

WSR 13-04-005
PERMANENT RULES
DEPARTMENT OF

SOCIAL AND HEALTH SERVICES

(Aging and Disability Services Administration)

[Filed January 24, 2013, 11:37 a.m., effective February 24, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: The division of developmental disabilities (DDD) is adopting new sections and amending others in chapter 388-845 WAC to comply with federal and state laws. These changes are required to maintain compliance with home and community based waiver programs for DDD that was approved by the Centers for Medicare and Medicaid Services (CMS). This also addresses obsolete language that is in conflict in all of the approved home and community based services (HCBS) waivers, clarify language to ensure that services are implemented and consistent with services contained in the approved HCBS waiver program, or to update language that is no longer in compliance with federal and state laws. These changes ensure the division is in compliance with the HCBS waiver program and to ensure the division can continue to collect federal financial match for the receipt of services.

Citation of Existing Rules Affected by this Order: Amending WAC 388-845-0005, 388-845-0010, 388-845-0030, 388-845-0045, 388-845-0050, 388-845-0060, 388-845-0070, 388-845-0105, 388-845-0310, 388-845-0400, 388-845-0405, 388-845-0410, 388-845-0500, 388-845-0501, 388-845-0510, 388-845-0750, 388-845-0900, 388-845-1100, 388-845-1155, 388-845-1160, 388-845-1310, 388-845-1600, 388-845-1605, 388-845-1610, 388-845-1615, 388-845-1620, 388-845-1710, 388-845-1800, 388-845-1900, 388-845-1910, 388-845-2000, 388-845-2200, 388-845-3000, 388-845-3055, 388-845-3056, 388-845-3060, 388-845-3061, 388-845-3062, 388-845-3065, 388-845-3070, 388-845-3075, 388-845-3080, 388-845-3085, 388-845-4000, and 388-845-4005.

Statutory Authority for Adoption: RCW 71A.12.030, 74.08.090.

Other Authority: SSB 6384, RCW 71A.12.030, 74.08.-090.

Adopted under notice filed as WSR 12-17-036 on August 7, 2012.

Changes Other than Editing from Proposed to Adopted Version: The department has removed some of the sections that were originally proposed. Those sections are not being permanently adopted at this time. The sections that are being permanently adopted have not changed since being proposed under WSR 12-17-036.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 45, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 2, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 2, Amended 45, Repealed 0.

Date Adopted: January 22, 2013.

Katherine I. Vasquez
 Rules Coordinator

Reviser's note: The material contained in this filing exceeded the page-count limitations of WAC 1-21-040 for appearance in this issue of the Register. It will appear in the 13-05 issue of the Register.

WSR 13-04-007

PERMANENT RULES

DEPARTMENT OF LICENSING

[Filed January 24, 2013, 12:21 p.m., effective February 24, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: To incorporate statutory changes made by SHB 2312 which passed the 2012 legislature.

- Adopts fees to be charged for military service award emblems to offset the costs of production and administration of the program.
- Provides clarity in the cost of fees for military service award emblems.
- Makes additional military service award emblems available.

Citation of Existing Rules Affected by this Order: Amending WAC 308-96A-530 Veteran remembrance license plate emblems.

Statutory Authority for Adoption: RCW 46.01.110 and 46.16A.251.

Adopted under notice filed as WSR 13-01-065 on December 18, 2012.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 1, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 0, Repealed 0.

Date Adopted: January 24, 2013.

Damon Monroe
 Rules Coordinator

AMENDATORY SECTION (Amending WSR 06-21-026, filed 10/9/06, effective 11/9/06)

WAC 308-96A-530 Veterans remembrance and military service award license plate emblems. (1) What (vet-

~~eran remembrance~~) license plate emblems are available? The following ~~((veteran remembrance))~~ license plate emblems are available:

(a) ~~((Veteran))~~ Veteran's remembrance ~~((vehicle license plate))~~ emblems with the words "~~((U.S. VETERAN))~~" ~~(referred to as veteran emblem);~~

~~(b) The United States flag waving on a staff without wording (referred to as the flag emblem); and~~

~~(c) Campaign medal emblem authorized in RCW 46.16.319(3))~~ U.S. veteran":

(b) Military service award emblems in RCW 46.18.295;

(c) Distinguished Flying Cross.

(2) **Who may purchase ~~((veteran remembrance))~~ license plate emblems?** Only persons qualified under RCW ~~((46.16.319))~~ 46.18.295 may purchase ~~((veteran remembrance))~~ license plate emblems.

(3) **What will I receive when I purchase ~~((veteran remembrance))~~ license plate emblems?** In addition to a receipt, you will receive an emblem package including: ~~((a))~~ One U.S. veteran emblem(~~(;~~

~~(b) One U.S. flag and campaign ribbon emblem; or~~

~~(c) Two campaign ribbon emblems; or~~

~~(d) Two~~) military service award emblem, or Distinguished Flying Cross emblem; and any two of the following:

(a) Campaign ribbon remembrance emblem.

(b) U.S. flag emblem(~~(;~~

(4) **What campaign ribbon remembrance emblems or military service award emblems are available ~~((for purchase))~~?** In addition to those in RCW 46.18.295, the following emblems are available:

(a) Afghanistan Campaign Medal.

~~(b) ((American Campaign Medal WWII.~~

~~(c) Armed Forces Expedition Medal.~~

~~(d))~~ Armed Forces Services Medal.

~~((e) Asiatic-Pacifie Campaign Medal WWII.~~

~~(f) European African Middle Eastern Campaign Medal WWII.~~

~~(g))~~ (c) Iraq Campaign Medal.

~~((h))~~ (d) Korean Defense Medal.

~~((i) Korean Service Medal.~~

~~(j))~~ (e) Kosovo Campaign Medal.

~~((k))~~ (f) Merchant Marines Atlantic War Zone Medal.

~~((l))~~ (g) Merchant Marines Middle East War Zone Medal.

~~((m))~~ (h) Merchant Marines Pacific War Zone Medal.

~~((n))~~ (i) National Defense Medal.

~~((o) South Asia Service Medal.~~

~~(p) U.S. Flag decal.~~

~~(q) U.S. Veteran decal.~~

~~(r) Vietnam Service Medal.~~

~~(s))~~ (j) War on Terrorism Expeditionary Medal.

~~((t))~~ (k) War on Terrorism Service Medal.

~~((u) World War I Victory Medal.)~~

(5) **How much do ~~((veteran remembrance))~~ license plate emblem packages cost?** ~~((Veteran remembrance))~~ License plate emblem packages cost ten dollars per package, in addition to fees authorized in RCW ~~((46.01.140 (5)(b)))~~ 46.17.040(2).

(6) **How do I display my license plate emblems?** In addition to the requirements and limitations in RCW ~~((46.16.327))~~ 46.16A.210:

(a) When the ~~((VETERAN))~~ veteran emblem, military service award emblem, or Distinguished Flying Cross emblem is displayed on a license plate, it must be displayed between the bottom license plate bolt holes;

(b) ~~((The FLAG))~~ U.S. flags and emblems described in subsection (4) of this section must be displayed ~~((to the left of the bottom left license plate bolt hole. When two FLAG emblems are displayed, one is displayed))~~ on the outside of each bottom license plate bolt hole. No more than two ~~((FLAG))~~ flags or small emblems may be affixed to any one license plate;

(c) ~~((The CAMPAIGN emblem must be displayed to the right of the bottom right license plate bolt hole. When two CAMPAIGN emblems are displayed, one is displayed on the outside of each bottom license plate bolt hole. No more than two CAMPAIGN emblems may be affixed to any one license plate;~~

~~(d))~~ For two-plated vehicles, you may display the emblems on either the front or rear license plate~~((; or)).~~ You may buy a second package if you want to display emblems on both license plates.

Note: When a license plate displaying veteran's remembrance emblems is transferred to a new owner, the emblems must be removed.

(7) **Do the ~~((veteran remembrance))~~ license plate emblems on my front license plate have to match the emblems on the rear license plate?** No, emblems displayed on the front license plate do not need to match emblems displayed on the rear license plate.

(8) **May I obtain a replacement or additional ~~((veteran remembrance))~~ license plate emblem package?** Yes:

(a) If you choose to purchase an additional set, you will be charged the fee in subsection ~~((4))~~ (5) of this section; or

(b) When the original emblems become faded or unrecognizable, you may obtain a replacement set at no fee; or

(c) When the license plates are replaced as required by the mandatory plate replacement law, you may obtain a replacement set ~~((will be provided))~~ at no fee.

WSR 13-04-011

PERMANENT RULES

BOARD OF ACCOUNTANCY

[Filed January 25, 2013, 9:11 a.m., effective February 25, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: To correct an error in subsection (3) and to clarify that licensees who prepare federal income tax returns in accordance with Internal Revenue Service rules do not violate client confidentiality.

Citation of Existing Rules Affected by this Order: Amending WAC 4-30-050 What are the requirements concerning records and clients confidential information?

Statutory Authority for Adoption: RCW 18.04.055(2), 18.04.405(1).

Adopted under notice filed as WSR 12-23-068 on November 20, 2012.

Changes Other than Editing from Proposed to Adopted Version: The board added the word "also" as the third word of the new language added to subsection (3). This provides clarity that the application of this new subsection is in addition to the confidentiality requirements of the rule prior to amendment.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 1, Repealed 0; Federal Rules or Standards: New 0, Amended 1, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 1, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 1, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 1, Repealed 0.

Date Adopted: January 22, 2013.

Richard C. Sweeney, CPA
Executive Director

AMENDATORY SECTION (Amending WSR 11-06-062, filed 3/2/11, effective 4/2/11)

WAC 4-30-050 What are the requirements concerning records and clients confidential information? (1) **Client:** The term "client" as used throughout WAC 4-30-050 and 4-30-051 includes former and current clients. For purposes of this section, a client relationship has been formed when confidential information has been disclosed by a prospective client in an initial interview to obtain or provide professional services.

(2) **Sale or transfer of client records:** No statement, record, schedule, working paper, or memorandum, including electronic records, may be sold, transferred, or bequeathed without the consent of the client or his or her personal representative or assignee, to anyone other than one or more surviving partners, shareholders, or new partners or new shareholders of the licensee, partnership, limited liability company, or corporation, or any combined or merged partnership, limited liability company, or corporation, or successor in interest.

(3) **Confidential client communication or information:** Licensees, CPA-Inactive certificate holders, nonlicensee firm owners and employees of such persons must not without the specific consent of the client or the heirs, successors, or authorized representatives (~~(or employee)~~) of the client disclose any confidential communication or information pertaining to the client obtained in the course of performing professional services.

This rule also applies to confidential communications and information obtained in the course of professional tax compliance services unless state or federal tax laws or regu-

lations require or permit use or disclosure of such information.

Consents may include those requirements of Treasury Circular 230 and IRC Sec. 7216 for purposes of this rule, provided the intended recipients are specifically and fully identified by full name, address, and other unique identifiers.

(4) This rule does not:

(a) Affect in any way the obligation of those persons to comply with a lawfully issued subpoena or summons;

(b) Prohibit disclosures in the course of a quality review of a licensee's attest, compilation, or other reporting services governed by professional standards;

(c) Preclude those persons from responding to any inquiry made by the board or any investigative or disciplinary body established by local, state, or federal law or recognized by the board as a professional association; or

(d) Preclude a review of client information in conjunction with a prospective purchase, sale, or merger of all or part of the professional practice of public accounting of any such persons.

WSR 13-04-053

PERMANENT RULES

BUILDING CODE COUNCIL

[Filed February 1, 2013, 11:02 a.m., effective July 1, 2013]

Effective Date of Rule: July 1, 2013.

Purpose: Adoption and amendment of the 2012 International Mechanical Code, chapter 51-52 WAC. This also includes adoption and amendment of the 2012 International Fuel Gas Code, the 2012 Edition of the National Fuel Gas Code (NFPA 54), and the 2011 Edition of the Liquefied Petroleum Gas Code (NFPA 58) as noted in WAC 51-52-0101 and 51-52-21101.

Citation of Existing Rules Affected by this Order: Amending WAC 51-52-003, 51-52-004, 51-52-008, 51-52-0101, 51-52-0202, 51-52-0306, 51-52-0403, 51-52-0404, 51-52-0501, 51-52-0504, 51-52-0505, 51-52-0506, 51-52-0507, 51-52-0601, 51-52-1000, 51-52-1500, and 51-52-21101.

Statutory Authority for Adoption: RCW 19.27.031 and 19.27.074.

Other Authority: Chapters 19.27 and 34.05 RCW.

Adopted under notice filed as WSR 12-16-083 on July 31, 2012.

Changes Other than Editing from Proposed to Adopted Version: 1. WAC 51-52-0403, Table 403.3: Based on testimony received, the outdoor airflow rate under "Private dwellings, single and multiple," "living areas" was changed to reference the whole house ventilation requirements in Tables 403.8.1 and 403.8.5.1 and coordinate with that section.

2. WAC 51-52-0403, Section 403.8.2: The control requirements in item 5.5 of this section were adjusted to coordinate with the requirements in Section 403.8.5.1 to specify operation at a minimum of one out of every four hours.

3. WAC 51-52-0403, Section 403.8.5.2: The exception was moved from Item 6 to Item 7 of this section. Testimony received indicated the exception was appearing in the wrong location.

4. WAC 51-52-0403, Section 928.1: It was pointed out at the public hearing that Items 4 and 5 of this section had been erroneously combined. The list has been corrected.

5. WAC 51-52-1000, Chapter 10: Based on concerns voiced during public testimony, an informational note was added to the beginning of Chapter 10 to clarify that boilers and pressure vessels must meet labor and industry regulations. In addition, Exception 7 of 1001.1 was modified to indicate that, in addition to other state and federal requirements, any local inspection programs would take precedence over this code.

6. Under the proposed rule, amendments to the 2012 International Fuel Gas Code were erroneously placed into the WAC sections for the National Fuel Gas Code and LP Gas Code. WAC 51-52-22004 and 51-52-22006 were renumbered to be included in the International Fuel Gas Code section, as WAC 51-52-21401 and 51-52-21601.

7. Under the proposed rule, the amendment of piping identification appeared as WAC 51-52-0303, under the section title Equipment and Appliance Location. Testimony was received that this location was erroneous and should actually be placed in Section 301. The section was moved to WAC 51-52-0301, under section title General.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 7, Amended 17, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 7, Amended 17, Repealed 0.

Date Adopted: November 9, 2012.

C. Ray Allshouse
Council Chair

Chapter 51-52 WAC

STATE BUILDING CODE ADOPTION AND AMENDMENT OF THE ((2009)) 2012 EDITION OF THE INTERNATIONAL MECHANICAL CODE

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-003 International Mechanical Code. The ((2009)) 2012 edition of the *International Mechanical Code* published by the International Code Conference is hereby adopted by reference with the exceptions noted in this chapter of the Washington Administrative Code (WAC).

AMENDATORY SECTION (Amending WSR 04-01-104, filed 12/17/03, effective 7/1/04)

WAC 51-52-004 Conflict between International Mechanical Code and State Energy Code chapter 51-11C WAC. In the case of conflict between the duct sealing or insulation requirements of Section 603 or Section 604 of this code and the duct sealing or insulation requirements of chapter 51-11C WAC, the Washington State Energy Code, or where applicable, a local jurisdiction's energy code, the provisions of such energy codes shall govern.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-008 Implementation. The International Mechanical Code adopted by chapter 51-52 WAC shall become effective in all counties and cities of this state on July 1, ((2010)) 2013.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0101 Section 101—General.

101.2 Scope. This code shall regulate the design, installation, maintenance, alteration and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions and related processes within buildings. This code shall also regulate those mechanical systems, system components, equipment and appliances specifically addressed herein. The installation of fuel gas distribution piping and equipment, fuel gas-fired appliances and fuel gas-fired appliance venting systems shall be regulated by the *International Fuel Gas Code*.

EXCEPTIONS:

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *International Residential Code*.
2. The standards for liquefied petroleum gas installations shall be the ((2008)) 2011 Edition of NFPA 58 (Liquefied Petroleum Gas Code) and the ((2009)) 2012 Edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code).

NEW SECTION

WAC 51-52-0102 Section 102—Applicability.

102.4 Additions, alterations or repairs. Additions, alterations, renovations or repairs to a mechanical system shall conform to that required for a new mechanical system without requiring the existing mechanical system to comply with all of the requirements of this code. Additions, alterations or repairs shall not cause an existing mechanical system to become unsafe, hazardous or overloaded.

Minor additions, alterations, renovations and repairs to existing mechanical systems shall meet the provisions for new construction, unless such work is done in the same manner and arrangement as was in the existing system, is not hazardous and is *approved*.

EXCEPTION: Additions, alterations, renovations or repairs to a mechanical system that is part of a building addition

with less than 500 square feet of conditioned floor area are exempt from the requirements for whole house ventilation systems, Section 403.8.5.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0202 Section 202—General definitions.

~~((SOURCE SPECIFIC VENTILATION. A mechanical ventilation system including all fans, controls, and ducting, which is dedicated to exhausting contaminant-laden air to the exterior of the building from the room or space in which the contaminant is generated.~~

~~UNUSUALLY TIGHT CONSTRUCTION. Construction meeting the following requirements:~~

~~1. Walls exposed to the outdoor atmosphere having a continuous water vapor retarder with a rating of 1 perm (57 ng/s·m²·Pa) or less with openings gasketed or sealed; and~~

~~2. Operable windows and doors meeting the air leakage requirements of the *International Energy Conservation Code*, Section 502.1.4; and~~

~~3. Caulking or sealants are applied to areas such as joints around window and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at penetrations for plumbing, electrical and gas lines, and at other openings; or~~

~~4. Buildings built in compliance with the 1986 or later editions of the Washington State Energy Code, chapter 51-11 WAC, Northwest Energy Code, or Super Good Cents weatherization standards or equivalent.)~~ **LOCAL EXHAUST.** An exhaust system that uses one or more fans to exhaust air from a specific room or rooms within a dwelling.

WHOLE HOUSE VENTILATION SYSTEM. A mechanical ventilation system, including fans, controls, and ducts, which replaces, by direct or indirect means, air from the habitable rooms with *outdoor air*.

NEW SECTION

WAC 51-52-0301 Section 301—General.

301.3 Identification. Each length of pipe and tubing and each pipe fitting utilized in a mechanical system shall bear the identification of the manufacturer.

EXCEPTION: The manufacturer identification for fittings and pipe nipples shall be on each piece or shall be printed on the fitting or nipple packaging or provided documentation.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0306 Section 306—Access and service space.

306.5 Equipment and appliances on roofs or elevated structures. Where equipment requiring access (~~and~~) or appliances are (~~installed on roofs or elevated structures at a height exceeding~~) located on an elevated structure or the roof of a building such that personnel will have to climb higher than 16 feet (4877 mm) above grade to access such

equipment or appliances, (such access shall be provided by a permanent approved means of access, the extent of which shall be from grade or floor level to the equipment and appliances' level service space) an interior or exterior means of access shall be provided. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) (~~high~~) in height or walking on roofs having a slope greater than 4 units vertical in 12 units horizontal (33 percent slope). Such access shall not require the use of portable ladders. Where access involves climbing over parapet walls, the height shall be measured to the top of the parapet wall.

Permanent ladders installed to provide the required access shall comply with the following minimum design criteria:

1. The side railing shall extend above the parapet or roof edge not less than 42 inches (1067 mm).

2. Ladders shall have rung spacing not to exceed 12 inches (305 mm) on center. The uppermost rung shall be a maximum of 24 inches below the upper edge of the roof hatch, roof or parapet, as applicable.

3. Ladders shall have a toe spacing not less than 7 inches (178 mm) deep.

4. There shall be a minimum of 18 inches (457 mm) between rails.

5. Rungs shall have a minimum 0.75-inch (19 mm) diameter and be capable of withstanding a 300-pound (136.1 kg) load.

6. Ladders over 30 feet (9144 mm) in height shall be provided with offset sections and landings capable of withstanding 100 pounds (488.2 kg/m²) per square foot. Landing dimensions shall be not less than 18 inches and not less than the width of the ladder served. A guardrail shall be provided on all open sides of the landing.

7. Climbing clearances. The distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be a minimum of 30 inches measured perpendicular to the rungs. This distance shall be maintained from the point of ladder access to the bottom of the roof hatch. A minimum clear width of 15 inches shall be provided on both sides of the ladder measured from the midpoint of and parallel with the rungs except where cages or wells are installed.

8. Landing required. The ladder shall be provided with a clear and unobstructed bottom landing area having a minimum dimension of 30 inches by 30 inches centered in front of the ladder.

9. Ladders shall be protected against corrosion by approved means.

10. Access to ladders shall be provided at all times.

Catwalks installed to provide the required access shall be not less than 24 inches (610 mm) wide and shall have railings as required for service platforms.

EXCEPTION: This section shall not apply to Group R-3 occupancies.

NEW SECTION**WAC 51-52-0307 Section 307—Condensate disposal.**

307.2.3 Auxiliary and secondary drain systems. In addition to the requirements of Section 307.2.1, where damage to any building components could occur as a result of overflow from the *equipment* primary condensate removal system, one of the following auxiliary protection methods shall be provided for each cooling coil or fuel-fired *appliance* that produces condensate:

1. An auxiliary drain pan with a separate drain shall be provided under the coils on which condensation will occur. The auxiliary pan drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The pan shall have a minimum depth of 1 1/2 inches (38 mm), shall not be less than 3 inches (76 mm) larger than the unit or the coil dimensions in width and length and shall be constructed of corrosion-resistant material. Galvanized sheet steel pans shall have a minimum thickness of not less than 0.0236 inch (0.6010 mm) (No. 24 gage). Non-metallic pans shall have a minimum thickness of not less than 0.0625 inch (1.6 mm).

2. A separate overflow drain line shall be connected to the drain pan provided with the *equipment*. Such overflow drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.

3. An auxiliary drain pan without a separate drain line shall be provided under the coils on which condensate will occur. Such pan shall be equipped with a water-level detection device conforming to UL 508 that will shut off the *equipment* served prior to overflow of the pan. The auxiliary drain pan shall be constructed in accordance with Item 1 of this section.

4. A water-level detection device conforming to UL 508 shall be provided that will shut off the *equipment* served in the event that the primary drain is blocked. The device shall be installed in the primary drain line, the overflow drain line, or in the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.

EXCEPTIONS:

1. Fuel-fired appliances that automatically shut down operation in the event of a stoppage in the condensate drainage system.
2. Uducted fan coil units where there is no factory option available for water-level detection devices and which are installed directly within the occupied space.

AMENDATORY SECTION (Amending WSR 12-07-020, filed 3/12/12, effective 4/12/12)

WAC 51-52-0403 Section 403—Mechanical ventilation.

403.2 Outdoor air required. The minimum ventilation rate of *outdoor air* shall be determined in accordance with Section 403.3.

EXCEPTIONS:

1. Where the registered design professional demonstrates that an engineered ventilation system design will prevent the maximum concentration of contaminants from exceeding that obtainable by the rate of

outdoor air ventilation determined in accordance with Section 403.3, the minimum required rate of *outdoor air* shall be reduced in accordance with such engineered system design.

2. Alternate systems designed in accordance with ASHRAE Standard 62.1 Section 6.2, Ventilation Rate Procedure, shall be permitted.

403.2.1 Recirculation of air. The air required by Section 403.3 shall not be recirculated. Air in excess of that required by Section 403.3 shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:

1. Ventilation air shall not be recirculated from one dwelling to another or to dissimilar occupancies.

2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where 10 percent or more of the resulting supply air-stream consists of air recirculated from these spaces.

3. Where mechanical exhaust is required by Note b in Table 403.3, recirculation of air from such spaces shall be prohibited. All air supplied to such spaces shall be exhausted, including any air in excess of that required by Table 403.3.

(Item 4 is not adopted.)

403.3 Outdoor airflow rate. Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate determined in accordance with this section. The occupant load utilized for design of the ventilation system shall not be less than the number determined from the estimated maximum occupant load rate indicated in Table 403.3. Ventilation rates for occupancies not represented in Table 403.3 shall be those for a listed occupancy classification that is most similar in terms of occupant density, activities and building construction; or shall be determined by an approved engineering analysis. The ventilation system shall be designed to supply the required rate of ventilation air continuously during the period the building is occupied, except as otherwise stated in other provisions of the code.

With the exception of smoking lounges, the ventilation rates in Table 403.3 are based on the absence of smoking in occupiable spaces. Where smoking is anticipated in a space other than a smoking lounge, the ventilation system serving the space shall be designed to provide ventilation over and above that required by Table 403.3 in accordance with accepted engineering practice.

EXCEPTION:

Where occupancy density is known and documented in the plans, the outside air rate may be based on the design occupant density. Under no circumstance shall the occupancies used result in outside air less than one-half that resulting from application of Table 403.3 estimated maximum occupancy rates.

Table 403.3
REQUIRED OUTDOOR VENTILATION AIR

(Occupancy Classification	People Outdoor Airflow Rate in Breathing Zone cfm/Person	Area Outdoor Airflow Rate in Breathing Zone R_p cfm/ft²	Default Occupant Density #/1000 ft³	Exhaust Airflow Rate cfm/ft²
Correctional facilities				
Cells				
without plumbing fixtures	5	0.12	25	—
with plumbing fixtures	5	0.12	25	1.0
Dining halls (see food and beverage service)	—	—	—	—
Guard stations	5	0.06	15	—
Day room	5	0.06	30	—
Booking/waiting	7.5	0.06	50	—
Dry cleaners, laundries				
Coin-operated dry cleaner	15	—	20	—
Coin-operated laundries	7.5	0.06	20	—
Commercial dry cleaner	30	—	30	—
Commercial laundry	25	—	10	—
Storage, pick up	7.5	0.12	30	—
Education				
Art classroom	10	0.18	20	0.7
Auditoriums	5	0.06	150	—
Classrooms (ages 5-8)	10	0.12	25	—
Classrooms (ages 9 plus)	10	0.12	35	—
Computer lab	10	0.12	25	—
Corridors (see public spaces)	—	—	—	—
Day care (through age 4)	10	0.18	25	—
Lecture classroom	7.5	0.06	65	—
Lecture hall (fixed seats)	7.5	0.06	150	—
Locker/dressing room	—	—	—	0.25
Media center	10	0.12	25	—
Multiuse assembly	7.5	0.06	100	—
Music/theater/dance	10	0.06	35	—
Science laboratories	10	0.18	25	1.0
Smoking lounges ^b	60	—	70	—
Sports locker rooms	—	—	—	0.5
Wood/metal shops	10	0.18	20	0.5
Food and beverage service				
Bars, cocktail lounges	7.5	0.18	100	—
Cafeteria, fast food	7.5	0.18	100	—
Dining rooms	7.5	0.18	70	—
Kitchens (cooking) ^b	—	—	—	0.7
Hospitals, nursing and convalescent homes				
Autopsy rooms ^b	—	—	—	0.5
Medical procedure rooms	15	—	20	—
Operating rooms	30	—	20	—
Patient rooms	25	—	10	—
Physical therapy	15	—	20	—
Recovery and ICU	15	—	20	—
Hotels, motels, resorts and dormitories				
Multipurpose assembly	5	0.06	120	—
Bathrooms/toilet—private	—	—	—	25/50 ^f
Bedroom/living room	5	0.06	10	—
Conference/meeting	5	0.06	50	—

(Occupancy Classification	People Outdoor Airflow Rate in Breathing Zone cfm/Person	Area Outdoor Airflow Rate in Breathing Zone R_a cfm/ft^{2a}	Default Occupant Density #/1000 ft^{2a}	Exhaust Airflow Rate cfm/ft²
Dormitory sleeping areas	5	0.06	20	—
Gambling casinos	7.5	0.18	120	—
Kitchens	—	—	—	25/100 ^f
Lobbies/prefunction	7.5	0.06	30	—
Offices				
Conference rooms	5	0.06	50	—
Office spaces	5	0.06	5	—
Reception areas	60	0.06	30	—
Telephone/data entry	5	0.06	60	—
Main entry lobbies	5	0.06	10	—
Private dwellings, single and multiple				
Garages, common for multiple units ^b	—	—	—	0.75
Garages, separate for each dwelling ^b	—	—	—	100 cfm per car
Kitchens ^b	—	—	—	25/100 ^f
Living areas ^e	See Tables 403.8.5.1 and 403.8.5.2	—	Based on the number of bedrooms. First bedroom: 2; each additional bedroom, 1	—
Toilet rooms, bathrooms and laundry areas ^f	—	—	—	20/50 ^f
Public spaces				
Corridors	—	0.06	—	—
Elevator car	—	—	—	1.0
Shower room (per shower head)	—	—	—	50/20 ^f
Smoking lounges ^b	60	—	70	—
Toilet rooms – public	—	—	—	50/70 ^e
Places of religious worship	5	0.06	120	—
Courtrooms	5	0.06	70	—
Legislative chambers	5	0.06	50	—
Libraries	5	0.12	10	—
Museums (children's)	7.5	0.12	40	—
Museums/galleries	7.5	0.06	40	—
Retail stores, sales floors and showroom floors				
Sales (except as below)	7.5	0.12	15	—
Dressing rooms	—	—	—	0.25
Mall common areas	7.5	0.06	40	—
Shipping and receiving	—	0.12	—	—
Smoking lounges ^b	60	—	70	—
Storage rooms	—	0.12	—	—
Warehouses (see storage)	—	—	—	—
Specialty shops				
Automotive motor-fuel dispensing stations ^b	—	—	—	1.5
Barber	7.5	0.06	25	0.5
Beauty and nail salons ^{b,h}	20	0.12	25	0.6
Embalmng room ^b	—	—	—	2.0
Pet shops (animal areas) ^b	7.5	0.18	10	0.9
Supermarkets	7.5	0.06	8	—
Sports and amusement				
Disco/dance floors	20	0.06	100	—
Bowling alleys (seating areas)	10	0.12	40	—

(Occupancy Classification	People Outdoor Airflow Rate in Breathing Zone cfm/Person	Area Outdoor Airflow Rate in Breathing Zone R_p cfm/ft^{2a}	Default Occupant Density #/1000 ft^{2a}	Exhaust Airflow Rate cfm/ft²
Game arcades	7.5	0.18	20	—
Ice arenas, without combustion engines	—	0.30	—	0.5
Gym, stadium arena (play area)	—	0.30	—	—
Spectator areas	7.5	0.06	150	—
Swimming pools (pool and deck area)	—	0.48	—	—
Health club/aerobics room	20	0.06	40	—
Health club/weight room	20	0.06	10	—
Storage				
Repair garages, enclosed parking garage ^{b,d}	—	—	—	0.75
Warehouses	—	0.06	—	—
Theaters				
Auditoriums (see education)	—	—	—	—
Lobbies	5	0.06	150	—
Stages, studios	10	0.06	70	—
Ticket booths	5	0.06	60	—
Transportation				
Platforms	7.5	0.06	100	—
Transportation waiting	7.5	0.06	100	—
Workrooms				
Bank vaults/safe deposit	5	0.06	5	—
Darkrooms	—	—	—	1.0
Copy, printing rooms	5	0.06	4	0.5
Meat processing ^e	15	—	10	—
Pharmacy (prep area)	5	0.18	10	—
Photo studios	5	0.12	10	—
Computer (without printing)	5	0.06	4	—))

Occupancy Classification	Occupant Density #/1000 ft^{2a}	People Outdoor Airflow Rate in Breathing Zone R_p cfm/Person	Area Outdoor Airflow Rate in Breathing Zone R_a cfm/ft^{2a}	Exhaust Airflow Rate cfm/ft²
Offices				
Conference rooms	50	5	0.06	—
Kitchenettes	—	—	—	0.30
Office spaces	5	5	0.06	—
Reception areas	30	5	0.06	—
Telephone/data entry	60	5	0.06	—
Main entry lobbies	10	5	0.06	—
Private dwellings, single and multiple				
Garages, common for multiple units ^b	—	—	—	0.75
Garages, separate for each dwelling ^b	—	—	—	100 cfm per car
Kitchens ^b	—	—	—	25/100 ^f
Living areas ^c	Based on the number of bedrooms. First bedroom, 2; each additional bedroom, 1	See Tables 403.8.1 and 403.8.5.1	—	—
Toilet rooms, bathrooms and laundry areas ^{g,i}	—	—	—	20/50 ^f
Sports and amusement				
Disco/dance floors	100	20	0.06	—
Bowling alleys (seating areas)	40	10	0.12	—

<u>Occupancy Classification</u>	<u>Occupant Density #/1000 ft^{2a}</u>	<u>People Outdoor Airflow Rate in Breathing Zone R_p cfm/Person</u>	<u>Area Outdoor Airflow Rate in Breathing Zone R_a cfm/ft^{2a}</u>	<u>Exhaust Airflow Rate cfm/ft²</u>
Game arcades	20	7.5	0.18	=
Ice arenas, without combustion engines ^l	=	=	0.30	0.5
Gym, stadium, arena (play area) ^l	=	=	0.30	=
Spectator areas	150	7.5	0.06	=
Swimming pools (pool and deck area)	=	=	0.48	=
Health club/aerobics room	40	20	0.06	=
Health club/weight room	10	20	0.06	=
Storage				
Janitor closets, trash rooms, recycling rooms	=	=	=	1.0
Repair garages, enclosed parking garage ^{b,d}	=	=	=	0.75
Storage rooms, chemical	=	=	=	1.5
Warehouses	=	=	0.06	=

For SI: 1 cubic foot per minute = 0.0004719 m³/s, 1 ton = 908 kg, 1 cubic foot per minutes per square foot = 0.00508 m³/(s•m²), °C = [(°F) -32]/1.8, 1 square foot = 0.0929 m².

- a. Based upon *net occupiable floor area*.
- b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited (see Section 403.2.1, Item 3).
- c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.
- d. Ventilation systems in enclosed parking garages shall comply with Section 404.
- e. Rates are per water closet or urinal. The higher rate shall be provided where ((periods of heavy use are expected to occur, such as toilets in theaters, schools and sports facilities)) the exhaust system is designed to operate intermittently. The lower rate shall be permitted ((where periods of heavy use are not expected-)) only where the exhaust system is designed to operate continuously while occupied.
- f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously ((during normal hours of use)) while occupied.
- g. ((Reserved-)) Mechanical exhaust is required and recirculation is prohibited.
- h. For nail salons, ((the required exhaust shall include ventilation tables or other systems that capture the contaminants and odors at their source and are capable of exhausting a minimum of))

each nail station shall be provided with a source capture system capable of exhausting not less than 50 cfm per station.

- i. A laundry area within a kitchen or bathroom is not required to have ((source specific)) local exhaust. For the laundry area to qualify as being within the kitchen, the laundry room door must open directly into the kitchen and not into an adjacent corridor. Where there are doors that separate the laundry area from the kitchen or bathroom the door shall be louvered.
- j. When combustion equipment is intended to be used on the playing surface, additional dilution ventilation and/or source control shall be provided.

403.8 Ventilation systems for Group R occupancies. Each dwelling unit or ((guest room)) sleeping unit shall be equipped with ((source specific)) local exhaust and whole house ventilation systems and shall comply with Sections 403.8.1 through 403.8.11. All public corridors and other than Group R occupied spaces that support the Group R occupancy shall meet the ventilation requirements of Section 402 or Sections 403.1 to 403.7.

403.8.1 Minimum ventilation performance. Ventilation systems shall be designed and installed to satisfy the ventilation requirements of Table 403.3 or Table 403.8.1. Breathing zone ventilation rates from Table 403.3 shall be calculated per Section 403.3.1.1 and corrected per zone air distribution effectiveness requirements per Section 403.3.1.2.

Table 403.8.1
VENTILATION RATES FOR ALL GROUP R PRIVATE DWELLINGS, SINGLE AND MULTIPLE
(CONTINUOUSLY OPERATING SYSTEMS)

Floor Area (ft ²)	Bedrooms ¹				
	0-1	2-3	4-5	6-7	>7
<1500	30	45	60	75	90
1501 - 3000	45	60	75	90	105
3001 - 4500	60	75	90	105	120
4501 - 6000	75	90	105	120	135
6001 - 7500	90	105	120	135	150
>7500	105	120	135	150	165

¹Ventilation rates in table are minimum outdoor airflow rates measured in cfm.

403.8.2 Control and operation.

1. Location of controls. Controls for all ventilation systems shall be readily accessible by the occupant.

2. Instructions. Operating instructions for whole house ventilation systems shall be provided to the occupant by the installer of the system.

3. ~~((Source specific))~~ Local exhaust ventilation systems. ~~((Source specific))~~ Local exhaust ventilation systems shall be controlled by manual switches, dehumidistats, timers, or other approved means.

4. Continuous whole house ventilation systems. Continuous whole house ventilation systems shall operate continuously. Exhaust fans, forced-air system fans, or supply fans shall be equipped with "fan on" as override controls. Controls shall be capable of operating the ventilation system without energizing other energy-consuming appliances. A label shall be affixed to the controls that reads "Whole House Ventilation (see operating instructions)."

5. Intermittent whole house ventilation systems. Intermittent whole house ventilation systems shall comply with the following:

5.1 They shall be capable of operating intermittently and continuously.

5.2 They shall have controls capable of operating the exhaust fans, forced-air system fans, or supply fans without energizing other energy-consuming appliances.

5.3 The ventilation rate shall be adjusted according to the exception in Section 403.8.5.1.

5.4 The system shall be designed so that it can operate automatically based on the type of control timer installed.

5.5 The intermittent mechanical ventilation system shall operate at least one hour out of every ~~((twelve))~~ four.

5.6 The system shall have a manual control and automatic control, such as a 24-hour clock timer.

5.7 At the time of final inspection, the automatic control shall be set to operate the whole house fan according to the schedule used to calculate the whole house fan sizing.

5.8 A label shall be affixed to the control that reads "Whole House Ventilation (see operating instructions)."

EXCEPTION: Engineered central ventilation systems serving dwelling units or sleeping units are not required to have individual controls for each dwelling unit or sleeping unit when designed for continuous operation and approved by the code official.

403.8.3 Outdoor air intake locations. *Outdoor air* intakes shall be classified as either operable openings or mechanical air intakes and shall be located per the following criteria. The intake locations for operable openings and mechanical air intakes shall comply with the following:

1. Openings for mechanical air intakes shall comply with Section 401.4. Operable openings shall comply with Section 401.4 items 2 and 4 only.

2. Intake openings shall not be located closer than 10 feet from an appliance vent outlet unless such vent outlet is 3 feet above the *outdoor air* inlet. The vent shall be permitted to be closer if specifically allowed by Chapter 8 or by the International Fuel Gas Code.

3. Intake openings shall be located where they will not pick up objectionable odors, fumes, or flammable vapors.

4. Intake openings shall be located where they will not take air from a hazardous or unsanitary location.

5. Intake openings shall be located where they will not take air from a room or space having a fuel-burning appliances.

6. Intake openings shall not be located closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.

7. Intake openings shall not be located where they will take air from an attic, crawl space, or garage.

403.8.4 ~~((Source specific))~~ Local exhaust ventilation requirements. ~~((Source specific))~~ Local exhaust ventilation systems shall exhaust at least the volume of air required for exhaust in Table 403.3. Exhaust shall be provided in each kitchen, bathroom, water closet, laundry area, indoor swimming pool, spa, and other room where water vapor or cooking odor is produced.

403.8.4.1 ~~((Source specific))~~ Local exhaust systems. Exhaust systems shall be designed and installed to meet all of the criteria below:

1. ~~((Source specific))~~ Local exhaust shall be discharged outdoors.

2. Exhaust outlets shall comply with Section ~~((501.2))~~ 501.3.

3. Pressure equalization shall comply with Section ~~((501.3))~~ 501.4.

4. Exhaust ducts in systems which are designed to operate intermittently shall be equipped with back-draft dampers.

5. All exhaust ducts in unconditioned spaces shall be insulated to a minimum of R-4.

6. Terminal outlet elements shall have at least the equivalent net free area of the ductwork.

7. Terminal outlet elements shall be screened or otherwise protected as required by Section ~~((501.2.2))~~ 501.3.2.

8. Exhaust fans in separate dwelling units or ~~((guest rooms))~~ sleeping units shall not share common exhaust ducts unless the system is engineered for this operation.

9. Where permitted by Chapter 5, multiple ~~((source specific))~~ local exhaust ducts may be combined. If more than one of the exhaust fans in a dwelling unit or ~~((guest room))~~ sleeping unit shares a common exhaust duct then each exhaust fan shall be equipped with a back-draft damper to prevent the recirculation of exhaust air from one room to another room via the exhaust ducting system.

403.8.4.2 ~~((Source specific))~~ Local exhaust fans. Exhaust fan construction and sizing shall meet the following criteria.

1. Exhaust fans shall be tested and rated in accordance with the airflow and sound rating procedures of the Home Ventilating Institute (HVI 915, HVI Loudness Testing and Rating Procedure, HVI 916, HVI Airflow Test Procedure, and HVI 920, HVI Product Performance Certification Procedure).

EXCEPTION: Where a range hood or down draft exhaust fan is used for ~~((source specific))~~ local exhaust for a kitchen, the device is not required to be rated per these standards.

2. Installation of the system or equipment shall be carried out in accordance with manufacturers' installation instructions.

3. Fan airflow rating and duct system shall be designed and installed to deliver at least the exhaust airflow required by Table 403.3. The airflows required refer to the delivered airflow of the system as installed and tested using a flow hood, flow grid, or other airflow measurement device.

- EXCEPTIONS:
1. An exhaust airflow rating at a pressure of 0.25 in. w.g. may be used, provided the duct sizing meets the prescriptive requirements of Table 403.8.4.2.
 2. Where a range hood or down draft exhaust fan is used to satisfy the ((source-specific-ventilation)) local exhaust requirements for kitchens, the range hood or down draft exhaust shall not be less than 100 cfm at 0.10 in. w.g.

**TABLE 403.8.4.2
PRESCRIPTIVE EXHAUST DUCT SIZING**

Fan Tested cfm at 0.25 inches w.g.	Minimum Flex Diameter	Maximum Length in Feet	Minimum Smooth Diameter	Maximum Length in Feet	Maximum Elbows ¹
50	4 inches	25	4 inches	70	3
50	5 inches	90	5 inches	100	3
50	6 inches	No Limit	6 inches	No Limit	3
80	4 inches ²	NA	4 inches	20	3
80	5 inches	15	5 inches	100	3
80	6 inches	90	6 inches	No Limit	3
100	5 inches ²	NA	5 inches	50	3
100	6 inches	45	6 inches	No Limit	3
125	6 inches	15	6 inches	No Limit	3
125	7 inches	70	7 inches	No Limit	3

1. For each additional elbow, subtract 10 feet from length.
2. Flex ducts of this diameter are not permitted with fans of this size.

403.8.5 Whole house ventilation requirements. Each dwelling unit or ((guest room)) sleeping unit shall be equipped with one of the following four types of mechanical whole house ventilation systems: A system using exhaust fans (see Section 403.8.6); a system integrated with forced-air systems (see Section 403.8.7); a system using supply fans (see Section 403.8.8); or a heat or energy recovery ventilation system (see Section 403.8.9). The whole house exhaust system is permitted to be one of the local exhaust systems required by Section 403.8.4 as long as the requirements of this section, in addition to the requirements of Section 403.8.5, are met.

403.8.5.1 Outdoor air. *Outdoor air* shall be distributed to each habitable space.

Where *outdoor air* supply intakes are separated from exhaust vents by doors, means shall be provided to ensure airflow to all separated habitable spaces by installing distribution ducts, installed grilles, transoms, doors undercut to a minimum of 1/2-inch above the surface of the finish floor covering, or other similar means where permitted by the *International Building Code*.

The mechanical system shall operate continuously to supply at least the volume of *outdoor air* required in Table 403.3 or Table 403.8.1.

EXCEPTION: Intermittently operating ventilation systems: ((The mechanical system shall have controls for intermittent operation per Section 403.8.2 and shall supply at least the volume of outdoor air required for intermittent operation based on the combination of its delivered capacity (from Table 403.3 or Table 403.8.1), its ven-

tilation effectiveness (from Table 403.8.5.1) and its daily fractional operation time (from Table 403.8.5.1) using the formula:

$$Q_f = Q_r(\epsilon f)$$

Where:

- Q_f = outdoor air flow rate
- Q_r = ventilation air requirement (from Table 403.3 or 403.8.1)
- ε = ventilation effectiveness (from Table 403.8.5.1)
- f = fractional operation time (from Table 403.8.5.1))

The whole house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table 403.3 or Table 403.8.1 is multiplied by the factor determined in accordance with Table 403.8.5.1.

**TABLE 403.8.5.1
((VENTILATION EFFECTIVENESS FOR)) INTERMITTENT
((FANS)) WHOLE HOUSE MECHANICAL VENTILATION RATE
FACTORS^{a,b}**

((Daily Fractional Operation Time, f	Ventilation Effectiveness, ε
f ≤ 35%	0.33
35% ≤ f < 60%	0.50
60% ≤ f < 80%	0.75
80% ≤ f	1.0))

<u>RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT</u>	<u>25%</u>	<u>33%</u>	<u>50%</u>	<u>66%</u>	<u>75%</u>	<u>100%</u>
Factor ^a	<u>4</u>	<u>3</u>	<u>2</u>	<u>1.5</u>	<u>1.3</u>	<u>1.0</u>

^a For ventilation system run-time values between those given, the factors are permitted to be determined by interpolation.

^b Extrapolation beyond the table is prohibited.

403.8.5.2 Whole house supply system general requirements. Whole house ventilation systems integrated with a forced-air system, systems using supply fans and systems using a heat or energy recovery ventilation system shall comply with the following.

1. *Outdoor air* louvers shall be adequately sized for the required airflow and shall comply with Section 401.5. *Outdoor air* intake locations shall comply with mechanical air intakes requirements of Section 403.8.3.

2. *Outdoor air* ducts for dedicated or central supply systems and exhaust ducts for heat or energy recovery systems shall be provided with a means for balancing the system to the required airflow via balance dampers or other devices.

3. *Outdoor air* ducts(;-) for dedicated or central systems shall be provided with motorized dampers.

EXCEPTIONS: 1. *Outdoor air* ducts at heat or energy recovery ventilation systems are not required to have motorized dampers.
2. *Outdoor air* ducts at continuous ventilation systems are not required to have motorized dampers.

4. *Outdoor air* ducts in the conditioned space shall be insulated to a minimum of R-4. In heat or energy recovery ventilation systems, ducts upstream of the heat exchanger shall also be insulated to at least R-4.

5. All *outdoor air* ducts shall be designed and installed to deliver at least the outdoor airflow required by Section 403.8.5.1. The airflows required refer to the delivered airflow of the system as installed and tested using a flow hood, flow grid, or other airflow measurement device.

EXCEPTION: The *outdoor air* duct for supply fan systems and heat or energy recovery systems may be prescriptively sized per Table 403.8.5.2 for dedicated *outdoor air* ducts upstream of the supply fan. Supply fans shall have the capacity to provide the amount of *outdoor air* required by Section 403.8.5.1 at 0.40 in. w.g. as per HVI 916 (April 1995). When prescriptively sized the system shall be tested and balanced using a flow hood, flow-grid, or other airflow measurement device.

6. Whole house ventilation controls for (~~continuous and~~) intermittent operation shall (~~be provided at both~~) allow concurrent operation of the forced-air fan and the associated outdoor air motorized damper.

7. Whole house ventilation controls for continuous operation shall be provided at the forced-air fan.

EXCEPTION: Engineered central ventilation systems serving dwelling units or sleeping units are not required to have individual controls for each dwelling or sleeping unit when designed for continuous operation and approved by the code official.

**TABLE 403.8.5.2
PRESCRIPTIVE SUPPLY FAN DUCT SIZING**

Supply Fan Tested cfm at 0.40" w.g.		
Specified Volume from Table 408.1	Minimum Smooth Duct Diameter	Minimum Flexible Duct Diameter
50 - 90 cfm	4 inch	5 inch
90 - 150 cfm	5 inch	6 inch
150 - 250 cfm	6 inch	7 inch
250 - 400 cfm	7 inch	8 inch

403.8.6 Whole house ventilation with exhaust fan systems. This section establishes minimum requirements for mechanical whole house ventilation systems using exhaust fans.

403.8.6.1 Outdoor air. Exhaust fan only ventilation systems shall provide outdoor air to each occupiable space through one of the following methods:

1. *Outdoor air* may be drawn through air inlets installed in exterior walls or windows. (~~For interior spaces without openings to the outdoor, air inlets cannot be used unless a transfer fan is provided in compliance with Section 403.8.6.1 Item 3-.)~~ The air inlets shall comply with all of the following:

((a)) 1.1. Inlets shall have controllable, secure openings and shall be designed to not compromise the thermal properties of the building envelope.

((b)) 1.2. Inlets shall be accessible to occupants, including compliance with Section 1109.13 of the International Building Code for designated accessible units, Type A units and Type B units.

((c)) 1.3. Inlets shall be screened or otherwise protected from entry by insects, leaves, or other material.

((d)) 1.4. Inlets shall provide not less than 4 square inches of net free area of opening for each 10 cfm of *outdoor air* required in Table 403.3 or Table 403.8.1.

((e)) 1.5. Any inlet or combination of inlets which provide 10 cfm at 10 Pascals as determined by the Home Ventilation Institute Air Flow Test Standard (HVI 901 (November 1996)) are deemed equivalent to 4 square inches of net free area.

((f)) 1.6. Each occupiable space shall have a minimum of one air inlet that has a minimum of 4 square inches of net free area.

2. In high-rise buildings, *outdoor air* may be drawn in through operable windows, doors, louvers or other operable openings to the outdoors. Exterior spaces shall have a minimum openable area of 4 percent of the total floor area being ventilated. Doors exiting to a corridor, court or public way shall not be used to provide *outdoor air*. (~~For interior spaces without openings to the outdoors, the opening to the adjoining room shall be unobstructed and shall have an area of not less than 8 percent of the floor area of the interior room or space, but not less than 25 square feet.~~) The operable openings shall comply with the following:

((a)) 2.1. Openings shall be controllable, securable, and shall be designed to not compromise the thermal properties of the building envelope.

((b)) 2.2. Openings shall be accessible to occupants, including compliance with Section 1109.13 of the International Building Code for designated accessible units, Type A units and Type B units.

3. For interior adjoining spaces(;- in buildings with air inlets in accordance with Section 403.8.6.1 Item 1 or in high-rise building without operable openings in accordance with Section 403.8.6.1 Item 2 shall have a whole house transfer fan sized to provide a minimum of the ventilation rate required per Section 403.8.5.1. The transfer fan shall circulate air between the interior room or space and the adjacent habitable space. The transfer fan may operate continuously or intermittently using controls per Section 403.8.2)) without outdoor air openings, one of the following two options shall be used to ventilate the interior adjoining space:

3.1. Provide a whole house transfer fan at the interior adjoining space sized to provide a minimum of the ventilation rate required per Section 403.8.5.1. The transfer fan

shall circulate air between the interior room or space and the adjacent habitable space. The transfer fan may operate continuously or intermittently using controls per Section 403.8.2.

3.2. Provide a permanent opening to the interior adjoining space. Opening shall be unobstructed and shall have an area of not less than 8 percent of the floor area of the interior adjoining space, but not less than 25 square feet.

403.8.6.2 Outside air intake locations. All *outside air* intake opening types described in Section 403.8.6.1 shall be classified operable openings and shall not be classified as mechanical air intakes. The intake locations shall comply with Section 403.8.3.

403.8.6.3 Whole house exhaust system. Whole house exhaust system shall be designed and installed to meet all of the applicable criteria below:

1. Whole house ventilation exhaust shall be discharged outdoors.
2. Exhaust outlets shall comply with Section 501.2.
3. Exhaust ducts in systems which are designed to operate intermittently shall be equipped with back-draft dampers.
4. All exhaust ducts in unconditioned spaces shall be insulated to a minimum of R-4.5. Terminal outlet elements shall have at least the equivalent net free area of the ductwork.
5. Terminal outlet elements shall be screened or otherwise protected as required by Section 501.2.2.
6. One of the required (~~(source specific)~~) local exhaust fans for the laundry room or bathroom may be designated as the whole house exhaust fan.
7. Exhaust fans in separate dwelling units or (~~(guest rooms)~~) sleeping units shall not share common exhaust ducts unless the system is engineered for this operation.
8. Where permitted by Chapter 5 whole house exhaust ducts may be combined with other (~~(source specific)~~) local exhaust ducts. If more than one of the exhaust fans in a dwelling unit or (~~(guest room)~~) sleeping unit shares a common exhaust duct then each exhaust fan shall be equipped with a back-draft damper to prevent the recirculation of exhaust air from one room to another room via the exhaust ducting system.

403.8.6.4 Whole house exhaust and transfer fans. Exhaust fan construction and sizing shall meet the following criteria.

1. Exhaust and transfer fans shall be tested and rated in accordance with the airflow and sound rating procedures of the Home Ventilating Institute (HVI 915, HVI Loudness Testing and Rating Procedure, HVI 916, HVI Airflow Test Procedure, and HVI 920, HVI Product Performance Certification Procedure).
2. Installation of system or equipment shall be carried out in accordance with manufacturers' design requirements and installation instructions.
3. Fan airflow rating and duct system shall be designed and installed to deliver at least the outdoor airflow required by Table 403.3 or Table 403.8.1. The airflows required refer to the delivered airflow of the system as installed and tested using a flow hood, flow grid, or other airflow measurement device.

EXCEPTION: An airflow rating at a pressure of 0.25 in. w.g. may be used, provided the duct sizing meets the prescriptive requirements of Table 403.8.5.2.

403.8.6.5 Fan noise. Whole house exhaust and transfer fans located 4 feet or less from the interior grille shall have a sone rating of 1.0 or less measured at 0.10 inches water gauge. Manufacturer's noise ratings shall be determined as per HVI 915. Remotely mounted fans shall be acoustically isolated from the structural elements of the building and from attached ductwork using insulated flexible duct or other approved material.

403.8.7 Whole house ventilation integrated with forced-air systems. This section establishes minimum requirements for mechanical whole house ventilation systems using forced-air system fans.

403.8.7.1 Outdoor air. Forced-air system fan ventilation systems shall provide *outdoor air* through one of the following methods:

1. A dedicated *outdoor air* louver and *outdoor air* duct for each dwelling unit or (~~(guest room)~~) sleeping unit shall supply *outdoor air* to the return side of the forced-air system fan; or
2. A central *outdoor air* delivery system that supplies multiple dwelling units or (~~(guest rooms)~~) sleeping units shall supply *outdoor air* to the return side of the forced air system fan.

403.8.7.2 Whole house forced-air system. Where *outdoor air* is provided to each habitable dwelling unit or (~~(guest room)~~) sleeping unit by a forced-air system, the *outdoor air* duct shall be connected to the return air stream at a point within 4 feet upstream of the forced-air unit. It shall not be connected directly to the forced-air unit cabinet in order to prevent thermal shock to the heat exchanger. At a minimum, filtration of the *outdoor air* shall be provided at the forced-air unit. The filter shall be accessible for regular maintenance and replacement. The filter shall have a Minimum Efficiency Rating Value (MERV) of at least 6.

403.8.8 Whole house ventilation with supply fan systems. This section establishes minimum requirements for mechanical whole house ventilation systems using supply fan systems.

403.8.8.1 Outdoor air. Supply fan ventilation systems shall provide *outdoor air* through one of the following methods:

1. A dedicated *outdoor air* louver and *outdoor air* duct for each dwelling unit or (~~(guest room)~~) sleeping unit shall supply *outdoor air* to a supply fan; or
2. A central *outdoor air* supply fan system shall distribute unconditioned or conditioned air to multiple dwelling units or (~~(guest rooms)~~) sleeping units.

403.8.8.2 Whole house supply system. Where *outdoor air* is provided to each habitable dwelling unit or (~~(guest room)~~) sleeping unit by supply fan systems the *outdoor air* shall be filtered.

The system filter may be located at the intake device or inline with the fan. The filter shall be accessible for regular maintenance and replacement. The filter shall have a Minimum Efficiency Rating Value (MERV) of at least 6.

403.8.9 Whole house ventilation with heat recovery or energy recovery ventilation systems. This section establishes minimum requirements for mechanical whole house ventilation systems using heat recovery or energy recovery ventilation systems.

403.8.9.1 Outdoor air. Heat recovery or energy recovery ventilation systems shall provide *outdoor air* through one of the following methods:

1. A dedicated *outdoor air* louver and *outdoor air* duct for each dwelling unit or (~~(guest room)~~) sleeping unit shall supply *outdoor air* to the heat recovery or energy recovery ventilator; or

2. A central *outdoor air* heat recovery or energy recovery unit shall distribute conditioned air to multiple dwelling units or (~~(guest rooms)~~) sleeping units.

403.8.9.2 Whole house heat recovery ventilator system.

Where *outdoor air* is provided to each habitable dwelling unit or (~~(guest room)~~) sleeping unit by heat recovery or energy recovery ventilator the *outdoor air* shall be filtered. The filter shall be located on the upstream side of the heat exchanger in both the intake and exhaust airstreams with a Minimum Efficiency Rating Value (MERV) of at least 6. The system filter may be located at the intake device or inline with the fan. The filter shall be accessible for regular maintenance and replacement.

403.8.10 (~~(Source specific)~~) Local exhaust ventilation and whole house ventilation alternate performance or design requirements. In lieu of complying with Sections 403.8.4 or 403.8.5 compliance with the section shall be demonstrated through engineering calculations by an engineer licensed to practice in the state of Washington or by performance testing. Documentation of calculations or performance test results shall be submitted to and approved by the building official. Performance testing shall be conducted in accordance with approved test methods.

403.8.11 Alternate systems. When approved by the code official, systems designed in accordance with ASHRAE Standard 62.2(~~(-2007)~~) shall be permitted.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0404 Section 404—Enclosed parking garages and automobile repair facilities.

~~(404.5)~~ **404.4 Automobile repair facilities.** In buildings used for the repair of automobiles, each repair stall shall be equipped with an exhaust extension duct, extending to the outside of the building. Exhaust extension duct over 10 feet in length shall mechanically exhaust at least 300 cfm. Connecting offices and waiting rooms shall be supplied with conditioned air under positive pressure.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0501 Section 501—General.

~~(501.2 Exhaust discharge.~~ The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a nuisance and not less than the distances specified in Section 501.2.1. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic or crawlspace.

EXCEPTIONS:

1. Whole-house cooling fans shall be permitted to discharge into the attic space of dwelling units having private attics.
2. Commercial cooking recirculating systems.

~~501.2.1)~~ **501.3.1 Location of exhaust outlets.** The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

1. **For ducts conveying explosive or flammable vapors, fumes or dusts:** 30 feet (9144 mm) from the property line; 10 feet (3048 mm) from operable openings into the building; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into the building which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.

2. **For other product-conveying outlets:** 10 feet (3048 mm) from property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into the building; 10 feet (3048 mm) above adjoining grade.

3. **For environmental air exhaust other than enclosed parking garage and transformer vault exhaust:** 3 feet (914 mm) from property lines, 3 feet (914 mm) from operable openings into buildings for all occupancies other than Group U, and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious.

EXCEPTIONS:

1. The separation between an air intake and exhaust outlet on a single listed package HVAC unit.
2. Exhaust from environmental air systems other than garages may be discharged into an open parking garage.
3. Except for Group I occupancies, where ventilation system design circumstances require building HVAC air to be relieved, such as during economizer operation, such air may be relieved into an open or enclosed parking garage within the same building.

4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the (~~(design flood level)~~) elevation required by Section 1613 of the *International Building Code* for utilities and attendant equipment.

5. For enclosed parking garage exhaust system outlets and transformer vault exhaust system outlets: 10 feet (3048 mm) from property lines which separate one lot from another; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining (~~(grade)~~) finished sidewalk.

6. For elevator machinery rooms in enclosed or open parking garages: Exhaust outlets may discharge air directly into the parking garage.

7. For specific systems see the following sections:

7.1. Clothes dryer exhaust, Section 504.4.

7.2. Kitchen hoods and other kitchen exhaust equipment, Sections ~~((506.3))~~ 506.3.13, 506.4 and 506.5.

7.3. Dust stock and refuse conveying systems, Section ~~((511))~~ 511.2.

7.4. Subslab soil exhaust systems, Section 512.4.

7.5. Smoke control systems, Section 513.10.3.

7.6. Refrigerant discharge, Section 1105.7.

7.7. Machinery room discharge, Section 1105.6.1.

501.4 Pressure equalization. Mechanical exhaust systems shall be sized to remove the quantity of air required by this chapter to be exhausted. The system shall operate when air is required to be exhausted. Where mechanical exhaust is required in a room or space, such space shall be maintained with a neutral or negative pressure. If a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical exhaust for a room, adequate means shall be provided for the natural or mechanical exhaust of the excess air supplied. If only a mechanical exhaust system is installed for a room or if a greater quantity of air is removed by a mechanical exhaust system than is supplied by a mechanical ventilating supply system for a room, adequate makeup air consisting of supply air, transfer air or outdoor air shall be provided to satisfy the deficiency. The calculated building infiltration rate shall not be used to satisfy the requirements of this section.

EXCEPTION: R-3 occupancies and dwelling units in R-2 occupancies are excluded from the pressure equalization requirement unless required by Section 504.5 or Section 505.2.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0504 Section 504—Clothes dryer exhaust.

504.6.4.1 Specified length. The maximum length of the exhaust duct shall be 35 feet (10668 mm) from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table 504.6.4.1.

The maximum length of the duct may be increased in an engineered exhaust system when a listed and labeled exhaust booster fan is installed in accordance with the manufacturer's installation instructions.

504.7.1 Protection required. Protective shield plates shall be provided in accordance with Section 504.6.7.

504.8 Common exhaust systems for clothes dryers located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple clothes dryers, the construction of the system shall be in accordance with all of the following:

1. The shaft in which the duct is installed shall be constructed and fire-resistance rated as required by the *International Building Code*.

2. Dampers shall be prohibited in the exhaust duct. Penetrations of the shaft and ductwork shall be protected in accordance with Section 607.5.5, Exception 2.

3. Rigid metal ductwork shall be installed within the shaft to convey the exhaust. The ductwork shall be constructed of sheet steel having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage) and in accordance with *SMACNA Duct Construction Standards*.

4. The ductwork within the shaft shall be designed and installed without offsets.

5. The exhaust fan motor design shall be in accordance with Section 503.2.

6. The exhaust fan motor shall be located outside of the airstream.

7. The exhaust fan shall run continuously, and shall be connected to a standby power source.

8. Exhaust fan operation shall be monitored in an approved location and shall initiate an audible or visual signal when the fan is not in operation.

9. Makeup air shall be provided for the exhaust system to maintain the minimum flow for the exhaust fan when the dryers are not operating. Additionally, makeup air shall be provided when required by Section 504.5.

10. A cleanout opening shall be located at the base of the shaft to provide access to the duct to allow for cleaning and inspection. The finished opening shall be not less than 12 inches by 12 inches (305 mm by 305 mm).

11. Screens shall not be installed at the termination.

12. The common multistory duct system shall serve only clothes dryers and shall be independent of other exhaust systems.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0505 Section 505—Domestic kitchen exhaust equipment.

505.1 Domestic systems. Where domestic range hoods and domestic appliances equipped with downdraft exhaust are located within dwelling units, such hoods and appliances shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls (~~((and))~~), shall be air tight (~~((and))~~), shall be equipped with a backdraft damper (~~((Domestic range hood duct systems shall not be combined with other environmental air exhaust systems))~~) and shall be independent of all other exhaust systems.

Listed and labeled exhaust booster fans shall be permitted when installed in accordance with the manufacturer's installation instructions.

EXCEPTIONS:

1. Where installed in accordance with the manufacturer's installation instructions and where mechanical ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.
2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:
 - 2.1. The duct shall be installed under a concrete slab poured on grade.
 - 2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.

- 2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
- 2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.
- 2.5. The PVC ducts shall be solvent cemented.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0506 Section 506—Commercial kitchen hood ventilation system ducts and exhaust equipment.

506.3.9 Grease duct cleanout location, spacing and installation.

506.3.9.1 Grease duct horizontal cleanout. Cleanouts located on horizontal sections of ducts shall:

- 1. Be spaced not more than 20 feet (6096 mm) apart.
 ((The cleanouts shall)) 2. Be located ((on the side of the duct with the opening not less than 1 1/2 inches (38 mm) above the bottom of the duct, and not less)) not more than 10 feet (3048 mm) from changes in direction that are greater than 45 degrees (0.79 rad).
- 3. Be located on the bottom only where other locations are not available and shall be provided with internal damping of the opening such that grease will flow past the opening without pooling. Bottom cleanouts and openings shall be approved for the application and installed liquid-tight.
- 4. Not be closer than 1 inch ((~~25~~) 25.4 mm) ((below the top of the duct. The opening minimum)) from the edges of the duct.
- 5. Have dimensions ((shall be)) of not less than 12 inches by 12 inches (305 mm by 305 mm) ((on each side)). Where ((the)) such dimensions ((of the side of the duct prohibit the cleanout)) preclude installation ((prescribed herein)), the openings shall ((be on the top of the duct or the bottom of the duct. Where located on the top of the duct, the opening edges shall be a minimum of 1 inch (25 mm) from the edges of the duct. Where located in the bottom of the duct, cleanout openings shall be designed to provide internal damming around the opening, shall be provided with gasketing to preclude grease leakage, shall provide for drainage of grease down the duct around the dam and shall be approved for the application. Where the dimensions of the sides, top or bottom of the duct preclude the installation of the prescribed minimum-size cleanout opening, the cleanout shall be located on the duct face that affords the largest opening dimension and shall be installed with the opening edges at the prescribed distances from the duct edges as previously set forth in this section)) be

not less than 12 inches (305 mm) on one side and shall be large enough to provide access for cleaning and maintenance.

6. Shall be located at grease reservoirs.

506.3.9.2 Grease duct vertical cleanouts. Where ducts pass vertically through floors, cleanouts shall be provided. A minimum of one cleanout shall be provided on each floor. Cleanout openings shall be not less than 1 1/2 inches (38 mm) from all outside edges of the duct or welded seams.

506.3.11 Grease duct enclosures. A grease duct serving a Type I hood that penetrates a ceiling, wall, floor or any concealed spaces shall be enclosed from the point of penetration to the outlet terminal. A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the International Building Code. The duct enclosure shall serve a single grease duct and shall not contain other ducts, piping or wiring systems. Duct enclosures shall be either field-applied or factory-built. Duct enclosures shall have a fire-resistance rating of not less than that of the assembly penetrated. The duct enclosure need not exceed 2 hours but shall not be less than 1 hour. Duct enclosures shall be as prescribed by Section 506.3.11.1, 506.3.11.2 or 506.3.11.3.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0507 Section 507—Commercial kitchen hoods.

507.2.1 Type I hoods. Type I hoods shall be installed where cooking appliances produce grease or smoke. Type I hoods shall be installed over medium-duty, heavy-duty and extra-heavy-duty cooking appliances. Type I hoods shall be installed over light-duty cooking appliances that produce grease or smoke.

- EXCEPTIONS:
- 1. A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m³ or less of grease when tested at an exhaust flow rate of 500 cfm in accordance with Section 17 of UL 710B.
 - 2. A Type I hood shall not be required in an R-2 type occupancy with not more than 16 residents.

507.2.3 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I, Type II or residential hoods as required for the type of appliances and processes in accordance with Table 507.2.2 and Sections 507.2, 507.2.1 and 507.2.2.

TABLE 507.2.2
 TYPE OF HOOD REQUIRED FOR DOMESTIC COOKING APPLIANCES
 IN THE FOLLOWING SPACES^{a, b}

<u>Type of Space</u>	<u>Type of Cooking</u>	<u>Type of Hood</u>
Church	1. Boiling, steaming and warming precooked food	Type II hood
	2. Roasting, pan frying and deep frying	Type I hood
Community or party room in apartment and condominium	1. Boiling, steaming and warming precooked food	Residential hood ^c or Type II hood ^d
	2. Roasting, pan frying and deep frying	Type I hood

<u>Type of Space</u>	<u>Type of Cooking</u>	<u>Type of Hood</u>
<u>Day care</u>	<u>1. Boiling, steaming and warming precooked food</u>	<u>Residential hood^c or Type II hood^d</u>
	<u>2. Roasting, pan frying and deep frying</u>	<u>Type I hood</u>
<u>Dormitory, boarding home, nursing home</u>	<u>1. Boiling, steaming and warming precooked food</u>	<u>Type II hood</u>
	<u>2. Roasting, pan frying and deep frying</u>	<u>Type I hood</u>
<u>Office lunch room</u>	<u>1. Boiling, steaming and warming precooked food</u>	<u>Residential hood^c or Type II hood^d</u>
	<u>2. Roasting, pan frying and deep frying</u>	<u>Type I hood</u>

^a Commercial cooking appliances shall comply with Section 507.2.

^b Requirements in this table apply to electric or gas fuel appliances only. Solid fuel appliances or charbroilers require Type I hoods.

^c Residential hood shall ventilate to the outside.

^d Type II hood required when more than one appliance is used.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-0601 Section 601—General.

601.2 Air movement in egress elements. Corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts.

EXCEPTIONS:

1. Use of a corridor as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, smoking lounges and janitor closets, shall be permitted provided that each such corridor is directly supplied with ((outdoor air)) *outdoor air* at a rate greater than the rate of makeup air taken from the corridor.
2. Where located within a dwelling unit, the use of corridors for conveying return air shall not be prohibited.
3. Where located within tenant spaces of one thousand square feet (93 m²) or less in area, utilization of corridors for conveying return air is permitted.
4. Incidental air movement from pressurized rooms within health care facilities, provided that the corridor is not the primary source of supply or return to the room.
5. Where such air is part of an engineered smoke control system.
6. Air supplied to corridors serving residential occupancies shall not be considered as providing ventilation air to the dwelling units subject to the following:
 - 6.1 The air supplied to the corridor is one hundred percent outside air; and
 - 6.2 The units served by the corridor have conforming ventilation air independent of the air supplied to the corridor; and
 - 6.3 For other than high-rise buildings, the supply fan will automatically shut off upon activation of corridor smoke detectors which shall be spaced at no more than thirty feet (9,144 mm) on center along the corridor; or
 - 6.4 For high-rise buildings, corridor smoke detector activation will close required smoke/fire dampers at the supply inlet to the corridor at the floor receiving the alarm.

NEW SECTION

WAC 51-52-0605 Section 605—Air filters.

605.4 Particulate matter removal. Particulate matter filters or air cleaners having a minimum efficiency reporting

value (MERV) of not less than 6 for ducted air handlers and not less than 4 for unducted air handlers shall be provided upstream of all cooling coils or other devices with wetted surfaces through which air is supplied to an occupiable space.

NEW SECTION

WAC 51-52-0928 Section 928—Evaporative cooling equipment.

928.1 General. Evaporative cooling equipment shall:

1. Be installed in accordance with the manufacturer's instructions.
2. Be installed on level platforms in accordance with Section 304.10.
3. Have openings in exterior walls or roofs flashed in accordance with the *International Building Code*.
4. Be provided with potable water backflow protection in accordance with backflow requirements in the plumbing code.
5. Have air intake opening locations in accordance with Section 401.4.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-1000 Chapter 10—Boilers, water heaters and pressure vessels.

((~~SECTIONS 1003 THROUGH 1011, are not adopted.~~

~~Boilers and Unfired Pressure Vessels are regulated by chapter 70.79 RCW.))~~

Informational Note: Boilers and pressure vessels are regulated by chapter 70.79 RCW and chapter 296-104 WAC in addition to the requirements of this code.

1001.1 Scope. This chapter shall govern the installation, alteration and repair of boilers, water heaters and pressure vessels.

EXCEPTIONS:

1. Pressure vessels used for unheated water supply.
2. Portable unfired pressure vessels and Interstate Commerce Commission containers.
3. Containers for bulk oxygen and medical gas.
4. Unfired pressure vessels having a volume of 5 cubic feet (0.14 m³) or less operating at pressures not

exceeding 250 pounds per square inch (psi) (1724 kPa) and located within occupancies of Groups B, F, H, M, R, S and U.

5. Pressure vessels used in refrigeration systems that are regulated by Chapter 11 of this code.

6. Pressure tanks used in conjunction with coaxial cables, telephone cables, power cables and other similar humidity control systems.

7. Any boiler or pressure vessel subject to inspection by federal or state inspection programs.

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-1500 Chapter 15—Referenced standards. The following referenced standards are added to Chapter 15.

ASHRAE

62.2-((2007)) 2010 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings

AMENDATORY SECTION (Amending WSR 10-03-099, filed 1/20/10, effective 7/1/10)

WAC 51-52-21101 Section 101—General.

101.2 Scope. This code shall apply to the installation of fuel gas piping systems, fuel gas utilization equipment, gaseous hydrogen systems and regulated accessories in accordance with Section 101.2.1 through 101.2.5.

EXCEPTIONS:

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *International Residential Code*.

2. The standards for liquefied petroleum gas installations shall be the ((2008)) 2011 Edition of NFPA 58 (Liquefied Petroleum Gas Code) and the ((2009)) 2012 Edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code).

NEW SECTION

WAC 51-52-21401 Chapter 4—Gas piping installations.

401.9 Identification. Each length of pipe and tubing and each pipe fitting utilized in a mechanical system shall bear the identification of the manufacturer.

EXCEPTION:

The manufacturer identification for fittings and pipe nipples shall be on each piece or shall be printed on the fitting or nipple packaging or provided documentation.

NEW SECTION

WAC 51-52-21601 Chapter 6—Specific appliances.

614.7.1 Protection required. Protective shield plates shall be provided in accordance with Section 614.6.3.

WSR 13-04-054

PERMANENT RULES

BUILDING CODE COUNCIL

[Filed February 1, 2013, 11:03 a.m., effective July 1, 2013]

Effective Date of Rule: July 1, 2013.

Purpose: Adoption and amendment of the 2012 Uniform Plumbing Code, chapter 51-56 WAC. This also includes repeal of chapter 51-57 WAC, Uniform Plumbing Code Appendix Chapters, which was incorporated into chapter 51-56 WAC.

Citation of Existing Rules Affected by this Order: Repealing WAC 51-57-001, 51-57-002, 51-57-003, 51-57-004, 51-57-007, 51-57-008, 51-57-202000, 51-57-790000 and 51-57-895000; and amending WAC 51-56-003, 51-56-008, 51-56-0100, 51-56-0200, 51-56-0300, 51-56-0400, 51-56-0500, 51-56-0600, 51-56-0700, 51-56-0900, 51-56-1100, 51-56-1300, 51-56-1400, and 51-56-1600.

Statutory Authority for Adoption: RCW 19.27.074 and 19.27.031.

Other Authority: Chapters 19.27 and 34.05 RCW.

Adopted under notice filed as WSR 12-16-082 on July 31, 2012.

Changes Other than Editing from Proposed to Adopted Version: The following changes were made based on testimony provided at the public hearings.

1. The state amendment to Section 601.2.2 relating to water pipe identification was removed. The new 2012 model code language in 601.2.2.1 is equivalent to the state amendment.

2. The permitting language in Section 1601.3 was modified to remove language pertaining to rainwater catchment systems and move it to a new section (Section 1702.2) in Chapter 17, Rainwater Catchment Systems. Additionally, duplicative language in new Section 1702.2.1 was removed.

3. Requirements for abandonment of nonpotable (Alternate Source and Rainwater) water tanks were retained for the 2012 edition. These sections were previously struck in the proposed code. Former Section 1622 will become new Section 1601.10, and Section 1632 will become new Section 1702.12.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 2, Amended 12, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 4, Amended 2, Repealed 9.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 4, Amended 6, Repealed 9.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 6, Amended 14, Repealed 9.

Date Adopted: November 9, 2012.

C. Ray Allshouse
Council Chair

Chapter 51-56 WAC

STATE BUILDING CODE ADOPTION AND AMENDMENT OF THE ~~((2009))~~ 2012 EDITION OF THE UNIFORM PLUMBING CODE

AMENDATORY SECTION (Amending WSR 10-03-101, filed 1/20/10, effective 7/1/10)

WAC 51-56-003 Uniform Plumbing Code. The ~~((2009))~~ 2012 edition of the Uniform Plumbing Code, including Appendices A, B, and I, published by the International Association of Plumbing and Mechanical Officials, is hereby adopted by reference with the following additions, deletions and exceptions: Provided that chapters 12 and 15 of this code are not adopted. Provided further, that those requirements of the Uniform Plumbing Code relating to venting and combustion air of fuel fired appliances as found in chapter 5 and those portions of the code addressing building sewers are not adopted.

NEW SECTION

WAC 51-56-004 Conflicts between Appendix I and the manufacturer's installation instructions. Where a conflict exists between the provisions of Appendix I and the manufacturer's installation instructions, the conditions of the listing and the manufacturer's installation instructions shall apply.

AMENDATORY SECTION (Amending WSR 10-03-101, filed 1/20/10, effective 7/1/10)

WAC 51-56-008 Implementation. The Uniform Plumbing Code adopted by chapter 51-56 WAC shall become effective in all counties and cities of this state on July 1, ~~((2010))~~ 2013, unless local government residential amendments have been approved by the state building code council.

AMENDATORY SECTION (Amending WSR 04-01-110, filed 12/17/03, effective 7/1/04)

WAC 51-56-0100 Chapter 1—Administration.

101.4.1.4 Conflict Between Codes. Delete paragraph.

~~((102.4 Appeals. All persons shall have the right to appeal a decision of the authority having jurisdiction. The jurisdiction shall have a board of appeals to hear and rule on Plumbing Code appeals. Members of the board shall be appointed by the jurisdiction. Decisions by the board shall be reported to the jurisdiction and administered by the authority having jurisdiction.))~~

103.1.3 Certification. State rules and regulations concerning certification shall apply.

AMENDATORY SECTION (Amending WSR 10-03-101, filed 1/20/10, effective 7/1/10)

WAC 51-56-0200 Chapter 2—Definitions.

205.0 Certified Backflow Assembly Tester - A person certified by the Washington state department of health under chapter 246-292 WAC to inspect (for correct installation and approval status) and test (for proper operation) approved backflow assemblies.

210.0 Hot Water - Water at a temperature exceeding or equal to 100°F.

211.0 Insanitary - A condition that is contrary to sanitary principles or is injurious to health.

Conditions to which "insanitary" shall apply include the following:

- (1) A trap that does not maintain a proper trap seal.
- (2) An opening in a drainage system, except where lawful, that is not provided with an approved liquid-sealed trap.
- (3) A plumbing fixture or other waste discharging receptor or device that is not supplied with water sufficient to flush and maintain the fixture or receptor in a clean condition, except as otherwise provided in this code.
- (4) A defective fixture, trap, pipe, or fitting.
- (5) A trap, except where in this code exempted, directly connected to a drainage system, the seal of which is not protected against siphonage and backpressure by a vent pipe.
- (6) A connection, cross-connection, construction, or condition, temporary or permanent, that would permit or make possible by any means whatsoever for an unapproved foreign matter to enter a water distribution system used for domestic purposes.
- (7) The foregoing enumeration of conditions to which the term "insanitary" shall apply, shall not preclude the application of that term to conditions that are, in fact, insanitary.

218.0 Plumbing System - Includes all potable water, building supply and distribution pipes, all reclaimed water systems, all plumbing fixtures and traps, all drainage and vent pipe(s), and all building drains including their respective joints and connection, devices, receptors, and appurtenances within the property lines of the premises and shall include potable water piping, potable water treating or using equipment, medical gas and medical vacuum systems, and water heaters: Provided, That no certification shall be required for the installation of a plumbing system within the property lines and outside a building.

AMENDATORY SECTION (Amending WSR 10-03-101, filed 1/20/10, effective 7/1/10)

WAC 51-56-0300 Chapter 3—General regulations.

~~((301.1.3))~~ **301.1.2 Standards.** Standards listed or referred to in this chapter or other chapters cover materials which will conform to the requirements of this code, when used in accordance with the limitations imposed in this or other chapters thereof and their listing. Where a standard covers materials of various grades, weights, quality, or configurations, ~~((there may be only a))~~ the portion of the listed standard ~~((which))~~ that is applicable shall be used. Design and materials for special conditions or materials not provided for herein are allowed to be used by special permission of the authority having jurisdiction after the authority having jurisdiction has

been satisfied as to their adequacy in accordance with Section 301.2.

~~((311.4))~~ **310.4 Use of Vent and Waste Pipes.** Except as hereinafter provided in Sections 908.0, 909.0, 910.0, and Appendix ~~((E))~~ C, no vent pipe shall be used as a soil or waste pipe, nor shall any soil or waste pipe be used as a vent.

~~((313.6))~~ **312.6 Freezing Protection.** No water, soil, or waste pipe shall be installed or permitted outside of a building or in an exterior wall unless, where necessary, adequate provision is made to protect such pipe from freezing. All hot and cold water pipes installed outside the conditioned space shall be insulated to a minimum ~~((R-3))~~ R-4.

~~((313.7))~~ **312.7 Fire-Resistant Construction.** All pipe penetrating floor/ceiling assemblies and fire-resistance rated walls or partitions shall be protected in accordance with the requirements of the building code.

AMENDATORY SECTION (Amending WSR 10-03-101, filed 1/20/10, effective 7/1/10)

WAC 51-56-0400 Chapter 4—Plumbing fixtures and fixture fittings.

~~((402.0))~~ **402.5 Setting.** Fixtures shall be set level and in proper alignment with reference to adjacent walls. No water closet or bidet shall be set closer than fifteen (15) inches (381 mm) from its center to any side wall or obstruction nor closer than thirty (30) inches (762 mm) center to center to any similar fixture. The clear space in front of any water closet or bidet shall be not less than twenty-one (21) inches (533 mm). No urinal shall be set closer than twelve (12) inches (305 mm) from its center to any side wall or partition nor closer than twenty-four (24) inches (610 mm) center to center.

EXCEPTION: The installation of paper dispensers or accessibility grab bars shall not be considered obstructions.

403.0 Water-Conserving Fixtures and Fittings.

~~((402.1))~~ **403.1** The purpose of this section shall be to implement water conservation performance standards in accordance with RCW 19.27.170.

~~((402.2))~~ **403.2 Application.** This section shall apply to all new construction and all remodeling involving replacement of plumbing fixtures and fittings in all residential, hotel, motel, school, industrial, commercial use, or other occupancies determined by the council to use significant quantities of water. Plumbing fixtures, fittings and appurtenances shall conform to the standards specified in this section and shall be provided with an adequate supply of potable water to flush and keep the fixtures in a clean and sanitary condition without danger of backflow or cross-connection.

~~((402.3))~~ **403.3 Water Efficiency Standards.**

~~((402.3.1))~~ **403.3.1 Standards for Vitreous China Plumbing Fixtures.**

~~((402.3.1.1))~~ **403.3.1.1** The following standards shall be adopted as plumbing materials, performance standards, and labeling standards for water closets and urinals. Water closets

and urinals shall meet either the ANSI/ASME standards or the CSA standard.

ANSI/ASME ((A112.19.2M-1998)) A112.19.2-2008/CSA B45.1-2008	Vitreous China Plumbing Fixtures
---------------------------------------------------------------------------------	-------------------------------------

ANSI/ASME A112.19.6- 1995 ((CSA B45	Hydraulic Requirements for Water Closets and Urinals CSA Standards on Plumbing Fixtures))
------------------------------------------------------	----------------------------------------------------------------------------------------------------------------

~~((402.3.1.2))~~ **403.3.1.2** The maximum water use allowed in gallons per flush (gpf) or liters per flush (lpf) for any of the following water closets shall be the following:

Tank-type toilets	1.6 gpf/6.0 lpf
Flushometer-valve toilets	1.6 gpf/6.0 lpf
Flushometer-tank toilets	1.6 gpf/6.0 lpf
Electromechanical hydraulic toilets	1.6 gpf/6.0 lpf

EXCEPTIONS:

1. Water closets located in day care centers, intended for use by young children may have a maximum water use of 3.5 gallons per flush or 13.25 liters per flush.
2. Water closets with bed pan washers may have a maximum water use of 3.5 gallons per flush or 13.25 liters per flush.
3. Blow out bowls, as defined in ANSI/ASME A112.19.2M, Section 5.1.2.3 may have a maximum water use of 3.5 gallons per flush or 13.25 liters per flush.

~~((402.3.1.3))~~ **403.3.1.3** The maximum water use allowed for any urinal shall be 1.0 gallons per flush or 3.78 liters per flush.

~~((402.3.1.3.1))~~ **403.3.1.3.1 Nonwater Urinals.** Nonwater urinals shall be listed and comply with the applicable standards referenced in Table ~~((14-1))~~ 1401.1. Nonwater urinals shall have a barrier liquid sealant to maintain a trap seal. Nonwater urinals shall permit the uninhibited flow of waste through the urinal to the sanitary drainage system. Nonwater urinals shall be cleaned and maintained in accordance with the manufacturer's instructions after installation. Where nonwater urinals are installed, they shall have a water distribution line rough-in to the urinal location to allow for the installation of an approved backflow prevention device in the event of a retrofit.

~~((402.3.1.4))~~ **403.3.1.4** No urinal or water closet that operates on a continuous flow or continuous flush basis shall be permitted.

~~((402.3.1.5))~~ **403.3.1.5** This section does not apply to fixtures installed before the effective date of this section, that are removed and relocated to another room or area of the same building after the effective date of this section.

~~((402.3.2))~~ **403.3.2 Standards for Plumbing Fixture Fittings.**

~~((402.3.2.1))~~ **403.3.2.1** The following standards are adopted as plumbing material, performance requirements, and labeling standards for plumbing fixture fittings. Faucets, aerators,

and shower heads shall meet either the ANSI/ASME standard or the CSA standard.

ANSI/ASME
((A112.18.1M-1996))
A112.18.1-2005/CSA B125.1-2005
((CSA B125

Plumbing Fixture Fittings

Plumbing Fittings))

~~((402.3.2.2))~~ **403.3.2.2** The maximum water use allowed for any shower head is 2.5 gallons per minute or 9.5 liters per minute.

EXCEPTION: Emergency use showers shall be exempt from the maximum water usage rates.

~~((402.3.2.3))~~ **403.3.2.3** The maximum water use allowed in gallons per minute (gpm) or liters per minute (lpm) for any of the following faucets and replacement aerators is the following:

Lavatory faucets	2.5 gpm/9.5 lpm
Kitchen faucets	2.5 gpm/9.5 lpm
Replacement aerators	2.5 gpm/9.5 lpm
Public lavatory faucets other than metering	0.5 gpm/1.9 lpm

~~((402.4))~~ **403.4 Metering Valves.** Lavatory faucets located in restrooms intended for use by the general public shall be equipped with a metering valve designed to close by spring or water pressure when left unattended (self-closing).

EXCEPTIONS: 1. Where designed and installed for use by persons with a disability.
2. Where installed in day care centers, for use primarily by children under 6 years of age.

~~((402.5))~~ **403.5 Prerinse Spray Valve.** Commercial food service prerinse spray valves shall have a maximum flow rate of 1.6 gallons per minute (gpm) at 60 pounds-force per square inch (psi) (0.10 L/s at 414 kPa) in accordance with ASME A112.18.1/CSA B125.1 and shall be equipped with an integral automatic shutoff.

403.6 Implementation.

~~((402.5.1))~~ **403.6.1** The standards for water efficiency and labeling contained within Section 402.3 shall be in effect as of July 1, 1993, as provided in RCW 19.27.170 and amended July 1, 1998.

~~((402.5.2))~~ **403.6.2** No individual, public or private corporation, firm, political subdivision, government agency, or other legal entity, may, for purposes of use in the state of Washington, distribute, sell, offer for sale, import, install, or approve for installation any plumbing fixtures or fittings unless the fixtures or fittings meet the standards as provided for in this section.

~~((407.5 Setting.~~ Fixtures shall be set level and in proper alignment with reference to adjacent walls. No water closet or bidet shall be set closer than fifteen (15) inches (381 mm) from its center to any side wall or obstruction nor closer than thirty (30) inches (762 mm) center to center to any similar fixture. The clear space in front of any water closet or bidet shall be not less than twenty-one (21) inches (533 mm). No

~~urinal shall be set closer than twelve (12) inches (305 mm) from its center to any side wall or partition nor closer than twenty-four (24) inches (610 mm) center to center.~~

EXCEPTION: The installation of paper dispensers or accessibility grab bars shall not be considered obstructions.

~~**411.2 Location of Floor Drains.** Floor drains shall be installed in the following areas:~~

~~**411.2.1** Toilet rooms containing two (2) or more water closets or a combination of one (1) water closet and one (1) urinal, except in a dwelling unit. The floor shall slope toward the floor drains.~~

~~**411.2.2** Laundry rooms in commercial buildings and common laundry facilities in multifamily dwelling buildings.~~

~~**411.7))** **408.4 Waste Outlet.** Showers shall have a waste outlet and fixture tailpiece not less than 2 inches (50 mm) in diameter. Fixture tailpieces shall be constructed from the materials specified in Section 701.1 for drainage piping. Strainers serving shower drains shall have a waterway at least equivalent to the area of the tailpiece.~~

EXCEPTION: In a residential dwelling unit where a 2 inch waste is not readily available and approval of the AHJ has been granted, the waste outlet, fixture tailpiece, trap and trap arm may be 1-1/2 inch when an existing tub is being replaced by a shower sized per Section 408.6 (2). This exception only applies where one shower head rated at 2.5 gpm is installed.

408.6 Shower Compartments. Shower compartments, regardless of shape, shall have a minimum finished interior of nine hundred (900) square inches (0.58 m²) and shall also be capable of encompassing a thirty inch (762 mm) circle. The minimum required area and dimensions shall be measured at a height equal to the top of the threshold and at a point tangent to its centerline. The area and dimensions shall be maintained to a point of not less than seventy (70) inches (1.778 m) above the shower drain outlet with no protrusions other than the fixture valve or valves, shower head, soap dishes, shelves, and safety grab bars or rails. Fold-down seats in accessible shower stalls shall be permitted to protrude into the thirty (30) inch (762 mm) circle.

EXCEPTIONS: 1. Showers that are designed to comply with ICC/ANSI A117.1.
2. The minimum required area and dimension shall not apply for a shower receptor having overall dimensions of not less than thirty (30) inches (762 mm) in width and sixty (60) inches (1,524 mm) in length.

~~**((412.0)) 414.3 Drainage Connection.** Domestic dishwashing machines shall discharge indirectly through an air gap fitting in accordance with Section 807.4 into a waste receptor, a wye branch fitting on the tailpiece of a kitchen sink, or dishwasher connection of a food waste grinder. Commercial dishwashing machines shall discharge indirectly through an air gap.~~

~~**418.3 Location of Floor Drains.** Floor drains shall be installed in the following areas:~~

~~1. Toilet rooms containing two (2) or more water closets or a combination of one (1) water closet and one (1) urinal, except in a dwelling unit. The floor shall slope toward the floor drains.~~

2. Laundry rooms in commercial buildings and common laundry facilities in multifamily dwelling buildings.

422.0 Minimum Number of Required Fixtures. For minimum number of plumbing fixtures required, see Building Code chapter 29 and Table 2902.1.

Sections ((412.4)) 422.1 through ((412.6)) 422.5 and Table ((4-1)) 422.1 are not adopted.

AMENDATORY SECTION (Amending WSR 11-05-037, filed 2/8/11, effective 7/1/13)

WAC 51-56-0500 Chapter 5—Water heaters.

501.0 General. The regulations of this chapter shall govern the construction, location, and installation of fuel burning and other water heaters heating potable water. The minimum capacity for water heaters shall be in accordance with the first hour rating listed in Table ((5-1)) 501.1. See the Mechanical Code for combustion air and installation of all vents and their connectors. All design, construction, and workmanship shall be in conformity with accepted engineering practices, manufacturer's installation instructions, and applicable standards and shall be of such character as to secure the results sought to be obtained by this Code. No water heater shall be hereinafter installed which does not comply in all respects with the type and model of each size thereof approved by the authority having jurisdiction. A list of accepted gas appliance standards is included in Table ((14-1)) 1401.1.

TABLE ((5-1)) 501.1^{1,3}

Number of Bathrooms	1 to 1.5			2 to 2.5				3 to 3.5			
	1	2	3	2	3	4	5	3	4	5	6
Number of Bedrooms	1	2	3	2	3	4	5	3	4	5	6
First Hour Rating ² , Gallons	42	54	54	54	67	67	80	67	80	80	80

Notes: ¹The first hour rating is found on the "Energy Guide" label.

²Nonstorage and solar water heaters shall be sized to meet the appropriate first hour rating as shown in the table.

³For replacement water heaters, see Section ((401.4.1.1-1)) 101.6.

~~((502.2 Chimney—Delete definition.~~

~~502.3 Chimney, Factory Built—Delete definition.~~

~~502.4 Chimney, Masonry—Delete definition.~~

~~502.5 Chimney, Metal—Delete definition.~~

~~502.7 Direct Vent Appliance—Delete definition.~~

~~502.8 Flue Collar—Delete definition.~~

~~502.9 Gas Vent, Type B—Delete definition.~~

~~502.10 Gas Vent, Type L—Delete definition.~~

~~502.12 Vent—Delete definition.~~

~~502.13 Vent Connector—Delete definition.~~

~~502.14 Venting System—Delete definition.~~

~~504.1 Inspection of Chimneys or Vents. Delete paragraph.~~

~~505.1) 504.1 Location.~~ Water heater installation in bedrooms and bathrooms shall comply with one of the following:

(1) Fuel-burning water heaters may be installed in a closet located in the bedroom or bathroom provided the closet is equipped with a listed, gasketed door assembly and a listed self-closing device. The self-closing door assembly shall meet the requirements of Section 505.1.1. The door assembly shall be installed with a threshold and bottom door seal and shall meet the requirements of Section 505.1.2. All combustion air for such installations shall be obtained from the outdoors in accordance with the International Mechanical Code. The closet shall be for the exclusive use of the water heater.

(2) Water heater shall be of the direct vent type.

~~((506.2)) 505.2 Safety Devices.~~ All storage-type water heaters deriving heat from fuels or types of energy other than gas, shall be provided with, in addition to the primary temperature

controls, an over-temperature safety protection device constructed, listed, and installed in accordance with nationally recognized applicable standards for such devices and a combination temperature and pressure relief valve.

~~((507.0)) 506.0 Combustion Air.~~ For issues relating to combustion air, see the Mechanical Code.

Sections ((507.1)) 506.1 through ((507.9)) 506.9 are not adopted.

Sections ((508.6)) 507.6 through ((508.9)) 507.9 are not adopted.

~~((508.12 Delete entire section.~~

~~508.14) 507.13 Installation in ((Residential)) Garages.~~ ((+)) Appliances in ((residential)) garages and in adjacent spaces that open to the garage and are not part of the living space of a dwelling unit shall be installed so that burners, burner-ignition devices and ignition sources are located not less than 18 inches above the floor unless listed as flammable vapor ignition resistant.

~~((2)) Such appliances shall be located or protected so it is not subject to physical damage by a moving vehicle.~~

~~(3) When appliances are installed in a separate enclosed space having access only from outside of the garage, such appliances shall be permitted to be installed at floor level, providing the required combustion air is taken from the exterior of the garage.~~

~~508.18) 507.16 Venting of Flue Gases - Delete entire section.~~

Sections ((508.20)) 507.18 through ((508.24.5)) 507.22 are not adopted.

~~((510.0)) 509.0 Venting of Equipment.~~ Delete entire section.

~~((511.0)) 510.0 Sizing of Category I Venting Systems.~~
Delete entire section.

~~((512.0)) 511.0 Direct Vent Equipment.~~ Delete entire section.

~~((Chapter 5, Part II is not adopted.))~~

AMENDATORY SECTION (Amending WSR 12-07-018, filed 3/12/12, effective 4/12/12)

WAC 51-56-0600 Chapter 6—Water supply and distribution. ~~((601.1 Except where not deemed necessary for safety or sanitation by the AHJ, each plumbing fixture shall be provided with an adequate supply of potable running water piped thereto in an approved manner, so arranged as to flush and keep it in a clean and sanitary condition without danger of backflow or cross-connection. Water closets and urinals shall be flushed by means of an approved flush tank or flushometer valve.~~

EXCEPTION: Listed fixtures that do not require water for their operation and are not connected to the water supply.

~~Kitchen sinks, lavatories, bathtubs, showers, bidets, laundry tubs and washing machine outlets shall be provided with hot and cold water. This requirement shall not supersede the requirements for individual temperature control limitations for public lavatories, bidets, bathtubs, whirlpool bathtubs and shower control valves.~~

~~**601.2.2 Color and Information.** Each system shall be identified with a colored pipe or band and coded with paints, wraps and materials compatible with the piping.~~

~~Except as required in Chapter 16, nonpotable water systems shall have a yellow background with black uppercase lettering, with the words "CAUTION: NONPOTABLE WATER, DO NOT DRINK." Each nonpotable system shall be identified to designate the liquid being conveyed, and the direction of normal flow shall be clearly shown. The minimum size of the letters and the length of color field shall conform to Table 6-1.~~

~~The background color and required information shall be indicated every twenty (20) feet (6,096 mm) but not less than once per room, and shall be visible from the floor level.~~

~~603.0 Cross-Connection Control.)~~ **603.1 General.** Cross-connection control shall be provided in accordance with the provisions of this chapter. Devices or assemblies for protection of the public water system must be models approved by the department of health under WAC 246-290-490. The authority having jurisdiction shall coordinate with the local water purveyor where applicable in all matters concerning cross-connection control within the property lines of the premises.

No person shall install any water operated equipment or mechanism, or use any water treating chemical or substance, if it is found that such equipment, mechanism, chemical or substance may cause pollution or contamination of the domestic water supply. Such equipment or mechanism may be permitted only when equipped with an approved backflow prevention device or assembly.

~~((603.4))~~ **603.2 Approval of Devices or Assemblies.** Before any device or assembly is installed for the prevention of backflow, it shall have first been approved by the authority having jurisdiction. Devices or assemblies shall be tested for conformity with recognized standards or other standards acceptable to the authority having jurisdiction. Backflow prevention devices and assemblies shall comply with Table ~~((6-2))~~ **603.2**, except for specific applications and provisions as stated in Section ~~((603.4))~~ **603.5.1** through ~~((603.4.22))~~ **603.5.21**.

All devices or assemblies installed in a potable water supply system for protection against backflow shall be maintained in good working condition by the person or persons having control of such devices or assemblies. Such devices or assemblies shall be tested in accordance with Section ~~((603.3.3))~~ **603.4.2** and WAC 246-290-490. If found to be defective or inoperative, the device or assembly shall be replaced or repaired. No device or assembly shall be removed from use or relocated or other device or assembly substituted, without the approval of the authority having jurisdiction.

Testing shall be performed by a Washington state department of health certified backflow assembly tester.

TABLE ~~((6-2))~~ **603.2**
Backflow Prevention Devices, Assemblies and Methods
The following line is deleted from the table:

Device, Assembly or Method	Applicable Standards	Pollution (Low Hazard)		Contamination (High Hazard)		Installation
		Back Siphonage	Back Pressure	Back Siphonage	Back Pressure	
Backflow preventer for carbonated beverage dispensers (two independent check valves with a vent to the atmosphere.)	ASSE 1022	X				Installation includes carbonated beverage machines or dispensers. These devices operate under intermittent or continuous pressure conditions.

~~((603.3.3))~~ **603.4.2 Testing.** For devices and assemblies other than those regulated by the Washington department of health in conjunction with the local water purveyor for the protection of public water systems, the authority having jurisdiction shall ensure that the premise owner or responsible person shall have the backflow prevention assembly tested by a Washington state department of health certified backflow assembly tester:

- (1) At the time of installation, repair or relocation; and
- (2) At least on an annual schedule thereafter, unless more frequent testing is required by the authority having jurisdiction.

~~((603.4.6.1))~~ **603.5.6 Protection from Lawn Sprinklers and Irrigation Systems.** Potable water supplies to systems having no pumps or connections for pumping equipment, and no chemical injection or provisions for chemical injection, shall be protected from backflow by one of the following devices:

- (1) Atmospheric vacuum breaker (AVB).
- (2) Pressure vacuum breaker backflow prevention assembly (PVB).
- (3) Spill-resistant pressure vacuum breaker (SVB).
- (4) Reduced pressure principle backflow (~~((preventer))~~) prevention assembly (RP).
- (5) A double check valve backflow prevention assembly (DC) may be allowed when approved by the water purveyor and the authority having jurisdiction.

~~((603.4.10 Potable Water Make Up Connections to))~~ **603.5.10 Steam or Hot Water Boilers.** Potable water connections to steam or hot water boilers shall be protected by an air gap or a reduced pressure principle backflow preventer.

~~((603.4.12))~~ **603.5.12 Beverage Dispensers.** Potable water supply to carbonators shall be protected by a listed reduced pressure principle backflow preventer as approved by the authority having jurisdiction for the specific use. The backflow preventer shall be located in accordance with Section ~~((603.3.4))~~ 603.4.3. The piping downstream of the backflow preventer shall not be of copper, copper alloy, or other material that is affected by carbon dioxide.

~~((603.4.14))~~ **603.5.13 Prohibited Location.** Backflow preventers shall not be located in any area containing fumes or aerosols that are toxic, poisonous, infectious, or corrosive.

~~((603.4.16.1))~~ **603.5.15 Protection from Fire Systems.** Except as provided under Sections ~~((603.4.16.2))~~ 603.5.15.1 and ~~((603.4.16.3))~~ 603.5.15.2, potable water supplies to fire protection systems that are normally under pressure, including but not limited to standpipes and automatic sprinkler systems, except in one or two family or townhouse residential flow-through or combination sprinkler systems piped in materials approved for potable water distribution systems, shall be protected from back-pressure and back-siphonage by one of the following testable devices:

1. Double check valve backflow prevention assembly (DC).
2. Double check detector fire protection backflow prevention assembly.

3. Reduced pressure principle backflow (~~((preventer))~~) prevention assembly (RP).

4. Reduced pressure detector fire protection backflow prevention assembly.

Potable water supplies to fire protection systems that are not normally under pressure shall be protected from backflow and shall meet the requirements of the appropriate standard(s) referenced in Table ~~((+4+))~~ 1401.1.

~~((604.15))~~ **604.14** Plastic water service piping may terminate within a building, provided the connection to the potable water distribution system shall be made as near as is practical to the point of entry and shall be accessible. Barbed insert fittings with hose clamps are prohibited as a transition fitting within the building.

608.5 Drains. Relief valves located inside a building shall be provided with a drain, not smaller than the relief valve outlet, of galvanized steel, hard drawn copper piping and fittings, CPVC, PP, or listed relief valve drain tube with fittings which will not reduce the internal bore of the pipe or tubing (straight lengths as opposed to coils) and shall extend from the valve to the outside of the building, with the end of the pipe not more than two (2) feet (610 mm) nor less than six (6) inches (152 mm) above the ground or the flood level of the area receiving the discharge and pointing downward. Such drains may terminate at other approved locations. No part of such drain pipe shall be trapped or subject to freezing. The terminal end of the drain pipe shall not be threaded.

EXCEPTION: Where no drainage was provided, replacement water heating equipment shall only be required to provide a drain pointing downward from the relief valve to extend between two feet (610 mm) and six inches (152 mm) from the floor. No additional floor drain need be provided.

610.4 Systems within the range of Table ~~((6-6))~~ 610.4 may be sized from that table or by the method set forth in Section 610.5.

Listed parallel water distribution systems shall be installed in accordance with their listing.

612.1 General. Where residential fire sprinkler systems are installed, they shall be installed in accordance with the International Building Code or International Residential Code.

613.0 Insulation of Potable Water Piping. Domestic water piping within commercial buildings shall be insulated in accordance with Section C403.2.8 and Table C403.2.8 or Section C404.6 of the Washington State Energy Code, as applicable.

AMENDATORY SECTION (Amending WSR 10-03-101, filed 1/20/10, effective 7/1/10)

WAC 51-56-0700 Chapter 7—Sanitary drainage.

~~((701.1.2))~~ **701.1 Drainage Piping.** Materials for drainage piping shall be in accordance with one of the referenced standards in Table 701.1 except that:

1. No galvanized wrought-iron or galvanized steel pipe shall be used underground and shall be kept not less than 6 inches (152 mm) above ground.

2. ABS and PVC DWV piping installations shall be installed in accordance with applicable standards in Table ~~((44-1))~~ 1401.1. Except for individual single family dwelling units, materials exposed within ducts or plenums shall have a maximum flame-spread index of ~~((not more than))~~ 25 and a maximum smoke developed index of ~~((not more than))~~ 50, when tested in accordance with ~~((the Test for Surface Burning Characteristics of the Building Materials (See the Building Code standards based on))~~ ASTM E-84 and ~~((ANSI/))~~UL 723(~~(+)~~).

3. No vitrified clay pipe or fittings shall be used above ground or where pressurized by a pump or ejector. They shall be kept not less than 12 inches (305 mm) below ground.

4. Copper tube for drainage and vent piping shall have a weight of not less than that of copper drainage tube type DWV.

5. Stainless steel 304 pipe and fittings shall not be installed underground and shall be kept not less than 6 inches (152 mm) above ground.

6. Cast-iron soil pipe and fittings shall be listed and tested in accordance with standards referenced in Table 1401.1. Such pipe and fittings shall be marked with country of origin and identification of the original manufacturer in addition to markings required by referenced standards.

Table 703.2

MAXIMUM UNIT LOADING AND MAXIMUM LENGTH OF DRAINAGE AND VENT PIPING

Notes:

1. Excluding trap arm.
2. Except sinks, urinals, and dishwashers - Exceeding 1 fixture unit.
3. Except six-unit traps or water closets.
4. Only four water closets or six-unit traps allowed on a vertical pipe or stack; and not to exceed three water closets or six-unit traps on a horizontal branch or drain.

EXCEPTION: In a single family dwelling addition or alteration where a 4 inch horizontal waste is not readily available four water closets not to exceed 1.6 gpf each may be allowed on a 3 inch horizontal waste when approved by the AHJ.

5. Based on one-fourth inch per foot (20.8 mm/m) slope. For one-eighths of an inch per foot (10.4 mm/m) slope, multiply horizontal fixture units by a factor of 0.8.

6. The diameter of an individual vent shall be not less than one and one-fourth inches (32 mm) nor less than one-half the diameter of the drain to which it is connected. Fixture unit load values for drainage and vent piping shall be computed from Table 702.1 and Table 702.2(b). Not to exceed one-third of the total permitted length of a vent shall be permitted to be installed in a horizontal position. Where vents are increased one pipe size for their entire length, the maximum length limitations specified in this table do not apply. This table is in accordance with the requirements of Section 901.2.

704.3 Commercial Dishwashing Machines and Sinks.

Except where specifically required to be connected indirectly to the drainage system, or when first approved by the authority having jurisdiction, all plumbing fixtures, drains, appurte-

nances, and appliances shall be directly connected to the drainage system of the building or premises.

705.4.2 Mechanical Joints. Mechanical joints for cast-iron pipe and fittings shall be of the compression or mechanical joint coupling type. Compression type joints with an elastomeric gasket for cast-iron hub and spigot pipe shall comply with ASTM C 564. Hub and spigot shall be clean and free of dirt, mud, sand, and foreign materials. Cut pipe shall be free from sharp edges. Fold and insert gasket into hub. Lubricate the joint following manufacturer's instructions. Insert spigot into hub until the spigot end of the pipe bottom out in the hub. Use the same procedure for the installation of fittings.

A mechanical joint shielded coupling type for hubless cast-iron pipe and fittings shall have a metallic shield and shall comply with ASTM A 1056, ASTM C 1277, ASTM C 1540, or CISPI 310. The elastomeric gasket shall comply with ASTM C 564. Hubless cast-iron pipe and fittings shall be clean and free of dirt, mud, sand, and foreign materials. Cut pipe shall be free from sharp edges. Gasket shall be placed on the end of the pipe or fitting and the stainless steel shield and clamp assembly on the end of the other pipe or fitting. Pipe or fittings shall be seated against the center stop inside the elastomeric sleeve. Slide the stainless steel shield and clamp assembly into position centered over the gasket and tighten. Bands shall be tightened using an approved calibrated torque wrench specifically set by the manufacturer of the couplings.

710.3 Sewage Ejector and Pumps. The minimum size of any pump or any discharge pipe from a sump having a water closet connected thereto shall be not less than two (2) inches (52 mm).

~~((Sections 710.3.1 through 710.3.3 are not adopted.))~~

CHAPTER 7, PART II—BUILDING SEWERS

Part II Building Sewers. Delete all of Part II (Sections 713 through 723, and Tables ~~((7-7))~~ 717.1 and ~~((7-8))~~ 721.1).

AMENDATORY SECTION (Amending WSR 10-03-101, filed 1/20/10, effective 7/1/10)

WAC 51-56-0900 Chapter 9—Vents.

~~((903.1.2))~~ **903.1 Applicable Standards.** Vent pipe and fittings shall comply with the applicable standards referenced in Table 701.1, except that:

1. No galvanized steel or 304 stainless steel pipe shall be installed underground and shall be not less than 6 inches (152 mm) above ground.

2. ABS and PVC DWV piping installations shall be installed in accordance with applicable standards in Table ~~((44-1))~~ 1401.1. Except for individual single family dwelling units, materials exposed within ducts or plenums shall have a maximum flame-spread index of ~~((not more than))~~ 25 and a maximum smoke developed index of ~~((not more than))~~ 50, when tested in accordance with ~~((the Test for Surface Burning Characteristics of the Building Materials (see the Building Code standards based on))~~ ASTM E-84 and ~~((ANSI/))~~UL 723(~~(+)~~).

~~(908.2.1 Where Permitted)~~ **908.2 Horizontal Wet Venting for Bathroom Groups.** Water closets, bathtubs, showers, bidets, and floor drains within one or two bathroom groups located on the same floor level and for private use shall be permitted to be vented by a wet vent. The wet vent shall be considered the vent for the fixtures and shall extend from the connection of the dry vent along the direction of the flow in the drain pipe to the most downstream fixture drain or trap arm connection to the horizontal branch drain. Each wet-vented fixture drain or trap arm shall connect independently to the wet-vented horizontal branch drain. Each individual fixture drain or trap arm shall connect horizontally to the wet-vented horizontal branch drain or shall be provided with a dry vent. The trap to vent distance shall be in accordance with Table ~~((40-1))~~ **1002.2**. Only the fixtures within the bathroom groups shall connect to the wet-vented horizontal branch drain. The water closet fixture drain or trap arm connection to the wet vent shall be downstream of any fixture drain or trap arm connections. Any additional fixtures shall discharge downstream of the wet-vent system and be conventionally vented.

NEW SECTION

WAC 51-56-1000 Chapter 10—Traps and interceptors.

1014.1.3 Food Waste Disposal Units and Dishwashers. Unless specifically required or permitted by the authority having jurisdiction, no food waste disposal unit or dishwasher shall be connected to or discharge into any hydromechanical grease interceptor. Commercial food waste disposers shall be permitted to discharge directly into the building's drainage system.

AMENDATORY SECTION (Amending WSR 07-01-094, filed 12/19/06, effective 7/1/07)

WAC 51-56-1100 Chapter 11—Storm drainage.

1101.3 Material Uses. Rainwater piping placed within the interior of a building or run within a vent or shaft shall be of cast iron, galvanized steel, wrought iron, brass, copper, lead, Schedule 40 ABS DWV, Schedule 40 PVC DWV, or other approved materials, and changes in direction shall conform to the requirements of Section 706.0. ABS and PVC DWV piping installations shall be installed in accordance with IS 5 and IS 9. Except for individual single-family dwelling units, materials exposed within ducts or plenums shall have a maximum flame-spread index of ~~((not more than))~~ 25 and a maximum smoke-developed index of ~~((not more than))~~ 50, when tested in accordance with ~~((the Test for Surface Burning Characteristics of the Building Materials (see the Building Code standards based on))~~ ASTM E-84 and ~~((ANSI))~~UL 723(~~(?)~~).

~~((4101.12.0))~~ **1101.12 Cleanouts.** Cleanouts for building storm drains shall comply with the requirements of this section.

1101.12.1 ~~((Cleanouts for building storm drains shall comply with the requirements of this section.))~~ **Locations.** Rain lead-

ers and conductors connected to a building storm sewer shall have a cleanout installed at the base of the outside leader or outside conductor before it connects to the horizontal drain. Cleanouts shall be placed inside the building near the connection between the building drain and the building sewer or installed outside the building at the lower end of the building drain and extended to grade.

1101.12.2 Cleaning. Each cleanout shall be installed so that it opens to allow cleaning in the direction of flow of the soil or waste or at right angles thereto, and except in the case of wye branch and end-of-line cleanouts, shall be installed vertically above the flow line of the pipe.

1101.12.3 Access. Cleanouts installed under concrete or asphalt paving shall be made accessible by yard boxes, or extending flush with paving with approved materials and be adequately protected.

1101.12.4 Manholes. Approved manholes may be installed in lieu of cleanouts when first approved by the authority having jurisdiction. The maximum distance between manholes shall not exceed three hundred (300) feet (91.4 m).

The inlet and outlet connections shall be made by the use of a flexible compression joint no closer than twelve (12) inches (305 mm) to, and not farther than three (3) feet (914 mm) from the manhole. No flexible compression joints shall be embedded in the manhole base.

1108.0 Controlled-Flow Roof Drainage. This section is not adopted.

AMENDATORY SECTION (Amending WSR 10-03-101, filed 1/20/10, effective 7/1/10)

WAC 51-56-1300 Chapter 13—Health care facilities and medical gas and vacuum systems.

Part II Medical Gas and Vacuum Systems

1309.0 Scope.

1309.1 General. The provisions herein shall apply to the design, installation, testing, and verification of medical gas, medical vacuum systems, and related permanent equipment in hospitals, clinics, veterinary clinics and other health care facilities.

1309.2 Purpose. The purpose of this chapter is to provide minimum requirements for the design, installation, testing and verification of medical gas, medical vacuum systems, and related permanent equipment, from the central supply system to the station outlets or inlets.

~~((4143.3))~~ **1321.3 Minimum Station Outlets/Inlets.** Station outlets and inlets for medical gas and medical vacuum systems for facilities licensed or certified by Washington state department of health (DOH) or Washington state department of social and health services (DSHS) shall be provided as listed in chapter 246-320 WAC as required by the applicable licensing rules as applied by DOH construction review services. All other medical gas and medical vacuum systems shall be provided as listed in Table ~~((43-3))~~ **1312.3**.

~~((4328.0))~~ **1327.0 System Verification.**

~~((1328.1))~~ **1327.1 Verification.** Prior to any medical gas system being placed in service, each and every system shall be verified as described in section 1328.2.

~~((1328.1.1))~~ **1327.1.1 Verification Tests.** Verification tests shall be performed only after all tests required in section ~~((1327.0))~~ **1326.0**, Installer Performed Tests, have been completed.

Testing shall be conducted by a party technically competent and experienced in the field of medical gas and vacuum pipeline testing and meeting the requirements of ANSI/ASSE Standard 6030, Medical Gas Verifiers Professional Qualifications Standard.

Testing shall be performed by a party other than the installing contractor or material vendor.

When systems have been installed by in-house personnel, testing shall be permitted by personnel of that organization who meet the requirements of this section.

AMENDATORY SECTION (Amending WSR 10-03-101, filed 1/20/10, effective 7/1/10)

WAC 51-56-1400 Chapter 14—Referenced standards.

TABLE ~~((44.4))~~ 1401.1

Standards for Materials, Equipment, Joints and Connections

Where more than one standard has been listed for the same material or method, the relevant portions of all such standards shall apply.

Add the following standard to those listed in Table ~~((44.4))~~ 1401.1:

Standard Number	Standard Title	Application
WAC 246-290-490	Washington State Department of Health Cross-connection Control Requirements	Backflow Protection

AMENDATORY SECTION (Amending WSR 12-07-018, filed 3/12/12, effective 4/12/12)

WAC 51-56-1600 Chapter 16—~~((Gray water systems))~~ Alternate water sources for nonpotable applications.

~~((Part I,))~~ **1601.1.1 Allowable use of Alternative Water.** Where approved or required by the authority having jurisdiction, alternate water sources (reclaimed (recycled) water, gray water and on-site treated nonpotable water) shall be permitted to be used in lieu of potable water for the applications identified in this chapter. Gray water shall not be used for irrigation except as permitted by the department of health rules.

1601.2 System Design. Alternate water source systems in accordance with this chapter shall be designed by a person registered or licensed to perform plumbing design work.

Components, piping, and fittings used in an alternate water source system shall be listed.

1601.3 Permit. It shall be unlawful for a person to construct, install, alter, or cause to be constructed, installed, or altered an alternate water source system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.

1601.5.2 Maintenance Log. A maintenance log for gray water, and on-site treated nonpotable water systems required to have a permit in accordance with Section 1601.3 shall be maintained by the property owner and be available for inspection. The property owner or designated appointee shall ensure that a record of testing, inspection and maintenance in accordance with Table 1601.5 is maintained in the log. The log will indicate the frequency of inspection and maintenance for each system.

1601.10 Abandonment. Where alternate water source systems for nonpotable use are abandoned, the procedure for abandonment shall be as required by the Authority Having Jurisdiction. Components of the abandoned system including, but not limited to, pipe, tubing, fittings and valves shall not be used for potable water systems.

1602.0 Gray Water Systems, is not adopted. Gray water shall not be used for irrigation except as permitted by the department of health rules.

~~((Part H~~

~~**1613. Nonpotable Reuse Water Systems—General:**~~

~~(A) The provisions of Part H of this chapter shall apply to the installation, construction, alteration, and repair of nonpotable reuse water intended to supply uses such as water closets, urinals, and trap primers for floor drains, and floor sinks, irrigation, industrial processes, water features and other uses approved by the Authority Having Jurisdiction. Potable water supplied as makeup water in these systems shall be protected against back pressure and backsiphonage in accordance with Sections 602.0 and 603.0.~~

~~(B) No permit for any nonpotable reuse water system shall be issued until complete plumbing plans, with appropriate data satisfactory to the Authority Having Jurisdiction, have been submitted and approved. No changes or connections shall be made to either the nonpotable water system or the potable water system within any site containing a nonpotable reuse water system without approval by the Authority Having Jurisdiction.~~

~~(C) Before the building is occupied, the installer shall perform the initial cross-connection test in the presence of the Authority Having Jurisdiction and other authorities having jurisdiction. The test shall be ruled successful by the Authority Having Jurisdiction before final approval is granted.~~

~~(D) A nonpotable reuse water system shall be designed by a person registered or licensed to perform plumbing design work.~~

1614.0 Definitions. Nonpotable reuse water shall include the following:

Reclaimed Water—Water derived in any part from wastewater with a domestic wastewater component that has been adequately and reliably treated, so that it can be used for beneficial purposes. Reclaimed water is not considered a wastewater (RCW 90.46.010);

Greywater or Gray Water—Domestic type flows from bathtubs, showers, bathroom sinks, washing machines, dishwashers, and kitchen or utility sinks. Gray water does not include flow from a toilet or urinal (RCW 90.46.010); and

Other nonpotable wastewater sources from appliances and fixtures excluding wastewater streams containing black water.

For rainwater harvesting, see Part III.

1615.0 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any nonpotable reused water system within a building or on a premises without first obtaining a permit to do such work from the Authority Having Jurisdiction.

1616.0 Drawings and Specifications. The Authority Having Jurisdiction shall be permitted to require any or all of the following information to be included with or in the plot plan before a permit is issued for a nonpotable reused water system:

(A) A plot plan drawn to scale and completely dimensioned, showing lot lines and structures, location of present and proposed potable water supplies and meters, water wells, streams, auxiliary water supply and systems, nonpotable reused water supply and meters, drain lines, and locations of private sewage disposal systems and 100 percent expansion areas or building sewer connected to the public sewer.

(B) Details of construction including riser diagrams or isometries and a full description of the complete installation, including installation methods, construction, and materials as required by the Authority Having Jurisdiction. To the extent permitted by structural conditions, nonpotable reused water risers within the toilet room, including appurtenances such as air/vacuum relief valves, pressure reducing valves, etc., shall be installed in the opposite end of the room containing the served fixtures from the potable water risers or opposite walls, as applicable. To the extent permitted by structural conditions, nonpotable reused water headers and branches off risers shall not be run in the same wall or ceiling cavity of the toilet room where potable water piping is run.

(C) Detailed initial and annual testing requirements as outlined elsewhere in this chapter.

1617.0 Pipe Material/Pipe Identification. Nonpotable reused water systems shall comply with Sections 1617.1 and 1617.2.

1617.1 Pipe Materials. Reclaimed water and nonpotable water reuse pipe, valves and fittings shall conform to the requirements of Sections 604.0, 605.0 and 606.0.

1617.2 Color and Information:

1617.2.1 Reclaimed Water. Reclaimed water systems shall have a purple background with black uppercase lettering with

the words "CAUTION: RECLAIMED WATER, DO NOT DRINK." The minimum size of the letters and length of the color field shall conform to Table 6-1. Where used, a colored identification band shall be indicated every twenty feet (6,096 mm) not less than once per room, and shall be visible from the floor level. Where concealed within construction, the piping shall be labeled on two opposing sides of the pipe within each stud or joist bay. Marking is not required for pipe manufactured with purple color integral to the pipe and marked with black uppercase lettering to read "CAUTION: NONPOTABLE RECLAIMED WATER, DO NOT DRINK" in intervals not to exceed five feet (1,524 mm). All valves, except fixture supply control valves shall be equipped with a locking feature. All mechanical equipment that is appurtenant to the reclaimed water system shall be painted purple.

1617.2.2 Other Nonpotable Reused Water. Except as noted in Section 1617.2.1, nonpotable water systems shall have a purple background with black uppercase lettering, with the words "CAUTION: NONPOTABLE WATER, DO NOT DRINK." Each nonpotable system shall be identified to designate the liquid being conveyed, and the direction of normal flow shall be clearly shown. The minimum size of the letters and length of the color field shall conform to Table 6-1.

The background color and required information shall be indicated every twenty feet but not less than once per room, and shall be visible from the floor level. Where concealed within construction, the piping shall be labeled on two opposing sides of the pipe within each stud or joist bay. All mechanical equipment that is appurtenant to the nonpotable reused water system shall be painted purple.

1618.0 Installation:

1618.1 Collection Reservoir. Nonpotable reuse water shall be collected in an approved reservoir constructed of durable, nonabsorbent and corrosion-resistant materials. The reservoir shall be a closed and gas-tight vessel. Access openings shall be provided to allow inspection and cleaning of the reservoir interior. The reservoir shall be sized to limit the retention time of nonpotable reuse water to a maximum of seventy-two hours.

1618.1.1 Filtration. Nonpotable reuse water entering the reservoir shall pass through an approved filter such as a media, sand or diatomaceous earth filter.

1618.1.2 Required Valve. A full open valve shall be installed downstream of the last fixture connection to the nonpotable reuse water discharge pipe before entering the required filter.

1618.1.3 Overflow. The collection reservoir shall be equipped with an overflow pipe of the same diameter as, or larger than, the influent pipe for the nonpotable reuse water. The overflow shall be indirectly connected to the sanitary drainage system.

1618.1.4 Drain. A drain shall be located at the lowest point of the collection reservoir and shall be indirectly connected to the sanitary drainage system. The drain shall be the same diameter as the overflow pipe required in Section 1618.1.3.

1618.1.5 Disinfection. Nonpotable reuse water shall be disinfected by an approved method that uses one or more disinfectants such as chlorine, iodine or ozone.

1618.1.6 Makeup Water. Potable water shall be supplied as a source of makeup water for nonpotable water systems that serve plumbing fixtures. The potable supply shall be protected against backflow in accordance with Chapter 6. A full-open valve shall be located on the makeup water supply line to the collection reservoir.

(A) Hose bibbs shall not be allowed on nonpotable reuse water piping systems.

(B) The nonpotable reuse water system and the potable water system within the building shall be provided with the required appurtenances (valves, air/vacuum relief valves, etc.) to allow for deactivation or drainage as required by this chapter for a cross-connection test in Section 1620.0.

(C) Nonpotable reuse water pipes shall not be run or laid in the same trench as potable water pipes. A ten-foot (3,048 mm) horizontal separation shall be maintained between pressurized, buried reclaimed and potable water piping. Buried potable water pipes crossing pressurized nonpotable reuse water pipes shall be laid not less than twelve inches (305 mm) above the nonpotable reuse water pipes. Nonpotable reuse water pipes laid in the same trench or crossing building sewer or drainage piping shall be installed in compliance with Sections 609.0 and 720.0 of this code. Nonpotable reuse water pipes shall be protected similar to potable water pipes.

1619.0 Signs.

1619.1 Commercial, Industrial and Institutional Room Entrance Signs. In commercial, industrial, and institutional occupancies, all rooms using nonpotable reuse water for water closets and/or urinals shall be identified with signs. Each sign shall contain one-half inch (12.7 mm) letters of a highly visible color on a contrasting background. The location of the sign(s) shall be such that the sign(s) shall be visible to all users. The number and location of the signs shall be approved by the Authority Having Jurisdiction and shall contain the following text:

~~TO CONSERVE WATER,
THIS BUILDING USES RECLAIMED WATER TO FLUSH TOILETS AND URINALS.~~

1619.2 Equipment Room Signs. Each room containing nonpotable reuse water equipment shall have a sign posted with the following wording in one-inch (25.4 mm) letters on a purple background:

~~CAUTION
NONPOTABLE RECLAIMED WATER, DO NOT DRINK,
DO NOT CONNECT TO DRINKING WATER SYSTEM.
NOTICE
CONTACT BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM.~~

This sign shall be posted in a location that is visible to anyone working on or near nonpotable reuse water equipment.

1619.3 Where water closets and/or urinals are flushed with nonpotable reuse water, the fixture shall be labeled:

CAUTION

~~TO CONSERVE WATER, THIS BUILDING USES NONPOTABLE RECLAIMED WATER TO FLUSH TOILETS AND URINALS~~

1619.4 Valve Access Door Signs. Each nonpotable reuse water valve within a wall shall have its access door into the wall equipped with a warning sign approximately six inches by six inches (152 mm x 152 mm) with wording in one-half inch (12.7 mm) letters on a purple background. The size, shape, and format of the sign shall be substantially the same as that specified in subsection (B) above. The signs shall be attached inside the access door frame and shall hang in the center of the access door frame. This sign requirement shall be applicable to any and all access doors, hatches, etc., leading to nonpotable reuse water piping and appurtenances.

1620.0 Inspection and Testing.

1620.1 Nonpotable reuse water piping shall be inspected and tested as outlined in this code for testing of potable water piping.

1620.2 An initial and subsequent annual inspection and test shall be performed on both the potable and nonpotable reuse water systems. The potable and nonpotable reuse water systems shall be isolated from each other and independently inspected and tested to ensure there is no cross-connection as follows:

1620.2.1 Visual Dual System Inspection. Prior to commencing the cross-connection testing, a dual system inspection shall be conducted by the Authority Having Jurisdiction and other authorities having jurisdiction:

(i) Meter locations of the nonpotable reuse water and potable water lines shall be checked to verify that no modifications were made, and that no cross-connections are visible.

(ii) Pumps and equipment, equipment room signs, and exposed piping in the equipment room shall be checked.

(iii) Valves shall be checked to ensure that valve lock seals are still in place and intact. Valve control door signs shall be checked to verify that no signs have been removed.

1620.2.2 Cross-Connection Test. The following procedure shall be followed by the applicant in the presence of the Authority Having Jurisdiction and other authorities having jurisdiction to determine whether a cross-connection occurred.

(i) The potable water system shall be activated and pressurized. The nonpotable reuse water system shall be shut down and completely drained.

(ii) The potable water system shall remain pressurized for a minimum period of time specified by the Authority Having Jurisdiction while the nonpotable reuse water system is empty. The minimum period the nonpotable reuse water system is to remain depressurized shall be determined on a case-by-case basis, taking into account the size and complexity of the potable and nonpotable reuse water distribution systems, but in no case shall that period be less than one hour.

(iii) Fixtures, potable and reclaimed, shall be tested and inspected for flow. Flow from any nonpotable reuse water system outlet shall indicate a cross-connection. No flow from a potable water outlet would indicate that it is connected to the nonpotable reuse water system.

(iv) The drain on the nonpotable reuse water system shall be checked for flow during the test and at the end of the period.

(v) The potable water system shall then be completely drained.

(vi) The nonpotable reuse water system shall then be activated and pressurized.

(vii) The nonpotable reuse water system shall remain pressurized for a minimum period of time specified by the Authority Having Jurisdiction while the potable water system is empty. The minimum period the potable water system is to remain depressurized shall be determined on a case-by-case basis, but in no case shall that period be less than one hour.

(viii) Fixtures, potable and reclaimed, shall be tested and inspected for flow. Flow from any potable water system outlet shall indicate a cross-connection. No flow from a nonpotable reuse water outlet would indicate that it is connected to the potable water system.

(ix) The drain on the potable water system shall be checked for flow during the test and at the end of the period.

(x) If there is no flow detected in any of the fixtures that would have indicated a cross-connection, the potable water system shall be repressurized.

1620.2.3 Cross Connection Discovered. The following procedure, in the presence of the Authority Having Jurisdiction, shall be activated immediately:

(i) Nonpotable reuse water piping to the building shall be shut down at the meter, and the nonpotable reuse water riser shall be drained.

(ii) Potable water piping to the building shall be shut down at the meter.

(iii) The cross-connection shall be uncovered and disconnected.

(iv) The building shall be retested following procedures listed in subsections (B)(1) and (2) above.

(v) The potable water system shall be chlorinated with fifty ppm chlorine for twenty-four hours.

(vi) The potable water system shall be flushed after twenty-four hours, and a standard bacteriological test shall be performed. If test results are acceptable, the potable water system shall be permitted to be recharged.

1620.3 An annual inspection of the nonpotable reuse water system, following the procedures listed in subsection 1620.0 (B)(1), shall be required. Annual cross-connection testing, following the procedures listed in subsection 1620.0 (B)(2), shall be required by the Authority Having Jurisdiction, unless site conditions do not require it. In no event shall the test occur less often than once in four years. Alternate testing requirements shall be permitted by the Authority Having Jurisdiction.

1621.0 Sizing. Nonpotable reuse water piping shall be sized as outlined in this code for sizing potable water piping.

1622.0 Abandonment of Nonpotable Reuse Water Systems. Where nonpotable reuse water systems are abandoned, the procedure for abandonment shall be as required by the Authority Having Jurisdiction. Components of the abandoned system, including, but not limited to, pipe, tubing, fittings and valves shall not be used for potable water systems.

Part III

1623.0 Rainwater Harvesting Systems—General. All components of the system not specifically addressed by the provisions of Part III of this chapter shall meet all applicable sections of this code, and any applicable manufacturer's installation instructions.

Engineered systems shall be installed per plans and specifications of the engineer of record.

1624.0 Scope. Applications for rainwater harvesting are unique for each application. For this reason, each rainwater harvesting system proposed for use must be engineered and site-specific and are subject to the approval of the Authority Having Jurisdiction. The requirement for the system to be engineered may be waived by the Authority Having Jurisdiction.

1624.1 Water Uses. Harvested rainwater uses may include water closets, urinals, hose bibbs, industrial applications, and irrigation purposes. Other uses may be allowed when first approved by the Authority Having Jurisdiction.

1625.0 Definitions. In addition to other definitions used in the Uniform Plumbing Code, the following definitions apply to rainwater harvesting systems:

1625.1 Auxiliary Supply. The piping arranged and protected from contamination to provide an alternate means of filling a cistern.

1625.2 Cistern. The central storage component of the rainwater harvesting system. Protection and maintenance of the cistern is essential for the health of the system.

1625.3 Debris Excluder. A screen or other device installed on the gutter or downspout system to prevent the accumulation of leaves, needles, or other debris in the system.

1625.4 Flat. Having a slope no greater than 1 in 50.

1625.5 Piping System. The system of pipes that conveys the harvested rainwater and distributes it to various fixtures.

1625.6 Prefiltration. A device to mechanically remove sediment and debris.

1625.7 Pump or Pressure System. The mechanical device necessary to distribute the harvested rainwater from the cistern to the designated fixtures.

1625.8 Rainwater Harvesting System (RWS). A cistern(s), pipe, fittings, pumps and other plumbing appurtenances required for and/or used to harvest and distribute rainwater.

1625.9 Return Elbow. A section of pipe with a 180 degree bend.

1625.10 Roof Drainage System. The roof drains, overflow drains, scuppers, gutters and downspouts used to convey the rainwater from the roof surface to the system.

1625.11 Roof Surface. The surface rainwater harvesting systems rely on for the collection of rainwater that has fallen on a building roof.

1625.12 Roof Wash or Roof Washer. A device or method for removal of sediment and debris from collected roof water by diverting initial rainfall from entry into the cistern(s).

1625.13 Screen. Corrosion resistant wire or other approved mesh having openings in determined sizes.

1625.14 Slope or Sloping. Having a slope greater than 1 in 50.

1625.15 Transfer Pump. The mechanical device to transfer collected water from downspouts to remote cistern(s).

1626.0 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any rainwater harvesting system within a building or on a premises without first obtaining a permit to do such work from the Authority Having Jurisdiction.

In addition to the permits required by this Code, the following additional permits may be required for the installation of a rainwater harvesting system: An electrical permit for the pump or other electrical controls; a building permit for cistern footings, foundations, enclosures and roof structures; a grading permit may be necessary for underground tanks. In addition, contact your regional office of the department of ecology regarding a registration form.

1626.1 Application. The following information must be provided with each permit application for a rainwater harvesting system:

1. Site or plot plan, including site elevations.
2. A diagram of the rainwater harvesting system (including piping and equipment) and domestic potable water systems, including sizing and dimensions.
3. Specifications and manufacturer's installation instructions for cistern(s), pump(s), filtration and/or disinfection, and roof washing or pre-filtration system(s).
4. Engineering. Installation, including, but not limited to, the following systems, will require structural engineering: Cisterns that are located on top of a building structure or cisterns that are located on sloping sites.

Information in addition to that listed above may be necessary in some instances. The size and complexity of the building, site and system will determine the necessity for additional information.

1627.0 General Provisions. A rainwater harvesting system begins at the point of collection and terminates as waste after the water collected has been used in plumbing fixtures, industrial applications, or used for irrigation purposes. The parts of the collection and distribution system include the roof surface, gutters and downspouts, roof washer, cistern, pump and the piping system.

1627.1 Collection System. Rainwater shall only be harvested from roof surfaces. Harvest shall not occur from the following locations:

1. Any vehicular or pedestrian area;
2. Surface water runoff; or
3. Bodies of standing water.

1627.2 Collection Pretreatment. Rainwater harvested from roof surfaces shall be pretreated by either a roof washing system or other filtration system of no more than 50 microns.

The quantity of the first flush generated by the rainwater harvesting system during any rain event shall be calculated as the first 0.02 inch of rainfall per 24-hour period per square foot of roof area and shall be diverted away from the cistern. Discharge of any diverted water shall go to a location approved by the Administrative Authority.

- EXCEPTIONS:
1. A first flush is not required where a post storage filtration or treatment system is installed and approved by the Administrative Authority.
 2. A first flush is not required for systems used exclusively for irrigation purposes.

1628.0 System Components:

1628.1 Roof Surface. The roof surface may be constructed of any material accepted by the Administrative Authority.

- EXCEPTION: Copper, zinc or lead roofing materials shall not be used.

1628.2 Roof Drainage System. Gutters and downspouts used to collect rainwater shall comply with the following:

1. Gutters and downspouts may be manufactured of any material. Gutter and downspout materials are not required to meet material specifications found in the Uniform Plumbing Code.

- EXCEPTION: Copper or zinc gutters and downspouts shall not be used. If existing gutters and downspouts are already in place, the interior shall be coated with a NSF-quality epoxy paint.

2. Gutter and downspout systems leading to the cistern shall be fitted with debris excluders.

1628.3 Roof Washers and Prefiltration. All rainwater harvesting systems using impervious roof surfaces shall have at least one roof washer per downspout or prefiltration system. A roof washer or prefiltration system is not required for pervious roof surfaces such as green roofs. Roof washers and prefiltration systems shall meet the following design requirements:

1628.3.1 All collected rainwater shall pass through a roof washer or prefiltration system before the water enters the cistern(s).

1628.3.2 If more than one cistern is used, a roof washer or prefiltration system shall be provided for each cistern.

- EXCEPTION: Where a series of cisterns are interconnected to supply water to a single system.

1628.3.3 The following requirements apply to all roof washers:

1628.3.3.1 The inlet to the roof washer shall be provided with a debris screen that protects the roof washer from the intrusion of waste and vermin.

1628.3.3.2 The roof washer shall rely on manually operated valves or other devices to do the diversion.

1628.3.3.8 Roof washers shall be readily accessible for regular maintenance.

1628.3.4 Prefiltration screens or filters shall be maintained consistent with manufacturer's specifications.

1628.4 Cisterns. The following are the minimum requirements for cisterns:

1628.4.1 General.

1628.4.1.1 All cisterns shall be listed for use with potable water.

1628.4.1.2 Cisterns shall be capable of being filled from both the rainwater harvesting system and the public or private water system.

1628.4.1.3 The municipal or on-site well water system shall be protected from cross-contamination in accordance with Section 603.4.5.

1628.4.1.4 Backflow assemblies shall be maintained and tested in accordance with Section 603.3.3.

1628.4.1.5 Cisterns may be used as storm water collection points that help to minimize flood damage, while providing a reservoir for later use.

1628.4.1.6 Cisterns shall have access to allow inspection and cleaning.

1628.4.2 Size. Any cistern, or combination of cisterns used, shall be sized adequately for the intended use of the water.

1628.4.2.1 For above grade cisterns, the ratio of the cistern size shall not be greater than 1:1 height to width, provided that for an engineered tank with an engineered foundation, the height may exceed the width, subject to approval of the Authority Having Jurisdiction. The ratio for below grade cisterns is not limited.

1628.4.3 Location. Cisterns may be installed either above or below grade. All cisterns shall be installed in accordance with the manufacturer's installation instructions. Where the installation requires a foundation, the foundation shall be flat and shall be capable of supporting the cistern weight when the cistern is full.

1628.4.3.1 Below Grade Cisterns. Below grade cisterns shall be provided with manhole risers a minimum of 8 inches above surrounding grade. Underground cisterns shall have tie-downs per manufacturer's specifications, or the excavated site must have a daylight drain or some other drainage mechanism to prevent floating of the cistern resulting from elevated groundwater levels.

1628.4.4 Protection. Cisterns shall be protected from sunlight to inhibit algae growth and ensure life expectancy of tank.

1628.4.5 Inlets, Outlets and Openings. All cistern openings shall be protected from unintentional entry by humans or vermin. Manhole covers shall be provided and shall be secured to prevent tampering. Where an opening is provided that could allow the entry of personnel, the opening shall be marked, "DANGER - CONFINED SPACE."

Cistern outlets shall be located at least 4 inches above the bottom of the cistern.

1628.4.6 Overflow. The cistern shall be equipped with an overflow device.

1628.4.6.1 The overflow device shall consist of a pipe equal to or greater than the cistern inlet and a minimum of 4 inches below any makeup device from other sources.

1628.4.6.2 The overflow outlet shall be protected with a screen having openings no greater than 0.25 inches or a self-sealing cover.

1628.4.6.3 The Authority Having Jurisdiction shall approve the discharge location of the overflow water.

1628.5 Pump. Where a pump is provided in conjunction with the rainwater harvesting system, the pump shall meet the following provisions:

1628.5.1 The pump and all other pump components shall be listed and approved for use with potable water systems.

1628.5.2 The pump shall be capable of delivering a minimum of 15 psi residual pressure at the highest outlet served. Minimum pump pressure shall allow for friction and other pressure losses. Maximum pressures shall not exceed 80 psi.

1628.6 Piping.

1628.6.1 There shall be no direct connection of any rainwater harvesting pipe system and any domestic potable water pipe system.

1628.6.2 Materials. Pipe used to convey harvested rainwater shall be identified per Section 601.2 and Table 6-1. Fittings and other system components shall be listed for use in conjunction with specified piping. Both piping and fittings shall be installed as required by applicable code and standards.

1628.6.2.1 All other products entering into the construction of a rainwater harvesting system shall be listed as required by code for the purpose intended, and suitable for use in a potable water system.

1628.6.3 Color and Information. All rainwater pipe shall have a purple background with black uppercase lettering, with the words "CAUTION: NONPOTABLE RAINWATER, DO NOT DRINK" every twenty feet along its length, but in no case less than once per room, and shall be visible from the floor level. The minimum size of the letters and the length of the color field shall conform to Table 6-1. Where concealed within construction, the piping shall be labeled on two opposing sides of the pipe within each stud or joist bay. All mechanical equipment that is appurtenant to the nonpotable rainwater system shall be painted purple.

1629.0 Signs.

1629.1 Commercial, Industrial and Institutional Room Entrance Signs. In commercial, industrial, and institutional occupancies, all rooms using nonpotable reuse water for water closets and/or urinals shall be identified with signs. Each sign shall contain one-half inch (12.7 mm) letters of a highly visible color on a contrasting background. The location of the sign(s) shall be such that the sign(s) shall be visible to all users. The number and location of the signs shall be approved by the Authority Having Jurisdiction and shall contain the following text:

~~TO CONSERVE WATER,
THIS BUILDING USES RAINWATER TO FLUSH TOILETS AND
URINALS.~~

~~**1629.2 Equipment Room Signs.** Each room containing nonpotable rainwater equipment shall have a sign posted with the following wording in one-inch (25.4 mm) letters on a purple background:~~

~~CAUTION
NONPOTABLE RAINWATER, DO NOT DRINK,
DO NOT CONNECT TO DRINKING WATER SYSTEM.
NOTICE
CONTACT BUILDING MANAGEMENT
BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM.~~

~~This sign shall be posted in a location that is visible to anyone working on or near nonpotable reuse water equipment.~~

~~**1629.3** Every water closet or urinal supply, hose bibb or irrigation outlet shall be permanently identified with an indelibly marked placard stating:~~

~~CAUTION
NONPOTABLE RAINWATER, DO NOT DRINK~~

~~**1630.0 Inspection and Testing.**~~

~~(A) Rainwater harvesting systems shall be inspected and tested as outlined in this code for testing of potable water piping.~~

~~(B) An initial inspection and test shall be performed on both the potable and rainwater harvesting systems. The potable and rainwater system shall be isolated from each other and independently inspected and tested to ensure there is no cross-connection.~~

~~**1631.0 System Maintenance.** Rainwater harvesting systems shall be maintained in functioning order for the life of the system. It is the property owner's responsibility to maintain the system until the system is abandoned as prescribed in this code.~~

~~**1632.0 System Abandonment.** If the owner of a rainwater harvesting system elects to cease use of, or fails to properly maintain such system, they shall abandon the system. To abandon the system one shall:~~

- ~~1. Remove the system entirely; and~~
- ~~2. Replace the rainwater harvesting pipe system with an approved potable water supply pipe system. Where an existing potable pipe system is already in place, fixtures may be reconnected to the existing system.~~

~~Rainwater harvesting system abandonment and potable water installations require permit, inspection(s) and approval(s).)~~

~~**1604.1 General.** The provisions of this section shall apply to the installation, construction, alteration, and repair of on-site treated nonpotable water systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, and other uses approved by the authority having jurisdiction.~~

NEW SECTION

WAC 51-56-1700 Chapter 17—Nonpotable rainwater catchment systems.

1702.0 Nonpotable Rainwater Catchment Systems.

1702.1 General. The installation, construction, alteration, and repair of rainwater catchments systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, irrigation, industrial processes, water features, cooling tower makeup and other uses shall be approved by the authority having jurisdiction.

EXCEPTION: Exterior irrigation piping.

1702.2 Permit. It shall be unlawful for a person to construct, install, alter, or cause to be constructed, installed, or altered a nonpotable rainwater catchment system in a building or on a premises without first obtaining a permit to do such work from the authority having jurisdiction.

- EXCEPTIONS:
1. A permit is not required for exterior rainwater catchment systems used for outdoor drip and subsurface irrigation with a maximum storage capacity of 360 gallons (1363 L).
 2. A plumbing permit is not required for rainwater catchment systems for single family dwellings where outlets, piping, and system components are located on the exterior of the building. This does not exempt the need for permits where required for electrical connections, tank supports, or enclosures.

1702.2.1 Plumbing Plan Submission. No permit for a rainwater catchment system shall be issued until complete plumbing plans, with data satisfactory to the Authority Having Jurisdiction, have been submitted and approved.

1702.12 Abandonment. Where nonpotable rainwater catchment systems are abandoned, the procedure for abandonment shall be as required by the Authority Having Jurisdiction. Components of the abandoned system including, but not limited to, pipe, tubing, fittings and valves shall not be used for potable water systems.

NEW SECTION

WAC 51-56-90700 Installation Standard 7-03—Polyethylene cold water building supply and yard piping.

2.6.1 Location. Polyethylene piping may terminate within a building or structure. The connection to the potable water distribution system shall be accessible, except that it may be buried underground outside of the building or structure in an accessible location. Barbed insert fittings with hose clamps are prohibited within a building.

NEW SECTION

WAC 51-56-90800 Installation Standard 8-03—PVC cold water building supply and yard piping.

2.7.1 Location. PVC piping may terminate within a building or structure. The connection to the potable water distribution system shall be accessible, except that it may be buried underground outside of the building or structure in an accessible location.

NEW SECTION**WAC 51-56-92000 Installation Standard 20-2010—CPVC solvent cemented hot and cold water distribution systems.**

2.1.2 Primer. Listed primers shall be used that are compatible with the type of listed CPVC cement and pipe used. The primer shall be a true solvent for CPVC, containing no slow-drying ingredient. Cleaners shall not be allowed to be used as a substitute or equivalent for a listed primer.

EXCEPTION: Listed solvent cements that do not require the use of primer shall be permitted for use with CPVC pipe and fittings, manufactured in accordance with ASTM D2845, 1/2 inch through 2 inches in diameter.

REPEALER

The following chapter of the Washington Administrative Code is repealed:

WAC 51-57-001	Authority.
WAC 51-57-002	Purpose.
WAC 51-57-003	Uniform Plumbing Code Standards.
WAC 51-57-004	Conflicts between Appendix I and the manufacturer's installation instructions.
WAC 51-57-007	Exceptions.
WAC 51-57-008	Implementation.
WAC 51-57-202000	Installation Standard 20-200—CPVC solvent cemented hot and cold water distribution systems.
WAC 51-57-790000	Installation Standard 7-03—Polyethylene cold water building supply and yard piping.
WAC 51-57-895000	Installation Standard 8-03—PVC cold water building supply and yard piping.

WSR 13-04-055**PERMANENT RULES****BUILDING CODE COUNCIL**

[Filed February 1, 2013, 11:03 a.m., effective July 1, 2013]

Effective Date of Rule: July 1, 2013.

Purpose: Adoption and amendment of the 2012 International Energy Conservation Code, Residential, chapter 51-11R WAC. This also includes repeal of the 2009 Washington State Energy Code, chapter 51-11 WAC.

Citation of Existing Rules Affected by this Order: Repealing chapter 51-11 WAC.

Statutory Authority for Adoption: RCW 19.27A.020 and 19.27A.045.

Other Authority: Chapters 19.27 and 34.05 RCW.

Adopted under notice filed as WSR 12-16-086 on July 31, 2012.

Changes Other than Editing from Proposed to Adopted Version: 1. WAC 51-11R-40211, 51-11R-40213, Tables R402.1.1 and R402.1.3: Data for climate zones outside of Washington state was removed for ease of use. Only Climate Zone 5/Marine 4 and Climate Zone 6 are applicable in this state.

2. WAC 51-11R-40551, Table R405.5.2(1): Based on public comments received, the heating, cooling and service water heating systems columns were modified to include the specification that equipment must meet minimum federal efficiency standards for the standard reference design in the simulated performance path.

3. WAC 51-11R-50000, Chapter 5: The reference for NFRC standards 100, 200 and 400 were corrected to the 2010 editions per the International Code Council Errata.

A final cost-benefit analysis is available by contacting Tim Nogler, P.O. Box 41449, Olympia, WA 98504-1449, phone (360) 407-9277, fax (360) 586-9088, e-mail sbcc@ga.wa.gov, or see <https://fortress.wa.gov/ga/apps/SBCC/File.ashx?cid=2328>.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 91, Amended 0, Repealed 151.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 91, Amended 0, Repealed 151.

Date Adopted: November 30, 2012.

C. Ray Allshouse
Council Chair

Chapter 51-11R WAC**STATE BUILDING CODE ADOPTION AND AMENDMENT OF THE 2012 EDITION OF THE INTERNATIONAL ENERGY CONSERVATION CODE, RESIDENTIAL**NEW SECTION**WAC 51-11R-10000 Chapter 1 [RE]—Scope and administration.**

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION**WAC 51-11R-10100 Section R101—Scope and general requirements.**

R101.1 Title. This code shall be known as the *International Energy Conservation Code* of THE STATE OF WASHINGTON, and shall be cited as such. It is referred to herein as "this code."

R101.2 Scope. This code applies to *residential buildings* and the buildings sites and associated systems and equipment. This code shall be the maximum and minimum energy code for residential construction in each town, city and county.

R101.3 Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

R101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

R101.4.1 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

R101.4.2 Historic buildings. The building official may modify the specific requirements of this code for historic buildings and require in lieu of alternate requirements which will result in a reasonable degree of energy efficiency. This modification may be allowed for those buildings or structures that are listed in the state or national register of historic places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a national register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the national or state registers of historic places either individually or as a contributing building to a historic district by the state historic preservation officer or the keeper of the national register of historic places.

R101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

EXCEPTION: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation. 2x4 framed walls shall be insulated to a minimum of R-15 and 2x6 framed walls shall be insulated to a minimum of R-21.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
7. Alterations that replace less than 60 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

The building official may approve designs of alterations or repairs which do not fully conform with all of the requirements of this code where in the opinion of the building official full compliance is physically impossible and/or economically impractical and:

1. The alteration or repair improves the energy efficiency of the building; or
2. The alteration or repair is energy efficient and is necessary for the health, safety, and welfare of the general public.

R101.4.3.1 Mechanical systems. When a space-conditioning system is altered by the installation or replacement of space-conditioning equipment (including replacement of the air handler, outdoor condensing unit of a split system air conditioner or heat pump, cooling or heating coil, or the furnace heat exchanger), the duct system that is connected to the new or replacement space-conditioning equipment shall be tested as specified in WSU RS-33. The test results shall be provided to the building official and the homeowner.

EXCEPTIONS:

1. Duct systems that are documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in WSU RS-33.
2. Ducts with less than 40 linear feet in unconditioned spaces.
3. Existing duct systems constructed, insulated or sealed with asbestos.
4. Additions of less than 750 square feet.

R101.4.4 Change in occupancy or use. Any space not within the scope of Section R101.2 which is converted to space that is within the scope of Section R101.2 shall be brought into full compliance with this code.

Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.

R101.4.5 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

R101.4.6 Mixed occupancy. Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of the IECC - Commercial and Residential Provisions.

R101.5 Compliance. *Residential buildings* shall meet the provisions of IECC - Residential Provisions. *Commercial buildings* shall meet the provisions of IECC - Commercial Provisions.

R101.5.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

R101.5.2 Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code.

1. Those with a peak design rate of energy usage less than 3.4 Btu/h • ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.

2. Those that do not contain *conditioned space*.

3. Greenhouses isolated from any conditioned space and not intended for occupancy.

NEW SECTION

WAC 51-11R-10200 Section R102—Alternate materials—Method of construction, design or insulating systems.

R102.1 General. This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.

NEW SECTION

WAC 51-11R-10300 Section R103—Construction documents.

R103.1 General. Construction documents and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

EXCEPTION: The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

R103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be

submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their *R*-values; fenestration *U*-factors and SHGCs; area-weighted *U*-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.

R103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

R103.3.1 Approval of construction documents. When the *code official* issues a permit where construction documents are required, the construction documents shall be endorsed in writing and stamped "Reviewed for Code Compliance." Such *approved* construction documents shall not be changed, modified or altered without authorization from the *code official*. Work shall be done in accordance with the *approved* construction documents.

One set of construction documents so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the *code official* or a duly authorized representative.

R103.3.2 Previous approvals. This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

R103.3.3 Phased approval. The *code official* shall have the authority to issue a permit for the construction of part of an energy conservation system before the construction documents for the entire system have been submitted or *approved*, provided adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.

R103.4 Amended construction documents. Changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.

R103.5 Retention of construction documents. One set of *approved* construction documents shall be retained by the *code official* for a period of not less than 180 days from date

of completion of the permitted work, or as required by state or local laws.

NEW SECTION

WAC 51-11R-10400 Section R104—Inspections.

R104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official*.

R104.2 Required approvals. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.

R104.2.1 Wall insulation inspection. The building official, upon notification, shall make a wall insulation inspection in addition to those inspections required in Section R109 of the *International Residential Code*. This inspection shall be made after all wall and cavity insulation is in place and prior to cover.

R104.3 Final inspection. The building shall have a final inspection and not be occupied until *approved*.

R104.4 Reinspection. A building shall be reinspected when determined necessary by the *code official*.

R104.5 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

R104.6 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

R104.7 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

R104.8 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.

R104.8.1 Revocation. The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

NEW SECTION

WAC 51-11R-10500 Section R105—Validity.

R105.1 General. If a portion of this code is held to be illegal or void, such a decision shall not affect the validity of the remainder of this code.

NEW SECTION

WAC 51-11R-10600 Section R106—Referenced standards.

R106.1 Referenced codes and standards. The codes and standards referenced in this code shall be those listed in Chapter 5, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections R106.1.1 and R106.1.2.

R106.1.1 Conflicts. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

R106.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

R106.2 Conflicting requirements. Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.

R106.3 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

R106.4 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law. In addition to the requirements of this code, all occupancies shall conform to the provisions included in the state building code (chapter 19.27 RCW). In case of conflicts among codes enumerated in RCW 19.27.031 (1) through (4) and this code, an earlier named code shall govern over those following. In the case of conflict between the duct sealing and insulation requirements of this code and the duct insulation requirements of Sections 603 and 604 of the *International Mechanical Code*, the duct insulation requirements of this code shall govern.

NEW SECTION

WAC 51-11R-10700 Section R107—Fees.

R107.1 Fees. A permit shall not be issued until the fees prescribed in Section R107.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

R107.2 Schedule of permit fees. A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

R107.3 Work commencing before permit issuance. Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official*, which shall be in addition to the required permit fees.

R107.4 Related fees. The payment of the fee for the construction, *alteration*, removal or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

R107.5 Refunds. The *code official* is authorized to establish a refund policy.

NEW SECTION

WAC 51-11R-10800 Section R108—Stop work order.

R108.1 Authority. Whenever the *code official* finds any work regulated by this code being performed in a manner either contrary to the provisions of this code or dangerous or unsafe, the *code official* is authorized to issue a stop work order.

R108.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

R108.3 Emergencies. Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work.

R108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine as established by the applicable governing entity.

NEW SECTION

WAC 51-11R-10900 Section R109—Board of appeals.

R109.1 General. In order to hear and decide appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The *code official* shall be an ex officio member of said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *code official*.

R109.2 Limitations on authority. An application for appeal shall be based on a claim that the true intent of this code or

the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

R109.3 Qualifications. The board of appeals shall consist of members who are qualified by experience and training and are not employees of the jurisdiction.

NEW SECTION

WAC 51-11R-11000 Section R110—Violations. It shall be unlawful for any person, firm, or corporation to erect or construct any building, or remodel or rehabilitate any existing building or structure in the state, or allow the same to be done, contrary to or in violation of any of the provisions of this code.

NEW SECTION

WAC 51-11R-11100 Section R111—Liability. Nothing contained in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of any city or county or its officers, employees or agents for any injury or damage resulting from the failure of a building to conform to the provisions of this code.

NEW SECTION

WAC 51-11R-20000 Chapter 2 [RE]—Definitions.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11R-20100 Section R201—General.

R201.1 Scope. Unless stated otherwise, the following words and terms in this code shall have the meanings indicated in this chapter.

R201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

R201.3 Terms defined in other codes. Terms that are not defined in this code but are defined in the *International Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *Uniform Plumbing Code* or the *International Residential Code* shall have the meanings ascribed to them in those codes.

R201.4 Terms not defined. Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

NEW SECTION

WAC 51-11R-20200 Section R202—General definitions.

NEW SECTION**WAC 51-11R-20201 Section R202.1—A.**

ABOVE-GRADE WALL. A wall enclosing *conditioned space* that is not a below-grade wall. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.

ACCESSIBLE. Admitting close approach as a result of not being guarded by locked doors, elevation or other effective means (see "*Readily accessible*").

ADDITION. An extension or increase in the *conditioned space* floor area or height of a building or structure.

ADVANCED FRAMED WALLS. Studs framed on 24-inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners, and one stud is used to support each header. Headers consist of double 2x material with R-10 insulation between the header and exterior sheathing. Interior partition wall/exterior wall intersections are fully insulated in the exterior wall. (See **Standard Framing** and Appendix A, of this code.)

AIR BARRIER. Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or a combination of materials.

ALTERATION. Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

APPROVED. Approval by the *code official* as a result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by nationally recognized organizations.

AUTOMATIC. Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "*Manual*").

NEW SECTION**WAC 51-11R-20202 Section R202.2—B.**

BASEMENT WALL. See *above-grade wall* and *below-grade wall*.

BELOW-GRADE WALL. That portion of a wall in the building envelope that is entirely below the finish grade and in contact with the ground.

BUILDING. Any structure used or intended for supporting or sheltering any use or occupancy, including any mechanical systems, service water heating systems and electric power and lighting systems located on the building site and supporting the building.

BUILDING SITE. A contiguous area of land that is under the ownership or control of one entity.

BUILDING THERMAL ENVELOPE. The *below-grade walls*, *above-grade walls*, floor, roof, and any other building elements that enclose *conditioned space* or provides a boundary between *conditioned space* and exempt or unconditioned space.

NEW SECTION**WAC 51-11R-20203 Section R202.3—C.**

C-FACTOR (THERMAL CONDUCTANCE). The coefficient of heat transmission (surface to surface) through a building component or assembly, equal to the time rate of heat flow per unit area and the unit temperature difference between the warm side and cold side surfaces (Btu/h ft² × °F) [W/(m² × K)].

CODE OFFICIAL. The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of "Residential buildings."

CONDITIONED FLOOR AREA. The horizontal projection of the floors associated with the *conditioned space*.

CONDITIONED SPACE. An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*.

CONTINUOUS AIR BARRIER. A combination of materials and assemblies that restrict or prevent the passage of air through the building thermal envelope.

CONTINUOUS INSULATION (c.i.). Insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.

CURTAIN WALL. Fenestration products used to create an external nonload-bearing wall that is designed to separate the exterior and interior environments.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION**WAC 51-11R-20204 Section R202.4—D.**

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where pump(s) prime the service hot water piping with heated water upon demand for hot water.

DUCT. A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.

DUCT SYSTEM. A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling equipment and appliances.

DWELLING UNIT. A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

NEW SECTION**WAC 51-11R-20205 Section R202.5—E.**

ENERGY ANALYSIS. A method for estimating the annual energy use of the *proposed design* and *standard reference design* based on estimates of energy use.

ENERGY COST. The total estimated annual cost for purchased energy for the building functions regulated by this code, including applicable demand charges.

ENERGY SIMULATION TOOL. An *approved* software program or calculation-based methodology that projects the annual energy use of a building.

ENTRANCE DOOR. Fenestration products used for ingress, egress and access in nonresidential buildings including, but not limited to, exterior entrances that utilize latching hardware and automatic closers and contain over 50 percent glass specifically designed to withstand heavy use and possibly abuse.

EXTERIOR WALL. Walls including both above-grade walls and below-grade walls.

NEW SECTION

WAC 51-11R-20206 Section R202.6—F.

FENESTRATION. Skylights, roof windows, vertical windows (fixed or moveable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors. Fenestration includes products with glass and nonglass glazing materials.

FENESTRATION AREA. Total area of the fenestration measured using the rough opening, and including the glazing, sash and frame.

FENESTRATION PRODUCT, FIELD-FABRICATED. A fenestration product whose frame is made at the construction site of standard dimensional lumber or other materials that were not previously cut, or otherwise formed with the specific intention of being used to fabricate a fenestration product or exterior door. Field fabricated does not include site-built fenestration.

FENESTRATION PRODUCT, SITE-BUILT. A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory-formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls, and atrium roof systems.

F-FACTOR. The perimeter heat loss factor for slab-on-grade floors ($\text{Btu/h} \times \text{ft} \times ^\circ\text{F}$) [$\text{W}/(\text{m} \times \text{K})$].

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11R-20207 Section R202.7—G.

NEW SECTION

WAC 51-11R-20208 Section R202.8—H.

HEATED SLAB-ON-GRADE FLOOR. Slab-on-grade floor construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under, the slab.

HIGH-EFFICACY LAMPS. Compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:

1. 60 lumens per watt for lamps over 40 watts;
2. 50 lumens per watt for lamps over 15 watts to 40 watts; and
3. 40 lumens per watt for lamps 15 watts or less.

NEW SECTION

WAC 51-11R-20209 Section R202.9—I.

INFILTRATION. The uncontrolled inward air leakage into a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

INSULATING SHEATHING. An insulating board with a core material having a minimum *R*-value of R-2.

INTEGRATED ENERGY EFFICIENCY RATIO (IEER). A single-number figure of merit expressing cooling part-load EER efficiency for unitary air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for the equipment.

INTERMEDIATE FRAMED WALLS. Studs framed on 16-inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners, and each opening is framed by two studs. Headers shall be insulated to R-10.

NEW SECTION

WAC 51-11R-20210 Section R202.10—J.

NEW SECTION

WAC 51-11R-20211 Section 202.11—K.

NEW SECTION

WAC 51-11R-20212 Section R202.12—L.

LABELED. Equipment, materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

LISTED. Equipment, materials, products or services included in a list published by an organization acceptable to the *code official* and concerned with evaluation of products or services that maintains periodic inspection of production of *listed* equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

LOW-VOLTAGE LIGHTING. A lighting system consisting of an isolating power supply, the low voltage luminaires, and associated equipment that are all identified for the use. The output circuits of the power supply operate at 30 volts (42.4 volts peak) or less under all load conditions.

NEW SECTION

WAC 51-11R-20213 Section R202.13—M.

MANUAL. Capable of being operated by personal intervention (see "Automatic").

NEW SECTION

WAC 51-11R-20214 Section R202.14—N.

NEW SECTION**WAC 51-11R-20215 Section R202.15—O.**NEW SECTION**WAC 51-11R-20216 Section R202.16—P.**

PROPOSED DESIGN. A description of the proposed building used to estimate annual energy use for determining compliance based on total building performance.

NEW SECTION**WAC 51-11R-20217 Section R202.17—Q.**NEW SECTION**WAC 51-11R-20218 Section R202.18—R.**

READILY ACCESSIBLE. Capable of being reached quickly for operation, renewal or inspection without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders or access equipment (see "*Accessible*").

REPAIR. The reconstruction or renewal of any part of an existing building.

RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane.

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof covering, underlayment, roof deck, insulation, vapor retarder and interior finish.

R-VALUE (THERMAL RESISTANCE). The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \cdot \text{ft}^2 \cdot \text{°F}/\text{Btu}$) [$\text{m}^2 \cdot \text{K}/\text{W}$].

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION**WAC 51-11R-20219 Section R202.19—S.**

SERVICE WATER HEATING. Supply of hot water for purposes other than comfort heating.

SKYLIGHT. Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal. Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.

SLAB-ON-GRADE FLOOR. That portion of a slab floor of the building envelope that is in contact with the ground and that is either above grade or is less than or equal to 24 inches below the final elevation of the nearest exterior grade.

SMALL BUSINESS. Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other

businesses, which has the purpose of making a profit, and which has fifty or fewer employees.

SOLAR HEAT GAIN COEFFICIENT (SHGC). The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation which is then reradiated, conducted or convected into the space.

STANDARD FRAMING. All framing practices not defined as "intermediate" or "advanced" shall be considered standard. (See **Advanced Framed Wall, Intermediate Framed Wall**).

STANDARD REFERENCE DESIGN. A version of the *proposed design* that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.

NEW SECTION**WAC 51-11R-20220 Section R202.20—T.**

THERMAL ISOLATION. Physical and space conditioning separation from *conditioned space(s)*. The *conditioned space(s)* shall be controlled as separate zones for heating and cooling or conditioned by separate equipment.

THERMOSTAT. An automatic control device used to maintain temperature at a fixed or adjustable set point.

NEW SECTION**WAC 51-11R-20221 Section R202.21—U.**

U-FACTOR (THERMAL TRANSMITTANCE). The coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films ($\text{Btu}/\text{h} \cdot \text{ft}^2 \cdot \text{°F}$) [$\text{W}/(\text{m}^2 \cdot \text{K})$].

UNHEATED SLAB-ON-GRADE FLOOR. A slab-on-grade floor that is not a heated slab-on-grade floor.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION**WAC 51-11R-20222 Section R202.22—V.**

VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

VENTILATION AIR. That portion of supply air that comes from outside (outdoors) plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.

VERTICAL FENESTRATION. All fenestration other than skylights.

VISIBLE TRANSMITTANCE [VT]. The ratio of visible light entering the space through the fenestration product assembly to the incident visible light, visible transmittance, includes the effects of glazing material and frame and is expressed as a number between 0 and 1.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION**WAC 51-11R-20223 Section R202.23—W.**

WHOLE HOUSE MECHANICAL VENTILATION SYSTEM. An exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air with outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rates.

NEW SECTION**WAC 51-11R-20224 Section R202.24—XYZ.**

ZONE. A space or group of spaces within a building with heating or cooling requirements that are sufficiently similar so that desired conditions can be maintained throughout using a single controlling device.

NEW SECTION**WAC 51-11R-30000 Chapter 3 [RE]—General requirements.**

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION**WAC 51-11R-30100 Section R301—Climate zones.**

R301.1 General. Climate zones from Table R301.1 shall be used in determining the applicable requirements from Chapter 4. Locations not in Table R301.1 (outside the United States) shall be assigned a climate zone based on Section R301.3.

R301.2 Warm humid counties. Warm humid counties are identified in Table R301.1 by an asterisk.

R301.3 International climate zones. The climate zone for any location outside the United States shall be determined by applying Table R301.3(1) and then Table R301.3(2).

TABLE R301.1**CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE AND COUNTY**

Key: A - Moist, B - Dry, C - Marine. Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

WASHINGTON

5B Adams	4C Grays Harbor	4C Pierce
5B Asotin	4C Island	4C San Juan
5B Benton	4C Jefferson	4C Skagit
5B Chelan	4C King	5B Skamania
4C Clallam	4C Kitsap	4C Snohomish
4C Clark	5B Kittitas	5B Spokane
5B Columbia	5B Klickitat	6B Stevens
4C Cowlitz	4C Lewis	4C Thurston
5B Douglas	5B Lincoln	4C Wahkiakum
6B Ferry	4C Mason	5B Walla Walla
5B Franklin	6B Okanogan	4C Whatcom
5B Garfield	4C Pacific	5B Whitman
5B Grant	6B Pend Oreille	5B Yakima

NEW SECTION**WAC 51-11R-30200 Section R302—Design conditions.**

R302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

R302.2 Exterior design conditions. The heating or cooling outdoor design temperatures shall be selected from Appendix C.

NEW SECTION**WAC 51-11R-30300 Section R303—Materials, systems and equipment.**NEW SECTION**WAC 51-11R-30310 Section R303.1—Identification.**

R303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

R303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

R303.1.1.1 Blown or sprayed roof/ceiling insulation. The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 300 square feet (28 m²) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch (25 mm) in height. Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed *R*-value shall be *listed* on certification provided by the insulation installer.

R303.1.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer's *R*-value mark is readily observable upon inspection.

R303.1.3 Fenestration product rating. *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled *U*-factor shall be

assigned a default *U*-factor from Table R303.1.3(1), R303.1.3(2) or R303.1.3(4). The solar heat gain coefficient (SHGC) and visible transmittance (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table R303.1.3(3).

EXCEPTION: Units without NFRC ratings produced by a *small business* may be assigned default *U*-factors from Table R303.1.3(5) for vertical fenestration.

R303.1.4 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (C.F.R. Title 16, Part 460) in units of $h \times ft^2 \times ^\circ F/Btu$ at a mean temperature of 75°F (24°C).

NEW SECTION

WAC 51-11R-30311 Table R303.1.3(1)—Default glazed fenestration *U*-factor.

NEW SECTION

WAC 51-11R-30312 Table R303.1.3(2)—Default door *U*-factors.

**TABLE R303.1.3(1)
DEFAULT GLAZED FENESTRATION *U*-FACTOR**

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKYLIGHT See Table R303.1.3(4)
Metal	1.20	0.80	
Metal with Thermal Break ^a	1.10	0.65	
Nonmetal or Metal Clad	0.95	0.55	
Glazed Block	0.60		

^aMetal Thermal Break = A metal thermal break framed window shall incorporate the following minimum design characteristics:

- 1) The thermal conductivity of the thermal break material shall be not more than 3.6 Btu-in/h/ft²/°F;
- 2) The thermal break material must produce a gap in the frame material of not less than 0.210 inches; and
- 3) All metal framing members of the products exposed to interior and exterior air shall incorporate a thermal break meeting the criteria in a) and b) above.

**TABLE R303.1.3(2)
DEFAULT DOOR *U*-FACTORS**

Door Type	No Glazed Fenestration	Single Glazing	Double Glazing with 1/4 in. Airspace	Double Glazing with 1/2 in. Airspace	Double Glazing with e = 0.10, 1/2 in. Argon
SWINGING DOORS (Rough opening - 38 in. x 82 in.)					
Slab Doors					
Wood slab in wood frame ^a	0.46				
6% glazed fenestration (22 in. x 8 in. lite)	-	0.48	0.47	0.46	0.44
25% glazed fenestration (22 in. x 36 in. lite)	-	0.58	0.48	0.46	0.42
45% glazed fenestration (22 in. x 64 in. lite)	-	0.69	0.49	0.46	0.39
More than 50% glazed fenestration	Use Table R303.1.3(1)				
Insulated steel slab with wood edge in wood frame ^a	0.16				
6% glazed fenestration (22 in. x 8 in. lite)	-	0.21	0.20	0.19	0.18
25% glazed fenestration (22 in. x 36 in. lite)	-	0.39	0.28	0.26	0.23
45% glazed fenestration (22 in. x 64 in. lite)	-	0.58	0.38	0.35	0.26
More than 50% glazed fenestration	Use Table R303.1.3(1)				
Foam insulated steel slab with metal edge in steel frame ^b	0.37				

Door Type	No Glazed Fenestration	Single Glazing	Double Glazing with 1/4 in. Airspace	Double Glazing with 1/2 in. Airspace	Double Glazing with e = 0.10, 1/2 in. Argon
6% glazed fenestration (22 in. x 8 in. lite)	-	0.44	0.42	0.41	0.39
25% glazed fenestration (22 in. x 36 in. lite)	-	0.55	0.50	0.48	0.44
45% glazed fenestration (22 in. x 64 in. lite)	-	0.71	0.59	0.56	0.48
More than 50% glazed fenestration	Use Table R303.1.3(1)				
Cardboard honeycomb slab with metal edge in steel frame ^b	0.61				
Style and Rail Doors					
Sliding glass doors/French doors	Use Table R303.1.3(1)				
Site-Assembled Style and Rail Doors					
Aluminum in aluminum frame	-	1.32	0.99	0.93	0.79
Aluminum in aluminum frame with thermal break	-	1.13	0.80	0.74	0.63

Note: Appendix A Tables A107.1(2) through A107.1(4) may also be used if applicable.
 a Thermally broken sill (add 0.03 for nonthermally broken sill).
 b Nonthermally broken sill.
 c Nominal *U*-factors are through the center of the insulated panel before consideration of thermal bridges around the edges of the door section and due to the frame.

NEW SECTION

WAC 51-11R-30313 Table R303.1.3(3)—Default glazed fenestration SHGC and VT.

**TABLE R303.1.3(3)
 DEFAULT GLAZED FENESTRATION SHGC AND VT**

	SINGLE GLAZED		DOUBLE GLAZED		GLAZED BLOCK
	Clear	Tinted	Clear	Tinted	
SHGC	0.8	0.7	0.7	0.6	0.6
VT	0.6	0.3	0.6	0.3	0.6

NEW SECTION

WAC 51-11R-30314 Table R303.1.3(4)—Default *U*-factors for skylights.

**TABLE R303.1.3(4)
 DEFAULT *U*-FACTORS FOR SKYLIGHTS**

Fenestration Type	Frame Type			
	Aluminum Without Thermal Break	Aluminum With Thermal Break	Reinforced Vinyl/Aluminum-Clad Wood or Vinyl	Wood or Vinyl-Clad Wood/Vinyl Without Reinforcing
Single Glazing glass acrylic/polycarb	U-1.58	U-1.51	U-1.40	U-1.18
	U-1.52	U-1.45	U-1.34	U-1.11
Double Glazing air argon	U-1.05	U-0.89	U-0.84	U-0.67
	U-1.02	U-0.86	U-0.80	U-0.64

Fenestration Type	Frame Type			
	Aluminum Without Thermal Break	Aluminum With Thermal Break	Reinforced Vinyl/Aluminum-Clad Wood or Vinyl	Wood or Vinyl-Clad Wood/Vinyl Without Reinforcing
Double Glazing, e = 0.20				
air	U-0.96	U-0.80	U-0.75	U-0.59
argon	U-0.91	U-0.75	U-0.70	U-0.54
Double Glazing, e = 0.10				
air	U-0.94	U-0.79	U-0.74	U-0.58
argon	U-0.89	U-0.73	U-0.68	U-0.52
Double Glazing, e = 0.05				
air	U-0.93	U-0.78	U-0.73	U-0.56
argon	U-0.87	U-0.71	U-0.66	U-0.50
Triple Glazing				
air	U-0.90	U-0.70	U-0.67	U-0.51
argon	U-0.87	U-0.69	U-0.64	U-0.48
Triple Glazing, e = 0.20				
air	U-0.86	U-0.68	U-0.63	U-0.47
argon	U-0.82	U-0.63	U-0.59	U-0.43
Triple Glazing, e = 0.20 on 2 surfaces				
air	U-0.82	U-0.64	U-0.60	U-0.44
argon	U-0.79	U-0.60	U-0.56	U-0.40
Triple Glazing, e = 0.10 on 2 surfaces				
air	U-0.81	U-0.62	U-0.58	U-0.42
argon	U-0.77	U-0.58	U-0.54	U-0.38
Quadruple Glazing, e = 0.10 on 2 surfaces				
air	U-0.78	U-0.59	U-0.55	U-0.39
argon	U-0.74	U-0.56	U-0.52	U-0.36
krypton	U-0.70	U-0.52	U-0.48	U-0.32

Notes for Table R303.1.3(4)

1. U-factors are applicable to both glass and plastic, flat and domed units, all spacers and gaps.
2. Emissivities shall be less than or equal to the value specified.
3. Gap fill shall be assumed to be air unless there is a minimum of 90% argon or krypton.
4. Aluminum frame with thermal break is as defined in footnote 1 to Table R303.1.3(1).

NEW SECTION

WAC 51-11R-30315 Table R303.1.3(5)—Small business compliance default table.

**TABLE R303.1.3(5)
SMALL BUSINESS COMPLIANCE TABLE
DEFAULT U-FACTORS FOR VERTICAL FENESTRATION**

Vertical Fenestration Description				Frame Type		
Panes	Low-e ¹	Spacer	Fill	Any Frame	Aluminum Thermal Break ²	Wood/Vinyl/Fiberglass
Double ³	A	Any	Argon	0.48	0.41	0.32
	B	Any	Argon	0.46	0.39	0.30
	C	Any	Argon	0.44	0.37	0.28
	C	High Performance	Argon	0.42	0.35	Deemed to comply ⁵

Vertical Fenestration Description				Frame Type		
Panes	Low-e ¹	Spacer	Fill	Any Frame	Aluminum Thermal Break ²	Wood/Vinyl/Fiberglass
Triple ⁴	A	Any	Air	0.50	0.44	0.26
	B	Any	Air	0.45	0.39	0.22
	C	Any	Air	0.41	0.34	0.20
	Any double low-e	Any	Air	0.35	0.32	0.18

¹ Low-eA (emissivity) shall be 0.24 to 0.16.

Low-eB (emissivity) shall be 0.15 to 0.08.

Low-eC (emissivity) shall be 0.07 or less.

² Aluminum Thermal Break = An aluminum thermal break framed window shall incorporate the following minimum design characteristics:

a) The thermal conductivity of the thermal break material shall be not more than 3.6 Btu-in/h/ft²/°F;

b) The thermal break material must produce a gap in the frame material of not less than 0.210 inches; and

c) All metal framing members of the products exposed to interior and exterior air shall incorporate a thermal break meeting the criteria in a and b above.

³ A minimum air space of 0.375 inches between panes of glass is required for double glazing.

⁴ A minimum air space of 0.25 inches between panes of glass is required for triple glazing.

⁵ Deemed to comply glazing shall not be used for performance compliance.

NEW SECTION

WAC 51-11R-30320 Section R303.2—Installation.

R303.2 Installation. All materials, systems and equipment shall be installed in accordance with the manufacturer's installation instructions and the *International Building Code* or *International Residential Code*, as applicable.

R303.2.1 Protection of exposed foundation insulation.

Insulation applied to the exterior of basement walls, crawl-space walls and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (153 mm) below grade.

NEW SECTION

WAC 51-11R-30330 Section R303.3—Maintenance information.

R303.3 Maintenance information. Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a *readily accessible* label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

NEW SECTION

WAC 51-11R-40000 Chapter 4 [RE]—Residential energy efficiency.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11R-40100 Section R401—General.

R401.1 Scope. This chapter applies to residential buildings.

R401.2 Compliance. Projects shall comply with sections identified as "mandatory" and with either sections identified as "prescriptive" or the performance approach in Section R405. In addition, one- and two-family dwellings and townhouses, as defined in Section 101.2 of the *International Residential Code*, shall comply with Section R406.

R401.3 Certificate (Mandatory). A permanent certificate shall be completed and posted on or within three feet of the electrical distribution panel by the builder or registered design professional. The certificate shall be completed by the builder or registered design professional and shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall list the predominant *R*-values of insulation installed in or on ceiling/roof, walls, foundation (slab, *below-grade wall*, and/or floor) and ducts outside conditioned spaces; *U*-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be *listed* for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

NEW SECTION

WAC 51-11R-40200 Section R402—Building thermal envelope.

NEW SECTION

WAC 51-11R-40210 Section R402.1—General.

R402.1 General (Prescriptive). The *building thermal envelope* shall meet the requirements of Sections R402.1.1 through R402.1.4.

R402.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Table R402.1.1 based on the climate zone specified in Chapter 3.

R402.1.2 R-value computation. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component *R*-value. The manufacturer's settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.

R402.1.3 U-factor alternative. An assembly with a *U*-factor equal to or less than that specified in Table R402.1.3 shall be permitted as an alternative to the *R*-value in Table R402.1.1.

R402.1.4 Total UA alternative. If the total *building thermal envelope* UA (sum of *U*-factor times assembly area) is less than or equal to the total UA resulting from using the *U*-factors in Table R402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table R402.1.1. The *U*-factors for typical construction assemblies are included in Appendix A in chapter 51-11C WAC. These values shall be used for all calculations. Where proposed construction assemblies are not represented in Appendix A, values shall be calculated in accordance with the ASHRAE *Handbook of Fundamentals* using the framing factors listed in Appendix A where applicable and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance. When using REScheck, the *U*-factors calculated by the software based on component *R*-value descriptions are acceptable. For the base building UA calculation, the maximum glazing area is 15% of the floor area.

NEW SECTION

WAC 51-11R-40211 Table R402.1.1—Insulation and fenestration requirements by component.

**TABLE R402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

Climate Zone	Fenestration U-Factor ^b	Skylight ^b U-Factor	Glazed Fenestration SHGC ^{b, e}	Ceiling R-Value ⁱ	Wood Frame Wall ^{g, k, l} R-Value	Mass Wall R-Value ⁱ	Floor R-Value	Below-Grade ^{c, k} Wall R-Value	Slab ^d R-Value & Depth
5 and Marine 4	0.30	0.50	NR	49	21 int	21/ 21 ^h	30 ^g	10/15/ 21int+TB	10, 2 ft
6	0.30	0.50	NR	49	21+5ci	21+5 ^h	30 ^g	10/15/ 21int+TB	10, 4 ft

For SI: 1 foot = 304.8 mm, ci = continuous insulation, int = intermediate framing.

^a *R*-values are minimums. *U*-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the compressed *R*-value of the insulation from Appendix Table A101.4 shall not be less than the *R*-value specified in the table.

^b The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

^c "10/15/21+TB" means R-10 continuous insulation on the exterior of the wall, or R-15 on the continuous insulation on the interior of the wall, or R-21 cavity insulation plus a thermal break between the slab and the basement wall at the interior of the basement wall. "10/15/21+TB" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the wall. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall. "TB" means thermal break between floor slab and basement wall.

^d R-10 continuous insulation is required under heated slab on grade floors. See R402.2.9.1.

^e There are no SHGC requirements in the Marine Zone.

^f Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.

^g Reserved.

^h First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used to maintain a consistent total sheathing thickness.

ⁱ The second *R*-value applies when more than half the insulation is on the interior of the mass wall.

^j For single rafter- or joist-vaulted ceilings, the insulation may be reduced to R-38.

^k Int. (intermediate framing) denotes standard framing 16 inches on center with headers insulated with a minimum of R-10 insulation.

^l Log and solid timber walls with a minimum average thickness of 3.5 inches are exempt from this insulation requirement.

NEW SECTION**WAC 51-11R-40213 Table R402.1.3—Equivalent *U*-factors.**

TABLE R402.1.3
EQUIVALENT *U*-FACTORS^a

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor ^b	Floor U-Factor	Below- Grade Wall U-Factor
5 and Marine 4	0.30	0.50	0.026	0.056	0.056	0.029	0.042
6	0.30	0.50	0.026	0.044	0.044	0.029	0.042

^a Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source or as specified in Section R402.1.3.

^b Reserved.

^c Basement wall *U*-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.

NEW SECTION**WAC 51-11R-40220 Section R402.2—Specific insulation requirements.****R402.2 Specific insulation requirements (Prescriptive).**

In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.12.

R402.2.1 Ceilings with attic spaces. When Section R402.1.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly, R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

R402.2.1.1 Loose insulation in attic spaces. Open-blown or poured loose fill insulation may be used in attic spaces where the slope of the ceiling is not more than 3 feet in 12 and there is at least 30 inches of clear distance from the top of the bottom chord of the truss or ceiling joist to the underside of the sheathing at the roof ridge.

R402.2.3 Eave baffle. For air permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain an opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material.

R402.2.4 Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed *R*-value of the loose fill insulation.

R402.2.5 Mass walls. Mass walls for the purposes of this chapter shall be considered above-grade walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs.

R402.2.6 Steel-frame ceilings, walls, and floors. Steel-frame ceilings, walls, and floors shall meet the *U*-factor requirements of Table R402.1.3.

R402.2.7 Floors. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. Insulation supports shall be installed so spacing is no more than 24-inches on center. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation.

EXCEPTIONS:

1. When foundation vents are not placed so that the top of the vent is below the lower surface of the floor insulation, a permanently attached baffle shall be installed at an angle of 30° from horizontal, to divert air flow below the lower surface of the floor insulation.
2. Substantial contact with the surface being insulated is not required in enclosed floor/ceiling assemblies containing ducts where full *R*-value insulation is installed between the duct and the exterior surface.

R402.2.8 Basement walls. Below-grade exterior wall insulation used on the exterior (cold) side of the wall shall extend from the top of the below-grade wall to the top of the footing and shall be approved for below-grade use. Above-grade insulation shall be protected. Insulation used on the interior (warm) side of the wall shall extend from the top of the below-grade wall to the below-grade floor level and shall include R-5 rigid board providing a thermal break between the concrete wall and the slab.

R402.2.9 Slab-on-grade floors. The minimum thermal resistance (*R*-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors shall be as specified in Table C402.1.1. The insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. A two-inch by two-inch (maximum) pressure treated nailer may be

placed at the finished floor elevation for attachment of interior finish materials. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil.

R402.2.9.1 Heated slab-on-grade floors (Mandatory).

The entire area of a heated slab-on-grade floor shall be thermally isolated from the soil with a minimum of R-10 insulation. The insulation shall be an approved product for its intended use. If a soil gas control system is present below the heated slab-on-grade floor, which results in increased convective flow below the heated slab-on-grade floor, the heated slab-on-grade floor shall be thermally isolated from the sub-slab gravel layer. R-10 heated slab-on-grade floor insulation is required for all compliance paths.

R402.2.10 Reserved.

R402.2.11 Masonry veneer. Insulation shall not be required on the horizontal portion of the foundation that supports a masonry veneer.

NEW SECTION

WAC 51-11R-40230 Section R402.3—Fenestration.

R402.3 Fenestration (Prescriptive). In addition to the requirements of Section R402, fenestration shall comply with Sections R402.3.1 through R402.3.6.

R402.3.1 U-factor. An area-weighted average of fenestration products shall be permitted to satisfy the *U*-factor requirements.

R402.3.2 Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the SHGC requirements.

R402.3.3 Glazed fenestration exemption. Up to 15 square feet (1.4 m²) of glazed fenestration per dwelling unit shall be permitted to be exempt from *U*-factor and SHGC requirements in Section R402.1.1. This exemption shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

R402.3.4 Opaque door exemption. One side-hinged opaque door assembly up to 24 square feet (2.22 m²) in area is exempted from the *U*-factor requirement in Section R402.1.1. This exemption shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

R402.3.5 Reserved.

R402.3.6 Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table R402.1.1.

NEW SECTION

WAC 51-11R-40240 Section R402.4—Air leakage.

R402.4 Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accor-

dance with the requirements of Sections R402.4.1 through R402.4.4.

R402.4.1 Building thermal envelope. The *building thermal envelope* shall comply with Sections R402.4.1.1 and R402.4.1.2. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

R402.4.1.1 Installation. The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

R402.4.1.2 Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*. Once visual inspection has confirmed sealing (see Table R402.4.1.1), operable windows and doors manufactured by *small business* shall be permitted to be sealed off at the frame prior to the test.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open, access hatches to conditioned crawl spaces and conditioned attics shall be open;
4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

R402.4.2 Fireplaces. New wood-burning fireplaces shall have tight-fitting flue dampers and outdoor combustion air.

R402.4.3 Air leakage of fenestration. Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L/s/m²), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m²), when tested according to NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and *listed* and *labeled* by the manufacturer.

EXCEPTIONS:

1. Field-fabricated fenestration products (windows, skylights and doors).
2. Custom exterior fenestration products manufactured by a small business provided they meet the applicable provisions of Chapter 24 of the *International Building Code*.

3. Custom exterior windows and doors manufactured by a small business provided they meet the applicable provisions of chapter 24 of the *International Building Code*. Once visual inspection has confirmed the presence of a gasket, operable windows and doors manufactured by *small business* shall be permitted to be sealed off at the frame prior to the test.

R402.4.4 Recessed lighting. Recessed luminaires installed in the *building thermal envelope* shall be Type IC-rated and certified under ASTM E283 as having an air leakage rate not more than 2.0 cfm (0.944 L/s) when tested at a 1.57 psf (75 Pa) pressure differential and shall have a label attached showing compliance with this test method. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

NEW SECTION

WAC 51-11R-40241 Table R402.4.1.1—Air barrier and insulation installation.

**TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION**

COMPONENT	CRITERIA ^A
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Cavity insulation installation	All cavities in the thermal envelope shall be filled with insulation. The density of the insulation shall be at the manufacturers' product recommendation and said density shall be maintained for all volume of each cavity. Batt type insulation will show no voids or gaps and maintain an even density for the entire cavity. Batt insulation shall be installed in the recommended cavity depth. Where an obstruction in the cavity due to services, blocking, bracing or other obstruction exists, the batt product will be cut to fit the remaining depth of the cavity. Where the batt is cut around obstructions, loose fill insulation shall be placed to fill any surface or concealed voids, and at the manufacturers' specified density. Where faced batt is used, the installation tabs must be stapled to the face of the stud. There shall be no compression to the batt at the edges of the cavity due to inset stapling installation tabs. Insulation that upon installation readily conforms to available space shall be installed filling the entire cavity and within the manufacturers' density recommendation.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed. Batt insulation installed in attic roof assemblies may be compressed at exterior wall lines to allow for required attic ventilation.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.

COMPONENT	CRITERIA ^A
Narrow cavities	Batts in narrow cavities shall be cut to fit and installed to the correct density without any voids or gaps or compression. Narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls. There shall be no voids or gaps or compression where cut to fit. Insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

^a In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

NEW SECTION

WAC 51-11R-40250 Section R402.5—Maximum fenestration U-factor and SHGC.

R402.5 Maximum fenestration U-factor and SHGC (Mandatory). The area-weighted average maximum fenestration U-factor permitted using tradeoffs from Section R402.1.4 or R405 shall be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using tradeoffs from Section R405 in Climate Zones 1 through 3 shall be 0.50.

NEW SECTION

WAC 51-11R-40300 Section R403—Systems.

NEW SECTION

WAC 51-11R-40310 Section R403.1—Controls.

R403.1 Controls (Mandatory). At least one thermostat shall be provided for each separate heating and cooling system.

R403.1.1 Programmable thermostat. Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. The thermostat shall allow for, at a minimum, a 5-2 programmable schedule (weekdays/weekends) and be capable of providing at least two programmable setback periods per day. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall

initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C). The thermostat and/or control system shall have an adjustable deadband of not less than 10°F.

EXCEPTIONS:

1. Systems controlled by an occupant sensor that is capable of shutting the system off when no occupant is sensed for a period of up to 30 minutes.
2. Systems controlled solely by a manually operated timer capable of operating the system for no more than two hours.

R403.1.2 Heat pump supplementary heat (Mandatory). Unitary air cooled heat pumps shall include controls that minimize supplemental heat usage during start-up, set-up, and defrost conditions. These controls shall anticipate need for heat and use compression heating as the first stage of heat. Controls shall indicate when supplemental heating is being used through visual means (e.g., LED indicators). Heat pumps equipped with supplementary heaters shall be installed with controls that prevent supplemental heater operation above 40°F. At final inspection the auxiliary heat lock out control shall be set to 35°F or less.

NEW SECTION

WAC 51-11R-40320 Section R403.2—Ducts.

R403.2 Ducts. Ducts and air handlers shall be in accordance with Sections R403.2.1 through R403.2.3.

R403.2.1 Insulation (Prescriptive). Ducts shall be insulated to a minimum of R-8.

EXCEPTION:

Ducts or portions thereof located completely inside the *building thermal envelope*. Ducts located in crawl spaces do not qualify for this exception.

R403.2.2 Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

- EXCEPTIONS:
1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
 2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
 3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Ducts shall be leak tested in accordance with WSU RS-33, using the maximum duct leakage rates specified. Duct tightness shall be verified by either of the following:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. Leakage to outdoors shall be less than or equal to 4 cfm (133.3 L/min) per 100 square feet of conditioned floor area.

2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

EXCEPTION: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope. Ducts located in crawl spaces do not qualify for this exception.

R403.2.2.1 Sealed air handler. Air handlers shall have a manufacturer's designation for an air leakage of no more than 2 percent of the design air flow rate when tested in accordance with ASHRAE 193.

R403.2.3 Building cavities (Mandatory). Building framing cavities shall not be used as ducts or plenums. Installation of ducts in exterior walls, floors or ceilings shall not displace required envelope insulation.

NEW SECTION

WAC 51-11R-40330 Section R403.3—Mechanical system piping insulation.

R403.3 Mechanical system piping insulation (Mandatory). Mechanical system piping capable of carrying fluids above 105°F (41°C) or below 55°F (13°C) shall be insulated to a minimum of R-6.

R403.3.1 Protection of piping insulation. Piping insulation exposed to weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance, and wind, and shall provide shielding from solar radi-

ation that can cause degradation of the material. Adhesive tape shall not be permitted.

NEW SECTION

WAC 51-11R-40340 Section R403.4—Service hot water systems.

R403.4 Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.4.1 and R403.4.2.

R403.4.1 Circulating hot water systems (Mandatory). Circulating hot water systems shall be provided with an automatic or *readily accessible* manual switch that can turn off the hot water circulating pump when the system is not in use.

R403.4.2 Hot water pipe insulation (Prescriptive). Insulation for hot water pipe shall have a minimum thermal resistance (R-value) of R-4.

R403.4.3 Electric water heater insulation. All electric water heaters in unheated spaces or on concrete floors shall be placed on an incompressible, insulated surface with a minimum thermal resistance of R-10.

NEW SECTION

WAC 51-11R-40350 Section R403.5—Mechanical ventilation.

R403.5 Mechanical ventilation (Mandatory). The building shall be provided with ventilation that meets the requirements of the *International Residential Code* or *International Mechanical Code*, as applicable, or with other approved means of ventilation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

R403.5.1 Whole-house mechanical ventilation system fan efficacy. Mechanical ventilation system fans shall meet the efficacy requirements of Table R403.5.1.

EXCEPTION: Where mechanical ventilation fans are integral to tested and listed HVAC equipment, they shall be powered by an electronically commutated motor.

NEW SECTION

WAC 51-11R-40351 Table R403.5.1—Mechanical ventilation system fan efficacy.

TABLE R403.5.1
MECHANICAL VENTILATION SYSTEM FAN EFFICACY

Fan Location	Air Flow Rate Minimum (cfm)	Minimum Efficacy (cfm/watt)	Air Flow Rate Maximum (cfm)
Range hoods	Any	2.8	Any
In-line fan	Any	2.8	Any
Bathroom, utility room	10	1.4	< 90
Bathroom, utility room	90	2.8	Any

For SI: 1 cfm = 28.3 L/min.

NEW SECTION**WAC 51-11R-40360 Section R403.6—Equipment sizing.**

R403.6 Equipment sizing (Mandatory). Heating and cooling equipment shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other *approved* heating and cooling calculation methodologies.

NEW SECTION**WAC 51-11R-40370 Section R403.7—Systems serving multiple dwelling units.**

R403.7 Systems serving multiple dwelling units (Mandatory). Systems serving multiple dwelling units shall comply with Sections C403 and C404 of the IECC—Commercial Provisions in lieu of Section R403.

NEW SECTION**WAC 51-11R-40380 Section R403.8—Snow melt system controls.**

R403.8 Snow melt system controls (Mandatory). Snow and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F, and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F.

NEW SECTION**WAC 51-11R-40390 Section R403.9—Pools and in-ground spas.**

R403.9 Pools and in-ground permanently installed spas (Mandatory). Pools and in-ground permanently installed spas shall comply with Sections R403.9.1 through R403.9.4.2.

R403.9.1 Heaters. All heaters shall be equipped with a *readily accessible* on-off switch that is mounted outside of the heater to allow shutting off the heater without adjusting the thermostat setting. Gas-fired heaters shall not be equipped with constant burning pilot lights.

R403.9.2 Time switches. Time switches or other control method that can automatically turn off and on heaters and pumps according to a preset schedule shall be installed on all heaters and pumps. Heaters, pumps and motors that have built in timers shall be deemed in compliance with this requirement.

EXCEPTIONS:

1. Where public health standards require 24-hour pump operation.
2. Where pumps are required to operate solar- and waste-heat-recovery pool heating systems.

R403.9.3 Covers. Heated pools and in-ground permanently installed spas shall be provided with a vapor-retardant cover.

EXCEPTION: Pools deriving over 70 percent of the energy for heating from site-recovered energy, such as a heat pump or

solar energy source computed over an operating season.

R403.9.4 Residential pool pumps. Pool pump motors may not be split-phase or capacitor start-induction run type.

R403.9.4.1 Two-speed capability.

1. Pump motors: Pool pump motors with a capacity of 1 hp or more shall have the capability of operating at two or more speeds with low speed having a rotation rate that is no more than one-half of the motor's maximum rotation rate.

2. Pump controls: Pool pump motor controls shall have the capability of operating the pool pump with at least two speeds. The default circulation speed shall be the lowest speed, with a high speed override capability being for a temporary period not to exceed one normal cycle.

R403.9.4.2 Pump operation. Circulating water systems shall be controlled so that the circulation pump(s) can be conveniently turned off, automatically or manually, when the water system is not in operation.

NEW SECTION**WAC 51-11R-40400 Section R404—Electrical power and lighting systems.**NEW SECTION**WAC 51-11R-40410 Section R404.1—Lighting equipment.**

R404.1 Lighting equipment (Mandatory). A minimum of 75 percent of permanently installed lamps in lighting fixtures shall be high-efficacy lamps.

R404.1.1 Lighting equipment (Mandatory). Fuel gas lighting systems shall not have continuously burning pilot lights.

NEW SECTION**WAC 51-11R-40500 Section R405—Simulated performance alternative (Performance).**NEW SECTION**WAC 51-11R-40510 Section R405.1—Scope.**

R405.1 Scope. This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating, cooling, and service water heating energy only.

NEW SECTION**WAC 51-11R-40520 Section R405.2—Mandatory requirements.**

R405.2 Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section R401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of R-8.

NEW SECTION

WAC 51-11R-40530 Section R405.3—Performance-based compliance.

R405.3 Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an annual energy consumption based on site energy expressed in Btu and Btu per square foot of *conditioned floor area* as follows:

1. For structures less than 1,500 square feet of conditioned floor area, the annual energy consumption shall be less than or equal to 97 percent of the annual energy consumption of the *standard reference design*.
2. For structures 1,500 to 5,000 square feet of conditioned floor area, the annual energy consumption shall be no more than 89 percent of the *standard reference design*.
3. For structures over 5,000 square feet of conditioned floor area, the annual energy consumption shall be no more than 83 percent of the *standard reference design*.

NEW SECTION

WAC 51-11R-40540 Section R405.4—Documentation.

R405.4 Documentation. Documentation of the software used for the performance design and the parameters for the building shall be in accordance with Sections R405.4.1 through R405.4.3.

R405.4.1 Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official*.

R405.4.2 Compliance report. Compliance software tools shall generate a report that documents that the *proposed design* complies with Section R405.3. The compliance documentation shall include the following information:

1. Address or other identification of the residence;

NEW SECTION

WAC 51-11R-40551 Table R405.5.2(1)—Specifications for the standard reference and proposed designs.

**TABLE R405.5.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: Mass wall if proposed wall is mass; otherwise wood frame. Gross area: Same as proposed U-factor: From Table R402.1.3 Solar absorptance = 0.75 Remittance = 0.90	As proposed As proposed As proposed As proposed
Below-grade walls	Type: Same as proposed Gross area: Same as proposed U-factor: From Table R402.1.3, with insulation layer on interior side of walls.	As proposed As proposed As proposed

2. An inspection checklist documenting the building component characteristics of the *proposed design* as listed in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design*, and shall document all inputs entered by the user necessary to reproduce the results;

3. Name of individual completing the compliance report; and

4. Name and version of the compliance software tool.

EXCEPTION: Multiple orientations. When an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements in each of the four cardinal (north, east, south and west) orientations.

R405.4.3 Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *standard reference design*.
2. A certification signed by the builder providing the building component characteristics of the *proposed design* as given in Table R405.5.2(1).
3. Documentation of the actual values used in the software calculations for the *proposed design*.

NEW SECTION

WAC 51-11R-40550 Section R405.5—Calculation procedure.

R405.5 Calculation procedure. Calculations of the performance design shall be in accordance with Sections R405.5.1 and R405.5.2.

R405.5.1 General. Except as specified by this section, the *standard reference design* and *proposed design* shall be configured and analyzed using identical methods and techniques.

R405.5.2 Residence specifications. The *standard reference design* and *proposed design* shall be configured and analyzed as specified by Table R405.5.2(1). Table R405.5.2(1) shall include by reference all notes contained in Table R402.1.1.

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade floors	Type: Wood frame Gross area: Same as proposed U-factor: From Table R402.1.3	As proposed As proposed As proposed
Ceilings	Type: Wood frame Gross area: Same as proposed U-factor: From Table R402.1.3	As proposed As proposed As proposed
Roofs	Type: Composition shingle on wood sheathing Gross area: Same as proposed Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed As proposed
Attics	Type: Vented with aperture = 1 ft ² per 300 ft ² ceiling area	As proposed
Foundations	Type: Same as proposed foundation wall area above and below-grade Soil characteristics: Same as proposed.	As proposed As proposed
Doors	Area: 40 ft ² Orientation: North U-factor: Same as fenestration from Table R402.1.3.	As proposed As proposed As proposed
Glazing ^a	Total area ^b = (a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area. (b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area. Orientation: Equally distributed to four cardinal compass orientations (N, E, S & W). U-factor: From Table R402.1.3 SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used. Interior shade fraction: 0.92 - (0.21 × SHGC for the standard reference design) External shading: None	As proposed As proposed As proposed As proposed 0.92 - (0.21 × SHGC as proposed) As proposed
Skylights	None	As proposed
Air exchange rate	Air leakage rate of 5 air changes per hour at a pressure of 0.2 inches w.g. (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: CFA = conditioned floor area N _{br} = number of bedrooms - Energy recovery shall not be assumed for mechanical ventilation.	For residences that are not tested, the same air leakage rate as the standard reference design. For tested residences, the measured air exchange rate ^c . The mechanical ventilation rate ^d shall be in addition to the air leakage rate and shall be as proposed.
Mechanical ventilation	None, except where mechanical ventilation is specified by the proposed design, in which case: Annual vent fan energy use: $kWh/yr = .03942 \times CFA + 29.565 \times (N_{br} + 1)$ where: CFA = conditioned floor area N _{br} = number of bedrooms	As proposed
Internal gains	IGain = $17,900 + 23.8 \times CFA + 4104 \times N_{br}$ (Btu/day per dwelling unit)	Same as standard reference design

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Internal mass	An internal mass for furniture and contents of 8 pounds per square foot of floor area.	Same as standard reference design, plus any additional mass specifically designed as a thermal storage element ^e but not integral to the building envelope or structure.
Structural mass	For masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air. For masonry basement walls, as proposed, but with insulation required by Table R402.1.3 located on the interior side of the walls. For other walls, for ceilings, floors, and interior walls, wood frame construction.	As proposed As proposed As proposed
Heating systems ^{f, g}	Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section C403 of the IECC—Commercial Provisions. For all other systems, the same system type as proposed, and the same system efficiency required by prevailing minimum federal standard. Capacity: Sized in accordance with Section R403.6	As proposed
Cooling systems ^{f, h}	Same system type as proposed. Same system efficiency as required by prevailing minimum federal standard. Capacity: Sized in accordance with Section R403.6.	As proposed
Service water heating ^{f, g, h, i}	Same system type as proposed. Same system efficiency as required by prevailing minimum federal standard. Use: Same as proposed design	As proposed gal/day = 30 + (10 × N_{br})
Thermal distribution systems		Thermal distribution system efficiency shall be as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.
Thermostat	Type: Manual, cooling temperature setpoint = 75°F; Heating temperature setpoint = 72°F	Same as standard reference

For SI: 1 square foot = 0.93 m², 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m², 1 gallon (U.S.) = 3.785 L, °C = (°F-3)/1.8, 1 degree = 0.79 rad

^a Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50 percent of the door area, the glazing area is the sunlight-transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.

^b For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:

$$AF = A_g \times FA \times F$$

where:

- AF = Total glazing area.
- A_g = Standard reference design total glazing area.

$$FA = \frac{\text{(Above-grade thermal boundary gross wall area)}}{\text{(above-grade boundary wall area + 0.5 x below-grade boundary wall area)}}$$

$$F = \frac{\text{(Above-grade thermal boundary wall area)}}{\text{(above-grade thermal boundary wall area + common wall area)}} \text{ or } 0.56, \text{ whichever is greater.}$$

and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.

Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.

Below-grade boundary wall is any thermal boundary wall in soil contact.

Common wall area is the area of walls shared with an adjoining dwelling unit.

L and CFA are in the same units.

^c Where required by the *code official*, testing shall be conducted by an *approved* party. Hourly calculations as specified in the *ASHRAE Handbook of Fundamentals*, or the equivalent, shall be used to determine the energy loads resulting from infiltration.

^d The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE *Handbook of Fundamentals*, page 26.24 and the "Whole-house Ventilation" provisions of 2001 ASHRAE *Handbook of Fundamentals*, page 26.19 for intermittent mechanical ventilation.

^e Thermal storage element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element must be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or must be connected to such a room with pipes or ducts that allow the element to be actively charged.

^f For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.

^g For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.

^h For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.

ⁱ For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.

^d Ductless systems shall be allowed to have forced airflow across a coil but shall not have any ducted airflow external to the manufacturer's air-handler enclosure.

NEW SECTION

WAC 51-11R-40560 Section R405.6—Calculation software tools.

R405.6 Calculation software tools. Calculation software, where used, shall be in accordance with Sections R405.6.1 through R405.6.3.

R405.6.1 Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the *standard reference design* and the *proposed design* and shall include the following capabilities:

1. Calculation of whole-building (as a single *zone*) sizing for the heating and cooling equipment in the *standard reference design* residence in accordance with Section R403.6.
2. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
3. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table R405.5.2(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

R405.6.2 Specific approval. Performance analysis tools meeting the applicable sections of Section R405 shall be permitted to be *approved*. Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official* shall be permitted to approve tools for a specified application or limited scope.

R405.6.3 Input values. When calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from an approved source.

NEW SECTION

WAC 51-11R-40600 Section R406—Additional energy efficiency requirements.

NEW SECTION

WAC 51-11R-40610 Section R406.1—Scope.

R406.1 Scope. This section establishes options for additional criteria to be met for one- and two-family dwellings and townhouses, as defined in Section 101.2 of the *International Residential Code* to demonstrate compliance with this code.

NEW SECTION

WAC 51-11R-40552 Table R405.5.2(2)—Default distribution system efficiencies for proposed designs.

**TABLE R405.5.2(2)
DEFAULT DISTRIBUTION SYSTEM EFFICIENCIES FOR PROPOSED DESIGNS^a**

DISTRIBUTION SYSTEM CONFIGURATION AND CONDITION	FORCED AIR SYSTEMS	HYDRONIC SYSTEMS ^b
Distribution system components located in unconditioned space	-	0.95
Untested distribution systems entirely located in conditioned space ^c	0.88	1
"Ductless" systems ^d	1	-

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093m², 1 pound per square inch = 6895 Pa, 1 inch water gauge = 1250 Pa.

^a Default values given by this table are for untested distribution systems, which must still meet minimum requirements for duct system insulation.

^b Hydronic systems shall mean those systems that distribute heating and cooling energy directly to individual spaces using liquids pumped through closed-loop piping and that do not depend on ducted, forced airflow to maintain space temperatures.

^c Entire system in conditioned space shall mean that no component of the distribution system, including the air-handler unit, is located outside of the conditioned space.

NEW SECTION

WAC 51-11R-40620 Section R406.2—Additional energy efficiency requirements.

R406.2 Additional energy efficiency requirements (Mandatory). Each dwelling unit in one- and two-family dwellings and townhouses, as defined in Section 101.2 of the *International Residential Code* shall comply with sufficient options from Table R406.2 so as to achieve the following minimum number of credits:

- 1. Small Dwelling Unit: 0.5 points
Dwelling units less than 1500 square feet in conditioned floor area with less than 300 square feet of fenestration area. Additions to existing building that are less than 750 square feet of heated floor area.
- 2. Medium Dwelling Unit: 1.5 points
All dwelling units that are not included in #1 or #3.
- 3. Large Dwelling Unit: 2.5 points
Dwelling units exceeding 5000 square feet of conditioned floor area.

The drawings included with the building permit application shall identify which options have been selected and the point value of each option, regardless of whether separate mechanical, plumbing, electrical, or other permits are utilized for the project.

NEW SECTION

WAC 51-11R-40621 Table R406.2—Energy credits.

**TABLE 406.2
ENERGY CREDITS (DEBITS)**

OPTION	DESCRIPTION	CREDIT(S)
1a	EFFICIENT BUILDING ENVELOPE 1a: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Fenestration U = 0.28 Floor R-38 Slab on grade R-10 perimeter and under entire slab Below grade slab R-10 perimeter and under entire slab or Compliance based on Section R402.1.4: Reduce the Total UA by 5%.	0.5
1b	EFFICIENT BUILDING ENVELOPE 1b: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Fenestration U = 0.25 Wall R-21 plus R-4 Floor R-38 Basement wall R-21 int plus R-5 ci Slab on grade R-10 perimeter and under entire slab Below grade slab R-10 perimeter and under entire slab or Compliance based on Section R402.1.4: Reduce the Total UA by 15%.	1.0
1c	EFFICIENT BUILDING ENVELOPE 1c: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Fenestration U = 0.22 Ceiling and single-rafter or joist-vaulted R-49 advanced Wood frame wall R-21 int plus R-12 ci Floor R-38 Basement wall R-21 int plus R-12 ci Slab on grade R-10 perimeter and under entire slab Below grade slab R-10 perimeter and under entire slab or Compliance based on Section R402.1.4: Reduce the Total UA by 30%.	2.0
2a	AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION 2a: Compliance based on R402.4.1.2: Reduce the tested air leakage to 4.0 air changes per hour maximum and All whole house ventilation requirements as determined by Section M1507.3 of the <i>International Residential Code</i> shall be met with a high efficiency fan (maximum 0.35 watts/cfm), not interlocked with the furnace fan ventilation systems using a furnace including an ECM motor are allowed, provided that they are controlled to operate at low speed in ventilation only mode.	0.5

OPTION	DESCRIPTION	CREDIT(S)
	To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the option being selected and shall specify the maximum tested building air leakage and shall show the heat recovery ventilation system.	
2b	<p>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION 2b: Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 2.0 air changes per hour maximum and All whole house ventilation requirements as determined by Section M1507.3 of the <i>International Residential Code</i> shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.70. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the maximum tested building air leakage and shall show the heat recovery ventilation system.</p>	1.0
2c	<p>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION 2c: Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 1.5 air changes per hour maximum and All whole house ventilation requirements as determined by Section M1507.3 of the <i>International Residential Code</i> shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.85. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the maximum tested building air leakage and shall show the heat recovery ventilation system.</p>	1.5
3a	<p>HIGH EFFICIENCY HVAC EQUIPMENT 3a: Gas, propane or oil-fired furnace with minimum AFUE of 95% To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	0.5
3b	<p>HIGH EFFICIENCY HVAC EQUIPMENT 3b: Air-source heat pump with minimum HSPF of 8.5 To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	1.0
3c	<p>HIGH EFFICIENCY HVAC EQUIPMENT 3c: Closed-loop ground source heat pump; with a minimum COP of 3.3 or Open loop water source heat pump with a maximum pumping hydraulic head of 150 feet and minimum COP of 3.6 To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	2.0
3d	<p>HIGH EFFICIENCY HVAC EQUIPMENT 3d: DUCTLESS SPLIT SYSTEM HEAT PUMPS, ZONAL CONTROL: In homes where the primary space heating system is zonal electric heating, a ductless heat pump system shall be installed and provide heating to at least one zone of the housing unit. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	1.0
4	<p>HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM:^a All heating and cooling system components installed inside the conditioned space. All combustion equipment shall be direct vent or sealed combustion. Locating system components in conditioned crawl spaces is not permitted under this option. Electric resistance heat is not permitted under this option. Direct combustion heating equipment with AFUE less than 80% is not permitted under this option. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and shall show the location of the heating and cooling equipment and all the ductwork.</p>	1.0
5a	<p>EFFICIENT WATER HEATING 5a: Water heating system shall include one of the following: Gas, propane or oil water heater with a minimum EF of 0.62 or Electric water heater with a minimum EF of 0.93. and for both cases All showerhead and kitchen sink faucets installed in the house shall be rated at 1.75 GPM or less. All other lavatory faucets shall be rated at 1.0 GPM or less.^b To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the water heater equipment type and the minimum equipment efficiency and shall specify the maximum flow rates for all showerheads, kitchen sink faucets, and other lavatory faucets.</p>	0.5

OPTION	DESCRIPTION	CREDIT(S)
5b	<p>EFFICIENT WATER HEATING 5b: Water heating system shall include one of the following: Gas, propane or oil water heater with a minimum EF of 0.82 or Solar water heating supplementing a minimum standard water heater. Solar water heating will provide a rated minimum savings of 85 therms or 2000 kWh based on the Solar Rating and Certification Corporation (SRCC) Annual Performance of OG-300 Certified Solar Water Heating Systems or Electric heat pump water heater with a minimum EF of 2.0 and meeting the standards of NEEA's Northern Climate Specifications for Heat Pump Water Heaters or Water heater heated by ground source heat pump meeting the requirements of Option 3c. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the water heater equipment type and the minimum equipment efficiency and, for solar water heating systems, the calculation of the minimum energy savings.</p>	1.5
6	<p>RENEWABLE ELECTRIC ENERGY: For each 1200 kWh of electrical generation provided annually by on-site wind or solar equipment a 0.5 credit shall be allowed, up to 3 credits. Generation shall be calculated as follows: For solar electric systems, the design shall be demonstrated to meet this requirement using the National Renewable Energy Laboratory calculator PVWATTS. Documentation noting solar access shall be included on the plans. For wind generation projects designs shall document annual power generation based on the following factors: The wind turbine power curve; average annual wind speed at the site; frequency distribution of the wind speed at the site and height of the tower. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall show the photovoltaic or wind turbine equipment type, provide documentation of solar and wind access, and include a calculation of the minimum annual energy power production.</p>	0.5

Footnotes: ^a **Interior Duct Placement.** Ducts included as Option 4 of Table R406.2 shall be placed wholly within the heated envelope of the housing unit. The placement shall be inspected and certified to receive the credits associated with this option.

EXCEPTION: Ducts complying with this section may have up to 5% of the total linear feet of ducts located in the exterior cavities or buffer spaces of the dwelling. If this exception is used the ducts will be tested to the following standards:

Post-construction test: Leakage to outdoors shall be less than or equal to 1 CFM per 100 ft² of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

^b **Plumbing Fixtures Flow Ratings.** Low flow plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following requirements:

- 1 Residential bathroom lavatory sink faucets: Maximum flow rate - 3.8 L/min (1.0 gal/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
- 2 Residential kitchen faucets: Maximum flow rate - 6.6 L/min (1.75 gal/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
- 3 Residential showerheads: Maximum flow rate - 6.6 L/min (1.75 gal/min) when tested in accordance with ASME A112.18.1/CSA B125.1.

NEW SECTION

WAC 51-11R-50000 Chapter 5—Referenced standards. This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section R106.

AAMA	American Architectural Manufacturers Association 1827 Walden Office Square Suite 550 Schaumburg, IL 60173-4268	
Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/LS.2/A C440-11	North American Fenestration Standard/Specifications for Windows, Doors and Unit Skylights	R402.4.3
ACCA	Air Conditioning Contractors of America 2800 Shirlington Road, Suite 300 Arlington, VA 22206	
Standard reference number	Title	Referenced in code section number
Manual J-11	Residential Load Calculation Eighth Edition	R403.6
Manual S-10	Residential Equipment	R403.6

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1791 Tullie Circle, N.E. Atlanta, GA 30329-2305	
Standard reference number	Title	Referenced in code section number
ASHRAE-2009	ASHRAE Handbook of Fundamentals R402.1.4, Table R405.5.2(1)	
ASHRAE 193-2010	Method of Test for Determining the Airtightness of HVAC Equipment	R403.2.2.1
ASTM	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2859	
Standard reference number	Title	Referenced in code section number
E 283-04	Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen	R402.4.4
CSA	Canadian Standards Association 5060 Spectrum Way Mississauga, Ontario, Canada L4W 5N6	
Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A440-11	North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights	R402.4.3
ICC	International Code Council, Inc. 500 New Jersey Avenue, N.W. 6th Floor Washington, DC 20001	
Standard reference number	Title	Referenced in code section number
IBC-12	International Building Code	R201.3, R303.2, R402.2.10
ICC 400-12	Standard on the Design and Construction of Log Structures	Table R402.4.1.1
IFC-12	International Fire Code	R201.3
IFGC-12	International Fuel Gas Code	R201.3
IMC-12	International Mechanical Code	R201.3, R403.2.2, R403.5
IRC-12	International Residential Code	R104.2.1, R201.3, R303.2, R401.2, R403.2.2, R403.5, R406.1, R406.2, Table R406.2
NEEA	Northwest Energy Efficiency Alliance 421 S.W. 6th Ave., Suite 600 Portland, OR 97204	
Standard reference number	Title	Referenced in code section number
NEEA-2011	Northern Climate Specification for Heat Pump Water Heaters, Vers. 4.0	Table R406.2
NFRC	National Fenestration Rating Council, Inc. 6305 Ivy Lane, Suite 140 Greenbelt, MD 20770	
Standard reference number	Title	Referenced in code section number
100-2010	Procedure for Determining Fenestration Products U-factors	R303.1.3
200-2010	Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence	R303.1.3
400-2010	Procedure for Determining Fenestration Product Air Leakage	R402.4.3
US-FTC	United States-Federal Trade Commission 600 Pennsylvania Avenue N.W. Washington, DC 20580	
Standard reference number	Title	Referenced in code section number
C.F.R. Title 16 (May 31, 2005)	R-value	Rule R303.1.4

WDMA	Window and Door Manufacturers Association 1400 East Touhy Avenue, Suite 470 Des Plaines, IL 60018	
Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A440-11	North American Fenestration Standard/Specifica- tion for Windows, Doors and Unit Skylights	R402.4.3
WSU	Washington State University Energy Extension Program 905 Plum Street S.E., Bldg 3 P.O. Box 43165 Olympia, WA 98506-3166	
Standard reference number	Title	Referenced in code section number
WSU RS 33	Duct Testing Standard for New and Existing Con- struction Publication No. WSUEEP12-016	R403.2.2

NEW SECTION

WAC 51-11R-60000 Appendix C—Exterior design conditions. As required by Section R302.2, the heating or cooling outdoor design temperatures shall be selected from Table C-1.

NEW SECTION

WAC 51-11R-60100 Table C-1—Outdoor design temperatures for Washington.

**TABLE C-1
OUTDOOR DESIGN TEMPERATURES**

Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)
Aberdeen 20NNE	25	83
Anacortes	24	72
Anatone	-4	89
Auburn	25	84
Battleground	19	91
Bellevue	24	83
Bellingham 2N	19	78
Blaine	17	73
Bremerton	29	83
Burlington	19	77
Chehalis	21	87
Chelan	10	89
Cheney	4	94
Chesaw	-11	81
Clarkston	10	94
Cle Elum	1	91
Colfax 1NW	2	94
Colville AP	-2	92
Concrete	19	83
Connell 4NNW	6	100
Cougar 5E	25	93
Dallesport AP	14	99
Darrington RS	13	85

Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)
Davenport	5	92
Edmonds	24	82
Ellensburg AP	2	90
Elma	24	88
Ephrata AP	7	97
Everett Paine AFB	21	79
Forks 1E	23	81
Glacier RS	13	82
Glenoma (Kosmos)	18	89
Goldendale	7	94
Grays River Hatchery	24	86
Greenwater	1.4	84
Grotto	21	84
Hoquiam AP	26	79
Inchelium 2NW	0	92
John Day Dam	19	100
Kent	21	85
Kirkland	17	83
La Grande	23	88
Leavenworth	-3	93
Little Goose Dam	22	101
Long Beach 3NNE	25	77
Longview	24	87
Lower Granite Dam	14	98
Lower Monument Dam	18	103
Marysville	23	79
Metaline Falls	-1	89
Methow 2W	1	89
Nespelem 2S	-4	93
Newhalem	19	89
Newport	-5	92
Northport	2	92

Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)
Oak Harbor	16	74
Odessa	7	100
Olga 2SE	24	71
Olympia AP	17	85
Omak 2NW	3	90
Oroville	5	93
Othello	9	98
Packwood	16	90
Plain	-3	89
Pleasant View	16	98
Pomeroy	3	95
Port Angeles	28	75
Port Townsend	25	76
Prosser	12	97
Puyallup	19	86
Quilcene 2SW	23	83
Quinault RS	25	84
Rainier, Longmire	15	85
Paradise RS	8	71
Raymond	28	81
Redmond	17	83
Republic	-9	87
Richland	11	101
Ritzville	6	99
Satus Pass	10	90
Seattle: SeaTac AP	24	83
Sedro Woolley 1E	19	78
Sequim	23	78
Shelton	23	85
Smyrna	8	102
Snohomish	21	81
Snoqualmie Pass	6	80
Spokane AP	4	92
Spokane CO	10	96
Stampede Pass	7	76
Stehekin 3NW	12	85
Stevens Pass	6	77
Tacoma CO	29	82
Tatoosh Island	31	63
Toledo AP	17	84
Vancouver	22	88
Vashon Island	28	78
Walla Walla AP	6	96
Waterville	1	88
Wellpinit	1	93

Location	Outdoor Design Temp Heating (°F)	Outdoor Design Temp Cooling (°F)
Wenatchee CO	10	92
Whidbey Island	11	71
Willapa Harbor	26	81
Wilson Creek	3	96
Winthrop 1WSW	-12	91
Yakima AP	11	94

ABBREVIATIONS:

- AFB Air Force Base
- AP Airport
- CO City Office
- RS Ranger Station
- Typical: "4(miles)NE"

REPEALER

The following chapter of the Washington Administrative Code is repealed:

- WAC 51-11-0100 Chapter 1—Administration and enforcement.
- WAC 51-11-0101 Section 101—Scope and general requirements.
- WAC 51-11-0102 Materials and equipment.
- WAC 51-11-0103 Alternate materials—Method of construction, design or insulating systems.
- WAC 51-11-0104 Plans and specifications.
- WAC 51-11-0105 Inspections and enforcement.
- WAC 51-11-0106 Violations.
- WAC 51-11-0107 Liability.
- WAC 51-11-0108 Conflicts with other codes.
- WAC 51-11-0109 Severability.
- WAC 51-11-0200 Chapter 2—Definitions.
- WAC 51-11-0201 Scope.
- WAC 51-11-0300 Chapter 3—Design conditions.
- WAC 51-11-0301 Design criteria.
- WAC 51-11-0302 Thermal design parameters.
- WAC 51-11-0303 Mechanical ventilation.
- WAC 51-11-0400 Chapter 4—Building design by systems analysis.
- WAC 51-11-0401 Scope.
- WAC 51-11-0402 Systems analysis.

WAC 51-11-0500	Chapter 5—Building design by component performance approach.	WAC 51-11-0701	Scope.
WAC 51-11-0501	Scope.	WAC 51-11-0800	Section 0800—Suggested software for chapter 4 systems analysis approach.
WAC 51-11-0502	Building envelope requirements.	WAC 51-11-0900	Chapter 0900—Additional residential energy efficiency requirements.
WAC 51-11-0503	Mechanical systems.	WAC 51-11-1000	Chapter 10.
WAC 51-11-0504	Domestic water systems.	WAC 51-11-1001	Section 1001 General.
WAC 51-11-0505	Lighting.	WAC 51-11-1002	Section 1002: Below grade walls and slabs.
WAC 51-11-0525	Equation 1—Single-family residential.	WAC 51-11-1003	Section 1003: On-grade slab floors.
WAC 51-11-0526	Equation 2—All occupancies.	WAC 51-11-1004	Section 1004: Floors over unconditioned space.
WAC 51-11-0527	Equation 3—Single-family residential.	WAC 51-11-1005	Section 1005: Above-grade walls.
WAC 51-11-0528	Equation 4—Reserved.	WAC 51-11-1006	Section 1006 Default U-factors for glazing and doors.
WAC 51-11-0529	Equation 5—Reserved.	WAC 51-11-1007	Section 1007 Ceilings.
WAC 51-11-0530	Table 5-1.	WAC 51-11-1008	Section 1008 Air infiltration.
WAC 51-11-0531	Table 5-2—Reserved.	WAC 51-11-1009	Section 1009 Mass.
WAC 51-11-0532	Table 5-3—Reserved.	WAC 51-11-1100	Title.
WAC 51-11-0533	Table 5-4—Reserved.	WAC 51-11-1110	Purpose and intent.
WAC 51-11-0534	Table 5-5—Reserved.	WAC 51-11-1120	Scope.
WAC 51-11-0535	Table 5-6—Reserved.	WAC 51-11-1130	Application to existing buildings.
WAC 51-11-0536	Table 5-7—Reserved.	WAC 51-11-1131	Additions to existing buildings.
WAC 51-11-0537	Table 5-8—Reserved.	WAC 51-11-1132	Alterations and repairs.
WAC 51-11-0538	Table 5-9—Reserved.	WAC 51-11-1133	Change of occupancy or use.
WAC 51-11-0539	Table 5-10—Reserved.	WAC 51-11-1134	Historic buildings.
WAC 51-11-0540	Table 5-11.	WAC 51-11-1135	Commissioning.
WAC 51-11-0541	Table 5-12.	WAC 51-11-1140	Enforcement.
WAC 51-11-0542	Table 5-13—Reserved.	WAC 51-11-1141	Plans and specifications.
WAC 51-11-0600	Chapter 6 building design by prescriptive requirements approach.	WAC 51-11-1142	Materials and equipment.
WAC 51-11-0601	Scope.	WAC 51-11-1143	Inspections.
WAC 51-11-0602	Building envelope requirements for single-family residential.	WAC 51-11-1144	Violations.
WAC 51-11-0603	Mechanical systems for single-family residential.	WAC 51-11-1150	Conflicts with other codes.
WAC 51-11-0604	Domestic water systems.	WAC 51-11-1160	Severability and liability.
WAC 51-11-0605	Lighting.	WAC 51-11-1200	Reserved.
WAC 51-11-0625	Table 6-1.	WAC 51-11-1301	Scope.
WAC 51-11-0700	Chapter 7—Standards.	WAC 51-11-1302	Space heat type.

WAC 51-11-1303	Climate zones.	WAC 51-11-1435	Simultaneous heating and cooling.
WAC 51-11-1310	General requirements.		
WAC 51-11-1311	Insulation.	WAC 51-11-1436	Heat recovery.
WAC 51-11-1312	Glazing and doors.	WAC 51-11-1437	Electric motor efficiency.
WAC 51-11-1313	Moisture control.	WAC 51-11-1438	System criteria.
WAC 51-11-1314	Air leakage.	WAC 51-11-1439	Exhaust systems.
WAC 51-11-1320	Prescriptive building envelope option.	WAC 51-11-1440	Domestic water systems.
WAC 51-11-1321	General.	WAC 51-11-1441	Water heater installation.
WAC 51-11-1322	Opaque envelope.	WAC 51-11-1442	Shut-off controls.
WAC 51-11-1323	Glazing.	WAC 51-11-1443	Pipe insulation.
WAC 51-11-1330	Component performance building envelope option.	WAC 51-11-1444	Conservation of water and pumping energy.
WAC 51-11-1331	General.	WAC 51-11-1445	Heat recovery for domestic water systems.
WAC 51-11-1332	Component U-factors.	WAC 51-11-1446	Domestic hot water meters.
WAC 51-11-1333	UA calculations.	WAC 51-11-1450	Heated pools.
WAC 51-11-1334	Solar heat gain coefficient rate calculations.	WAC 51-11-1451	General.
WAC 51-11-1401	Scope.	WAC 51-11-1452	Pool water heaters.
WAC 51-11-1402	Mechanical ventilation.	WAC 51-11-1453	Controls.
WAC 51-11-1410	General requirements.	WAC 51-11-1454	Pool covers and insulation.
WAC 51-11-1411	HVAC equipment performance requirements.	WAC 51-11-1460	Cold storage.
WAC 51-11-1412	Controls.	WAC 51-11-1501	Scope.
WAC 51-11-1413	Economizers.	WAC 51-11-1510	General requirements.
WAC 51-11-1414	Ducting systems.	WAC 51-11-1511	Electric motors.
WAC 51-11-1415	Piping systems.	WAC 51-11-1512	Exempt lighting.
WAC 51-11-1416	Commissioning and completion requirements.	WAC 51-11-1513	Lighting controls.
WAC 51-11-1420	Simple systems (packaged unitary equipment).	WAC 51-11-1514	Exit signs.
WAC 51-11-1421	System type.	WAC 51-11-1520	Prescriptive lighting option.
WAC 51-11-1422	Controls.	WAC 51-11-1521	Prescriptive interior lighting requirements.
WAC 51-11-1423	Economizers.	WAC 51-11-1522	Prescriptive exterior lighting requirements.
WAC 51-11-1424	Separate air distribution systems.	WAC 51-11-1530	Lighting power allowance option.
WAC 51-11-1430	Complex systems.	WAC 51-11-1531	Interior lighting power allowance.
WAC 51-11-1431	System type.	WAC 51-11-1532	Exterior lighting power allowance.
WAC 51-11-1432	Controls.		
WAC 51-11-1433	Economizers.	WAC 51-11-99901	Section 1—General.
WAC 51-11-1434	Separate air distribution systems.	WAC 51-11-99902	Section 2—Simulation general requirements.

WAC 51-11-99903	Section 3—Calculation of the proposed and baseline building performance.
WAC 51-11-99904	Section 4—Suggested software for systems analysis approach.

WSR 13-04-056
PERMANENT RULES
BUILDING CODE COUNCIL

[Filed February 1, 2013, 11:04 a.m., effective July 1, 2013]

Effective Date of Rule: July 1, 2013.

Purpose: Adoption and amendment of the 2012 International Energy Conservation Code, Commercial, chapter 51-11C WAC. The residential portion is adopted under chapter 51-11R WAC in a separate filing. The filing for chapter 51-11R WAC includes the repeal of the 2009 Washington State Energy Code, chapter 51-11 WAC.

Statutory Authority for Adoption: RCW 19.27A.020 and 19.27A.025.

Other Authority: Chapters 19.27 and 34.05 RCW.

Adopted under notice filed as WSR 12-16-088 on July 31, 2012.

Changes Other than Editing from Proposed to Adopted Version: 1. WAC 51-11C-10140, Section C101.4.3: Based on testimony received, the lighting alterations in existing buildings language was clarified and coordinated with the percentage requirements in Section C101.4.3.1.

2. WAC 51-11C-10140, Section C101.4.4: Based on testimony received by the council, the language regarding change in use or occupancy was clarified. An exception was also added to allow a ten percent higher energy use for existing buildings when using either the component performance method or total building performance method to comply with the code. This makes it much easier to comply and rehabilitate existing buildings.

3. WAC 51-11C-10140, Section C101.4.5: This section was coordinated with requirements for semi-heated spaces. An exception was also added to allow a ten percent higher energy use for existing buildings when using either the component performance method or total building performance method to comply with the code.

4. WAC 51-11C-10150, Section C101.5.2: Based on testimony received, low energy buildings were exempted from all thermal envelope requirements, not just the wall requirements.

5. WAC 51-11C-10150, Section C101.5.2.1: This section was added to coordinate with the requirements for semi-heated space.

6. WAC 51-11C-20204, Definition of Daylight Zone: Based on testimony received, the description of under atrium glazing (which was proposed in 2011 and tabled at that time) was included in this definition to assist in the design of multi-story atriums.

7. WAC 51-11C-20212, Definition of Low Voltage Lighting: Based on testimony received, the definition of low voltage lighting was modified to remove the amperage refer-

ence. It was suggested there are products available with ratings above the twenty-five amp specification.

8. WAC 51-11C-20219, Definition of Semi-Heated Space: Based on testimony provided, the definition of semi-heated space was modified and simplified to apply a single set of criteria to all climate zones.

9. WAC 51-11C-30100, Section C301: Sections C301.2 (Warm humid counties) and C301.3 (International climate zones) were removed for clarity since these designations are not used in Washington state.

10. WAC 51-11C-402131, Equation C402.1: Target UA - Based on testimony received, the formula was adjusted to split out vertical glazing and skylights, to correlate with IECC language.

11. WAC 51-11C-402121, Table C402.1.2: Mass Wall Envelope Requirements - The Council, after reviewing all testimony regarding mass wall U-values, voted to move forward with Option 2 and the less stringent requirements for U-values. The associated footnote (d) was modified for better clarity and enforceability.

Unheated slabs - the perimeter insulation F-value was changed to 0.54. See item 12 for more information.

12. WAC 51-11C-402220 [51-11C-402200], Table C402.2: Based on comments received, the thermal block requirement for Roof, Metal Building was changed to R-3.5 for consistency with ASHRAE.

13. WAC 51-11C-402220 [51-11C-402200], Table C402.2: Based on the cost-benefit analysis performed, the perimeter insulation required for unheated slabs was reduced from R-20 to R-10. The analysis showed negligible energy savings for the proposed increase in insulation.

14. WAC 51-11C-402200, Table C402.2: Footnote f - The table for continuous insulation values using metal fasteners was modified based on information from an ASHRAE study showing less heat loss than previously estimated. In addition, the definition for continuous insulation was modified to reflect this information.

15. WAC 51-11C-40225, Section C402.2.5: Corrected the mass floor material weight reference (~~±~~ 120 pcf) per the International Code Council errata.

16. WAC 51-11C-40232, Section C402.3.2: Skylight Area - "Storage" was removed from the list of occupancy types, and the requirement was limited to single story buildings. The missing equation C4-1 (ICC errata) was also added.

17. WAC 51-11C-40241, Section C402.4.1.2: Air Barrier Testing - Based on testimony received, the council amended this section to require air barrier testing for all commercial buildings.

18. WAC 51-11C-403231, Tables C403.2.3.1(1) editorial corrections: A-D: Correct table title;

A: Corrected EER value for Air conditioners, water cooled $\geq 760,000$ Btu/hr; IEER value for condensing unit, air cooled; removed small duct high velocity (air cooled) category per ASHRAE 90.1 errata

B: Add "greater than or equal to" symbols;

D: Correct VRF EER in D: ~~4+2~~ 11.0

19. WAC 51-11C-403232, Table C403.2.3.1(2): Corrected through the wall, air cooled (cooling mode) SEER val-

ues per ASHRAE 90.1 errata; removed single duct high velocity, air cooled category per ASHRAE 90.1 errata.

20. WAC 51-11C-403233, Table C403.2.3(3): Corrected efficiency requirements for PTHP (heating mode) new construction per the International Code Council errata; fixed references to with/without louvered sides in room air conditioner categories; added ASHRAE 90.1 labeling requirements for replacement units as alternate in footnote b.

21. WAC 51-11C-40324, Section C403.2.4: Added reference to Sections C403.4.5 through C403.4.10 to the scoping section to include requirements from WSEC.

22. WAC 51-11C-403244, Section C403.2.4.4: Shut Off Damper Controls - Based on testimony received, an exception was added to correlate with the International Mechanical Code.

23. WAC 51-11C-403248, Sections C403.2.4.8 and C403.2.4.9: Added missing language from 2009 WSEC to the thermostatic control requirements.

24. WAC 51-11C-403553, Section C403.2.5.3: Garage Ventilation - Based on testimony received, the controls were correlated with the International Mechanical Code requirements.

25. WAC 51-11C-403294, Section C403.2.12: Fan and Pump Systems - Clarification that the requirements apply to motor nameplate horsepower.

26. WAC 51-11C-40331, Section C403.3.1.1: Economizers (Simple systems) - Based on testimony received, language from the 2009 WSEC was included for integrated controls in equipment >65,000 Btu/h for clarity and to maintain the stringency from the WSEC.

27. WAC 51-11C-40341, Section C403.4.1: Economizers - In response to testimony received, the 2009 WSEC economizer exception for chilled water systems was retained to provide additional flexibility, especially for existing buildings.

28. WAC 51-11C-40343, Section C403.4.3.4: Economizers (Complex systems) - Based on testimony received, additional language was provided to add clarification of part load requirements for heat pumps.

29. WAC 51-11C-40345, Section C403.4.5: VAV System requirements - Based on testimony received, an item was added to allow maintaining ventilation rates required by other codes or standards.

30. WAC 51-11C-404021, Table C404.2: Editorial adjustments to various errors in the table for greater than/less than symbols; correct placement of footnote c in instantaneous water heaters, gas.

31. WAC 51-11C-40406, Section C404.6: Pipe Insulation - Based on testimony received, a second exception was added for hot water piping outside of the recirculation zone.

32. WAC 51-11C-40410, Section C404.10: Corrected reference in scoping section; corrected reference to ASHRAE 146.

33. WAC 51-11C-40501, Section C405.1: Dwelling Unit Lighting - Based on testimony received, the original IECC requirement for percentage of high efficacy lighting was retained, changing from fifty percent to seventy-five percent of lamps.

34. WAC 51-11C-405022, Section C405.2.2.3.3: Added this section with "Reserved" to clarify this section of the IECC is not adopted.

35. WAC 51-11C-405023, Section C405.2.3: Emergency Lighting Controls - Based on testimony received, the language in this section was modified to clarify intent.

36. Sections 51-11C-40600 through 51-11C-40605, Section C406: Commercial Additional Energy Efficiency Measures - Based on testimony provided and in light of legal questions, this section was not adopted. To coordinate this change with the total building performance method, the percentage cited in Section C401.2 was also modified.

37. WAC 51-11C-407051, Table C407.5.1: Total Building Performance method - the following modifications were made based on testimony received at the public hearings:

- The standard reference design specifications for heat pumps was modified to include heat pump and package terminal heat pump reference standards.

- Modify footnote h to ensure air-source heat pumps with auxiliary heat are modeled consistently.

38. WAC 51-11C-40801, Section C408.1, Commissioning: Added service water heating and energy metering into the scoping sections since there are commissioning requirements for these systems.

39. WAC 51-11C-40901, C409.1: Metering, General - Based on testimony provided the threshold for the size of buildings requiring metering was increased to 50,000 square feet.

40. WAC 51-11C-40903, C409.3: Metering, end use - Based on testimony, an exception was provided to end use metering for electrical energy fed through VFDs.

41. WAC 51-11C-40904, C409.4: Metering, meters - Based on testimony provided, adjustments were made to the accuracy requirements to be more in line with current capabilities; the display requirements were modified to allow on-line displays and third party services.

42. WAC 51-11C-40905, C409.5.1.1: Metering, existing buildings - The requirements for existing buildings were modified to coordinate with the increased size threshold and the language simplified.

43. WAC 51-11C-50000, Chapter 5: Updated Reference Standards for NFRC from 2007 to 2010 editions; added ANSI/ASME A17.1, IAPMO/UPC and NEMA TP-1.

44. WAC 51-11C-610337: Table A103.3.7.1(1): Based on testimony given at the public hearings, note 5 was added to the CMU tables to provide information on the origin of the values.

45. WAC 51-11C-610337: Table A103.3.7.1(2) - Add missing footnotes to table for Default U-Factors for Concrete and Masonry Walls: Made various corrections to errors in U-values.

Corrected reference for metal clips based on the change described in item 14.

Corrected U-values under continuous insulation, no framing.

46. WAC 51-11C-610337: Table A103.3.7.2 - Add missing footnotes to table for Peripheral Edges of Intermediate Concrete Floors.

47. WAC 51-11C-61041, Table A104.1: Corrected U-value for Below grade walls, 3.5 foot: 0.0278.

48. WAC 51-11C-61081, Section A108.1, Air infiltration: Corrected section reference to air leakage requirements in the residential code, chapter 51-11R WAC.

A final cost-benefit analysis is available by contacting Tim Nogler, P.O. Box 41449, Olympia, WA 98504-1449, phone (360) 407-9277, fax (360) 586-9088, e-mail sbcc@ga.wa.gov, or see <https://fortress.wa.gov/ga/apps/SBCC/File.ashx?cid=2422>.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 288, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 288, Amended 0, Repealed 0.

Date Adopted: November 30, 2012.

C. Ray Allshouse
Council Chair

Chapter 51-11C WAC

STATE BUILDING CODE ADOPTION AND AMENDMENT OF THE 2012 EDITION OF THE INTERNATIONAL ENERGY CONSERVATION CODE, COMMERCIAL

NEW SECTION

WAC 51-11C-10000 Chapter 1 [CE]—Scope and administration.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-10100 Section C101—Scope and general requirements.

C101.1 Title. This code shall be known as the *International Energy Conservation Code* of [NAME OF JURISDICTION], and shall be cited as such. It is referred to herein as "this code."

C101.2 Scope. This code applies to *commercial buildings* and the buildings sites and associated systems and equipment.

EXCEPTION: The provisions of this code do not apply to temporary growing structures used solely for the commercial production of horticultural plants including ornamental plants, flowers, vegetables, and fruits. "Temporary growing structure" means a structure that has the sides and roof covered with polyethylene, polyvinyl, or

similar flexible synthetic material and is used to provide plants with either frost protection or increased heat retention. A temporary growing structure is not considered a building for purposes of this code.

C101.3 Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-10140 Section C101.4—Applicability.

C101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

C101.4.1 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C101.4.2 Historic buildings. The building official may modify the specific requirements of this code for historic buildings and require in lieu of alternate requirements which will result in a reasonable degree of energy efficiency. This modification may be allowed for those buildings or structures that are listed in the state or national register of historic places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a national register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the national or state registers of historic places either individually or as a contributing building to a historic district by the state historic preservation officer or the keeper of the national register of historic places.

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

EXCEPTION: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.

2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are insulated to full depth with insulation having a minimum nominal value of R-3.0 per inch installed per Section C402.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
7. Alterations to lighting systems only that replace less than 60 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

C101.4.3.1 Lighting and motors. Alterations that replace 60 percent or more of the luminaires in a space enclosed by walls or ceiling-height partitions shall comply with Sections C405.5 and C405.6. Where less than 60 percent of the fixtures in a space enclosed by walls or ceiling-height partitions are new, the installed lighting wattage shall be maintained or reduced.

Where new wiring is being installed to serve added fixtures and/or fixtures are being relocated to a new circuit, controls shall comply with Sections C405.2.1, C405.2.2.3, C405.2.3, C405.3.4, and as applicable C408.3. In addition, office areas less than 300 ft² enclosed by walls or ceiling-height partitions, and all meeting and conference rooms, and all school classrooms, shall be equipped with occupancy sensors that comply with Section C405.2.2 and C408.3. Where a new lighting panel (or a moved lighting panel) with all new raceway and conductor wiring from the panel to the fixtures is being installed, controls shall also comply with the other requirements in Sections C405.2.2 and C408.3.

Where new walls or ceiling-height partitions are added to an existing space and create a new enclosed space, but the lighting fixtures are not being changed, other than being relocated, the new enclosed space shall have controls that comply with Sections C405.2.1, C405.2.2, C405.2.3 and C408.3.

Those motors which are altered or replaced shall comply with Section C403.2.13.

C101.4.3.2 Mechanical systems. Those parts of systems which are altered or replaced shall comply with Section C403. Additions or alterations shall not be made to an existing mechanical system that will cause the existing mechanical system to become out of compliance.

All new systems in existing buildings, including packaged unitary equipment and packaged split systems, shall comply with Section C403.

Where mechanical cooling is added to a space that was not previously cooled, the mechanical cooling system shall

comply with the economizer requirements in Section C403.3.1 or C403.4.1.

EXCEPTION: Alternate designs that are not in full compliance with this code may be approved when the building official determines that existing building or occupancy constraints make full compliance impractical or where full compliance would be economically impractical.

Alterations to existing mechanical cooling systems shall not decrease economizer capacity unless the system complies with Section C403.3.1 or C403.4.1. In addition, for existing mechanical cooling systems that do not comply with Sections C403.3.1 or Section 403.4.1, including both the individual unit size limits and the total building capacity limits on units without economizer, other alterations shall comply with Table C101.4.3.1.

When space cooling equipment is replaced, controls shall be installed to provide for integrated operation with economizer in accordance with Section C403.3.

Existing equipment currently in use may be relocated within the same floor or same tenant space if removed and reinstalled within the same permit.

C101.4.4 Change in occupancy or use. Spaces undergoing a change in occupancy from an F, S or U occupancy to an occupancy other than F, S or U shall comply with this code. Any space that is converted to a residential dwelling unit or portion thereof, from another use or occupancy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2 (1) or (2) to another use in Table C405.5.2 (1) or (2), the installed lighting wattage shall comply with Section C405.5.

EXCEPTION: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is allowed to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is allowed to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

C101.4.5 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* or *semi-heated space* shall be required to be brought into full compliance with this code. Any semi-heated space that is altered to become conditioned space shall be required to be brought into full compliance with this code.

EXCEPTION: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is allowed to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is allowed to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

C101.4.6 Mixed occupancy. Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of IECC—Commercial Provisions or IECC—Residential Provisions.

NEW SECTION

WAC 51-11C-10143 Table C101.4.3.1—Economizer compliance options for mechanical alterations.

**Table C101.4.3.1
Economizer Compliance Options for Mechanical Alterations**

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	Any alteration with new or replacement equipment	Replacement unit of the same type with the same or smaller output capacity	Replacement unit of the same type with a larger output capacity	New equipment added to existing system or replacement unit of a different type
1. Packaged Units	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,3}	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,3}	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}
2. Split Systems	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency: + 10/5% ⁵ Economizer: Shall not decrease existing economizer capability	Only for new units < 54,000 Btu/h replacing unit installed prior to 1991 (one of two): Efficiency: + 10/5% ⁵ Economizer: 50% ⁶ For units > 54,000 Btu/h or any units installed after 1991: Option A	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}
3. Water Source Heat Pump	Efficiency: min. ¹ Economizer: C403.4.1 ²	(two of three): Efficiency: + 10/5% ⁵ Flow control valve ⁷ Economizer: 50% ⁶	(three of three): Efficiency: + 10/5% ⁵ Flow control valve ⁷ Economizer: 50% ⁶ (except for certain pre-1991 systems ⁸)	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4} (except for certain pre-1991 systems ⁸)
4. Hydronic Economizer using Air-Cooled Heat Rejection Equipment (Dry Cooler)	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 10/5% ⁵ Economizer: Shall not decrease existing economizer capacity	Option A	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}
5. Air-Handling Unit (including fan coil units) where the system has an air-cooled chiller	Efficiency: min. ¹ Economizer: C403.4.1 ²	Economizer: Shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems ⁸)	Option A (except for certain pre-1991 systems ⁸)
6. Air- Handling Unit (including fan coil units) and Water-cooled Process Equipment, where the system has a water-cooled chiller ¹⁰	Efficiency: min. ¹ Economizer: C403.4.1 ²	Economizer: Shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems ⁸ and certain 1991-2004 systems ⁹)	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4} (except for certain pre-1991 systems ⁸ and certain 1991-2004 systems ⁹)
7. Cooling Tower	Efficiency: min. ¹ Economizer: C403.4.1 ²	No requirements	Option A	Option A

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	Any alteration with new or replacement equipment	Replacement unit of the same type with the same or smaller output capacity	Replacement unit of the same type with a larger output capacity	New equipment added to existing system or replacement unit of a different type
8. Air-Cooled Chiller	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency: + 5% ¹¹ Economizer: Shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 10% ¹² and (2) multistage Economizer: Shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}
9. Water-Cooled Chiller	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency (one of two): (1) + 10% ¹³ or (2) plate frame heat exchanger ¹⁵ Economizer: Shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 15% ¹⁴ and (2) plate frame heat exchanger ¹⁵ Economizer: Shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}
10. Boiler	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency: + 8% ¹⁶ Economizer: Shall not decrease existing economizer capacity	Efficiency: + 8% ¹⁶ Economizer: Shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}

¹ Minimum equipment efficiency shall comply with Section C403.2.3 and Tables C403.2.3(1) through C403.2.3(9).

² System and building shall comply with Section C403.4.1 (including both the individual unit size limits and the total building capacity limits on units without economizer). It is acceptable to comply using one of the exceptions to Section C403.4.1.

³ All equipment replaced in an existing building shall have air economizer complying with Sections C403.3.1 and C403.4.1 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section C403.3.1.

⁴ All separate new equipment added to an existing building shall have air economizer complying with Sections C403.3.1 and C403.4.1 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section C403.4.1.

⁵ Equipment shall have a capacity-weighted average cooling system efficiency:

- a. For units with a cooling capacity below 54,000 Btu/h, a minimum of 10% greater than the requirements in Tables C403.2.3(1) and C403.2.3(2) (1.10 x values in Tables C403.2.3(1) and C403.2.3(2)).
- b. For units with a cooling capacity of 54,000 Btu/h and greater, a minimum of 5% greater than the requirements in Tables C403.2.3(1) and C403.2.3(2) (1.05 x values in Tables C403.2.3(1) and C403.2.3(2)).

⁶ Minimum of 50% air economizer that is ducted in a fully enclosed path directly to every heat pump unit in each zone, except that ducts may terminate within 12 inches of the intake to an HVAC unit provided that they are physically fastened so that the outside air duct is directed into the unit intake. If this is an increase in the amount of outside air supplied to this unit, the outside air supply system shall be capable of providing this additional outside air and equipped with economizer control.

⁷ Have flow control valve to eliminate flow through the heat pumps that are not in operation with variable speed pumping control complying with Section C403.4.3 for that heat pump.

– When the total capacity of all units with flow control valves exceeds 15% of the total system capacity, a variable frequency drive shall be installed on the main loop pump.

– As an alternate to this requirement, have a capacity-weighted average cooling system efficiency that is 5% greater than the requirements in note 5 (i.e., a minimum of 15%/10% greater than the requirements in Tables C403.2.3(1) and C403.2.3(2) (1.15/1.10 x values in Tables C403.2.3(1) and C403.2.3(2)).

⁸ Systems installed prior to 1991 without fully utilized capacity are allowed to comply with Option B, provided that the individual unit cooling capacity does not exceed 90,000 Btu/h.

⁹ Economizer not required for systems installed with water economizer plate and frame heat exchanger complying with previous codes between 1991 and June 2013, provided that the total fan coil load does not exceed the existing or added capacity of the heat exchangers.

¹⁰ For water-cooled process equipment where the manufacturers' specifications require colder temperatures than available with waterside economizer, that portion of the load is exempt from the economizer requirements.

¹¹ The air-cooled chiller shall have an IPLV efficiency that is a minimum of 5% greater than the IPLV requirements in Table C403.2.3(7) (1.05 x IPLV values in Table C403.2.3(7)).

¹² The air-cooled chiller shall:

- a. Have an IPLV efficiency that is a minimum of 10% greater than the IPLV requirements in Table C403.2.3(7) (1.10 x IPLV values in Table C403.2.3(7)); and
- b. Be multistage with a minimum of two compressors.

¹³ The water-cooled chiller shall have an IPLV efficiency that is a minimum of 10% greater than the IPLV requirements in Table C403.2.3(7) (1.10 x IPLV values in Table C403.2.3(7)).

¹⁴ The water-cooled chiller shall have an IPLV efficiency that is a minimum of 15% greater than the IPLV requirements in Table C403.2.3(7), (1.15 x IPLV values in Table C403.2.3(7)).

¹⁵ Economizer cooling shall be provided by adding a plate-frame heat exchanger on the waterside with a capacity that is a minimum of 20% of the chiller capacity at standard AHRI rating conditions.

¹⁶ The replacement boiler shall have an efficiency that is a minimum of 8% higher than the value in Table C403.2.3(5) (1.08 x value in Table C403.2.3(5)), except for electric boilers.

NEW SECTION

WAC 51-11C-10150 Section C101.5—Compliance.

C101.5 Compliance. *Residential buildings* shall meet the provisions of IECC—Residential Provisions. *Commercial buildings* shall meet the provisions of IECC—Commercial Provisions.

C101.5.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

C101.5.2 Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from all thermal envelope provisions of this code:

1. Those that are heated and/or cooled with a peak design rate of energy usage less than 3.4 Btu/h • ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.

2. Those that do not contain *conditioned space*.

3. Greenhouses isolated from any conditioned space and not intended for occupancy.

C101.5.2.1 Semi-heated spaces. A *semi-heated* space shall meet all of the *building thermal envelope* requirements, except that insulation is not required for opaque wall assemblies. Component performance calculations involving semi-heated spaces shall calculate fully insulated opaque walls for the Target UA calculation, and Total Building Performance calculations involving semi-heated spaces shall calculate fully insulated opaque walls for the Standard Reference Design.

NEW SECTION

WAC 51-11C-10200 Section C102—Alternate materials—Method of construction, design or insulating systems.

C102.1 General. This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.

NEW SECTION

WAC 51-11C-10300 Section C103—Construction documents.

C103.1 General. Construction documents and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

EXCEPTION: The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

C103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the loca-

tion, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their *R*-values; fenestration *U*-factors and SHGCs; area-weighted *U*-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

C103.3.1 Approval of construction documents. When the *code official* issues a permit where construction documents are required, the construction documents shall be endorsed in writing and stamped "Reviewed for Code Compliance." Such *approved* construction documents shall not be changed, modified or altered without authorization from the *code official*. Work shall be done in accordance with the *approved* construction documents.

One set of construction documents so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the *code official* or a duly authorized representative.

C103.3.2 Previous approvals. This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

C103.3.3 Phased approval. The *code official* shall have the authority to issue a permit for the construction of part of an energy conservation system before the construction documents for the entire system have been submitted or *approved*, provided adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.

C103.4 Amended construction documents. Changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.

C103.5 Retention of construction documents. One set of *approved* construction documents shall be retained by the *code official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

NEW SECTION**WAC 51-11C-10400 Section C104—Inspections.**

C104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official*.

C104.2 Required approvals. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*. Where applicable, inspections shall include at least:

C104.2.1 Envelope

C104.2.1.1 Wall Insulation Inspection: To be made after all wall insulation and air vapor retarder sheet or film materials are in place, but before any wall covering is placed.

C104.2.1.2 Glazing Inspection: To be made after glazing materials are installed in the building.

C104.2.1.3 Exterior Roofing Insulation: To be made after the installation of the roof insulation, but before concealment.

C104.2.1.4 Slab/Floor Insulation: To be made after the installation of the slab/floor insulation, but before concealment.

C104.2.2 Mechanical

C104.2.2.1 Mechanical Equipment Efficiency and Economizer: To be made after all equipment and controls required by this code are installed and prior to the concealment of such equipment or controls.

C104.2.2.2 Mechanical Pipe and Duct Insulation: To be made after all pipe and duct insulation is in place, but before concealment.

C104.2.3 Lighting and motors

C104.2.3.1 Lighting Equipment and Controls: To be made after the installation of all lighting equipment and controls required by this code, but before concealment of the lighting equipment.

C104.2.3.2 Motor Inspections: To be made after installation of all equipment covered by this code, but before concealment.

C104.3 Final inspection. The building shall have a final inspection and not be occupied until *approved*.

C104.4 Reinspection. A building shall be reinspected when determined necessary by the *code official*.

C104.5 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

C104.6 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

C104.7 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

C104.8 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.

C104.8.1 Revocation. The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

NEW SECTION**WAC 51-11C-10500 Section C105—Validity.**

C105.1 General. If a portion of this code is held to be illegal or void, such a decision shall not affect the validity of the remainder of this code.

NEW SECTION**WAC 51-11C-10600 Section C106—Referenced standards.**

C106.1 Referenced codes and standards. The codes and standards referenced in this code shall be those listed in Chapter 5, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections C106.1.1 and C106.1.2.

C106.1.1 Conflicts. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

C106.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

C106.2 Conflicting requirements. Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.

C106.3 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

C106.4 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law. In addition to the requirements of this code, all occupancies shall conform to the provisions included in the State Building Code (chapter 19.27 RCW). In case of conflicts among the codes enumerated in RCW 19.27.031 (1) through (4) and this code, an earlier named code shall govern over those following. In the case of conflict between the duct sealing and insulation requirements of this code and the duct insulation requirements of Sections 603 and 604 of the *International Mechanical Code*, the duct insulation requirements of this code, or where applicable, a local jurisdiction's energy code shall govern.

NEW SECTION

WAC 51-11C-10700 Section C107—Fees.

C107.1 Fees. A permit shall not be issued until the fees prescribed in Section C107.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

C107.2 Schedule of permit fees. A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

C107.3 Work commencing before permit issuance. Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official*, which shall be in addition to the required permit fees.

C107.4 Related fees. The payment of the fee for the construction, *alteration*, removal or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

C107.5 Refunds. The *code official* is authorized to establish a refund policy.

NEW SECTION

WAC 51-11C-10800 Section C108—Stop work order.

C108.1 Authority. Whenever the *code official* finds any work regulated by this code being performed in a manner either contrary to the provisions of this code or dangerous or unsafe, the *code official* is authorized to issue a stop work order.

C108.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

C108.3 Emergencies. Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work.

C108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-10900 Section C109—Board of appeals.

C109.1 General. In order to hear and decide appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The *code official* shall be an ex officio member of said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *code official*.

C109.2 Limitations on authority. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

C109.3 Qualifications. The board of appeals shall consist of members who are qualified by experience and training and are not employees of the jurisdiction.

NEW SECTION

WAC 51-11C-11000 Section C110—Violations. It shall be unlawful for any person, firm, or corporation to erect or construct any building, or remodel or rehabilitate any existing building or structure in the state, or allow the same to be done, contrary to or in violation of any of the provisions of this code.

NEW SECTION

WAC 51-11C-11100 Section C111—Liability. Nothing contained in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of any city or county or its officers, employees or agents for any injury or damage resulting from the failure of a building to conform to the provisions of this code.

NEW SECTION**WAC 51-11C-20000 Chapter 2 [CE]—Definitions.**

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION**WAC 51-11C-20100 Section C201—General.**

C201.1 Scope. Unless stated otherwise, the following words and terms in this code shall have the meanings indicated in this chapter.

C201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

C201.3 Terms defined in other codes. Terms that are not defined in this code but are defined in the *International Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *Uniform Plumbing Code* or the *International Residential Code* shall have the meanings ascribed to them in those codes.

C201.4 Terms not defined. Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

NEW SECTION

WAC 51-11C-20200 Section C202—General definitions.

NEW SECTION**WAC 51-11C-20201 Section C202.1—A.**

ABOVE-GRADE WALL. A wall enclosing *conditioned space* that is not a below-grade wall. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.

ACCESSIBLE. Admitting close approach as a result of not being guarded by locked doors, elevation or other effective means (see "*Readily accessible*").

ADDITION. An extension or increase in the *conditioned space* floor area or height of a building or structure.

AIR BARRIER. Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or a combination of materials.

ALTERATION. Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

APPROVED. Approval by the *code official* as a result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by nationally recognized organizations.

ATTIC AND OTHER ROOFS. All other roofs, including roofs with insulation entirely below (inside of) the roof structure

(i.e., attics, cathedral ceilings, and single-rafter ceilings), roofs with insulation both above and below the roof structure, and roofs without insulation but excluding roofs with insulation entirely above deck and metal building roofs.

AUTOMATIC. Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "Manual").

NEW SECTION**WAC 51-11C-20202 Section C202.2—B.**

BELOW-GRADE WALL. That portion of a wall in the building envelope that is entirely below the finish grade and in contact with the ground.

BUILDING. Any structure used or intended for supporting or sheltering any use or occupancy, including any mechanical systems, service water heating systems and electric power and lighting systems located on the building site and supporting the building.

BUILDING COMMISSIONING. A process that verifies and documents that the selected building systems have been designed, installed, and function according to the owner's project requirements and construction documents, and to minimum code requirements.

BUILDING ENTRANCE. Any door, set of doors, doorway, or other form of portal that is used to gain access to the building from the outside by the public.

BUILDING SITE. A contiguous area of land that is under the ownership or control of one entity.

BUILDING THERMAL ENVELOPE. The below-grade walls, above-grade walls, floor, roof, and any other building elements that enclose *conditioned space* or provides a boundary between *conditioned space*, *semiheated space* and exempt or unconditioned space.

NEW SECTION**WAC 51-11C-20203 Section C202.3—C.**

C-FACTOR (THERMAL CONDUCTANCE). The coefficient of heat transmission (surface to surface) through a building component or assembly, equal to the time rate of heat flow per unit area and the unit temperature difference between the warm side and cold side surfaces (Btu/h ft² x °F) [W/(m² x K)].

CODE OFFICIAL. The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

COEFFICIENT OF PERFORMANCE (COP) - COOLING. The ratio of the rate of heat removal to the rate of energy input, in consistent units, for a complete refrigerating system or some specific portion of that system under designated operating conditions.

COEFFICIENT OF PERFORMANCE (COP) - HEATING. The ratio of the rate of heat removal to the rate of heat delivered to the rate of energy input, in consistent units, for a complete heat pump system, including the compressor and, if applicable, auxiliary heat, under designated operating conditions.

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of "Residential buildings."

CONDITIONED FLOOR AREA. The horizontal projection of the floors associated with the *conditioned space*.

CONDITIONED SPACE. An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*.

CONTINUOUS AIR BARRIER. A combination of materials and assemblies that restrict or prevent the passage of air through the building thermal envelope.

CONTINUOUS INSULATION (CI). Insulation that is continuous across all structural members without thermal bridges other than service openings and penetrations by metal fasteners with a cross-sectional area, as measured in the plane of the surface, of less than 0.04% of the opaque surface area of the assembly. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.

CURTAIN WALL. Fenestration products used to create an external nonload-bearing wall that is designed to separate the exterior and interior environments.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-20204 Section C202.4—D.

DATA ACQUISITION SYSTEM. An electronic system managed by the building owner to collect, tabulate and display metering information.

DAYLIGHT ZONE. (See also Fig. C202.4)

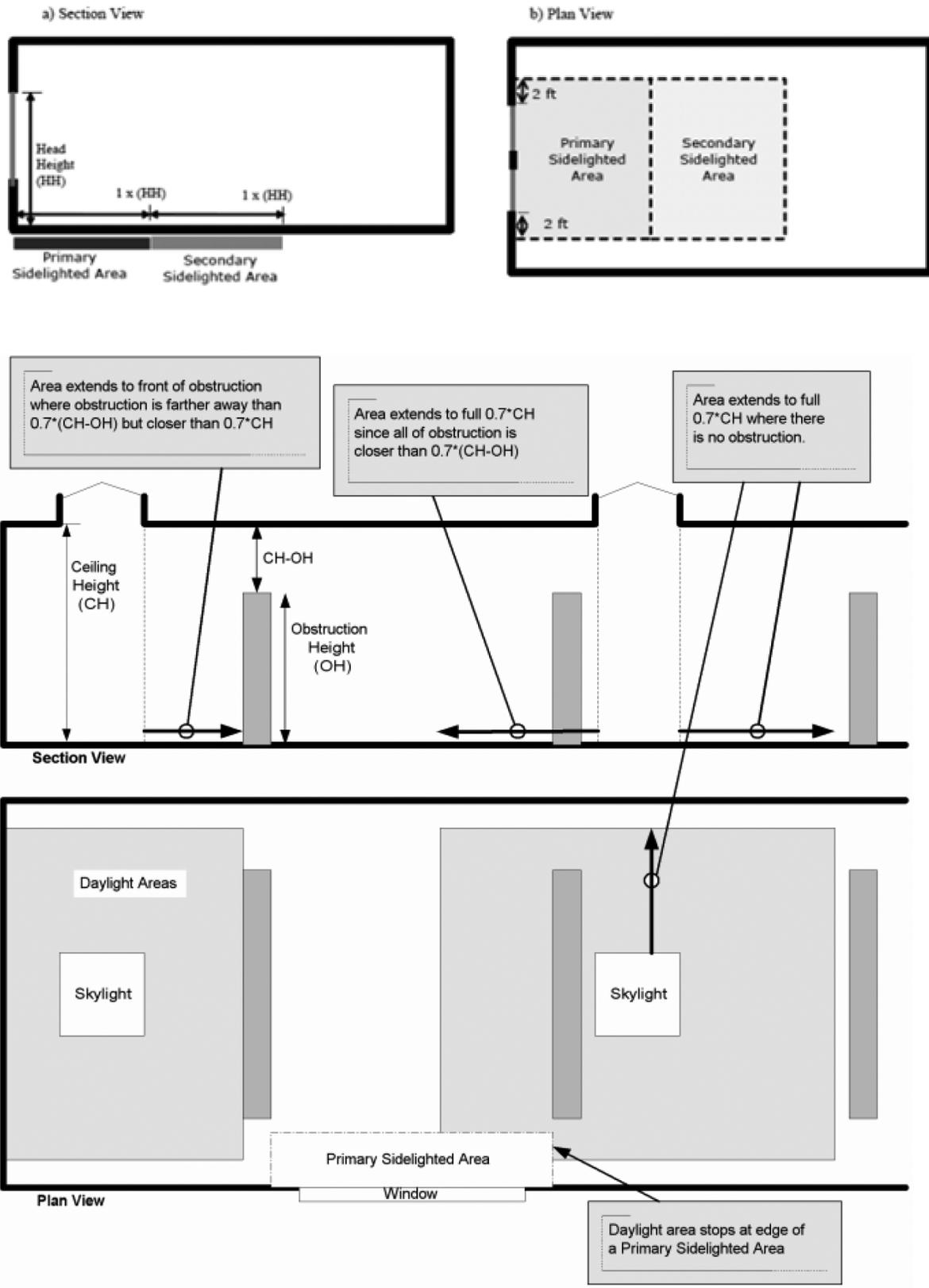
1. **Under skylights.** The area under skylights whose horizontal dimension, in each direction, is equal to the skylight dimension in that direction plus either 70 percent of the floor-to-ceiling height or the dimension to a ceiling height opaque partition, or one-half the distance to adjacent skylights or vertical fenestration, whichever is least.

2. **Adjacent to vertical fenestration.** The area adjacent to vertical fenestration which receives daylight through the fenestration. For purposes of this definition and unless more detailed analysis is provided, the primary daylight *zone* depth is assumed to extend into the space a distance equal to the window head height and the secondary daylighted zone extends from the edge of the primary zone to a distance equal to two times the window head height or to the nearest ceiling height opaque partition, whichever is less. The daylight *zone* width is assumed to be the width of the window plus 2 feet (610 mm) on each side, or the window width plus the distance to an opaque partition, or the window width plus one-half the distance to adjacent skylight or vertical fenestration, whichever is least.

3. **In parking garages.** The area within 20 feet of any portion of a perimeter wall that has a net opening to wall ratio of at least 40 percent and no exterior obstructions within 20 feet.

4. **Under atrium glazing.** The area at the floor directly beneath the atrium and the top floor under the atrium whose horizontal dimension, in each direction, is equal to the distance between the floor and ceiling height. Levels below the top floor that are not directly beneath the atrium are unaffected.

Figure C202.1



Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-20207 Section C202.7—G.

GENERAL LIGHTING. Lighting that provides a substantially uniform level of illumination throughout an area. General lighting shall not include decorative lighting or lighting that provides a dissimilar level of illumination to serve a specialized application or feature within such area.

NEW SECTION

WAC 51-11C-20208 Section C202.8—H.

HEAT TRAP. An arrangement of piping and fittings, such as elbows, or a commercially available heat trap that prevents thermosyphoning of hot water during standby periods.

HEATED SLAB-ON-GRADE FLOOR. Slab-on-grade floor construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under, the slab.

HIGH-EFFICACY LUMINAIRES. Luminaires with compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:

1. 60 Lumens per watt for lamps over 40 watts;
2. 50 Lumens per watt for lamps over 15 watts to 40 watts; and
3. 40 Lumens per watt for lamps 15 watts or less.

HUMIDISTAT. A regulatory device, actuated by changes in humidity, used for automatic control of relative humidity.

NEW SECTION

WAC 51-11C-20209 Section C202.9—I.

INFILTRATION. The uncontrolled inward air leakage into a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

INSULATING SHEATHING. An insulating board with a core material having a minimum *R*-value of R-2.

INSULATION ENTIRELY ABOVE DECK. A roof with all insulation:

1. Installed above (outside of) the roof structure; and
2. Continuous (i.e., uninterrupted by framing members).

INTEGRATED ENERGY EFFICIENCY RATIO (IEER). A single-number figure of merit expressing cooling part-load EER efficiency for unitary air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for the equipment.

INTEGRATED PART LOAD VALUE (IPLV). A single number figure of merit based on part-load EER, COP, or kW/ton expressing part-load efficiency for air conditioning and heat pump equipment on the basis of weighted operation at various load capacities for equipment.

NEW SECTION

WAC 51-11C-20210 Section C202.10—J.

NEW SECTION

WAC 51-11C-20211 Section C202.11—K.

NEW SECTION

WAC 51-11C-20212 Section C202.12—L.

LABELED. Equipment, materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

LISTED. Equipment, materials, products or services included in a list published by an organization acceptable to the *code official* and concerned with evaluation of products or services that maintains periodic inspection of production of *listed* equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

LOW-VOLTAGE LIGHTING. A lighting system consisting of an isolating power supply, the low voltage luminaires, and associated equipment that are all identified for the use. The output circuits of the power supply operate at 30 volts (42.4 volts peak) or less under all load conditions.

LUMINAIRE. A complete lighting unit consisting of a lamp or lamps together with the housing designed to distribute the light, position and protect the lamps, and connect the lamps to the power supply.

NEW SECTION

WAC 51-11C-20213 Section C202.13—M.

MANUAL. Capable of being operated by personal intervention (see "Automatic").

METAL BUILDING ROOF. A roof that:

1. Is constructed with a metal, structural, weathering surface;
2. Has no ventilated cavity; and
3. Has the insulation entirely below deck (i.e., does not include composite concrete and metal deck construction nor a roof framing system that is separated from the superstructure by a wood substrate) and whose structure consists of one or more of the following configurations:

- a. Metal roofing in direct contact with the steel framing members;
- b. Metal roofing separated from the steel framing members by insulation;
- c. Insulated metal roofing panels installed as described in a or b.

METAL BUILDING WALL. A *wall* whose structure consists of metal spanning members supported by steel structural members (i.e., does not include spandrel glass or metal panels in curtain *wall systems*).

METER. A device that measures the flow of energy.

MICROCELL. A wireless communication facility consisting of an antenna that is either: (a) Four (4) feet in height and with an area of not more than 580 square inches; or (b) if a

tubular antenna, no more than four (4) inches in diameter and no more than six (6) feet in length; and the associated equipment cabinet that is six (6) feet or less in height and no more than 48 square feet in floor area.

NEW SECTION

WAC 51-11C-20214 Section C202.14—N.

NAMEPLATE HORSEPOWER. The nominal motor horsepower rating stamped on the motor nameplate.

NONSTANDARD PART LOAD VALUE (NPLV). A single-number part-load efficiency figure of merit calculated and referenced to conditions other than IPLV conditions, for units that are not designed to operate at ARI standard rating conditions.

NEW SECTION

WAC 51-11C-20215 Section C202.15—O.

ON-SITE RENEWABLE ENERGY. Energy derived from solar radiation, wind, waves, tides, landfill gas, biomass, or the internal heat of the earth. The energy system providing on-site renewable energy shall be located on the project site.

NEW SECTION

WAC 51-11C-20216 Section C202.16—P.

PERSONAL WIRELESS SERVICE FACILITY. A wireless communication facility (WCF), including a microcell, which is a facility for the transmission and/or reception of radio frequency signals and which may include antennas, equipment shelter or cabinet, transmission cables, a support structure to achieve the necessary elevation, and reception and/or transmission devices or antennas.

PROPOSED DESIGN. A description of the proposed building used to estimate annual energy use for determining compliance based on total building performance.

NEW SECTION

WAC 51-11C-20217 Section C202.17—Q.

NEW SECTION

WAC 51-11C-20218 Section C202.18—R.

READILY ACCESSIBLE. Capable of being reached quickly for operation, renewal or inspection without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders or access equipment (see "*Accessible*").

REFRIGERATED WAREHOUSE COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of 3,000 ft² or greater.

REFRIGERATED WAREHOUSE FREEZER. An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of 3,000 ft² or greater.

REPAIR. The reconstruction or renewal of any part of an existing building.

RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and multiple single-family

dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane.

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof covering, underlayment, roof deck, insulation, vapor retarder and interior finish.

R-VALUE (THERMAL RESISTANCE). The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \cdot \text{ft}^2 \cdot ^\circ\text{F}/\text{Btu}$) [$(\text{m}^2 \cdot \text{K})/\text{W}$].

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-20219 Section C202.19—S.

SCREW LAMP HOLDERS. A lamp base that requires a screw-in-type lamp, such as a compact-fluorescent, incandescent, or tungsten-halogen bulb.

SEMI-HEATED SPACE. An enclosed space within a building, including adjacent connected spaces separated by an uninsulated component (e.g., basements, utility rooms, garages, corridors), which:

1. Is heated but not cooled, and has a maximum heating system output capacity of 3.4 Btu/(h-ft²) but not greater than 8 Btu/(h-ft²);
2. Is not a cold storage space or frozen storage space.

SERVICE WATER HEATING. Heating water for domestic or commercial purposes other than space heating and process requirements.

SKYLIGHT. Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal. Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.

SLAB BELOW GRADE. Any portion of a slab floor in contact with the ground which is more than 24 inches below the final elevation of the nearest exterior grade.

SLAB-ON-GRADE FLOOR. That portion of a slab floor of the building envelope that is in contact with the ground and that is either above grade or is less than or equal to 24 inches below the final elevation of the nearest exterior grade.

SLEEPING UNIT. A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not *sleeping units*.

SMALL BUSINESS. Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other businesses, which has the purpose of making a profit, and which has fifty or fewer employees.

SOLAR HEAT GAIN COEFFICIENT (SHGC). The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar

radiation which is then reradiated, conducted or convected into the space.

STANDARD REFERENCE DESIGN. A version of the *proposed design* that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.

STEEL-FRAMED WALL. A *wall* with a cavity (insulated or otherwise) whose exterior surfaces are separated by steel framing members (i.e., typical steel stud *walls* and curtain *wall systems*).

STOREFRONT. A nonresidential system of doors and windows mullied as a composite fenestration structure that has been designed to resist heavy use. *Storefront* systems include, but are not limited to, exterior fenestration systems that span from the floor level or above to the ceiling of the same story on commercial buildings, with or without mullied windows and doors.

SUBSYSTEM METER. A meter placed downstream of the energy supply meter that measures the energy delivered to a load or a group of loads.

SUNROOM. A one-story structure attached to a dwelling with a glazing area in excess of 40 percent of the gross area of the structure's exterior walls and roof.

NEW SECTION

WAC 51-11C-20220 Section C202.20—T.

THERMAL ISOLATION. Physical and space conditioning separation from *conditioned space(s)*. The *conditioned space(s)* shall be controlled as separate zones for heating and cooling or conditioned by separate equipment.

THERMOSTAT. An automatic control device used to maintain temperature at a fixed or adjustable set point.

NEW SECTION

WAC 51-11C-20221 Section C202.21—U.

U-FACTOR (THERMAL TRANSMITTANCE). The coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h • ft² • °F) [W/(m² • K)].

UNHEATED SLAB-ON-GRADE FLOOR. A slab-on-grade floor that is not a heated slab-on-grade floor.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-20222 Section C202.22—V.

VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

VENTILATION AIR. That portion of supply air that comes from outside (outdoors) plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.

VERTICAL FENESTRATION. All fenestration other than skylights.

VISIBLE TRANSMITTANCE [VT]. The ratio of visible light entering the space through the fenestration product assembly to the incident visible light, visible transmittance, includes the effects of glazing material and frame and is expressed as a number between 0 and 1.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-20223 Section C202.23—W.

WALK-IN COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of less than 3,000 ft².

WALK-IN FREEZER. An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of less than 3,000 ft².

WALL. That portion of the *building envelope*, including opaque area and *fenestration*, that is vertical or tilted at an angle of 60 degrees from horizontal or greater. This includes *above-grade walls* and *below-grade walls*, between floor spandrels, peripheral edges of floors, and foundation *walls*.

WOOD-FRAMED AND OTHER WALLS. All other *wall* types, including wood stud *walls*.

NEW SECTION

WAC 51-11C-20224 Section C202.24—X, Y, Z.

ZONE. A space or group of spaces within a building with heating or cooling requirements that are sufficiently similar so that desired conditions can be maintained throughout using a single controlling device.

NEW SECTION

WAC 51-11C-30000 Chapter 3 [CE]—General requirements.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-30100 Section C301—Climate zones.

C301.1 General. Climate zones from Table C301.1 shall be used in determining the applicable requirements from Chapter 4.

Table C301.1 Climate Zones and Moisture Regimes Designations by State and County

Key: A - Moist, B - Dry, C - Marine. Absence of moisture designation indicates moisture regime is irrelevant.

WASHINGTON

5B Adams	4C Grays Harbor	4C Pierce
5B Asotin	4C Island	4C San Juan
5B Benton	4C Jefferson	4C Skagit

Key: A - Moist, B - Dry, C - Marine. Absence of moisture designation indicates moisture regime is irrelevant.

WASHINGTON

5B Chelan	4C King	5B Skamania
4C Clallam	4C Kitsap	4C Snohomish
4C Clark	5B Kittitas	5B Spokane
5B Columbia	5B Klickitat	6B Stevens
4C Cowlitz	4C Lewis	4C Thurston
5B Douglas	5B Lincoln	4C Wahkiakum
6B Ferry	4C Mason	5B Walla Walla
5B Franklin	6B Okanogan	4C Whatcom
5B Garfield	4C Pacific	5B Whitman
5B Grant	6B Pend Oreille	5B Yakima

NEW SECTION

WAC 51-11C-30200 Section C302—Design conditions.

C302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

C302.2 Exterior design conditions. The heating or cooling outdoor design temperatures shall be selected from Appendix C.

NEW SECTION

WAC 51-11C-30300 Section C303—Materials, systems and equipment.

NEW SECTION

WAC 51-11C-30310 Section 303.1—Identification.

C303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

C303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

C303.1.1.1 Blown or sprayed roof/ceiling insulation. The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on

markers that are installed at least one for every 300 square feet (28 m²) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch (25 mm) in height. Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed *R*-value shall be *listed* on certification provided by the insulation installer.

C303.1.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer's *R*-value mark is readily observable upon inspection.

C303.1.3 Fenestration product rating. *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled *U*-factor shall be assigned a default *U*-factor from Table C303.1.3(1), C303.1.3(2) or C303.1.3(4). The solar heat gain coefficient (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table C303.1.3(3).

EXCEPTION: Units without NFRC ratings produced by a small business may be assigned default *U*-factors from Table C303.1.3(5) for vertical fenestration.

C303.1.4 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (C.F.R. Title 16, Part 460) in units of h x ft² x °F/Btu at a mean temperature of 75°F (24°C).

NEW SECTION

WAC 51-11C-303131 Table C303.1.3(1)—Default glazed fenestration *U*-factor.

**Table C303.1.3(1)
Default Glazed Fenestration *U*-Factor**

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKY-LIGHT
Metal	1.20	0.80	See Table C303.1.3(4)
Metal with Thermal Break	1.10	0.65	
Nonmetal or Metal Clad	0.95	0.55	
Glazed Block	0.60		

NEW SECTION

WAC 51-11C-303132 Table C303.1.3(2)—Default door *U*-factors.

**Table C303.1.3(2)
Default Door *U*-Factors
See Appendix A, Section A107**

NEW SECTION

WAC 51-11C-303133 Table C303.1.3(3)—Default glazed fenestration SHGC and VT.

**Table C303.1.3(3)
Default Glazed Fenestration SHGC and VT**

	SINGLE GLAZED		DOUBLE GLAZED		GLAZE BLOCK
	Clear	Tinted	Clear	Tinted	
SHGC	0.40	0.40	0.40	0.40	0.40
VT	0.6	0.3	0.6	0.3	0.6

NEW SECTION

WAC 51-11C-303134 Table C303.1.3(4)—Default *U*-factors for skylights.

**Table C303.1.3(4)
Default *U*-Factors for Skylights**

Fenestration Type	Frame Type			
	Aluminum Without Thermal Break	Aluminum With Thermal Break	Reinforced Vinyl/Aluminum-Clad Wood or Vinyl	Wood or Vinyl-Clad Wood/Vinyl Without Reinforcing
Single Glazing glass acrylic/polycarb	U-1.58 U-1.52	U-1.51 U-1.45	U-1.40 U-1.34	U-1.18 U-1.11
Double Glazing air argon	U-1.05 U-1.02	U-0.89 U-0.86	U-0.84 U-0.80	U-0.67 U-0.64
Double Glazing, <i>e</i> = 0.20 air argon	U-0.96 U-0.91	U-0.80 U-0.75	U-0.75 U-0.70	U-0.59 U-0.54
Double Glazing, <i>e</i> = 0.10 air argon	U-0.94 U-0.89	U-0.79 U-0.73	U-0.74 U-0.68	U-0.58 U-0.52
Double Glazing, <i>e</i> = 0.05 air argon	U-0.93 U-0.87	U-0.78 U-0.71	U-0.73 U-0.66	U-0.56 U-0.50
Triple Glazing air argon	U-0.90 U-0.87	U-0.70 U-0.69	U-0.67 U-0.64	U-0.51 U-0.48
Triple Glazing, <i>e</i> = 0.20 air argon	U-0.86 U-0.82	U-0.68 U-0.63	U-0.63 U-0.59	U-0.47 U-0.43
Triple Glazing, <i>e</i> = 0.20 on 2 surfaces air argon	U-0.82 U-0.79	U-0.64 U-0.60	U-0.60 U-0.56	U-0.44 U-0.40
Triple Glazing, <i>e</i> = 0.10 on 2 surfaces air argon	U-0.81 U-0.77	U-0.62 U-0.58	U-0.58 U-0.54	U-0.42 U-0.38

Fenestration Type	Frame Type			
	Aluminum Without Thermal Break	Aluminum With Thermal Break	Reinforced Vinyl/Aluminum-Clad Wood or Vinyl	Wood or Vinyl-Clad Wood/Vinyl Without Reinforcing
Quadruple Glazing, $e = 0.10$ on 2 surfaces				
air	U-0.78	U-0.59	U-0.55	U-0.39
argon	U-0.74	U-0.56	U-0.52	U-0.36
krypton	U-0.70	U-0.52	U-0.48	U-0.32

¹ U-factors are applicable to both glass and plastic, flat and domed units, all spacers and gaps.
² Emissivities shall be less than or equal to the value specified.
³ Gap fill shall be assumed to be air unless there is a minimum of 90 percent argon or krypton.
⁴ Aluminum frame with thermal break is as defined in footnote 1 to Table C303.1.3(5).

NEW SECTION

WAC 51-11C-303135 Table C303.1.3(5)—Small business compliance default table.

**Table C303.1.3(5)
 Small Business Compliance Table
 Default U-Factors for Vertical Glazing**

Vertical Glazing Description				Frame Type		
Panes	Low-e ¹	Spacer	Fill	Any Frame	Aluminum Thermal Break ²	Wood/Vinyl/Fiberglass
Double ³	A	Any	Argon	0.48	0.41	0.32
	B	Any	Argon	0.46	0.39	0.30
	C	Any	Argon	0.44	0.37	0.28
	C	High Performance	Argon	0.42	0.35	Deemed to comply ⁵
Triple ⁴	A	Any	Air	0.50	0.44	0.26
	B	Any	Air	0.45	0.39	0.22
	C	Any	Air	0.41	0.34	0.20
	Any double low-e	Any	Air	0.35	0.32	0.18

¹ Low-eA (emissivity) shall be 0.24 to 0.16.
 Low-eB (emissivity) shall be 0.15 to 0.08.
 Low-eC (emissivity) shall be 0.07 or less.
² Aluminum Thermal Break = An aluminum thermal break framed window shall incorporate the following minimum design characteristics:
 a) The thermal conductivity of the thermal break material shall be not more than 3.6 Btu-in/h/ft²/°F;
 b) The thermal break material must produce a gap in the frame material of not less than 0.210 inches; and
 c) All metal framing members of the products exposed to interior and exterior air shall incorporate a thermal break meeting the criteria in a) and b) above.
³ A minimum air space of 0.375 inches between panes of glass is required for double glazing.
⁴ A minimum air space of 0.25 inches between panes of glass is required for triple glazing.
⁵ Deemed to comply glazing shall not be used for performance compliance.

NEW SECTION

WAC 51-11C-30320 Section C303.2—Installation.

C303.2 Installation. All materials, systems and equipment shall be installed in accordance with the manufacturer's installation instructions and the *International Building Code*.

C303.2.1 Protection of exposed foundation insulation. Insulation applied to the exterior of basement walls, crawl-space walls and the perimeter of slab-on-grade floors shall

have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (153 mm) below grade.

NEW SECTION

WAC 51-11C-30330 Section C303.3—Maintenance information.

C303.3 Maintenance information. Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a *readily accessible* label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

NEW SECTION

WAC 51-11C-40000 Chapter 4 [CE]—Commercial energy efficiency.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-40100 Section C401—General.

C401.1 Scope. The requirements contained in this chapter are applicable to commercial buildings, or portions of commercial buildings.

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of Sections C402, C403, C404, C405, C408 and C409.
2. The requirements of Section C407, C408, C409, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy consumption shall be equal to or less than 93 percent of the standard reference design building.

C401.2.1 Application to existing buildings. Additions, alterations and repairs to existing buildings shall comply with Sections C402, C403, C404, C405, C408 and C409.

NEW SECTION

WAC 51-11C-40200 Section C402—Building envelope requirements.

NEW SECTION

WAC 51-11C-40210 Section C402.1—General (Prescriptive).

NEW SECTION

WAC 51-11C-402121 Table C402.1.2—Opaque thermal envelope assembly requirements.

**Table C402.1.2
Opaque Thermal Envelope Assembly Requirements^a**

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Roofs				
Insulation entirely above deck	U-0.034	U-0.031	U-0.032	U-0.031
Metal buildings	U-0.031	U-0.031	U-0.029	U-0.031

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 or Section C402.1.3 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1. Walk-in coolers and walk-in freezers shall comply with C402.5. Refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with C402.6.

EXCEPTION: Unstaffed equipment shelters or cabinets used solely for personal wireless service facilities.

NEW SECTION

WAC 51-11C-40211 Section C402.1.1—Insulation and fenestration criteria.

C402.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Tables C402.2 and C402.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.2.

NEW SECTION

WAC 51-11C-40212 Section C402.1.2—U-Factor alternative.

C402.1.2 U-factor alternative. An assembly with a *U*-factor, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-value in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the "All other" column of Table C402.1.2. The *U*-factors for typical construction assemblies are included in Appendix A. These values shall be used for all calculations. Where proposed construction assemblies are not represented in Appendix A, values shall be calculated in accordance with the ASHRAE *Handbook—Fundamentals* using the framing factors listed in Appendix A where applicable and shall include the thermal bridging effects of framing materials.

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Attic and other	U-0.021	U-0.021	U-0.021	U-0.021
Walls, Above Grade				
Mass	U-0.104 ^d	U-0.078	U-0.078	U-0.071
Metal building	U-0.052	U-0.052	U-0.052	U-0.044
Steel framed	U-0.055	U-0.055	U-0.049	U-0.044
Wood framed and other	U-0.054	U-0.054	U-0.051	U-0.044
Walls, Below Grade				
Below-grade wall ^b	Same as above grade	Same as above grade	Same as above grade	Same as above grade
Floors				
Mass	U-0.031	U-0.031	U-0.031	U-0.031
Joist/framing	U-0.029	U-0.029	U-0.029	U-0.029
Slab-on-Grade Floors				
Unheated slabs	F-0.54	F-0.54	F-0.54	F-0.52
Heated slabs ^c	F-0.55	F-0.55	F-0.55	F-0.55

^a Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from Appendix A is required unless otherwise allowed by Section C402.1.2.

^b Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.

^c Heated slab *F*-factors shall be determined specifically for heated slabs. Unheated slab factors shall not be used.

^d Exception: Integral insulated concrete block walls complying with ASTM C90 with all cores filled and meeting both of the following:

1 At least 50 percent of cores must be filled with vermiculite or equivalent fill insulation; and

2 The building thermal envelope encloses one or more of the following uses: Warehouse (storage and retail), gymnasium, auditorium, church chapel, arena, kennel, manufacturing plant, indoor swimming pool, pump station, water and waste water treatment facility, storage facility, storage area, motor vehicle service facility. Where additional uses not listed (such as office, retail, etc.) are contained within the building, the exterior walls that enclose these areas may not utilize this exception and must comply with the appropriate mass wall *U*-factor from Table C402.1.2.

NEW SECTION

WAC 51-11C-40213 Section C402.1.3—Component performance option.

C402.1.3 Component performance building envelope option.

C402.1.3.1 General. Buildings or structures whose design heat loss rate (UA_p) and solar heat gain coefficient rate ($SHGC * A_p$) are less than or equal to the target heat loss rate (UA_t) and solar heat gain coefficient rate ($SHGC * A_t$) shall be considered in compliance with this section. The stated *U*-factor, *F*-factor or allowable area of any component assembly, listed in Table C402.1.2 and Table C402.3, such as roof/ceiling, opaque wall, opaque door, fenestration, floor over conditioned space, slab-on-grade floor, radiant floor or opaque floor may be increased and the *U*-factor or *F*-factor for other components decreased, provided that the total heat gain or loss for the entire building envelope does not exceed the total resulting from compliance to the *U*-factors, *F*-factors or allowable areas specified in this section. Compliance shall

be calculated in total for the building envelope for nonresidential spaces and for residential spaces.

C402.1.3.2 Component *U*-factors. The *U*-factors for typical construction assemblies are included in Chapter 3 and Appendix A. These values shall be used for all calculations. Where proposed construction assemblies are not represented in Chapter 3 or Appendix A, values shall be calculated in accordance with the ASHRAE Handbook—Fundamentals, using the framing factors listed in Appendix A.

For envelope assemblies containing metal framing, the *U*-factor shall be determined by one of the following methods:

1. Results of laboratory measurements according to acceptable methods of test.

2. ASHRAE Handbook—Fundamentals where the metal framing is bonded on one or both sides to a metal skin or covering.

3. The zone method as provided in ASHRAE Handbook—Fundamentals.

4. Effective framing/cavity *R*-values as provided in Appendix A.

When return air ceiling plenums are employed, the roof/ceiling assembly shall:

a. For thermal transmittance purposes, not include the ceiling proper nor the plenum space as part of the assembly; and

b. For gross area purposes, be based upon the interior face of the upper plenum surface.

5. Tables in ASHRAE 90.1-2010 Normative Appendix A.

C402.1.3.3 *UA* calculations. The target UA_t and the proposed UA_p shall be calculated using Equations C402-1 and C402-2 and the corresponding areas and *U*-factors from Table C402.1.2 and Table C402.3. For the target UA_t calculation, the skylights shall be located in roof/ceiling area up to the maximum skylight area per Section C402.3.1 and the remainder of the fenestration allowed per Section C402.3.1 shall be located in the wall area.

C402.1.3.4 SHGC rate calculations. Solar heat gain coefficient shall comply with Table C402.3. The target SHGCA_t

and the proposed SHGCA_p shall be calculated using Equations C402-3 and C402-4 and the corresponding areas and SHGCs from Table C402.3.

NEW SECTION

WAC 51-11C-402131 Equation C402-1—Target UA_t

**Equation C402-1
Target UA_t**

$$UA_t = U_{radt}A_{radt} + U_{mrt}A_{mrt} + U_{rat}A_{rat} + U_{mwt}A_{mwt} + U_{mbwt}A_{mbwt} + U_{sft}A_{sft} + U_{wft}A_{wft} + U_{fmt}A_{fmt} + U_{fjt}A_{fjt} + F_{st}P_{st} + F_{srt}P_{srt} + U_{dst}A_{dst} + U_{drt}A_{drt} + U_{vgt}A_{vgt} + U_{vgmt}A_{vgmt} + U_{vgmot}A_{vgmot} + U_{vgdt}A_{vgdt} + U_{ogt}A_{ogt}$$

U_{at} = The target combined specific heat transfer of the gross roof/ceiling assembly, exterior wall and floor area.

Where:

- U_{radt} = The thermal transmittance value for roofs with the insulation entirely above deck found in Table C402.1.2.
- U_{mrt} = The thermal transmittance value for metal building roofs found in Table C402.1.2.
- U_{rat} = The thermal transmittance value for attic and other roofs found in Table C402.1.2.
- U_{mwt} = The thermal transmittance value for opaque mass walls found in Table C402.1.2.
- U_{mbwt} = The thermal transmittance value for opaque metal building walls found in Table C402.1.2.
- U_{sft} = The thermal transmittance value for opaque steel-framed walls found in Table C402.1.2.
- U_{wft} = The thermal transmittance value for opaque wood framed and other walls found in Table C402.1.2.
- U_{fmt} = The thermal transmittance value for mass floors over unconditioned space found in Table C402.1.2.
- U_{fjt} = The thermal transmittance value for joist floors over unconditioned space found in Table C402.1.2.
- F_{st} = The F-factor for slab-on-grade floors found in Table C402.1.2.
- F_{srt} = The F-factor for radiant slab floors found in Table C402.1.2.
- U_{dst} = The thermal transmittance value for opaque swinging doors found in Table C402.2.
- U_{drt} = The thermal transmittance value for opaque roll-up or sliding doors found in Table C402.2.
- U_{vgt} = The thermal transmittance value for vertical fenestration with nonmetal framing found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area.
- U_{vgmt} = The thermal transmittance value for vertical fenestration with fixed metal framing found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area.
- U_{vgmot} = The thermal transmittance value for vertical fenestration with operable metal framing found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area.
- U_{vgdt} = The thermal transmittance value for entrance doors found in Table C402.3 which corresponds to the proposed vertical fenestration area as a percent of gross exterior wall area.
- U_{ogt} = The thermal transmittance for skylights found in Table C402.3 which corresponds to the proposed skylight area as a percent of gross exterior roof area.
- A_{fmt} = The proposed mass floor over unconditioned space area, A_{fm}.
- A_{fjt} = The proposed joist floor over unconditioned space area, A_{fj}.
- P_{st} = The proposed linear feet of slab-on-grade floor perimeter, P_s.
- P_{srt} = The proposed linear feet of radiant slab floor perimeter, P_{rs}.
- A_{dst} = The proposed opaque swinging door area, A_{ds}.
- A_{drt} = The proposed opaque roll-up or sliding door area, A_{dr}.

and
If the vertical fenestration area as a percent of gross exterior wall area does not exceed the maximum allowed in Section C402.3.1:

- A_{mwt} = The proposed opaque above grade mass wall area, A_{mw} .
- A_{mbwt} = The proposed opaque above grade metal building wall area, A_{mbw} .
- A_{sftw} = The proposed opaque above grade steel framed wall area, A_{mfw} .
- A_{wftw} = The proposed opaque above grade wall wood framed and other area, A_w .
- A_{vgt} = The proposed vertical fenestration area with nonmetal framing, A_{vg} .
- A_{vgmt} = The proposed vertical fenestration area with fixed metal framing, A_{vgm} .
- A_{vgmot} = The proposed vertical fenestration area with operable metal framing, A_{vgmo} .
- A_{vgdt} = The proposed entrance door area, A_{vgd} .

or

If the vertical fenestration area as a percent of gross exterior wall area exceeds the maximum allowed in Section C402.3.1, the area of each fenestration element shall be reduced in the base envelope design by the same percentage and the net area of each wall type increased proportionately by the same percentage so that the total vertical fenestration area is exactly equal to the allowed percentage per Section C402.3.1 of the gross wall area.

and

If the skylight area as a percent of gross exterior roof area does not exceed the maximum allowed in Section C402.3.1:

- A_{radt} = The proposed roof area with insulation entirely above the deck, A_{rad} .
- A_{mrt} = The proposed roof area for metal buildings, A_{mr} .
- A_{rat} = The proposed attic and other roof area, A_{or} .
- A_{ogat} = The proposed skylight area, A_{ogor} .

or

If the skylight area as a percent of gross exterior roof area exceeds the maximum allowed in Section C402.3.1, the area of each skylight element shall be reduced in the base envelope design by the same percentage and the net area of each roof type increased proportionately by the same percentage so that the total skylight area is exactly equal to the allowed percentage per Section C402.3.1 of the gross roof area.

NEW SECTION

WAC 51-11C-402132 Equation C402-2—Proposed UA_p .

**Equation C402-2
Proposed UA_p**

$$UA_p = U_{rad}A_{rad} + U_{mr}A_{mr} + U_{ra}A_{ra} + U_{mw}A_{mw} + U_{mbw}A_{mbw} + U_{sftw}A_{sftw} + U_{wftw}A_{wftw} + U_{fm}A_{fm} + U_{fj}A_{fj} + F_sP_s + F_{sr}P_{sr} + U_{ds}A_{ds} + U_{dr}A_{dr} + U_{vg}A_{vg} + U_{vgmf}A_{vgmf} + U_{vgmo}A_{vgmo} + U_{vgd}A_{vgd} + U_{og}A_{og}$$

Where:

- UA_p = The combined proposed specific heat transfer of the gross exterior wall, floor and roof/ceiling assembly area.
- U_{rad} = The thermal transmittance of the roof area where the insulation is entirely above the roof deck.
- A_{rad} = Opaque roof area where the insulation is entirely above the roof deck.
- U_{mr} = The thermal transmittance of the metal building roof area.
- A_{mr} = Opaque metal building roof area.
- U_{ra} = The thermal transmittance of the roof over attic and other roof area.
- A_{ra} = Opaque roof over attic and other roof area.
- U_{mw} = The thermal transmittance of the opaque mass wall area.
- A_{mw} = Opaque mass wall area (not including opaque doors).
- U_{mbw} = The thermal transmittance of the opaque metal building wall area.
- A_{mbw} = Opaque metal building wall area (not including opaque doors).
- U_{sftw} = The thermal transmittance of the opaque steel framed wall area.
- A_{sftw} = Opaque steel framed wall area (not including opaque doors).
- U_{wftw} = The thermal transmittance of the opaque wood framed and other wall area.

- A_{wfw} = Opaque wood framed and other wall area (not including opaque doors).
- U_{fm} = The thermal transmittance of the mass floor over unconditioned space area.
- A_{fm} = Mass floor area over unconditioned space.
- U_{fj} = The thermal transmittance of the joist floor over unconditioned space area.
- A_{fj} = Joist floor area over unconditioned space.
- F_s = Slab-on-grade floor component F-factor.
- P_s = Linear feet of slab-on-grade floor perimeter.
- F_{sr} = Radiant floor component F-factor.
- P_{sr} = Lineal feet of radiant floor perimeter.
- U_{ds} = The thermal transmittance value of the opaque swinging door area.
- A_{ds} = Opaque swinging door area.
- U_{dr} = The thermal transmittance value of the opaque roll-up or sliding door area.
- A_{dr} = Opaque roll-up or sliding door area.
- U_{vg} = The thermal transmittance of the vertical fenestration area with nonmetal framing.
- A_{vg} = Vertical fenestration area with nonmetal framing.
- U_{vgmf} = The thermal transmittance of the vertical fenestration area with fixed metal framing.
- A_{vgmf} = Vertical fenestration area with fixed metal framing.
- U_{vgmo} = The thermal transmittance of the vertical fenestration area with operable metal framing.
- A_{vgmo} = Vertical fenestration area with operable metal framing.
- U_{vgd} = The thermal transmittance of the vertical fenestration area for entrance doors.
- A_{vgd} = Vertical fenestration area for entrance doors.
- U_{og} = The thermal transmittance for the skylights.
- A_{og} = Skylight area.

NOTE: Where more than one type of wall, window, roof/ceiling, door and skylight is used, the U and A terms for those items shall be expanded into subelements as:

$$U_{mw1}A_{mw1} + U_{mw2}A_{mw2} + U_{sfw1}A_{sfw1} + \dots \text{etc.}$$

NEW SECTION

WAC 51-11C-402133 Equation C402-3—Target SHGCA_t

**Equation C402-3
Target SHGCA_t**

$$SHGCA_t = SHGC_t (A_{ogt} + A_{vgt} + A_{vgmt} + A_{vgmot} + A_{vgdt})$$

Where:

- SHGCA_t = The target combined specific heat gain of the target fenestration area.
- SHGC_t = The solar heat gain coefficient for fenestration found in Table C402.3 which corresponds to the proposed total fenestration area as a percent of gross exterior wall area, and A_{ogt}, A_{vgt}, A_{vgmt}, A_{vgmot} and A_{vgdt} are defined under Equation C402-1.

NEW SECTION

WAC 51-11C-402134 Equation C402-4—Proposed SHGCA_p

**Equation C402-4
Proposed SHGCA_p**

$$SHGCA_p = SHGC_{og}A_{og} + SHGC_{vg}A_{vg}$$

Where:

- SHGCA_t = The combined proposed specific heat gain of the proposed fenestration area.

- SHGC_{og} = The solar heat gain coefficient of the skylights.
- A_{og} = The skylight area.
- SHGC_{vg} = The solar heat gain coefficient of the vertical fenestration.
- A_{vg} = The vertical fenestration area.

NEW SECTION

WAC 51-11C-40214 Section C402.1.4—Semi-heated spaces.

C402.1.4 Semi-heated spaces. All spaces shall comply with the requirements in Section C402 unless they meet the definition for semi-heated spaces. For semi-heated spaces, the building envelope shall comply with the same requirements as that for conditioned spaces in Section C402; however, for semi-heated spaces heated by other than electric resistance heating equipment, wall insulation is not required for those walls that separate semi-heated spaces from the exterior provided that the space meets all the requirements of semi-heated space. Semi-heated spaces shall be calculated separately from other conditioned spaces for compliance purposes. Building envelope assemblies separating conditioned space from semi-heated space shall comply with exterior envelope insulation requirements. When choosing the unin-

ulated wall option, the wall shall not be included in Component Performance Building Envelope Option calculation.

NEW SECTION

WAC 51-11C-40220 Section C402.2—Specific insulation requirements.

C402.2 Specific insulation requirements (Prescriptive). Opaque assemblies shall comply with Table C402.2. Where two or more layers of continuous insulation board are used in a construction assembly, the continuous insulation boards shall be installed in accordance with Section C303.2. If the continuous insulation board manufacturer's installation instructions do not address installation of two or more layers, the edge joints between each layer of continuous insulation boards shall be staggered.

NEW SECTION

WAC 51-11C-402200 Table C402.2—Opaque thermal envelope requirements.

**Table C402.2
Opaque Thermal Envelope Requirements^{a, f}**

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Roofs				
Insulation entirely above deck	R-30ci	R-38ci	R-30ci	R-38ci
Metal buildings (with R-3.5 thermal blocks) ^{a, b}	R-25 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS
Attic and other	R-49	R-49	R-49	R-49
Walls, Above Grade				
Mass	R-9.5ci	R-13.3ci	R-11.4ci	R-15.2ci
Metal building	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-19 + R-16ci
Steel framed	R-13 + R-10ci	R-19 + R-8.5ci	R-13 + R-12.5ci	R-19 + R-14ci
Wood framed and other	R-21 int	R-21 int	R-13 + R-7.5ci or R-20 + R-3.8ci	R-21 + R-5ci
Walls, Below Grade				
Below-grade wall ^d	Same as above grade	Same as above grade	Same as above grade	Same as above grade
Floors				
Mass	R-30ci	R-30ci	R-30ci	R-30ci
Joist/framing	R-30 ^e	R-30 ^e	R-38 ^e	R-38 ^e
Slab-on-Grade Floors				
Unheated slabs	R-10 for 24" below	R-10 for 24" below	R-10 for 48" below	R-15 for 48" below

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Heated slabs ^d	R-10 perimeter & under entire slab			
Opaque Doors				
Swinging	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or sliding	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner system—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

^a Assembly descriptions can be found in Chapter 2 and Appendix A.

^b Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.

^c R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-ft² °F.

^d Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

^e Steel floor joist systems shall be insulated to R-38 + R-10ci.

^f For roof, wall or floor assemblies where the proposed assembly would not be continuous insulation, two alternate nominal *R*-value compliance options for assemblies with isolated metal penetrations of otherwise continuous insulation are:

Assemblies with continuous insulation (see definition)	Alternate option for assemblies with metal penetrations, greater than 0.04% but less than 0.08%
R-11.4ci	R-14.3
R-13.3ci	R-16.6
R-15.2ci	R-19.0
R-30ci	R-38
R-38ci	R-48
R-13 + R-7.5ci	R-13 + R-9.4
R-13 + R-10ci	R-13 + R-12.5
R-13 + R-12.5ci	R-13 + R-15.6
R-13 + R-13ci	R-13 + R-16.3
R-19 + R-8.5ci	R-19 + R-10.6
R-19 + R-14ci	R-19 + R-17.5
R-19 + R-16ci	R-19 + R-20
R-20 + R-3.8ci	R-20 + R-4.8
R-21 + R-5ci	R-21 + R-6.3

These alternate nominal *R*-value compliance options are allowed for projects complying with all of the following:

1. The ratio of the cross-sectional area, as measured in the plane of the surface, of metal penetrations of otherwise continuous insulation to the opaque surface area of the assembly is greater than 0.0004 (0.04%), but less than 0.0008 (0.08%).
2. The metal penetrations of otherwise continuous insulation are isolated or discontinuous (e.g., brick ties or other discontinuous metal attachments, offset brackets supporting shelf angles that

allow insulation to go between the shelf angle and the primary portions of the wall structure). No continuous metal elements (e.g., metal studs, z-girts, z-channels, shelf angles) penetrate the otherwise continuous portion of the insulation.

3. Building permit drawings shall contain details showing the locations and dimensions of all the metal penetrations (e.g., brick ties or other discontinuous metal attachments, offset brackets, etc.) of otherwise continuous insulation. In addition, calculations shall be provided showing the ratio of the cross-sectional area of metal penetrations of otherwise continuous insulation to the overall opaque wall area.

For other cases where the proposed assembly is not continuous insulation, see Section C402.1.2 for determination of *U*-factors for assemblies that include metal other than screws and nails.

NEW SECTION

WAC 51-11C-40221 Section C402.2.1—Roof assembly.

C402.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

- EXCEPTIONS:
1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.2.
 2. Unit skylight curbs included as a component of an NFRC 100 rated assembly shall not be required to be insulated.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

C402.2.1.1 Roof solar reflectance and thermal emittance.

Low-sloped roofs, with a slope less than 2 units vertical in 12 horizontal, directly above cooled *conditioned spaces* in Climate Zones 1, 2, and 3 shall comply with one or more of the options in Table C402.2.1.1.

EXCEPTIONS: The following roofs and portions of roofs are exempt from the requirements in Table C402.2.1.1:

1. Portions of roofs that include or are covered by:
 - 1.1. Photovoltaic systems or components.
 - 1.2. Solar air or water heating systems or components.
 - 1.3. Roof gardens or landscaped roofs.
 - 1.4. Above-roof decks or walkways.
 - 1.5. Skylights.
 - 1.6. HVAC systems, components, and other opaque objects mounted above the roof.
2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.
3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (psf) (74 kg/m²) or 23 psf (117 kg/m²) pavers.
4. Roofs where a minimum of 75 percent of the roof area meets a minimum of one of the exceptions above.

NEW SECTION

WAC 51-11C-402211 Table C402.2.1.1—Reflectance and emittance options.

**Table C402.2.1.1
Reflectance and Emittance Options^a**

Three-year aged solar reflectance ^b of 0.55 and three-year aged thermal emittance ^c of 0.75
Initial solar reflectance ^b of 0.70 and initial thermal emittance ^c of 0.75
Three-year-aged solar reflectance index ^d of 64 initial solar reflectance index ^d of 82

^a The use of area-weighted averages to meet these requirements shall be permitted. Materials lacking initial tested values for either solar reflectance or thermal emittance, shall be assigned both an initial solar reflectance of 0.10 and an initial thermal emittance of 0.90. Materials lacking three-year aged tested values for either solar reflectance or thermal emittance shall be assigned both a three-year aged solar reflectance of 0.10 and a three-year aged thermal emittance of 0.90.

^b Solar reflectance tested in accordance with ASTM C 1549, ASTM E 903 or ASTM E 1918.

^c Thermal emittance tested in accordance with ASTM C 1371 or ASTM E 408.

^d Solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a convection coefficient of 2.1 Btu/h x ft² x °F (12W/m² x K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance. Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance.

NEW SECTION

WAC 51-11C-40222 Section C402.2.2—Classification of walls.

C402.2.2 Classification of walls. Walls associated with the building envelope shall be classified in accordance with Section C202.

NEW SECTION

WAC 51-11C-40223 Section C402.2.3—Above-grade walls.

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

"Mass walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m²) of wall surface area; or
2. 25 psf (120 kg/m²) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1,900 kg/m³).

NEW SECTION

WAC 51-11C-40224 Section C402.2.4—Below-grade walls.

C402.2.4 Thermal resistance of below-grade walls. The minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the below-grade walls shall be as specified in Table C402.2.

NEW SECTION

WAC 51-11C-40225 Section C402.2.5—Floors over unconditioned space.

C402.2.5 Floors over outdoor air or unconditioned space. The minimum thermal resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly.

"Mass floors" shall include floors weighing not less than:

1. 35 psf (170 kg/m²) of floor surface area; or
2. 25 psf (120 kg/m²) of floor surface area if the material weight is not more than 120 pcf (1,900 kg/m³).

NEW SECTION

WAC 51-11C-40226 Section C402.2.6—Slab on grade.

C402.2.6 Slabs on grade. Where the slab on grade is in contact with the ground, the minimum thermal resistance (*R*-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors shall be as specified in Table C402.2. The insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil.

EXCEPTION: Where the slab-on-grade floor is greater than 24 inches (61 mm) below the finished exterior grade, perimeter insulation is not required.

NEW SECTION

WAC 51-11C-40227 Section C402.2.7—Opaque doors.

C402.2.7 Opaque doors. Opaque doors (doors having less than 50 percent glass area) shall meet the applicable requirements for doors as specified in Table C402.2 and be considered as part of the gross area of above-grade walls that are part of the building envelope.

NEW SECTION

WAC 51-11C-40228 Section C402.2.8—Insulation of radiant heating systems.

C402.2.8 Insulation of radiant heating systems. Radiant panels, and associated U-bends and headers, designed for sensible heating of an indoor space through heat transfer from the thermally effective panel surfaces to the occupants or indoor space by thermal radiation and natural convection and the bottom surfaces of floor structures incorporating radiant heating shall be insulated with a minimum of R-3.5 (0.62 m²/K × W).

NEW SECTION

WAC 51-11C-40230 Section C402.3—Fenestration (Prescriptive).

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.

NEW SECTION

WAC 51-11C-402300 Table C402.3—Building envelope requirements—Fenestration.

**Table C402.3
Building Envelope Requirements—Fenestration**

CLIMATE ZONE	5 AND MARINE 4	6
Vertical Fenestration		
U-factor		
Nonmetal framing (all) ^a	0.30	0.30
Metal framing (fixed) ^b	0.38	0.36
Metal framing (operable) ^c	0.40	0.40
Metal framing (entrance doors) ^d	0.60	0.60
SHGC		
SHGC	0.40	0.40
Skylights		
U-factor	0.50	0.50
SHGC	0.35	0.35

NR = No requirement.

^a "Nonmetal framing" includes framing materials other than metal, with or without metal reinforcing or cladding.

^b "Metal framing" includes metal framing, with or without thermal break. "Fixed" includes curtain wall, storefront, picture windows, and other fixed windows.

^c "Metal framing" includes metal framing, with or without thermal break. "Operable" includes openable fenestration products other than "entrance doors."

^d "Metal framing" includes metal framing, with or without thermal break. "Entrance door" includes glazed swinging entrance doors. Other doors which are not entrance doors, including sliding glass doors, are considered "operable."

NEW SECTION

WAC 51-11C-40231 Section C402.3.1—Maximum area.

C402.3.1 Maximum area. The vertical fenestration area (not including opaque doors and opaque spandrel panels) shall not exceed 30 percent of the gross above-grade wall area. The skylight area shall not exceed 3 percent of the gross roof area.

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone;
2. Automatic daylighting controls are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

EXCEPTION: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

C402.3.1.2 Increased skylight area with daylighting controls. The skylight area shall be permitted to be a maximum of 5 percent of the roof area provided automatic daylighting controls are installed in daylight zones under skylights.

NEW SECTION

WAC 51-11C-40232 Section C402.3.2—Minimum skylight fenestration area.

C402.3.2 Minimum skylight fenestration area. For single story buildings only, in an enclosed space greater than 10,000 square feet (929 m²), directly under a roof with ceiling heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, gymnasium/exercise center, convention center, automotive service, manufacturing, nonrefrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide a minimum skylight area to daylight zone under skylights of either:

1. Not less than 3 percent with a skylight VT of at least 0.40; or
2. Provide a minimum skylight effective aperture of at least 1 percent determined in accordance with Equation C4-1.

Skylight Effective Aperture = (0.85 x Skylight Area x Skylight VT x WF)/Daylight zone under skylight

(Equation C4-1)

where:

- Skylight area = Total fenestration area of skylights.
- Skylight VT = Area weighted average visible transmittance of skylights.
- WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.
- Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

EXCEPTION: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in Climate Zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

C402.3.2.1 Lighting controls in daylight zones under skylights. All lighting in the daylight zone shall be controlled by automatic daylighting controls that comply with Section C405.2.2.3.2.

EXCEPTION: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in Climate Zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

C402.3.2.2 Haze factor. Skylights in office, storage, automotive service, manufacturing, nonrefrigerated warehouse, retail store, and distribution/sorting area spaces shall have a glazing material or diffuser with a measured haze factor greater than 90 percent when tested in accordance with ASTM D 1003.

EXCEPTION: Skylights designed to exclude direct sunlight entering the occupied space by the use of fixed or automated baffles, or the geometry of skylight and light well need not comply with Section C402.3.2.2.

NEW SECTION

WAC 51-11C-40233 Section C402.3.3—Maximum U-factor and SHGC.

C402.3.3 Maximum U-factor and SHGC. For vertical fenestration, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3, based on the window projection factor. For skylights, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3.

The window projection factor shall be determined in accordance with Equation C4-2.

$PF = A/B$

(Equation C4-2)

where:

- PF = Projection factor (decimal).
- A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.
- B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different PF values, they shall each be evaluated separately.

C402.3.3.1 SHGC adjustment. Where the fenestration projection factor for a specific vertical fenestration product is greater than or equal to 0.2, the required maximum SHGC from Table C402.3 shall be adjusted by multiplying the required maximum SHGC by the multiplier specified in Table C402.3.3.1 corresponding with the orientation of the fenestration product and the projection factor.

**Table C402.3.3.1
SHGC Adjustment Multipliers**

PROJECTION FACTOR	ORIENTED WITHIN 45 DEGREES OF TRUE NORTH	ALL OTHER ORIENTATION
0.2 ≤ PF < 0.5	1.1	1.2
PF ≥ 0.5	1.2	1.6

C402.3.3.2 Increased vertical fenestration SHGC. In Climate Zones 1, 2 and 3, vertical fenestration entirely located not less than 6 feet (1729 mm) above the finished floor shall be permitted a maximum SHGC of 0.40.

C402.3.3.3 Reserved.

C402.3.3.4 Reserved.

C402.3.3.5 Dynamic glazing. For compliance with Section C402.3.3, the SHGC for dynamic glazing shall be determined

using the manufacturer's lowest-rated SHGC, and the VT/SHGC ratio shall be determined using the maximum VT and maximum SHGC. Dynamic glazing shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

NEW SECTION

WAC 51-11C-40234 Section C402.3.4—Area-weighted *U*-factor.

C402.3.4 Area-weighted *U*-factor. An area-weighted average shall be permitted to satisfy the *U*-factor requirements for each fenestration product category listed in Table C402.3. Individual fenestration products from different fenestration product categories listed in Table C402.3 shall not be combined in calculating area-weighted average *U*-factor.

NEW SECTION

WAC 51-11C-40240 Section C402.4—Air leakage.

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8.

NEW SECTION

WAC 51-11C-40241 Section C402.4.1—Air barriers.

C402.4.1 Air barriers. A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope, or any combination thereof. The air barrier shall comply with Sections C402.4.1.1 and C402.4.1.2.

EXCEPTION: Air barriers are not required in buildings located in Climate Zones 1, 2 and 3.

C402.4.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.

2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

3. Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

EXCEPTION: Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and 3.

C402.4.1.2 Air barrier compliance options. A continuous air barrier for the opaque building envelope shall comply with Section C402.4.1.2.3.

C402.4.1.2.1 Materials. Materials with an air permeability no greater than 0.004 cfm/ft² (0.02 L/s • m²) under a pressure differential of 0.3 inches water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2178 shall comply with this section. Materials in Items 1 through 15 shall be deemed to comply with this section provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.

1. Plywood with a thickness of not less than 3/8 inch (10 mm).

2. Oriented strand board having a thickness of not less than 3/8 inch (10 mm).

3. Extruded polystyrene insulation board having a thickness of not less than 1/2 inch (12 mm).

4. Foil-back polyisocyanurate insulation board having a thickness of not less than 1/2 inch (12 mm).

5. Closed cell spray foam a minimum density of 1.5 pcf (2.4 kg/m³) having a thickness of not less than 1 1/2 inches (36 mm).

6. Open cell spray foam with a density between 0.4 and 1.5 pcf (0.6 and 2.4 kg/m³) and having a thickness of not less than 4.5 inches (113 mm).

7. Exterior or interior gypsum board having a thickness of not less than 1/2 inch (12 mm).

8. Cement board having a thickness of not less than 1/2 inch (12 mm).

9. Built up roofing membrane.

10. Modified bituminous roof membrane.

11. Fully adhered single-ply roof membrane.

12. A Portland cement/sand parge, or gypsum plaster having a thickness of not less than 5/8 inch (16 mm).

13. Cast-in-place and precast concrete.

14. Fully grouted concrete block masonry.

15. Sheet steel or aluminum.

C402.4.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft² (0.2 L/s • m²) under a pressure differential of 0.3 inches of water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. Assemblies listed in Items 1 and 2 shall be deemed to comply provided joints are sealed and requirements of Section C402.4.1.1 are met.

1. Concrete masonry walls coated with one application either of block filler and two applications of a paint or sealer coating;

2. A Portland cement/sand parge, stucco or plaster minimum 1/2 inch (12 mm) in thickness.

C402.4.1.2.3 Building test. The completed building shall be tested and the air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft² at a pressure differential of 0.3 inches water gauge (2.0 L/s • m² at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the building owner and the Code Official. If the tested rate exceeds that defined here, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be

submitted to the building owner and the Code Official and any further requirement to meet the leakage air rate will be waived.

NEW SECTION

WAC 51-11C-40242 Section C402.4.2—Air barrier penetrations.

C402.4.2 Air barrier penetrations. Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

NEW SECTION

WAC 51-11C-40243 Section C402.4.3—Air leakage of fenestration.

C402.4.3 Air leakage of fenestration. The air leakage of fenestration assemblies shall meet the provisions of Table C402.4.3. Testing shall be in accordance with the applicable reference test standard in Table C402.4.3 by an accredited, independent testing laboratory and *labeled* by the manufacturer.

EXCEPTIONS:

1. Field-fabricated fenestration assemblies that are sealed in accordance with Section C402.4.1.
2. Fenestration in buildings that comply with Section C402.4.1.2.3 are not required to meet the air leakage requirements in Table C402.4.3.
3. Custom exterior windows and doors manufactured by a *small business* provided they meet the applicable provisions of Chapter 24 of the *International Building Code*. Once visual inspection has confirmed the presence of a gasket, operable windows and doors manufactured by *small business* shall be permitted to be sealed off at the frame prior to the test.

**Table C402.4.3
Maximum Air Infiltration Rate
for Fenestration Assemblies**

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT ²)	TEST PROCEDURE
Windows	0.20 ^a	AAMA/ WDMA/ CSA101/I.S.2 /A440 or NFRC 400
Sliding doors	0.20 ^a	
Swinging doors	0.20 ^a	
Skylights - With condensation weepage openings	0.30	NFRC 400 or ASTM E 283 at 1.57 psf (75 Pa)
Skylights - All other	0.20 ^a	
Curtain walls	0.06	ANSI/DASMA 105, NFRC 400, or ASTM E 283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	1.00	
Revolving doors	1.00	
Garage doors	0.40	
Rolling doors	1.00	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m².

^a The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).

NEW SECTION

WAC 51-11C-40244 Section C402.4.4—Doors and access openings.

C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies. Doors and access openings from conditioned space to shafts, chutes, stairways and elevator lobbies shall either meet the requirements of Section C402.4.3 or shall be gasketed, weatherstripped or sealed.

EXCEPTION:

Door openings required to comply with Section 715 or 715.4 of the *International Building Code*; or doors and door openings required by the *International Building Code* to comply with UL 1784 shall not be required to comply with Section C402.4.4.

NEW SECTION

WAC 51-11C-40245 Section C402.4.5—Air intakes, exhaust openings, stairways and shafts.

C402.4.5 Air intakes, exhaust openings, stairways and shafts. Stairway enclosures and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be provided with dampers in accordance with Sections C402.4.5.1 and C402.4.5.2.

C402.4.5.1 Stairway and shaft vents. Stairway and shaft vents shall be provided with Class I motorized dampers with a maximum leakage rate of 4 cfm/ft² (20.3 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

Stairway and shaft vent dampers shall be installed with controls so that they are capable of automatically opening upon:

1. The activation of any fire alarm initiating device of the building's fire alarm system; or
2. The interruption of power to the damper.

C402.4.5.2 Outdoor air intakes and exhausts. *Outdoor air* supply, exhaust openings and relief outlets shall be provided with Class IA motorized dampers which close automatically when the system is off. Return air dampers shall be equipped with motorized dampers. Dampers shall have a maximum leakage rate of 4 cfm/ft² (20.3 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

- EXCEPTIONS:
1. Gravity (nonmotorized) dampers having a maximum leakage rate of 20 cfm/ft² (101.6 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D are permitted to be used for relief openings in buildings less than three stories in height above grade if equipment has less than 5,000 cfm total supply flow.
 2. Gravity (nonmotorized) dampers for ventilation air intakes shall be protected from direct exposure to wind.
 3. Gravity dampers smaller than 24 inches (610 mm) in either dimension shall be permitted to have a leakage of 40 cfm/ft² (203.2 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.
 4. Gravity (nonmotorized) dampers in Group R occupancies where the design outdoor air intake or exhaust capacity does not exceed 400 cfm (189 L/s).

NEW SECTION

WAC 51-11C-40246 Section C402.4.6—Loading dock weatherseals.

C402.4.6 Loading dock weatherseals. Cargo doors and loading dock doors shall be equipped with weatherseals to restrict infiltration when vehicles are parked in the doorway.

NEW SECTION

WAC 51-11C-40247 Section C402.4.7—Vestibules.

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate

the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Interior and exterior doors shall have a minimum distance between them of not less than 7 feet. The exterior envelope of conditioned vestibules shall comply with the requirements for a conditioned space. Either the interior or exterior envelope of unconditioned vestibules shall comply with the requirements for a conditioned space. The building lobby is not considered a vestibule.

- EXCEPTIONS:
1. Buildings in Climate Zones 1 and 2.
 2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
 3. Doors opening directly from a *sleeping unit* or dwelling unit.
 4. Doors that open directly from a space less than 3,000 square feet (298 m²) in area and are separate from the building entrance.
 5. Revolving doors.
 6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.
 7. Building entrances in buildings that are less than four stories above grade and less than 10,000 ft² in area.
 8. Elevator doors in parking garages provided that the elevators have an enclosed lobby at each level of the garage.

NEW SECTION

WAC 51-11C-40248 Section C402.4.8—Recessed lighting.

C402.4.8 Recessed lighting. Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and *labeled* as having an air leakage rate of not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 Pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and interior wall or ceiling covering.

NEW SECTION

WAC 51-11C-40250 Section C402.5—Walk-in coolers and walk-in freezers.

C402.5 Walk-in coolers and walk-in freezers. Walk-in coolers and walk-in freezers shall comply with all of the following:

1. Shall be equipped with automatic door closers that firmly close walk-in doors that have been closed to within 1 inch of full closure.

EXCEPTION: Doors wider than 3 feet 9 inches or taller than 7 feet.

2. Doorways shall have strip doors (curtains), spring-hinged doors, or other method of minimizing infiltration when doors are open.

3. *Walk-in coolers* shall contain wall, ceiling, and door insulation of at least R-25 and *walk-in freezers* at least R-32.

EXCEPTION: Glazed portions of doors or structural members.

4. *Walk-in freezers* shall contain floor insulation of at least R-28.

5. Transparent reach-in doors for *walk-in freezers* and windows in *walk-in freezer* doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

6. Transparent reach-in doors for *walk-in coolers* and windows in *walk-in cooler* doors shall be double-pane glass with heat-reflective treated glass and gas filled; or triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

NEW SECTION

WAC 51-11C-40260 Section C402.6—Refrigerated warehouse coolers and freezers.

C402.6 Refrigerated warehouse coolers and refrigerated warehouse freezers. Refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with all of the following:

1. Shall be equipped with automatic door closers that firmly close walk-in doors that have been closed to within 1 inch of full closure.

EXCEPTION: Doors wider than 3 feet 9 inches or taller than 7 feet.

2. Doorways shall have strip doors (curtains), spring-hinged doors, or other method of minimizing infiltration when doors are open.

3. *Refrigerated warehouse coolers* shall contain wall, ceiling, and door insulation of at least R-25 and *refrigerated warehouse freezers* at least R-32.

EXCEPTION: Glazed portions of doors or structural members.

4. *Refrigerated warehouse freezers* shall contain floor insulation of at least R-28.

5. Transparent reach-in doors for *refrigerated warehouse freezers* and windows in *refrigerated warehouse freezer* doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

6. Transparent reach-in doors for *refrigerated warehouse coolers* and windows in *refrigerated warehouse cooler* doors shall be double-pane glass with heat-reflective treated glass and gas filled; or triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

NEW SECTION

WAC 51-11C-40300 Section C403—Mechanical systems.

NEW SECTION

WAC 51-11C-40310 Section C403.1—General.

C403.1 General. Mechanical systems and equipment serving heating, cooling, ventilating, and other needs shall comply with Section C403.2 (referred to as the mandatory provisions) and either:

1. Section C403.3 (Simple systems); or
2. Section C403.4 (Complex systems).

EXCEPTION: Energy using equipment used by a manufacturing, industrial or commercial process other than for conditioning spaces or maintaining comfort and amenities for the occupants and not otherwise regulated by C403.2.3, Tables C403.2.1 (1) through (9) inclusive, C403.2.4.5, C403.2.5.4, C403.2.8, C403.2.13, C403.4.6, C403.5, C403.6, C404.2, or Table C404.2. Data center HVAC equipment is not covered by this exception.

Walk-in coolers and walk-in freezers shall comply with Section C403.5. Refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C403.6.

NEW SECTION

WAC 51-11C-40320 Section C403.2—Provisions applicable to all mechanical systems.

C403.2 Provisions applicable to all mechanical systems (Mandatory). Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Sections C403.2.1 through C403.2.11.

NEW SECTION

WAC 51-11C-40321 Section C403.2.1—Calculation of heating and cooling loads.

C403.2.1 Calculation of heating and cooling loads. Design loads shall be determined in accordance with the procedures described in ANSI/ASHRAE/ACCA Standard 183. The design loads shall account for the building envelope, lighting, ventilation and occupancy loads based on the project design. Heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HVAC system in accordance with the *ASHRAE HVAC Systems and Equipment Handbook*. Alternatively, design loads shall be determined by an *approved* equivalent computation procedure, using the design parameters specified in Chapter 3.

NEW SECTION

WAC 51-11C-40322 Section C403.2.2—Equipment and systems sizing.

C403.2.2 Equipment and system sizing. The output capacity of heating and cooling equipment and systems shall not exceed the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

EXCEPTIONS:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.

NEW SECTION

WAC 51-11C-40323 Section C403.2.3—HVAC equipment performance requirements.

C403.2.3 HVAC equipment performance requirements. Equipment shall meet the minimum efficiency requirements of Tables C403.2.3(1), C403.2.3(2), C403.2.3(3), C403.2.3(4), C403.2.3(5), C403.2.3(6), C403.2.3(7) and C403.2.3(8) when tested and rated in accordance with the applicable test procedure. Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of Table C403.2.3(9). The efficiency shall be verified through certification and listed under an *approved* certification program or, if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

Gas-fired and oil-fired forced air furnaces with input ratings $\geq 225,000$ Btu/h (65 kW) and all unit heaters shall also have an intermittent ignition or interrupted device (IID), and

$$\text{Adjusted minimum full-load COP ratings} = (\text{Full-load COP from Table 6.8.1C of AHRI Standard 550/590}) \times K_{adj}$$

(Equation C4-3)

$$\text{Adjusted minimum NPLV rating} = (\text{IPLV from Table 6.8.1C of AHRI Standard 550/590}) \times K_{adj}$$

(Equation C4-4)

Where:

$$K_{adj} = A \times B$$

$$A = 0.0000015318 \times (\text{LIFT})^4 - 0.000202076 \times (\text{LIFT})^3 + 0.0101800 \times (\text{LIFT})^2 - 0.264958 \times \text{LIFT} + 3.930196$$

$$B = 0.0027 \times L_{vg}^{Evap} (\text{°C}) + 0.982$$

$$\text{LIFT} = L_{vg}^{Cond} - L_{vg}^{Evap}$$

$$L_{vg}^{Cond} = \text{Full-load condenser leaving water temperature (°C)}$$

$$L_{vg}^{Evap} = \text{Full-load leaving evaporator temperature (°C)}$$

SI units shall be used in the K_{adj} equation.

The adjusted full-load and *NPLV* values shall only be applicable for centrifugal chillers meeting all of the following full-load design ranges:

1. The leaving evaporator fluid temperature is not less than 36°F (2.2°C).
2. The leaving condenser fluid temperature is not greater than 115°F (46.1°C).
3. LIFT is not less than 20°F (11.1°C) and not greater than 80°F (44.4°C).

EXCEPTION: Centrifugal chillers designed to operate outside of these ranges need not comply with this code.

C403.2.3.2 Positive displacement (air- and water-cooled) chilling packages. Equipment with a leaving fluid temperature higher than 32°F (0°C), shall meet the requirements of Table C403.2.3(7) when tested or certified with water at stan-

have either mechanical draft (including power venting) or a flue damper. A vent damper is an acceptable alternative to a flue damper for furnaces where combustion air is drawn from the conditioned space. All furnaces with input ratings $\geq 225,000$ Btu/h (65 kW), including electric furnaces, that are not located within the conditioned space shall have jacket losses not exceeding 0.75 percent of the input rating.

Chilled water plants and buildings with more than 500 tons total capacity shall not have more than 100 tons provided by air-cooled chillers.

- EXCEPTIONS:
1. Where the designer demonstrates that the water quality at the building site fails to meet manufacturer's specifications for the use of water-cooled equipment.
 2. Air-cooled chillers with minimum efficiencies at least 10 percent higher than those listed in Table C403.2.3(7).
 3. Replacement of existing equipment.

C403.2.3.1 Water-cooled centrifugal chilling packages.

Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F (7°C) leaving chilled-water temperature and 85°F (29°C) entering condenser water temperature with 3 gpm/ton (0.054 l/s • kW) condenser water flow shall have maximum full-load kW/ton and *NPLV* ratings adjusted using Equations C4-3 and C4-4.

dard rating conditions, in accordance with the referenced test procedure.

C403.2.3.3 Packaged electric heating and cooling equipment.

Packaged electric equipment providing both heating and cooling with a total cooling capacity greater than 20,000 Btu/h shall be a heat pump.

EXCEPTION: Unstaffed equipment shelters or cabinets used solely for personal wireless service facilities.

C403.2.3.4 Humidification.

If an air economizer is required on a cooling system for which humidification equipment is to be provided to maintain minimum indoor humidity levels, then the humidifier shall be of the adiabatic type (direct evaporative media or fog atomization type).

EXCEPTIONS: 1. Health care facilities where WAC 246-320-525 allows only steam injection humidifiers in duct work downstream of final filters.
 2. Systems with water economizer.
 3. 100% outside air systems with no provisions for air recirculation to the central supply fan.

4. Nonadiabatic humidifiers cumulatively serving no more than 10% of a building's air economizer capacity as measured in cfm. This refers to the system cfm serving rooms with stand alone or duct mounted humidifiers.

NEW SECTION

WAC 51-11C-403231 Table C403.2.3(1)—Minimum efficiency requirements—Electrically operated unitary air conditioners and condensing units.

**Table C403.2.3(1)A
 Minimum Efficiency Requirements—Electrically Operated Unitary Air Conditioners and Condensing Units**

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency		Test Procedure ^a			
				Before 6/1/2011	As of 6/1/2011				
Air conditioners, air cooled	< 65,000 Btu/h ^b	All	Split System	13.0 SEER	13.0 SEER	AHRI 210/240			
			Single Package	13.0 SEER	13.0 SEER				
Through-the-wall (air cooled)	≤ 30,000 Btu/h ^b	All	Split System	12.0 SEER	12.0 SEER	AHRI 210/240			
			Single Package	12.0 SEER	12.0 SEER				
Air conditioners, air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.2 EER 11.4 IEER	11.2 EER 11.4 IEER	AHRI 340/360			
		All other	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 11.2 IEER				
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 11.2 IEER				
		All other	Split System and Single Package	10.8 EER 11.0 IEER	10.8 EER 11.0 IEER				
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.0 EER 10.1 IEER	10.0 EER 10.1 IEER				
		All other	Split System and Single Package	9.8 EER 9.9 IEER	9.8 EER 9.9 IEER				
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.7 EER 9.8 IEER	9.7 EER 9.8 IEER				
		All other	Split System and Single Package	9.5 EER 9.6 IEER	9.5 EER 9.6 IEER				
	Air conditioners, water cooled	< 65,000 Btu/h ^b	All	Split System and Single Package	12.1 EER 12.3 IEER		12.1 EER 12.3 IEER	AHRI 210/240	
		≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.5 EER 11.7 IEER		12.1 EER 12.3 IEER	AHRI 340/360	
All other			Split System and Single Package	11.3 EER 11.5 IEER	11.9 EER 12.1 IEER				
≥ 135,000 Btu/h and < 240,000 Btu/h		Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	12.5 EER 12.7 IEER				
		All other	Split System and Single Package	10.8 EER 11.0 IEER	12.3 EER 12.5 IEER				
≥ 240,000 Btu/h and < 760,000 Btu/h		Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.1 IEER	12.4 EER 12.6 IEER				
		All other	Split System and Single Package	10.8 EER 10.9 IEER	12.2 EER 12.4 IEER				
≥ 760,000 Btu/h		Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.1 IEER	12.2 EER 12.4 IEER				
		All other	Split System and Single Package	10.8 EER 10.9 IEER	12.0 EER 12.2 IEER				
< 65,000 Btu/h ^b		All	All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 210/240		
				≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.5 EER 11.7 IEER		12.1 EER 12.3 IEER
					All other	Split System and Single Package	11.3 EER 11.5 IEER		11.9 EER 12.1 IEER

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency		Test Procedure ^a
				Before 6/1/2011	As of 6/1/2011	
Air conditioners, evaporatively cooled	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	12.0 EER 12.2 IEER	AHRI 340/360
		All other	Split System and Single Package	10.8 EER 11.0 IEER	11.8 EER 12.0 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.1 IEER	11.9 EER 12.1 IEER	
		All other	Split System and Single Package	10.8 EER 10.9 IEER	12.2 EER 11.9 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.1 EER	11.7 EER 11.9 EER	
		All other	Split System and Single Package	10.8 EER 10.9 EER	11.5 EER 11.7 EER	
Condensing units, air cooled	≥ 135,000 Btu/h			10.1 EER 11.4 IEER	10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h			13.1 EER 13.6 IEER	13.5 EER 14.0 IEER	
Condensing units, evaporatively cooled	≥ 135,000 Btu/h			13.1 EER 13.6 IEER	13.5 EER 14.0 IEER	

For SI: 1 British thermal unit per hour = 0.2931 W.

^aChapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

^bSingle-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

Table C403.2.3(1)B
Minimum Efficiency Requirements—Air Conditioners and Condensing Units Serving Computer Rooms

Equipment Type	Net Sensible Cooling Capacity ^a	Minimum Scop-127 ^b Efficiency Downflow Units/upflow Units	Test Procedure
Air conditioners, air cooled	< 65,000 Btu/h (< 19 kW)	2.20/2.09	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h (≥ 19 kW and < 70 kW)	2.10/1.99	
	≥ 240,000 Btu/h (≥ 70 kW)	1.90/1.79	
Air conditioners, water cooled	< 65,000 Btu/h (< 19 kW)	2.60/2.49	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h (≥ 19 kW and < 70 kW)	2.50/2.39	
	≥ 240,000 Btu/h (≥ 70 kW)	2.40/2.29	
Air conditioners, water cooled with fluid economizer	< 65,000 Btu/h (< 19 kW)	2.55/2.44	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h (≥ 19 kW and < 70 kW)	2.45/2.34	
	≥ 240,000 Btu/h (≥ 70 kW)	2.35/2.24	
Air conditioners, glycol cooled (rated at 40% propylene glycol)	< 65,000 Btu/h (< 19 kW)	2.50/2.39	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h (≥ 19 kW and < 70 kW)	2.15/2.04	
	≥ 240,000 Btu/h (≥ 70 kW)	2.10/1.99	

Equipment Type	Net Sensible Cooling Capacity ^a	Minimum Scop-127 ^b Efficiency Downflow Units/upflow Units	Test Procedure
Air conditioners, glycol cooled (rated at 40% propylene glycol) with fluid economizer	< 65,000 Btu/h (< 19 kW)	2.45/2.34	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h (≥ 19 kW and < 70 kW)	2.10/1.99	
	≥ 240,000 Btu/h (≥ 70 kW)	2.05/1.94	

^aNet sensible cooling capacity: The total gross cooling capacity less the latent cooling less the energy to the air movement system (Total Gross - Latent - Fan Power).

^bSensible coefficient of performance (SCOP-127): A ratio calculated by dividing the net sensible cooling capacity in watts by the total power input in watts (excluding reheaters and humidifiers) at conditions defined in ASHRAE Standard 127. The net sensible cooling capacity is the gross sensible capacity minus the energy dissipated into the cooled space by the fan system.

Table C403.2.3(1)C
Minimum Efficiency Requirements—Electrically Operated Variable Refrigerant Flow Air Conditioners

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF Air Conditioners, Air Cooled	< 65,000 Btu/h	All	VRF Multi-Split System	13.0 SEER	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System	11.2 EER 13.1 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System	11.0 EER 12.9 IEER	
	≥ 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-split System	10.0 EER 11.6 IEER	

Table C403.2.3(1)D
Minimum Efficiency Requirements—Electrically Operated Variable Refrigerant Flow Air-to-Air and Applied Heat Pumps

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF Air Cooled (cooling mode)	< 65,000 Btu/h	All	VRF Multi-Split System	13.0 SEER	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System	11.0 EER 12.9 IEER	
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System with Heat Recovery	10.8 EER 12.7 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System	10.6 EER 12.3 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System with Heat Recovery	10.4 EER 12.1 IEER	
	≥ 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System	9.5 EER 11.0 IEER	

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
	≥ 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System with Heat Recovery	9.3 EER 10.8 IEER	
VRF Water Source (cooling mode)	< 65,000 Btu/h	All	VRF Multi-Split System <i>86°F entering water</i>	12.0 EER	AHRI 1230
	< 65,000 Btu/h	All	VRF Multi-Split System with Heat Recovery <i>86°F entering water</i>	11.8 EER	
	≥ 65,000 Btu/h and < 135,000 Btu/h	All	VRF Multi-Split System <i>86°F entering water</i>	12.0 EER	
	≥ 65,000 Btu/h and < 135,000 Btu/h	All	VRF Multi-Split System with Heat Recovery <i>86°F entering water</i>	11.8 EER	
	≥ 135,000 Btu/h	All	VRF Multi-Split System <i>86°F entering water</i>	10.0 EER	
	≥ 135,000 Btu/h	All	VRF Multi-Split System with Heat Recovery <i>86°F entering water</i>	9.8 EER	
VRF Groundwater Source (cooling mode)	< 135,000 Btu/h	All	VRF Multi-Split System <i>59°F entering water</i>	16.2 EER	AHRI 1230
	< 135,000 Btu/h	All	VRF Multi-Split System with Heat Recovery <i>59°F entering water</i>	16.0 EER	
	≥ 135,000 Btu/h	All	VRF Multi-Split System <i>59°F entering water</i>	13.8 EER	
	≥ 135,000 Btu/h	All	VRF Multi-Split System with Heat Recovery <i>59°F entering water</i>	13.6 EER	
VRF Ground Source (cooling mode)	< 135,000 Btu/h	All	VRF Multi-Split System <i>77°F entering water</i>	13.4 EER	AHRI 1230
	< 135,000 Btu/h	All	VRF Multi-Split System with Heat Recovery <i>77°F entering water</i>	13.2 EER	
	≥ 135,000 Btu/h	All	VRF Multi-Split System <i>77°F entering water</i>	11.0 EER	

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
	≥ 135,000 Btu/h	All	VRF Multi-Split System with Heat Recovery <i>77°F entering water</i>	10.8 EER	
VRF Air Cooled (heating mode)	< 65,000 Btu/h (cooling capacity)	—	VRF Multi-Split System	7.7 HSPF	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)	—	VRF Multi-Split System <i>47°F db/43°F wb outdoor air</i> <i>17°F db/15°F wb outdoor air</i>	3.3 COP 2.25 COP	
	≥ 135,000 Btu/h (cooling capacity)	—	VRF Multi-Split System <i>47°F db/43°F wb outdoor air</i> <i>17°F db/15°F wb outdoor air</i>	3.2 COP 2.05 COP	
VRF Water Source (heating mode)	< 135,000 Btu/h (cooling capacity)	—	VRF Multi-Split System <i>68°F entering water</i>	4.2 COP	AHRI 1230
	≥ 135,000 Btu/h (cooling capacity)	—	VRF Multi-Split System <i>68°F entering water</i>	3.9 COP	
VRF Groundwater Source (heating mode)	< 135,000 Btu/h (cooling capacity)	—	VRF Multi-Split System <i>50°F entering water</i>	3.6 COP	AHRI 1230
	≥ 135,000 Btu/h (cooling capacity)	—	VRF Multi-Split System <i>50°F entering water</i>	3.3 COP	
VRF Ground Source (heating mode)	< 135,000 Btu/h (cooling capacity)	—	VRF Multi-Split System <i>32°F entering water</i>	3.1 COP	AHRI 1230
	≥ 135,000 Btu/h (cooling capacity)	—	VRF Multi-Split System <i>32°F entering water</i>	2.8 COP	

NEW SECTION

WAC 51-11-403232 Table C403.2.3(2)—Minimum efficiency requirements—Electrically operated unitary and applied heat pumps.

**Table C403.2.3(2)
Minimum Efficiency Requirements—Electrically Operated Unitary and Applied Heat Pumps**

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure ^a
Air cooled (cooling mode)	< 65,000 Btu/h ^b	All	Split System	13.0 SEER	AHRI 210/240
			Single Packaged	13.0 SEER	
Through-the-wall, air cooled (cooling mode)	≤ 30,000 Btu/h ^b	All	Split System	12.0 SEER	
			Single Packaged	12.0 SEER	
Air cooled (cooling mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	AHRI 340/360

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure ^a
	≥ 135,000 Btu/h and < 240,000 Btu/h	All Other	Split System and Single Package	10.8 EER 11.0 IEER	
		Electric Resistance (or None)	Split System and Single Package	10.6 EER 10.7 IEER	
	All Other	Split System and Single Package	10.4 EER 10.5 IEER		
	≥ 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.5 EER 9.6 IEER	
		All Other	Split System and Single Package	9.3 EER 9.4 IEER	
Water source (cooling mode)	< 17,000 Btu/h	All	86°F entering water	11.2 EER	ISO 13256-1
	≥ 17,000 Btu/h and < 65,000 Btu/h	All	86°F entering water	12.0 EER	
	≥ 65,000 Btu/h and < 135,000 Btu/h	All	86°F entering water	12.0 EER	
Ground water source (cooling mode)	< 135,000 Btu/h	All	59°F entering water	16.2 EER	
Ground water source (cooling mode)	< 135,000 Btu/h	All	77°F entering water	13.4 EER	
Water-source water to water (cooling mode)	< 135,000 Btu/h	All	86°F entering water	10.6 EER	ISO 13256-2
			59°F entering water	16.3 EER	
Ground water source brine to water (cooling mode)	< 135,000 Btu/h	All	77°F entering fluid	12.1 EER	
Air cooled (heating mode)	< 65,000 Btu/h ^b	—	Split System	7.7 HSPF	AHRI 210/240
			Single Package	7.7 HSPF	
Through-the-wall, (air cooled, heating mode)	≤ 30,000 Btu/hb (cooling capacity)	—	Split System	7.4 HSPF	
			Single Package	7.4 HSPF	
Small-duct high velocity (air cooled, heating mode)	< 65,000 Btu/h ^b	—	Split System	6.8 HSPF	
Air cooled (heating mode)	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)	—	47°F db/43°F wb Outdoor Air	3.3 COP	AHRI 340/360
			17°F db/15°F wb Outdoor Air	2.25 COP	
	≥ 135,000 Btu/h (cooling capacity)	—	47°F db/43°F wb Outdoor Air	3.2 COP	
			17°F db/15°F wb Outdoor Air	2.05 COP	
Water source (heating mode)	< 135,000 Btu/h (cooling capacity)	—	68°F entering water	4.2 COP	ISO 13256-1
Ground water source (heating mode)	< 135,000 Btu/h (cooling capacity)	—	50°F entering water	3.6 COP	
Ground source (heating mode)	< 135,000 Btu/h (cooling capacity)	—	32°F entering fluid	3.1 COP	
Water-source water to water (heating mode)	< 135,000 Btu/h (cooling capacity)	—	68°F entering water	3.7 COP	ISO 13256-2
			50°F entering water	3.1 COP	
Ground source brine to water (heating mode)	< 135,000 Btu/h (cooling capacity)	—	32°F entering fluid	2.5 COP	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

^aChapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

^bSingle-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-403233 Table C403.2.3(3)—Minimum efficiency requirements—Electrically operated PTAC, PTHP, SPVAC, SPVHP, room air conditioners.

Table C403.2.3(3) Minimum Efficiency Requirements—Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners and Room Air-Conditioner Heat Pumps

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency		Test Procedure ^a
			Before 10/08/2012	As of 10/08/2012	
PTAC (cooling mode) new construction	All Capacities	95°F db outdoor air	12.5 - (0.213 × Cap/1000) EER	13.8 - (0.300 × Cap/1000) EER	AHRI 310/380
PTAC (cooling mode) replacements ^b	All Capacities	95°F db outdoor air	10.9 - (0.213 × Cap/1000) EER	10.9 - (0.213 × Cap/1000) EER	
PTHP (cooling mode) new construction	All Capacities	95°F db outdoor air	12.3 - (0.213 × Cap/1000) EER	14.0 - (0.300 × Cap/1000) EER	
PTHP (cooling mode) replacements ^b	All Capacities	95°F db outdoor air	10.8 - (0.213 × Cap/1000) EER	10.8 - (0.213 × Cap/1000) EER	
PTHP (heating mode) new construction	All Capacities	—	3.2 - (0.026 × Cap/1000) COP	3.7 - (0.052 × Cap/1000) COP	
PTHP (heating mode) replacements ^b	All Capacities	—	2.9 - (0.026 × Cap/1000) COP	2.9 - (0.026 × Cap/1000) COP	
SPVAC (cooling mode)	< 65,000 Btu/h	95°F db/75°F wb outdoor air	9.0 EER	9.0 EER	AHRI 390
	≥ 65,000 Btu/h and < 135,000 Btu/h	95°F db/75°F wb outdoor air	8.9 EER	8.9 EER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	95°F db/75°F wb outdoor air	8.6 EER	8.6 EER	
SPVHP (cooling mode)	< 65,000 Btu/h	95°F db/75°F wb outdoor air	9.0 EER	9.0 EER	AHRI 390
	≥ 65,000 Btu/h and < 135,000 Btu/h	95°F db/75°F wb outdoor air	8.9 EER	8.9 EER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	95°F db/75°F wb outdoor air	8.6 EER	8.6 EER	
SPVHP (heating mode)	<65,000 Btu/h	47°F db/43°F wb outdoor air	3.0 COP	3.0 COP	AHRI 390
	≥ 65,000 Btu/h and < 135,000 Btu/h	47°F db/43°F wb outdoor air	3.0 COP	3.0 COP	
	≥ 135,000 Btu/h and < 240,000 Btu/h	47°F db/43°F wb outdoor air	2.9 COP	2.9 COP	
Room air conditioners, with louvered sides	< 6,000 Btu/h	—	9.7 SEER	9.7 SEER	ANSI/AHA-MRAC-1
	≥ 6,000 Btu/h and < 8,000 Btu/h	—	9.7 EER	9.7 EER	
	≥ 8,000 Btu/h and < 14,000 Btu/h	—	9.8 EER	9.8 EER	
	≥ 14,000 Btu/h and < 20,000 Btu/h	—	9.7 SEER	9.7 SEER	
	≥ 20,000 Btu/h	—	8.5 EER	8.5 EER	
Room air conditioners, without louvered sides	< 8,000 Btu/h	—	9.0 EER	9.0 EER	ANSI/AHA-MRAC-1
	≥ 8,000 Btu/h and < 20,000 Btu/h	—	8.5 EER	8.5 EER	
	≥ 20,000 Btu/h	—	8.5 EER	8.5 EER	
Room air-conditioner heat pumps with louvered sides	< 20,000 Btu/h	—	9.0 EER	9.0 EER	ANSI/AHA-MRAC-1
	≥ 20,000 Btu/h	—	8.5 EER	8.5 EER	
Room air-conditioner heat pumps without louvered sides	< 14,000 Btu/h	—	8.5 EER	8.5 EER	ANSI/AHA-MRAC-1
	≥ 14,000 Btu/h	—	8.0 EER	8.0 EER	
Room air conditioner case-ment only	All capacities	—	8.7 EER	8.7 EER	ANSI/AHA-MRAC-1

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency		Test Procedure ^a
			Before 10/08/2012	As of 10/08/2012	
Room air conditioner case-ment-slider	All capacities	—	9.5 EER	9.5 EER	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

"Cap" = The rated cooling capacity of the product in Btu/h. If the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculations.

^aChapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

^bReplacement unit shall be factory labeled as follows: "MANUFACTURED FOR NONSTANDARD SIZE APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW STANDARD PROJECTS" or "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches (406 mm) in height and less than 42 inches (1067 mm) in width.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-403234 Table C403.2.3(4)—Minimum efficiency requirements—Warm air furnaces and unit heaters.

Table 403.2.3(4)

Warm Air Furnaces and Combination Warm Air Furnaces/Air-Conditioning Units, Warm Air Duct Furnaces and Unit Heaters, Minimum Efficiency Requirements

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency ^{d, e}	Test Procedure ^a
Warm air furnaces, gas fired	< 225,000 Btu/h	—	78% AFUE or 80% E_t^c	DOE 10 C.F.R. Part 430 or ANSI Z21.47
	≥ 225,000 Btu/h	Maximum capacity ^c	80% E_t^f	ANSI Z21.47
Warm air furnaces, oil fired	< 225,000 Btu/h	—	78% AFUE or 80% E_t^c	DOE 10 C.F.R. Part 430 or UL 727
	≥ 225,000 Btu/h	Maximum capacity ^b	81% E_t^g	UL 727
Warm air duct furnaces, gas fired	All capacities	Maximum capacity ^b	80% E_c	ANSI Z83.8
Warm air unit heaters, gas fired	All capacities	Maximum capacity ^b	80% E_c	ANSI Z83.8
Warm air unit heaters, oil fired	All capacities	Maximum capacity ^b	80% E_c	UL 731

For SI: 1 British thermal unit per hour = 0.2931 W.

^aChapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

^bMinimum and maximum ratings as provided for and allowed by the unit's controls.

^cCombination units not covered by the National Appliance Energy Conservation Act of 1987 (NAECA) (3-phase power or cooling capacity greater than or equal to 65,000 Btu/h [19 kW]) shall comply with either rating.

^d E_t = Thermal efficiency. See test procedure for detailed discussion.

^e E_c = Combustion efficiency (100% less flue losses). See test procedure for detailed discussion.

^f E_c = Combustion efficiency. Units must also include an IID, have jackets not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

^g E_t = Thermal efficiency. Units must also include an IID, have jacket losses not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-403235 Table C403.2.3(5)—Minimum efficiency requirements—Gas- and oil-fired boilers.

**Table C403.2.3(5)
Minimum Efficiency Requirements—Gas- and Oil-Fired Boilers**

Equipment Type ^a	Subcategory or Rating Condition	Size Category (Input)	Minimum Efficiency	Test Procedure
Boilers, hot water	Gas-fired	< 300,000 Btu/h	80% AFUE	10 C.F.R. Part 430
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^b	80% E_t	10 C.F.R. Part 431
		> 2,500,000 Btu/h ^a	82% E_c	
	Oil-fired ^c	< 300,000 Btu/h	80% AFUE	10 C.F.R. Part 430
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^b	82% E_t	10 C.F.R. Part 431
		> 2,500,000 Btu/h ^a	84% E_c	
Boilers, steam	Gas-fired	< 300,000 Btu/h	75% AFUE	10 C.F.R. Part 430
	Gas-fired - All, except natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^b	79% E_t	10 C.F.R. Part 431
		> 2,500,000 Btu/h ^a	79% E_t	
	Gas-fired-natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^b	77% E_t	
		> 2,500,000 Btu/h ^a	77% E_t	
	Oil-fired ^c	< 300,000 Btu/h	80% AFUE	10 C.F.R. Part 430
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^b	81% E_t	10 C.F.R. Part 431
		> 2,500,000 Btu/h ^a	81% E_t	

For SI: 1 British thermal unit per hour = 0.2931 W.

E_c = Combustion efficiency (100 percent less flue losses).

E_t = Thermal efficiency. See referenced standard document for detailed information.

^aThese requirements apply to boilers with rated input of 8,000,000 Btu/h or less that are not packaged boilers and to all packaged boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers.

^bMaximum capacity minimum and maximum ratings as provided for and allowed by the unit's controls.

^cIncludes oil-fired (residual).

NEW SECTION

WAC 51-11C-403236 Table C403.2.3(6)—Reserved.

**Table C403.2.3(6)
Reserved**

NEW SECTION

WAC 51-11C-403237 Table C403.2.3(7)—Minimum efficiency requirements—Water chilling packages.

**Table C403.2.3(7)
Minimum Efficiency Requirements—Water Chilling Packages^a**

Equipment Type	Size Category	Units	Before 1/1/2010		As of 1/1/2010 ^b				Test Procedure ^c
			Full Load	IPLV	Path A		Path B		
					Full Load	IPLV	Full Load	IPLV	
Air cooled chillers	< 150 tons	EER	≥ 9.562	≥ 10.416	≥ 9.562	≥ 12.500	NA	NA	AHRI 550/590
	≥ 150 tons	EER			≥ 9.562	≥ 12.750	NA	NA	
Air cooled without condenser, electrical operated	All capacities	EER	≥ 10.586	≥ 11.782	Air cooled chillers without condensers shall be rated with matching condensers and comply with the air cooled chiller efficiency requirements				
Water cooled, electrically operated, reciprocating	All capacities	kW/ton	≤ 0.837	≤ 0.696	Reciprocating units shall comply with water cooled positive displacement efficiency requirements				

Equipment Type	Size Category	Units	Before 1/1/2010		As of 1/1/2010 ^b				Test Procedure ^c	
			Full Load	IPLV	Path A		Path B			
					Full Load	IPLV	Full Load	IPLV		
Water cooled, electrically operated, positive displacement	< 75 tons	kW/ton	≤ 0.790	≤ 0.676	≤ 0.780	≤ 0.630	≤ 0.800	≤ 0.600		
	≥75 tons and < 150 tons	kW/ton			≤ 0.775	≤ 0.615	≤ 0.790	≤ 0.586		
	≥ 150 tons and < 300 tons	kW/ton	≤ 0.717	≤ 0.627	≤ 0.680	≤ 0.580	≤ 0.718	≤ 0.540		
	≥ 300 tons	kW/ton	≤ 0.639	≤ 0.571	≤ 0.620	≤ 0.540	≤ 0.639	≤ 0.490		
Water cooled, electrically operated, centrifugal	< 150 tons	kW/ton	≤ 0.703	≤ 0.669	≤ 0.634	≤ 0.596	≤ 0.639	≤ 0.450		
	≥ 150 tons and < 300 tons	kW/ton	≤ 0.634	≤ 0.596						
	≥ 300 tons and < 600 tons	kW/ton	≤ 0.576	≤ 0.549	≤ 0.576	≤ 0.549	≤ 0.600	≤ 0.400		
	≥600 tons	kW/ton	≤ 0.576	≤ 0.549	≤ 0.570	≤ 0.539	≤ 0.590	≤ 0.400		
Air cooled, absorption single effect	All capacities	COP	≥ 0.600	NR	≥ 0.600	NR	NA	NA		AHRI 560
Water cooled, absorption single effect	All capacities	COP	≥ 0.700	NR	≥ 0.700	NR	NA	NA		
Absorption double effect, indirect fired	All capacities	COP	≥ 1.000	≥ 1.050	≥ 1.000	≥ 1.050	NA	NA		
Absorption double effect, direct fired	All capacities	COP	≥ 1.000	≥ 1.000	≥ 1.000	≥ 1.000	NA	NA		

For SI: 1 ton = 3517 W, 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

NA = Not applicable, not to be used for compliance;
 NR = No requirement.

^a The centrifugal chiller equipment requirements, after adjustment in accordance with Section C403.2.3.1 or Section C403.2.3.2, do not apply to chillers used in low-temperature applications where the design leaving fluid temperature is less than 36°F. The requirements do not apply to positive displacement chillers with leaving fluid temperatures less than or equal to 32°F. The requirements do not apply to absorption chillers with design leaving fluid temperatures less than 40°F.

^b Compliance with this standard can be obtained by meeting the minimum requirements of Path A or B. However, both the full load and IPLV shall be met to fulfill the requirements of Path A or B.

^c Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-403238 Table C403.2.3(8)—Minimum efficiency requirements—Heat rejection equipment.

**Table C403.2.3(8)
 Minimum Efficiency Requirements—Heat Rejection Equipment**

Equipment Type ^a	Total System Heat Rejection Capacity at Rated Conditions	Subcategory or Rating Condition	Performance Required ^{b, c, d}	Test Procedure ^{e, f}
Propeller or axial fan open circuit cooling towers	All	95°F Entering Water 85°F Leaving Water 75°F Entering wb	≥ 38.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal fan open circuit cooling towers	All	95°F Entering Water 85°F Leaving Water 75°F Entering wb	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Propeller or axial fan closed circuit cooling towers	All	102°F Entering Water 90°F Leaving Water 75°F Entering wb	≥ 14.0 gpm/hp	CTI ATC-105S and CTI STD-201
Centrifugal closed circuit cooling towers	All	102°F Entering Water 90°F Leaving Water 75°F Entering wb	≥ 7.0 gpm/hp	CTI ATC-105S and CTI STD-201

Equipment Type ^a	Total System Heat Rejection Capacity at Rated Conditions	Subcategory or Rating Condition	Performance Required ^{b, c, d}	Test Procedure ^{e, f}
Air cooled condensers	All	125°F Condensing Temperature R-22 Test Fluid 190°F Entering Gas Temperature 15°F Subcooling 95°F Entering db	≥ 176,000 Btu/h • hp	AHRI 460

For SI: °C = [(°F) - 32]/1.8, L/s • kW = (gpm/hp)/(11.83), COP = (Btu/h • hp)/(2550.7).

db = dry bulb temperature, °F;
wb = wet bulb temperature, °F.

^a The efficiencies and test procedures for both open and closed circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of wet and dry heat exchange sections.

^b For purposes of this table, open circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the fan nameplate rated motor power.

^c For purposes of this table, closed circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the sum of the fan nameplate rated motor power and the spray pump nameplate rated motor power.

^d For purposes of this table, air cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power.

^e Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

^f If a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program, or, if a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, but the product is not listed in the existing certification program, the ratings shall be verified by an independent laboratory test report.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-403239 Table C403.2.3(9)—Minimum efficiency requirements—Heat transfer equipment.

**Table C403.2.3(9)
Heat Transfer Equipment**

Equipment Type	Subcategory	Minimum Efficiency	Test Procedure ^a
Liquid-to-liquid heat exchangers	Plate type	NR	AHRI 400

NR = No requirement.

^a Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

NEW SECTION

WAC 51-11C-40324 Section C403.2.4—HVAC system controls.

C403.2.4 HVAC system controls. Each heating and cooling system shall be provided with thermostatic controls as specified in Section C403.2.4.1, C403.2.4.2, C403.2.4.3,

C403.2.4.4, C403.4.1, C403.4.2, C403.4.3, C403.4.4, C403.4.5, C403.4.6, C403.4.7, C403.4.8, C403.4.9, or C403.4.10.

NEW SECTION

WAC 51-11C-403241 Section C403.2.4.1—Thermostatic controls.

C403.2.4.1 Thermostatic controls. The supply of heating and cooling energy to each *zone* shall be controlled by individual thermostatic controls capable of responding to temperature within the *zone*. At a minimum, each floor of a building shall be considered as a separate zone. Controls on systems required to have economizers and serving single zones shall have multiple cooling stage capability and activate the economizer when appropriate as the first stage of cooling. See Section C403.3.1 or C403.4.1 for further economizer requirements. Where humidification or dehumidification or both is provided, at least one humidity control device shall be provided for each humidity control system.

EXCEPTION: Independent perimeter systems that are designed to offset only building envelope heat losses or gains or both serving one or more perimeter *zones* also served by an interior system provided:

1. The perimeter system includes at least one thermostatic control *zone* for each building exposure having exterior walls facing only one orientation (within +/- 45 degrees) (0.8 rad) for more than 50 contiguous feet (15,240 mm); and
2. The perimeter system heating and cooling supply is controlled by a thermostat located within the *zones* served by the system.

C403.2.4.1.1 Heat pump supplementary heat. Unitary air cooled heat pumps shall include microprocessor controls that minimize supplemental heat usage during start-up, set-up, and defrost conditions. These controls shall anticipate need for heat and use compression heating as the first stage of heat. Controls shall indicate when supplemental heating is being used through visual means (e.g., LED indicators). Heat pumps equipped with supplementary heaters shall be installed with controls that prevent supplementary heater operation above 40°F.

EXCEPTION: Packaged terminal heat pumps (PTHPs) of less than 2 tons (24,000 Btu/hr) cooling capacity provided with controls that prevent supplementary heater operation above 40°F.

NEW SECTION**WAC 51-11C-403242 Section C403.2.4.2—Setpoint overlap restriction.**

C403.2.4.2 Setpoint overlap restriction. Where used to control both heating and cooling, *zone* thermostatic controls shall provide a temperature range or deadband of at least 5°F (2.8°C) within which the supply of heating and cooling energy to the *zone* is capable of being shut off or reduced to a minimum.

EXCEPTION: Thermostats requiring manual changeover between heating and cooling modes.

NEW SECTION**WAC 51-11C-403243 Section C403.2.4.3—Off-hour controls.**

C403.2.4.3 Off-hour controls. For all occupancies other than Group R, each *zone* shall be provided with thermostatic setback controls that are controlled by either an automatic time clock or programmable control system.

EXCEPTIONS: 1. *Zones* that will be operated continuously.
2. *Zones* with a full HVAC load demand not exceeding 6,800 Btu/h (2 kW) and having a readily accessible manual shutoff switch.

C403.2.4.3.1 Thermostatic setback capabilities. Thermostatic setback controls shall have the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C).

C403.2.4.3.2 Automatic setback and shutdown capabilities. Automatic time clock or programmable controls shall be capable of starting and stopping the system for seven different daily schedules per week and retaining their programming and time setting during a loss of power for at least 10 hours. Additionally, the controls shall have a manual override that allows temporary operation of the system for up to 2 hours; a manually operated timer capable of being adjusted to operate the system for up to 2 hours; or an occupancy sensor.

C403.2.4.3.3 Automatic start capabilities. Automatic start controls shall be provided for each HVAC system. The controls shall be capable of automatically adjusting the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

NEW SECTION**WAC 51-11C-403244 Section C403.2.4.4—Shutoff damper controls.**

C403.2.4.4 Shutoff damper controls. Both outdoor air supply and exhaust ducts shall be equipped with motorized dampers that will automatically shut when the systems or spaces served are not in use or during building warm-up, cooldown, and setback.

EXCEPTIONS: 1. Gravity relief dampers serving systems less than 5,000 cfm total supply shall be permitted in buildings less than three stories in height.
2. Gravity dampers shall be permitted for buildings of any height located in Climate Zones 1, 2 and 3.

3. Gravity (nonmotorized) dampers in Group R occupancies where the design outdoor air intake or exhaust capacity does not exceed 400 cfm (189 L/s).
4. Systems serving areas which require continuous operation.
5. Combustion air intakes.
6. Operation of dampers shall be allowed during ventilation prepurge one hour before expected occupancy and for unoccupied period precooling during the cooling season.
7. Dampers are not required in systems where specifically prohibited by the *International Mechanical Code*.

NEW SECTION**WAC 51-11C-403245 Section C403.2.4.5—Snowmelt system controls.**

C403.2.4.5 Snow melt system controls. Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F (10°C) and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F (4°C) so that the potential for snow or ice accumulation is negligible.

NEW SECTION**WAC 51-11C-403246 Section C403.2.4.6—Combustion heating equipment controls.**

C403.2.4.6 Combustion heating equipment controls. Combustion heating equipment with a capacity over 225,000 Btu/h shall have modulating or staged combustion control.

EXCEPTIONS: 1. Boilers.
2. Radiant heaters.

NEW SECTION**WAC 51-11C-403247 Section C403.2.4.7—Hotel/motel controls.**

C403.2.4.7 Group R-1 hotel/motel guest rooms. For hotel and motel guest rooms, a minimum of one of the following control technologies shall be required in hotels/motels with over 50 guest rooms such that the space temperature would automatically setback (winter) or set up (summer) by no less than 5°F (3°C) or hotel and motel guest rooms, a minimum of:

1. Controls that are activated by the room occupant via the primary room access method - Key, card, deadbolt, etc.
2. Occupancy sensor controls that are activated by the occupant's presence in the room.

NEW SECTION**WAC 51-11C-403248 Section C403.2.4.8—Residential occupancy controls.**

C403.2.4.8 Group R-2 and R-3 dwelling units. The primary space conditioning system within each dwelling unit shall be provided with at least one programmable thermostat for the regulation of space temperature. The thermostat shall

allow for, at a minimum, a 5-2 programmable schedule (weekdays/weekends) and be capable of providing at least two programmable setback periods per day.

Each additional system provided within the dwelling unit shall be provided with at least one adjustable thermostat for the regulation of temperature.

- EXCEPTIONS:
1. Systems controlled by an occupant sensor that is capable of shutting the system off when no occupant is sensed for a period of up to 30 minutes.
 2. Systems controlled solely by a manually operated timer capable of operating the system for no more than two hours.
 3. Ductless heat pumps.

Each thermostat shall be capable of being set by adjustment or selection of sensors as follows: When used to control heating only: 55°F to 75°F; when used to control cooling only: 70°F to 85°F.

C403.2.4.9 Group R-2 sleeping units. The primary space conditioning system within each sleeping unit shall be provided with at least one programmable thermostat for the regulation of space temperature. The thermostat shall allow for, at a minimum, a 5-2 programmable schedule (weekdays/weekends) and be capable of providing at least two programmable setback periods per day.

Each additional system provided within the sleeping unit shall be provided with at least one adjustable thermostat for the regulation of temperature.

- EXCEPTIONS:
1. Systems controlled by an occupant sensor that is capable of shutting the system off when no occupant is sensed for a period of up to 30 minutes.
 2. Systems controlled solely by a manually operated timer capable of operating the system for no more than two hours.
 3. *Zones* with a full HVAC load demand not exceeding 3,400 Btu/h (1 kW) and having a readily accessible manual shutoff switch.
 4. Ductless heat pumps.

Each thermostat shall be capable of being set by adjustment or selection of sensors as follows: When used to control heating only: 55°F to 75°F; when used to control cooling only: 70°F to 85°F.

NEW SECTION

WAC 51-11C-403249 Section C403.2.4.9—Direct digital control system capabilities.

C403.2.4.10 Direct digital control system capabilities. All complex systems equipped with direct digital control (DDC) systems and all buildings with total cooling capacity exceeding 780,000 Btu/h (2,662 kW) shall have the following capability:

1. Trending: All control system input and output points shall be accessible and programmed for trending, and a graphic trending package shall be provided with the control system.
2. Demand Response Setpoint Adjustment: Control logic shall increase the cooling zone set points by at least 2°F (1°C) and reduce the heating zone set points by at least 2°F (1°C) when activated by a demand response signal. The demand response signal shall be a binary input to the control

system or other interface approved by the serving electric utility.

NEW SECTION

WAC 51-11C-40325 Section C403.2.5—Ventilation.

C403.2.5 Ventilation. Ventilation, either natural or mechanical, shall be provided in accordance with Chapter 4 of the *International Mechanical Code*. Where mechanical ventilation is provided, the system shall provide the capability to reduce the outdoor air supply to the minimum required by Chapter 4 of the *International Mechanical Code*.

NEW SECTION

WAC 51-11C-403251 Section C403.2.5.1—Demand control ventilation.

C403.2.5.1 Demand controlled ventilation. Demand control ventilation (DCV) shall be provided for spaces larger than 500 square feet (50 m²) and with an occupant load greater than 25 people per 1000 square feet (93 m²) of floor area (as established in Table 403.3 of the *International Mechanical Code*) and served by systems with one or more of the following:

1. An air-side economizer;
2. Automatic modulating control of the outdoor air damper; or
3. A design outdoor airflow greater than 3,000 cfm (1400 L/s).

- EXCEPTION:
- Demand control ventilation is not required for systems and spaces as follows:
1. Systems with energy recovery complying with Section C403.2.6.
 2. Multiple-*zone* systems without direct digital control of individual *zones* communicating with a central control panel.
 3. System with a design outdoor airflow less than 1,000 cfm (472 L/s).
 4. Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1,200 cfm (600 L/s).
 5. Ventilation provided for process loads only.

NEW SECTION

WAC 51-11C-403252 Section C403.2.5.2—Occupancy sensors.

C403.2.5.2 Occupancy sensors. Classrooms, gyms, auditoriums and conference rooms larger than 500 square feet of floor area shall have occupancy sensor control that will either close outside air dampers or turn off serving equipment when the space is unoccupied except where equipped with another means to automatically reduce outside air intake below design rates when spaces are partially occupied.

NEW SECTION

WAC 51-11C-403253 Section C403.2.5.3—Loading dock and parking garage ventilation system controls.

C403.2.5.3 Enclosed loading dock and parking garage exhaust ventilation system control. Mechanical ventilation

systems for enclosed loading docks and parking garages shall be designed to exhaust the airflow rates (maximum and minimum) determined in accordance with the *International Mechanical Code*.

Ventilation systems shall be equipped with a control device that operates the system automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices. Each of the following types of controllers shall be capable of shutting off fans or modulating fan speed. Control devices shall not reduce airflow rates below the minimum requirement in accordance with the *International Mechanical Code* during scheduled periods of occupied operation.

1. Gas sensor controllers used to activate the exhaust ventilation system shall stage or modulate fan speed upon detection of specified gas levels. All equipment used in sensor controlled systems shall be designed for the specific use and installed in accordance with the manufacturer's recommendations. The system shall be arranged to operate automatically by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. Garages and loading docks shall be equipped with a controller and a full array of carbon monoxide (CO) sensors set to maintain levels of carbon monoxide below 35 parts per million (ppm). Additionally, a full array of nitrogen dioxide detectors shall be connected to the controller set to maintain the nitrogen dioxide level below the OSHA standard for eight hour exposure. Spacing and location of the sensors shall be installed in accordance with manufacturer recommendations.

2. Occupant detection sensors used to activate the system shall detect entry into the parking garage along both the vehicle and pedestrian pathways.

C403.2.5.3.1 System activation devices for enclosed loading docks. Ventilation systems for enclosed loading docks shall be activated by one of the following:

- 1. Gas sensors installed in accordance with the *International Mechanical Code*; or
- 2. Occupant detection sensors used to activate the system that detects entry into the loading area along both the vehicle and pedestrian pathways.

C403.2.5.3.2 System activation devices for enclosed parking garages. Ventilation systems for enclosed parking garages shall be activated by gas sensors.

EXCEPTION: A parking garage ventilation system having a total design capacity under 8,000 cfm may use occupant sensors.

NEW SECTION

WAC 51-11C-403254 Section C403.2.5.4—Exhaust systems.

C403.2.5.4 Exhaust systems.

C403.2.5.4.1 Kitchen hoods. Each kitchen area with total exhaust capacity larger than 2,000 cfm shall be provided with make-up air sized so that at least 50% of exhaust air volume be (a) unheated or heated to no more than 60°F and (b) uncooled or cooled without the use of mechanical cooling.

- EXCEPTIONS:
- 1. Where hoods are used to exhaust ventilation air which would otherwise exfiltrate or be exhausted by other fan systems. A detailed accounting of exhaust airflows shall be provided on the plans that accounts for the impact of any required demand controlled ventilation.
 - 2. Certified grease extractor hoods that require a face velocity no greater than 60 fpm.

C403.2.5.4.2 Laboratory exhaust systems. Buildings with laboratory exhaust systems having a total exhaust rate greater than 5,000 cfm (2,360 L/s) shall include heat recovery systems to preconditioned makeup air from laboratory exhaust. The heat recovery system shall be capable of increasing the outside air supply temperature at design heating conditions by 25°F (13.9°C) in Climate Zones 4C/5B and 35°F (19.4°C) in Climate Zone 6B. A provision shall be made to bypass or control the heat recovery system to permit air economizer operation as required by Section C403.4.

- EXCEPTIONS:
- 1. Variable air volume laboratory exhaust and room supply systems capable of reducing exhaust and make-up air volume to 50% or less of design values; or
 - 2. Direct make-up (auxiliary) air supply equal to at least 75% of the exhaust rate, heated no warmer than 2°F (1.1°C) below room set point, cooled to no cooler than 3°F (1.7°C) above room set point, no humidification added, and no simultaneous heating and cooling used for dehumidification control; or
 - 3. Combined Energy Reduction Method: VAV exhaust and room supply system capable of reducing exhaust and makeup air volumes and a heat recovery system to precondition makeup air from laboratory exhaust that when combined will produce the same energy reduction as achieved by a heat recovery system with a 50% sensible recovery effectiveness as required above. For calculation purposes, the heat recovery component can be assumed to include the maximum design supply airflow rate at design conditions. The combined energy reduction (Q_{ER}) shall meet the following:

$$Q_{ER} \geq Q_{MIN}$$

$$Q_{MIN} = CFM_S \cdot (T_R - T_O) \cdot 1.1 \cdot 0.6$$

$$Q_{ER} = CFM_S \cdot (T_R - T_O) \cdot 1.1(A + B)/100$$

Where:

- Q_{MIN} = Energy recovery at 60% sensible effectiveness (Btu/h)
- Q_{ER} = Combined energy reduction (Btu/h)
- CFM_S = The maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute
- T_R = Space return air dry bulb at winter design conditions
- T_O = Outdoor air dry bulb at winter design conditions
- A = Percentage that the exhaust and makeup air volumes can be reduced from design conditions
- B = Percentage sensible heat recovery effectiveness

NEW SECTION

WAC 51-11C-40326 Section C403.2.6—Energy recovery.

C403.2.6 Energy recovery.

C403.2.6.1 Energy recovery ventilation systems. Any system with minimum outside air requirements at design conditions greater than 5,000 CFM or any system required by Table C403.2.6 shall include an energy recovery system. The energy recovery system shall have the capability to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls which permit operation of the economizer as required by Section C403.4. Where a single room or space is supplied by multiple units, the aggregate ventilation (cfm) of those units shall be used in applying this requirement.

EXCEPTION: An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.
2. Laboratory fume hood systems that include at least one of the following features:
 - 2.1. Variable-air-volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent or less of design values.
 - 2.2. Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than 2°F (1.1°C) above room setpoint, cooled to no cooler than 3°F (1.7°C) below room setpoint, no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.

4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Multi-zone systems with cold deck supply air and zone reheat where the minimum outdoor air is less than 70 percent of total supply air.
9. Systems serving residential multifamily spaces where the largest source of air exhausted at a single location at the building exterior is less than 25 percent of the design outdoor air flow rate.

C403.2.6.2 Condensate systems. On-site steam heating systems shall have condensate water heat recovery. On-site includes a system that is located within or adjacent to one or more buildings within the boundary of a contiguous area or campus under one ownership and which serves one or more of those buildings.

Buildings using steam generated off-site with steam heating systems which do not have condensate water recovery shall have condensate water recovery.

C403.2.6.3 Condenser heat recovery. Facilities having food service, meat or deli departments and having 500,000 Btu/h or greater of remote refrigeration condensers shall have condenser waste heat recovery from freezers and coolers and shall use the waste heat for service water heating, space heating or for dehumidification reheat. Facilities having a gross conditioned floor area of 40,000 ft² or greater and 1,000,000 Btu/h or greater of remote refrigeration shall have condenser waste heat recovery from freezers and coolers and shall use the waste heat for service water heating, and either for space heating or for dehumidification reheat for maintaining low space humidity.

NEW SECTION

WAC 51-11C-403261 Table C403.2.6—Energy recovery requirement.

**Table C403.2.6
Energy Recovery Requirement**

Climate Zone	Percent (%) Outdoor Air at Full Design Airflow Rate					
	≥ 30% and < 40%	≥ 40% and < 50%	≥ 50% and < 60%	≥ 60% and < 70%	≥ 70% and < 80%	≥ 80%
	Design Supply Fan Airflow Rate (cfm)					
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	≥5000	≥ 5000
1B, 2B, 5C	NR	NR	≥ 26000	≥ 12000	≥ 5000	≥ 4000
6B	≥ 11000	≥ 5500	≥ 4500	≥ 3500	≥ 2500	≥ 1500
1A, 2A, 3A, 4A, 5A, 6A	≥ 5500	≥ 4500	≥ 3500	≥ 2000	≥ 1000	> 0
7, 8	≥ 2500	≥ 1000	> 0	> 0	> 0	> 0

NR = Not required.

NEW SECTION**WAC 51-11C-40327 Section C403.2.7—Duct and plenum insulation and sealing.****C403.2.7 Duct and plenum insulation and sealing.**

C403.2.7.1 Ducts, shafts and plenums conveying outside air from the exterior of the building to the mechanical system shall meet all air leakage and building envelope insulation requirements of Section C402, plus building envelope vapor control requirements from the *International Building Code*, extending continuously from the building exterior to an automatic shutoff damper or heating or cooling equipment. For the purposes of building envelope insulation requirements, duct surfaces shall meet the requirements for metal framed walls per Table C402.1.2. Duct surfaces included as part of the building envelope shall not be used in the calculation of maximum glazing area as described in Section 402.3.1.

EXCEPTIONS:

1. Outside air ducts serving individual supply air units with less than 2,800 cfm of total supply air capacity, provided these are insulated to R-7.
2. Unheated equipment rooms with combustion air louvers, provided they are isolated from conditioned space at sides, top and bottom of the room with R-11 nominal insulation.

C403.2.7.2 All other supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and a minimum of R-8 insulation where located outside the building. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by minimum insulation value as required for exterior walls by Section C402.2.3.

EXCEPTIONS:

1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).

Supply ducts which convey supply air at temperatures less than 55°F or greater than 105°F shall be insulated with a minimum of R-3.3 insulation where located within conditioned space.

All ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

C403.2.7.3 Duct construction. Ductwork shall be constructed and erected in accordance with the *International Mechanical Code*.

C403.2.7.3.1 Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge (w.g.) (500 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

EXCEPTION: Continuously welded and locking-type longitudinal joints and seams on ducts operating at static pressures

less than 2 inches water gauge (w.g.) (500 Pa) pressure classification.

C403.2.7.3.2 Medium-pressure duct systems. All ducts and plenums designed to operate at a static pressure greater than 2 inches water gauge (w.g.) (500 Pa) but less than 3 inches w.g. (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

C403.2.7.3.3 High-pressure duct systems. Ducts designed to operate at static pressures in excess of 3 inches water gauge (w.g.) (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. In addition, ducts and plenums shall be leak-tested in accordance with the SMACNA *HVAC Air Duct Leakage Test Manual* with the rate of air leakage (CL) less than or equal to 6.0 as determined in accordance with Equation C4-5.

(Equation C4-5)

$$CL = F/P0.65$$

Where:

- F = The measured leakage rate in cfm per 100 square feet of duct surface.
- P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct area have been tested and that all tested sections meet the requirements of this section.

NEW SECTION**WAC 51-11C-40328 Section C403.2.8—Piping insulation.**

C403.2.8 Piping insulation. All piping serving as part of a heating or cooling system shall be thermally insulated in accordance with Table C403.2.8.

EXCEPTIONS:

1. Factory-installed piping within HVAC equipment tested and rated in accordance with a test procedure referenced by this code.
2. Factory-installed piping within room fan-coils and unit ventilators tested and rated according to AHRI 440 (except that the sampling and variation provisions of Section 6.5 shall not apply) and 840, respectively.
3. Piping that conveys fluids that have a design operating temperature range between 60°F (15°C) and 105°F (41°C).
4. Piping that conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power.
5. Strainers, control valves, and balancing valves associated with piping 1 inch (25 mm) or less in diameter.
6. Direct buried piping that conveys fluids at or below 60°F (15°C).

C403.2.8.1 Protection of piping insulation. Piping insulation exposed to weather shall be protected from damage, including that due to sunlight, moisture, equipment maintenance and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesives tape shall not be permitted.

NEW SECTION

WAC 51-11C-403281 Table C403.2.8—Minimum pipe insulation thickness.

**Table C403.2.8
Minimum Pipe Insulation Thickness (thickness in inches)^a**

Fluid Operating Temperature Range and Usage (°F)	Insulation Conductivity		Nominal Pipe or Tube Size (inches)				
	Conductivity Btu • in. / (h • ft ² • °F) ^b	Mean Rating Temperature, °F	< 1	1 to < 1-1/2	1-1/2 to < 4	4 to < 8	≥ 8
> 350	0.32 - 0.34	250	4.5	5.0	5.0	5.0	5.0
251 - 350	0.29 - 0.32	200	3.0	4.0	4.5	4.5	4.5
201 - 250	0.27 - 0.30	150	2.5	2.5	2.5	3.0	3.0
141 - 200	0.25 - 0.29	125	1.5	1.5	2.0	2.0	2.0
105 - 140	0.21 - 0.28	100	1.0	1.0	1.5	1.5	1.5
40 - 60	0.21 - 0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20 - 0.26	75	0.5	1.0	1.0	1.0	1.5

^a For piping smaller than 1-1/2 inch (38 mm) and located in partitions within *conditioned spaces*, reduction of these thicknesses by 1 inch (25 mm) shall be permitted (before thickness adjustment required in footnote b) but not to a thickness less than 1 inch (25 mm).

^bFor insulation outside the stated conductivity range, the minimum thickness (*T*) shall be determined as follows:

$$T = r\{(1 + t/r)^{K/k} - 1\}$$

Where:

- T* = Minimum insulation thickness,
- r* = Actual outside radius of pipe,
- t* = Insulation thickness listed in the table for applicable fluid temperature and pipe size,
- K* = Conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu × in/h × ft² × °F) and
- k* = The upper value of the conductivity range listed in the table for the applicable fluid temperature.

^c For direct-buried heating and hot water system piping, reduction of these thicknesses by 1-1/2 inches (38 mm) shall be permitted (before thickness adjustment required in footnote b but not to thicknesses less than 1 inch (25 mm)).

NEW SECTION

WAC 51-11C-40329 Section C403.2.9—Mechanical system commissioning and completion requirements.

C403.2.9 Mechanical systems commissioning and completion requirements. Mechanical systems shall be commissioned and completed in accordance with Section C408.2.

NEW SECTION

WAC 51-11C-403291 Section C403.2.10—Air system design and control.

C403.2.10 Air system design and control. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through C403.2.10.2.

C403.2.10.1 Allowable fan floor horsepower. Each HVAC system at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan*

system bhp (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single *zone* variable-air-volume systems shall comply with the constant volume fan power limitation.

EXCEPTION: The following fan systems are exempt from allowable fan floor horsepower requirement.

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less.

C403.2.10.2 Motor nameplate horsepower. For each fan, the selected fan motor shall be no larger than the first available motor size greater than the brake horsepower (bhp). The fan brake horsepower (bhp) shall be indicated on the design documents to allow for compliance verification by the *code official*.

EXCEPTIONS:

1. For fans less than 6 bhp (4413 W), where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.
2. For fans 6 bhp (4413 W) and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.
3. For fans used only in *approved* life safety applications such as smoke evacuation.

C403.2.10.3 Fractional hp fan motors. Motors for fans that are 1/12 hp or greater and less than 1 hp shall be electronically commutated motors or shall have a minimum motor efficiency of 70 percent when rated in accordance with DOE 10 C.F.R. 431. These motors shall also have the means to adjust motor speed for either balancing or remote control. Belt-driven fans may use sheave adjustments for airflow balancing in lieu of a varying motor speed.

EXCEPTIONS:

1. Motors in the airstream within fan-coils and terminal units that operate only when providing heating to the space served.
2. Motors installed in space conditioning equipment certified under Section C403.2.3.

NEW SECTION

WAC 51-11C-403292 Table C403.2.10.1—Fan power limitation.

Table C403.2.10.1(1)
Fan Power Limitation

	Limit	Constant Volume	Variable Volume
Option 1: Fan system motor nameplate hp	Allowable nameplate motor hp	hp ≤ CFM _S × 0.0011	hp ≤ CFM _S × 0.0015
Option 2: Fan system bhp	Allowable fan system bhp	bhp ≤ CFM _S × 0.00094 + A	bhp ≤ CFM _S × 0.0013 + A

Where:

- CFM_S = The maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute.
- hp = The maximum combined motor nameplate horsepower.
- bhp = The maximum combined fan brake horsepower.
- A = Sum of [PD × CFM_D/4131]

For SI: 1 cfm = 0.471 L/s.

Where:

- PD = Each applicable pressure drop adjustment from Table C403.2.10.1(2) in. w.c.
- CFM_D = The design airflow through each applicable device from Table C403.2.10.1(2) in cubic feet per minute.
- For SI: 1 bhp = 735.5 W, 1 hp = 745.5 W.

Table C403.2.10.1(2)
Fan Power Limitation Pressure Drop Adjustment

Device	Adjustment
Credits	
Fully ducted return and/or exhaust air systems	0.5 inch w.c. (2.15 inches w.c. for laboratory and vivarium systems)
Return and/or exhaust air flow control devices	0.5 inch w.c.
Exhaust filters, scrubbers, or other exhaust treatment	The pressure drop of device calculated at fan system design condition
Particulate filtration credit: MERV 9 - 12	0.5 inch w.c.
Particulate filtration credit: MERV 13 - 15	0.9 inch w.c.
Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Pressure drop calculated at 2x clean filter pressure drop at fan system design condition
Carbon and other gas-phase air cleaners	Clean filter pressure drop at fan system design condition
Biosafety cabinet	Pressure drop of device at fan system design condition
Energy recovery device, other than coil runaround loop	(2.2 × energy recovery effectiveness) – 0.5 inch w.c. for each airstream
Coil runaround loop	0.6 inch w.c. for each airstream
Evaporative humidifier/cooler in series with another cooling coil	Pressure drop of device at fan system design conditions
Sound attenuation section	0.15 inch w.c.
Exhaust system serving fume hoods	0.35 inch w.c.
Laboratory and vivarium exhaust systems in high-rise buildings	0.25 inch w.c./100 feet of vertical duct exceeding 75 feet

w.c. = water column.

For SI: 1 inch w.c.= 249 Pa, 1 inch= 25.4 mm.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION**WAC 51-11C-403293 Section C403.2.11—Heating outside a building.**

C403.2.11 Heating outside a building. Systems installed to provide heat outside a building shall be radiant systems.

Such heating systems shall be controlled by an occupancy sensing device or a timer switch, so that the system is automatically deenergized when no occupants are present.

NEW SECTION**WAC 51-11C-403294 Section C403.2.12—System criteria.**

C403.2.12 System criteria. For fan and pump motors 7.5 hp and greater including motors in or serving custom and packaged air handlers serving variable air volume fan systems, constant volume fans, heating and cooling hydronic pumping systems, pool and service water pumping systems, domestic water pressure boosting systems, cooling tower fan, and other pump or fan motors where variable flows are required, there shall be:

1. Variable speed drives; or
2. Other controls and devices that will result in fan and pump motor demand of no more than 30 percent of design wattage at 50 percent of design air volume for fans when static pressure set point equals 1/3 the total design static pressure, and 50 percent of design water flow for pumps, based on manufacturer's certified test data. Variable inlet vanes, throttling valves (dampers), scroll dampers or bypass circuits shall not be allowed.

EXCEPTION: Variable speed devices are not required for motors that serve:

1. Fans or pumps in packaged equipment where variable speed drives are not available as a factory option from the equipment manufacturer.
2. Fans or pumps that are required to operate only for emergency fire-life-safety events (e.g., stairwell pressurization fans, elevator pressurization fans, fire pumps, etc.).

C403.2.12.1 Heat rejection equipment. The requirements of this section apply to heat rejection equipment used in comfort cooling systems such as air-cooled condensers, open cooling towers, closed-circuit cooling towers, and evaporative condensers.

EXCEPTION: Heat rejection devices included as an integral part of equipment listed in Tables C403.2.3(1) through C403.2.3(3).

Heat rejection equipment shall have a minimum efficiency performance not less than values specified in Table C403.2.3(8). These requirements apply to all propeller, axial fan and centrifugal fan cooling towers. Table C403.2.3(8) specifies requirements for air-cooled condensers that are within rating conditions specified within the table.

C403.2.12.1.1 Variable flow controls. Cooling tower fans 7.5 hp and greater shall have control devices that vary flow by controlling the leaving fluid temperature or condenser temperature/pressure of the heat rejection device.

C403.2.12.1.2 Limitation on centrifugal fan cooling towers. Open cooling towers with a combined rated capacity of 1,100 gpm and greater at 95°F condenser water return, 85°F condenser water supply and 75°F outdoor wet-bulb temperature shall meet the energy efficiency requirement for axial fan open circuit cooling towers.

EXCEPTION: Open circuit cooling towers that are ducted (inlet or discharge) or have external sound attenuation that requires external static pressure capability.

C403.2.12.2 Large volume fan systems. Single or multiple fan systems serving a zone or adjacent zones without separating walls with total air flow over 10,000 cfm (3,540 L/s) are required to reduce airflow based on space thermostat heating and cooling demand. A variable speed drive shall reduce airflow to a maximum 75 percent of peak airflow or minimum ventilation air requirement as required by Section 403 of the *International Mechanical Code*, whichever is greater.

EXCEPTIONS:

1. Systems where the function of the supply air is for purposes other than temperature control, such as maintaining specific humidity levels or supplying an exhaust system.
2. Dedicated outdoor air supply unit(s) with heat recovery where airflow is equal to the minimum ventilation requirements and other fans cycle off unless heating or cooling is required.
3. An area served by multiple units where designated ventilation units have 50 percent or less of total area airflow and nonventilation unit fans cycle off when heating or cooling is not required.

All air-conditioning equipment and air-handling units with direct expansion cooling and a cooling capacity at AHRI conditions greater than or equal to 110,000 Btu/h that serve single zones shall have their supply fans controlled by two-speed motors or variable speed drives. At cooling demands less than or equal to 50 percent, the supply fan controls shall be able to reduce the airflow to no greater than the larger of the following:

1. Two-thirds of the full fan speed; or
2. The volume of outdoor air required to meet the ventilation requirements of Section 403 of the *International Mechanical Code*.

NEW SECTION**WAC 51-11C-403295 Section C403.2.13—Electric motor efficiency.**

C403.2.13 Electric motor efficiency. Design A and B squirrel-cage, T-frame induction permanently wired polyphase motors of 1 hp or more having synchronous speeds of 3,600, 1,800 and 1,200 rpm shall have a nominal full-load motor efficiency no less than the corresponding values for energy efficient motors provided in NEMA Standard MG-1.

EXCEPTIONS:

1. Motors used in systems designed to use more than one speed of a multi-speed motor.
2. Motors used as a component of the equipment meeting the minimum equipment efficiency requirements of Section C403.2.3 and Tables C403.2.3(1) through C403.2.3(9) provided that the motor input is included when determining the equipment efficiency.
3. Motors that are an integral part of specialized process equipment.

4. Where the motor is integral to a listed piece of equipment for which no complying motor has been approved.

Fan motors less than 1 hp in series terminal units shall be electronically commutated motors, or shall have a minimum motor efficiency of 65 percent when rated in accordance with NEMA Standard MG-1 at full load rating conditions.

NEW SECTION

WAC 51-11C-40330 Section C403.3—Simple HVAC systems and equipment.

C403.3 Simple HVAC systems and equipment (Prescriptive). This section applies to unitary or packaged HVAC systems listed in Tables C403.2.3(1) through C403.2.3(8), each serving one *zone* and controlled by a single thermostat in the *zone* served. It also applies to two-pipe heating systems serving one or more *zones*, where no cooling system is installed.

To qualify as a simple system, systems shall have no active humidification or simultaneous heating and cooling and shall be one of the following:

1. Air cooled, constant volume packaged equipment, which provide heating, cooling or both, and require only external connection to duct work and energy services with cooling capacity of 135,000 Btu/h or less.
2. Air cooled, constant volume split systems, which provide heating, cooling or both, with cooling capacity of 84,000 Btu/h or less.
3. Heating only systems which have a capacity of less than 1,000 cfm or which have a minimum outside air supply of less than 30 percent of the total air circulation.

The combined airflow rate of all simple systems serving single rooms must be less than 10,000 cfm or they do not qualify as simple systems.

NEW SECTION

WAC 51-11C-40331 Section C403.3.1—Economizers.

C403.3.1 Economizers. Each cooling system that has a fan shall include an air economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

EXCEPTION: Economizers are not required for the systems listed below:

1. Qualifying small equipment: This exception shall not be used for unitary cooling equipment installed outdoors or in a mechanical room adjacent to the outdoors. This exception is allowed to be used for other cooling units and split systems with a total cooling capacity rated in accordance with Section C403.2.3 of less than 33,000 Btu/h (hereafter referred to as qualifying small systems) provided that these are high-efficiency cooling equipment with SEER and EER values more than 15 percent higher than minimum efficiencies listed in Tables C403.2.3 (1) through (3), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. The total capacity of all qualifying small equipment without economizers shall not exceed 72,000 Btu/h per building, or 5 percent of its air economizer capacity, whichever is greater. That portion of the equipment serving residential occupancies is not included

in determining the total capacity of all units without economizers in a building. Redundant units are not counted in the capacity limitations. This exception shall not be used for the shell-and-core permit or for the initial tenant improvement or for Total Building Performance.

2. Systems with dehumidification that affect other systems so as to increase the overall building energy consumption. New humidification equipment shall comply with Section C403.2.3.4.

3. For residential occupancies, cooling units installed outdoors or in a mechanical room adjacent to outdoors with a total cooling capacity less than 20,000 Btu/h and other cooling units with a total cooling capacity less than 54,000 Btu/h provided that these are high-efficiency cooling equipment with IEER, SEER, and EER values more than 15 percent higher than minimum efficiencies listed in Tables C403.2.3 (1) through (10), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. For split systems and VRF systems, compliance is based on the cooling capacity of individual fan coil units.

4. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).

**Table C403.3.1(2)
Equipment Efficiency Performance
Exception for Economizers**

Climate Zones	Cooling Equipment Performance Improvement (EER OR IPLV)
2B	10% Efficiency Improvement
3B	15% Efficiency Improvement
4B	20% Efficiency Improvement

C403.3.1.1 Air economizers. Air economizers shall comply with Sections C403.3.1.1.1 through C403.3.1.1.4.

C403.3.1.1.1 Design capacity. Air economizer systems shall be capable of modulating *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

C403.3.1.1.2 Control signal. Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature. Air economizers on systems with cooling capacity greater than 65,000 Btu/h shall be capable of providing partial cooling even when additional mechanical cooling is required to meet the remainder of the cooling load.

EXCEPTION: The use of mixed air temperature limit control shall be permitted for systems that are both controlled from space temperature (such as single *zone* systems) and having cooling capacity less than 65,000 Btu/h.

C403.3.1.1.3 High-limit shutoff. Air economizers shall be capable of automatically reducing *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table C403.3.1.1.3(1). High-limit shutoff control settings for these control types shall be those specified in Table C403.3.1.1.3(2).

C403.3.1.1.4 Relief of excess outdoor air. Systems shall be capable of relieving excess *outdoor air* during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

NEW SECTION

WAC 51-11C-40332 Section C403.3.2—Hydronic system controls.

C403.3.2 Hydronic system controls. Hydronic systems of at least 300,000 Btu/h (87,930 W) design output capacity supplying heated and chilled water to comfort conditioning systems shall include controls that meet the requirements of Section C403.4.3.

NEW SECTION

WAC 51-11C-40340 Section C403.4—Complex HVAC systems and equipment.

C403.4 Complex HVAC systems and equipment (prescriptive). This section applies to HVAC equipment and systems not covered in Section C403.3.

For buildings with a total equipment cooling capacity of 300 tons and above, the equipment shall comply with one of the following:

1. No one unit shall have a cooling capacity of more than 2/3 of the total installed cooling equipment capacity;
2. The equipment shall have a variable speed drive; or
3. The equipment shall have multiple compressors.

NEW SECTION

WAC 51-11C-40341 Section C403.4.1—Economizers.

C403.4.1 Economizers. Air economizers shall be provided on all new systems including those serving computer server rooms, electronic equipment, radio equipment, and telephone switchgear. Economizers shall comply with Sections C403.4.1.1 through C403.4.1.4.

EXCEPTIONS: 1. Water-cooled refrigeration equipment serving chilled beams and chilled ceiling space cooling systems only which are provided with a water economizer meeting the requirements of Section C403.4.1. Water economizer capacity per building shall not

exceed 500 tons. This exception shall not be used for Total Building Performance.

2. Systems complying with all of the following criteria:

- 2.1. Consist of multiple water source heat pumps connected to a common water loop;
- 2.2. Have a minimum of 60 percent air economizer;
- 2.3. Have water source heat pumps with an EER at least 15 percent higher for cooling and a COP at least 15 percent higher for heating than that specified in Section C403.2.3;
- 2.4. Where provided, have a central boiler or furnace efficiency of 90 percent minimum for units up to 199,000 Btu/h; and
- 2.5. Provide heat recovery with a minimum 50 percent heat recovery effectiveness as defined in Section C403.2.6 to preheat the outside air supply.

3. Chilled water terminal units connected to systems with chilled water generation equipment with IPLV values more than 25 percent higher than minimum part load efficiencies listed in Table C403.2.3(7), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. The total capacity of all systems without economizers shall not exceed 480,000 Btu/h per building, or 20 percent of its air economizer capacity, whichever is greater. That portion of the equipment serving Group R Occupancy is not included in determining the total capacity of all units without economizers in a building. This exception shall not be used for the initial permit (this includes any initial permit for the space including, but not limited to, the shell-and-core permit, built-to-suit permit, and tenant improvement permit) or for Total Building Performance Method.

4. For Group R occupancies, cooling units installed outdoors or in a mechanical room adjacent to outdoors with a total cooling capacity less than 20,000 Btu/h and other cooling units with a total cooling capacity less than 54,000 Btu/h provided that these are high-efficiency cooling equipment with SEER and EER values more than 15 percent higher than minimum efficiencies listed in Tables C403.2.3 (1) through (3), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. For split systems, compliance is based on the cooling capacity of individual fan coil units.

5. Equipment used to cool any dedicated server room, electronic equipment room or telecom switch room provided that they completely comply with Option a, b, or c in the table below. The total capacity of all systems without economizers shall not exceed 240,000 Btu/h per building or 10 percent of its air economizer capacity, whichever is greater. This exception shall not be used for Total Building Performance.

	Equipment Type	Higher Equipment Efficiency	Part-Load Control	Economizer
Option a	Tables C403.2.3(1) and C403.2.3(2) ^a	+15% ^b	Required over 85,000 Btu/h ^c	None Required
Option b	Tables C403.2.3(1) and C403.2.3(2) ^a	+5% ^d	Required over 85,000 Btu/h ^c	Waterside Economizer
Option c	ASHRAE Standard 127 ^f	+0% ^g	Required over 85,000 Btu/h ^c	Waterside Economizer

Notes for Exception 5:

^aFor a system where all of the cooling equipment is subject to the AHRI standards listed in Tables C403.2.3(1) and C403.2.3(2), the system shall comply with all of the following (note that if the system contains any cooling equipment that exceeds the capacity limits in Table C403.2.3(1) or C403.2.3(2), or if the system contains any cooling equipment that is not included in Table

C403.2.3(1) or C403.2.3(2), then the system is not allowed to use this option).

^bThe cooling equipment shall have an EER value and an IPLV value that is a minimum of 15 percent greater than the value listed in Tables C403.2.3(1) and C403.2.3(2) (1.15 x values in Tables C403.2.3(1) and C403.2.3(2)).

^cFor units with a total cooling capacity over 85,000 Btu/h, the system shall utilize part-load capacity control schemes that are

able to modulate to a part-load capacity of 50 percent of the load or less that results in the compressor operating at the same or higher EER at part loads than at full load (e.g., minimum of two-stages of compressor unloading such as cylinder unloading, two-stage scrolls, dual tandem scrolls, but hot gas bypass is not credited as a compressor unloading system).

^dThe cooling equipment shall have an EER value and an IPLV value that is a minimum of 5 percent greater than the value listed in Tables C403.2.3(1) and C403.2.3(2) (1.05 x values in Tables C403.2.3(1) and C403.2.3(2)).

^eThe system shall include a water economizer in lieu of air economizer. Water economizers shall be capable of providing the total concurrent cooling load served by the connected terminal equipment lacking airside economizer, at outside air temperatures of 50°F dry-bulb/45°F wet-bulb and below. For this calculation, all factors including solar and internal load shall be the same as those used for peak load calculations, except for the outside temperatures. The equipment shall be served by a dedicated condenser water system unless a nondedicated condenser water system exists that can provide appropriate water temperatures during hours when waterside economizer cooling is available.

^fFor a system where all cooling equipment is subject to ASHRAE Standard 127.

^gThe cooling equipment subject to the ASHRAE Standard 127 shall have an EER value and an IPLV value that is equal or greater than the value listed in Tables C403.2.3(1) and C403.2.3(2) when determined in accordance with the rating conditions ASHRAE Standard 127 (i.e., not the rating conditions in AHRI Standard 210/240 or 340/360). This information shall be provided by an independent third party.

6. Variable refrigerant flow (VRF) systems, multiple-zone split-system heat pumps, consisting of multiple, individually metered indoor units with multi-speed fan motors, served on a single common refrigeration circuit with an exterior reverse-cycle heat pump with variable speed compressor(s) and variable speed condenser fan(s). These systems shall also be capable of providing simultaneous heating and cooling operation, where recovered energy from the indoor units operating in one mode can be transferred to one or more indoor units operating in the other mode, and shall serve at least 20 percent internal (no perimeter wall within 12') and 20 percent perimeter zones (as determined by conditioned floor area) and the outdoor unit shall be at least 65,000 Btu/h in total capacity. Systems utilizing this exception shall have 50 percent heat recovery effectiveness as defined by Section C403.2.6 on the outside air. For the purposes of this exception, dedicated server rooms, electronic equipment rooms or telecom switch rooms are not considered perimeter zones. This exception shall be limited to buildings of 60,000 square feet and less.

C403.4.1.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry-bulb (10°C dry-bulb)/45°F wet-bulb (7.2°C wet-bulb) and below.

EXCEPTION: Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry-bulb (10°C dry-bulb)/45°F wet-bulb (7.2°C wet-bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry-bulb (7.2°C dry-bulb)/40°F wet-bulb (4.5°C wet-bulb).

C403.4.1.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a waterside pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.

C403.4.1.3 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

EXCEPTIONS:

1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.
2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15,827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.

C403.4.1.4 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.

EXCEPTION: Economizers on VAV systems that cause *zone* level heating to increase due to a reduction in supply air temperature.

NEW SECTION

WAC 51-11C-40342 Section C403.4.2—VAV fan control.

C403.4.2 Variable air volume (VAV) fan control. Individual VAV fans with motors of 7.5 horsepower (5.6 kW) or greater shall be:

1. Driven by a mechanical or electrical variable speed drive;
 2. Driven by a vane-axial fan with variable-pitch blades;
- OR

3. The fan shall have controls or devices that will result in fan motor demand of no more than 30 percent of their design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data.

C403.4.2.1 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with *zone* reset control complying with Section C403.4.2.2. For sensors installed downstream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

C403.4.2.2 Set points for direct digital control. For systems with direct digital control of individual *zone* boxes reporting to the central control panel, the static pressure setpoint shall be reset based on the *zone* requiring the most pressure, i.e., the setpoint is reset lower until one *zone* damper is nearly wide open.

NEW SECTION**WAC 51-11C-40343 Section C403.4.3—Hydronic systems controls.**

C403.4.3 Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated shall be limited in accordance with Sections C403.4.3.1 through C403.4.3.3. Hydronic heating systems comprised of multiple-packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls capable of sequencing operation of the boilers. Hydronic heating systems comprised of a single boiler and greater than 500,000 Btu/h (146,550 W) input design capacity shall include either a multi-staged or modulating burner.

C403.4.3.1 Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are prohibited.

C403.4.3.2 Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water shall be designed to allow a dead band between changeover from one mode to the other of at least 15°F (8.3°C) outside air temperatures; be designed to and provided with controls that will allow operation in one mode for at least 4 hours before changing over to the other mode; and be provided with controls that allow heating and cooling supply temperatures at the changeover point to be no more than 30°F (16.7°C) apart.

C403.4.3.3 Hydronic (water loop) heat pump systems. Hydronic heat pump systems shall comply with Sections C403.4.3.3.1 through C403.4.3.3.3.

C403.4.3.3.1 Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are capable of providing a heat pump water supply temperature dead band of at least 20°F (11.1°C) between initiation of heat rejection and heat addition by the central devices.

EXCEPTION: Where a system loop temperature optimization controller is installed and can determine the most efficient operating temperature based on real time conditions of demand and capacity, dead bands of less than 20°F (11°C) shall be permitted.

C403.4.3.3.2 Heat rejection. Heat rejection equipment shall comply with Sections C403.4.3.3.2.1 and C403.4.3.3.2.2.

EXCEPTION: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

C403.4.3.3.2.1 Climate Zones 3 and 4. For Climate Zones 3 and 4:

1. If a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.

2. If an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.

3. If an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

C403.4.3.3.2.2 Climate Zones 5 through 8. For Climate Zones 5 through 8, if an open- or closed-circuit cooling tower is used, then a separate heat exchanger shall be provided to isolate the cooling tower from the heat pump loop, and heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop and providing an automatic valve to stop the flow of fluid.

C403.4.3.3.3 Isolation valve. Each hydronic heat pump on the hydronic system having a total pump system power exceeding 10 horsepower (hp) (7.5 kW) shall have a two-way (but not three-way) valve. For the purposes of this section, pump system power is the sum of the nominal power demand (i.e., nameplate horsepower at nominal motor efficiency) of motors of all pumps that are required to operate at design conditions to supply fluid from the heating or cooling source to all heat transfer devices (e.g., coils, heat exchanger) and return it to the source. This converts the system into a variable flow system and, as such, the primary circulation pumps shall comply with the variable flow requirements in Section C403.4.3.6.

C403.4.3.4 Part load controls. Hydronic systems greater than or equal to 300,000 Btu/h (87,930 W) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that have the capability to:

1. Automatically reset the supply-water temperatures using zone-return water temperature, building-return water temperature, or outside air temperature as an indicator of building heating or cooling demand. The temperature shall be capable of being reset by at least 25 percent of the design supply-to-return water temperature difference; and

2. Reduce system pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple-staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off or control valves designed to modulate or step down, and close, as a function of load, or other *approved* means.

Hydronic systems serving hydronic heat pumps are exempt from item 1, and only those hydronic systems with a total pump system power greater than 3 hp (2.2 kw) shall have controls meeting the requirements of item 2, above.

C403.4.3.5 Pump isolation. Chilled water plants including more than one chiller shall have the capability to reduce flow automatically through the chiller plant when a chiller is shut down and automatically shut off flow to chillers that are shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

EXCEPTION: Chillers that are piped in series for the purpose of increased temperature differential.

Boiler plants including more than one boiler shall have the capability to reduce flow automatically through the boiler

plant when a boiler is shut down and automatically shut off flow to chillers that are shut down.

C403.4.3.6 Variable flow controls. Individual pumps requiring variable speed control per Section C403.4.9 shall be controlled in one of the following manners:

1. For systems having a combined pump motor horsepower less than or equal to 20 hp (15 kW) and without direct digital control of individual coils, pump speed shall be a function of either:

1.1. Required differential pressure; or

1.2. Reset directly based on zone hydronic demand, or other zone load indicators; or

1.3. Reset directly based on pump power and pump differential pressure.

2. For systems having a combined pump motor horsepower that exceeds 20 hp (15 kW) or smaller systems with direct digital control, pump speed shall be a function of either:

2.1. The static pressure set point as reset based on the valve requiring the most pressure; or

2.2. Directly controlled based on zone hydronic demand.

NEW SECTION

WAC 51-11C-403431 Table C403.4.3.1.1.3—High limit shutoff controls.

Table C403.3.1.1.3(1)

High-limit Shutoff Control Options for Air Economizers

Climate Zones	Allowed Control Types	Prohibited Control Types
1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	Fixed dry-bulb Differential dry-bulb Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	Fixed enthalpy
1A, 2A, 3A, 4A	Fixed dry-bulb Fixed enthalpy Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	Differential dry-bulb
All other climates	Fixed dry-bulb Differential dry-bulb Fixed enthalpy Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	—

^aElectronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.

Table C403.3.1.1.3(2)

High-limit Shutoff Control Setting for Air Economizers

Device Type	Climate Zone	Required High Limit (Economizer off When):	
		Equation	Description
Fixed dry-bulb	1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	$T_{OA} > 75^{\circ}\text{F}$	Outdoor air temperature exceeds 75°F
	5A, 6A, 7A	$T_{OA} > 70^{\circ}\text{F}$	Outdoor air temperature exceeds 70°F
	All other zones	$T_{OA} > 65^{\circ}\text{F}$	Outdoor air temperature exceeds 65°F
Differential dry-bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Fixed enthalpy	All	$h_{OA} > 28 \text{ Btu/lb}^a$	Outdoor air enthalpy exceeds 28 Btu/lb of dry air ^a
Electronic enthalpy	All	$(T_{OA}, RH_{OA}) > A$	Outdoor air temperature/RH exceeds the "A" setpoint curve ^b
Differential enthalpy	All	$h_{OA} > H_{ra}$	Outdoor air enthalpy exceeds return air enthalpy
Dew-point and dry-bulb temperatures	All	$DP_{OA} > 55^{\circ}\text{F}$ or $T_{OA} > 75^{\circ}\text{F}$	Outdoor air dry-bulb exceeds 75°F or outside dew-point exceeds 55°F (65 gr/lb)

For SI: °C = (°F - 32) × 5/9, 1 Btu/lb = 2.33 kJ/kg.

^a At altitudes substantially different than sea level, the fixed enthalpy limit shall be set to the enthalpy value at 75°F and 50 percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

^b Setpoint "A" corresponds to a curve on the psychrometric chart that goes through a point at approximately 75°F and 40 percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

NEW SECTION**WAC 51-11C-40344 Section C403.4.4—Heat rejection equipment fan speed control.**

C403.4.4 Heat rejection equipment fan speed control. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

NEW SECTION**WAC 51-11C-40345 Section C403.4.5—Requirements for complex mechanical systems serving multiple zones.**

C403.4.5 Requirements for complex mechanical systems serving multiple zones. Sections C403.4.5.1 through C403.4.5.4 shall apply to complex mechanical systems serving multiple zones. Supply air systems serving multiple zones shall be VAV systems which, during periods of occupancy, are designed and capable of being controlled to reduce primary air supply to each *zone* to one of the following before reheating, recooling or mixing takes place:

1. Thirty percent of the maximum supply air to each *zone*.
2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.
3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
4. Minimum flow rates required by applicable codes or standards for occupant health and safety.

EXCEPTION: The following define where individual *zones* or where entire air distribution systems are exempted from the requirement for VAV control:

1. Reserved.
2. *Zones* or supply air systems where at least 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.
3. *Zones* where special humidity levels are required to satisfy process needs.
4. *Zones* with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.
5. *Zones* where the volume of air to be reheated, re-cooled or mixed is no greater than the volume of outside air required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
6. *Zones* or supply air systems with thermostatic and humidistatic controls capable of operating in sequence the supply of heating and cooling energy to the *zones* and which are capable of preventing reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

C403.4.5.1 Single duct variable air volume (VAV) systems, terminal devices. Single duct VAV systems shall use terminal devices capable of reducing the supply of primary supply air before reheating or recooling takes place.

C403.4.5.2 Dual duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct shall use terminal devices which are capable of reducing the flow from one duct to a minimum before mixing of air from the other duct takes place.

C403.4.5.3 Reserved.

C403.4.5.4 Supply-air temperature reset controls. Multiple *zone* HVAC systems shall include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature. The controls shall be capable of resetting the supply air temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

- EXCEPTIONS:
1. Systems that prevent reheating, recooling or mixing of heated and cooled supply air.
 2. Seventy-five percent of the energy for reheating is from site-recovered or site solar energy sources.
 3. *Zones* with peak supply air quantities of 300 cfm (142 L/s) or less.

NEW SECTION**WAC 51-11C-40346 Section C403.4.6—Heat recovery for service water heating.**

C403.4.6 Heat recovery for service water heating. Condenser heat recovery shall be installed for heating or reheating of service hot water provided the facility operates 24 hours a day, the total installed heat capacity of water cooled systems exceeds 1,500,000 Btu/hr of heat rejection, and the design service water heating load exceeds 250,000 Btu/hr.

The required heat recovery system shall have the capacity to provide the smaller of:

1. Sixty percent of the peak heat rejection load at design conditions; or
2. The preheating required to raise the peak service hot water draw to 85°F (29°C).

- EXCEPTIONS:
1. Facilities that employ condenser heat recovery for space heating or reheat purposes with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.
 2. Facilities that provide 60 percent of their service water heating from site solar or site recovered energy or from other sources.

NEW SECTION**WAC 51-11C-40347 Section C403.4.7—Hot gas bypass limitation.**

C403.4.7 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table C403.4.7.

- EXCEPTION: Unitary packaged systems with cooling capacities not greater than 90,000 Btu/h (26,379 W).

**Table C403.4.7
Maximum Hot Gas Bypass Capacity**

Rated Capacity	Maximum Hot Gas Bypass Capacity (% of total capacity)
≤ 240,000 Btu/h	50
> 240,000 Btu/h	25

For SI: 1 British thermal unit per hour = 0.2931 W.

NEW SECTION

WAC 51-11C-40350 Section C403.5—Walk-in coolers and freezers.

C403.5 Walk-in coolers and walk-in freezers. Walk-in coolers and walk-in freezers shall comply with all of the following:

1. Anti-sweat heaters without anti-sweat heater controls shall have a total door rail, glass, and frame heater power draw of less than or equal to 7.1 watts per square foot of door opening for *walk-in freezers*, and 3.0 watts per square foot of door opening for *walk-in coolers*.
2. Anti-sweat heater controls shall reduce the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.
3. Evaporator fan motors that are less than 1 horsepower and less than 460 volts shall use electronically commutated motors (brushless direct current motors) or 3-phase motors.
4. Condenser fan motors that are less than 1 horsepower shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.

NEW SECTION

WAC 51-11C-40360 Section C403.6—Refrigerated warehouse coolers and freezers.

NEW SECTION

WAC 51-11C-404021 Table C404.2—Minimum performance of water-heating equipment.

**Table C404.2
Minimum Performance of Water-Heating Equipment**

Equipment Type	Size Category (input)	Subcategory or Rating Condition	Performance Required ^{a, b}	Test Procedure
Water heaters, electric	≤ 12 kW	Resistance	0.97 - 0.00 132 \bar{V} , EF	DOE 10 C.F.R. Part 430
	> 12 kW	Resistance	1.73 \bar{V} + 155 SL, Btu/h	ANSI Z21.10.3
	≤ 24 amps and ≤ 250 volts	Heat pump	0.93 - 0.00 132 \bar{V} , EF	DOE 10 C.F.R. Part 430
Storage water heaters, gas	≤ 75,000 Btu/h	≥ 20 gal	0.67 - 0.0019 \bar{V} , EF	DOE 10 C.F.R. Part 430
	> 75,000 Btu/h and ≤ 155,000 Btu/h	< 4,000 Btu/h/gal	80% E_t (Q/800 + 110 \sqrt{V}) SL, Btu/h	ANSI Z21.10.3
	> 155,000 Btu/h	< 4,000 Btu/h/gal	80% E_t (Q/800 + 110 \sqrt{V}) SL, Btu/h	
Instantaneous water heaters, gas	> 50,000 Btu/h and < 200,000 Btu/h	≥ 4,000 (Btu/h)/gal and < 2 gal	0.62 - 0.00 19 \bar{V} , EF	DOE 10 C.F.R. Part 430
	≥ 200,000 Btu/h ^c	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t	ANSI Z21.10.3

C403.6 Refrigerated warehouse coolers and refrigerated warehouse freezers. Refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with all of the following:

1. Evaporator fan motors that are less than 1 horsepower and less than 460 volts shall use electronically commutated motors (brushless direct current motors) or 3-phase motors.
2. Condenser fan motors that are less than 1 horsepower shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.

NEW SECTION

WAC 51-11C-40400 Section C404—Service water heating (Mandatory).

NEW SECTION

WAC 51-11C-40401 Section C404.1—General.

C404.1 General. This section covers the minimum efficiency of, and controls for, service water-heating equipment and insulation of service hot water piping.

NEW SECTION

WAC 51-11C-40402 Section C404.2—Service water-heating equipment performance efficiency.

C404.2 Service water-heating equipment performance efficiency. Water-heating equipment and hot water storage tanks shall meet the requirements of Table C404.2. The efficiency shall be verified through certification and *listed* under an *approved* certification program, or if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer.

Equipment Type	Size Category (input)	Subcategory or Rating Condition	Performance Required ^{a, b}	Test Procedure
	≥ 200,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	80% E_t (Q/800 + 110 \sqrt{V}) SL, Btu/h	
Storage water heaters, oil	≤ 105,000 Btu/h	≥ 20 gal	0.59 - 0.0019V, EF	DOE 10 C.F.R. Part 430
	> 105,000 Btu/h	< 4,000 Btu/h/gal	78% E_t (Q/800 + 110 \sqrt{V}) SL, Btu/h	ANSI Z21.10.3
Instantaneous water heaters, oil	≤ 210,000 Btu/h	≥ 4,000 Btu/h/gal and < 2 gal	0.59 - 0.0019V, EF	DOE 10 C.F.R. Part 430
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t	ANSI Z21.10.3
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	78% E_t (Q/800 + 110 \sqrt{V}) SL, Btu/h	
Hot water supply boilers, gas and oil	≥ 300,000 Btu/h and < 12,500,000 Btu/h	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t	ANSI Z21.10.3
Hot water supply boilers, gas	≥ 300,000 Btu/h and < 12,500,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	80% E_t (Q/800 + 110 \sqrt{V}) SL, Btu/h	
Hot water supply boilers, oil	≥ 300,000 Btu/h and < 12,500,000 Btu/h	≥ 4,000 Btu/h/gal and > 10 gal	78% E_t (Q/800 + 110 \sqrt{V}) SL, Btu/h	
Pool heaters, gas and oil	All	—	78% E_t	ASHRAE 146
Heat pump pool heaters	All	—	4.0 COP	AHRI 1160
Unfired storage tanks	All	—	Minimum insulation requirement R-12.5 (h • ft ² • °F)/Btu	(none)

For SI: °C = [(°F) - 32]/1.8, 1 British thermal unit per hour = 0.2931 W, 1 gallon = 3.785 L, 1 British thermal unit per hour per gallon = 0.078 W/L.

^aEnergy factor (EF) and thermal efficiency (E_t) are minimum requirements. In the EF equation, V is the rated volume in gallons.

^bStandby loss (SL) is the maximum Btu/h based on a nominal 70°F temperature difference between stored water and ambient requirements. In the SL equation, Q is the nameplate input rate in Btu/h. In the SL equation for electric water heaters, V is the rated volume in gallons. In the SL equation for oil and gas water heaters and boilers, V is the rated volume in gallons.

^cInstantaneous water heaters with input rates below 200,000 Btu/h must comply with these requirements if the water heater is designed to heat water to temperatures 180°F or higher.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-40403 Section C404.3—Temperature controls.

C404.3 Temperature controls. Service water-heating equipment shall be provided with controls to allow a setpoint of 110°F (43°C) for equipment serving dwelling units and 90°F (32°C) for equipment serving other occupancies. The outlet temperature of lavatories in public facility rest rooms shall be limited to 110°F (43°C).

NEW SECTION

WAC 51-11C-40404 Section C404.4—Heat traps.

C404.4 Heat traps. Water-heating equipment not supplied with integral heat traps and serving noncirculating systems shall be provided with heat traps on the supply and discharge piping associated with the equipment.

NEW SECTION

WAC 51-11C-40405 Section C404.5—Water heater installation.

C404.5 Water heater installation. Electric water heaters in unconditioned spaces or on concrete floors shall be placed on an incompressible, insulated surface with a minimum thermal resistance of R-10.

NEW SECTION

WAC 51-11C-40406 Section C404.6—Pipe insulation.

C404.6 Pipe insulation. For automatic-circulating hot water and heat-traced systems, piping shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K). The first 8 feet (2438 mm) of piping in nonhot-water-supply temperature maintenance systems served by equipment without integral heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K).

EXCEPTIONS:

- Heat-traced piping systems shall meet the insulation thickness requirements per the manufacturer's installation instructions. Untraced piping within a heat traced system shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K).
- Hot water piping that is part of the final pipe run to the plumbing fixture and is not part of the automatic-circulating hot water recirculation path is not required to meet the minimum insulation requirements of C404.6.

NEW SECTION**WAC 51-11C-40407 Section C404.7—Hot water system controls.**

C404.7 Hot water system controls. Circulating hot water system pumps or heat trace shall be arranged to be turned off either automatically or manually when there is limited hot water demand. Ready access shall be provided to the operating controls.

NEW SECTION**WAC 51-11C-40408 Section C404.8—Shut-off controls.**

C404.8 Shut-off controls. Systems designed to maintain usage temperatures in hot water pipes, such as circulating hot water systems or heat traced pipes, shall be equipped with automatic time switches or other controls to turn off the system during periods of nonuse.

NEW SECTION**WAC 51-11C-40409 Section C404.9—Domestic hot water meters.**

C404.9 Domestic hot water meters. Each individual dwelling unit in a Group R-2 multi-family residential occupancy with central service shall be provided with a domestic hot water meter to allow for domestic hot water billing based on actual domestic hot water usage.

NEW SECTION**WAC 51-11C-40410 Section C404.10—Pools and in-ground spas.**

C404.10 Pools and in-ground permanently installed spas (mandatory). Pools and in-ground permanently installed spas shall comply with Sections C404.10.1 through C404.10.4.

C404.10.1 Heaters. Heat pump pool heaters shall have a minimum COP of 4.0 determined in accordance with ASHRAE Standard 146. Other pool heating equipment shall comply with the applicable efficiencies in Section C404.2.3.

All heaters shall be equipped with a readily *accessible* on-off switch that is mounted outside of the heater to allow shutting off the heater without adjusting the thermostat setting. Gas-fired heaters shall not be equipped with constant burning pilot lights.

C404.10.2 Time switches. Time switches or other control method that can automatically turn off and on heaters and pumps according to a preset schedule shall be installed on all heaters and pumps. Heaters, pumps and motors that have built in timers shall be deemed in compliance with this requirement.

EXCEPTIONS:

1. Where public health standards require 24-hour pump operation.
2. Where pumps are required to operate solar- and waste-heat-recovery pool heating systems.

C404.10.3 Covers. Heated pools and in-ground permanently installed spas shall be provided with a vapor-retardant cover on or at the water surface. Pools heated to more than 90°F shall have a pool cover with a minimum insulation value of R-12, and the sides and bottom of the pool shall also have a minimum insulation value of R-12.

C404.10.4 Heat recovery. Heated indoor swimming pools, spas or hot tubs with water surface area greater than 200 square feet shall provide for energy conservation by an exhaust air heat recovery system that heats ventilation air, pool water or domestic hot water. The heat recovery system shall be capable of decreasing the exhaust air temperature at design heating conditions (80°F indoor) by 36°F (10°C) in Climate Zones 4C and 5B and 48°F (26.7°C) in Climate Zone 6B.

EXCEPTION:

Pools, spas or hot tubs that include system(s) that provide equivalent recovered energy on an annual basis through one of the following methods:

1. Renewable energy;
2. Dehumidification heat recovery;
3. Waste heat recovery; or
4. A combination of these system sources capable of providing at least 70 percent of the heating energy required over an operating season.

NEW SECTION**WAC 51-11C-40500 Section C405—Electrical power and lighting systems.**NEW SECTION**WAC 51-11C-40501 Section C405.1—General.**

C405.1 General (mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior applications, electrical energy consumption, minimum acceptable lighting equipment for exterior applications, and minimum efficiencies for motors and transformers.

EXCEPTION:

Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that a minimum of 75 percent of the lamps in permanently installed light fixtures shall be high efficacy lamps.

Walk-in coolers and walk-in freezers shall comply with C405.10. Refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with C405.11.

NEW SECTION**WAC 51-11C-40502 Section C405.2—Electrical power and lighting systems.**

C405.2 Lighting controls (mandatory). Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, C405.2.4 and C405.2.5.

EXCEPTION:

Industrial or manufacturing process areas, as may be required for production and safety.

NEW SECTION**WAC 51-11C-405021 Section C405.2.1—Manual lighting controls.**

C405.2.1 Manual lighting controls. All buildings shall include manual lighting controls that meet the requirements of Sections C405.2.1.1 and C405.2.1.2.

C405.2.1.1 Interior lighting controls. Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identifies the lights served and indicates their status.

EXCEPTIONS:

1. Areas designated as security or emergency areas that need to be continuously lighted.
2. Lighting in stairways or corridors that are elements of the means of egress.

C405.2.1.2 Light reduction controls. Each area that is required to have a manual control shall also allow the occupant to reduce the connected lighting load in a reasonably uniform illumination pattern by at least 50 percent. Lighting reduction shall be achieved by one of the following or other *approved* method:

1. Controlling all lamps or luminaires;
2. Dual switching of alternate rows of luminaires, alternate luminaires or alternate lamps;
3. Switching the middle lamp luminaires independently of the outer lamps; or
4. Switching each luminaire or each lamp.

EXCEPTION:

Light reduction controls need not be provided in the following areas and spaces:

1. Areas that have only one luminaire, with rated power less than 100 watts.
2. Areas that are controlled by an occupant-sensing device.
3. Corridors, equipment rooms, storerooms, restrooms, public lobbies, electrical or mechanical rooms.
4. *Sleeping unit* (see Section C405.2.3).
5. Spaces that use less than 0.6 watts per square foot (6.5 W/m²).
6. Daylight spaces complying with Section C405.2.2.3.2.

NEW SECTION**WAC 51-11C-405022 Section C405.2.2—Additional lighting controls.**

C405.2.2 Additional lighting controls. Each area that is required to have a manual control shall also have controls that meet the requirements of Sections C405.2.2.1, C405.2.2.2 and C405.2.2.3.

EXCEPTION:

Additional lighting controls need not be provided in the following spaces:

1. *Sleeping units*.
2. Spaces where patient care is directly provided.
3. Spaces where an automatic shutoff would endanger occupant safety or security.
4. Lighting intended for continuous operation.

C405.2.2.1 Automatic time switch control devices. Automatic time switch controls shall be installed to control lighting in all areas of the building. Automatic time switches shall

have a minimum 7 day clock and be capable of being set for 7 different day types per week and incorporate an automatic holiday "shut-off" feature, which turns off all loads for at least 24 hours and then resumes normally scheduled operations. Automatic time switches shall also have program back-up capabilities, which prevent the loss of program and time settings for at least 10 hours, if power is interrupted.

EXCEPTIONS:

1. Emergency egress lighting does not need to be controlled by an automatic time switch.
2. Lighting in spaces controlled by occupancy sensors does not need to be controlled by automatic time switch controls.

The automatic time switch control device shall include an override switching device that complies with the following:

1. The override switch shall be in a readily accessible location;
2. The override switch shall be located where the lights controlled by the switch are visible; or the switch shall provide a mechanism which announces the area controlled by the switch;
3. The override switch shall permit manual operation;
4. The override switch, when initiated, shall permit the controlled lighting to remain on for a maximum of 2 hours; and
5. Any individual override switch shall control the lighting for a maximum area of 5,000 square feet (465 m²).

EXCEPTION:

Within malls, arcades, auditoriums, single tenant retail spaces, industrial facilities and arenas:

1. The time limit shall be permitted to exceed 2 hours provided the override switch is a captive key device; and
2. The area controlled by the override switch is permitted to exceed 5,000 square feet (465 m²), but shall not exceed 20,000 square feet (1860 m²).

C405.2.2.2 Occupancy sensors. Occupancy sensors shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, warehouse spaces, storage rooms and janitorial closets, and other spaces 300 square feet (28 m²) or less enclosed by floor-to-ceiling height partitions. These automatic control devices shall be installed to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power.

EXCEPTION:

Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants.

C405.2.2.3 Daylight zone control. Daylight zones shall be designed such that lights in the daylight zone are controlled independently of general area lighting and are controlled in accordance with Section C405.2.2.3.2. Each daylight control zone shall not exceed 2,500 square feet (232 m²). Contiguous daylight zones adjacent to vertical fenestration are allowed to be controlled by a single controlling device provided that they do not include zones facing more than two adjacent cardinal orientations (i.e., north, east, south, west). The primary daylight zone shall be controlled separately from the second-

ary daylight zone. Daylight zones under skylights more than 15 feet (4572 mm) from the perimeter shall be controlled separately from daylight zones adjacent to vertical fenestration. Controls shall:

1. Control only luminaires within the daylit area.
2. Incorporate time-delay circuits to prevent cycling of light level changes of less than three minutes.

EXCEPTION: Daylight zones enclosed by walls or ceiling height partitions and containing two or fewer light fixtures are not required to have a separate switch for general area lighting.

C405.2.2.3.1 Reserved.

C405.2.2.3.2 Automatic daylighting controls. Setpoint and other controls for calibrating the lighting control device shall be readily accessible.

Daylighting controls device shall be capable of automatically reducing the lighting power in response to available daylight by either one of the following methods:

1. Continuous dimming using dimming ballasts and daylight-sensing automatic controls that are capable of reducing the power of general lighting in the daylit zone continuously to less than 20 percent of rated power at maximum light output.
2. Stepped dimming using multi-level switching and daylight-sensing controls that are capable of reducing lighting power automatically. The system shall provide a minimum of two control channels per zone and be installed in a manner such that at least one control step is between 50 percent and 70 percent of design lighting power and another control step is no greater than 35 percent of design power, and the system is capable of automatically turning the system off.

C405.2.2.3.3 Reserved.

NEW SECTION

WAC 51-11C-405023 Section C405.2.3—Specific application controls.

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles. Where a hotel/motel includes more than 50 rooms, controls shall be automatic to ensure all power to the lights and switched outlets are turned off when the occupant is not in the room.
4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall be automatically shut off whenever that space is unoccupied and shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.

5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.

6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.

7. Luminaires serving the exit access and providing means of egress illumination required by Section 1006.1 of the *International Building Code*, including luminaires that function as both normal and emergency means of egress illumination shall be controlled by a combination of listed emergency relay and occupancy sensors, or signal from another building control system, that automatically shuts off the lighting when the areas served by that illumination are unoccupied.

EXCEPTION: Means of egress illumination serving the exit access that does not exceed 0.05 watts per square foot of building area is exempt from this requirement.

NEW SECTION

WAC 51-11C-405024 Section C405.2.4—Exterior lighting controls.

C405.2.4 Exterior lighting controls. Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photosensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hours.

NEW SECTION

WAC 51-11C-405025 Section C405.2.5—Area controls.

C405.2.5 Area controls. The maximum lighting power that may be controlled from a single switch or automatic control shall not exceed that which is provided by a 20 ampere circuit loaded to not more than 80 percent. A master control may be installed provided the individual switches retain their capability to function independently. Circuit breakers may not be used as the sole means of switching.

EXCEPTION: Areas less than 5 percent of the building footprint for footprints over 100,000 ft².

NEW SECTION

WAC 51-11C-40503 Section C405.3—Reserved.

C405.3 Reserved.

NEW SECTION

WAC 51-11C-40504 Section C405.4—Exit signs.

C405.4 Exit signs (mandatory). Internally illuminated exit signs shall not exceed 5 watts per side.

NEW SECTION

WAC 51-11C-40505 Section C405.5—Interior lighting power requirements.

C405.5 Interior lighting power requirements (prescriptive). A building complies with this section if its total connected lighting power calculated under Section C405.5.1 is no greater than the interior lighting power calculated under Section C405.5.2.

NEW SECTION

WAC 51-11C-405051 Section C405.5.1—Total connected interior lighting power.

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4.

EXCEPTIONS:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
 - 1.1. Professional sports arena playing field lighting.
 - 1.2. Emergency lighting automatically off during normal building operation.
 - 1.3. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired and other medical and age-related issues.
 - 1.4. Casino gaming areas.
 - 1.5. General area lighting power in industrial and manufacturing occupancies dedicated to the inspection or quality control of goods and products.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
 - 2.1. Task lighting for medical and dental purposes.
 - 2.2. Display lighting for exhibits in galleries, museums and monuments.
 3. Lighting for theatrical purposes, including performance, stage, film production and video production.
 4. Lighting for photographic processes.
 5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
 6. Task lighting for plant growth or maintenance.
 7. Advertising signage or directional signage.
 8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
 9. Lighting equipment that is for sale.
 10. Lighting demonstration equipment in lighting education facilities.
 11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
 12. Lighting integral to both open and glass enclosed refrigerator and freezer cases.
 13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
 14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff.
 15. Lighting used for aircraft painting.

C405.5.1.1 Screw lamp holders. The wattage shall be the maximum *labeled* wattage of the luminaire.

C405.5.1.2 Low-voltage lighting. The wattage shall be the specified wattage of the transformer supplying the system.

C405.5.1.3 Other luminaires. The wattage of all other lighting equipment shall be the wattage of the lighting equipment verified through data furnished by the manufacturer or other *approved* sources.

C405.5.1.4 Line-voltage lighting track and plug-in busway. The wattage shall be:

1. The specified wattage of the luminaires included in the system with a minimum of 50 W/lin ft. (162 W/lin. m);
2. The wattage limit of the system's circuit breaker; or
3. The wattage limit of other permanent current limiting device(s) on the system.

NEW SECTION

WAC 51-11C-405052 Section C405.5.2—Interior lighting power requirements.

C405.5.2 Interior lighting power. The total interior lighting power allowance (watts) is determined according to Table C405.5.2(1) using the Building Area Method, or Table C405.5.2(2) using the Space-by-Space Method, for all areas of the building covered in this permit. For the Building Area Method, the interior lighting power allowance is the floor area for each building area type listed in Table C405.5.2(1) times the value from Table C405.5.2(1) for that area. For the purposes of this method, an "area" shall be defined as all contiguous spaces that accommodate or are associated with a single building area type as listed in Table C405.5.2(1). Where this method is used to calculate the total interior lighting power for an entire building, each building area type shall be treated as a separate area. For the Space-by-Space Method, the interior lighting power allowance is determined by multiplying the floor area of each space times the value for the space type in Table C405.5.2(2) that most closely represents the proposed use of the space, and then summing the lighting power allowances for all spaces. Tradeoffs among spaces are permitted.

NEW SECTION

WAC 51-11C-405053 Table C405.5.2(1)—Interior lighting power allowances—Building area method.

**Table C405.5.2(1)
Interior Lighting Power Allowances—Building Area Method**

Building Area Type	LPD (w/ft ²)
Automotive facility	0.82
Convention center	1.08
Court house	1.05
Dining: Bar lounge/leisure	0.99
Dining: Cafeteria/fast food	0.90
Dining: Family	0.89
Dormitory	0.61
Exercise center	0.88
Fire station	0.71
Gymnasium	0.95

Building Area Type	LPD (w/ft ²)
Health care clinic	0.87
Hospital	1.20
Hotel	1.00
Library	1.18
Manufacturing facility	1.11
Motel	0.88
Motion picture theater	0.83
Multifamily	0.60
Museum	1.00
Office	0.90
Parking garage	0.20
Penitentiary	0.90
Performing arts theater	1.25
Police station	0.90
Post office	0.87
Religious building	1.05
Retail	1.33
School/university	0.99
Sports arena	0.78
Town hall	0.92
Transportation	0.77
Warehouse	0.50
Workshop	1.20

NEW SECTION

WAC 51-11C-405054 Table C405.5.5.2(2)—Interior lighting power allowances—Space-by-space method.

Table C405.5.2(2)

Interior Lighting Power Allowances—Space-by-Space Method

Common Space-by-Space Types	LPD (w/ft ²)
Atrium - First 40 feet in height	0.03 per ft. ht.
Atrium - Above 40 feet in height	0.02 per ft. ht.
Audience/seating area - Permanent	
For auditorium	0.79
For performing arts theater	2.43
For motion picture theater	1.14
Classroom/lecture/training	1.24
Conference/meeting/multipurpose	1.23
Corridor/transition	0.66
Dining area	
Bar/lounge/leisure dining	1.31
Family dining area	0.89
Dressing/fitting room performing arts theater	0.40
Electrical/mechanical	0.95
Food preparation	0.99

Common Space-by-Space Types	LPD (w/ft ²)
Laboratory for classrooms	1.28
Laboratory for medical/industrial/research	1.81
Lobby	0.90
Lobby for performing arts theater	2.00
Lobby for motion picture theater	0.52
Locker room	0.75
Lounge recreation	0.73
Office - Enclosed	1.11
Office - Open plan	0.98
Restroom	0.98
Sales area	1.68 ^a
Stairway	0.69
Storage	0.63
Workshop	1.59
Building Specific Space-by-space Types	
Automotive - Service/repair	0.67
Bank/office - Banking activity area	1.38
Convention center	
Exhibit space	1.45
Audience/seating area	0.82
Courthouse/police station/penitentiary	
Courtroom	1.72
Confinement cells	1.10
Judge chambers	1.17
Penitentiary audience seating	0.43
Penitentiary classroom	1.34
Penitentiary dining	1.07
Dormitory living quarters	0.38
Fire stations	
Engine rooms	0.56
Sleeping quarters	0.25
Gymnasium/fitness center	
Fitness area	0.72
Gymnasium audience/seating	0.43
Playing area	1.20
Health care clinic/hospital	
Corridors/transition	0.89
Emergency	2.26
Exam/treatment	1.66
Medical supplies	1.27
Nursery	0.88
Nurse station	0.87
Operating room	1.89
Patient room	0.62

Common Space-by-Space Types	LPD (w/ft ²)
Pharmacy	1.14
Physical therapy	0.91
Radiology/imaging	1.32
Recovery	1.15
Hotel	
Dining area	0.82
Guest rooms	1.11
Hotel lobby	1.06
Highway lodging dining	0.88
Highway lodging guest rooms	0.75
Library	
Card file and cataloguing	0.72
Reading area	0.93
Stacks	1.71
Manufacturing	
Corridors/transition	0.41
Detailed manufacturing	1.29
Equipment room	0.95
Extra high bay (> 50-foot floor-ceiling height)	1.05
High bay (25 - 50-foot floor-ceiling height)	1.23
Low bay (< 25-foot floor-ceiling height)	1.19
Museum	
General exhibition	1.05
Restoration	1.02
Parking garage - Garage areas	0.19
Post office	
Sorting area	0.94

Common Space-by-Space Types	LPD (w/ft ²)
Religious building	
Audience seating	1.53
Fellowship hall	0.64
Worship pulpit/choir	1.53
Retail	
Dressing/fitting area	0.87
Mall concourse	1.10
Sales area	1.68 ^a
Sports arena	
Audience seating	0.43
Court sports area - Class 4	0.72
Court sports area - Class 3	1.20
Court sports area - Class 2	1.92
Court sports area - Class 1	3.01
Ring sports area	2.68
Transportation	
Air/train/bus baggage area	0.76
Airport concourse	0.36
Audience seating	0.54
Terminal - Ticket counter	1.08
Warehouse	
Fine material storage	0.95
Medium/bulky material	0.58

For SI: 1 foot = 304.8 mm, 1 watt per square foot = 11 W/m².
^aWhere lighting equipment is specified to be installed to highlight specific merchandise in addition to lighting equipment specified for general lighting and is switched or dimmed on circuits different from the circuits for general lighting, the smaller of the actual wattage of the lighting equipment installed specifically for merchandise, or additional lighting power as determined below shall be added to the interior lighting power determined in accordance with this line item.

Calculate the additional lighting power as follows:

$$\text{Additional Interior Lighting Power Allowance} = 500 \text{ watts} + (\text{Retail Area 1} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 2} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 3} \times 1.4 \text{ W/ft}^2) + (\text{Retail Area 4} \times 2.5 \text{ W/ft}^2).$$

Where:

- Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.
- Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.
- Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.
- Retail Area 4 = The floor area used for the sale of jewelry, crystal and china.

EXCEPTION: Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the authority having jurisdiction.

NEW SECTION

WAC 51-11C-40506 Section C405.6—Exterior lighting.

C405.6 Exterior lighting (mandatory). Where the power for exterior lighting is supplied through the energy service to the building, all exterior lighting shall comply with Sections C405.6.1 and C405.6.2.

EXCEPTION: Where *approved* because of historical, safety, signage or emergency considerations.

1. Specialized signal, directional and marker lighting associated with transportation;
2. Advertising signage or directional signage;
3. Integral to equipment or instrumentation and is installed by its manufacturer;
4. Theatrical purposes, including performance, stage, film production and video production;
5. Athletic playing areas;
6. Temporary lighting;
7. Industrial production, material handling, transportation sites and associated storage areas;
8. Theme elements in theme/amusement parks; and
9. Used to highlight features of public monuments and registered historic landmark structures or buildings.

NEW SECTION

WAC 51-11C-405061 Section C405.6.1—Exterior building grounds lighting.

C405.6.1 Exterior building grounds lighting. All exterior building grounds luminaires that operate at greater than 100 watts shall contain lamps having a minimum efficacy of 60 lumens per watt unless the luminaire is controlled by a motion sensor or qualifies for one of the exceptions under Section C405.6.2.

NEW SECTION

WAC 51-11C-405062 Section C405.6.2—Exterior building lighting power.

C405.6.2 Exterior building lighting power. The total exterior lighting power allowance for all exterior building applications is the sum of the base site allowance plus the individual allowances for areas that are to be illuminated and are permitted in Table C405.6.2(2) for the applicable lighting zone. Tradeoffs are allowed only among exterior lighting applications listed in Table C405.6.2(2), Tradable Surfaces section. The lighting zone for the building exterior is determined from Table C405.6.2(1) unless otherwise specified by the local jurisdiction. Exterior lighting for all applications (except those included in the exceptions to Section C405.6.2) shall comply with the requirements of Section C405.6.1.

EXCEPTION: Lighting used for the following exterior applications is exempt where equipped with a control device independent of the control of the nonexempt lighting:

NEW SECTION

WAC 51-11C-405063 Table C405.6.2(1)—Exterior lighting zones.

**Table C405.6.2(1)
Exterior Lighting Zones**

Lighting Zone	Description
1	Developed areas of national parks, state parks, forest land, and rural areas
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed use areas
3	All other areas
4	High-activity commercial districts in major metropolitan areas as designated by the local land use planning authority

NEW SECTION

WAC 51-11C-405064 Table C405.6.2(2)—Individual lighting power allowances for building exteriors.

**Table C405.6.2(2)
Individual Lighting Power Allowances for Building Exteriors**

		Lighting Zones			
		Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance (Base allowance is usable in tradable or nontradable surfaces.)		500 W	600 W	750 W	1300 W
Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas are tradable.)	Uncovered Parking Areas				
	Parking areas and drives	0.04 W/ft ²	0.06 W/ft ²	0.10 W/ft ²	0.13 W/ft ²
	Building Grounds				
	Walkways less than 10 feet wide	0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot	1.0 W/linear foot
	Walkways 10 feet wide or greater, plaza areas, special feature areas	0.14 W/ft ²	0.14 W/ft ²	0.16 W/ft ²	0.2 W/ft ²
	Stairways	0.75 W/ft ²	1.0 W/ft ²	1.0 W/ft ²	1.0 W/ft ²
	Pedestrian tunnels	0.15 W/ft ²	0.15 W/ft ²	0.2 W/ft ²	0.3 W/ft ²
	Building Entrances and Exits				
	Main entries	20 W/linear foot of door width	20 W/linear foot of door width	30 W/linear foot of door width	30 W/linear foot of door width

		Lighting Zones			
		Zone 1	Zone 2	Zone 3	Zone 4
	Other doors	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width
	Entry canopies	0.25 W/ft ²	0.25 W/ft ²	0.4 W/ft ²	0.4 W/ft ²
	Sales Canopies				
	Free standing and attached	0.6 W/ft ²	0.6 W/ft ²	0.8 W/ft ²	1.0 W/ft ²
	Outdoor Sales				
	Open areas (including vehicle sales lots)	0.25 W/ft ²	0.25 W/ft ²	0.5 W/ft ²	0.7 W/ft ²
	Street frontage for vehicle sales lots in addition to "open area" allowance	No Allowance	10 W/linear foot	10 W/linear foot	30 W/linear foot
Nontradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.)	Building facades	No allowance	0.1 W/ft ² for each illuminated wall or surface or 2.5 W/linear foot for each illuminated wall or surface length	0.15 W/ft ² for each illuminated wall or surface or 3.75 W/linear foot for each illuminated wall or surface length	0.2 W/ft ² for each illuminated wall or surface or 5.0 W/linear foot for each illuminated wall or surface length
	Automated teller machines and night depositories	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location
	Entrances and gatehouse inspection stations at guarded facilities	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area
	Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area
	Drive-up windows/doors	400 W per drive-through	400 W per drive-through	400 W per drive-through	400 W per drive-through
	Parking near 24-hour retail entrances	800 W per main entry	800 W per main entry	800 W per main entry	800 W per main entry

For SI: 1 foot = 304.8 mm, 1 watt per square foot = W/0.0929 m²

NEW SECTION

WAC 51-11C-40507 Section C405.7—Electrical energy consumption.

C405.7 Electrical energy consumption (mandatory). In buildings having individual dwelling units, provisions shall be made to determine the electrical energy consumed by each tenant by separately metering individual dwelling units. A utility tenant meter meets this requirement.

NEW SECTION

WAC 51-11C-40508 Section C405.8—Electric motors.

C405.8 Electric motors. All permanently wired polyphase motors of 1 hp or more, which are not part of an HVAC system, shall comply with Section C403.2.13.

EXCEPTIONS:

1. Motors that are an integral part of specialized process equipment.
2. Where the motor is integral to a listed piece of equipment for which no complying motor has been approved.

NEW SECTION

WAC 51-11C-40509 Section C405.9—Transformers.

C405.9 Transformers. The minimum efficiency of a low voltage dry-type distribution transformer shall be the Class I Efficiency Levels for distribution transformers specified in Table 4-2 of NEMA TP-1.

NEW SECTION

WAC 51-11C-40510 Section C405.10—Walk-in coolers and freezers.

C405.10 Walk-in coolers and walk-in freezers. Walk-in coolers and walk-in freezers shall comply with all of the following:

1. Lights shall use light sources with an efficacy of 40 lumens per watt or more, including ballast losses (if any). Light sources with an efficacy of less than 40 lumens per watt, including ballast losses (if any), may be used in conjunction with a timer or device that turns off the lights within 15 minutes of when the *walk-in cooler* or *walk-in freezer* is not occupied by people.

NEW SECTION

WAC 51-11C-40511 Section C405.11—Refrigerated warehouse coolers and freezers.

C405.11 Refrigerated warehouse coolers and refrigerated warehouse freezers. Refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with all of the following:

1. Lights shall use light sources with an efficacy of 40 lumens per watt or more, including ballast losses (if any). Light sources with an efficacy of less than 40 lumens per watt, including ballast losses (if any), may be used in conjunction with a timer or device that turns off the lights within 15 minutes of when the *refrigerated warehouse cooler* or *refrigerated warehouse freezer* is not occupied by people.

NEW SECTION

WAC 51-11C-40512 Section C405.12—Escalators and moving walks.

C405.12 Escalators and moving walks.

C405.12.1 Variable speed escalators. Where variable speed escalators and moving walks are permitted by the administrative authority, all escalators and moving walks shall reduce their operating speed to no more than 15 feet per minute when no passengers have been detected for a period of time not exceeding three times the amount of time required to transfer a passenger between landings. Such escalators and moving walks shall comply with the requirements of ANSI/ASME A17.1 for variable speed escalators and moving walks.

EXCEPTION: A power factor controller that reduces operating voltage in response to light loading conditions may be provided in place of the variable speed function.

C405.12.2 Regenerative drive. Escalators designed either for one-way down operation only or for reversible operation shall have variable frequency regenerative drives that supply electrical energy to the building electrical system when loaded with more than 5 passengers.

NEW SECTION

WAC 51-11C-40513 Section C405.13—Electrical power and lighting systems commissioning and completion requirements.

C405.13 Electrical power and lighting systems commissioning and completion requirements. Electrical power and lighting systems shall be commissioned and completed in accordance with Section C408.

NEW SECTION

WAC 51-11C-40600 Section C406—Additional efficiency package options.

Sections C406.1 through C406.4 are not adopted.

NEW SECTION

WAC 51-11C-40700 Section C407—Total building performance.

NEW SECTION

WAC 51-11C-40701 Section C407.1—Scope.

C407.1 Scope. This section establishes criteria for compliance using total building performance. All systems and loads shall be included in determining the total building performance including, but not limited to: Heating systems, cooling systems, service water heating, fan systems, lighting power, receptacle loads and process loads.

NEW SECTION

WAC 51-11C-40702 Section C407.2—Mandatory requirements.

C407.2 Mandatory requirements. Compliance with this section requires that the criteria of Sections C402.4, C403.2, C404 and C405 be met.

The building permit application for projects utilizing this method shall include in one submittal all building and mechanical drawings and all information necessary to verify that the building envelope and mechanical design for the project corresponds with the annual energy analysis. If credit is proposed to be taken for lighting energy savings, then an electrical permit application shall also be submitted and approved prior to the issuance of the building permit. If credit is proposed to be taken for energy savings from other components, then the corresponding permit application (e.g., plumbing, boiler, etc.) shall also be submitted and approved prior to the building permit application. Otherwise, components of the project that would not be approved as part of a building permit application shall be modeled the same in both the proposed building and the *standard reference design* and shall comply with the requirements of this code.

NEW SECTION

WAC 51-11C-40703 Section C407.3—Performance-based compliance.

C407.3 Performance-based compliance. Compliance based on total building performance requires that a proposed building (*proposed design*) be shown to have an annual energy consumption based on site energy expressed in Btu and Btu per square foot of *conditioned floor area* that is less than or equal to the annual energy consumption of the *standard reference design*.

NEW SECTION

WAC 51-11C-40704 Section C407.4—Documentation.

C407.4 Documentation. Documentation verifying that the methods and accuracy of compliance software tools conform to the provisions of this section shall be provided to the *code official*.

C407.4.1 Compliance report. Building permit submittals shall include a report that documents that the *proposed design* has annual energy consumption less than or equal to the annual energy consumption of the *standard reference design*. The compliance documentation shall include the following information:

1. Address of the building;
2. An inspection checklist documenting the building component characteristics of the *proposed design* as listed in Table C407.5.1(1). The inspection checklist shall show the estimated annual energy consumption for both the *standard reference design* and the *proposed design*;
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.

C407.4.2 Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *standard reference design*;
2. Thermal zoning diagrams consisting of floor plans showing the thermal zoning scheme for *standard reference design* and *proposed design*;
3. Input and output report(s) from the energy analysis simulation program containing the complete input and output files, as applicable. The output file shall include energy use totals and energy use by energy source and end-use served, total hours that space conditioning loads are not met and any errors or warning messages generated by the simulation tool as applicable;
4. An explanation of any error or warning messages appearing in the simulation tool output; and
5. A certification signed by the builder providing the building component characteristics of the *proposed design* as given in Table C407.5.1(1).

NEW SECTION

WAC 51-11C-40705 Section C407.5—Calculation procedure.

C407.5 Calculation procedure. Except as specified by this section, the *standard reference design* and *proposed design* shall be configured and analyzed using identical methods and techniques.

C407.5.1 Building specifications. The *standard reference design* and *proposed design* shall be configured and analyzed as specified by Table C407.5.1(1). Table C407.5.1(1) shall include by reference all notes contained in Table C402.2.

C407.5.2 Thermal blocks. The *standard reference design* and *proposed design* shall be analyzed using identical thermal blocks as specified in Section C407.5.2.1, C407.5.2.2 or C407.5.2.3.

C407.5.2.1 HVAC zones designed. Where HVAC *zones* are defined on HVAC design drawings, each HVAC *zone* shall be modeled as a separate thermal block.

EXCEPTION: Different HVAC *zones* shall be allowed to be combined to create a single thermal block or identical thermal blocks to which multipliers are applied provided:

1. The space use classification is the same throughout the thermal block.
2. All HVAC *zones* in the thermal block that are adjacent to glazed exterior walls face the same orientation or their orientations are within 45 degrees (0.79 rad) of each other.
3. All of the *zones* are served by the same HVAC system or by the same kind of HVAC system.

C407.5.2.2 HVAC zones not designed. Where HVAC *zones* have not yet been designed, thermal blocks shall be defined based on similar internal load densities, occupancy, lighting, thermal and temperature schedules, and in combination with the following guidelines:

1. Separate thermal blocks shall be assumed for interior and perimeter spaces. Interior spaces shall be those located more than 15 feet (4572 mm) from an exterior wall. Perimeter spaces shall be those located closer than 15 feet (4572 mm) from an *exterior wall*.

2. Separate thermal blocks shall be assumed for spaces adjacent to glazed exterior walls: A separate *zone* shall be provided for each orientation, except orientations that differ by no more than 45 degrees (0.79 rad) shall be permitted to be considered to be the same orientation. Each *zone* shall include floor area that is 15 feet (4572 mm) or less from a glazed perimeter wall, except that floor area within 15 feet (4572 mm) of glazed perimeter walls having more than one orientation shall be divided proportionately between *zones*.

3. Separate thermal blocks shall be assumed for spaces having floors that are in contact with the ground or exposed to ambient conditions from *zones* that do not share these features.

4. Separate thermal blocks shall be assumed for spaces having exterior ceiling or roof assemblies from *zones* that do not share these features.

C407.5.2.3 Multifamily residential buildings. Residential spaces shall be modeled using one thermal block per space except that those facing the same orientations are permitted to be combined into one thermal block. Corner units and units with roof or floor loads shall only be combined with units sharing these features.

NEW SECTION

WAC 51-11C-407051 Table C407.5.1(1)—Specifications for the standard reference and proposed design.

**Table C407.5.1(1)
Specifications for the Standard Reference and Proposed Designs**

Building Component Characteristics	Standard Reference Design	Proposed Design
Space use classification	Same as proposed	The space use classification shall be chosen in accordance with Table C405.5.2 for all areas of the building covered by this permit. Where the space use classification for a building is not known, the building shall be categorized as an office building.
Roofs	Type: Insulation entirely above deck Gross area: Same as proposed U-factor: From Table C402.1.2 Solar absorptance: 0.75 Emittance: 0.90	As proposed As proposed As proposed As proposed As proposed
Walls, above-grade	Type: Mass wall if proposed wall is mass; otherwise steel-framed wall Gross area: Same as proposed U-factor: From Table C402.1.2 Solar absorptance: 0.75 Emittance: 0.90	As proposed As proposed As proposed As proposed As proposed
Walls, below-grade	Type: Mass wall Gross area: Same as proposed U-Factor: From Table C402.1.2 with insulation layer on interior side of walls	As proposed As proposed As proposed
Floors, above-grade	Type: Joist/framed floor Gross area: Same as proposed U-factor: From Table C402.1.2	As proposed As proposed As proposed
Floors, slab-on-grade	Type: Unheated F-factor: From Table C402.1.2	As proposed As proposed
Doors	Type: Swinging Area: Same as proposed U-factor: From Table C402.2	As proposed As proposed As proposed
Vertical Fenestration	Area 1. The proposed vertical fenestration area; where the proposed vertical fenestration area is less than 30 percent of above-grade wall area. 2. 30 percent of above-grade wall area; where the proposed vertical fenestration area is 30 percent or more of the above-grade wall area. U-factor: From Table C402.3 for the same framing material as proposed SHGC: From Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used External shading and PF: None	As proposed As proposed As proposed As proposed
Skylights	Area	As proposed

Building Component Characteristics	Standard Reference Design	Proposed Design
	<p>1. The proposed skylight area; where the proposed skylight area is less than 3 percent of gross area of roof assembly.</p> <p>2. 3 percent of gross area of roof assembly; where the proposed skylight area is 3 percent or more of gross area of roof assembly.</p> <p><i>U</i>-factor: From Table C402.3 SHGC: From Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used</p>	<p>As proposed As proposed</p>
Lighting, interior	<p>The interior lighting power shall be determined in accordance with Table C405.5.2. Where the occupancy of the building is not known, the lighting power density shall be 1.0 watt per square foot (10.73 W/m²) based on the categorization of buildings with unknown space classification as offices.</p> <p>Automatic lighting controls (e.g., programmable controls or automatic controls for daylight utilization) shall be modeled in <i>the standard reference design</i> as required by Section C405.</p>	As proposed
Lighting, exterior	<p>The lighting power shall be determined in accordance with Table C405.6.2(2). Areas and dimensions of tradable and nontradable surfaces shall be the same as proposed.</p>	As proposed
Internal gains	Same as proposed	<p>Receptacle, motor and process loads shall be modeled and estimated based on the space use classification. All end-use load components within and associated with the building shall be modeled to include, but not be limited to, the following: Exhaust fans, parking garage ventilation fans, exterior building lighting, swimming pool heaters and pumps, elevators, escalators, refrigeration equipment and cooking equipment.</p>
Schedules	Same as proposed	<p>Operating schedules shall include hourly profiles for daily operation and shall account for variations between weekdays, weekends, holidays and any seasonal operation. Schedules shall model the time-dependent variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads. The schedules shall be typical of the proposed building type as determined by the designer and approved by the jurisdiction.</p>

Building Component Characteristics	Standard Reference Design	Proposed Design
Mechanical ventilation	Same as proposed, except when modeling demand-control ventilation in the proposed design when its use is not required by Section C403.2.5.1 or occupancy sensor ventilation controls when their use is not required by Section C403.2.5.2.	As proposed, in accordance with Section C403.2.5.
Heating systems	<p>Fuel type: Same as proposed design</p> <p>Equipment type^a: From Tables C407.5.1(2) and C407.5.1(3)</p> <p>Efficiency: From Tables C403.2.3(2), C403.2.3(3), C403.2.3(4) and C403.2.3(5)</p> <p>Preheat coils: If the HVAC system in the proposed design has a preheat coil and a preheat coil can be modeled in the <i>standard reference design</i>, the <i>standard reference design</i> shall be modeled with a preheat coil controlled in the same manner as the proposed design.</p> <p>Capacity^b: Sized proportionally to the capacities in the proposed design based on sizing runs, i.e., the ratio between the capacities used in the annual simulations and the capacities determined by the sizing runs shall be the same for both the proposed design and <i>standard reference design</i>, and shall be established such that no smaller number of unmet heating load hours and no larger heating capacity safety factors are provided than in the proposed design.</p> <p>Weather conditions used in sizing runs to determine <i>standard reference design</i> equipment capacities may be based either on hourly historical weather files containing typical peak conditions or on design days developed using 99.6% heating design temperatures and 1% dry-bulb and 1% wet-bulb cooling design temperatures.</p>	<p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p>
Cooling systems	<p>Fuel type: Same as proposed design</p> <p>Equipment type^c: From Tables C407.5.1(2) and C407.5.1(3)</p> <p>Efficiency: From Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3)</p> <p>Capacity^b: Sized proportionally to the capacities in the proposed design based on sizing runs, i.e., the ratio between the capacities used in the annual simulations and the capacities determined by the sizing runs shall be the same for both the proposed design and <i>standard reference design</i>, and shall be established such that no smaller number of unmet cooling load hours and no larger cooling capacity safety factors are provided than in the proposed design.</p> <p>Economizer^d: Same as proposed, in accordance with Section C403.4.1. The high-limit shutoff shall be a dry-bulb switch with a setpoint as determined by Table C403.3.1.1.3(2).</p>	<p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p>
Energy recovery	<i>Standard reference design</i> systems shall be modeled where required in Section C403.2.6.	As proposed

Building Component Characteristics	Standard Reference Design	Proposed Design
Fan systems	<p>Airflow rate: System design supply airflow rates for the <i>standard reference design</i> shall be based on a supply-air-to-room-air temperature difference of 20°F or the required ventilation air or makeup air, whichever is greater. If return or relief fans are specified in the proposed design, the <i>standard reference design</i> shall also be modeled with fans serving the same functions and sized for the <i>standard reference design</i> system supply fan air quantity less the minimum outdoor air, or 90% of the supply fan air quantity, whichever is larger.</p> <p>Motor brake horsepower: System fan electrical power for supply, return, exhaust, and relief (excluding power to fan-powered VAV boxes) shall be calculated using the following formulas: For systems 8 and 10, $P_{fan} = CFMS \times 0.3$ For all other systems, $P_{fan} = bhp \times 746 / \text{Fan Motor Efficiency}$ Where: P_{fan} = Electric power to fan motor (watts) bhp = Brake horsepower of <i>standard reference design</i> fan motor from Table C403.2.10.1(1) – Option 2 Fan motor = The efficiency from Table C403.2.13 for the efficiency next motor size greater than the bhp using the enclosed motor at 1800 rpm CFMS = The <i>standard reference design</i> system maximum design supply fan airflow rate in cfm</p>	<p>As proposed</p> <p>As proposed</p>
On-site renewable energy	No on-site renewable energy shall be modeled in the <i>standard reference design</i> .	As proposed. On-site renewable energy sources energy shall not be considered to be consumed energy and shall not be included in the proposed building performance.
Shading from adjacent structures/terrain	Same as proposed.	For the <i>standard reference design</i> and the proposed building, shading by permanent structures and terrain shall be taken into account for computing energy consumption whether or not these features are located on the building site. A permanent fixture is one that is likely to remain for the life of the proposed design.
Service water heating	<p>Fuel type: Same as proposed Efficiency: From Table C404.2 Capacity: Same as proposed Same as proposed</p>	<p>As proposed As proposed</p> <p>Demand: Service hot-water energy consumption shall be calculated explicitly based upon the volume of service hot water required and the entering makeup water and the leaving service hot water temperatures. Entering water temperatures shall be estimated based upon the location.</p>

Building Component Characteristics	Standard Reference Design	Proposed Design
	Where no service water hot water system exists or is specified in the proposed design, no service hot water heating shall be modeled.	Leaving temperatures shall be based upon the end-use requirements. Service water loads and usage shall be the same for both the <i>standard reference design</i> and the proposed design and shall be documented by the calculation procedures recommended by the manufacturer's specifications or generally accepted engineering methods. As proposed

^aWhere no heating system exists or has been specified, the heating system shall be modeled as fossil fuel. The system characteristics shall be identical in both the standard reference design and proposed design.

^bThe ratio between the capacities used in the annual simulations and the capacities determined by sizing runs shall be the same for both the standard reference design and proposed design.

^cWhere no cooling system exists or no cooling system has been specified, the cooling system shall be modeled as an air-cooled single-zone system, one unit per thermal zone. The system characteristics shall be identical in both the standard reference design and proposed design.

^dReserved.

NEW SECTION

WAC 51-11C-407052 Table C407.5.1(2)—HVAC systems map.

**Table C407.5.1(2)
HVAC Systems Map**

Condenser Cooling Source ^a	Heating System Classification ^b	Standard Reference Design HVAC System Type ^c		
		Single-Zone Residential System	Single-Zone Nonresidential System	All Other
Water/ground	Electric resistance	System 5	System 5	System 1
	Heat pump	System 6	System 6	System 6
	Fossil fuel	System 7	System 7	System 2
	Electric resistance	System 8	System 9	System 3
Air/none	Heat pump	System 8	System 9	System 3
	Fossil fuel	System 10	System 11	System 4

^aSelect "water/ground" if the proposed design system condenser is water or evaporatively cooled; select "air/none" if the condenser is air cooled. Closed-circuit dry coolers shall be considered air cooled. Systems utilizing district cooling shall be treated as if the condenser water type were "water." If no mechanical cooling is specified or the mechanical cooling system in the proposed design does not require heat rejection, the system shall be treated as if the condenser water type were "Air." For proposed designs with ground-source or groundwater-source heat pumps, the standard reference design HVAC system shall be water-source heat pump (System 6).

^bSelect the path that corresponds to the proposed design heat source: Electric resistance, heat pump (including air source and water source), or fuel fired. Systems utilizing district heating (steam or hot water) and systems with no heating capability shall be treated as if the heating system type were "fossil fuel." For systems with mixed fuel heating sources, the system or systems that use the secondary heating source type (the one with the smallest total installed output capacity for the spaces served by the system) shall be modeled identically in the standard reference design and the primary heating source type shall be used to determine *standard reference design* HVAC system type.

^cSelect the *standard reference design* HVAC system category: The system under "single-zone residential system" shall be selected if the HVAC system in the proposed design is a single-zone system and serves a residential space. The system under "single-zone nonresidential system" shall be selected if the HVAC system in the proposed design is a single-zone system and serves other than residential spaces. The system under "all other" shall be selected for all other cases.

NEW SECTION

WAC 51-11C-407053 Table C407.5.1(3)—Specifications for the standard reference design HVAC system description.

Table C407.5.1(3)
Specifications for the Standard Reference Design HVAC System Descriptions

System No.	System Type	Fan Control	Cooling Type	Heating Type
1	Variable air volume with parallel fan-powered boxes ^a	VAV ^d	Chilled water ^e	Electric resistance
2	Variable air volume with reheat ^b	VAV ^d	Chilled water ^e	Hot water fossil fuel boiler ^f
3	Packaged variable air volume with parallel fan-powered boxes ^a	VAV ^d	Direct expansion ^c	Electric resistance
4	Packaged variable air volume with reheat ^b	VAV ^d	Direct expansion ^c	Hot water fossil fuel boiler ^f
5	Two-pipe fan coil	Constant volume ^e	Chilled water ^e	Electric resistance
6	Water-source heat pump	Constant volume ^e	Direct expansion ^c	Electric heat pump and boiler ^g
7	Four-pipe fan coil	Constant volume ^e	Chilled water ^e	Hot water fossil fuel boiler ^f
8	Packaged terminal heat pump	Constant volume ^e	Direct expansion ^c	Electric heat pump ^h
9	Packaged rooftop heat pump	Constant volume ^e	Direct expansion ^c	Electric heat pump ^h
10	Packaged terminal air conditioner	Constant volume ^e	Direct expansion	Hot water fossil fuel boiler ^f
11	Packaged rooftop air conditioner	Constant volume ^e	Direct expansion	Fossil fuel furnace

For SI: 1 foot = 304.8 mm, 1 cfm/ft² = 0.0004719, 1 Btu/h = 0.293/W, °C = [(°F) - 32]/1.8].

^a**VAV with parallel boxes:** Fans in parallel VAV fan-powered boxes shall be sized for 50 percent of the peak design flow rate and shall be modeled with 0.35 W/cfm fan power. Minimum volume setpoints for fan-powered boxes shall be equal to the minimum rate for the space required for ventilation consistent with Section C403.4.5, Exception 5. Supply air temperature setpoint shall be constant at the design condition.

^b**VAV with reheat:** Minimum volume setpoints for VAV reheat boxes shall be 0.4 cfm/ft² of floor area. Supply air temperature shall be reset based on zone demand from the design temperature difference to a 10°F temperature difference under minimum load conditions. Design airflow rates shall be sized for the reset supply air temperature, i.e., a 10°F temperature difference.

^c**Direct expansion:** The fuel type for the cooling system shall match that of the cooling system in the proposed design.

^d**VAV:** When the proposed design system has a supply, return or relief fan motor horsepower (hp) requiring variable flow controls as required by Section C403.2.12, the corresponding fan in the VAV system of the standard reference design shall be modeled assuming a variable speed drive. For smaller fans, a forward-curved centrifugal fan with inlet vanes shall be modeled. If the proposed design's system has a direct digital control system at the zone level, static pressure setpoint reset based on zone requirements in accordance with Section C403.4.2 shall be modeled.

^e**Chilled water:** For systems using purchased chilled water, the chillers are not explicitly modeled. Otherwise, the standard reference design's chiller plant shall be modeled with chillers having the number as indicated in Table C407.5.1(4) as a function of standard reference building chiller plant load and type as indi-

cated in Table C407.5.1(5) as a function of individual chiller load. Where chiller fuel source is mixed, the system in the standard reference design shall have chillers with the same fuel types and with capacities having the same proportional capacity as the proposed design's chillers for each fuel type. Chilled water supply temperature shall be modeled at 44°F design supply temperature and 56°F return temperature. Piping losses shall not be modeled in either building model. Chilled water supply water temperature shall be reset in accordance with Section C403.4.3.4. Pump system power for each pumping system shall be the same as the proposed design; if the proposed design has no chilled water pumps, the standard reference design pump power shall be 22 W/gpm (equal to a pump operating against a 75-foot head, 65-percent combined impeller and motor efficiency). The chilled water system shall be modeled as primary-only variable flow with flow maintained at the design rate through each chiller using a bypass. Chilled water pumps shall be modeled as riding the pump curve or with variable-speed drives when required in Section C403.4.3.4. The heat rejection device shall be an axial fan cooling tower with variable speed fans if required in Section C403.4.4 or Section C403.2.12. Condenser water design supply temperature shall be 85°F or 10°F approach to design wet-bulb temperature, whichever is lower, with a design temperature rise of 10°F. The tower shall be controlled to maintain a 70°F leaving water temperature where weather permits, floating up to leaving water temperature at design conditions. Pump system power for each pumping system shall be the same as the proposed design; if the proposed design has no condenser water pumps, the standard reference design pump power shall be 19 W/gpm (equal to a pump operating against a 60-foot head, 60-percent combined impeller and motor efficiency). Each chiller shall be modeled

with separate condenser water and chilled water pumps interlocked to operate with the associated chiller.

^f**Fossil fuel boiler:** For systems using purchased hot water or steam, the boilers are not explicitly modeled. Otherwise, the boiler plant shall use the same fuel as the proposed design and shall be natural draft. The standard reference design boiler plant shall be modeled with a single boiler if the standard reference design plant load is 600,000 Btu/h and less and with two equally sized boilers for plant capacities exceeding 600,000 Btu/h. Boilers shall be staged as required by the load. Hot water supply temperature shall be modeled at 180°F design supply temperature and 130°F return temperature. Piping losses shall not be modeled in either building model. Hot water supply water temperature shall be reset in accordance with Section C403.4.3.4. Pump system power for each pumping system shall be the same as the proposed design; if the proposed design has no hot water pumps, the standard reference design pump power shall be 19 W/gpm (equal to a pump operating against a 60-foot head, 60-percent combined impeller and motor efficiency). The hot water system shall be modeled as primary only with continuous variable flow. Hot water pumps shall be modeled as riding the pump curve or with variable speed drives when required by Section C403.4.3.4.

^g**Electric heat pump and boiler:** Water-source heat pumps shall be connected to a common heat pump water loop controlled to maintain temperatures between 60°F and 90°F. Heat rejection from the loop shall be provided by an axial fan closed-circuit evaporative fluid cooler with variable speed fans if required in Section C403.4.2 or Section C403.2.12. Heat addition to the loop shall be provided by a boiler that uses the same fuel as the proposed design and shall be natural draft. If no boilers exist in the proposed design, the standard reference building boilers shall be fossil fuel. The standard reference design boiler plant shall be modeled with a single boiler if the standard reference design plant load is 600,000 Btu/h or less and with two equally sized boilers for plant capacities exceeding 600,000 Btu/h. Boilers shall be staged as required by the load. Piping losses shall not be modeled in either building model. Pump system power shall be the same as the proposed design; if the proposed design has no pumps, the standard reference design pump power shall be 22 W/gpm, which is equal to a pump operating against a 75-foot head, with a 65-percent combined impeller and motor efficiency. Loop flow shall be variable with flow shutoff at each heat pump when its compressor cycles off as required by Section C403.4.3.3. Loop pumps shall be modeled as riding the pump curve or with variable speed drives when required by Section C403.4.3.4.

^h**Electric heat pump:** Electric air-source heat pumps shall be modeled with electric auxiliary heat. The system shall be controlled with a multistage space thermostat and an outdoor air thermostat wired to energize auxiliary heat only on the last thermostat stage and when outdoor air temperature is less than 40°F. In heating operation the system shall be controlled to operate the heat pump as the first stage of heating, before energizing the electric auxiliary heat, down to a minimum outdoor air temperature of 35°F for System No. 8 or 17°F for System No. 9. If the Proposed Design utilizes the same system type as the Standard Design (PTHP or PSZ-HP), the Proposed Design shall be modeled with the same minimum outdoor air temperature for heat pump operation as the Standard Design. For temperatures below the stated minimum outdoor air temperatures, the electric auxiliary heat shall be controlled to provide the full heating load.

ⁱ**Constant volume:** Fans shall be controlled in the same manner as in the proposed design; i.e., fan operation whenever the space is occupied or fan operation cycled on calls for heating and cooling. If the fan is modeled as cycling and the fan energy is included in the energy efficiency rating of the equipment, fan energy shall not be modeled explicitly.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-407054 Table C407.5.1(4)—Number of chillers.

**Table C407.5.1(4)
Number of Chillers**

Total Chiller Plant Capacity	Number of Chillers
≤ 300 tons	1
> 300 tons, < 600 tons	2, sized equally
≥ 600 tons	2 minimum, with chillers added so that no chiller is larger than 800 tons, all sized equally

For SI: 1 ton = 3517 W.

NEW SECTION

WAC 51-11C-407055 Table C407.5.1(5)—Water chiller types.

**Table C407.5.1(5)
Water Chiller Types**

Individual Chiller Plant Capacity	Electric-Chiller Type	Fossil Fuel Chiller Type
≤ 100 tons	Reciprocating	Single-effect absorption, direct fired
> 100 tons, < 300 tons	Screw	Double-effect absorption, direct fired
≥ 300 tons	Centrifugal	Double-effect absorption, direct fired

For SI: 1 ton = 3517 W.

NEW SECTION

WAC 51-11C-40706 Section C407.6—Calculation software tool.

C407.6 Calculation software tools. Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the *standard reference design* and the *proposed design* and shall include the following capabilities.

1. Building operation for a full calendar year (8,760 hours).
2. Climate data for a full calendar year (8,760 hours) and shall reflect *approved* coincident hourly data for temperature, solar radiation, humidity and wind speed for the building location.
3. Ten or more thermal zones.
4. Thermal mass effects.
5. Hourly variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC

equipment availability, service hot water usage and any process loads.

6. Part-load performance curves for mechanical equipment.

7. Capacity and efficiency correction curves for mechanical heating and cooling equipment.

8. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table C407.5.1(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., R-value, U-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

9. Air-side economizers with integrated control.

10. *Standard reference design* characteristics specified in Table C407.5.1(1).

C407.6.1 Specific approval. Performance analysis tools meeting the applicable subsections of Section C407 and tested according to ASHRAE Standard 140 shall be permitted to be *approved*. Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official* shall be permitted to approve tools for a specified application or limited scope.

C407.6.2 Input values. Where calculations require input values not specified by Sections C402, C403, C404 and C405, those input values shall be taken from an *approved* source.

C407.6.3 Exceptional calculation methods. When the *simulation program* does not model a design, material, or device of the *proposed design*, an Exceptional Calculation Method shall be used if approved by the *building official*. If there are multiple designs, materials, or devices that the *simulation program* does not model, each shall be calculated separately and Exceptional Savings determined for each. At no time shall the total Exceptional Savings constitute more than half of the difference between the *baseline building performance* and the *proposed building performance*. All applications for approval of an exceptional method shall include:

1. Step-by-step documentation of the Exceptional Calculation Method performed detailed enough to reproduce the results;

2. Copies of all spreadsheets used to perform the calculations;

3. A sensitivity analysis of *energy* consumption when each of the input parameters is varied from half to double the value assumed;

4. The calculations shall be performed on a time step basis consistent with the *simulation program* used; and

5. The *Performance Rating* calculated with and without the Exceptional Calculation Method.

NEW SECTION

WAC 51-11C-40800 Section C408—System commissioning.

NEW SECTION

WAC 51-11C-40801 Section C408.1—General.

C408.1 General. This section covers the commissioning of the building mechanical systems in Section C403, service water heating systems in Section C404, electrical power and lighting systems in Section C405 and energy metering in Section C409. Prior to passing the final mechanical and electrical inspections or obtaining a certificate of occupancy, the *registered design professional* or approved agency shall provide evidence of systems *commissioning* and completion in accordance with the provisions of this section.

Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.1.2 and C408.1.3.

C408.1.1 Commissioning plan. A *commissioning plan* shall be developed by a *registered design professional* or approved agency and shall include the following items:

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.

2. Roles and responsibilities of the commissioning team.

3. A schedule of activities including systems testing and balancing, functional testing, and supporting documentation.

4. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.

5. Functions to be tested.

6. Conditions under which the test will be performed.

7. Measurable criteria for performance.

C408.1.2 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.

2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions, with anticipated date of completion.

3. Climatic conditions required for performance of the deferred tests.

4. Record of progress and completion of operator training.

C408.1.2.1 Acceptance of report. *Buildings*, or portions thereof, shall not pass the final mechanical and electrical inspections or obtain a certificate of occupancy, until such time as the *code official* has received a letter of transmittal from the *building* owner acknowledging that the *building* owner has received the Preliminary Commissioning Report. Completion of the Commissioning Compliance Checklist (Figure C408.1.2.1) is deemed to satisfy this requirement.

C408.1.2.2 Copy of report. The *code official* shall be permitted to require that a copy of the Preliminary Commissioning Report be made available for review by the *code official*.

C408.1.3 Documentation requirements. The *construction documents* shall specify that the *documents* described in this section be provided to the *building owner* within 90 days of the date of receipt of the *certificate of occupancy*.

C408.1.3.1 Record documents. Construction documents shall be updated to convey a record of the alterations to the original design. Such updates shall include updated mechanical, electrical and control drawings red-lined, or redrawn if specified, that show all changes to size, type and locations of components, equipment and assemblies.

C408.1.3.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. Controls system maintenance and calibration information, including wiring diagrams, schematics, record documents, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.

5. A narrative of how each system is intended to operate, including recommended setpoints. Sequence of operation is not acceptable for this requirement.

C408.1.3.3 System balancing report. A written report describing the activities and measurements completed in accordance with Section C408.2.2.

C408.1.3.4 Final commissioning report. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner and shall include:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

EXCEPTION: Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.

C408.1.4 Systems operation training. Training of the maintenance staff for equipment included in the manuals required by Section C408.1.3.2 shall include at a minimum:

1. Review of systems documentation.
2. Hands-on demonstration of all normal maintenance procedures, normal operating modes, and all emergency shut-down and start-up procedures.
3. Training completion report.

NEW SECTION

WAC 51-11C-408012 Figure C408.1.2.1—Commissioning compliance checklist.

**Figure C408.1.2.1
Commissioning Compliance Checklist**

Project Information	Project Name:
	Project Address:
	Commissioning Authority:
Commissioning Plan (Section 408.1.1)	<input type="checkbox"/> Commissioning Plan was used during construction and included items below <ul style="list-style-type: none"> • A narrative description of activities and the personnel intended to accomplish each one • Measurable criteria for performance • Functions to be tested
Systems Balancing (Section C408.2.2)	<input type="checkbox"/> Systems Balancing has been completed <ul style="list-style-type: none"> • Air and Hydronic systems are proportionately balanced in a manner to first minimize throttling losses. • Test ports are provided on each pump for measuring pressure across the pump.
Functional Testing (Section C408.2.3, C408.3.1, C408.4.1, C408.4.1.3 and C408.5.1)	<input type="checkbox"/> HVAC Systems Equipment Testing has been completed (Section C408.2.3.1) HVAC equipment has been tested to demonstrate the installation and operation of components, systems and system-to-system interfacing relationships in accordance with approved plans and specifications <input type="checkbox"/> HVAC Controls Functional Testing has been completed (Section C408.2.3.2) HVAC controls have been tested to ensure that control devices are calibrated, adjusted and operate properly. Sequences of operation have been functionally tested to ensure they operate in accordance with approved plans and specifications <input type="checkbox"/> Economizers Functional Testing has been completed (Section C408.2.3.3) Economizers operate in accordance with manufacturer's specifications <input type="checkbox"/> Lighting Controls Functional Testing has been completed (Section C408.3.1) Lighting controls have been tested to ensure that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications <input type="checkbox"/> Service Water Heating System Functional Testing has been completed (Section C408.4.1)

	<p>Service water heating equipment has been tested to ensure that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications</p> <p><input type="checkbox"/> Pool and Spa Functional Testing has been completed (Section C408.4.1.3) Pools and spas have been tested to ensure that service water heating equipment, time switches and heat recovery equipment are calibrated, adjusted and operate in accordance with approved plans and specifications</p> <p><input type="checkbox"/> Metering System Functional Testing has been completed (Section C408.5.1) Energy source meters, energy end-use meters, the energy metering data acquisition system and required display are calibrated adjusted and operate in accordance with approved plans and specifications</p>
<p>Supporting Documents (Section 408.1.3.2)</p>	<p><input type="checkbox"/> Manuals, record documents and training have been completed or are scheduled</p> <ul style="list-style-type: none"> • System documentation has been provided to the owner or scheduled date: _____ • Record documents have been submitted to owner or scheduled date: _____ • Training has been completed or scheduled date: _____
<p>Commissioning Report (Section C408.1.2)</p>	<p><input type="checkbox"/> Preliminary Commissioning Report submitted to Owner and includes items below</p> <ul style="list-style-type: none"> • Deficiencies found during testing required by this section which have not been corrected at the time of report preparation • Deferred tests, which cannot be performed at the time of report preparation due to climatic conditions
<p>Certification</p>	<p><input type="checkbox"/> I hereby certify that all requirements for Commissioning have been completed in accordance with the Washington State Energy Code, including all items above</p> <p style="text-align: center;">_____</p> <p style="text-align: center;">Building Owner or Owner's Representative _____ Date</p>

NEW SECTION

WAC 51-11C-40802 Section C408.2—Mechanical systems commissioning and completion requirements.

C408.2 Mechanical systems commissioning and completion requirements. Mechanical equipment and controls shall comply with Section C408.2.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Exception: Systems which (a) qualify as simple systems using the criteria in Section C403.3, (b) are not required to have an economizer per Section C403.3.1, and (c) where the building total mechanical equipment capacity is less than 480,000 Btu/h (140,690 W) cooling capacity and 600,000 Btu/h (175,860 W) heating capacity.

C408.2.1 Reserved.

C408.2.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the product specifications. Test and balance activities shall include air system and hydronic system balancing.

C408.2.2.1 Air systems balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code*. Discharge dampers are prohibited on constant volume fans and variable volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.74 kW), fan speed shall be adjusted to meet design flow conditions.

EXCEPTION: Fans with fan motors of 1 hp (0.74 kW) or less.

C408.2.2.2 Hydronic systems balancing. Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or test ports at each side of each pump.

EXCEPTIONS:

1. Pumps with pump motors of 5 hp (3.7 kW) or less.
2. Where throttling results in no greater than five percent of the nameplate horsepower draw above that required if the impeller were trimmed.

C408.2.3 Functional performance testing. Functional performance testing specified in Sections C408.2.3.1 through C408.2.3.3 shall be conducted. Written procedures which clearly describe the individual systematic test procedures, the expected systems' response or acceptance criteria for each procedure, the actual response or findings, and any pertinent discussion shall be followed. At a minimum, testing shall affirm operation during actual or simulated winter and summer design conditions and during full outside air conditions.

C408.2.3.1 Equipment. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and *sequence of operation*, including under full-load, part-load and the following emergency conditions:

1. All modes as described in the *sequence of operation*;
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

C408.2.3.2 Controls. HVAC control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved* plans and specifications.

C408.2.3.3 Economizers. Air economizers shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

NEW SECTION

WAC 51-11C-40803 Section C408.3—Lighting system functional testing.

C408.3 Lighting system functional testing. Controls for automatic lighting systems shall comply with Section C408.3.1.

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. Written procedures which clearly describe the individual systematic test procedures, the expected systems' response or acceptance criteria for each procedure, the actual response or findings, and any pertinent discussion shall be followed. At a minimum, testing shall affirm operation during normally occupied daylight conditions. The construction documents shall state the party who will conduct the required functional testing.

Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.

NEW SECTION

WAC 51-11C-40804 Section C408.4—Service water heating systems commissioning and completion requirements.

C408.4 Service water heating systems commissioning and completion requirements. Service water heating equipment and controls shall comply with Section C408.4. Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements.

EXCEPTION: The following systems are exempt from the commissioning requirements:

1. Service water heating systems in buildings where the largest service water heating system capacity is less than 200,000 Btu/h (58,562 W) and where there are no pools or in-ground permanently installed spas.

C408.4.1 Functional performance testing. Functional performance testing specified in Sections C408.4.1.1 through C408.4.1.3 shall be conducted. Written procedures which clearly describe the individual systematic test procedures, the expected systems' response or acceptance criteria for each procedure, the actual response or findings, and any pertinent discussion shall be followed. At a minimum, testing shall affirm operation with the system under 50 percent water heating load.

C408.4.1.1 Equipment. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and *sequence of operation*, including under full-load, part-load and the following emergency conditions:

1. Redundant or *automatic* back-up mode;
2. Performance of alarms; and
3. Mode of operation upon a loss of power and restoration of power.

C408.4.1.2 Controls. Service water heating controls shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved* plans and specifications.

C408.4.1.3 Pools and spas. Service water heating equipment, time switches, and heat recovery equipment which serve pools and in-ground permanently installed spas shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

NEW SECTION

WAC 51-11C-40805 Section C408.5—Metering system commissioning.

C408.5 Metering system commissioning. Energy metering systems required by Section C409 shall comply with Section C408.5 and be included in the commissioning process required by Section C408.1. Construction documents shall clearly indicate provisions for *commissioning* in accordance with Section C408 and are permitted to refer to specifications for further requirements.

C408.5.1 Functional testing. Functional testing shall be conducted by following written procedures which clearly describe the individual systematic test procedures, the expected systems' response or acceptance criteria for each procedure, the actual response or findings, and any pertinent discussion. Functional testing shall document that energy source meters, energy end-use meters, the energy metering data acquisition system, and required energy consumption display are calibrated, adjusted and operate in accordance with approved plans and specifications. At a minimum, testing shall confirm that:

1. The metering system devices and components work properly under low and high load conditions.
2. The metered data is delivered in a format that is compatible with the data collection system.
3. The energy display is accessible to building operation and management personnel.
4. The energy display meets code requirements regarding views required in Section C409.4.3. The display shows energy data in identical units (e.g., kWh).

NEW SECTION**WAC 51-11C-40900 Section C409—Energy metering and energy consumption management.**NEW SECTION**WAC 51-11C-40901 Section C409.1—General.**

C409.1 General. Buildings with a gross conditioned floor area over 50,000 square feet shall comply with Section C409. Buildings shall be equipped to measure, monitor, record and display energy consumption data for each energy source and end use category per the provisions of this section, to enable effective energy management.

- EXCEPTIONS:
1. Tenant spaces within buildings if the tenant space has its own utility service and utility meters.
 2. Buildings in which there is no gross conditioned floor area over 25,000 square feet, including building common area, that is served by its own utility services and meters.

C409.1.1 Alternate metering methods. Where approved by the building official, energy use metering systems may differ from those required by this section, provided that they are permanently installed and that the source energy measurement, end use category energy measurement, data storage and data display have similar accuracy to and are at least as effective in communicating actionable energy use information to the building management and users, as those required by this section.

C409.1.2 Conversion factor. Any threshold stated in kW shall include the equivalent BTU/h heating and cooling capacity of installed equipment at a conversion factor of 3,412 Btu per kW at 50 percent demand.

NEW SECTION**WAC 51-11C-40902 Section C409.2—Energy source metering.**

C409.2 Energy source metering. Buildings shall have a meter at each energy source. For each energy supply source listed in Section C409.2.1 through C409.2.4, meters shall collect data for the whole building or for each separately metered portion of the building where not exempted by the exception to Section C409.1.

- EXCEPTIONS:
1. Energy source metering is not required where end use metering for an energy source accounts for all usage of that energy type within a building, and the data acquisition system accurately totals the energy delivered to the building or separately metered portion of the building.

2. Solid fuels such as coal, firewood or wood pellets that are delivered via mobile transportation do not require metering.

C409.2.1 Electrical energy. This category shall include all electrical energy supplied to the building and its associated site, including site lighting, parking, recreational facilities, and other areas that serve the building and its occupants.

C409.2.2 Gas and liquid fuel supply energy. This category shall include all natural gas, fuel oil, propane and other gas or liquid fuel energy supplied to the building and site.

C409.2.3 District energy. This category shall include all net energy extracted from district steam systems, district chilled water loops, district hot water systems, or other energy sources serving multiple buildings.

C409.2.4 Site-generated renewable energy. This category shall include all net energy generated from on-site solar, wind, geothermal, tidal or other natural sources.

NEW SECTION**WAC 51-11C-40903 Section C409.3—End-use metering.**

C409.3 End-use metering. Meters shall be provided to collect energy use data for each end-use category listed in Sections C409.3.1 through C409.3.2. These meters shall collect data for the whole building or for each separately metered portion of the building where not exempted by the exception to Section C409.1. Multiple meters may be used for any end-use category, provided that the data acquisition system totals all of the energy used by that category.

- EXCEPTIONS:
1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.
 2. Separate metering is not required for fire pumps, stairwell pressurization fans or other life safety systems that operate only during testing or emergency.
 3. End use metering is not required for individual tenant spaces not exceeding 2,500 square feet in floor area when a dedicated source meter meeting the requirements of Section C409.4.1 is provided for the tenant space.

C409.3.1 HVAC system energy use. This category shall include all energy including electrical, gas, liquid fuel, district steam and district chilled water that is used by boilers, chillers, pumps, fans and other equipment used to provide space heating, space cooling, dehumidification and ventilation to the building, but not including energy that serves process loads, water heating or miscellaneous loads as defined in Section C409.3. Multiple HVAC energy sources, such as gas, electric and steam, are not required to be summed together.

- EXCEPTIONS:
1. All 120 volt equipment.
 2. 208/120 volt equipment in a building where the main service is 480/277 volt power.
 3. Electrical energy fed through variable frequency drives that are connected to the energy metering data acquisition center.

C409.3.2 Water heating energy use. This category shall include all energy used for heating of domestic and service hot water, but not energy used for space heating.

EXCEPTION: Water heating energy use less than 50 kW does not require end-use metering.

NEW SECTION

WAC 51-11C-40904 Section C409.4—Measurement devices, data acquisition system and energy display.

C409.4 Measurement devices, data acquisition system and energy display.

C409.4.1 Meters. Meters and other measurement devices required by this section shall have local displays or be configured to automatically communicate energy data to a data acquisition system. Source meters may be any digital-type meters. Current sensors or flow meters are allowed for end use metering, provided that they have an accuracy of +/- 5%. All required metering systems and equipment shall provide at least hourly data that is fully integrated into the data acquisition and display system per the requirements of Section C409.

C409.4.2 Data acquisition system. The data acquisition system shall store the data from the required meters and other sensing devices for a minimum of 36 months. For each energy supply and end use category required by C409.2 and C409.3, it shall provide real-time energy consumption data and logged data for any hour, day, month or year.

C409.4.3 Energy display. For each building subject to Section C409.2 and C409.3, either a readily accessible and visible display, or a web page or other electronic document accessible to building management or to a third-party energy data analysis service shall be provided in the building accessible by building operation and management personnel. The display shall graphically provide the current energy consumption rate for each whole building energy source, plus each end use category, as well as the average and peak values for any day, week or year.

C409.4.4 Commissioning. The entire system shall be commissioned in accordance with Section C408.5. Deficiencies found during testing shall be corrected and retested and the commissioning report shall be updated to confirm that the entire metering and data acquisition and display system is fully functional.

NEW SECTION

WAC 51-11C-40905 Section C409.5—Metering for existing buildings.

C409.5 Metering for existing buildings.

C409.5.1 Existing buildings that were constructed subject to the requirements of this section. Where new or replacement systems or equipment are installed in an existing building that was constructed subject to the requirements of this section, metering shall be provided for such new or replacement systems or equipment so that their energy use is included in the corresponding end-use category defined in Section C409.2. This includes systems or equipment added in conjunction with additions or alterations to existing buildings.

C409.5.1.1 Small existing buildings. Metering and data acquisition systems shall be provided for additions over 25,000 square feet in accordance with the requirements of sections C409.2 and C409.3.

NEW SECTION

WAC 51-11C-50000 Chapter 5 [CE]—Referenced standards. This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 106.

AAMA	American Architectural Manufacturers Association 1827 Walden Office Square Suite 550 Schaumburg, IL 60173-4268	
Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A C440—11	North American Fenestration Standard/Specifications for Windows, Doors and Unit Skylights	..... Table C402.4.3
AHAM	Association of Home Appliance Manufacturers 1111 19th Street, N.W., Suite 402 Washington, D.C. 20036	
Standard reference number	Title	Referenced in code section number
ANSI/AHAM RAC-1—2008	Room Air Conditioners	..... Table C403.2.3(3)
AHRI	Air Conditioning, Heating, and Refrigeration Institute	

4100 North Fairfax Drive, Suite 200 Arlington, VA 22203		
Standard reference number	Title	Referenced in code section number
ISO/AHRI/ASHRAE		
13256-1 (2005)	Water-source Heat Pumps - Testing and Rating for Performance - Part 1: Water-to-air and Brine-to-air Heat Pumps	Table C403.2.3(2)
ISO/AHRI/ASHRAE		
13256-2 (1998)	Water-source Heat Pumps - Testing and Rating for Performance - Part 2: Water-to-water and Brine-to-water Heat Pumps	Table C403.2.3(2)
210/240—08	Unitary Air Conditioning and Air-source Heat Pump Equipment	Table C403.2.3(1), Table C403.2.3(2)
310/380—04	Standard for Packaged Terminal Air Conditioners and Heat Pumps	Table C403.2.3(3)
340/360—2007	Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment	Table C403.2.3(1), Table C403.2.3(2)
365—09	Commercial and Industrial Unitary Air-conditioning Condensing Units	Table C403.2.3(1), Table C403.2.3(6)
390—03	Performance Rating of Single Package Vertical Air Conditioners and Heat Pumps	Table C403.2.3(3)
400—01	Liquid to Liquid Heat Exchangers with Addendum 2	Table C403.2.3(9)
440—08	Room Fan Coil	C403.2.8
460—05	Performance Rating Remote Mechanical Draft Air-cooled Refrigerant Condensers	Table C403.2.3(8)
550/590—03	Water Chilling Packages Using the Vapor Compression Cycle—with Addenda	C403.2.3.1, Table C403.2.3(7), Table C406.2(6)
560—00	Absorption Water Chilling and Water-heating Packages	Table C403.2.3(7)
1160—08	Performance Rating of Heat Pump Pool Heaters	Table C404.2
AMCA Air Movement and Control Association International 30 West University Drive Arlington Heights, IL 60004-1806		
Standard reference number	Title	Referenced in code section number
500D—10	Laboratory Methods for Testing Dampers for Rating	C402.4.5.1, C402.4.5.2
ANSI American National Standards Institute 25 West 43rd Street Fourth Floor New York, NY 10036		
Standard reference number	Title	Referenced in code section number
ANSI/ASME A17.1-2010	Safety code for elevators and escalators	C405.12.1
Z21.10.3/CSA 4.3—04	Gas Water Heaters, Volume III—Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating Tank and Instantaneous	Table C404.2

Z21.47/CSA 2.3—06	Gas-fired Central Furnaces	Table C403.2.3(4), Table C406.2(4)
Z83.8/CSA 2.6—09	Gas Unit Heaters, Gas Packaged Heaters, Gas Utility Heaters and Gas-fired Duct Furnaces	Table C403.2.3(4), Table C406.2(4)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1791 Tullie Circle, N.E. Atlanta, GA 30329-2305	
Standard reference number	Title	Referenced in code section number
ANSI/ASHRAE/ACCA		
Standard 127-2007	Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners	C403.4.1
Standard 183—2007	Peak Cooling and Heating Load Calculations in Buildings, Except Low-rise Residential Buildings	C403.2.1
ASHRAE—2004	ASHRAE HVAC Systems and Equipment Handbook—2004	C403.2.1
ISO/AHRI/ASHRAE		
13256-1 (2005)	Water-source Heat Pumps—Testing and Rating for Performance— Part 1: Water-to-air and Brine-to-air Heat Pumps	Table C403.2.3(2)
ISO/AHRI/ASHRAE		
13256-2 (1998)	Water-source Heat Pumps—Testing and Rating for Performance—Part 2: Water-to-water and Brine-to-water Heat Pumps	Table C403.2.3(2)
90.1—2010	Energy Standard for Buildings Except Low-rise Residential Buildings (ANSI/ASHRAE/IESNA 90.1—2010)	C401.2, C401.2.1, C402.1.1, Table C402.1.2, Table C402.2, Table C407.6.1
119—88 (RA 2004)	Air Leakage Performance for Detached Single-family Residential Buildings	Table C405.5.2(1)
140—2010	Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs	C407.6.1
146—2006	Testing and Rating Pool Heaters	Table C404.2
ASTM	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2859	
Standard reference number	Title	Referenced in code section number
C 90—08	Specification for Load-bearing Concrete Masonry Units	Table C402.2
C 1371—04	Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emisometers	Table C402.2.1.1
C 1549—04	Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using A Portable Solar Reflectometer	Table C405.2.1.1

D 1003—07e1	Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics	.....	C402.3.2.2
E 283—04	Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen	.....	Table C402.2.1.1, C402.4.1.2.2, Table C402.4.3, C402.4.4, C402.4.8
E 408—71 (2002)	Test Methods for Total Normal Emittance of Surfaces Using Inspection-meter Techniques	.....	Table C402.2.1.1
E 779—03	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization	.....	C402.4.1.2.3
E 903—96	Standard Test Method Solar Absorptance, Reflectance and Transmittance of Materials Using Integrating Spheres (Withdrawn 2005)	.....	Table C402.2.1.1
E 1677—05	Standard Specification for an Air-retarder (AR) Material or System for Low-rise Framed Building Walls	.....	C402.4.1.2.2
E 1918—97	Standard Test Method for Measuring Solar Reflectance of Horizontal or Low-sloped Surfaces in the Field	.....	Table C402.2.1.1
E 1980—(2001)	Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-sloped Opaque Surfaces	.....	Table C402.2.1.1
E 2178—03	Standard Test Method for Air Permanence of Building Materials	.....	C402.4.1.2.1
E 2357—05	Standard Test Method for Determining Air Leakage of Air Barrier Assemblies	.....	C404.1.2.2
CSA	Canadian Standards Association 5060 Spectrum Way Mississauga, Ontario, Canada L4W 5N6		
Standard reference number	Title		Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A440—11	North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights	.....	R402.4.3
CTI	Cooling Technology Institute 2611 FM 1960 West, Suite A-101 Houston, TX 77068		
Standard reference number	Title		Referenced in code section number
ATC 105 (00) STD 201—09	Acceptance Test Code for Water Cooling Tower Standard for Certification of Water Cooling Towers Thermal Performances	..... .....	Table C403.2.3(8) Table C403.2.3(8)
DASMA	Door and Access Systems Manufacturers Association 1300 Sumner Avenue Cleveland, OH 44115-2851		
Standard reference number	Title		Referenced in code section number
105—92 (R2004)	Test Method for Thermal Transmittance and Air Infiltration of Garage Doors	.....	Table C402.4.3
DOE	U.S. Department of Energy		

c/o Superintendent of Documents U.S. Government Printing Office Washington, D.C. 20402-9325		
Standard reference number	Title	Referenced in code section number
10 C.F.R., Part 430—1998	Energy Conservation Program for Consumer Products: Test Procedures and Certification and Enforcement Requirement for Plumbing Products; and Certification and Enforcement Requirements for Residential Appliances; Final Rule	Table C403.2.3(4), Table C403.2.3(5), Table C404.2, Table C406.2(4), Table C406.2(5)
10 C.F.R., Part 430, Subpart B, Appendix N—1998	Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers	C202
10 C.F.R., Part 431—2004	Energy Efficiency Program for Certain Commercial and Industrial Equipment: Test Procedures and Efficiency Standards; Final Rules	Table C403.2.3(5), Table C406.2(5)
NAECA 87—(88)	National Appliance Energy Conservation Act 1987 [(Public Law 100-12 (with Amendments of 1988-P.L. 100-357)]	Tables C403.2.3 (1), (2), (4)
IAPMO International Association of Plumbing and Mechanical Officials 4755 E. Philadelphia Street Ontario, CA 91761		
Standard reference number	Title	Referenced in code section number
UPC—2012	Uniform Plumbing Code	C201.3
ICC International Code Council, Inc. 500 New Jersey Avenue, N.W., 6th Floor Washington, DC 20001		
Standard reference number	Title	Referenced in code section number
IBC—12	International Building Code	C201.3, C303.2, C402.4.4
IFC—12	International Fire Code	C201.3
IFGC—12	International Fuel Gas Code	C201.3
IMC—12	International Mechanical Code	C403.2.5, C403.2.5.1, C403.2.6, C403.2.7, C403.2.7.1, C403.2.7.1.1, C403.2.7.1.2, C403.2.7.1.3, C403.4.5, C408.2.2.1
IESNA Illuminating Engineering Society of North America 120 Wall Street, 17th Floor New York, NY 10005-4001		
Standard reference number	Title	Referenced in code section number

ANSI/ASHRAE/IESNA 90.1—2010	Energy Standard for Buildings Except Low-rise Residential Buildings	C401.2, C401.2.1, C402.1.1, Table C402.1.2, Table C402.2, Table C407.6.1
ISO	International Organization for Standardization 1, rue de Varembe, Case postale 56, CH-1211 Geneva, Switzerland	
Standard reference number	Title	Referenced in code section number
ISO/AHRI/ASHRAE 13256-1 (2005)	Water-source Heat Pumps—Testing and Rating for Performance—Part 1: Water-to-air and Brine-to-air Heat Pumps	C403.2.3(2)
ISO/AHRI/ASHRAE 13256-2 (1998)	Water-Source Heat Pumps—Testing and Rating for Performance—Part 2: Water-to-water and Brine-to-water Heat Pumps	C403.2.3(2)
NEMA	National Electric Manufacturers Association 1300 North 17th Street Suite 1752 Rosslyn, VA 22209	
Standard reference number	Title	Referenced in code section number
TP-1-2002	Guide for Determining Energy Efficiency for Distribution Transformers	C405.9
NFRC	National Fenestration Rating Council, Inc. 6305 Ivy Lane, Suite 140 Greenbelt, MD 20770	
Standard reference number	Title	Referenced in code section number
100—2010	Procedure for Determining Fenestration Product U-factors	C303.1.2, C402.2.1
200—2010	Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence	C303.1.3, C402.3.1.1
400—2010	Procedure for Determining Fenestration Product Air Leakage	Table C402.4.3
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc. 4021 Lafayette Center Drive Chantilly, VA 20151-1209	
Standard reference number	Title	Referenced in code section number
SMACNA—85	HVAC Air Duct Leakage Test Manual	C403.2.7.1.3
UL	Underwriters Laboratories 333 Pfingsten Road Northbrook, IL 60062-2096	
Standard reference number	Title	Referenced in code section number
727—06	Oil-fired Central Furnaces—with Revisions through April 2010	Table C403.2.3(4), Table C406.2(4)

731—95	Oil-fired Unit Heaters—with Revisions through April 2010	Table C403.2.3(4), Table C406.2(4)
US-FTC	United States-Federal Trade Commission 600 Pennsylvania Avenue N.W. Washington, DC 20580	
Standard reference number	Title	Referenced in code section number
C.F.R. Title 16 (May 31, 2005)	R-value Rule	C303.1.4
WDMA	Window and Door Manufacturers Association 1400 East Touhy Avenue, Suite 470 Des Plaines, IL 60018	
Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A440—11	North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights	Table C402.4.3

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-11C-60000 Appendix A—Default heat loss coefficients.

NEW SECTION

WAC 51-11C-61010 Section A101—General.

NEW SECTION

WAC 51-11C-61011 Section A101.1—Scope.

A101.1 Scope. The following defaults shall apply to Chapter 4 of both the (RE) and (CE) sections of the IECC. This chapter includes tables of seasonal average heat loss coefficients for specified nominal insulation.

NEW SECTION

WAC 51-11C-61012 Section A101.2—Description.

NEW SECTION

WAC 51-11C-61014 Section A101.4—Compression of insulation.

A101.4 Compression of insulation. Insulation which is compressed shall be rated in accordance with Table A101.4 or reduction in value may be calculated in accordance with the procedures in the ASHRAE Fundamentals Handbook.

A101.2 Description. These coefficients were developed primarily from data and procedures from the ASHRAE Fundamentals Handbook.

Coefficients not contained in this chapter may be computed using the procedures listed in this reference if the assumptions in the following sections are used, along with data from the sources referenced above.

NEW SECTION

WAC 51-11C-61013 Section A101.3—Air films.

A101.3 Air films. Default R-values used for air films shall be as follows:

R-Value	Condition
0.17	All exterior surfaces
0.61	Interior horizontal surfaces, heat flow up
0.92	Interior horizontal surfaces, heat flow down
0.68	Interior vertical surfaces

**Table A101.4
R-value of Fiberglass Batts Compressed Within Various Depth Cavities**

Insulation R-Values at Standard Thickness												
Rated R-Value	82	71	60	49	38	30	22	21	19	15	13	11
<i>Standard Thickness, Inches</i>	26.0	22.5	19.0	15.5	12	9.5	6.5	5.5	6	3.5	3.5	3.5
Nominal Lumber Sizes, Inches	Actual Depth of Cavity, Inches	Insulation R-Values when Installed in a Confined Cavity										
Truss	26.0	82	—	—	—	—	—	—	—	—	—	—

Insulation R-Values at Standard Thickness													
Rated R-Value	82	71	60	49	38	30	22	21	19	15	13	11	
Standard Thickness, Inches	26.0	22.5	19.0	15.5	12	9.5	6.5	5.5	6	3.5	3.5	3.5	
Nominal Lumber Sizes, Inches	Actual Depth of Cavity, Inches	Insulation R-Values when Installed in a Confined Cavity											
Truss	22.5	—	71	—	—	—	—	—	—	—	—	—	—
Truss	19.0	—	—	60	—	—	—	—	—	—	—	—	—
Truss	15.5	—	—	—	49	—	—	—	—	—	—	—	—
Truss	12.0	—	—	—	—	38	—	—	—	—	—	—	—
2 x 12	11.25	—	—	—	—	37	—	—	—	—	—	—	—
2 x 10	9.25	—	—	—	—	32	30	—	—	—	—	—	—
2 x 8	7.25	—	—	—	—	27	26	22	21	19	—	—	—
2 x 6	5.5	—	—	—	—	—	21	20	21	18	—	—	—
2 x 4	3.5	—	—	—	—	—	—	14	—	13	15	13	11
	2.5	—	—	—	—	—	—	—	—	—	—	9.8	—
	1.5	—	—	—	—	—	—	—	—	—	—	6.3	6.0

NEW SECTION

WAC 51-11C-61015 Section A101.5—Building materials.

A101.5 Building materials. Default R-values used for building materials shall be as shown in Table A101.5.

**Table A101.5
Default R-values for Building Materials**

Material	Nominal Size (in.)	Actual Size (in.)	R-Value (Heat Capacity ^c)
Air cavity (unventilated), between metal studs at 16 inches on center ^a	-	-	0.79
Air cavity (unventilated), all other depths and framing materials ¹	-	-	0.91
Airfilm, exterior surfaces ^b	-	-	0.17
Airfilm, interior horizontal surfaces, heat flow up ^b	-	-	0.61
Airfilm, interior horizontal surfaces, heat flow down ^b	-	-	0.92
Airfilm, interior vertical surfaces ^b	-	-	0.68
Brick at R-0.12/in. (face brick, 75% solid/25% core area, 130 lbs/ft ³)	4	3.5	0.32 (5.9)
Carpet and rubber pad	-	-	1.23
Concrete at R-0.0625/in., heavyweight (144 lbs/ft ³)	-	2	0.13 (HC-4.8)
	-	4	0.25 (HC-9.6)
	-	6	0.38 (HC-14.4)
	-	8	0.50 (HC-19.2)
	-	10	0.63 (HC-24.0)
	-	12	0.75 (HC-28.8)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft ³)	6	-	0.80 (HC-11.4)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft ³)	6	-	0.51 (HC-13.2)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft ³)	6	-	1.33 (HC-6.7)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft ³)	6	-	0.82 (HC-9.0)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft ³)	8	-	1.05 (HC-15.5)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft ³)	8	-	0.69 (HC-17.9)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft ³)	8	-	1.44 (HC-9.6)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft ³)	8	-	0.98 (HC-12.0)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft ³)	10	-	1.30 (HC-19.7)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft ³)	10	-	0.87 (HC-22.6)

Material	Nominal Size (in.)	Actual Size (in.)	R-Value (Heat Capacity ^c)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft ³)	10	-	1.61 (HC-11.9)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft ³)	10	-	1.11 (HC-14.8)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft ³)	12	-	1.53 (HC-23.9)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft ³)	12	-	1.06 (HC-27.2)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft ³)	12	-	1.75 (HC-14.2)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft ³)	12	-	1.23 (HC-17.5)
Flooring, wood subfloor	-	0.75	0.94
Gypsum board	-	0.5	0.45
	-	0.625	0.56
Metal deck	-	-	0
Roofing, built-up	-	0.375	0.33
Sheathing, vegetable fiber board, 0.78 in.	-	0.78	2.06
Soil at R-0.104/in.	-	12	1.25
Steel, mild		1	0.0031807
Stucco	-	0.75	0.08

^aThere is no credit for cavities that are open to outside air.

^bAir films do not apply to air cavities within an assembly.

^cFor heat capacity for concrete and concrete masonry materials with densities other than the values listed in Table A101.5, see Tables A3.1B and A3.1C in ASHRAE/IESNA Standard 90.1.

NEW SECTION

WAC 51-11C-61020 Section A102—Ceilings.

NEW SECTION

WAC 51-11C-61021 Section A102.1—General.

A102.1 General. Table A102.1 lists heat loss coefficients for the opaque portion of exterior ceilings below vented attics, vaulted ceilings and roof decks in units of Btu/h • ft² • °F of ceiling.

They are derived from procedures listed in the ASHRAE Fundamentals Handbook. Ceiling U-factors are modified for the buffering effect of the attic, assuming an indoor temperature of 65°F and an outdoor temperature of 45°F.

A102.1.1 Metal framed ceilings. The nominal R-values in Table A103.3.6.2: Effective R-Values for Metal Framing and Cavity Only may be used for purposes of calculating metal framed ceiling section U-factors in lieu of the ASHRAE zone calculation method as provided in Chapter 27 of the ASHRAE Fundamentals Handbook.

Metal building roofs have a different construction and are addressed in Table A102.2.5.

NEW SECTION

WAC 51-11C-610211 Table A102.1—Default U-factors for ceilings.

**Table A102.1
Default U-factors for Ceilings**

	Standard Frame	Advanced Frame
Ceilings Below Vented Attics		
Flat	Baffled	
R-19	0.049	0.047
R-30	0.036	0.032
R-38	0.031	0.026
R-49	0.027	0.020
R-60	0.025	0.017
Scissors Truss		
R-30 (4/12 roof pitch)	0.043	0.031
R-38 (4/12 roof pitch)	0.040	0.025
R-49 (4/12 roof pitch)	0.038	0.020
R-30 (5/12 roof pitch)	0.039	0.032
R-38 (5/12 roof pitch)	0.035	0.026

	Standard Frame	Advanced Frame
Ceilings Below Vented Attics		
R-49 (5/12 roof pitch)	0.032	0.020
Vaulted Ceilings	16" O.C.	24" O.C.
Vented		
R-19 2x10 joist	0.049	0.048
R-30 2x12 joist	0.034	0.033
R-38 2x14 joist	0.027	0.027
Unvented		
R-30 2x10 joist	0.034	0.033
R-38 2x12 joist	0.029	0.027
R-21 + R-21 2x12 joist	0.026	0.025
Roof Deck	4 x Beams, 48" O.C.	
R-12.5 2" Rigid insulation	0.064	
R-21.9 3.5" Rigid insulation	0.040	
R-37.5 6" Rigid insulation	0.025	
R-50 8" Rigid insulation	0.019	

NEW SECTION

WAC 51-11C-61022 Section A102.2—Component description.

A102.2 Component description. The four types of ceilings are characterized as follows:

A102.2.1 Ceilings below a vented attic. Attic insulation is assumed to be blown-in, loose-fill fiberglass with a K-value of $2.6 \text{ h} \cdot \text{ft}^2 \cdot \text{°F}/\text{Btu}$ per inch. Full bag count for specified R-value is assumed in all cases. Ceiling dimensions for flat ceiling calculations are 45 by 30 feet, with a gabled roof having a 4/12 pitch. The attic is assumed to vent naturally at the rate of 3 air changes per hour through soffit and ridge vents. A void fraction of 0.002 is assumed for all attics with insulation baffles. Standard-framed, un baffled attics assume a void fraction of 0.008.

Attic framing is either standard or advanced. Standard framing assumes tapering of insulation depth around the perimeter with resultant decrease in thermal resistance. An increased R-value is assumed in the center of the ceiling due to the effect of piling leftover insulation. Advanced framing assumes full and even depth of insulation extending to the outside edge of exterior walls. Advanced framing does not change from the default value.

U-factors for flat ceilings below vented attics with standard framing may be modified with the following table:

Roof Pitch	U-Factor for Standard Framing	
	R-30	R-38
4/12	0.036	0.031
5/12	0.035	0.030
6/12	0.034	0.029
7/12	0.034	0.029
8/12	0.034	0.028
9/12	0.034	0.028
10/12	0.033	0.028
11/12	0.033	0.027
12/12	0.033	0.027

Vented scissors truss attics assume a ceiling pitch of 2/12 with a roof pitch of either 4/12 or 5/12. Unbaffled standard framed scissors truss attics are assumed to have a void fraction of 0.016.

A102.2.2 Vaulted ceilings. Insulation is assumed to be fiberglass batts installed in roof joist cavities. In the vented case, at least 1.5 inches between the top of the batts and the underside of the roof sheathing is left open for ventilation in each cavity. A ventilation rate of 3.0 air changes per hour is assumed. In the unvented or dense pack case, the ceiling cavity is assumed to be fully packed with insulation, leaving no space for ventilation.

A102.2.3 Roof decks. Rigid insulation is applied to the top of roof decking with no space left for ventilation. Roofing materials are attached directly on top of the insulation. Framing members are often left exposed on the interior side.

A102.2.4 Metal truss framing. Overall system tested values for the roof/ceiling U_o for metal framed truss assemblies from approved laboratories shall be used, when such data is acceptable to the building official.

Alternatively, the U_o for roof/ceiling assemblies using metal truss framing may be obtained from Tables A102.2.4(1) through A102.2.4(5).

A102.2.5 Metal building roof. Table A102.2.5: The base assembly is a roof where the insulation is compressed when installed beneath metal roof panels attached to the steel structure (purlins). Additional assemblies include continuous insulation, uncompressed and uninterrupted by framing.

U-factors for metal building roofs shall be taken from Table A102.2.5, provided the average purlin spacing is at least 52 inches and the R-value of the thermal spacer block is greater than or equal to the thermal spacer block R-value indicated in Table A107.2.5 for the assembly. It is not acceptable to use the U-factors in Table A102.2.6 if additional insulated sheathing is not continuous.

A102.2.5.1 Single layer. The rated R-value of insulation is for insulation installed perpendicular to and draped over purlins and then compressed when the metal roof panels are

attached. A minimum R-3 (R-0.5) thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor.

A102.2.5.2 Double layer. The first rated R-value of insulation is for insulation installed perpendicular to and draped over purlins. The second rated R-value of insulation is for unfaced insulation installed above the first layer and parallel to the purlins and then compressed when the metal roof panels are attached. A minimum R-3 (R-0.5) thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor.

A102.2.5.3 Continuous insulation. For continuous insulation (e.g., insulation boards or blankets), it is assumed that the insulation is installed below the purlins and is uninterrupted by framing members. Insulation exposed to the conditioned space or semi-heated space shall have a facing, and all insulation seams shall be continuously sealed to provide a continuous air barrier.

A102.2.5.4 Liner system (Ls). A continuous membrane is installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins. For multilayer installations, the last rated R-value of insulation is for unfaced insulation draped over purlins and then compressed when the metal roof panels are attached. A minimum R-3 (R-0.5) thermal spacer block between the purlins and the metal roof panels

is required, unless compliance is shown by the overall assembly U-factor.

A102.2.5.5 Filled cavity. The first rated R-value of insulation is for faced insulation installed parallel to the purlins. The second rated R-value of insulation is for unfaced insulation installed above the first layer, parallel to and between the purlins and compressed when the metal roof panels are attached. The facer of the first layer of insulation is of sufficient width to be continuously sealed to the top flange of the purlins and to accommodate the full thickness of the second layer of insulation. A supporting structure retains the bottom of the first layer at the prescribed depth required for the full thickness of the second layer of insulation being installed above it. A minimum R-5 (R-0.9) thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor.

A102.2.6 Roofs with insulation entirely above deck (uninterrupted by framing). Table A102.2.6: The base assembly is continuous insulation over a structural deck. Added insulation is continuous and uninterrupted by framing. For the insulation, the first column lists the R-value for continuous insulation with a uniform thickness; the second column lists the comparable area-weighted average R-value for continuous insulation provided that the insulation thickness is never less than R-5 (except at roof drains) and that the slope is no greater than 1/4 inch per foot.

NEW SECTION

WAC 51-11C-610221 Tables A102.2.4—Steel truss framed ceiling U_o values.

**Table A102.2.4(1)
Steel Truss^a Framed Ceiling U_o**

Cavity R-value	Truss Span (ft)												
	12	14	16	18	20	22	24	26	28	30	32	34	36
19	0.1075	0.0991	0.0928	0.0878	0.0839	0.0807	0.0780	0.0757	0.0737	0.0720	0.0706	0.0693	0.0681
30	0.0907	0.0823	0.0760	0.0710	0.0671	0.0638	0.0612	0.0589	0.0569	0.0552	0.0538	0.0525	0.0513
38	0.0844	0.0759	0.0696	0.0647	0.0607	0.0575	0.0548	0.0525	0.0506	0.0489	0.0474	0.0461	0.0449
49	0.0789	0.0704	0.0641	0.0592	0.0552	0.0520	0.0493	0.0470	0.0451	0.0434	0.0419	0.0406	0.0395

**Table A102.2.4(2)
Steel Truss^a Framed Ceiling U_o with R-3 Sheathing**

Cavity R-value	Truss Span (ft)												
	12	14	16	18	20	22	24	26	28	30	32	34	36
19	0.0809	0.0763	0.0728	0.0701	0.0679	0.0661	0.0647	0.0634	0.0623	0.0614	0.0606	0.0599	0.0592
30	0.0641	0.0595	0.0560	0.0533	0.0511	0.0493	0.0478	0.0466	0.0455	0.0446	0.0438	0.0431	0.0424
38	0.0577	0.0531	0.0496	0.0469	0.0447	0.0430	0.0415	0.0402	0.0392	0.0382	0.0374	0.0367	0.0361
49	0.0523	0.0476	0.0441	0.0414	0.0393	0.0375	0.0360	0.0348	0.0337	0.0328	0.0319	0.0312	0.0306

**Table A102.2.4(3)
Steel Truss^a Framed Ceiling U_o with R-5 Sheathing**

Cavity R-value	Truss Span (ft)												
	12	14	16	18	20	22	24	26	28	30	32	34	36
19	0.0732	0.0697	0.0670	0.0649	0.0633	0.0619	0.0608	0.0598	0.0590	0.0583	0.0577	0.0571	0.0567
30	0.0564	0.0529	0.0502	0.0481	0.0465	0.0451	0.0440	0.0430	0.0422	0.0415	0.0409	0.0403	0.0399
38	0.0501	0.0465	0.0438	0.0418	0.0401	0.0388	0.0376	0.0367	0.0359	0.0351	0.0345	0.0340	0.0335
49	0.0446	0.0410	0.0384	0.0363	0.0346	0.0333	0.0322	0.0312	0.0304	0.0297	0.0291	0.0285	0.0280

Table A102.2.4(4)
Steel Truss^a Framed Ceiling U_o with R-10 Sheathing

Cavity R-value	Truss Span (ft)												
	12	14	16	18	20	22	24	26	28	30	32	34	36
19	0.0626	0.0606	0.0590	0.0578	0.0569	0.0561	0.0555	0.0549	0.0545	0.0541	0.0537	0.0534	0.0531
30	0.0458	0.0437	0.0422	0.0410	0.0401	0.0393	0.0387	0.0381	0.0377	0.0373	0.0369	0.0366	0.0363
38	0.0394	0.0374	0.0359	0.0347	0.0337	0.0330	0.0323	0.0318	0.0313	0.0309	0.0305	0.0302	0.0299
49	0.0339	0.0319	0.0304	0.0292	0.0283	0.0275	0.0268	0.0263	0.0258	0.0254	0.0251	0.0247	0.0245

Table A102.2.4(5)
Steel Truss^a Framed Ceiling U_o with R-15 Sheathing

Cavity R-value	Truss Span (ft)												
	12	14	16	18	20	22	24	26	28	30	32	34	36
19	0.0561	0.0550	0.0541	0.0535	0.0530	0.0526	0.0522	0.0519	0.0517	0.0515	0.0513	0.0511	0.0509
30	0.0393	0.0382	0.0373	0.0367	0.0362	0.0358	0.0354	0.0351	0.0349	0.0347	0.0345	0.0343	0.0341
38	0.0329	0.0318	0.0310	0.0303	0.0298	0.0294	0.0291	0.0288	0.0285	0.0283	0.0281	0.0279	0.0278
49	0.0274	0.0263	0.0255	0.0249	0.0244	0.0239	0.0236	0.0233	0.0230	0.0228	0.0226	0.0225	0.0223

Footnotes for Tables A102.2.4(1) through A102.2.4(5)

^a Assembly values based on 24 inch on center truss spacing; 11 Truss member connections penetrating insulation (4 at the eaves, 7 in the interior space); 1/2 inch drywall ceiling; all truss members are 2x4 "C" channels with a solid web.

^bCeiling sheathing installed between bottom chord and drywall.

NEW SECTION

WAC 51-11C-610225 Tables A102.2.5—Default U-factors for metal building roofs.

Table A102.2.5
Default U-factors for Metal Building Roofs

Insulation System	Rated R-Value of Insulation	Overall U-Factor for Entire Base Roof Assembly	Overall U-Factor for Assembly of Base Roof Plus Continuous Insulation (uninterrupted by framing) Rated R-Value of Continuous Insulation					
			R-6.5	R-13	R-19.5	R-26	R-32.5	R-39
Standing Seam Roofs with Thermal Spacer Blocks^{a, b}								
Single Layer	None	1.280	0.137	0.073	0.049	0.037	0.030	0.025
	R-10	0.115	0.066	0.046	0.035	0.029	0.024	0.021
	R-11	0.107	0.063	0.045	0.035	0.028	0.024	0.021
	R-13	0.101	0.061	0.044	0.034	0.028	0.024	0.020
	R-16	0.096	0.059	0.043	0.033	0.027	0.023	0.020
	R-19	0.082	0.053	0.040	0.031	0.026	0.022	0.020
Double Layer	R-10 + R-10	0.088	0.056	0.041	0.032	0.027	0.023	0.020
	R-10 + R-11	0.086	0.055	0.041	0.032	0.027	0.023	0.020
	R-11 + R-11	0.085	0.055	0.040	0.032	0.026	0.023	0.020
	R-10 + R-13	0.084	0.054	0.040	0.032	0.026	0.023	0.020
	R-11 + R-13	0.082	0.053	0.040	0.032	0.026	0.022	0.020
	R-13 + R-13	0.075	0.050	0.038	0.030	0.025	0.022	0.019
	R-10 + R-19	0.074	0.050	0.038	0.030	0.025	0.022	0.019
	R-11 + R-19	0.072	0.049	0.037	0.030	0.025	0.022	0.019
	R-13 + R-19	0.068	0.047	0.036	0.029	0.025	0.021	0.019
	R-16 + R-19	0.065	0.046	0.035	0.029	0.024	0.021	0.018
Liner System	R-19 + R-11	0.035						
	R-25 + R-11	0.031						
	R-30 + R-11	0.029						
	R-25 + R-11 + R-11	0.026						
Filled Cavity with Thermal Spacer Blocks^c								
	R-10 + R-19	0.057	0.042	0.033	0.027	0.023	0.020	0.018

Insulation System	Rated R-Value of Insulation	Overall U-Factor for Entire Base Roof Assembly	Overall U-Factor for Assembly of Base Roof Plus Continuous Insulation (uninterrupted by framing) Rated R-Value of Continuous Insulation					
			R-6.5	R-13	R-19.5	R-26	R-32.5	R-39
Standing Seam Roofs without Thermal Spacer Blocks								
Liner System	R-19 + R-11	0.040						
Thru-Fastened Roofs without Thermal Spacer Blocks								
Single Layer	R-10	0.184						
	R-11	0.182						
	R-13	0.174						
	R-16	0.157						
	R-19	0.151						
Liner System	R-19 + R-11	0.044						

(Multiple R-values are listed in order from inside to outside)

^aA standing seam roof clip that provides a minimum 1.5 inch distance between the top of the purlins and the underside of the metal roof panels is required.

^bA minimum R-3 thermal spacer block is required.

^cA minimum R-5 thermal spacer block is required.

NEW SECTION

WAC 51-11C-610226 Tables A102.2.6—Assembly U-factors for roofs with insulation entirely above deck.

Table A102.2.6

Assembly U-factors for Roofs with Insulation Entirely above Deck (Uninterrupted by Framing)

Rated R-Value of Insulation Alone: Minimum Through-out, Unsloned	Rated R-Value of Insulation Alone: Average (R-5 minimum), Sloped (1/4 inch per foot maximum)	Overall U-Factor for Entire Assembly
R-0	Not Allowed	U-1.282
R-1	Not Allowed	U-0.562
R-2	Not Allowed	U-0.360
R-3	Not Allowed	U-0.265
R-4	Not Allowed	U-0.209
R-5	Not Allowed	U-0.173
R-6	R-7	U-0.147
R-7	R-8	U-0.129
R-8	R-9	U-0.114
R-9	R-10	U-0.102
R-10	R-12	U-0.093
R-11	R-13	U-0.085
R-12	R-15	U-0.078
R-13	R-16	U-0.073
R-14	R-18	U-0.068
R-15	R-20	U-0.063
R-16	R-22	U-0.060
R-17	R-23	U-0.056
R-18	R-25	U-0.053
R-19	R-27	U-0.051
R-20	R-29	U-0.048
R-21	R-31	U-0.046
R-22	R-33	U-0.044
R-23	R-35	U-0.042
R-24	R-37	U-0.040

Rated R-Value of Insulation Alone: Minimum Through-out, Unsloned	Rated R-Value of Insulation Alone: Average (R-5 minimum), Sloped (1/4 inch per foot maximum)	Overall U-Factor for Entire Assembly
R-25	R-39	U-0.039
R-26	R-41	U-0.037
R-27	R-43	U-0.036
R-28	R-46	U-0.035
R-29	R-48	U-0.034
R-30	R-50	U-0.032
R-35	R-61	U-0.028
R-40	R-73	U-0.025
R-45	R-86	U-0.022
R-50	R-99	U-0.020
R-55	R-112	U-0.018
R-60	R-126	U-0.016

NEW SECTION

WAC 51-11C-61030 Section A103—Above grade walls.

NEW SECTION

WAC 51-11C-61031 Section A103.1—General.

A103.1 General. Tables A103.1(1), A103.1(2) and A103.1(3) list heat loss coefficients for the opaque portion of above-grade wood stud frame walls, metal stud frame walls and concrete masonry walls (Btu/h • ft² • °F) respectively. They are derived from procedures listed in the ASHRAE Fundamentals Handbook. For intermediate floor slabs which penetrate the insulated wall, use the concrete wall U-factors in Table A103.1(2).

Insulation is assumed to uniformly fill the entire cavity and to be installed as per manufacturer's directions. All walls are assumed to be finished on the inside with 1/2 inch gypsum wallboard, and on the outside with either beveled wood siding over 1/2 inch plywood sheathing or with 5/8 inch T1-

11 siding. Insulated sheathing (either interior or exterior) is assumed to cover the entire opaque wall surface, except where modified in accordance with footnote h to Table C402.1.1.

Metal building walls have a different construction and are addressed in Table A103.3.6.3.

NEW SECTION

WAC 51-11C-61032 Section A103.2—Framing description.

A103.2 Framing description. For wood stud frame walls, three framing types are considered and defined as follows:

A103.2.1 Standard. Studs framed on 16 inch centers with double top plate and single bottom plate. Corners use three studs and each opening is framed using two studs. Headers consist of double 2x or single 4x material with an air space left between the header and the exterior sheathing. Interior partition wall/exterior wall intersections use two studs in the exterior wall.

Standard framing weighting factors:

Studs and plates	0.19
Insulated cavity	0.77
Headers	0.04

A103.2.2 Intermediate. Studs framed on 16 inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners, and each opening is framed by two studs. Headers consist of double 2x material with R-10 insulation. Interior partition wall/exterior wall intersections are fully insulated in the exterior wall.

Intermediate framing weighting factors:

TABLE A103.3.1(1)

2 x 4 Single Wood Stud: R-11 Batt

	R-value of Foam Board	Siding Material/Framing Type			
		Lapped Wood		T1-11	
		STD	ADV	STD	ADV
NOTE:	0	0.088	0.084	0.094	0.090
Nominal Batt R-value:	1	0.080	0.077	0.085	0.082
R-11 at 3.5 inch thickness	2	0.074	0.071	0.078	0.075
Installed Batt R-value:	3	0.069	0.066	0.072	0.070
R-11 in 3.5 inch cavity	4	0.064	0.062	0.067	0.065
	5	0.060	0.058	0.063	0.061
	6	0.056	0.055	0.059	0.057
	7	0.053	0.052	0.055	0.054
	8	0.051	0.049	0.052	0.051
	9	0.048	0.047	0.050	0.049
	10	0.046	0.045	0.047	0.046
	11	0.044	0.043	0.045	0.044
	12	0.042	0.041	0.043	0.042

Studs and plates	0.18
Insulated cavity	0.78
Headers	0.04

A103.2.3 Advanced. Studs framed on 24 inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners, and one stud is used to support each header. Headers consist of double 2x material with R-10 insulation. Interior partition wall/exterior wall intersections are fully insulated in the exterior wall.

Advanced framing weighting factors:

Studs and plates	0.13
Insulated cavity	0.83
Headers	0.04

NEW SECTION

WAC 51-11C-61033 Section A103.3—Component description.

A103.3 Component description. Default coefficients for the following types of walls are listed: Single-stud walls, strap walls, double-stud walls, log walls, stress-skin panels, metal stud walls, and metal building walls.

NEW SECTION

WAC 51-11C-610331 Section A103.3.1—Single stud wall.

A103.3.1 Single-stud wall. Tables A103.3.1(1) through A103.3.1(8): Assumes either 2 x 4 or 2 x 6 studs framed on 16 or 24 inch centers. Headers are solid for 2 x 4 walls and double 2x for 2 x 6 walls, with either dead-air or rigid-board insulation in the remaining space.

TABLE A103.3.1(2)

2 x 4 Single Wood Stud: R-13 Batt

	R-value of Foam Board	Siding Material/Framing Type			
		Lapped Wood		T1-11	
		STD	ADV	STD	ADV
NOTE:	0	0.082	0.078	0.088	0.083
Nominal Batt R-value:	1	0.075	0.072	0.080	0.076
R-13 at 3.63 inch thickness	2	0.069	0.066	0.073	0.070
Installed Batt R-value:	3	0.065	0.062	0.068	0.065
R-12.7 in 3.5 inch cavity	4	0.060	0.058	0.063	0.061
	5	0.057	0.055	0.059	0.057
	6	0.053	0.052	0.056	0.054
	7	0.051	0.049	0.052	0.051
	8	0.048	0.047	0.050	0.048
	9	0.046	0.045	0.047	0.046
	10	0.044	0.043	0.045	0.044
	11	0.042	0.041	0.043	0.042
	12	0.040	0.039	0.041	0.040

TABLE A103.3.1(3)

2 x 4 Single Wood Stud: R-15 Batt

	R-value of Foam Board	Siding Material/Framing Type			
		Lapped Wood		T1-11	
		STD	ADV	STD	ADV
NOTE:	0	0.076	0.071	0.081	0.075
Nominal Batt R-value:	1	0.069	0.065	0.073	0.069
R-15 at 3.5 inch thickness	2	0.064	0.061	0.068	0.069
Installed Batt R-value:	3	0.060	0.057	0.063	0.059
R-15 in 3.5 inch cavity	4	0.056	0.053	0.059	0.056
	5	0.053	0.051	0.055	0.052
	6	0.050	0.048	0.052	0.050
	7	0.047	0.046	0.049	0.047
	8	0.045	0.044	0.047	0.045
	9	0.043	0.042	0.044	0.043
	10	0.041	0.040	0.042	0.041
	11	0.039	0.038	0.041	0.039
	12	0.038	0.037	0.039	0.038

TABLE A103.3.1(4)

2 x 6 Single Wood Stud: R-19 Batt

	R-value of Foam Board	Siding Material/Framing Type Lapped Wood			T1-11		
		STD	INT	ADV	STD	INT	ADV
NOTE:	0	0.062	0.058	0.055	0.065	0.061	0.058
Nominal Batt R-value:	1	0.058	0.055	0.052	0.060	0.057	0.055
R-19 at 6 inch thickness	2	0.054	0.052	0.050	0.056	0.054	0.051
Installed Batt R-value:	3	0.051	0.049	0.047	0.053	0.051	0.049
R-18 in 5.5 inch cavity	4	0.048	0.046	0.045	0.050	0.048	0.046
	5	0.046	0.044	0.043	0.048	0.046	0.044
	6	0.044	0.042	0.041	0.045	0.044	0.042
	7	0.042	0.040	0.039	0.043	0.042	0.040
	8	0.040	0.039	0.038	0.041	0.040	0.039
	9	0.038	0.037	0.035	0.039	0.038	0.037
	10	0.037	0.036	0.035	0.038	0.037	0.036
	11	0.036	0.035	0.034	0.036	0.035	0.035
	12	0.034	0.033	0.033	0.035	0.034	0.033

TABLE A103.3.1(5)

2 x 6 Single Wood Stud: R-21 Batt

	R-value of Foam Board	Siding Material/Framing Type Lapped Wood			T1-11		
		STD	INT	ADV	STD	INT	ADV
NOTE:	0	0.057	0.054	0.051	0.060	0.056	0.053
Nominal Batt R-value:	1	0.054	0.051	0.048	0.056	0.053	0.050
R-21 at 5.5 inch thickness	2	0.050	0.048	0.045	0.052	0.050	0.047
Installed Batt R-value:	3	0.048	0.045	0.043	0.049	0.047	0.045
R-21 in 5.5 inch cavity	4	0.045	0.043	0.041	0.047	0.045	0.043
	5	0.043	0.041	0.040	0.044	0.042	0.041
	6	0.041	0.039	0.038	0.042	0.041	0.039
	7	0.039	0.038	0.036	0.040	0.039	0.037
	8	0.038	0.036	0.035	0.039	0.037	0.036
	9	0.036	0.035	0.034	0.037	0.036	0.035
	10	0.035	0.034	0.033	0.036	0.035	0.033
	11	0.033	0.033	0.032	0.034	0.033	0.032
	12	0.032	0.031	0.031	0.033	0.032	0.031

TABLE A103.3.1(6)

2 x 6 Single Wood Stud: R-22 Batt

	R-value of Foam Board	Siding Material/Framing Type					
		Lapped Wood			T1-11		
		STD	INT	ADV	STD	INT	ADV
	0	0.059	0.055	0.052	0.062	0.058	0.054
NOTE:	1	0.055	0.052	0.049	0.057	0.054	0.051
Nominal Batt R-value:	2	0.052	0.049	0.047	0.054	0.051	0.048
R-22 at 6.75 inch thickness	3	0.049	0.046	0.044	0.050	0.048	0.046
Installed Batt R-value:	4	0.046	0.044	0.042	0.048	0.046	0.044
R-20 in 5.5 inch cavity	5	0.044	0.042	0.041	0.045	0.043	0.042
	6	0.042	0.040	0.039	0.043	0.042	0.040
	7	0.040	0.039	0.037	0.041	0.040	0.038
	8	0.038	0.037	0.036	0.039	0.038	0.037
	9	0.037	0.036	0.035	0.038	0.037	0.035
	10	0.035	0.034	0.033	0.036	0.035	0.034
	11	0.034	0.033	0.032	0.035	0.034	0.033
	12	0.033	0.032	0.031	0.034	0.033	0.032

TABLE A103.3.1(7)

2 x 6 Single Wood Stud: Two R-11 Batts

	R-value of Foam Board	Siding Material/Framing Type					
		Lapped Wood			T1-11		
		STD	INT	ADV	STD	INT	ADV
NOTE:	0	0.060	0.057	0.054	0.063	0.059	0.056
Nominal Batt R-value:	1	0.056	0.053	0.051	0.059	0.056	0.053
R-22 at 7 inch thickness	2	0.053	0.050	0.048	0.055	0.052	0.050
Installed Batt R-value:	3	0.050	0.048	0.046	0.052	0.049	0.047
R-18.9 in 5.5 inch cavity	4	0.047	0.045	0.044	0.049	0.047	0.045
	5	0.045	0.043	0.042	0.046	0.045	0.043
	6	0.043	0.041	0.040	0.044	0.043	0.041
	7	0.041	0.040	0.038	0.042	0.041	0.039
	8	0.039	0.038	0.037	0.040	0.039	0.038
	9	0.038	0.037	0.036	0.039	0.038	0.036
	10	0.036	0.035	0.034	0.037	0.036	0.035
	11	0.035	0.034	0.033	0.036	0.035	0.034
	12	0.034	0.033	0.032	0.034	0.034	0.033

TABLE A103.3.1(8)

2 x 8 Single Stud: R-25 Batt

	R-value of Foam Board	Siding Material/Framing Type					
		Lapped Wood			T1-11		
		STD	INT	ADV	STD	INT	ADV
NOTE:	0	0.051	0.047	0.045	0.053	0.049	0.046
Nominal Batt R-value:	1	0.048	0.045	0.043	0.049	0.046	0.044
R-25 at 8 inch thickness	2	0.045	0.043	0.041	0.047	0.044	0.042
Installed Batt R-value:	3	0.043	0.041	0.039	0.044	0.042	0.040
R-23.6 in 7.25 inch cavity	4	0.041	0.039	0.037	0.042	0.040	0.038
	5	0.039	0.037	0.036	0.040	0.038	0.037
	6	0.037	0.036	0.035	0.038	0.037	0.036
	7	0.036	0.035	0.033	0.037	0.035	0.034
	8	0.035	0.033	0.032	0.035	0.034	0.033
	9	0.033	0.032	0.031	0.034	0.033	0.032
	10	0.032	0.031	0.030	0.033	0.032	0.031
	11	0.031	0.030	0.029	0.032	0.031	0.030
	12	0.030	0.029	0.028	0.031	0.030	0.029

NEW SECTION

WAC 51-11C-610332 Section A103.3.2—Strap wall.

A103.3.2 Strap wall. Table A103.3.2: Assumes 2 x 6 studs framed on 16 or 24 inch centers. 2 x 3 or 2 x 4 strapping is run horizontally along the interior surface of the wall to provide additional space for insulation.

**Table A103.3.2
2 x 6: Strap Wall**

	Siding Material/Frame Type			
	Lapped Wood		T1-11	
	STD	ADV	STD	ADV
R-19 + R-11 Batts	0.036	0.035	0.038	0.036
R-19 + R-8 Batts	0.041	0.039	0.042	0.040

NEW SECTION

WAC 51-11C-610333 Section A103.3.3—Double stud wall.

A103.3.3 Double stud wall. Tables A103.3.3(1) and A103.3.3(2): Assumes an exterior structural wall and a separate interior, nonstructural wall. Insulation is placed in both wall cavities and in the space between the two walls. Stud spacing is assumed to be on 24 inch centers for both walls.

**Table A103.3.3(1)
2 x 6 + 2 x 4: Double Wood Stud**

Batt Configuration			Siding Material/Frame Type			
			Lapped Wood		T1-11	
Exterior	Middle	Interior	STD	ADV	STD	ADV
R-19	————	R-11	0.040	0.037	0.041	0.038
R-19	————	R-19	0.034	0.031	0.035	0.032
R-19	R-8	R-11	0.029	0.028	0.031	0.029
R-19	R-11	R-11	0.027	0.026	0.028	0.027
R-19	R-11	R-19	0.024	0.023	0.025	0.023

Batt Configuration			Siding Material/Frame Type			
			Lapped Wood		T1-11	
Exterior	Middle	Interior	STD	ADV	STD	ADV
R-19	R-19	R-19	0.021	0.020	0.021	0.020

Table A103.3.3(2)
2 x 4 + 2 x 4: Double Wood Stud

Batt Configuration			Siding Material/Frame Type			
			Lapped Wood		T1-11	
Exterior	Middle	Interior	STD	ADV	STD	ADV
R-11	————	R-11	0.050	0.046	0.052	0.048
R-19	————	R-11	0.039	0.037	0.043	0.039
R-11	R-8	R-11	0.037	0.035	0.036	0.036
R-11	R-11	R-11	0.032	0.031	0.033	0.032
R-13	R-13	R-13	0.029	0.028	0.029	0.028
R-11	R-19	R-11	0.026	0.026	0.027	0.026

NEW SECTION

WAC 51-11C-610334 Section A103.3.4—Log wall.

A103.3.4 Log wall. See Table A103.3.4.

Table A103.3.4
Log Walls

	Average Log Diameter, Inches	U-factor
NOTE: R-value of wood:	6	0.148
R-1.25 per inch thickness	8	0.111
	10	0.089
Average wall thickness	12	0.074
90% average log diameter	14	0.063
	16	0.056

NEW SECTION

WAC 51-11C-610335 Section A103.3.5—Stress skin panel.

A103.3.5 Stress-skin panel. See Table A103.3.5.

Table A103.3.5
Stress Skin Panel

Panel Thickness, Inches U-factor

NOTE: R-value of expanded polystyrene: R-3.85 per inch	3 1/2	0.071
	5 1/2	0.048
	7 1/4	0.037
Framing: 6%	9 1/4	0.030
Spline: 8%	11 1/4	0.025
No thermal bridging between interior and exterior splines		

NEW SECTION

WAC 51-11C-610336 Section A103.3.6—Metal stud walls.

A103.3.6 Metal stud walls. The nominal R-values in Tables A103.3.6.1 through A103.3.6.3 may be used for purposes of calculating metal stud wall section U-factors in lieu of the ASHRAE zone calculation method as provided in Chapter 27 of the ASHRAE Fundamentals Handbook.

A103.3.6.1 Metal stud wall, overall assembly U-factors. Tables A103.3.6.1(1) and A103.6.1(2): Assumes metal studs spaced on 16 or 24 inch centers with insulation installed to fill wall cavities. Continuous rigid board insulation is applied without creating uninsulated voids in the wall assembly.

Table A103.3.6.1(1)
Overall Assembly U-factors for Metal Stud Walls with Continuous Insulation

Metal Framing	R-Value of Continuous Foam Board Insulation	Cavity Insulation					
		R-0	R-11	R-13	R-15	R-19	R-21
16" o.c.	R-0 (none)	0.352	0.132	0.124	0.118	0.109	0.106

Metal Framing	R-Value of Continuous Foam Board Insulation	Cavity Insulation					
		R-0	R-11	R-13	R-15	R-19	R-21
	R-1	0.260	0.117	0.111	0.106	0.099	0.096
	R-2	0.207	0.105	0.100	0.096	0.090	0.087
	R-3	0.171	0.095	0.091	0.087	0.082	0.080
	R-4	0.146	0.087	0.083	0.080	0.076	0.074
	R-5	0.128	0.080	0.077	0.074	0.071	0.069
	R-6	0.113	0.074	0.071	0.069	0.066	0.065
	R-7	0.102	0.069	0.066	0.065	0.062	0.061
	R-8	0.092	0.064	0.062	0.061	0.058	0.057
	R-9	0.084	0.060	0.059	0.057	0.055	0.054
	R-10	0.078	0.057	0.055	0.054	0.052	0.051
	R-11	0.072	0.054	0.052	0.051	0.050	0.049
	R-12	0.067	0.051	0.050	0.049	0.047	0.047
	R-13	0.063	0.049	0.048	0.047	0.045	0.045
	R-14	0.059	0.046	0.045	0.045	0.043	0.043
	R-15	0.056	0.044	0.043	0.043	0.041	0.041
	R-20	0.044	0.036	0.036	0.035	0.034	0.034
24" o.c.	R-0 (none)	0.338	0.116	0.108	0.102	0.094	0.090
	R-1	0.253	0.104	0.098	0.092	0.086	0.083
	R-2	0.202	0.094	0.089	0.084	0.079	0.077
	R-3	0.168	0.086	0.082	0.078	0.073	0.071
	R-4	0.144	0.079	0.075	0.072	0.068	0.066
	R-5	0.126	0.073	0.070	0.067	0.064	0.062
	R-6	0.112	0.068	0.066	0.063	0.060	0.059
	R-7	0.100	0.064	0.062	0.059	0.057	0.055
	R-8	0.091	0.060	0.058	0.056	0.054	0.052
	R-9	0.084	0.057	0.055	0.053	0.051	0.050
	R-10	0.077	0.054	0.052	0.050	0.048	0.048
	R-11	0.072	0.051	0.049	0.048	0.046	0.045
	R-12	0.067	0.048	0.047	0.046	0.044	0.043
	R-13	0.063	0.046	0.045	0.044	0.042	0.042
	R-14	0.059	0.044	0.043	0.042	0.041	0.040
	R-15	0.056	0.042	0.041	0.040	0.039	0.038
R-20	0.044	0.035	0.034	0.034	0.033	0.032	

Continuous foam board insulation: Continuous insulation assumes no thermal bridging of insulation by framing or z-furring through applied foam board. Zone calculation method as provided in the ASHRAE Fundamentals Handbook must be used for thermally bridged foam board insulation. Values for attachment of insulation with z-furring are given in Table A103.3.6.1(2).

Table A103.3.6.1(2)
Overall Assembly U-factors for Metal Stud Walls with Insulation Supported by Z-furring

Metal Framing	R-Value of Foam Board Insulation	Z-furring Attachment	Cavity Insulation					
			R-0	R-11	R-13	R-15	R-19	R-21
16" o.c.	R-0 (none)	Horizontal	0.352	0.132	0.124	0.118	0.109	0.106

Metal Framing	R-Value of Foam Board Insulation	Z-furring Attachment	Cavity Insulation					
			R-0	R-11	R-13	R-15	R-19	R-21
	R-5	Horizontal	0.155	0.089	0.086	0.083	0.078	0.077
	R-7.5	Horizontal	0.128	0.080	0.077	0.074	0.071	0.069
	R-10	Horizontal	0.110	0.072	0.070	0.068	0.065	0.064
	R-12.5	Horizontal	0.099	0.068	0.065	0.064	0.061	0.060
	R-15	Horizontal	0.091	0.064	0.062	0.060	0.058	0.057
	R-17.5	Horizontal	0.084	0.060	0.058	0.057	0.055	0.054
	R-20	Horizontal	0.078	0.057	0.056	0.054	0.052	0.052
	R-22.5	Horizontal	0.074	0.055	0.054	0.052	0.051	0.050
	R-25	Horizontal	0.071	0.053	0.052	0.051	0.049	0.048
	R-0 (none)	Vertical	0.352	0.132	0.124	0.118	0.109	0.106
	R-5	Vertical	0.165	0.093	0.089	0.086	0.081	0.079
	R-7.5	Vertical	0.142	0.085	0.081	0.079	0.075	0.073
	R-10	Vertical	0.126	0.079	0.076	0.074	0.070	0.069
	R-12.5	Vertical	0.115	0.074	0.072	0.070	0.066	0.065
	R-15	Vertical	0.107	0.071	0.069	0.067	0.064	0.063
	R-17.5	Vertical	0.100	0.068	0.065	0.064	0.061	0.060
	R-20	Vertical	0.094	0.065	0.063	0.061	0.059	0.058
	R-22.5	Vertical	0.090	0.063	0.061	0.060	0.057	0.056
R-25	Vertical	0.086	0.061	0.059	0.058	0.056	0.055	
24" o.c.	R-0 (none)	Horizontal	0.338	0.116	0.108	0.102	0.094	0.090
	R-5	Horizontal	0.152	0.082	0.078	0.074	0.070	0.068
	R-7.5	Horizontal	0.126	0.074	0.070	0.068	0.064	0.062
	R-10	Horizontal	0.109	0.067	0.065	0.062	0.059	0.058
	R-12.5	Horizontal	0.098	0.063	0.061	0.059	0.056	0.055
	R-15	Horizontal	0.090	0.060	0.058	0.056	0.053	0.052
	R-17.5	Horizontal	0.083	0.057	0.055	0.053	0.051	0.050
	R-20	Horizontal	0.078	0.054	0.052	0.051	0.049	0.048
	R-22.5	Horizontal	0.074	0.052	0.050	0.049	0.047	0.046
	R-25	Horizontal	0.070	0.050	0.049	0.047	0.046	0.045
	R-0 (none)	Vertical	0.338	0.116	0.108	0.102	0.094	0.090
	R-5	Vertical	0.162	0.084	0.080	0.077	0.072	0.070
	R-7.5	Vertical	0.140	0.078	0.074	0.071	0.067	0.065
	R-10	Vertical	0.124	0.073	0.070	0.067	0.063	0.062
	R-12.5	Vertical	0.113	0.069	0.066	0.064	0.061	0.059
	R-15	Vertical	0.106	0.066	0.063	0.061	0.058	0.057
	R-17.5	Vertical	0.098	0.063	0.061	0.059	0.056	0.055
	R-20	Vertical	0.093	0.061	0.059	0.057	0.054	0.053
R-22.5	Vertical	0.089	0.059	0.057	0.055	0.053	0.051	
R-25	Vertical	0.085	0.057	0.055	0.054	0.051	0.050	

Values in Table A103.3.6.1(2) may not be interpolated between. The value of the foam board insulation must meet or exceed the value listed in the table in order to use the value shown.

A103.3.6.2 Metal stud wall, effective R-values for metal framing and cavity only. Table A103.3.6.2: These values may be used for the metal-framing/cavity layers in walls with metal studs spaced on 16- or 24-inch centers with insulation installed to fill wall cavities in lieu of using the zone method provided in Chapter 25 of the ASHRAE Fundamentals Handbook.

Table A103.3.6.2
Effective R-values for Metal Framing and Cavity Only

	Cavity		Insulation		
	Nominal Depth, Inches	Actual Depth, Inches	Nominal R-Value	Effective R-Value	
				16" O.C.	24" O.C.
<i>Air Cavity</i>	any	any	R-0.91 (air)	0.79	0.91
Wall	4	3-1/2	R-11	5.5	6.6
	4	3-1/2	R-13	6.0	7.2
	4	3-1/2	R-15	6.4	7.8
	6	5-1/2	R-19	7.1	8.6
	6	5-1/2	R-21	7.4	9.0
	8	7-1/4	R-25	7.8	9.6
Roof		Insulation is uncompressed	R-11	5.5	6.1
			R-19	7.0	9.1
			R-30	9.3	11.4

A103.3.6.3 Metal building wall. Table A103.3.6.3: A wall whose structure consists of metal spanning panels supported by steel structural members (does not include spandrel glass or metal panels in curtain wall systems). The first nominal R-value is for insulation compressed between metal wall panels and the steel structure. For double-layer installations, the second rated R-value of insulation is for insulation installed from the inside, covering the girts. For continuous insulation (e.g., insulation boards) it is assumed that the insulation boards are installed on the inside of the girts and uninterrupted by the framing members. Insulation exposed to the conditioned space or semi-heated space shall have a facing, and all insulation seams shall be continuously sealed to provide a continuous air barrier.

Table A103.3.6.3
Default Metal Building Wall U-factors

Insulation System	Rated R-Value of Insulation	Overall U-Factor for Entire Base Wall Assembly	Overall U-Factor for Assembly of Base Wall Plus Continuous Insulation (Uninterrupted by Framing)					
			R-6.5	R-13	R-19.5	R-26	R-32.5	R-39
Single Layer of Mineral Fiber								
	None	1.180	0.136	0.072	0.049	0.037	0.030	0.025
	R-10	0.186	0.084	0.054	0.040	0.032	0.026	0.023
	R-11	0.185	0.084	0.054	0.040	0.032	0.026	0.023
	R-13	0.162	0.079	0.052	0.039	0.031	0.026	0.022
	R-16	0.155	0.077	0.051	0.039	0.031	0.026	0.022
	R-19	0.147	0.075	0.050	0.038	0.030	0.025	0.022

NEW SECTION

WAC 51-11C-610337 Section A103.3.7—Concrete and masonry walls.

A103.3.7 Concrete and masonry walls.

A103.3.7.1 Concrete masonry walls. The nominal R-values in Table A103.3.7.1 may be used for purposes of calculating concrete masonry wall section U-factors in lieu of the ASHRAE isothermal planes calculation method as provided in Chapter 27 of the ASHRAE Fundamentals Handbook.

Table A103.3.7.1(1) Default U-factors for Concrete and Masonry Walls

8" Concrete Masonry

Wall Description	CORE TREATMENT			
	Partial Grout with UngROUTED Cores			Solid Grout
	Empty	Loose-fill insulated		
		Perlite	Vermiculite	
Exposed Block, Both Sides	0.40	0.23	0.24	0.43
R-5 Interior Insulation, Wood Furring	0.14	0.11	0.12	0.15
R-6 Interior Insulation, Wood Furring	0.14	0.11	0.11	0.14
R-10.5 Interior Insulation, Wood Furring	0.11	0.09	0.09	0.11
R-8 Interior Insulation, Metal Clips	0.11	0.09	0.09	0.11
R-6 Exterior Insulation	0.12	0.10	0.10	0.12
R-10 Exterior Insulation	0.08	0.07	0.07	0.08
R-9.5 Rigid Polystyrene Integral Insulation, Two Webbed Block	0.11	0.09	0.09	0.12

12" Concrete Masonry

Wall Description	CORE TREATMENT			
	Partial Grout with UngROUTED Cores			Solid Grout
	Empty	Loose-fill insulated		
		Perlite	Vermiculite	
Exposed Block, Both Sides	0.35	0.17	0.18	0.33
R-5 Interior Insulation, Wood Furring	0.14	0.10	0.10	0.13
R-6 Interior Insulation, Wood Furring	0.13	0.09	0.10	0.13
R-10.5 Interior Insulation, Wood Furring	0.11	0.08	0.08	0.10
R-8 Interior Insulation, Metal Clips	0.10	0.08	0.08	0.09
R-6 Exterior Insulation	0.11	0.09	0.09	0.11
R-10 Exterior Insulation	0.08	0.06	0.06	0.08
R-9.5 Rigid Polystyrene Integral Insulation, Two Webbed Block	0.11	0.08	0.09	0.12

8" Clay Brick

Wall Description	CORE TREATMENT			
	Partial Grout with UngROUTED Cores			Solid Grout
	Empty	Loose-fill insulated		
		Perlite	Vermiculite	
Exposed Block, Both Sides	0.50	0.31	0.32	0.56
R-5 Interior Insulation, Wood Furring	0.15	0.13	0.13	0.16
R-6 Interior Insulation, Wood Furring	0.15	0.12	0.12	0.15
R-10.5 Interior Insulation, Wood Furring	0.12	0.10	0.10	0.12
R-8 Interior Insulation, Metal Clips	0.11	0.10	0.10	0.11
R-6 Exterior Insulation	0.12	0.11	0.11	0.13
R-10 Exterior Insulation	0.08	0.08	0.08	0.09

6" Concrete Poured or Precast

Wall Description	CORE TREATMENT			
	Partial Grout with UngROUTED Cores			Solid Grout
	Empty	Loose-fill insulated		
		Perlite	Vermiculite	
Exposed Concrete, Both Sides	NA	NA	NA	0.61
R-5 Interior Insulation, Wood Furring	NA	NA	NA	0.16
R-6 Interior Insulation, Wood Furring	NA	NA	NA	0.15
R-10.5 Interior Insulation, Wood Furring	NA	NA	NA	0.12
R-8 Interior Insulation, Metal Clips	NA	NA	NA	0.12
R-6 Exterior Insulation	NA	NA	NA	0.13
R-10 Exterior Insulation	NA	NA	NA	0.09

1. Grouted cores at 40" x 48" on center vertically and horizontally in partial grouted walls.
2. Interior insulation values include 1/2" gypsum board on the inner surface.
3. Furring and stud spacing is 16" on center. Insulation is assumed to fill furring space and is not compressed.
4. Intermediate values may be interpolated using this table. Values not contained in this table may be computed using the procedures listed in the ASHRAE Fundamentals Handbook.
5. Concrete Masonry Unit (CMU) assembly U-values are based on local test data for Washington state CMU block material using the ASTM C-236-87 steady state thermal conductance test. Tests included an 8"x8"x16" CMU with all cells filled with vermiculite (1995) and 8"x8"x16" CMU with all cells filled with polymaster foam in place insulation (1996). Refer to ASHRAE Standard 90.1 for additional nationally recognized data on the thermal performance of CMU block walls.

Table A103.3.7.1(2) Default U-Factors for Concrete and Masonry Walls^{a, b, c, d}

Framing Type and Depth	Rated R-value of Insulation Alone	Assembly U-factors for Solid Concrete Walls	Assembly U-factors for Concrete Block Walls: Solid Grouted	Assembly U-factors for Concrete Block Walls: Partially Grouted (Cores Uninsulated Except Where Specified)
Base Wall only				
No Framing	R-0	U-0.740	U-0.580	U-0.480
	UngROUTED Cores Filled with Loose-Fill Insulation	N.A.	N.A.	U-0.350
Continuous Wood Framing				
0.75 in.	R-3.0	U-0.247	U-0.226	U-0.210
1.5 in.	R-6.0	U-0.160	U-0.151	U-0.143
2.0 in.	R-10.0	U-0.116	U-0.111	U-0.107
3.5 in.	R-11.0	U-0.094	U-0.091	U-0.088
3.5 in.	R-13.0	U-0.085	U-0.083	U-0.080
3.5 in.	R-15.0	U-0.079	U-0.077	U-0.075
5.5 in.	R-19.0	U-0.060	U-0.059	U-0.058
5.5 in.	R-21.0	U-0.057	U-0.055	U-0.054
Continuous Metal Framing at 24 in. on center horizontally				
1.0 in.	R-0.0	U-0.414	U-0.359	U-0.318
1.0 in.	R-3.8	U-0.325	U-0.290	U-0.263
1.0 in.	R-5.0	U-0.314	U-0.281	U-0.255
1.0 in.	R-6.5	U-0.305	U-0.274	U-0.249
1.5 in.	R-11.0	U-0.267	U-0.243	U-0.223
2.0 in.	R-7.6	U-0.230	U-0.212	U-0.197
2.0 in.	R-10.0	U-0.219	U-0.202	U-0.188

Framing Type and Depth	Rated R-value of Insulation Alone	Assembly U-factors for Solid Concrete Walls	Assembly U-factors for Concrete Block Walls: Solid Grouted	Assembly U-factors for Concrete Block Walls: Partially Grouted (Cores Uninsulated Except Where Specified)
2.0 in.	R-13.0	U-0.210	U-0.195	U-0.182
3.0 in.	R-11.4	U-0.178	U-0.167	U-0.157
3.0 in.	R-15.0	U-0.168	U-0.158	U-0.149
3.0 in.	R-19.0	U-0.161	U-0.152	U-0.144
3.5 in.	R-11.0	U-0.168	U-0.158	U-0.149
3.5 in.	R-13.0	U-0.161	U-0.152	U-0.144
3.5 in.	R-15.0	U-0.155	U-0.147	U-0.140
4.5 in.	R-17.1	U-0.133	U-0.126	U-0.121
4.5 in.	R-22.5	U-0.124	U-0.119	U-0.114
4.5 in.	R-25.2	U-0.122	U-0.116	U-0.112
5.0 in.	R-19.0	U-0.122	U-0.117	U-0.112
5.0 in.	R-25.0	U-0.115	U-0.110	U-0.106
5.0 in.	R-28.0	U-0.112	U-0.107	U-0.103
5.0 in.	R-32.0	U-0.109	U-0.105	U-0.101
5.5 in.	R-19.0	U-0.118	U-0.113	U-0.109
5.5 in.	R-20.9	U-0.114	U-0.109	U-0.105
5.5 in.	R-21.0	U-0.113	U-0.109	U-0.105
5.5 in.	R-27.5	U-0.106	U-0.102	U-0.099
5.5 in.	R-30.8	U-0.104	U-0.100	U-0.096
6.0 in.	R-22.8	U-0.106	U-0.102	U-0.098
6.0 in.	R-30.0	U-0.099	U-0.095	U-0.092
6.0 in.	R-33.6	U-0.096	U-0.093	U-0.090
6.5 in.	R-24.7	U-0.099	U-0.096	U-0.092
7.0 in.	R-26.6	U-0.093	U-0.090	U-0.087
7.5 in.	R-28.5	U-0.088	U-0.085	U-0.083
8.0 in.	R-30.4	U-0.083	U-0.081	U-0.079
1 in. Metal Clips at 24 in. on center horizontally and 16 in. vertically (also, where allowed by Section C402.1.2, for assemblies with a ratio of metal penetration area/mass wall area of < 0.0004 or < 0.04% of the mass wall area) See ASHRAE Fundamentals for determination of U-factors for assemblies that include metal other than screws and nails.				
1.0 in.	R-3.8	U-0.210	U-0.195	U-0.182
1.0 in.	R-5.0	U-0.184	U-0.172	U-0.162
1.0 in.	R-5.6	U-0.174	U-0.163	U-0.154
1.5 in.	R-5.7	U-0.160	U-0.151	U-0.143
1.5 in.	R-7.5	U-0.138	U-0.131	U-0.125
1.5 in.	R-8.4	U-0.129	U-0.123	U-0.118
2.0 in.	R-7.6	U-0.129	U-0.123	U-0.118
2.0 in.	R-10.0	U-0.110	U-0.106	U-0.102
2.0 in.	R-11.2	U-0.103	U-0.099	U-0.096
2.5 in.	R-9.5	U-0.109	U-0.104	U-0.101
2.5 in.	R-12.5	U-0.092	U-0.089	U-0.086
2.5 in.	R-14.0	U-0.086	U-0.083	U-0.080
3.0 in.	R-11.4	U-0.094	U-0.090	U-0.088
3.0 in.	R-15.0	U-0.078	U-0.076	U-0.074

Framing Type and Depth	Rated R-value of Insulation Alone	Assembly U-factors for Solid Concrete Walls	Assembly U-factors for Concrete Block Walls: Solid Grouted	Assembly U-factors for Concrete Block Walls: Partially Grouted (Cores Uninsulated Except Where Specified)
3.0 in.	R-16.8	U-0.073	U-0.071	U-0.069
3.5 in.	R-13.3	U-0.082	U-0.080	U-0.077
3.5 in.	R-17.5	U-0.069	U-0.067	U-0.065
3.5 in.	R-19.6	U-0.064	U-0.062	U-0.061
4.0 in.	R-15.2	U-0.073	U-0.071	U-0.070
4.0 in.	R-20.0	U-0.061	U-0.060	U-0.058
4.0 in.	R-22.4	U-0.057	U-0.056	U-0.054
5.0 in.	R-28.0	U-0.046	U-0.046	U-0.045
6.0 in.	R-33.6	U-0.039	U-0.039	U-0.038
7.0 in.	R-39.2	U-0.034	U-0.034	U-0.033
8.0 in.	R-44.8	U-0.030	U-0.030	U-0.029
9.0 in.	R-50.4	U-0.027	U-0.027	U-0.026
10 in.	R-56.0	U-0.024	U-0.024	U-0.024
11 in.	R-61.6	U-0.022	U-0.022	U-0.022
Continuous Insulation Uninterrupted by Framing				
No Framing	R-1.0	U-0.425	U-0.367	U-0.324
	R-2.0	U-0.298	U-0.269	U-0.245
	R-3.0	U-0.230	U-0.212	U-0.197
	R-4.0	U-0.187	U-0.175	U-0.164
	R-5.0	U-0.157	U-0.149	U-0.141
No Framing	R-6.0	U-0.136	U-0.129	U-0.124
	R-7.0	U-0.120	U-0.115	U-0.110
	R-8.0	U-0.107	U-0.103	U-0.099
	R-9.0	U-0.097	U-0.093	U-0.090
	R-10.0	U-0.088	U-0.085	U-0.083
No Framing	R-11.0	U-0.081	U-0.079	U-0.076
	R-12.0	U-0.075	U-0.073	U-0.071
	R-13.0	U-0.070	U-0.068	U-0.066
	R-14.0	U-0.065	U-0.064	U-0.062
	R-15.0	U-0.061	U-0.060	U-0.059
No Framing	R-16.0	U-0.058	U-0.056	U-0.055
	R-17.0	U-0.054	U-0.053	U-0.052
	R-18.0	U-0.052	U-0.051	U-0.050
	R-19.0	U-0.049	U-0.048	U-0.047
	R-20.0	U-0.047	U-0.046	U-0.045
No Framing	R-21.0	U-0.045	U-0.044	U-0.043
	R-22.0	U-0.043	U-0.042	U-0.042
	R-23.0	U-0.041	U-0.040	U-0.040
	R-24.0	U-0.039	U-0.039	U-0.038
	R-25.0	U-0.038	U-0.037	U-0.037
No Framing	R-30.0	U-0.032	U-0.032	U-0.031
	R-35.0	U-0.028	U-0.027	U-0.027
	R-40.0	U-0.024	U-0.024	U-0.024

Framing Type and Depth	Rated R-value of Insulation Alone	Assembly U-factors for Solid Concrete Walls	Assembly U-factors for Concrete Block Walls: Solid Grouted	Assembly U-factors for Concrete Block Walls: Partially Grouted (Cores Uninsulated Except Where Specified)
	R-45.0	U-0.022	U-0.021	U-0.021
	R-50.0	U-0.019	U-0.019	U-0.019
	R-55.0	U-0.018	U-0.018	U-0.018
	R-60.0	U-0.016	U-0.016	U-0.016
Brick cavity wall with continuous insulation				
No Framing	R-0.0	U-0.337	U-0.299	U-0.270
No Framing	R-3.8	U-0.148	U-0.140	U-0.133
No Framing	R-5.0	U-0.125	U-0.120	U-0.115
No Framing	R-6.5	U-0.106	U-0.102	U-0.098
No Framing	R-7.6	U-0.095	U-0.091	U-0.088
No Framing	R-10.0	U-0.077	U-0.075	U-0.073
No Framing	R-10.5	U-0.079	U-0.077	U-0.075
No Framing	R-11.4	U-0.070	U-0.068	U-0.066
No Framing	R-15.0	U-0.056	U-0.055	U-0.053
No Framing	R-16.5	U-0.054	U-0.053	U-0.052
No Framing	R-19.0	U-0.046	U-0.045	U-0.044
No Framing	R-22.5	U-0.041	U-0.040	U-0.039
No Framing	R-28.5	U-0.033	U-0.032	U-0.032
Continuous Insulation Uninterrupted by Framing with Stucco and Continuous Metal Framing at 24 in. on center horizontally				
1.0 in.	R-0.0 + R-19 c.i.	U-0.047	U-0.046	U-0.045
1.0 in.	R-3.8 + R-19 c.i.	U-0.045	U-0.044	U-0.044
1.0 in.	R-5.0 + R-19 c.i.	U-0.045	U-0.044	U-0.043
1.0 in.	R-6.5 + R-19 c.i.	U-0.045	U-0.044	U-0.043
1.5 in.	R-11.0 + R-19 c.i.	U-0.044	U-0.043	U-0.043
2.0 in.	R-7.6 + R-19 c.i.	U-0.043	U-0.042	U-0.041
2.0 in.	R-10.0 + R-19 c.i.	U-0.042	U-0.041	U-0.041
2.0 in.	R-13.0 + R-19 c.i.	U-0.042	U-0.041	U-0.041
3.0 in.	R-11.4 + R-19 c.i.	U-0.041	U-0.040	U-0.039
3.0 in.	R-15.0 + R-19 c.i.	U-0.040	U-0.039	U-0.039
3.0 in.	R-19.0 + R-19 c.i.	U-0.040	U-0.039	U-0.038
3.5 in.	R-11.0 + R-19 c.i.	U-0.040	U-0.039	U-0.039
3.5 in.	R-13.0 + R-19 c.i.	U-0.040	U-0.039	U-0.038
5.0 in.	R-19.0 + R-19 c.i.	U-0.037	U-0.036	U-0.036
5.0 in.	R-25.0 + R-19 c.i.	U-0.036	U-0.035	U-0.035
5.0 in.	R-32.5 + R-19 c.i.	U-0.035	U-0.035	U-0.034
5.5 in.	R-19.0 + R-19 c.i.	U-0.036	U-0.036	U-0.035
5.5 in.	R-21.0 + R-19 c.i.	U-0.035	U-0.035	U-0.035

Note for Default Table A103.3.7.1(2):

a. It is acceptable to use the U-factors in Table A103.3.7.1(2) for all concrete and masonry walls, provided that the grouting is equal to or less than that specified.

- For ungrouted walls, use the partially grouted column.
- For metal studs and z-furring, use the continuous-metal-framing category.
- For discontinuous metal clips 1 inch square or smaller, use the metal-clip category.
- For insulation that is attached without any framing members (e.g. glued), use the continuous-insulation uninterrupted-by-framing category. Continuous insulation may be installed on the interior or exterior of masonry walls, or between stand-alone walls in multilayer masonry walls, or on the interior or exterior of the concrete.

- b. For Table A103.3.7.1(2), the U-factor includes R-0.17 for exterior air film and R-0.68 for interior air film-vertical surfaces. For insulated walls, the U-factor also includes R-0.45 for 0.5 in. gypsum board. U-factors are provided for the following configurations:
 - (1) Concrete wall: 8-in. normal weight concrete wall with a density of 145 lb/ft³.
 - (2) Solid grouted concrete block wall: 8-in. medium weight ASTM C90 concrete block with a density of 115 lb/ft³ and solid grouted cores.
 - (3) Partially grouted concrete block wall: 8-in. medium weight ASTM C90 concrete block with a density of 115 lb/ft³ having reinforcing steel every 32 in. vertically and every 48 in. horizontally, with cores grouted in those areas only. Other cores are filled with insulating material only if there is no other insulation.
- c. For walls with insulation contained in a framing layer, the U-factors in Table A103.3.7.1(2) assume contact (and thermal bridging) between the mass wall and other framing. For wall assemblies with multiple layers where the wood or metal framing layer does not contact the concrete or masonry layer (i.e., walls with an airspace between the stud wall layer and the mass wall layer), it is acceptable to use the appropriate wood or metal frame wall default U-factors in Tables A103.3.1 or A103.3.6.1. Note: It is acceptable to use this approach where the insulation extends beyond the framing and is in contact with the mass wall layer (e.g. a nominal four-inch metal stud containing insulation that is nominally six inches thick and therefore extends two inches beyond the back of the metal stud).
- d. Except for wall assemblies qualifying for note 3, if not taken from Table A103.3.7.1(2), mass wall U-factors shall be determined in accordance with ASHRAE 90.1, Appendix A, Section A3.1 and Tables A3.1A to A3.1D, or Section A9.4.

A103.3.7.2 Peripheral edges of intermediate concrete floors. See Table A103.3.7.2.

Table A103.3.7.2
Default U-factors for Peripheral Edges of Intermediate Concrete Floors^{a, b, c, d}

Slab Edge Treatment	Average Thickness of Wall above and below			
	6 inches	8 inches	10 inches	12 inches
Exposed Concrete	0.816	0.741	0.678	0.625
R-5 Exterior Insulation	0.161	0.157	0.154	0.152
R-6 Exterior Insulation	0.138	0.136	0.134	0.132
R-7 Exterior Insulation	0.122	0.120	0.118	0.116
R-8 Exterior Insulation	0.108	0.107	0.106	0.104
R-9 Exterior Insulation	0.098	0.097	0.095	0.094
R-10 Exterior Insulation	0.089	0.088	0.087	0.086
R-11 Exterior Insulation	0.082	0.081	0.080	0.079
R-12 Exterior Insulation	0.076	0.075	0.074	0.074
R-13 Exterior Insulation	0.070	0.070	0.069	0.068
R-14 Exterior Insulation	0.066	0.065	0.065	0.064
R-15 Exterior Insulation	0.062	0.061	0.061	0.060

Note for Table A103.3.7.2:

- a. Exterior insulation values listed above are continuous R-values on the exterior side of the concrete floor.
- b. For conditions with an exterior wall above the peripheral edge of intermediate concrete floor but with no wall below the intermediate concrete floor this table may be used as long as the code minimum insulation is applied to the floor slab below the concrete floor.
- c. Typical conditions where conditioned space building envelope wall thermal insulation values are broken concrete floors include, but are not limited to, the following examples:
 - 1. Elevator hoistway shafts that serve the conditioned building and pass through unconditioned floors such as parking garage levels;
 - 2. Stairwell enclosures that serve the conditioned building and pass through unconditioned floors such as parking garage levels;
 - 3. Walls between interior and exterior building envelope that separate the interior conditioned space from an exterior courtyard or roofdeck;
 - 4. Walls between interior and exterior building envelope that separate the interior conditioned space from an exterior unconditioned space on parking garage levels.

NEW SECTION

WAC 51-11C-61040 Section A104—Below-grade walls and slabs.

NEW SECTION

WAC 51-11C-61041 Section A104.1—General.

A104.1 General. Table A104.1 lists heat loss coefficients for below-grade walls and floors.

Coefficients for below-grade walls are given as U-factors (Btu/h • ft² • °F of wall area). Coefficients for below-grade slabs are listed as F-factors (Btu/h • ft • °F per lineal foot of slab perimeter).

Below-grade wall U-factors are only valid when used with the accompanying below-grade slab F-factor, and vice versa.

Table A104.1
Default Wall U-factors and Slab F-factors for Basements

	Below Grade Wall U-factor	Below Grade Slab F-factor
2 Foot Depth Below Grade		
Uninsulated	0.350	0.59
R-11 Interior	0.066	0.68
R-11 Interior w/TB	0.070	0.60
R-19 Interior	0.043	0.69

	Below Grade Wall U-factor	Below Grade Slab F-factor
R-19 Interior w/TB	0.045	0.61
R-10 Exterior	0.070	0.60
R-12 Exterior	0.061	0.60
3.5 Foot Depth Below Grade		
Uninsulated	0.278	0.53
R-11 Interior	0.062	0.63
R-11 Interior w/TB	0.064	0.57
R-19 Interior	0.041	0.64
R-19 Interior w/TB	0.042	0.57
R-10 Exterior	0.064	0.57
R-12 Exterior	0.057	0.57
7 Foot Depth Below Grade		
Uninsulated	0.193	0.46
R-11 Interior	0.054	0.56
R-11 Interior w/TB	0.056	0.42
R-19 Interior	0.037	0.57
R-19 Interior w/TB	0.038	0.43
R-10 Exterior	0.056	0.42
R-12 Exterior	0.050	0.42

TB = Thermal Break

NEW SECTION

WAC 51-11C-61042 Section A104.2—Component description.

A104.2 Component description. All below-grade walls are assumed to be 8 inch concrete. The wall is assumed to extend from the slab upward to the top of the mud sill for the distance specified in Table A104.1, with 6 inches of concrete wall extending above grade.

Interior insulation is assumed to be fiberglass batts placed in the cavity formed by 2 x 4 framing on 24 inch centers with 1/2 inch gypsum board as the interior finish material. Exterior insulation is assumed to be applied directly to the exterior of the below-grade wall from the top of the wall to the footing. The exterior case does not assume any interior framing or sheetrock.

In all cases, the entire wall surface is assumed to be insulated to the indicated nominal level with the appropriate framing and insulation application. Coefficients are listed for wall depths of 2, 3-1/2 and 7 feet below grade. Basements shallower than two feet should use on-grade slab coefficients.

Heat-loss calculations for wall areas above-grade should use above-grade wall U-factors, beginning at the mudsill.

NEW SECTION

WAC 51-11C-61043 Section A104.3—Insulation description.

A104.3 Insulation description. Coefficients are listed for the following four configurations:

1. **Uninsulated:** No insulation or interior finish.

2. **Interior insulation:** Interior 2 x 4 insulated wall without a thermal break between concrete wall and slab.

3. **Interior insulation with thermal break:** Interior 2 x 4 insulated wall with R-5 rigid board providing a thermal break between the concrete wall and the slab.

4. **Exterior insulation:** Insulation applied directly to the exterior surface of the concrete wall.

NEW SECTION

WAC 51-11C-61050 Section A105—Floors over unconditioned space.

NEW SECTION

WAC 51-11C-61051 Section A105.1—General.

A105.1 General. Tables A105.1(1), A105.1(2) and A105.1(3) list heat loss coefficients for floors over unconditioned spaces in units of Btu/h • ft² • °F.

They are derived from procedures listed in the ASHRAE Fundamentals Handbook, assuming an average outdoor temperature of 45°F, an average indoor temperature of 65°F and a crawlspace area of 1350 ft² and 100 feet of perimeter. The crawlspace is assumed to be 2.5 feet high, with 24 inches below grade and 6 inches above grade.

**Table A105.1(1)
Default U-factors for Floors
over Vented Crawlspace or
Unheated Basement**

Nominal R-value		U-factor	
Floor	Perimeter	Post & Beam	Joists
0	0	0.112	0.134
	11	0.100	0.116
	19	0.098	0.114
	30	0.093	0.107
11	0	0.052	0.056
	11	0.048	0.052
19	0	0.038	0.041
	11	0.036	0.038
22	0	0.034	0.037
	11	0.033	0.035
25	0	0.032	0.034
	11	0.031	0.033
30	0	0.028	0.029
	11	0.027	0.028
38	0	0.024	0.025
	11	0.024	0.024

**Table A105.1(2)
Default U-factors for Floors over Heated Plenum Crawlspace**

Nominal R-value Perimeter	U-factor
11	0.085

Nominal R-value Perimeter	U-factor
19	0.075
30	0.069

Note: Crawlspace used as heated plenums have approximately 30 percent higher heat loss rate than unvented crawlspaces with the same assumed ACH. Default U-factors in Table A105.1(2) reflect this higher rate of heat loss.

**Table A105.1(3)
Default U-factors for Exposed Floors**

Nominal R-value	U-factor		
	Concrete	Wood Joist	Metal Joist
R-11	0.077	0.088	0.14
R-15	0.059	0.076	0.12
R-19	0.048	0.062	0.11
R-21	0.043	0.057	0.11
R-25	0.037	0.051	0.10
R-30	0.031	0.040	0.09
R-38	0.025	0.034	0.08

NEW SECTION

WAC 51-11C-61052 Section A105.2—Crawlspace description.

A105.2 Crawlspace description. Four configurations are considered: Naturally ventilated crawlspace, mechanically vented crawlspace, heated plenum crawlspace and exposed floor.

A105.2.1 Naturally ventilated crawlspaces. Assumed to have 3.0 air changes per hour, with at least 1.0 ft² of net-free ventilation in the foundation for every 300 ft² of crawlspace floor area. The crawlspace is not actively heated. Floors over unheated areas, such as garages, may only use those values which have R-0 perimeter insulation.

NEW SECTION

WAC 51-11C-61061 Section A106.1—General.

A106.1 General. Table A106.1 lists heat loss coefficients for heated on-grade slab floors, in units of Btu/h • °F per lineal foot of perimeter.

**Table A106.1
Default F-factors for On-Grade Slabs**

Insulation Type	R-0	R-5	R-10	R-15	R-20	R-30
Unheated Slab						
Uninsulated slab	0.73	—	—	—	—	—
2 ft. Horizontal (No thermal break)	—	0.70	0.70	0.69	—	—
4 ft. Horizontal (No thermal break)	—	0.67	0.64	0.63	—	—
2 ft. Vertical	—	0.58	0.54	0.52	—	—
4 ft. Vertical	—	0.54	0.48	0.45	—	—
Fully insulated slab*	—	—	0.36	0.31	0.26	0.21

A105.2.2 Mechanically ventilated crawlspaces. Assume to have 1.5 air changes per hour, with less than 1.0 ft² of net-free ventilation in the foundation for every 300 ft² of crawlspace floor area. The crawlspace is not actively heated. Floors over unheated basements may only use those values which have R-0 perimeter insulation.

A105.2.3 Heated plenum crawlspaces. Assumed to have 0.25 air changes per hour, with no foundation vents. Heated supply air from central furnace is blown into a crawlspace and allowed to enter the living space unducted via holes cut into the floor.

A105.2.4 Exposed floors. Assumes no buffer space, and a covering of 1/2 inch T1-11 on the exterior of the cavity exposed to the outside air or rigid insulation below a concrete floor, such as over parking garages.

NEW SECTION

WAC 51-11C-61053 Section A105.3—Construction description.

A105.3 Construction description. Floors are assumed to be either joisted floors framed on 16 inch centers, or post and beam on 4 foot by 8 foot squares. Insulation is assumed to be installed under the subflooring between the joists or beams with no space between the insulation and the subfloor. Insulation is assumed to be uncompressed. Exposed floors also include concrete with continuous rigid insulation assumed.

Perimeter insulation is assumed to extend from the top of the rim joist to the crawlspace floor and then inward along the ground (on top of the ground cover) for at least 24 inches.

Floor coverings are assumed to be light carpet with rubber pad.

NEW SECTION

WAC 51-11C-61060 Section A106—On-grade slab floors.

Insulation Type	R-0	R-5	R-10	R-15	R-20	R-30
Heated Slab						
Uninsulated slab	0.84	—	—	—	—	—
Fully insulated slab*	—	0.74	0.55	0.44	0.39	0.32
R-5 Center (With perimeter insulation)	—	—	0.66	0.62	—	—
R-10 Center (With perimeter insulation)	—	—	—	0.51	—	—
3 ft. Vertical	—	—	0.78	—	—	—

*Edge insulation R-10 regardless of the below slab insulation level.

NEW SECTION

WAC 51-11C-61062 Section A106.2—Component description.

A106.2 Component description. All on-grade slab floors are assumed to be 6 inch concrete poured directly onto the earth. The bottom of the slab is assumed to be at grade line. Monolithic and floating slabs are not differentiated.

Soil is assumed to have a conductivity of 0.75 Btu/h • ft² • °F. Slabs 2 feet or more below grade should use basement coefficients.

NEW SECTION

WAC 51-11C-61063 Section A106.3—Insulation description.

A106.3 Insulation description. Coefficients are provided for the following three configurations:

1. **Two foot (or four foot) vertical:** Insulation is applied directly to the slab exterior, extending downward from the top of the slab to a depth of 2 feet (or 4 feet) below grade.

NEW SECTION

WAC 51-11C-61071 Table A107.1(1)—Default U-factors for doors.

**Table A107.1(1)
Default U-factors for Doors**

Door Type	No Glazed Fenestration	Single Glazing	Double Glazing with 1/4 in. Airspace	Double Glazing with 1/2 in. Airspace	Double Glazing with e = 0.10, 1/2 in. Argon
Swinging Doors (Rough opening - 38 in. x 82 in.)					
Slab Doors					
Wood slab in wood frame ^a	0.46				
6% glazed fenestration (22 in. x 8 in. lite)	-	0.48	0.47	0.46	0.44
25% glazed fenestration (22 in. x 36 in. lite)	-	0.58	0.48	0.46	0.42
45% glazed fenestration (22 in. x 64 in. lite)	-	0.69	0.49	0.46	0.39

2. **Two foot (or four foot) horizontal:** Insulation is applied directly to the underside of the slab, and run horizontally from the perimeter inward for 2 feet (or 4 feet). The slab edge is exposed in this configuration.

Note: A horizontal installation with a thermal break of at least R-5 at the slab edge should use the vertical-case F-factors.

3. **Fully insulated slab:** Insulation extends from the top of the slab, along the entire perimeter, and completely covers the area under the slab. Thicker perimeter insulation covers the slab edge and extends 2 feet under the slab.

NEW SECTION

WAC 51-11C-61070 Section A107—Default U-factors for doors.

NEW SECTION

WAC 51-11C-61071 Section A107.1—Doors without NFRC certification.

A107.1 Doors without NFRC certification. Doors that do not have NFRC certification shall be assigned the appropriate U-factor from Tables A107.1(1) through A107.1(4).

Door Type	No Glazed Fenestration	Single Glazing	Double Glazing with 1/4 in. Airspace	Double Glazing with 1/2 in. Airspace	Double Glazing with e = 0.10, 1/2 in. Argon
More than 50% glazed fenestration	Use Table C303.1.3(1)/R303.1.3(1) as appropriate				
Insulated steel slab with wood edge in wood frame ^a	0.16				
6% glazed fenestration (22 in. x 8 in. lite)	-	0.21	0.20	0.19	0.18
25% glazed fenestration (22 in. x 36 in. lite)	-	0.39	0.28	0.26	0.23
45% glazed fenestration (22 in. x 64 in. lite)	-	0.58	0.38	0.35	0.26
More than 50% glazed fenestration	Use Table C303.1.3(1)/R303.1.3(1) as appropriate				
Foam insulated steel slab with metal edge in steel frame ^b	0.37				
6% glazed fenestration (22 in. x 8 in. lite)	-	0.44	0.42	0.41	0.39
25% glazed fenestration (22 in. x 36 in. lite)	-	0.55	0.50	0.48	0.44
45% glazed fenestration (22 in. x 64 in. lite)	-	0.71	0.59	0.56	0.48
More than 50% glazed fenestration	Use Table C303.1.3(1)/R303.1.3(1) as appropriate				
Cardboard honeycomb slab with metal edge in steel frame ^b	0.61				
Style and Rail Doors					
Sliding glass doors/French doors	Use Table C303.1.3(1)/R303.1.3(1) as appropriate				
Site-Assembled Style and Rail Doors					
Aluminum in aluminum frame	-	1.32	0.99	0.93	0.79
Aluminum in aluminum frame with thermal break	-	1.13	0.80	0.74	0.63

^aThermally broken sill (add 0.03 for nonthermally broken sill)

^bNonthermally broken sill

^cNominal U-factors are through the center of the insulated panel before consideration of thermal bridges around the edges of the door sections and due to the frame.

NEW SECTION

WAC 51-11C-610712 Table A107.1(2)—Default U-factors for revolving doors.

**Table A107.1(2)
Default U-factors for Revolving Doors**

Revolving Doors	
Size (W x H)	U-Factor
3-wing	
8 ft. x 7 ft.	0.79
10 ft. x 8 ft.	0.80

Revolving Doors	
Size (W x H)	U-Factor
4-wing	
7 ft. x 6.5 ft.	0.63
7 ft. x 7.5 ft.	0.64
Open	
82 in. x 84 in.	1.32

NEW SECTION

WAC 51-11C-610713 Table A107.1(3)—Default U-factors for steel emergency doors.

**Table A107.1(3)
Default U-factors for Steel Emergency Doors**

Double-skin Steel Emergency Exit Doors		
Core Insulation	3 ft. x 6 ft. 8 in.	6 ft. x 6 ft. 8 in.
1-3/8 in. thickness		
Honeycomb kraft paper	0.57	0.52
Mineral wool, steel ribs	0.44	0.36
Polyurethane foam	0.34	0.28
1-3/4 in. thickness		
Honeycomb kraft paper	0.57	0.54
Mineral wool, steel ribs	0.41	0.33
Polyurethane foam	0.31	0.26

Double-skin Steel Emergency Exit Doors		
Core Insulation	3 ft. x 6 ft. 8 in.	6 ft. x 6 ft. 8 in.
1-3/8 in. thickness		
Honeycomb kraft paper	0.60	0.55
Mineral wool, steel ribs	0.47	0.39
Polyurethane foam	0.37	0.31
1-3/4 in. thickness		
Honeycomb kraft paper	0.60	0.57
Mineral wool, steel ribs	0.44	0.37
Polyurethane foam	0.34	0.30

NEW SECTION

WAC 51-11C-610714 Table A107.1(4)—Default U-factors for steel garage and hangar doors.

**Table A107.1(4)
Default U-factors for Steel Garage and Hangar Doors**

Double-skin Steel Garage and Aircraft Hangar Doors					
Insulation^c	One-piece tilt-up^a		Sectional tilt-up^b	Aircraft hangar	
	8 ft. x 7 ft.	16 ft. x 7 ft.	9 ft. x 7 ft.	72 ft. x 12 ft.^e	240 ft. x 50 ft.^d
1-3/8 in. thickness					
EPS, steel ribs	0.36	0.33	0.34 - 0.39		
XPS, steel ribs	0.33	0.31	0.31 - 0.36		
2 in. thickness					
EPS, steel ribs	0.31	0.28	0.29 - 0.33		
XPS, steel ribs	0.29	0.26	0.27 - 0.31		
3 in. thickness					
EPS, steel ribs	0.26	0.23	0.25 - 0.28		
XPS, steel ribs	0.24	0.21	0.24 - 0.27		
4 in. thickness					
EPS, steel ribs	0.23	0.20	0.23 - 0.25		
XPS, steel ribs	0.21	0.19	0.21 - 0.24		
6 in. thickness					
EPS, steel ribs	0.20	0.16	0.20 - 0.21		
XPS, steel ribs	0.19	0.15	0.19 - 0.21		
4 in. thickness					
Noninsulated				1.10	1.23
Expanded polystyrene				0.25	0.16
Mineral wool, steel ribs				0.25	0.16
Extruded polystyrene				0.23	0.15
6 in. thickness					
Noninsulated				1.10	1.23
Expanded polystyrene				0.21	0.13
Mineral wool, steel ribs				0.23	0.13
Extruded polystyrene				0.20	0.12
Uninsulated					
All products	1.15				

- ^aValues are for thermally broken or thermally unbroken doors.
- ^bLower values are for thermally broken doors; upper values are for doors with no thermal break.
- ^cTypical size for a small private airplane (single-engine or twin).
- ^dTypical hangar door for a midsize commercial jet airliner.
- ^eEPS is extruded polystyrene, XPS is expanded polystyrene.

Table A108.1(1)
Assumed Effective Air Changes per Hour

Air-Leakage Control Package	Air Changes per Hour	
	Natural	Effective
Standard	0.35	0.35

NEW SECTION

WAC 51-11C-61080 Section A108—Air infiltration.

NEW SECTION

WAC 51-11C-61081 Section A108.1—General.

A108.1 General. Tables A108.1(1) and A108.1(2) list effective air change rates and heat capacities for heat loss due to infiltration for Single-Family Residential.

The estimated seasonal average infiltration rate in air changes per hour (ACH) is given for standard air-leakage control (see Section R402.4 for air leakage requirements for Single-Family Residential). The effective air change rate shall be used in calculations for compliance under either the Component Performance or Systems Analysis approaches.

Heat loss due to infiltration shall be computed using the following equation:

$$Q_{infil} = ACH_{eff} * HCP$$

Where:

- Q_{infil} = Heat loss due to air infiltration.
- ACH_{eff} = The effective air infiltration rate in Table A108.1(1)
- HCP = The Heat Capacity Density Product for the appropriate elevation or climate zone as given below.

NEW SECTION

WAC 51-11C-71021 Table B102—Acceptable occupancy densities, receptacle power densities and service hot water consumption.

TABLE B102
Acceptable Occupancy Densities, Receptacle Power Densities and Service Hot Water Consumption^a

Building Type	Occupancy Density ^b ft ² /Person (Btu/h • ft ²)	Receptacle Power Density ^c , Watts/ft ² (Btu/h • ft ²)	Service Hot Water Quantities ^d Btu/h per person
Assembly	50 (4.60)	0.25 (0.85)	215
Health/Institutional	200 (1.15)	1.00 (3.41)	135
Hotel/Motel	250 (0.92)	0.25 (0.85)	1,110
Light Manufacturing	750 (0.31)	0.20 (0.68)	225
Office	275 (0.84)	0.75 (2.56)	175
Parking Garage	NA	NA	NA
Restaurant	100 (2.30)	0.10 (0.34)	390
Retail	300 (3.07)	0.25 (0.85)	135
School	75 (3.07)	0.50 (1.71)	215

Table A108.1(2)
Default Heat Capacity/Density Product for Air

Zone	Average Elevation	Heat Capacity/Density
1	Mean Sea Level	0.0180 Btu/h • °F
2	2000	0.0168 Btu/h • °F
3	3000	0.0162 Btu/h • °F

NEW SECTION

WAC 51-11C-70000 Appendix B—Default internal load values and schedules.

NEW SECTION

WAC 51-11C-71010 Section B101—General.

B101.1 Scope. The following default internal load values and schedules shall apply to Section C407.

NEW SECTION

WAC 51-11C-71020 Section B102—Default tables of internal loads.

B102 Default tables of internal loads. Default occupancy densities, receptacle power densities and service hot water consumption are included in Table B102.

Building Type	Occupancy Density ^b ft ² /Person (Btu/h • ft ²)	Receptacle Power Density ^c , Watts/ft ² (Btu/h • ft ²)	Service Hot Water Quantities ^d Btu/h per person
Warehouse	15,000 (0.02)	0.10 (0.34)	225

^aThe occupancy densities, receptacle power densities, and service hot water consumption values are from ASHRAE Standard 90.1-1989 and addenda.

^bValues are in square feet of conditioned floor area per person. Heat generation in Btu per person per hour is 230 sensible and 190 latent. Figures in parenthesis are equivalent Btu per hour per square foot.

^cValues are in watts per square foot of conditioned floor area. Figures in parenthesis are equivalent Btu per hour per square foot. These values are the minimum acceptable. If other process loads are not input (such as for computers, cooking, refrigeration, etc.), it is recommended that receptacle power densities be increased until total process energy consumption is equivalent to 25 percent of the total.

^dValues are in Btu per person per hour.

NEW SECTION

WAC 51-11C-71030 Section B103—Default schedules.

B103 Default schedules. Default schedules for occupancy, lighting, receptacles, HVAC, service hot water, and elevators are included in Tables B103(1) through B103(10).

NEW SECTION

WAC 51-11C-71031 Table B103(1)—Assembly occupancy.

**Table B103(1)
Assembly Occupancy^a**

Hour of Day (time)	Schedule for Occupancy <i>Percent of Maximum Load</i>			Schedule for Lighting ^b / Receptacle <i>Percent of Maximum Load</i>			Schedule for HVAC System			Schedule for Service Hot Water <i>Percent of Maximum Load</i>			Schedule for Elevator <i>Percent of Maximum Load</i>		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)	0	0	0	5	5	5	Off	Off	Off	0	0	0	0	0	0
2 (1-2am)	0	0	0	5	5	5	Off	Off	Off	0	0	0	0	0	0
3 (2-3am)	0	0	0	5	5	5	Off	Off	Off	0	0	0	0	0	0
4 (3-4am)	0	0	0	5	5	5	Off	Off	Off	0	0	0	0	0	0
5 (4-5am)	0	0	0	5	5	5	Off	Off	Off	0	0	0	0	0	0
6 (5-6am)	0	0	0	5	5	5	On	Off	Off	0	0	0	0	0	0
7 (6-7am)	0	0	0	35/40	5	5	On	On	On	0	0	0	0	0	0
8 (7-8am)	0	0	0	35/40	30	30	On	On	On	0	0	0	0	0	0
9 (8-9am)	20	20	10	35/40	30	30	On	On	On	0	0	0	0	0	0
10 (9-10am)	20	20	10	65/75	40/50	30	On	On	On	5	5	5	0	0	0
11 (10-11am)	20	20	10	65/75	40/50	30	On	On	On	5	5	5	0	0	0
12 (11-12pm)	80	60	10	65/75	40/50	30	On	On	On	35	20	10	0	0	0
13 (12-1pm)	80	60	10	65/75	40/50	55/65	On	On	On	5	0	0	0	0	0
14 (1-2pm)	80	60	70	65/75	40/50	55/65	On	On	On	5	0	0	0	0	0
15 (2-3pm)	80	60	70	65/75	40/50	55/65	On	On	On	5	0	0	0	0	0
16 (3-4pm)	80	60	70	65/75	40/50	55/65	On	On	On	5	0	0	0	0	0
17 (4-5pm)	80	60	70	65/75	40/50	55/65	On	On	On	5	0	0	0	0	0
18 (5-6pm)	80	60	70	65/75	40/50	55/65	On	On	On	0	0	0	0	0	0
19 (6-7pm)	20	60	70	65/75	40/50	55/65	On	On	On	0	0	0	0	0	0
20 (7-8pm)	20	60	70	65/75	40/50	55/65	On	On	On	0	65	65	0	0	0
21 (8-9pm)	20	60	70	65/75	40/50	55/65	On	On	On	0	30	30	0	0	0
22 (9-10pm)	20	80	70	65/75	40/50	55/65	On	On	On	0	0	0	0	0	0
23 (10-11pm)	10	10	20	25	40/50	5	On	On	On	0	0	0	0	0	0
24 (11-12am)	0	0	0	5	5	5	Off	Off	Off	0	0	0	0	0	0
Total/Day	710	750	700	1010/ 1155	660/ 800	745/845	1800	1700	1700	70	125	115	0	0	0

Hour of Day (time)	Schedule for Occupancy			Schedule for Lighting ^{b/} Receptacle			Schedule for HVAC System			Schedule for Service Hot Water			Schedule for Elevator		
	Percent of Maximum Load			Percent of Maximum Load						Percent of Maximum Load			Percent of Maximum Load		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
Total/Week	50.50		hours	64.55/74.20		hours	124		hours	5.9		hours	0		hours
Total/Year	2633		hours	3357/3869		hours	6465		hours	308		hours	0		hours

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system, and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

^bLighting profiles are modified to reflect the requirement for occupancy sensors in Section C405.2.

NEW SECTION

WAC 51-11C-71032 Table B103(2)—Health occupancy.

**Table B103(2)
Health Occupancy^a**

Hour of Day (time)	Schedule for Occupancy			Schedule for Lighting ^{b/} Receptacle			Schedule for HVAC System			Schedule for Service Hot Water			Schedule for Elevator		
	Percent of Maximum Load			Percent of Maximum Load						Percent of Maximum Load			Percent of Maximum Load		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)	0	0	0	10	10	5	On	On	On	1	1	1	0	0	0
2 (1-2am)	0	0	0	10	10	5	On	On	On	1	1	1	0	0	0
3 (2-3am)	0	0	0	10	10	5	On	On	On	1	1	1	0	0	0
4 (3-4am)	0	0	0	10	10	5	On	On	On	1	1	1	0	0	0
5 (4-5am)	0	0	0	10	10	5	On	On	On	1	1	1	0	0	0
6 (5-6am)	0	0	0	10	10	5	On	On	On	1	1	1	0	0	0
7 (6-7am)	0	0	0	10	10	5	On	On	On	1	1	1	0	0	0
8 (7-8am)	10	10	0	45/50	20	5	On	On	On	17	1	1	2	2	0
9 (8-9am)	50	30	5	80/90	35/40	10	On	On	On	58	20	1	75	46	2
10 (9-10am)	80	40	5	80/90	35/40	10	On	On	On	66	28	1	100	70	2
11 (10-11am)	80	40	5	80/90	35/40	10	On	On	On	78	30	1	100	70	2
12 (11-12pm)	80	40	5	80/90	35/40	10	On	On	On	82	30	1	100	70	2
13 (12-1pm)	80	40	5	80/90	35/40	10	On	On	On	71	24	1	75	51	2
14 (1-2pm)	80	40	5	80/90	35/40	10	On	On	On	82	24	1	100	51	2
15 (2-3pm)	80	40	5	80/90	35/40	10	On	On	On	78	23	1	100	51	2
16 (3-4pm)	80	40	5	80/90	35/40	10	On	On	On	74	23	1	100	51	2
17 (4-5pm)	80	40	0	30	35/40	5	On	On	On	63	23	1	100	51	0
18 (5-6pm)	50	10	0	30	35/40	5	On	On	On	41	10	1	100	25	0
19 (6-7pm)	30	10	0	30	10	5	On	On	On	18	1	1	52	2	0
20 (7-8pm)	30	0	0	30	10	5	On	On	On	18	1	1	52	0	0
21 (8-9pm)	20	0	0	30	10	5	On	On	On	18	1	1	52	0	0
22 (9-10pm)	20	0	0	30	10	5	On	On	On	10	1	1	28	0	0
23 (10-11pm)	0	0	0	30	10	5	On	On	On	1	1	1	0	0	0
24 (11-12am)	0	0	0	10	10	5	On	On	On	1	1	1	0	0	0
Total/Day	850	380	40	975/1060	500/550	160	2400	2400	2400	783	249	24	1136	540	16
Total/Week		46.70	hours		55.35/60.10	hours		168	hours		41.88	hours		62.36	hours
Total/Year		2435	hours		2878/3134	hours		8760	hours		2148	hours		3251	hours

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system, and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

^bLighting profiles are modified to reflect the requirement for occupancy sensors in Section C405.2.

NEW SECTION

WAC 51-11C-71033 Table B103(3)—Hotel/motel occupancy.

**Table B103(3)
Hotel/Motel Occupancy^a**

Hour of Day (time)	Schedule for Occupancy Percent of Maximum Load			Schedule for Lighting/ Receptacle Percent of Maximum Load			Schedule for HVAC System			Schedule for Service Hot Water Percent of Maximum Load			Schedule for Elevator Percent of Maximum Load		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)	90	90	70	20	20	30	On	On	On	20	20	25	40	44	55
2 (1-2am)	90	90	70	15	20	30	On	On	On	15	15	20	33	35	55
3 (2-3am)	90	90	70	10	10	20	On	On	On	15	15	20	33	35	43
4 (3-4am)	90	90	70	10	10	20	On	On	On	15	15	20	33	35	43
5 (4-5am)	90	90	70	10	10	20	On	On	On	20	20	20	33	35	43
6 (5-6am)	90	90	70	20	10	20	On	On	On	25	25	30	33	35	43
7 (6-7am)	70	70	70	40	30	30	On	On	On	50	40	50	42	40	52
8 (7-8am)	40	50	70	50	30	40	On	On	On	60	50	50	42	32	52
9 (8-9am)	40	50	50	40	40	40	On	On	On	55	50	50	52	45	65
10 (9-10am)	20	30	50	40	40	30	On	On	On	45	50	55	52	45	65
11 (10-11am)	20	30	50	25	30	30	On	On	On	40	45	50	40	42	53
12 (11-12pm)	20	30	30	25	25	30	On	On	On	45	50	50	51	60	60
13 (12-1pm)	20	30	30	25	25	30	On	On	On	40	50	40	51	65	53
14 (1-2pm)	20	30	20	25	25	20	On	On	On	35	45	40	51	65	51
15 (2-3pm)	20	30	20	25	25	20	On	On	On	30	40	30	51	65	50
16 (3-4pm)	30	30	20	25	25	20	On	On	On	30	40	30	51	65	44
17 (4-5pm)	50	30	30	25	25	20	On	On	On	30	35	30	63	65	64
18 (5-6pm)	50	50	40	25	25	20	On	On	On	40	40	40	80	75	62
19 (6-7pm)	50	60	40	60	60	50	On	On	On	55	55	50	86	80	65
20 (7-8pm)	70	60	60	80	70	70	On	On	On	60	55	50	70	80	63
21 (8-9pm)	70	60	60	90	70	80	On	On	On	50	50	40	70	75	63
22 (9-10pm)	80	70	80	80	70	60	On	On	On	55	55	50	70	75	63
23 (10-11pm)	90	70	80	60	60	50	On	On	On	45	40	40	45	55	40
24 (11-12am)	90	70	80	30	30	30	On	On	On	25	30	20	45	55	40
Total/Day	1390	1390	1300	855	785	810	2400	2400	2400	915	930	900	1217	1303	1287
Total/Week		96.40	hours		58.70	hours		168.0	hours		64.05	hours		86.75	hours
Total/Year		5026	hours		3061	hours		8760	hours		3340	hours		4523	hours

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system, and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

NEW SECTION

WAC 51-11C-71034 Table B103(4)—Light manufacturing occupancy.

Table B103(4)
Light Manufacturing Occupancy^a

Hour of Day (time)	Schedule for Occupancy <i>Percent of Maximum Load</i>			Schedule for Lighting ^b / Receptacle <i>Percent of Maximum Load</i>			Schedule for HVAC System			Schedule for Service Hot Water <i>Percent of Maximum Load</i>			Schedule for Elevator <i>Percent of Maximum Load</i>		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
2 (1-2am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
3 (2-3am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
4 (3-4am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
5 (4-5am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
6 (5-6am)	0	0	0	10	5	5	Off	Off	Off	8	8	7	0	0	0
7 (6-7am)	10	10	5	10	10	5	On	On	Off	7	7	4	0	0	0
8 (7-8am)	20	10	5	30	10	5	On	On	Off	19	11	4	35	16	0
9 (8-9am)	95	30	5	85/90	30	5	On	On	Off	35	15	4	69	14	0
10 (9-10am)	95	30	5	85/90	30	5	On	On	Off	38	21	4	43	21	0
11 (10-11am)	95	30	5	85/90	30	5	On	On	Off	39	19	4	37	18	0
12 (11-12pm)	95	30	5	85/90	30	5	On	On	Off	47	23	6	43	25	0
13 (12-1pm)	50	10	5	75/80	15	5	On	On	Off	57	20	6	58	21	0
14 (1-2pm)	95	10	5	85/90	15	5	On	On	Off	54	19	9	48	13	0
15 (2-3pm)	95	10	5	85/90	15	5	On	On	Off	34	15	6	37	8	0
16 (3-4pm)	95	10	5	85/90	15	5	On	On	Off	33	12	4	37	4	0
17 (4-5pm)	95	10	5	85/90	15	5	On	On	Off	44	14	4	46	5	0
18 (5-6pm)	30	5	5	50	5	5	On	On	Off	26	7	4	62	6	0
19 (6-7pm)	10	5	0	30	5	5	On	Off	Off	21	7	4	20	0	0
20 (7-8pm)	10	0	0	30	5	5	On	Off	Off	15	7	4	12	0	0
21 (8-9pm)	10	0	0	20	5	5	On	Off	Off	17	7	4	4	0	0
22 (9-10pm)	10	0	0	20	5	5	On	Off	Off	8	9	7	4	0	0
23 (10-11pm)	5	0	0	10	5	5	Off	Off	Off	5	5	4	0	0	0
24 (11-12am)	5	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
Total/Day	920	200	60	995/ 1040	280	120	1600	1200	0	537	256	113	555	151	0
Total/Week		48.60	hours		53.75/ 56.00	hours		92.00	hours		30.54	hours		29.26	hours
Total/Year		2534	hours		2795/ 2920	hours		4797	hours		1592	hours		1526	hours

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system, and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

^bLighting profiles are modified to reflect the requirement for occupancy sensors in Section C405.2.

NEW SECTION

WAC 51-11C-71035 Table B103(5)—Office occupancy.

Table B103(5)
Office Occupancy^a

Hour of Day (time)	Schedule for Occupancy Percent of Maximum Load			Schedule for Lighting ^b / Receptacle Percent of Maximum Load			Schedule for HVAC System			Schedule for Service Hot Water Percent of Maximum Load			Schedule for Elevator Percent of Maximum Load		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
2 (1-2am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
3 (2-3am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
4 (3-4am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
5 (4-5am)	0	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
6 (5-6am)	0	0	0	10	5	5	Off	Off	Off	8	8	7	0	0	0
7 (6-7am)	10	10	5	10	10	5	On	On	Off	7	7	4	0	0	0
8 (7-8am)	20	10	5	30	10	5	On	On	Off	19	11	4	35	16	0
9 (8-9am)	95	30	5	65/90	30	5	On	On	Off	35	15	4	69	14	0
10 (9-10am)	95	30	5	65/90	30	5	On	On	Off	38	21	4	43	21	0
11 (10-11am)	95	30	5	65/90	30	5	On	On	Off	39	19	4	37	18	0
12 (11-12pm)	95	30	5	65/90	30	5	On	On	Off	47	23	6	43	25	0
13 (12-1pm)	50	10	5	55/80	15	5	On	On	Off	57	20	6	58	21	0
14 (1-2pm)	95	10	5	65/90	15	5	On	On	Off	54	19	9	48	13	0
15 (2-3pm)	95	10	5	65/90	15	5	On	On	Off	34	15	6	37	8	0
16 (3-4pm)	95	10	5	65/90	15	5	On	On	Off	33	12	4	37	4	0
17 (4-5pm)	95	10	5	65/90	15	5	On	On	Off	44	14	4	46	5	0
18 (5-6pm)	30	5	5	35/50	5	5	On	On	Off	26	7	4	62	6	0
19 (6-7pm)	10	5	0	30	5	5	On	On	Off	21	7	4	20	0	0
20 (7-8pm)	10	0	0	30	5	5	On	Off	Off	15	7	4	12	0	0
21 (8-9pm)	10	0	0	20	5	5	On	Off	Off	17	7	4	4	0	0
22 (9-10pm)	10	0	0	20	5	5	On	Off	Off	8	9	7	4	0	0
23 (10-11pm)	5	0	0	10	5	5	Off	Off	Off	5	5	4	0	0	0
24 (11-12am)	5	0	0	5	5	5	Off	Off	Off	5	5	4	0	0	0
Total/Day	920	200	60	800/ 1040	280	120	1600	1200	0	537	256	113	555	151	0
Total/Week		48.60	hours		44.00/ 56.00	hours		92.00	hours		30.54	hours		29.26	hours
Total/Year		2534	hours		2288/ 2920	hours		4797	hours		1592	hours		1526	hours

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system, and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

^bLighting profiles are modified to reflect the requirement for occupancy sensors in Section C405.2.

NEW SECTION

WAC 51-11C-71036 Table B103(6)—Parking garage occupancy.

Table B103(6)
Parking Garage Occupancy^a

Hour of Day (time)	Schedule for Occupancy Percent of Maximum Load			Schedule for Lighting ^{b/} Receptacle Percent of Maximum Load			Schedule for HVAC System			Schedule for Service Hot Water Percent of Maximum Load			Schedule for Elevator Percent of Maximum Load		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)				50/100	50/100	50/100									
2 (1-2am)				50/100	50/100	50/100									
3 (2-3am)				50/100	50/100	50/100									
4 (3-4am)				50/100	50/100	50/100									
5 (4-5am)				50/100	50/100	50/100									
6 (5-6am)				50/100	50/100	50/100									
7 (6-7am)				100	100	50/100									
8 (7-8am)				100	100	50/100									
9 (8-9am)				100	100	50/100									
10 (9-10am)				100	100	50/100	Based								
11 (10-11am)				100	100	50/100	on								
12 (11-12pm)		N/A		100	100	50/100	likely			N/A					
13 (12-1pm)				100	100	50/100	use								
14 (1-2pm)				100	100	50/100									
15 (2-3pm)				100	100	50/100									
16 (3-4pm)				100	100	50/100									
17 (4-5pm)				100	100	50/100									
18 (5-6pm)				100	50/100	50/100									
19 (6-7pm)				100	50/100	50/100									
20 (7-8pm)				100	50/100	50/100									
21 (8-9pm)				100	50/100	50/100									
22 (9-10pm)				100	50/100	50/100									
23 (10-11pm)				50/100	50/100	50/100									
24 (11-12am)				50/100	50/100	50/100									
Total/Day				2000/ 2400	1750/ 2400	1200/ 2400									
Total/Week					129.50/ 168	hours									
Total/Year					6734/ 8760	hours									

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

^bLighting profiles are modified to reflect the requirement for occupancy sensors in Section C405.2. For parking garage lighting, the schedule has been revised to accompany the office schedule: The lighting in the parking garage is set to be on at 100 percent for all hours when the building occupancy is 10 percent or greater, but reduced to 50 percent (per Section C405.2) for all hours when the building occupancy is less than 10 percent. For a parking garage serving a use other than office, it is acceptable to modify the parking garage schedule to parallel that use.

NEW SECTION

WAC 51-11C-71037 Table B103(7)—Restaurant occupancy.

Table B103(7)
Restaurant Occupancy^a

Hour of Day (time)	Schedule for Occupancy Percent of Maximum Load			Schedule for Lighting ^b / Receptacle Percent of Maximum Load			Schedule for HVAC System			Schedule for Service Hot Water Percent of Maximum Load			Schedule for Elevator Percent of Maximum Load		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)	15	30	20	15	20	20	On	On	On	20	20	25	0	0	0
2 (1-2am)	15	25	20	15	15	15	On	On	On	15	15	20	0	0	0
3 (2-3am)	5	5	5	15	15	15	On	On	On	15	15	20	0	0	0
4 (3-4am)	0	0	0	15	15	15	Off	Off	Off	0	0	0	0	0	0
5 (4-5am)	0	0	0	15	15	15	Off	Off	Off	0	0	0	0	0	0
6 (5-6am)	0	0	0	20	15	15	Off	Off	Off	0	0	0	0	0	0
7 (6-7am)	0	0	0	35/40	30	30	Off	Off	Off	0	0	0	0	0	0
8 (7-8am)	5	0	0	35/40	30	30	On	Off	Off	60	0	0	0	0	0
9 (8-9am)	5	0	0	55/60	55/60	45/50	On	Off	Off	55	0	0	0	0	0
10 (9-10am)	5	5	0	55/60	55/60	45/50	On	On	Off	45	50	0	0	0	0
11 (10-11am)	20	20	10	85/90	75/80	65/70	On	On	On	40	45	50	0	0	0
12 (11-12pm)	50	45	20	85/90	75/80	65/70	On	On	On	45	50	50	0	0	0
13 (12-1pm)	80	50	25	85/90	75/80	65/70	On	On	On	40	50	40	0	0	0
14 (1-2pm)	70	50	25	85/90	75/80	65/70	On	On	On	35	45	40	0	0	0
15 (2-3pm)	40	35	15	85/90	75/80	65/70	On	On	On	30	40	30	0	0	0
16 (3-4pm)	20	30	20	85/90	75/80	65/70	On	On	On	30	40	30	0	0	0
17 (4-5pm)	25	30	25	85/90	75/80	55/60	On	On	On	30	35	30	0	0	0
18 (5-6pm)	50	30	35	85/90	85/90	55/60	On	On	On	40	40	40	0	0	0
19 (6-7pm)	80	70	55	85/90	85/90	55/60	On	On	On	55	55	50	0	0	0
20 (7-8pm)	80	90	65	85/90	85/90	55/60	On	On	On	60	55	50	0	0	0
21 (8-9pm)	80	70	70	85/90	85/90	55/60	On	On	On	50	50	40	0	0	0
22 (9-10pm)	50	65	35	85/90	85/90	55/60	On	On	On	55	55	50	0	0	0
23 (10-11pm)	35	55	20	45/50	45/50	45/50	On	On	On	45	40	40	0	0	0
24 (11-12am)	20	35	20	30	30	30	On	On	On	25	30	20	0	0	0
Total/Day	750	740	485	1370/ 1455	1290/ 1365	1040/ 1115	2000	1800	1700	790	730	625	0	0	0
Total/Week		49.75	hours		91.80/ 97.55	hours		135	hours		53.05	hours	0	hours	
Total/Year		2594	hours		4774/ 5086	hours		7039	hours		2766	hours	0	hours	

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

^bLighting profiles are modified to reflect the requirement for occupancy sensors in Section C405.2.

NEW SECTION

WAC 51-11C-71038 Table B103(8)—Retail occupancy.

Table B103(8)
Retail Occupancy^a

Hour of Day (time)	Schedule for Occupancy Percent of Maximum Load			Schedule for Lighting ^b / Receptacle Percent of Maximum Load			Schedule for HVAC System			Schedule for Service Hot Water Percent of Maximum Load			Schedule for Elevator Percent of Maximum Load		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)	0	0	0	5	5	5	Off	Off	Off	4	11	7	0	0	0
2 (1-2am)	0	0	0	5	5	5	Off	Off	Off	5	10	7	0	0	0
3 (2-3am)	0	0	0	5	5	5	Off	Off	Off	5	8	7	0	0	0
4 (3-4am)	0	0	0	5	5	5	Off	Off	Off	4	6	6	0	0	0
5 (4-5am)	0	0	0	5	5	5	Off	Off	Off	4	6	6	0	0	0
6 (5-6am)	0	0	0	5	5	5	Off	Off	Off	4	6	6	0	0	0
7 (6-7am)	0	0	0	5	5	5	On	On	Off	4	7	7	0	0	0
8 (7-8am)	10	10	0	20	10	5	On	On	Off	15	20	10	12	9	0
9 (8-9am)	20	20	0	50	30	10	On	On	On	23	24	12	22	21	0
10 (9-10am)	50	50	10	85/90	55/60	10	On	On	On	32	27	14	64	56	11
11 (10-11am)	50	60	20	85/90	85/90	40	On	On	On	41	42	29	74	66	13
12 (11-12pm)	70	80	20	85/90	85/90	40	On	On	On	57	54	31	68	68	35
13 (12-1pm)	70	80	40	85/90	85/90	55/60	On	On	On	62	59	36	68	68	37
14 (1-2pm)	70	80	40	85/90	85/90	55/60	On	On	On	61	60	36	71	69	37
15 (2-3pm)	70	80	40	85/90	85/90	55/60	On	On	On	50	49	34	72	70	39
16 (3-4pm)	80	80	40	85/90	85/90	55/60	On	On	On	45	48	35	72	69	41
17 (4-5pm)	70	80	40	85/90	85/90	55/60	On	On	On	46	47	37	73	66	38
18 (5-6pm)	50	60	20	85/90	85/90	40	On	On	Off	47	46	34	68	58	34
19 (6-7pm)	50	20	10	55/60	50	20	On	On	Off	42	44	25	68	47	3
20 (7-8pm)	30	20	0	55/60	30	5	On	On	Off	34	36	27	58	43	0
21 (8-9pm)	30	20	0	50	30	5	On	On	Off	33	29	21	54	43	0
22 (9-10pm)	0	10	0	20	10	5	Off	On	Off	23	22	16	0	8	0
23 (10-11pm)	0	0	0	5	5	5	Off	Off	Off	13	16	10	0	0	0
24 (11-12am)	0	0	0	5	5	5	Off	Off	Off	8	13	6	0	0	0
Total/Day	750	750	280	1060/1115	940/ 985	500/ 525	1500	1600	900	662	690	459	844	761	288
Total/Week		46.30	hours		67.40/ 70.85	hours		100	hours		44.59	hours		52.69	hours
Total/Year		2414	hours		3505/ 3694	hours		5214	hours		2325	hours		2747	hours

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

^bLighting profiles are modified to reflect the requirement for occupancy sensors in Section C405.2.

NEW SECTION

WAC 51-11C-71039 Table B103(9)—School and warehouse occupancies.

Table B103(9)
School Occupancy^a

Hour of Day (time)	Schedule for Occupancy <i>Percent of Maximum Load</i>			Schedule for Lighting ^b /Receptacle <i>Percent of Maximum Load</i>			Schedule for HVAC System			Schedule for Service Hot Water <i>Percent of Maximum Load</i>			Schedule for Elevator <i>Percent of Maximum Load</i>		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)	0	0	0	5	5	5	Off	Off	Off	5	3	3	0	0	0
2 (1-2am)	0	0	0	5	5	5	Off	Off	Off	5	3	3	0	0	0
3 (2-3am)	0	0	0	5	5	5	Off	Off	Off	5	3	3	0	0	0
4 (3-4am)	0	0	0	5	5	5	Off	Off	Off	5	3	3	0	0	0
5 (4-5am)	0	0	0	5	5	5	Off	Off	Off	5	3	3	0	0	0
6 (5-6am)	0	0	0	5	5	5	Off	Off	Off	5	3	3	0	0	0
7 (6-7am)	0	0	0	5	5	5	Off	Off	Off	5	3	3	0	0	0
8 (7-8am)	5	0	0	30	5	5	On	Off	Off	10	3	3	0	0	0
9 (8-9am)	75	10	0	60/85	15	5	On	On	Off	34	3	5	30	0	0
10 (9-10am)	90	10	0	65/95	15	5	On	On	Off	60	5	5	30	0	0
11 (10-11am)	90	10	0	65/95	15	5	On	On	Off	63	5	5	30	0	0
12 (11-12pm)	80	10	0	65/95	15	5	On	On	Off	72	5	5	30	0	0
13 (12-1pm)	80	10	0	55/80	15	5	On	On	Off	79	5	5	30	0	0
14 (1-2pm)	80	0	0	55/80	5	5	On	Off	Off	83	3	5	30	0	0
15 (2-3pm)	80	0	0	55/80	5	5	On	Off	Off	61	3	3	30	0	0
16 (3-4pm)	45	0	0	50/70	5	5	On	Off	Off	65	3	3	15	0	0
17 (4-5pm)	15	0	0	35/50	5	5	On	Off	Off	10	3	3	0	0	0
18 (5-6pm)	5	0	0	35/50	5	5	On	Off	Off	10	3	3	0	0	0
19 (6-7pm)	15	0	0	35	5	5	On	Off	Off	19	3	3	0	0	0
20 (7-8pm)	20	0	0	35	5	5	On	Off	Off	25	3	3	0	0	0
21 (8-9pm)	20	0	0	35	5	5	On	Off	Off	22	3	3	0	0	0
22 (9-10pm)	10	0	0	30	5	5	On	Off	Off	22	3	3	0	0	0
23 (10-11pm)	0	0	0	5	5	5	Off	Off	Off	12	3	3	0	0	0
24 (11-12am)	0	0	0	5	5	5	Off	Off	Off	9	3	3	0	0	0
Total/Day	710	50	0	750/990	170	120	1500	500	0	691	80	84	285	0	0
Total/Week		36.00	hours		40.40/ 52.40	hours		80.00	hours		36.19	hours		14.25	hours
Total/Year		1877	hours		2101/ 2732	hours		4171	hours		1887	hours		743	hours

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

^bLighting profiles are modified to reflect the requirement for occupancy sensors in Section C405.2.

**Table B103(10)
Warehouse Occupancy^a**

Hour of Day (time)	Schedule for Occupancy			Schedule for Lighting ^b / Receptacle			Schedule for HVAC System			Schedule for Service Hot Water			Schedule for Elevator		
	Percent of Maximum Load			Percent of Maximum Load						Percent of Maximum Load			Percent of Maximum Load		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1 (12-1am)	0	0	0	5	5	5	Off	Off	Off	2	2	2	0	0	0
2 (1-2am)	0	0	0	5	5	5	Off	Off	Off	2	2	2	0	0	0
3 (2-3am)	0	0	0	5	5	5	Off	Off	Off	2	2	2	0	0	0
4 (3-4am)	0	0	0	5	5	5	Off	Off	Off	2	2	2	0	0	0
5 (4-5am)	0	0	0	5	5	5	Off	Off	Off	5	2	2	0	0	0
6 (5-6am)	0	0	0	5	5	5	Off	Off	Off	7	2	2	0	0	0
7 (6-7am)	0	0	0	5	5	5	Off	Off	Off	7	2	2	0	0	0
8 (7-8am)	15	0	0	25/40	5	5	On	Off	Off	10	2	2	0	0	0
9 (8-9am)	70	20	0	45/70	8	5	On	On	Off	30	6	2	0	0	0
10 (9-10am)	90	20	0	55/90	24	5	On	On	Off	36	12	2	0	0	0
11 (10-11am)	90	20	0	55/90	24	5	On	On	Off	36	12	2	30	0	0
12 (11-12pm)	90	20	0	55/90	24	5	On	On	Off	46	17	2	0	0	0
13 (12-1pm)	50	10	0	50/80	5	5	On	On	Off	57	4	4	0	0	0
14 (1-2pm)	85	10	0	55/90	5	5	On	On	Off	43	4	4	0	0	0
15 (2-3pm)	85	10	0	55/90	5	5	On	On	Off	38	2	2	0	0	0
16 (3-4pm)	85	10	0	55/90	5	5	On	On	Off	40	2	2	40	0	0
17 (4-5pm)	20	0	0	55/90	5	5	On	Off	Off	30	2	2	0	0	0
18 (5-6pm)	0	0	0	30	5	5	Off	Off	Off	18	2	2	0	0	0
19 (6-7pm)	0	0	0	5	5	5	Off	Off	Off	3	2	2	0	0	0
20 (7-8pm)	0	0	0	5	5	5	Off	Off	Off	3	2	2	0	0	0
21 (8-9pm)	0	0	0	5	5	5	Off	Off	Off	3	2	2	0	0	0
22 (9-10pm)	0	0	0	5	5	5	Off	Off	Off	3	2	2	0	0	0
23 (10-11pm)	0	0	0	5	5	5	Off	Off	Off	3	2	2	0	0	0
24 (11-12am)	0	0	0	5	5	5	Off	Off	Off	3	2	2	0	0	0
Total/Day	680	120	0	600/915	180	120	1000	800	0	429	91	52	70	0	0
Total/Week		35.20	hours		33.00/ 48.75	hours		58.00	hours		22.88	hours		3.50	hours
Total/Year		1835	hours		1716/ 2542	hours		3024	hours		1193	hours		182	hours

Wk = Weekday

^aSchedules for occupancy, lighting, receptacle, HVAC system and service hot water are from ASHRAE Standard 90.1-1989 and addendums, except that 5 percent emergency lighting has been added for all off hours. Elevator schedules, except for restaurants, are from the U.S. Department of Energy Standard Evaluation Techniques except changed to 0 percent when occupancy is 0 percent. **These values may be used only if actual schedules are not known.**

^bLighting profiles are modified to reflect the requirement for occupancy sensors in Section C405.2.

NEW SECTION

WAC 51-11C-80000 Appendix C—Exterior design conditions. As required by Sections C302.2 and R302.2, the heating or cooling outdoor design temperatures shall be selected from Table C-1.

NEW SECTION

WAC 51-11C-80100 Table C-1—Outdoor design temperatures for Washington.

**Table C-1
Outdoor Design Temperatures**

Location	Outdoor Design Temp. Heating (°F)	Outdoor Design Temp. Cooling (°F)
Aberdeen 20 NNE	25	83
Anacortes	24	72
Anatone	-4	89
Auburn	25	84
Battleground	19	91

Location	Outdoor Design Temp. Heating (°F)	Outdoor Design Temp. Cooling (°F)
Bellevue	24	83
Bellingham 2 N	19	78
Blaine	17	73
Bremerton	29	83
Burlington	19	77
Chehalis	21	87
Chelan	10	89
Cheney	4	94
Chesaw	-11	81
Clarkston	10	94
Cle Elum	1	91
Colfax 1 NW	2	94
Colville AP	-2	92
Concrete	19	83
Connell 4 NNW	6	100
Cougar 5 E	25	93
Dallesport AP	14	99
Darrington RS	13	85
Davenport	5	92
Edmonds	24	82
Ellensburg AP	2	90
Elma	24	88
Ephrata AP	7	97
Everett Paine AFB	21	79
Forks 1 E	23	81
Glacier RS	13	82
Glenoma (Kosmos)	18	89
Goldendale	7	94
Grays River Hatchery	24	86
Greenwater	1.4	84
Grotto	21	84
Hoquiam AP	26	79
Inchelium 2 NW	0	92
John Day Dam	19	100
Kent	21	85
Kirkland	17	83
La Grande	23	88
Leavenworth	-3	93
Little Goose Dam	22	101
Long Beach 3 NNE	25	77
Longview	24	87
Lower Granite Dam	14	98

Location	Outdoor Design Temp. Heating (°F)	Outdoor Design Temp. Cooling (°F)
Lower Monument Dam	18	103
Marysville	23	79
Metaline Falls	-1	89
Methow 2 W	1	89
Nespelem 2 S	-4	93
Newhalem	19	89
Newport	-5	92
Northport	2	92
Oak Harbor	16	74
Odessa	7	100
Olga 2 SE	24	71
Olympia, AP	17	85
Omak 2 NW	3	90
Oroville	5	93
Othello	9	98
Packwood	16	90
Plain	-3	89
Pleasant View	16	98
Pomeroy	3	95
Port Angeles	28	75
Port Townsend	25	76
Prosser	12	97
Puyallup	19	86
Quilcene 2 SW	23	83
Quinalt RS	25	84
Rainier, Longmire	15	85
Paradise RS	8	71
Raymond	28	81
Redmond	17	83
Republic	-9	87
Richland	11	101
Ritzville	6	99
Satus Pass	10	90
Seattle: Sea-Tac AP	24	83
Sedro Woolley 1 E	19	78
Sequim	23	78
Shelton	23	85
Smyrna	8	102
Snohomish	21	81
Snoqualmie Pass	6	80
Spokane AP	4	92
Spokane CO	10	96
Stampede Pass	7	76

Location	Outdoor Design Temp. Heating (°F)	Outdoor Design Temp. Cooling (°F)
Stehekin 3 NW	12	85
Stevens Pass	6	77
Tacoma CO	29	82
Tatoosh Island	31	63
Toledo AP	17	84
Vancouver	22	88
Vashon Island	28	78
Walla Walla AP	6	96
Waterville	1	88
Wellpinit	1	93
Wenatchee CO	10	92
Whidbey Island	11	71
Willapa Harbor	26	81
Wilson Creek	3	96
Winthrop 1 WSW	-12	91
Yakima AP	11	94

ABBREVIATIONS:

AFB Air Force Base
 AP Airport
 CO City Office
 RS Ranger Station
 Typical: "4(miles)NE"

WSR 13-04-059**PERMANENT RULES****DEPARTMENT OF LICENSING**

[Filed February 1, 2013, 12:20 p.m., effective March 4, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: Update WAC 308-104-160 to provide a definition for "moving violations" and "nonmoving violations" for purposes of RCW 46.20.2891, 46.65.020, and chapter 308-104 WAC.

Citation of Existing Rules Affected by this Order: Amending WAC 308-104-160.

Statutory Authority for Adoption: RCW 46.01.110, 46.20.2891, 46.20.291, and 46.65.020.

Adopted under notice filed as WSR 12-24-082 on December 5, 2012.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 1, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 1, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 0, Repealed 0.

Date Adopted: February 1, 2013.

Damon Monroe
 Rules Coordinator

Moving Violations
Draft 2.0

AMENDATORY SECTION (Amending WSR 00-18-070, filed 9/1/00, effective 10/2/00)

WAC 308-104-160 Moving and nonmoving violations defined. ((A "nonmoving violation" as used in)) For purposes of RCW 46.20.2891, 46.65.020, and this chapter, the term "moving violation" means any violation of vehicle laws listed in this section that is committed by the driver of a vehicle, while the vehicle is moving. However, being in actual physical control of a motor vehicle while under the influence of intoxicating liquor or any drug is also considered a moving violation for the purposes of this section. Parking violations, equipment violations or paperwork violations relating to insurance, registration, licensing and inspection are considered "nonmoving violations." ((shall mean any violation or traffic infraction in Title 46 RCW, other than those)) Moving violations are those violations included in the following list or violations of substantially similar laws, administrative regulations, local laws, ordinances, regulations, or resolutions of a political subdivision of this state, the federal government, or any other state:

- (1) Driving while under the influence of intoxicating liquor or any drug as defined by RCW 46.61.502;
- (2) Physical control of a motor vehicle while under the influence of intoxicating liquor or any drug, as defined by RCW 46.61.504;
- (3) Vehicular homicide, as defined by RCW 46.61.520;
- (4) Vehicular assault, as defined by RCW 46.61.522;
- (5) Reckless driving, as defined by RCW 46.61.500;
- (6) Racing, as defined by RCW 46.61.530;
- (7) Embracing, as defined by RCW 46.61.665;
- (8) Hit and run (injury, death, striking the body of a deceased person, or occupied vehicle), as defined by RCW 46.52.020;
- (9) Attempting to elude a police vehicle, as defined by RCW 46.61.024;
- (10) Driving while driving privilege suspended or revoked, as defined by RCW 46.20.342, 46.20.345, or 46.20.394((-or 46.20.420));
- (11) Reckless endangerment of roadway workers, as defined in RCW 46.61.527;
- (12) Driver under twenty-one driving or being in physical control of a motor vehicle after consuming alcohol, as defined in RCW 46.61.503;

(13) Driving or in physical control of commercial motor vehicle while having alcohol in system, as defined in RCW 46.25.110;

(14) Open container violation (driver), as defined by RCW 46.61.519;

(15) Negligent driving in the first degree, as defined by RCW 46.61.5249;

(16) Negligent driving in the second degree, as defined by RCW 46.61.525 or 46.61.526;

(17) Hit and run (unattended vehicle or property), as defined by RCW 46.52.010;

(18) Disobey road sign, as defined by RCW 46.61.050, ~~((and))~~ 46.61.070, or 46.61.450;

(19) Disobey signalman, officer, or firefighter, as defined by RCW 46.61.015, 46.61.020, 46.61.021, or 46.61.-022;

(20) Disobey school patrol, as defined by RCW 46.61.385;

(21) Speed too fast for conditions, as defined by RCW 46.61.400;

(22) Speed in excess of maximum limit, as defined by RCW 46.61.400 or 46.61.460;

(23) Speeding in a school zone, as defined by RCW 46.61.440;

(24) Failure to stop, as defined by RCW 46.61.055, 46.61.065, 46.61.195, 46.61.200, 46.61.340, 46.61.345, 46.61.350, 46.61.365, 46.61.370, or 46.61.375;

(25) Failure to yield right of way, as defined by RCW 46.61.180, 46.61.183, 46.61.185, 46.61.190, 46.61.202, 46.61.205, 46.61.210, 46.61.212, 46.61.215, 46.61.220, 46.61.235, 46.61.245, 46.61.261, 46.61.300, or 46.61.427;

(26) Failure to keep to the right, as defined by RCW 46.61.100 or 46.61.105;

(27) Wrong way on a one-way street or rotary traffic island, as defined by RCW 46.61.135;

(28) Improper lane change or travel, as defined by RCW 46.61.140;

(29) Straddling or driving over centerline, as defined by RCW 46.61.140;

(30) Driving on the wrong side of the road, as defined by RCW 46.61.150;

(31) Crossing divider, as defined by RCW 46.61.150;

(32) Improper entrance to or exit from freeway, as defined by RCW 46.61.155;

(33) Violating restrictions on a limited access highway while driving a motor vehicle, as defined by RCW 46.61.160;

(34) High occupancy vehicle lane violation, as defined by RCW 46.61.165;

~~((34))~~ (35) Improper overtaking or passing, as defined by RCW 46.61.110, 46.61.115, 46.61.120, 46.61.125, ~~((or))~~ 46.61.130, or 46.61.428;

~~((35))~~ (36) Passing stopped school bus, as defined by RCW 46.61.370;

~~((36))~~ (37) Passing stopped private carrier bus, as defined by RCW 46.61.375;

~~((37))~~ (38) Following ~~((to))~~ too closely, as defined by RCW 46.61.145;

~~((38))~~ (39) Following fire apparatus, as defined by RCW 46.61.635;

~~((39))~~ (40) Crossing fire hose, as defined by RCW 46.61.640;

~~((40))~~ (41) Driving on sidewalk, as defined by RCW 46.61.606;

~~((41))~~ (42) Driving through safety zone, as defined by RCW 46.61.260;

~~((42))~~ (43) Driving with wheels off roadway, as defined by RCW 46.61.670;

~~((43))~~ (44) Impeding traffic, as defined by RCW 46.61.100, 46.61.425, or 46.20.427;

~~((44))~~ (45) Improper turn, as defined by RCW 46.61.290;

~~((45))~~ (46) Prohibited turn, as defined by RCW 46.61.295;

~~((46))~~ (47) Failure to signal or improper signal, as defined by RCW 46.61.305, 46.61.310, or 46.61.315;

~~((47))~~ (48) Improper backing, as defined by RCW 46.61.605;

~~((48))~~ (49) Unlawful operation of motorcycle on roadway, as defined by RCW 46.61.608, 46.61.612, or 46.61.614;

~~((49))~~ (50) Reckless endangerment, as defined by RCW 9A.36.050;

~~((50))~~ (51) Failure to maintain control, as defined by RCW 46.61.445;

~~((51))~~ (52) Violation of license restriction(s), as defined by RCW 46.20.041 or 46.20.740;

~~((52))~~ (53) Violation of instruction permit restrictions, as defined by RCW 46.20.055;

~~((53))~~ (54) Violation of out-of-service order, as defined by RCW 46.25.090;

~~((54))~~ (55) Obstructed vision or control, as defined by RCW 46.61.615;

~~((55))~~ (56) Carrying persons or animals outside of vehicle, as defined by RCW 46.61.660;

~~((56))~~ (57) Carrying passenger in towed vehicle, as defined by RCW 46.61.625;

~~((57))~~ (58) Coasting on downgrade, as defined by RCW 46.61.630;

~~((58))~~ (59) Violation of child restraint requirements, as defined by RCW 46.61.687;

~~((59))~~ (60) Carrying child under the age of five years old on motorcycle, as defined by RCW 46.37.530;

~~((60))~~ (61) Carrying passenger improperly on motorcycle, as defined by RCW 46.61.610;

~~((61))~~ (62) No helmet, goggles, mirrors, windshield or face shield, as defined by RCW 46.37.530;

~~((62))~~ ~~Motorcycle handlebars above maximum height, as defined by RCW 46.61.611;~~

(63) Operating moped on freeway or sidewalk, as defined by RCW 46.61.710;

(64) ~~(Illegal, improper, defective, or missing vehicle equipment, as defined by RCW 46.37.010;~~

~~(65))~~ (65) Driving without lights, as defined by RCW 46.37.020;

~~((66))~~ (65) Failure to dim lights, as defined by RCW 46.37.230;

~~((67))~~ (66) Operating motorcycle without lights, as defined by RCW 46.37.522;

~~((68))~~ (67) No lamp, reflector, or flag on extended load, as defined by RCW 46.37.140;

~~((69)) Unnecessary noise, as defined by RCW 46.37.380;~~

~~(70)) (68) Wearing earphones or viewing television in vehicle, as defined by RCW 46.37.480;~~

~~((71) Permitting illegal vehicle operation, as defined by RCW 46.20.343 or 46.61.675;~~

~~(72)) (69) Failure to secure load, as defined by RCW 46.37.490;~~

~~((73)) (70) Spilling load, as defined by RCW 46.61.655; and~~

~~((74)) (71) Improper towing, as defined by RCW 46.44.070.~~

WSR 13-04-063

PERMANENT RULES

BUILDING CODE COUNCIL

[Filed February 1, 2013, 2:12 p.m., effective July 1, 2013]

Effective Date of Rule: July 1, 2013.

Purpose: Adoption and amendment of the 2012 International Fire Code, chapter 51-54A WAC. The filing for chapter 51-54A WAC includes the repeal of the 2009 Washington State Fire Code, chapter 51-54 WAC.

Citation of Existing Rules Affected by this Order: Repealing chapter 51-54 WAC.

Statutory Authority for Adoption: RCW 19.27A.031 and 19.27.074.

Other Authority: Chapters 19.27 and 34.05 RCW.

Adopted under notice filed as WSR 12-16-085 on July 31, 2012.

Changes Other than Editing from Proposed to Adopted Version: (**NOTE:** The 2012 IFC was completely reorganized and renumbered by the International Code Council, from forty-seven to eighty chapter headings, with thirty chapters held in reserve for future use. Chapter 51-54 WAC will be repealed entirely, and replaced by chapter 51-54A WAC.)

1. WAC 51-54A-0202 General definitions. Definitions were modified for consistency with the Building Code related to licensed care facilities.

2. WAC 51-54A-0401 through 51-54A-0408: Proposed language identical to the 2012 IFC language in these sections was removed from the filing for purposes of clarity.

3. WAC 51-54A-0908 Emergency alarm systems. Carbon monoxide alarms: References NFPA 720-2012 rather than 2009. Alarms are required in sleeping units as well as dwelling units.

4. WAC 51-54A-1009 Stairways and handrails. Corresponds with the Building Code for exit access stairways.

5. WAC 51-54A-1103 Fire safety requirements for existing buildings. References NFPA 720-2012 rather than 2009.

6. WAC 51-54A-1104 Means of egress for existing buildings. Exempts existing high-rise buildings from requirement to install photo-luminescent marking in stairways.

7. WAC 51-54A-8000 Referenced standards. Modifies prior amendment to the Fire Code re: NFPA 720.

A final cost-benefit analysis is available by contacting Tim Nogler, P.O. Box 41449, Olympia, WA 98504-1449,

phone (360) 407-9277, fax (360) 586-5366, e-mail sbcc@ga.wa.gov.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 45, Amended 0, Repealed 24.

Date Adopted: November 30, 2012.

C. Ray Allshouse
Council Chair

Chapter 51-54A WAC

STATE BUILDING CODE ADOPTION AND AMENDMENT OF THE 2012 EDITION OF THE INTERNATIONAL FIRE CODE

NEW SECTION

WAC 51-54A-001 Authority. These rules are adopted under the authority of chapter 19.27 RCW.

NEW SECTION

WAC 51-54A-002 Purpose. The purpose of these rules is to implement the provisions of chapter 19.27 RCW, which provides that the State Building Code Council shall maintain the State Building Code in a status which is consistent with the purpose as set forth in RCW 19.27.020. In maintaining the codes the council shall regularly review updated versions of the codes adopted under the act, and other pertinent information, and shall amend the codes as deemed appropriate by the council.

NEW SECTION

WAC 51-54A-003 International Fire Code. The 2012 edition of the International Fire Code, published by the International Code Council is hereby adopted by reference with the following additions, deletions, and exceptions.

NEW SECTION

WAC 51-54A-007 Exceptions. The exceptions and amendments to the International Fire Code contained in the provisions of chapter 19.27 RCW shall apply in case of conflict with any of the provisions of these rules.

Codes referenced which are not adopted through RCW 19.27.031 or chapter 19.27A RCW shall not apply unless specifically adopted by the authority having jurisdiction. The

2012 International Wildland Urban Interface Code is included in this code as Section 8100 with amendments found in Appendix Chapter K.

The provisions of this code do not apply to temporary growing structures used solely for the commercial production of horticultural plants including ornamental plants, flowers, vegetables, and fruits. "Temporary growing structure" means a structure that has the sides and roof covered with polyethylene, polyvinyl, or similar flexible synthetic material and is used to provide plants with either frost protection or increased heat retention. A temporary growing structure is not considered a building for purposes of this code.

The provisions of this code do not apply to the construction, alteration, or repair of temporary worker housing except as provided by rule adopted under chapter 70.114A RCW or chapter 37, Laws of 1998 (2SSB 6168). "Temporary worker housing" means a place, area, or piece of land where sleeping places or housing sites are provided by an employer for his or her employees or by another person, including a temporary worker housing operator, who is providing such accommodations for employees, for temporary, seasonal occupancy, and includes "labor camps" under RCW 70.54.110.

The manufacture, storage, handling, sale and use of fireworks shall be governed by chapter 70.77 RCW and by chapter 212-17 WAC and local ordinances consistent with chapter 212-17 WAC.

NEW SECTION

WAC 51-54A-008 Implementation. The International Fire Code adopted by chapter 51-54A WAC shall become effective in all counties and cities of this state on July 1, 2013.

NEW SECTION

WAC 51-54A-0101 Section 101—Scope and general requirements.

101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted. The State Building Code Council has determined that a local ordinance adopting Appendix K Wildland Urban Interface Code may be adopted by any local government upon notification of the council.

NEW SECTION

WAC 51-54A-0105 Permits.

SECTION 105 SCOPE AND GENERAL REQUIREMENTS

105.1.1 Permits required. Any property owner or authorized agent who intends to conduct an operation or business, or install or modify systems and equipment, which is regulated by this code, or to cause any such work to be done shall first make application to the fire code official and obtain the required permit.

NEW SECTION

WAC 51-54A-0202 General definitions.

SECTION 202 GENERAL DEFINITIONS

ADULT FAMILY HOME. A dwelling, licensed by Washington state, in which a person or persons provide personal care, special care, room and board to more than one but not more than six adults who are not related by blood or marriage to the person or persons providing the services.

ALERT SIGNAL. A distinctive signal indicating the need for trained personnel and occupants to initiate a specific action, such as shelter-in-place.

ALERT SYSTEM. Approved devices, equipment and systems or combinations of systems used to transmit or broadcast an alert signal.

CHILD CARE. For the purposes of these regulations, child care is the care of children during any period of a 24-hour day.

CHILD CARE, FAMILY HOME. A child care facility, licensed by Washington state, located in the dwelling of the person or persons under whose direct care and supervision the child is placed, for the care of twelve or fewer children, including children who reside at the home.

COVERED BOAT MOORAGE. A pier or system of floating or fixed access ways to which vessels on water may be secured and any portion of which are covered by a roof.

ELECTRICAL CODE. The National Electrical Code, promulgated by the National Fire Protection Association, as adopted by rule or local ordinance under the authority of chapter 19.28 RCW.

EMERGENCY DRILL. An exercise performed to train staff and occupants and to evaluate their efficiency and effectiveness in carrying out emergency procedures.

EXISTING. Buildings, facilities or conditions that are already in existence, constructed or officially authorized prior to the adoption of this code.

GRAVITY-OPERATED DROP OUT VENTS. Automatic smoke and heat vents containing heat-sensitive glazing designed to shrink and drop out of the vent openings when exposed to fire.

HOSPICE CARE CENTER. A building or portion thereof used on a 24-hour basis for the provision of hospice services to terminally ill inpatients.

MOTOR VEHICLE. Includes, but not limited to, a vehicle, machine, tractor, trailer or semitrailer, or any combination thereof, propelled or drawn by mechanical power and designed for use upon the highways in the transportation of passengers or property. It does not include a vehicle, locomotive or car operated exclusively on a rail or rails, or a trolley bus operated by electric power derived from a fixed overhead wire, furnishing local passenger transportation similar to street-railway service. The term "motor vehicle" also

includes freight containers or cargo tanks used, or intended for use, in connection with motor vehicles.

NIGHTCLUB. An A-2 Occupancy use under the 2006 International Building Code in which the aggregate area of concentrated use of unfixed chairs and standing space that is specifically designated and primarily used for dancing or viewing performers exceeds three hundred fifty square feet, excluding adjacent lobby areas. "Nightclub" does not include theaters with fixed seating, banquet halls, or lodge halls.

OCCUPANCY CLASSIFICATION. For the purposes of this code, certain occupancies are defined as follows:

Group I-2. This occupancy shall include buildings and structures used for medical care on a 24-hour basis for more than five persons who are incapable of self-preservation. This group shall include, but not be limited to, the following:

- Foster care facilities
- Detoxification facilities
- Hospice care centers
- Hospitals
- Nursing homes
- Psychiatric hospitals

Five or fewer persons receiving care. A facility such as the above with five or fewer persons receiving such care shall be classified as Group R-3 or shall comply with the *International Residential Code* provided an *automatic sprinkler system* is installed in accordance with Section 903.3.1.3 or with Section P2904 of the *International Residential Code*.

Licensed care facility. A facility such as the above providing licensed care to clients in one of the categories listed in Section 310.1 of the International Building Code licensed by Washington state shall be classified as Group R-2.

Family home child care. Family home child care licensed by Washington state for the care of twelve or fewer children shall be classified as Group R-3 or shall comply with the *International Residential Code*.

Adult care facility. A facility that provides accommodations for less than 24 hours for more than five unrelated adults and provides supervision and personal care services shall be classified as Group I-4.

EXCEPTION: Where the occupants are capable of responding to an emergency situation without physical assistance from the staff, the facility shall be classified as Group R-3.

Child care facility. Child care facilities that provide supervision and personal care on a less than 24-hour basis for more than five children 2 1/2 years of age or less shall be classified as Group I-4.

EXCEPTIONS:

1. A child day care facility that provides care for more than five but no more than 100 children 2 1/2 years or less of age, where the rooms in which the children are cared for are located on a level of exit discharge serving such rooms and each of these child care rooms has an exit door directly to the exterior, shall be classified as Group E.
2. Family child care homes licensed by Washington state for the care of 12 or fewer children shall be classified as Group R-3.

Residential Group R. Residential Group R includes, among others, the use of a building or structure, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I or when not regulated by the *International Residential Code*. This group shall include:

R-1 Residential occupancies containing sleeping units where the occupants are primarily transient in nature, including:

- Boarding houses (transient) with more than 10 occupants
- Congregate living facilities (transient) with more than 10 occupants
- Hotels (transient)
- Motels (transient)

R-2 Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including:

- Apartment houses
- Assisted living facilities as licensed by Washington state under chapter 388-78A WAC
- Boarding houses (nontransient) with more than 16 occupants
- Congregate living facilities (nontransient) with more than 16 occupants
- Convents
- Dormitories
- Fraternities and sororities
- Hotels (nontransient)
- Live/work units
- Monasteries
- Motels (nontransient)

Residential treatment facilities as licensed by Washington state under chapter 246-337 WAC

Vacation timeshare properties

R-3 Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, or I, including:

Buildings that do not contain more than two dwelling units.

- Boarding houses (nontransient) with 16 or fewer occupants.

- Boarding houses (transient) with 10 or fewer occupants.
- Care facilities that provide accommodations for five or fewer persons receiving care.

- Congregate living facilities (nontransient) with 16 or fewer occupants.

- Congregate living facilities (transient) with 10 or fewer occupants.

Care facilities within a dwelling. Care facilities for five or fewer persons receiving care that are within a single-family dwelling are permitted to comply with the *International Residential Code* provided an automatic sprinkler system is installed in accordance with Section 903.3.1.3 or with Section P2904 of the *International Residential Code*.

Adult family homes, family home child care. Adult family homes and family home child care facilities that are within a single-family home are permitted to comply with the *International Residential Code*.

Foster family care homes. Foster family care homes licensed by Washington state are permitted to comply with the *International Residential Code*, as an accessory use to a

dwelling, for six or fewer children including those of the resident family.

R-4 Classification is not adopted. Any reference in this code to R-4 does not apply.

PORTABLE SCHOOL CLASSROOM. A structure, transportable in one or more sections, which requires a chassis to be transported, and is designed to be used as an educational space with or without a permanent foundation. The structure shall be trailerable and capable of being demounted and relocated to other locations as needs arise.

RECALL SIGNAL. An electrically or mechanically operated signal used to recall occupants after an emergency drill or to terminate a shelter-in-place event that shall be distinct from any alarm or alert signal used to initiate an emergency plan, or other signals.

SHELTER-IN-PLACE. An emergency response used to minimize exposure of facility occupants to chemical or environmental hazards by taking refuge in predetermined interior rooms or areas where actions are taken to isolate the interior environment from the exterior hazard.

NEW SECTION

WAC 51-54A-0307 Open burning, recreational fires and portable outdoor fireplaces.

307.2.1 Authorization. Where required by state or local law or regulations, open burning shall only be permitted with prior approval from the state or local air and water quality management authority, provided that all conditions specified in the authorization are followed. See also chapter 173-425 WAC.

307.4.2 Recreational fires. Recreational fires shall not be conducted within 25 feet of a structure or combustible material. Conditions which could cause a fire to spread within 25 feet of a structure shall be eliminated prior to ignition. See also chapter 173-425 WAC.

NEW SECTION

WAC 51-54A-0308 Open flames.

308.1.4 Open-flame cooking devices. This section is not adopted.

308.1.7 Religious ceremonies. Participants in religious ceremonies shall not be precluded from carrying hand-held candles. See RCW 19.27.031(3).

308.1.9 Aisles and exits. Candles shall be prohibited in areas where occupants stand, or in an aisle or exit.

EXCEPTION: Candles used in religious ceremonies.

NEW SECTION

WAC 51-54A-0401 General.

401.2 Approval. Where required by the fire code official, fire safety plans, emergency procedures and employee training programs shall be approved.

NEW SECTION

WAC 51-54A-0402 Definitions. The following terms are defined in Chapter 2:

ALARM SIGNAL

ALERT SIGNAL

ALERT SYSTEM

EMERGENCY DRILL

SHELTER-IN-PLACE

RECALL SIGNAL

NEW SECTION

WAC 51-54A-0404 Fire safety and emergency plans.

404.1 General. Fire safety, evacuation, shelter-in-place plans and associated drills shall comply with the requirements of Sections 404.2 through 404.5.1.

404.2 Fire safety and evacuation plans. Fire safety and evacuation plans shall comply with the requirements of Sections 404.2.1 through 404.2.2.2.

404.2.1 Where required. An approved fire safety and evacuation plan shall be prepared and maintained for the following occupancies and buildings.

1. Group A having an occupant load of 100 or more.
2. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
3. Group E.
4. Group F buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
5. Group H.
6. Group I.
7. Group R-1.
8. Group R-2 college and university buildings. Boarding homes, group homes, and residential treatment facilities licensed by the state of Washington.
9. High-rise buildings.
10. Group M buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
11. Covered malls exceeding 50,000 square feet (4645 m²) in aggregate floor area.
12. Open mall buildings exceeding 50,000 square feet (4645 m²) in aggregate area within perimeter line.
13. Underground buildings.
14. Buildings with an atrium and having an occupancy in Group A, E or M.

404.2.2 Contents. Fire evacuation and safety plan contents shall be in accordance with Sections 404.2.2.1 and 404.2.2.2.

404.2.2.1 Fire evacuation plans. Fire evacuation plans shall include the following:

1. Emergency egress or escape routes and whether evacuation of the building is to be complete or, where approved, by selected floors or areas only.

2. Procedures for employees who must remain to operate critical equipment before evacuating.
3. Procedures for assisted rescue for persons unable to use the general means of egress unassisted.
4. Procedures for accounting for employees and occupants after evacuation has been completed.
5. Identification and assignment of personnel responsible for rescue or emergency medical aid.
6. The preferred and any alternative means of notifying occupants of a fire.
7. The preferred and any alternative means of reporting fires and other emergencies to the fire department or designated emergency response organization.
8. Identification and assignment of personnel who can be contacted for further information or explanation of duties under the plan.
9. A description of the emergency voice/alarm communication system alert tone and preprogrammed voice messages, where provided.

404.2.2.2 Fire safety plans. Fire safety plans shall include the following:

1. The procedure for reporting a fire or other emergency.
2. The life safety strategy and procedures for notifying, relocating or evacuating occupants, including occupants who need assistance.
3. Site plans indicating the following:
 - 3.1. The occupancy assembly point.
 - 3.2. The locations of fire hydrants.
 - 3.3. The normal routes of fire department vehicle access.
4. Floor plans identifying the locations of the following:
 - 4.1. Exits.
 - 4.2. Primary evacuation routes.
 - 4.3. Secondary evacuation routes.
 - 4.4. Accessible egress routes.
 - 4.5. Areas of refuge.
 - 4.6. Exterior areas for assisted rescue.
 - 4.7. Manual fire alarm boxes.
 - 4.8. Portable fire extinguishers.
 - 4.9. Occupant-use hose stations.
 - 4.10. Fire alarm annunciators and controls.
5. A list of major fire hazards associated with the normal use and occupancy of the premises, including maintenance and housekeeping procedures.
6. Identification and assignment of personnel responsible for maintenance of systems and equipment installed to prevent or control fires.
7. Identification and assignment of personnel responsible for maintenance, housekeeping and controlling fuel hazard sources.

404.3 Shelter-in-place plans. Shelter-in-place plans shall comply with the requirements of Sections 404.3.1 through 404.3.2.

404.3.1 Where required. A shelter-in-place plan shall be prepared and maintained for all Group E occupancies.

EXCEPTION: Day cares not collocated on a Group E campus.

404.3.2 Shelter-in-place plan contents. Shelter-in-place plans shall include the following:

1. Identification of the procedures of initiating the shelter-in-place plan throughout the facility or campus.
2. Identification of prearranged alert and recall signals to notify all occupants.
3. Identification of procedures for reporting the facility is sheltering-in-place to the local emergency dispatch center.
4. A means of two-way communication between a central location and each secure area, and consideration for maintaining means of communication in absence of primary power.
5. Identification of protective security measures.
6. Location of emergency supplies.
7. Accountability procedures for staff to report the presence or absence of occupants.
8. Identification of crisis response team members in accordance with the National Incident Management System.
9. Actions to be taken in the event of a fire or medical emergency while sheltering-in-place.

404.4 Maintenance. Emergency plans shall be reviewed or updated annually or as necessitated by changes in staff assignments, occupancy or the physical arrangement of the building.

404.5 Availability. Emergency plans shall be available in the workplace for reference and review by employees, and copies shall be furnished to the fire code official for review upon request.

NEW SECTION

WAC 51-54A-0405 Emergency drills.

405.1 General. Emergency drills complying with the provisions of this section shall be conducted at least annually in the occupancies listed in Section 404.2.1 or when required by the fire code official. Drills shall be designed in cooperation with the local authorities.

405.2 Frequency. Required emergency drills shall be held at the intervals specified in Table 405.2 or more frequently where necessary to familiarize all occupants with the drill procedure.

405.2.1 Group E occupancies. The occupancy shall conduct at a minimum the following drills during the year:

1. One drill using the school mapping information system.

EXCEPTION: Day cares not collocated on a school campus.

2. Six fire evacuation drills.
3. One shelter-in-place drill.

**Table 405.2
Emergency Drill Frequency and Participation**

Group or Occupancy	Frequency	Participation
Group A	Quarterly	Employees
Group B ^c	Annually	Employees
Group E	Monthly ^{a,e}	All Occupants
Group F	Annually	Employees

Group or Occupancy	Frequency	Participation
Group I	Quarterly on each shift	Employees ^b
Group R-1	Quarterly on each shift	Employees
Group R-2 ^f	Quarterly on each shift	Employees
Group R-2 ^d	Four Annually	All Occupants
High-rise buildings	Annually	Employees

^aThe frequency shall be allowed to be modified in accordance with Section 408.3.2.

^bFire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section 408.10.5. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.

^cGroup B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.

^dApplicable to Group R-2 college and university buildings in accordance with Section 408.3.

^eDay cares collocated on a Group E campus shall participate in emergency drills occurring on the campus.

^fApplicable to boarding homes, group homes, and residential treatment facilities licensed by the state of Washington.

405.4 Time. Drills shall be held at unexpected times and under varying conditions to simulate the unusual conditions that occur in case of an emergency.

405.5 Recordkeeping. Records shall be maintained of required emergency evacuation drills and include the following information:

1. Identity of the person conducting the drill.
2. Date and time of the drill.
3. Notification method used.
4. Staff members on duty and participating.
5. Number of occupants participating.
6. Special conditions simulated.
7. Problems encountered and corrective actions taken.
8. Weather conditions when occupants were evacuated.
9. Time required to accomplish complete evacuation, or shelter-in-place.

405.6 Notification. Where required by the fire code official, prior notification of emergency drills shall be given to the fire code official.

405.7 Initiation. Emergency drills shall be initiated in accordance with Sections 405.7.1 through 405.7.2.

405.7.1 Fire evacuation drills. Where a fire alarm system is provided, emergency evacuation drills shall be initiated by activating the fire alarm system. The fire alarm monitoring company shall be notified prior to the activation of the fire alarm system for drills proposed and again at the conclusion of the transmission and restoration of the fire alarm system to normal mode.

EXCEPTION: Drills conducted between the hours of 9:00 p.m. and 6:00 a.m., in Group R-2 boarding homes, group

homes, and residential treatment facilities licensed by the state of Washington.

405.7.2 Shelter-in-place drills. Shelter-in-place drills shall be initiated by the shelter-in-place alert signal, generated by the alerting system in accordance with Section 915.

405.8 Accountability. As building occupants arrive at the assembly point, efforts shall be made to determine if all occupants have been successfully evacuated and/or have been accounted for in the shelter-in-place.

405.9 Recall and reentry. The recall signal initiation shall be manually operated and under the control of the person in charge of the premises or the official in charge of the incident. No one shall reenter the premises until authorized to do so by the official in charge.

NEW SECTION

WAC 51-54A-0406 Employee training and response procedures.

406.1 General. Employees in the occupancies listed in Section 404.2.1 shall be trained in the emergency procedures described in their emergency plans. Training shall be based on these plans and as described in Section 404.2 and 404.3.

406.2 Frequency. Employees shall receive training in the contents of the emergency plans and their duties as part of new employee orientation and at least annually thereafter. Records shall be kept and made available to the fire code official upon request.

406.3 Employee training program. Employees shall be trained in fire prevention, evacuation, sheltering-in-place, and fire safety in accordance with Sections 406.3.1 through 406.3.3.

406.3.3 Emergency shelter-in-place training. Where a facility has a shelter-in-place plan, employees shall be trained on the alert and recall signals, communication system, location of emergency supplies, the use of the incident notification and alarm system, and their assigned duties and procedures in the event of an alarm or emergency.

NEW SECTION

WAC 51-54A-0408 Use and occupancy-related requirements.

408.10 Group R-4 occupancies. This section is not adopted.

NEW SECTION

WAC 51-54A-0503 Fire apparatus access roads.

503.1 Where required. Fire apparatus access roads shall be provided and maintained in accordance with locally adopted street, road, and access standards.

503.1.1 Buildings and facilities, is not adopted.

503.1.2 Additional access, is not adopted.

503.1.3 High-piled storage, is not adopted.

503.2 Specifications. This section is not adopted.

503.3 Marking. This section is not adopted.

503.4 Obstruction of fire apparatus access roads. This section is not adopted.

503.4.1 Traffic calming devices. This section is not adopted.

NEW SECTION

WAC 51-54A-0507 Fire protection water supplies.

507.3 Fire flow. Fire flow requirements for buildings or portions of buildings and facilities shall be determined by an approved method.

EXCEPTION: Fire flow is not required for structures under 500 square feet with a B, U or R-1 occupancy where structures are at least 30 feet from any other structure and are used only for recreation.

NEW SECTION

WAC 51-54A-0508 Fire command center.

508.1.2 Separation. The fire command center shall be separated from the remainder of the building by not less than a 2-hour fire barrier constructed in accordance with Section 707 of the International Building Code or horizontal assembly constructed in accordance with Section 712 of the International Building Code, or both.

NEW SECTION

WAC 51-54A-0605 Electrical equipment, wiring and hazards.

605.11 Solar photovoltaic power systems. This section is not adopted.

NEW SECTION

WAC 51-54A-0609 Commercial kitchen hoods.

[M] **609.2 Where required.** A Type I hood shall be installed at or above all commercial cooking appliances and domestic cooking appliances used for commercial purposes that produce grease laden vapors.

EXCEPTIONS: 1. A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m³ or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m³/s) in accordance with Section 17 of UL 710B.
2. A Type I hood shall not be required to be installed in an R-2 occupancy with not more than 16 residents.

609.2.1 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I, Type II or residential hoods as required for the type of appliances and processes in accordance with Table 609.2.1 and Sections 507.2, 507.2.1 and 507.2.2 of the International Mechanical Code.

**Table 609.2.1
Type of Hood Required for Domestic Cooking Appliances
in the Following Spaces^{a, b}**

Type of Space	Type of Cooking	Type of Hood
Church	1. Boiling, steaming and warming precooked food	Type II hood
	2. Roasting, pan frying and deep frying	Type I hood
Community or party room in apartment and condominium	1. Boiling, steaming and warming precooked food	Residential hood ^c or Type II hood ^d
	2. Roasting, pan frying and deep frying	Type I hood
Day care	1. Boiling, steaming and warming precooked food	Residential hood ^c or Type II hood ^d
	2. Roasting, pan frying and deep frying	Type I hood
Dormitory, boarding home, nursing home	1. Boiling, steaming and warming precooked food	Type II hood
	2. Roasting, pan frying and deep frying	Type I hood
Office lunch room	1. Boiling, steaming and warming precooked food	Residential hood ^c or Type II hood ^d
	2. Roasting, pan frying and deep frying	Type I hood

^a Commercial cooking appliances shall comply with Section 507.2 of the International Mechanical Code.

^b Requirements in this table apply to electric or gas fuel appliances only. Solid fuel appliances or charbroilers require Type I hoods.

^c Residential hood shall ventilate to the outside.

^d Type II hood required when more than one appliance is used.

609.3 Operations, inspection and maintenance. Commercial cooking systems shall be operated, inspected and maintained in accordance with Sections 609.3.1 through 609.3.4 and Chapter 11 of NFPA 96.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

NEW SECTION

WAC 51-54A-0806 Decorative vegetation in new and existing buildings.

806.1.1 Restricted occupancies. Natural cut trees shall be prohibited in the following occupancies:

- 1. Group I; and
- 2. R-2 occupancies providing licensed care to clients in one of the categories listed in the International Building Code, Section 310.1, licensed by Washington state.

806.1.2 Support devices. The support device that holds the tree in an upright position shall be of a type that is stable and that meets all of the following criteria:

- 1. The device shall hold the tree securely and be of adequate size to avoid tipping over of the tree.
- 2. The device shall be capable of containing a minimum supply of water in accordance with Table 806.1.2.
- 3. The water level, when full, shall cover the tree stem at least 2 inches (51 mm). The water level shall be maintained above the fresh cut and checked at least once daily.

**Table 806.1.2
Support Stand Water Capacity**

Tree Stem Diameter (inches)	Minimum Support Stand Water Capacity (gallons)	Typical Daily Water Transpiration Amount (gallons)
Up to 4	1	1/4 to 1
4 to 6	1 1/2	1 1/4 to 1 1/2
7 to 8	2	1 3/4 to 2
9 to 12	3	2 1/4 to 3
13 and over	4	Over 3

NEW SECTION

WAC 51-54A-0903 Automatic sprinkler systems.

903.2.1.6 Nightclub. An automatic sprinkler system shall be provided throughout Group A-2 nightclubs as defined in this code.

903.2.3 Group E. An automatic sprinkler system shall be provided for Group E occupancies.

- EXCEPTIONS:
- 1. Portable school classrooms with an occupant load of 50 or less calculated in accordance with Table 1004.1.2, provided that the aggregate area of any cluster of portable classrooms does not exceed 5,000 square feet (1465 m²); and clusters of portable school classrooms shall be separated as required by the building code.
 - 2. Group E occupancies with an occupant load of 50 or less, calculated in accordance with Table 1004.1.2.

903.2.8 Group R. An automatic sprinkler system installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R fire area.

- EXCEPTION:
- Group R-1 if all of the following conditions apply:
 - 1. The Group R fire area is no more than 500 square feet and is used for recreational use only.
 - 2. The Group R fire area is on only one story.
 - 3. The Group R fire area does not include a basement.

- 4. The Group R fire area is no closer than 30 feet from another structure.
- 5. Cooking is not allowed within the Group R fire area.
- 6. The Group R fire area has an occupant load of no more than 8.
- 7. A hand-held (portable) fire extinguisher is in every Group R fire area.

903.2.11.1.3 Basements. Where any portion of a basement is located more than 75 feet (22,860 mm) from openings required by Section 903.2.11.1, or where new walls, partitions or other similar obstructions are installed that increase the exit access travel distance to more than 75 feet, the basement shall be equipped throughout with an approved automatic sprinkler system.

NEW SECTION

WAC 51-54A-0907 Fire alarm and detection systems.

907.2.9.1.1 Group R-2 boarding homes. A manual fire alarm system shall be installed in Group R-2 occupancies where the building contains a boarding home licensed by the state of Washington.

- EXCEPTION:
- In boarding homes licensed by the state of Washington, manual fire alarm boxes in resident sleeping areas shall not be required at exits if located at all constantly attended staff locations, provided such staff locations are visible, continuously accessible, located on each floor, and positioned so no portion of the story exceeds a horizontal travel distance of 200 feet to a manual fire alarm box.

NEW SECTION

WAC 51-54A-0908 Emergency alarm systems.

908.7 Carbon monoxide alarms. Group I or Group R occupancies shall be provided with single station carbon monoxide alarms installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in dwelling units or sleeping units and on each level of the dwelling. The carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720-2012 and the manufacturer's instructions.

- EXCEPTIONS:
- 1. For other than R-2 occupancies, the building does not contain a fuel-burning appliance, a fuel-burning fireplace, or an attached garage; or
 - 2. Sleeping units or dwelling units in I and R-1 occupancies and R-2 college dormitories, hotel, and DSHS licensed boarding home and residential treatment facility occupancies which do not themselves contain a fuel-burning appliance, or a fuel-burning fireplace, or have an attached garage, need not be provided with carbon monoxide alarms provided that:
 - a. The sleeping unit or dwelling unit is not adjacent to any room which contains a fuel-burning appliance, a fuel-burning fireplace, or an attached garage; and
 - b. The sleeping unit or dwelling unit is not connected by duct work or ventilation shafts with a supply or return register in the same room to any room containing a fuel-burning appliance, a fuel-burning fireplace, or an attached garage; and
 - c. The building is provided with a common area carbon monoxide detection system.

3. An open parking garage, as defined in Chapter 2 of the International Building Code, or enclosed parking garage ventilated in accordance with Section 404 of the International Mechanical Code shall not be considered an attached garage.

908.7.1 Carbon monoxide detection systems. Carbon monoxide detection systems, that include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720-2012 shall be permitted. The carbon monoxide detectors shall be listed as complying with UL 2075.

NEW SECTION

WAC 51-54A-0909 Smoke control systems.

909.21 Elevator hoistway pressurization alternative. Where elevator hoistway pressurization is provided in lieu of required enclosed elevator lobbies, the pressurization system shall comply with Sections 909.21.1 through 909.21.13.

909.21.1 Pressurization requirements. Elevator hoistways shall be pressurized to maintain a minimum positive pressure of 0.10 inches of water (25 Pa) and a maximum positive pressure of 0.25 inches of water (67 Pa) with respect to adjacent occupied space on all floors. This pressure shall be measured at the midpoint of each hoistway door, with all elevator cars at the floor of recall and all hoistway doors on the floor of recall open and all other hoistway doors closed. The opening and closing of hoistway doors at each level must be demonstrated during this test. The supply air intake shall be from an outside uncontaminated source located a minimum distance of 20 feet (6096 mm) from any air exhaust system or outlet.

909.21.2 Rational analysis. A rational analysis complying with Section 909.4 shall be submitted with the construction documents.

909.21.3 Ducts for system. Any duct system that is part of the pressurization system shall be protected with the same fire-resistance rating as required for the elevator shaft enclosure.

909.21.4 Fan system. The fan system provided for the pressurization system shall be as required by Sections 909.21.4.1 through 909.21.4.4.

909.21.4.1 Fire resistance. When located within the building, the fan system that provides the pressurization shall be protected with the same fire-resistance rating required for the elevator shaft enclosure.

909.21.4.2 Smoke detection. The fan system shall be equipped with a smoke detector that will automatically shut down the fan system when smoke is detected within the system.

909.21.4.3 Separate systems. A separate fan system shall be used for each elevator hoistway.

909.21.4.4 Fan capacity. The supply fan shall either be adjustable with a capacity of at least 1,000 cfm (0.4719 m³/s) per door, or that specified by a registered design professional to meet the requirements of a designed pressurization system.

909.21.5 Standby power. The pressurization system shall be provided with standby power from the same source as other required emergency systems for the building.

909.21.6 Activation of pressurization system. The elevator pressurization system shall be activated upon activation of the building fire alarm system or upon activation of the elevator lobby smoke detectors. Where both a building fire alarm system and elevator lobby smoke detectors are present, each shall be independently capable of activating the pressurization system.

909.21.7 Special inspection. Special inspection for performance shall be required in accordance with Section 909.18.8. System acceptance shall be in accordance with Section 909.19.

909.21.8 Marking and identification. Detection and control systems shall be marked in accordance with Section 909.14.

909.21.9 Control diagrams. Control diagrams shall be provided in accordance with Section 909.15.

909.21.10 Control panel. A control panel complying with Section 909.16 shall be provided.

909.21.11 System response time. Hoistway pressurization systems shall comply with the requirements for smoke control system response time in Section 909.17.

909.21.12 Hoistway venting. Hoistway venting required by Section 3004 of the International Building Code need not be provided for pressurized elevator shafts.

909.21.13 Machine rooms. Elevator machine rooms shall be pressurized in accordance with this section unless separated from the hoistway shaft by construction in accordance with Section 707 of the International Building Code.

NEW SECTION

WAC 51-54A-0915 Alerting systems.

915.1 General. An approved alerting system shall be provided in buildings and structures as required in Chapter 4 and this section, unless other requirements are provided by another section of this code.

EXCEPTION: Approved alerting systems in existing buildings, structures or occupancies.

915.2 Power source. Alerting systems shall be provided with power supplies in accordance with Section 4.4.1 of NFPA 72 and circuit disconnecting means identified as "EMERGENCY ALERTING SYSTEM."

EXCEPTION: Systems which do not require electrical power to operate.

915.3 Duration of operation. The alerting system shall be capable of operating under nonalarm condition (quiescent load) for a minimum of 24 hours and then shall be capable of operating during an emergency condition for a period of 15 minutes at maximum connected load.

915.4 Combination system. Alerting system components and equipment shall be allowed to be used for other purposes.

915.4.1 System priority. The alerting system use shall take precedence over any other use.

915.4.2 Fire alarm system. Fire alarm systems sharing components and equipment with alerting systems must be in accordance with Section 6.8.4 of NFPA 72.

915.4.2.1 Signal priority. Recorded or live alert signals generated by an alerting system that shares components with a fire alarm system shall, when actuated, take priority over fire alarm messages and signals.

915.4.2.2 Temporary deactivation. Should the fire alarm system be in the alarm mode when such an alerting system is actuated, it shall temporarily cause deactivation of all fire alarm-initiated audible messages or signals during the time period required to transmit the alert signal.

915.4.2.3 Supervisory signal. Deactivation of fire alarm audible and visual notification signals shall cause a supervisory signal for each notification zone affected in the fire alarm system.

915.5 Audibility. Audible characteristics of the alert signal shall be in accordance with Section 7.4.1 of NFPA 72 throughout the area served by the alerting system.

EXCEPTION: Areas served by approved visual or textual notification, where the visible notification appliances are not also used as a fire alarm signal, are not required to be provided with audibility complying with Section 915.6.

915.6 Visibility. Visible and textual notification appliances shall be permitted in addition to alert signal audibility.

NEW SECTION

WAC 51-54A-1007 Accessible means of egress.

1007.1 Accessible means of egress required. Accessible means of egress shall comply with this section. Accessible spaces shall be provided with not less than one accessible means of egress. Where more than one means of egress are required by Section 1015.1 or 1021.1 from any accessible space, each accessible portion of the space shall be served by not less than two accessible means of egress.

EXCEPTIONS:

1. Accessible means of egress are not required in alterations to existing buildings.
2. One accessible means of egress is required from an accessible mezzanine level in accordance with Section 1007.3, 1007.4 or 1007.5.
3. In assembly areas with sloped or stepped aisles, one accessible means of egress is permitted where the common path of travel is accessible and meets the requirements in Section 1028.8.
4. In parking garages, accessible means of egress are not required to serve parking areas that do not contain accessible parking spaces.

1007.8.1 System requirements. Two-way communication systems shall provide communication between each required location and the fire command center or a central control point location approved by the fire department. Where the central control point is not constantly attended, a two-way communication system shall have a timed automatic telephone dial-out capability to a monitoring location. The two-

way communication system shall include both audible and visible signals. The two-way communication system shall have a battery backup or an approved alternate source of power that is capable of 90 minutes use upon failure of the normal power source.

NEW SECTION

WAC 51-54A-1008 Doors, gates and turnstiles.

1008.1.9.3 Locks and latches. Locks and latches shall be permitted to prevent operation of doors where any of the following exists:

1. Places of detention or restraint.

2. In buildings in occupancy Group A having an occupant load of 300 or less, Groups B, F, M and S, and in places of religious worship, the main exterior door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:

2.1. The locking device is readily distinguishable as locked;

2.2. A readily visible sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN BUILDING IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background; and

2.3. The use of the key-operated locking device is revocable by the building official for due cause.

3. Where egress doors are used in pairs, approved automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts has no door-knob or surface-mounted hardware.

4. Doors from individual dwelling or sleeping units of Group R occupancies having an occupant load of 10 or less are permitted to be equipped with a night latch, dead bolt, or security chain, provided such devices are openable from the inside without the use of a key or a tool.

5. Fire doors after the minimum elevated temperature has disabled the unlatching mechanism in accordance with listed fire door test procedures.

6. Approved, listed locks without delayed egress shall be permitted in Group R-2 boarding homes licensed by Washington state, provided that:

6.1. The clinical needs of one or more patients require specialized security measures for their safety.

6.2. The doors unlock upon actuation of the automatic sprinkler system or automatic fire detection system.

6.3. The doors unlock upon loss of electrical power controlling the lock or lock mechanism.

6.4. The lock shall be capable of being deactivated by a signal from a switch located in an approved location.

6.5. There is a system, such as a keypad and code, in place that allows visitors, staff persons and appropriate residents to exit. Instructions for exiting shall be posted within six feet of the door.

1008.1.9.6 Special locking arrangements in Group I-2. Approved special egress locks shall be permitted in a Group I-2 Occupancy where the clinical needs of persons receiving care require such locking. Special egress locks shall be permitted in such occupancies where the building is equipped

throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or an approved automatic smoke or heat detection system installed in accordance with Section 907, provided that the doors unlock in accordance with Items 1 through 7.

1. The doors unlock upon actuation of the automatic sprinkler system or automatic fire detection system.

2. The doors unlock upon loss of power controlling the lock or lock mechanism.

3. The door locks shall have the capability of being unlocked by a signal from the fire command center, a nursing station or other approved location.

4. A building occupant shall not be required to pass through more than one door equipped with a special egress lock before entering an exit.

5. The procedures for the operation(s) of the unlocking system shall be described and approved as part of the emergency planning and preparedness required by Chapter 4 of the International Fire Code.

6. There is a system, such as a keypad and code, in place that allows visitors, staff persons and appropriate residents to exit. Instructions for exiting shall be posted within six feet of the door.

7. Emergency lighting shall be provided at the door.

EXCEPTION: Items 1, 2, 3, and 6 shall not apply to doors to areas where persons, which because of clinical needs, require restraint or containment as part of the function of a psychiatric treatment area provided that all clinical staff shall have the keys, codes or other means necessary to operate the locking devices.

NEW SECTION

WAC 51-54A-1009 Stairways and handrails.

1009.3 Exit access stairways. Floor openings between stories created by exit access stairways shall be enclosed.

EXCEPTIONS:

1. In other than Group I-2 and I-3 occupancies, exit access stairways that serve, or atmospherically communicate between, only two stories are not required to be enclosed. Such interconnected stories shall not be open to other stories.
2. Exit access stairways serving and contained within a single residential dwelling unit or sleeping unit in Group R-1, R-2 or R-3 occupancies are not required to be enclosed.
3. In Group B or M occupancies, exit access stairways that are designed exclusively for circulation are not required to be enclosed provided that the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the area of the floor opening between stories does not exceed twice the horizontal projected area of the exit access stairway, and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13.
4. In other than Group B and M occupancies, exit access stairways that are designed exclusively for circulation are not required to be enclosed provided that the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the floor opening does not connect more than four stories, the area of the floor opening between stories does not exceed twice the horizontal projected area of the exit access stairway, and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13.

5. Exit access stairways with an atrium complying with the provisions of Section 404 of the International Building Code are not required to be enclosed.

6. Exit access stairways and ramps in open parking garages that serve only the parking garage are not required to be enclosed.

7. Stairways serving outdoor facilities where all portions of the means of egress are essentially open to the outside are not required to be enclosed.

8. Exit access stairways serving stages, platforms and technical production areas in accordance with Sections 410.6.2 and 410.6.3 of the International Building Code are not required to be enclosed.

9. Stairways are permitted to be open between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.

10. In Group I-3 occupancies, exit access stairways constructed in accordance with Section 408.5 of the International Building Code, are not required to be enclosed.

1009.18 Stairways in individual dwelling units. Stairs or ladders within an individual dwelling unit used for access to areas of 200 square feet (18.6 m²) or less, and not containing the primary bathroom or kitchen, are exempt from the requirements of Section 1009.

NEW SECTION

WAC 51-54A-1010 Ramps.

1010.1 Scope. The provisions of this section shall apply to ramps used as a component of a means of egress.

EXCEPTIONS:

1. Other than ramps that are part of the accessible routes providing access in accordance with Sections 1108.2 through 1108.2.4 and 1108.2.6, ramped aisles within assembly rooms or spaces shall conform with the provisions in Section 1028.11.
2. Curb ramps shall comply with ICC A117.1.
3. Vehicle ramps in parking garages for pedestrian exit access shall not be required to comply with Sections 1010.4 through 1010.10 when they are not an accessible route serving accessible parking spaces or other required accessible elements.
4. In a parking garage where one accessible means of egress serving accessible parking spaces or other accessible elements is provided, a second accessible means of egress serving that area may include a vehicle ramp that does not comply with Sections 1010.5, 1010.6, and 1010.9. A landing complying with Sections 1010.7.1 and 1010.7.4 shall be provided at any change of direction in the accessible means of egress.

NEW SECTION

WAC 51-54A-1018 Corridors.

1018.5 Air movement in corridors. Corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts.

EXCEPTIONS:

1. Use of a corridor as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, smoking lounges and janitor closets, shall be permitted provided that each such corridor is directly supplied with outdoor air at a rate greater than the rate of makeup air taken from the corridor.
2. Where located within a dwelling unit, the use of corridors for conveying return air shall not be prohibited.

3. Where located within tenant spaces of one thousand square feet (93 m²) or less in area, utilization of corridors for conveying return air is permitted.
4. Incidental air movement from pressurized rooms within health care facilities, provided that a corridor is not the primary source of supply or return to the room.
5. Where such air is part of an engineered smoke control system.
6. Air supplied to corridors serving residential occupancies shall not be considered as providing ventilation air to the dwelling units subject to the following:
 - 6.1. The air supplied to the corridor is one hundred percent outside air; and
 - 6.2. The units served by the corridor have conforming ventilation air independent of the air supplied to the corridor; and
 - 6.3. For other than high-rise buildings, the supply fan will automatically shut off upon activation of corridor smoke detectors which shall be spaced at no more than thirty feet (9144 mm) on center along the corridor; or
 - 6.4. For high-rise buildings, corridor smoke detector activation will close required smoke/fire dampers at the supply inlet to the corridor at the floor receiving the alarm.

1018.6 Corridor continuity. Fire-resistance-rated corridors shall be continuous from the point of entry to an exit, and shall not be interrupted by intervening rooms.

- EXCEPTIONS:
1. Foyers, lobbies or reception rooms constructed as required for corridors shall not be construed as intervening rooms.
 2. In Group R-2 boarding homes and residential treatment facilities licensed by Washington state, seating areas shall be allowed to be open to the corridor provided:
 - 2.1. The seating area is constructed as required for the corridor;
 - 2.2. The floor is separated into at least two compartments complying with Section 407.5 of the International Building Code;
 - 2.3. Each individual seating area does not exceed 150 square feet, excluding the corridor width;
 - 2.4. The combined total space of seating areas per compartment does not exceed 300 square feet, excluding the corridor width;
 - 2.5. Combustible furnishings located within the seating area shall be in accordance with Section 805; and
 - 2.6. Emergency means of egress lighting is provided as required by Section 1006 to illuminate the area.

NEW SECTION

WAC 51-54A-1021 Number of exits and exit configurations.

1021.3.1 Access to exits at adjacent levels. Access to exits at other levels shall be by stairways or ramps. Where access to exits occurs from adjacent building levels, the horizontal and vertical exit access travel distance to the closest exit shall not exceed that specified in Section 1016.1. The path of egress travel to an exit shall not pass through more than one adjacent story.

- EXCEPTION:
- Landing platforms or roof areas for helistops that are less than 60 feet (18,288 mm) long, or less than 2,000 square feet (186 m²) in area, shall be permitted to access the second exit by a fire escape, alternating tread device or ladder leading to the story or level below.

NEW SECTION

WAC 51-54A-1103 Fire safety requirements for existing buildings.

1103.4.3 Nightclub. An automatic sprinkler system shall be provided throughout A-2 nightclubs as defined in this code. No building shall be constructed for, used for, or converted to occupancy as a nightclub except in accordance with this section.

1103.9 Carbon monoxide alarms. Existing Group I or Group R occupancies shall be provided with single station carbon monoxide alarms in accordance with Section 908.7. An inspection will occur when alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created. The carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720-2012 and the manufacturer's instructions.

- EXCEPTIONS:
1. For other than R-2 occupancies, if the building does not contain a fuel-burning appliance, a fuel-burning fireplace, or an attached garage.
 2. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, or electrical permits.
 3. Installation, alteration or repairs of noncombustion plumbing or mechanical systems.
 4. Sleeping units or dwelling units in I and R-1 occupancies and R-2 college dormitories, hotel, and DSHS licensed boarding home and residential treatment facility occupancies which do not themselves contain a fuel-burning appliance, a fuel-burning fireplace, or have an attached garage, need not be provided with carbon monoxide alarms provided that:
 - 4.1. The sleeping units or dwelling unit is not adjacent to any room which contains a fuel-burning appliance, a fuel-burning fireplace, or an attached garage; and
 - 4.2. The sleeping units or dwelling unit is not connected by duct work or ventilation shafts with a supply or return register in the same room to any room containing a fuel-burning appliance, a fuel-burning fireplace, or to an attached garage; and
 - 4.3. The building is provided with a common area carbon monoxide detection system.
 5. An open parking garage, as defined in the International Building Code, or enclosed parking garage ventilated in accordance with Section 404 of the International Mechanical Code shall not be considered an attached garage.

NEW SECTION

WAC 51-54A-1104 Means of egress for existing buildings.

1104.1 General. Means of egress in existing buildings shall comply with Section 1030 and 1104.2 through 1104.24.

- EXCEPTION:
- Means of egress conforming to the requirements of the building code under which they were constructed and Section 1030 shall not be required to comply with 1104.2 through 1104.22 and 1104.24.

NEW SECTION**WAC 51-54A-3601 Marinas—Scope.**

3601.1.2 Permits. For permits to operate marine motor fuel-dispensing stations, application of flammable or combustible finishes, and hot works, see Section 105.6.

NEW SECTION**WAC 51-54A-3602 Definitions.**

3602.1 Definitions. The following terms are defined in Chapter 2:

COVERED BOAT MOORAGE

FLOAT

GRAVITY-OPERATED DROP OUT VENTS

MARINA

PIER

VESSEL

WHARF

NEW SECTION**WAC 51-54A-3604 Fire protection equipment.**

3604.2 Standpipes. Marinas shall be equipped throughout with Class I manual, dry standpipe systems in accordance with NFPA 303. Systems shall be provided with outlets located such that no point on the marina pier or float system exceeds 150 feet from a standpipe outlet.

3604.3 Access and water supply. Piers and wharves shall be provided with fire apparatus access roads and water-supply systems with on-site fire hydrants when required and approved by the fire code official. At least one fire hydrant capable of providing the required fire flow shall be provided within an approved distance of standpipe supply connections.

3604.4 Portable fire extinguishers. One 4A40BC fire extinguisher shall be provided at each standpipe outlet. Additional fire extinguishers, suitable for the hazards involved, shall be provided and maintained in accordance with Section 906.

3604.7 Smoke and heat vents. Approved automatic smoke and heat vents shall be provided in covered boat moorage areas exceeding 2,500 sq. ft. (232 m²) in area, excluding roof overhangs.

EXCEPTION: Smoke and heat vents are not required in areas protected by automatic sprinklers.

3604.7.1 Design and installation. Where smoke and heat vents are required they shall be installed near the roof peak, evenly distributed and arranged so that at least one vent is over each covered berth. The effective vent area shall be calculated using a ratio of one square foot of vent to every fifteen square feet of covered berth area (1:15). Each vent shall provide a minimum opening size of 4 ft. x 4 ft.

3604.7.1.1 Smoke and heat vents. Smoke and heat vents shall operate automatically by actuation of a heat-responsive device rated at 100°F (56°C) above ambient.

EXCEPTION: Gravity-operated drop out vents.

3604.7.1.2 Gravity-operated drop out vents. Gravity-operated drop out vents shall fully open within 5 minutes after the vent cavity is exposed to a simulated fire represented by a time-temperature gradient that reaches an air temperature of 500°F (260°C) within 5 minutes.

3604.8 Draft curtains. Draft curtains shall be provided in covered boat moorage areas exceeding 2,500 sq. ft. (232 m²) in area, excluding roof overhangs.

EXCEPTION: Draft curtains are not required in areas protected by automatic sprinklers.

3604.8.1 Draft curtain construction. Draft curtains shall be constructed of sheet metal, gypsum board or other approved materials that provide equivalent performance to resist the passage of smoke. Joints and connections shall be smoke tight.

3604.8.2 Draft curtain location and depth. The maximum area protected by draft curtains shall not exceed 2,000 sq. ft. (186 m²) or two slips or berths, whichever is smaller. Draft curtains shall not extend past the piling line. Draft curtains shall have a minimum depth of 4 feet and shall not extend closer than 8 feet (2438 mm) to the walking surface of the pier.

NEW SECTION**WAC 51-54A-5306 Medical gas systems.**

5306.1 General. Compressed gases at hospitals and similar facilities intended for inhalation or sedation including, but not limited to, analgesia systems for dentistry, podiatry, veterinary and similar uses shall comply with Sections 5306.2 through 5306.4 in addition to other requirements of this chapter.

EXCEPTION: All new distribution piping, supply manifolds, connections, regulators, valves, alarms, sensors and associated equipment shall be in accordance with the Plumbing Code.

5306.4 Medical gas systems. The maintenance and testing of medical gas systems including, but not limited to, distribution piping, supply manifolds, connections, pressure regulators and relief devices and valves, shall comply with the maintenance and testing requirements of NFPA 99 and the general provisions of this chapter.

NEW SECTION**WAC 51-54A-5601 General.**

5601.1 Scope. The provisions of this chapter shall govern the possession, manufacture, storage, handling, sale and use of explosives, explosive materials, and small arms ammunition. The manufacture, storage, handling, sale and use of fireworks shall be governed by chapter 70.77 RCW, and by chapter 212-17 WAC and local ordinances consistent with chapter 212-17 WAC.

EXCEPTIONS:

1. The Armed Forces of the United States, Coast Guard or National Guard.
2. Explosives in forms prescribed by the official United States Pharmacopoeia.
3. The possession, storage and use of small arms ammunition when packaged in accordance with DOT packaging requirements.
4. The possession, storage and use of not more than 1 pound (0.454 kg) of commercially manufactured sporting black powder, 20 pounds (9 kg) of smokeless powder and 10,000 small arms primers for hand loading of small arms ammunition for personal consumption.
5. The use of explosive materials by federal, state and local regulatory, law enforcement and fire agencies acting in their official capacities.
6. Special industrial explosive devices which in the aggregate contain less than 50 pounds (23 kg) of explosive materials.
7. The possession, storage and use of blank industrial-power load cartridges when packaged in accordance with DOT packaging regulations.
8. Transportation in accordance with DOT 49 C.F.R. Parts 100-178.
9. Items preempted by federal regulations.

5601.1.1 Explosive material standard. In addition to the requirements of this chapter, NFPA 495 shall govern the manufacture, transportation, storage, sale, handling and use of explosive materials. See also chapter 70.74 RCW and chapter 296-52 WAC.

NEW SECTION

WAC 51-54A-5704 Storage.

5704.2.11 Underground tanks. Underground storage of flammable and combustible liquids in tanks shall comply with Section 3404.2 and Sections 3404.2.11.1 through 3404.2.11.5.2. Corrosion protection shall comply with WAC 173-360-305.

NEW SECTION

WAC 51-54A-5706 Special operations.

5706.5.4.5 Commercial, industrial, governmental or manufacturing. Dispensing of Class II and III motor vehicle fuel from tank vehicles into the fuel tanks of motor vehicles located at commercial, industrial, governmental or manufacturing establishments is allowed where permitted, provided such dispensing operations are conducted in accordance with the following: (Those sections not noted here remain unchanged.)

12. Fuel delivery vehicles shall be equipped with spill clean-up supplies in accordance with the department of ecology's Source Control Best Management Practices. Such supplies shall be readily available for deployment by the operator at all times and include nonwater absorbents capable of absorbing 15 gallons (56.76 L) of diesel fuel, storm drain plug or cover kit, a nonwater absorbent containment boom of a minimum 10 foot long (3038 mm) length with a 12-gallon (45.41 L) absorbent capacity, a nonmetallic shovel, and two 5-gallon (19 L) buckets with lids.

NEW SECTION

WAC 51-54A-6108 Fire protection.

6108.1 Scope. Storage, handling and transportation of liquefied petroleum gas (LP-gas) and the installation of LP-gas equipment pertinent to systems for such uses shall comply with this chapter and NFPA 58. Properties of LP-gas shall be determined in accordance with Appendix B of NFPA 58.

EXCEPTION: The use and storage of listed propane fired barbeque grills on R-2 decks and balconies with an approved container not exceeding a water capacity of 20 pounds (9 kg) that maintain a minimum clearance of 18 inches on all sides, unless listed for lesser clearances.

NEW SECTION

WAC 51-54A-8000 Referenced standards.

NFPA 96-07 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations. 609.3

NFPA 720-12 Standard for the Installation of Carbon Monoxide (CO) Warning Equipment in Dwelling Units 908.7, 1103.9

NEW SECTION

WAC 51-54A-8100 Appendix K—Wildland-Urban-Interface Code.

K101.5 Additions or alterations. Additions or alterations may be made to any building or structure without requiring the existing building or structure to comply with all of the requirements of this code, provided the addition or alteration conforms to that required for a new building or structure.

EXCEPTION: Provisions of this code that specifically apply to existing conditions are retroactive. See Sections 402.3, 601.1 and Appendix A.

Additions or alterations shall not cause the existing building or structure to become unsafe. An unsafe condition shall be deemed to have been created if an addition or alteration will cause the existing building or structure to become structurally unsafe or overloaded; will not provide adequate access in compliance with the provisions of this code or will obstruct existing exits or access; will create a fire hazard; will reduce required fire resistance or will otherwise create conditions dangerous to human life.

K108.3 Site plan. In addition to the requirements for plans in the International Building Code, the code official may require site plans which include topography, width and percent of grade of access roads, landscape and vegetation details, locations of structures or building envelopes, existing or proposed overhead utilities, occupancy classification of buildings, types of ignition resistant construction of buildings, structures and their appendages, roof classification of buildings, and site water supply systems. The code official is authorized to waive or modify the requirement for a site plan.

K108.4 Vegetation management plans. When required by the code official or when utilized by the permit applicant pursuant to Section 502, vegetation management plans shall be

prepared and shall be submitted to the code official for review and approval as part of the plans required for a permit. See Appendix B.

K108.7 Vicinity plan. When required by the code official, the requirements for site plans shall include details regarding the vicinity within 300 feet (91,440 mm) of property lines, including other structures, slope, vegetation, fuel breaks, water supply systems and access roads.

K402.1.1 Access. New subdivisions, as determined by this jurisdiction, shall be provided with fire apparatus access roads in accordance with the International Fire Code.

K402.1.2 Water supply. New subdivisions, as determined by this jurisdiction, shall be provided with water supply in accordance with the International Fire Code.

K402.2 Individual structures. Individual structures shall comply with Sections 402.2.1 and 402.2.2.

K402.2.1 Access. Individual structures hereafter constructed or relocated into or within wildland-urban interface areas shall be provided with fire apparatus access in accordance with the International Fire Code.

K402.2.2 Water supply. Individual structures hereafter constructed or relocated into or within wildland-urban interface areas shall be provided with a conforming water supply in accordance with the International Fire Code.

- EXCEPTIONS:
1. Structures constructed to meet the requirements for the class of ignition-resistant construction specified in Table K503.1 for a nonconforming water supply.
 2. Buildings containing only private garages, carports, sheds and agricultural buildings with a floor area of not more than 600 square feet (56 m²).

K402.3 Existing conditions. Existing address markers, roads and fire protection equipment shall be in accordance with the International Fire Code.

**Table K503.1
Ignition-Resistant Construction^a**

	Fire Hazard Severity					
	Moderate Hazard		High Hazard		Extreme Hazard	
	Water Supply ^b		Water Supply ^b		Water Supply ^b	
Defensible Space^c	Conforming	Nonconforming	Conforming	Nonconforming	Conforming	Nonconforming
Nonconforming	IR 2	IR 1	IR 1	IR 1 N.C.	IR 1 N.C.	Not Permitted
Conforming	IR 3	IR 2	IR 2	IR 1	IR 1	IR 1 N.C.
1.5 x Conforming	Not Required	IR 3	IR 3	IR 2	IR 2	IR 1

^aAccess shall be in accordance with Section 402.

^bWater supply shall be in accordance with Section 402.1.

IR 1 = Ignition-resistant construction in accordance with Section 504.

IR 2 = Ignition-resistant construction in accordance with Section 505.

IR 3 = Ignition-resistant construction in accordance with Section 506.

N.C. = Exterior walls shall have a fire-resistance rating of not less than 1 hour and the exterior surfaces of such walls shall be noncombustible. Usage of log wall construction is allowed.

^c Conformance based on Section 603.

K403 Access. This section not adopted.

K404 Water supply. This section not adopted.

APPENDIX B-VEGETATION MANAGEMENT PLAN - THIS APPENDIX IS ADOPTED.

APPENDIX C-FIRE DANGER RATING SYSTEM - THIS APPENDIX IS ADOPTED.

**WSR 13-04-067
PERMANENT RULES
BUILDING CODE COUNCIL**

[Filed February 1, 2013, 5:18 p.m., effective July 1, 2013]

Effective Date of Rule: July 1, 2013.

Purpose: The proposed rules will adopt and amend the 2012 edition of the International Building Code for all jurisdictions in the state. State amendments to the base codes were developed to more closely meet the needs of Washington state local jurisdictions that enforce the code and to ensure fairness to small business in the state.

Citation of Existing Rules Affected by this Order:
Amending chapter 51-50 WAC.

Statutory Authority for Adoption: RCW 19.27.031.

Other Authority: Chapters 19.27 and 34.05 RCW.

Adopted under notice filed as WSR 12-16-089 on July 31, 2012.

Changes Other than Editing from Proposed to Adopted Version:

- WAC 51-50-0202, amended definitions proposed for "exit access ramp" and "exit access stairway" were not adopted as proposed earlier. Additional changes were made to ensure consistency between the Building and Fire Codes.
- WAC 51-50-0308, provides new definitions for "24-hour care" and "hospice care center."
- WAC 51-50-1008, amended language related to special locking arrangements in psychiatric treatment areas, to be consistent with the 2012 IBC.
- WAC 51-50-1018, amended the language on corridor continuity and access stairways or ramps, to be consistent with 2012 IBC.

- WAC 51-50-1204, amended language to reference department of ecology requirements for certain fuel-burning [burning] devices.
- WAC 51-50-1901, 51-50-1903, 51-50-1904, re: Concrete, are amended for consistency with the IBC language and standards (ACI 318) being adopted through the International Code Council.
- WAC 51-50-2902, modified Table 2902.1 to remove obsolete footnote references.

A final cost-benefit analysis is available by contacting Tim Nogler, P.O. Box 41449, Olympia, WA 98504-1449, phone (360) 407-9277, fax (360) 586-9088, e-mail Tim.Nogler@des.wa.gov.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 21, Amended 66, Repealed 0.

Date Adopted: November 9, 2012.

C. Ray Allshouse
Council Chair

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-003 International Building Code. The ~~((2009))~~ 2012 edition of the *International Building Code*, including Appendix E, published by the International Code Council is hereby adopted by reference with the exceptions noted in this chapter of the Washington Administrative Code.

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-005 International Building Code requirements for barrier-free accessibility. Chapter 11 and other International Building Code requirements for barrier-free access, including ICC ~~((A117.1-2003))~~ A117.1-2009 and Appendix E, are adopted pursuant to chapters 70.92 and 19.27 RCW.

Pursuant to RCW 19.27.040, Chapter 11 and requirements affecting barrier-free access shall not be amended by local governments.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-007 Exceptions. The exceptions and amendments to the International Building Code contained in

the provisions of chapter 19.27 RCW shall apply in case of conflict with any of the provisions of these rules.

The provisions of this code do not apply to temporary growing structures used solely for the commercial production of horticultural plants including ornamental plants, flowers, vegetables, and fruits. "Temporary growing structure" means a structure that has the sides and roof covered with polyethylene, polyvinyl, or similar flexible synthetic material and is used to provide plants with either frost protection or increased heat retention. A temporary growing structure is not considered a building for purposes of this code.

The provisions of this code do not apply to the construction, alteration, or repair of temporary worker housing except as provided by rule adopted under chapter 70.114A RCW or chapter 37, Laws of 1998 (SB 6168). "Temporary worker housing" means a place, area, or piece of land where sleeping places or housing sites are provided by an employer for his or her employees or by another person, including a temporary worker housing operator, who is providing such accommodations for employees, for temporary, seasonal occupancy, and includes "labor camps" under RCW 70.54.110.

Codes referenced which are not adopted through RCW 19.27.031 or chapter 19.27A RCW shall not apply unless specifically adopted by the authority having jurisdiction. The ~~((2009))~~ 2012 International Existing Building Code is included in the adoption of this code in Section 3401.5 and amended in WAC 51-50-480000.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-008 Implementation. The International Building Code adopted under chapter 51-50 WAC shall become effective in all counties and cities of this state on July 1, ~~((2010))~~ 2013.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0200 Chapter 2—Definitions.

SECTION 202—DEFINITIONS.

ADULT FAMILY HOME. ~~((See Section 310.2.))~~ A dwelling licensed by Washington state, in which a person or persons provide personal care, special care, room and board to more than one but not more than six adults who are not related by blood or marriage to the person or persons providing the services.

~~((AIR PERMEABLE))~~ **AIR-IMPERMEABLE INSULATION.** An insulation having an air permeance equal to or less than 0.02 L/s-m² at 75 Pa pressure differential tested in accordance with ASTM E2178 or ASTM E283.

CHILD ~~((DAY))~~ CARE. ~~((See Section 310.2.))~~ The care of children during any period of a 24-hour day.

CHILD ~~((DAY))~~ CARE ~~((HOME))~~, FAMILY HOME. ~~((See Section 310.2.))~~ A child care facility, licensed by Washington state, located in the dwelling of the person or persons under whose direct care and supervision the child is placed, for the

care of twelve or fewer children, including children who reside at the home.

HOSPICE CARE CENTER. A building or portion thereof used on a 24-hour basis for the provision of hospice services to terminally ill inpatients.

NIGHTCLUB. An A-2 Occupancy use under the 2006 International Building Code in which the aggregate area of concentrated use of unfixed chairs and standing space that is specifically designated and primarily used for dancing or viewing performers exceeds three hundred fifty square feet, excluding adjacent lobby areas. "Nightclub" does not include theaters with fixed seating, banquet halls, or lodge halls.

NONSTRUCTURAL CONCRETE. Any element made of plain or reinforced concrete that is not part of a structural system required to transfer either gravity or lateral loads to the ground.

PORTABLE SCHOOL CLASSROOM. ((See Section 902.1.

~~**RESIDENTIAL CARE/ASSISTED LIVING FACILITIES.** See Section 310.2. This definition is not adopted.)) A structure, transportable in one or more sections, which requires a chassis to be transported, and is designed to be used as an educational space with or without a permanent foundation. The structure shall be trailerable and capable of being demounted and relocated to other locations as needs arise.~~

SMALL BUSINESS. Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other businesses, which has the purpose of making a profit, and which has fifty or fewer employees.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0305 Section 305—Educational Group E.

~~((**305.2 Day Care.** The use of a building or structure, or portion thereof, for educational, supervision or personal care services for more than five children older than 2 1/2 years of age, shall be classified as a Group E Occupancy.~~

EXCEPTION: Family child day care homes licensed by Washington state for the care of twelve or fewer children shall be classified as Group R-3.))

305.2.4 Family home child care. Family home child care licensed by Washington state for the care of twelve or fewer children shall be classified as Group R-3 or shall comply with the *International Residential Code*.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0308 Section 308—Institutional Group I.

~~((**308.1 Institutional Group I.** Institutional Group I Occupancy includes, among others, the use of a building or structure, or a portion thereof, in which people are cared for or live in a supervised environment, having physical limitations~~

~~because of health or age are harbored for medical treatment or other care or treatment, or in which people are detained for penal or correctional purposes or in which the liberty of the occupants is restricted. Institutional occupancies shall be classified as Group I-1, I-2, I-3 or I-4.~~

~~**308.2 Group I-1.** This occupancy shall include buildings, structures or parts thereof housing more than 16 persons, on a 24-hour basis, who because of age, mental disability or other reasons, live in a supervised residential environment that provides personal care services. The occupants are capable of responding to an emergency situation without physical assistance from staff. This group shall include, but not be limited to, the following:~~

~~Residential board and care facilities
Assisted living facilities
Halfway houses
Group homes
Congregate care facilities
Social rehabilitation facilities
Alcohol and drug centers
Convalescent facilities~~

~~A facility such as the above with five or fewer persons and adult family homes licensed by Washington state shall be classified as a Group R-3 or shall comply with the *International Residential Code* in accordance with Section 101.2.~~

~~A facility such as the above, providing licensed care to clients in one of the categories listed in Section 310.1 licensed by Washington state shall be classified as Group R-2.~~

~~**308.3) 308.2 Definitions.** The following terms are defined in Chapter 2:~~

~~**24-HOUR CARE.**
Custodial Care.
Detoxification Facilities.
Foster Care Facilities.
HOSPICE CARE CENTER.
Hospitals and psychiatric hospitals.
Incapable of self-preservation.
Medical care.
Nursing homes.~~

~~**308.3.2 Licensed care facilities.** Assisted living facilities as licensed by Washington state under chapter 388-78A WAC and residential treatment facilities as licensed by Washington state under chapter 246-337 WAC shall be classified as Group R-2.~~

~~**308.3.3 Adult family homes.** Adult family homes licensed by Washington state shall be classified as Group R-3 or shall comply with the *International Residential Code*.~~

~~**308.4 Group I-2.** This occupancy shall include buildings and structures used for *medical* ((, surgical, psychiatric, nursing or custodial care for)) *care* on a 24-hour basis for more than five persons who are ((not capable)) *incapable of self-preservation*. This group shall include, but not be limited to, the following:~~

~~((Child)) Foster care facilities,
Detoxification facilities,
Hospice care centers,~~

Hospitals,
 ((Mental hospitals))
 Nursing homes,
 Psychiatric hospitals.

((A facility such as the above providing licensed care to clients in one of the categories listed in Section 310.1 licensed by Washington state shall be classified as Group R-2.

308.3.1 Definitions. The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein:

CHILD CARE FACILITIES. Facilities that provide care on a 24-hour basis to more than five children, 2 1/2 years of age or less, shall be classified as Group I-2.

DETOXIFICATION FACILITY. Facilities that serve patients who are provided treatment for substance abuse on a 24-hour basis and who are incapable of self-preservation or who are harmful to themselves or others.

HOSPITALS AND MENTAL HOSPITALS. A building or portion thereof used on a 24-hour basis for the medical, psychiatric, obstetrical or surgical treatment of inpatients who are incapable of self-preservation.

NURSING HOMES. Nursing homes are long-term care facilities on a 24-hour basis, including both intermediate care facilities and skilled nursing facilities, serving more than five persons and any of the persons are incapable of self-preservation.

HOSPICE CARE CENTER. A building or portion thereof used on a 24-hour basis for the provision of hospice services to terminally ill inpatients.

308.5.2 Child care facility. A facility that provides supervision and personal care on a less than 24-hour basis for more than five children 2 1/2 years of age or less shall be classified as Group I-4.

EXCEPTIONS:

1. A child day care facility that provides care for more than five but no more than 100 children 2 1/2 years or less of age, where the rooms in which the children are cared for are located on a level of exit discharge serving such rooms and each of these child care rooms has an exit door directly to the exterior, shall be classified as Group E.
2. Family child day care homes licensed by Washington state for the care of twelve or fewer children shall be classified as Group R-3.)

308.4.2 Licensed care facilities. Assisted living facilities as licensed by Washington state under chapter 388-78A WAC and residential treatment facilities as licensed by Washington state under chapter 246-337 WAC shall be classified as Group R-2.

308.6.5 Family home child care. Family home child care licensed by Washington state for the care of twelve or fewer children shall be classified as Group R-3 or shall comply with the *International Residential Code*.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0310 Section 310—Residential Group R.

~~((310.1 Residential Group R. Residential Group R includes, among others, the use of a building or structure, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I or when not regulated by the International Residential Code in accordance with Section 101.2. Residential occupancies shall include the following:~~

~~**R-1.** Residential occupancies containing *sleeping units* where the occupants are primarily *transient* in nature, including:~~

~~Boarding houses (transient)
 Hotels (transient)
 Motels (transient)~~

~~Congregate living facilities (transient) with 10 or fewer occupants are permitted to comply with the construction requirements for Group R-3.))~~

310.2 Definitions. The following terms are defined in Chapter 2:

ADULT FAMILY HOME.
BOARDING HOUSE.
CHILD CARE.
CHILD CARE, FAMILY HOME.
CONGREGATE LIVING FACILITIES.
DORMITORY.
GROUP HOME.
PERSONAL CARE SERVICE.
TRANSIENT.

310.4 Residential Group R-2. Residential occupancies containing *sleeping units* or more than two *dwelling units* where the occupants are primarily permanent in nature, including:

Apartment houses
 Assisted living facilities as licensed by Washington state under chapter 388-78A WAC

Boarding houses ((not transient)) nontransient) with more than 16 occupants

((Boarding homes as licensed by Washington state under chapter 388-78A WAC))

Congregate living facilities (nontransient) with more than 16 occupants

Convents
 Dormitories
 Fraternities and sororities
 Hotels (nontransient)
 Live/work units
 Monasteries
 Motels (nontransient)

Residential treatment facilities as licensed by Washington state under chapter 246-337 WAC

Vacation timeshare properties

((Congregate living facilities with sixteen or fewer occupants are permitted to comply with the construction requirements for Group R-3.

~~**R-3.** Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:~~

~~Buildings that do not contain more than two *dwelling units*. Adult care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.~~

~~Child care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.~~

~~*Congregate living facilities* with sixteen or fewer persons.~~

~~Adult care within a single family home, adult family homes and family child day care homes are permitted to comply with the International Residential Code.~~

~~Foster family care homes licensed by Washington state are permitted to comply with the *International Residential Code*, as an accessory use to a dwelling, for six or fewer children including those of the resident family.)~~

310.5.2 Adult family homes, family home child care. Adult family homes and family home child care facilities that are within a single-family home are permitted to comply with the *International Residential Code*.

310.5.3 Foster family care homes. Foster family care homes licensed by Washington state are permitted to comply with the *International Residential Code*, as an accessory use to a dwelling, for six or fewer children including those of the resident family.

R-4 classification is not adopted. Any reference in this code to R-4 does not apply.

~~**(310.2 Definitions.** The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein:~~

~~**ADULT FAMILY HOME.** A dwelling, licensed by Washington state, in which a person or persons provide personal care, special care, room and board to more than one but not more than six adults who are not related by blood or marriage to the person or persons providing the services.~~

~~**BOARDING HOUSE.** A building arranged or used for lodging for compensation, with or without meals, and not occupied as a single family unit.~~

~~**CHILD DAY CARE.** For the purposes of these regulations, is the care of children during any period of a 24-hour day.~~

~~**CHILD DAY CARE HOME, FAMILY.** A child day care facility, licensed by Washington state, located in the dwelling of the person or persons under whose direct care and supervision the child is placed, for the care of twelve or fewer children, including children who reside at the home.~~

~~**CONGREGATE LIVING FACILITIES.** A building or part thereof that contains sleeping units where residents share bathroom and/or kitchen facilities.~~

~~**DORMITORY.** A space in a building where group sleeping accommodations are provided in one room, or in a series of closely associated rooms, for persons not members of the same family group, under joint occupancy and single management, as in college dormitories or fraternity houses.~~

~~**PERSONAL CARE SERVICE.** The care of residents who do not require chronic or convalescent medical or nursing care. Per-~~

~~sonal care involves responsibility for safety of the resident while inside the building.~~

~~**RESIDENTIAL CARE/ASSISTED LIVING FACILITIES.** This definition is not adopted.~~

~~**TRANSIENT.** Occupancy of a dwelling or sleeping unit for not more than 30 days.)~~

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0403 Section 403—High-rise buildings.

403.5.4 Smokeproof exit enclosures. Every required exit stairway serving floors more than 75 feet (22,860 mm) above the lowest level of fire department vehicle access shall ~~((comply))~~ be a *smokeproof enclosure* in accordance with Sections 909.20 and ~~((4022.9))~~ 1022.10.

EXCEPTION: Unless required by other sections of this code, portions of such stairways which extend to serve floors below the level of exit discharge need not comply with Sections 909.20 and ~~((4022.9))~~ 1022.10 provided the portion of the stairway below is separated from the level of exit discharge with a 1 hour fire barrier.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0407 ((Reserved-)) Group I-2.

407.4.3.2 Separation. *Care suites* shall be separated from other portions of the building by a smoke partition complying with Section 710. Partitions within suites are not required to be smoke resistant or fire resistance rated unless required by another section of this code.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0420 Section 420—Groups I-1, R-1, R-2, R-3.

~~**((420.4)) 420.6 Subdivision of building spaces—Smoke barriers.** Smoke barriers complying with Section ((710)) 709 shall be installed on all floors ((other than the level of exit discharge)) of a Group R-2 boarding home or residential treatment facility licensed by Washington state((, where a fire-resistance rated corridor is required by Table 1018.1)). The smoke barrier shall subdivide the floor into at least two compartments complying with Section ((407.4)) 407.5.~~

420.7 Adult family homes. This section shall apply to all newly constructed adult family homes and all existing single-family homes being converted to adult family homes. This section shall not apply to those adult family homes licensed by the state of Washington department of social and health services prior to July 1, 2001.

420.7.1 Submittal standards. In addition to the requirements of Section 107, the submittal shall identify the project as a Group R-3 adult family home occupancy. A floor plan shall be submitted identifying the means of egress and the components in the means of egress such as stairs, ramps, platform lifts and elevators. The plans shall indicate the rooms

used for clients and the sleeping room classification of each room.

420.7.2 Sleeping room classification. Each sleeping room in an adult family home shall be classified as one of the following:

1. Type S - Where the means of egress contains stairs, elevators or platform lifts.

2. Type NS1 - Where one means of egress is at grade level or a ramp constructed in accordance with Section 420.7.8 is provided.

3. Type NS2 - Where two means of egress are at grade level or ramps constructed in accordance with Section 420.7.8 are provided.

420.7.3 Types of locking devices and door activation. All bedrooms and bathroom doors shall be openable from the outside when locked.

Every closet door shall be readily openable from the inside.

Operable parts of door handles, pulls, latches, locks and other devices installed in adult family homes shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. Pocket doors shall have graspable hardware available when in the closed or open position.

The force required to activate operable parts shall be 5.0 pounds (22.2 N) maximum. Required exit door(s) shall have no additional locking devices. Required exit door hardware shall unlock inside and outside mechanisms when exiting the building allowing reentry into the adult family home without the use of a key, tool or special knowledge.

420.7.4 Smoke and carbon monoxide alarm requirements. All adult family homes shall be equipped with smoke and carbon monoxide alarms installed as required in Section 908.7. Alarms shall be installed in such a manner so that the detection device warning is audible from all areas of the dwelling upon activation of a single alarm.

420.7.5 Escape windows and doors. Every sleeping room shall be provided with emergency escape and rescue windows as required by Section 1029. No alternatives to the sill height such as steps, raised platforms or other devices placed by the openings will be approved as meeting this requirement.

420.7.6 Fire apparatus access roads and water supply for fire protection. Adult family homes shall be served by fire apparatus access roads and water supplies meeting the requirements of the local jurisdiction.

420.7.7 Grab bar general requirements. Where facilities are designated for use by adult family home clients, grab bars for water closets, bathtubs and shower stalls shall be installed according to this section.

420.7.7.1 Grab bar cross section. Grab bars with a circular cross section shall have an outside diameter of 1 1/4 inches minimum and 2 inches maximum. Grab bars with noncircular cross section shall have a cross section dimension of 2 inches maximum and a perimeter dimension of 4 inches minimum and 4 5/8 inches maximum.

420.7.7.2 Grab Bar Installation. Grab bars shall have a spacing of 1 1/2 inches between the wall and the bar. Projecting objects, control valves and bathtub or shower stall enclosure features above, below and at the ends of the grab bar shall have a clear space of 1 1/2 inches to the grab bar.

EXCEPTION: Swing-up grab bars shall not be required to meet the 1 1/2 inch spacing requirement.

Grab bars shall have a structural strength of 250 pounds applied at any point on the grab bar, fastener, mounting device or supporting structural member. Grab bars shall not be supported directly by any residential grade fiberglass bathing or showering unit. Acrylic bars found in bathing units shall be removed.

Fixed position grab bars, when mounted, shall not rotate, spin or move and have a graspable surface finish.

420.7.7.3 Grab Bars at Water Closets. Water closets shall have grab bars mounted on both sides. Grab bars can be a combination of fixed position and swing-up bars. Grab bars shall meet the requirements of Section 420.7.7. Grab bars shall mount between 33 inches and 36 inches above floor grade. Centerline distance between grab bars, regardless of type used, shall be between 25 inches minimum and 30 inches maximum.

420.7.7.3.1 Fixed position grab bars. Fixed position grab bars shall be a minimum of 36 inches in length and start 12 inches from the rear wall.

420.7.7.3.2 Swing-up grab bars. Swing-up grab bars shall be a minimum of 28 inches in length from the rear wall.

420.7.7.4 Grab bars at bathtubs. Horizontal and vertical grab bars shall meet the requirements of Section 420.7.7.

420.7.7.4.1 Vertical grab bars. Vertical grab bars shall be a minimum of 18 inches long and installed at the control end wall and head end wall. Grab bars shall mount within 4 inches of the exterior of the bath tub edge or within 4 inches within the bath tub. The bottom end of the bar shall start between 36 inches and 42 inches above floor grade.

EXCEPTION: The required vertical grab bar can be substituted with a floor to ceiling grab bar meeting the requirements of Section 420.7.7 at the control end and head end entry points.

420.7.7.4.2 Horizontal grab bars. Horizontal grab bars shall be provided at the control end, head end, and the back wall within the bathtub area. Grab bars shall be mounted between 33 inches and 36 inches above floor grade. Control end and head end grab bars shall be 24 inches minimum in length. Back wall grab bars shall be 36 inches minimum in length.

420.7.7.5 Grab bars at shower stalls. Where shower stalls are provided to meet the requirements for bathing facilities, grab bars shall meet the requirements of Section 420.7.7.

EXCEPTION: Shower stalls with permanent built-in seats are not required to have vertical or horizontal grab bars at the seat end wall. A vertical floor to ceiling grab bar shall be installed within 4 inches of the exterior of the shower aligned with the nose of the built-in seat.

420.7.7.5.1 Vertical grab bars. Vertical grab bars shall be 18 inches minimum in length and installed at the control end wall and head end wall. Vertical bars shall be mounted within 4 inches of the exterior of the shower stall or within 4 inches of the inside of the shower stall. The bottom end of vertical bars mount between 36 inches and 42 inches above floor grade.

420.7.7.5.2 Horizontal grab bars. Horizontal grab bars shall be installed on all sides of the shower stall mounted between 33 inches and 36 inches above the floor grade. Horizontal grab bars shall be a maximum of 6 inches from adjacent walls. Horizontal grab bars shall not interfere with shower control valves.

420.7.8 Ramps. All interior and exterior ramps, when provided, shall be constructed in accordance with Section 1010 with a maximum slope of 1 vertical to 12 horizontal.

EXCEPTION: Where it is technically infeasible to comply with Section 1010, ramps in existing buildings being converted to use as adult family homes shall be permitted to comply with the following:

1. They shall have a maximum slope of 1 unit vertical in 12 units horizontal (8 percent slope).
2. Landings of at least 3 feet by 3 feet (914 mm by 914 mm) shall be provided at the top and bottom of the ramp, where doors open onto the ramp, and where the ramp changes direction.

420.7.8.1 Handrails for ramps. Handrails shall be provided for ramps in accordance with Section 1010.9.

EXCEPTION: Where it is technically infeasible to comply with Section 1010.9, ramps in existing buildings being converted to use as adult family homes shall be permitted to comply with the following:

1. Handrails shall be installed on both sides of ramps with a rise of more than 6 inches and a slope between 1 vertical to 12 horizontal and 1 vertical and 20 horizontal.
2. Handrail height, measured above the finished surface of the ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).
3. Handrails shall comply with Section 1012.3.
4. Handrails where required on ramps shall be continuous for the full length of the ramp. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1 1/2 inches (38 mm) between the wall and the handrails.

420.7.9 Stair treads and risers. Stair treads and risers shall be constructed in accordance with Section 1009.

EXCEPTION: Where it is technically infeasible to comply with Section 1009, stair treads and risers in existing buildings being converted to use as adult family homes shall be permitted to comply with the following:

1. The maximum riser height shall be 7 3/4 inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that the opening between treads does not permit the passage of a 4-inch-diameter (102 mm) sphere. The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.

2. The minimum tread depth shall be 10 inches (254 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm).

3. Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than 3/8 inch (9.5 mm). Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8 inch (9.5 mm) of the rectangular tread depth.

4. The radius of curvature at the nosing shall be no greater than 9/16 inch (14 mm). A nosing not less than 3/4 inch (19 mm) but not more than 1 1/4 inches (32 mm) shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than 3/8 inch (9.5 mm) between two stories, including the nosing at the level of floors and landings. Beveling of nosings shall not exceed 1/2 inch (12.7 mm). A nosing is not required where the tread depth is a minimum of 11 inches (279 mm).

420.7.9.1 Handrails for treads and risers. Handrails shall be installed on both sides of treads and risers numbering from one riser to multiple risers. Handrails shall comply with Section 1009.15.

420.7.10 Shower stalls. Where provided to meet the requirements for bathing facilities, the minimum size of shower stalls for an adult family home shall be 30 inches deep by 48 inches long.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0422 Section 422—(~~Ambulatory health care~~) Reserved.

~~(422.1 General.~~ Occupancies classified as ambulatory health care facilities shall comply with the provisions of Sections 422.1 through 422.7 and other applicable provisions of this code by the services provided.

~~422.2 Separation.~~ Ambulatory health care facilities where four or more care recipients are rendered incapable of self-preservation at any given time shall be separated from adjacent spaces, corridors or tenants with a fire partition installed in accordance with Section 709.

~~422.3 Smoke compartments.~~ Where the aggregate area of one or more ambulatory health care facility exceeds 10,000 square feet on one story, the story shall be provided with a smoke barrier to subdivide the story into not less than two smoke compartments. Smoke barriers shall be installed in accordance with Section 710. The area of any one such smoke compartment shall not exceed 22,500 square feet (2092 m²). The travel distance from any point in a smoke

compartment to a smoke barrier door shall not exceed 200 feet (60,960 mm).

EXCEPTION: Where the ambulatory health care facility is completely surrounded by the required smoke barrier, such smoke barriers shall not be required to be continuous from an outside wall to outside wall.

~~422.4 Refuge area.~~ At least 15 net square feet (2.8 m²) per occupant shall be provided within the aggregate area of corridors, patient rooms, treatment rooms, lounge or dining areas and other low hazard areas on each side of each smoke barrier. Each ambulatory health care facility shall be provided with access to the required refuge areas without passing through or utilizing adjacent tenant spaces.

~~422.5 Independent egress.~~ A means of egress shall be provided from each smoke compartment created by smoke barriers without having to return through the smoke compartment from which means of egress originated.

~~422.6 Automatic sprinkler systems.~~ Automatic sprinkler systems shall be provided for ambulatory care facilities in accordance with Section 903.2.2.

~~422.7 Fire alarm systems.~~ A fire alarm system shall be provided for ambulatory health care facilities in accordance with Section 907.2.2.1.)

AMENDATORY SECTION (Amending WSR 10-24-059, filed 11/29/10, effective 7/1/11)

WAC 51-50-0504 Section 504—Height.

504.3 Stair enclosure pressurization increase. For Group R1 and R2 occupancies in buildings of Type VA construction equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, the maximum number of stories permitted in Section 504.2 may be increased by one provided the interior exit stairways and ramps are pressurized in accordance with Section 909.20 and Section 909.11.

504.4 Roof structures. (Same as ((2009)) 2012 IBC except Section number revised)

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0506 Building area modifications.

506.4 Single occupancy buildings with more than one story. The total allowable building area of a single occupancy building with more than one story above grade plane shall be determined in accordance with this section. The actual aggregate building area at all stories in the building shall not exceed the total allowable building area.

EXCEPTION: Basements ((below the first story above grade plane)) need not be included in the total allowable building area, provided each basement does not exceed the area permitted for a building with no more than one story above grade plane.

506.5 Mixed occupancy area determination. The total allowable building area for buildings containing mixed occupancies shall be determined in accordance with the applicable

provisions of this section. Basements ((below the first story above grade plane)) need not be included in the total allowable building area, provided each such basement does not exceed the area permitted for a building with no more than one story above grade plane.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0509 ((Reserved.)) Incidental uses.

Table 509
Incidental Uses

<u>Room or Area</u>	<u>Separation and/or Protection</u>
<u>Dry type transformers over 112.5 kVA and required to be in a fire resistant room per NEC (NFPA 70) Section 450.21 (B)¹</u>	<u>1 hour or provide automatic sprinkler system</u>

¹ Dry type transformers rated over 35,000 volts and oil-insulated transformers shall be installed in a transformer vault complying with NFPA 70.

(Remainder of table unchanged)

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0708 Section 708—((Shaft enclosures.)) Reserved.

~~((708.14.2.12 Hoistway venting.~~ Hoistway venting required by Section 3004 need not be provided for pressurized elevator shafts.

~~708.14.2.13 Machine rooms.~~ Elevator machine rooms shall be pressurized in accordance with this section unless separated from the hoistway shaft by construction in accordance with Section 707.)

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0710 Section 710—((Smoke barriers.)) Reserved.

~~((710.4 Continuity.~~ Smoke barriers shall form an effective membrane continuous from outside wall to outside wall and from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, deck or slab above, including continuity through concealed spaces, such as those found above suspended ceiling, and interstitial structural and mechanical spaces. The supporting construction shall be protected to afford the required fire resistance rating of the wall or floor supported in buildings of other than Type IIB, IIIB, or VB construction.

EXCEPTIONS: 1. Smoke barrier walls are not required in interstitial spaces where such spaces are designed and constructed with ceilings that provide resistance to the

passage of fire and smoke equivalent to that provided by the smoke barrier walls.
~~2. Smoke barriers provided to enclose areas of refuge as required by Section 1007.6 are not required to extend from outside wall to outside wall.)~~

AMENDATORY SECTION (Amending WSR 04-01-108, filed 12/17/03, effective 7/1/04)

**WAC 51-50-0902 Section 902—((Definitions.))
 Reserved.**

~~((902.1 Definitions.~~

~~**PORTABLE SCHOOL CLASSROOM.** A structure, transportable in one or more sections, which requires a chassis to be transported, and is designed to be used as an educational space with or without a permanent foundation. The structure shall be trailerable and capable of being demounted and relocated to other locations as needs arise.))~~

AMENDATORY SECTION (Amending WSR 10-24-059, filed 11/29/10, effective 7/1/11)

WAC 51-50-0903 Section 903—Automatic sprinkler systems.

903.2.1.6 Nightclub. An automatic sprinkler system shall be provided throughout Group A-2 nightclubs as defined in this code.

903.2.3 Group E. An automatic sprinkler system shall be provided for Group E Occupancies.

EXCEPTIONS:

1. Portable school classrooms with an occupant load of 50 or less calculated in accordance with Table 1004.1.2, provided aggregate area of any cluster or portion of a cluster of portable school classrooms does not exceed 5,000 square feet (1465 m²); and clusters of portable school classrooms shall be separated as required by the building code.
2. Group E occupancies with an occupant load of 50 or less, calculated in accordance with Table ~~((1004.1.1))~~ 1004.1.2.

903.2.7 Group M. An automatic sprinkler system shall be provided throughout buildings containing a Group M occupancy, where one of the following conditions exists:

1. A Group M fire area exceeds 12,000 square feet (1115 m²).
2. A Group M fire area is located more than three stories above grade plane.
3. The combined area of all Group M fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. Where a Group M occupancy that is used for the display and sale of upholstered furniture or mattresses exceeds 5000 square feet (464 m²).

903.2.8 Group R. An automatic fire sprinkler system installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R fire area.

EXCEPTION:

Group R-1 if all of the following conditions apply:

1. The Group R fire area is no more than 500 square feet and is used for recreational use only.
2. The Group R fire area is only one story.
3. The Group R fire area does not include a basement.

4. The Group R fire area is no closer than 30 feet from another structure.
5. Cooking is not allowed within the Group R fire area.
6. The Group R fire area has an occupant load of no more than 8.
7. A hand held (portable) fire extinguisher is in every Group R fire area.

AMENDATORY SECTION (Amending WSR 12-01-099, filed 12/20/11, effective 4/1/12)

WAC 51-50-0908 Section 908—Emergency alarm systems.

[F] 908.7 Carbon monoxide alarms. Group I or Group R occupancies shall be provided with single station carbon monoxide alarms installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in dwelling units or sleeping units and on each level of the dwelling. The carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720-2012 and the manufacturer's instructions.

EXCEPTIONS:

1. For other than R-3 occupancies, the building does not contain a fuel-burning appliance, a fuel-burning fireplace, or an attached garage; or
2. Sleeping units or dwelling units in I and R-1 occupancies and R-2 college dormitories, hotel, and DSHS licensed boarding home and residential treatment facility occupancies which do not themselves contain a fuel-burning appliance, or a fuel-burning fireplace, or have an attached garage, ~~((but which are located in a building with a fuel-burning appliance, or a fuel-burning fireplace, or an attached garage,))~~ need not be provided with carbon monoxide alarms provided that:
 - a. The sleeping unit or dwelling unit is not adjacent to any room which contains a fuel-burning appliance, a fuel-burning fireplace, or an attached garage; and
 - ~~((2-))~~ b. The sleeping unit or dwelling unit is not connected by duct work or ventilation shafts with a supply or return register in the same room to any room containing a fuel-burning appliance, a fuel-burning fireplace, or to an attached garage; and
 - ~~((3-))~~ c. The building is provided with a common area carbon monoxide ~~((alarm))~~ detection system.
- ~~((4-))~~ 3. An open parking garage, as defined in Chapter 2 of the International Building Code, or enclosed parking garage ventilated in accordance with Section 404 of the *International Mechanical Code* shall not be ~~((deemed to be))~~ considered an attached garage.

908.7.1 Carbon monoxide detection systems. Carbon monoxide detection systems, that include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720-2012 shall be permitted. The carbon monoxide detectors shall be listed as complying with UL 2075.

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-0909 Section 909—Smoke control systems.

~~((909.6.3 Elevator shaft pressurization. Where elevator shaft pressurization is required to comply with Exception 6 of Section 708.14.1, the pressurization system shall comply with and be maintained in accordance with 708.14.2.~~

909.6.3.1 Activation. The elevator shaft pressurization system shall be activated by a fire alarm system which shall include smoke detectors or other approved detectors located near the elevator shaft on each floor as approved by the building official and fire code official. If the building has a fire alarm panel, detectors shall be connected to, with power supplied by, the fire alarm panel.

909.6.3.2 Power system. The power source for the fire alarm system and the elevator shaft pressurization system shall be in accordance with Section 909.11.)

909.21.12 Hoistway venting. Hoistway venting required by Section 3004 need not be provided for pressurized elevator shafts.

909.21.13 Machine rooms. Elevator machine rooms shall be pressurized in accordance with this section unless separated from the hoistway shaft by construction in accordance with Section 707.

AMENDATORY SECTION (Amending WSR 10-24-059, filed 11/29/10, effective 7/1/11)

WAC 51-50-1005 Section 1005—(~~Egress width.~~) Reserved.

~~((1005.1 Minimum required egress width. The means of egress width shall not be less than required by this section. The total width of means of egress in inches (mm) shall not be less than the total occupant load served by the means of egress multiplied by 0.3 inches (7.62 mm) per occupant for stairways and by 0.2 inches (5.08 mm) per occupant for other egress components. The width shall not be less than specified elsewhere in this code. Multiple means of egress shall be sized such that the loss of any one means of egress shall not reduce the available capacity to less than 50 percent of the required capacity. The maximum capacity required from any story of a building shall be maintained to the termination of the means of egress.~~

EXCEPTIONS:

1. Means of egress complying with Section 1028.
2. For other than H and I-2 occupancies, the total width of means of egress in inches (mm) shall not be less than the total occupant load served by the means of egress multiplied by 0.2 inches (5.1 mm) per occupant for stairways and by 0.15 inches (3.8 mm) per occupant for other egress components in buildings that are provided with sprinkler protection in accordance with 903.3.1.1 or 903.3.1.2 and an emergency voice/alarm communication system in accordance with 907.5.2.2.)

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1008 Section 1008—Doors, gates and turnstiles.

1008.1.9.3 Locks and latches. Locks and latches shall be permitted to prevent operation of doors where any of the following exists:

1. Places of detention or restraint.
2. In buildings in occupancy Group A having an occupant load of 300 or less, Groups B, F, M and S, and in places of religious worship, the main exterior door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:
 - 2.1. The locking device is readily distinguishable as locked;
 - 2.2. A readily visible and durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN BUILDING IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background; and
 - 2.3. The use of the key-operated locking device is revocable by the building official for due cause.
3. Where egress doors are used in pairs, approved automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts has no door-knob or surface-mounted hardware.
4. Doors from individual dwelling or sleeping units of Group R occupancies having an occupant load of 10 or less are permitted to be equipped with a night latch, dead bolt, or security chain, provided such devices are openable from the inside without the use of a key or a tool.

5. Fire doors after the minimum elevated temperature has disabled the unlatching mechanism in accordance with listed fire door test procedures.

6. Approved, listed locks without delayed egress shall be permitted in Group R-2 boarding homes licensed by Washington state, provided that:

- 6.1. The clinical needs of one or more patients require specialized security measures for their safety.
- 6.2. The doors unlock upon actuation of the automatic sprinkler system or automatic fire detection system.
- 6.3. The doors unlock upon loss of electrical power controlling the lock or lock mechanism.
- 6.4. The lock shall be capable of being deactivated by a signal from a switch located in an approved location.
- 6.5. There is a system, such as a keypad and code, in place that allows visitors, staff persons and appropriate residents to exit. Instructions for exiting shall be posted within six feet of the door.

1008.1.9.6 Special locking arrangements in Group I-2. Approved special egress locks shall be permitted in a Group I-2 Occupancy where the clinical needs of persons receiving care require such locking. Special egress locks shall be permitted in such occupancies where the building is equipped throughout with an automatic *sprinkler system* in accordance with Section 903.3.1.1 or an *approved* automatic smoke or heat detection system installed in accordance with Section 907, provided that the doors (~~unlock~~) are installed and operate in accordance with Items 1 through ((6 below)) 7.

1. The doors unlock upon actuation of the automatic sprinkler system or automatic fire detection system.

2. The doors unlock upon loss of power controlling the lock or lock mechanism.

3. The door locks shall have the capability of being unlocked by a signal from the *fire command center*, a nursing station or other *approved* location.

4. A building occupant shall not be required to pass through more than one door equipped with a special egress lock before entering an exit.

5. The procedures for the operation(s) of the unlocking system shall be described and approved as part of the emergency planning and preparedness required by Chapter 4 of the International Fire Code.

~~((5-))~~ 6. There is a system, such as a keypad and code, in place that allows visitors, staff persons and appropriate residents to exit. Instructions for exiting shall be posted within six feet of the door.

~~((6-))~~ 7. Emergency lighting shall be provided at the door.

EXCEPTION: Items 1(~~((2, 3,))~~) through 4 and ~~((5))~~ 6 shall not apply to doors to areas where persons, which because of clinical needs, require restraint or containment as part of the function of a (~~(Group I-2 mental hospital))~~ psychiatric treatment area provided that all clinical staff shall have the keys, codes or other means necessary to operate the locking devices.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1009 Section 1009—Stairways and handrails.

1009.3 Exit access stairways. Floor openings between stories created by exit access stairways shall be enclosed.

EXCEPTIONS:

1. In other than Group I-2 and I-3 occupancies, exit access stairways that serve, or atmospherically communicate between, only two stories are not required to be enclosed. Such interconnected stories shall not be open to other stories.
2. Exit access stairways serving and contained within a single residential dwelling unit or sleeping unit in Group R-1, R-2 or R-3 occupancies are not required to be enclosed.
3. In Group B or M occupancies, exit access stairways that are designed exclusively for circulation are not required to be enclosed provided that the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the area of the floor opening between stories does not exceed twice the horizontal projected area of the exit access stairway, and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13.
4. In other than Group B and M occupancies, exit access stairways that are designed exclusively for circulation are not required to be enclosed provided that the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the floor opening does not connect more than four stories, the area of the floor opening between stories does not exceed twice the horizontal projected area of the exit access stairway, and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13.

5. Exit access stairways within an atrium complying with the provisions of Section 404 are not required to be enclosed.

6. Exit access stairways and ramps in open parking garages that serve only the parking garage are not required to be enclosed.

7. Stairways serving outdoor facilities where all portions of the means of egress are essentially open to the outside are not required to be enclosed.

8. Exit access stairways serving stages, platforms and technical production areas in accordance with Sections 410.6.2 and 410.6.3 are not required to be enclosed.

9. Stairways are permitted to be open between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.

10. In group I-3 occupancies, exit access stairways constructed in accordance with Section 408.5 are not required to be enclosed.

~~((1009-15))~~ **1009.18 Stairways in individual dwelling units.** Stairs or ladders within an individual dwelling unit used for access to areas of 200 square feet (18.6 m²) or less, and not containing the primary bathroom or kitchen, are exempt from the requirements of Section 1009.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1010 Section 1010—Ramps.

1010.1 Scope. The provisions of this section shall apply to ramps used as a component of a means of egress.

EXCEPTIONS:

1. Other than ramps that are part of the accessible routes providing access in accordance with Sections 1108.2 through 1108.2.4 and 1108.2.6, ramped aisles within assembly rooms or spaces shall conform with the provisions in Section 1028.11.
2. Curb ramps shall comply with ICC A117.1.
3. Vehicle ramps in parking garages for pedestrian exit access shall not be required to comply with Sections ~~((1010.3))~~ 1010.4 through ~~((1010.9))~~ 1010.10 when they are not an accessible route serving accessible parking spaces (~~((#))~~), other required accessible elements, or part of an accessible means of egress.
4. In a parking garage where one accessible means of egress serving accessible parking spaces or other accessible elements is provided, a second accessible means of egress serving that area may include a vehicle ramp that does not comply with Sections ~~((1010.4, 1010.5, and 1010.8))~~ 1010.5, 1010.6, and 1010.9. A landing complying with Sections ~~((1010.6.1 and 1010.6.4))~~ 1010.7.1 and 1010.7.4 shall be provided at any change of direction in the accessible means of egress.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1014 ((Exit access-)) Reserved.

~~((1014.2.2 Group I-2.~~

~~**General.** Habitable spaces and suites in Group I-2 occupancies are permitted to comply with this Section 1014.2.2.~~

~~**1014.2.2.1 Exit access doors.** Habitable spaces and suites in Group I-2 occupancies shall have an exit access door leading directly to a corridor.~~

((EXCEPTION: Rooms with exit doors opening directly to the outside at ground level.

~~**1014.2.2.2 Exit access through suites.** Exit access from areas not classified as a Group I-2 Occupancy suite shall not pass through a suite. In a suite required to have more than one exit, one exit access may pass through an adjacent suite if all other requirements of Section 1014.2 are satisfied.~~

~~**1014.2.2.3 Separation.** Suites in Group I-2 Occupancies shall be separated from other portions of the building by a smoke partition complying with Section 711. Partitions within suites are not required to be smoke-resistant or fire-resistance-rated unless required by another section of this Code.~~

~~**1014.2.2.4 Suites containing patient sleeping areas.** Patient sleeping areas in Group I-2 Occupancies shall be permitted to be divided into suites with one intervening room if one of the following conditions is met:~~

1. The intervening room within the suite is not used as an exit access for more than eight patient beds.

2. The arrangement of the suite allows for direct and constant visual supervision by nursing personnel.

~~**1014.2.2.4.1 Area.** Suites of sleeping rooms shall not exceed 5,000 square feet (465 m²).~~

~~**1014.2.2.4.2 Exit access.** Any patient sleeping room, or any suite that includes patient sleeping rooms, of more than 1,000 square feet (93 m²) shall have at least two exit access doors located in accordance with Section 1015.2.~~

~~**1014.2.2.4.3 Travel distance.** The travel distance between any point in a suite of sleeping rooms and an exit access door of that suite shall not exceed 100 feet (30,480 mm). The travel distance between any point in a Group I-2 Occupancy patient sleeping room and an exit access door in that room shall not exceed 50 feet (15,240 mm).~~

~~**1014.2.2.5 Suites not containing patient sleeping areas.** Areas other than patient sleeping areas in Group I-2 Occupancies shall be permitted to be divided into suites that comply with Sections 1014.2.2.5.1 through 1014.2.2.5.4.~~

~~**1014.2.2.5.1 Area.** Suites of rooms, other than patient sleeping rooms, shall not exceed 10,000 square feet (929 m²).~~

~~**1014.2.2.5.2 Exit access.** Any rooms or suite of rooms, other than patient sleeping rooms, of more than 2,500 square feet (232 m²) shall have at least two exit access doors located in accordance with Section 1015.2.~~

~~**1014.2.2.5.3 One intervening room.** For rooms other than patient sleeping rooms, suites of rooms are permitted to have one intervening room if the travel distance within the suite to the exit access door is not greater than 100 feet (30,480 mm).~~

~~**1014.2.2.5.4 Two intervening rooms.** For rooms other than patient sleeping rooms located within a suite, exit access travel from within the suite shall be permitted through two intervening rooms where the travel distance to the exit access door is not greater than 50 feet (15,240 mm).))~~

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1018 Section 1018—Corridors.

1018.5 Air movement in corridors. Corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts.

- EXCEPTIONS:
1. Use of a corridor as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, smoking lounges and janitor closets, shall be permitted provided that each such corridor is directly supplied with outdoor air at a rate greater than the rate of makeup air taken from the corridor.
 2. Where located within a dwelling unit, the use of corridors for conveying return air shall not be prohibited.
 3. Where located within tenant spaces of one thousand square feet (93 m²) or less in area, utilization of corridors for conveying return air is permitted.
 4. Incidental air movement from pressurized rooms within health care facilities, provided that a corridor is not the primary source of supply or return to the room.
 5. Where such air is part of an engineered smoke control system.
 6. Air supplied to corridors serving residential occupancies shall not be considered as providing ventilation air to the dwelling units subject to the following:
 - 6.1 The air supplied to the corridor is one hundred percent outside air; and
 - 6.2 The units served by the corridor have conforming ventilation air independent of the air supplied to the corridor; and
 - 6.3 For other than high-rise buildings, the supply fan will automatically shut off upon activation of corridor smoke detectors which shall be spaced at no more than thirty feet (9,144 mm) on center along the corridor; or
 - 6.4 For high-rise buildings, corridor smoke detector activation will close required smoke/fire dampers at the supply inlet to the corridor at the floor receiving the alarm.

1018.6 Corridor continuity. Fire-resistance-rated corridors shall be continuous from the point of entry to an exit, and shall not be interrupted by intervening rooms. Where the path of egress travel within a fire-resistance-rated corridor to the exit includes travel along unenclosed exit access stairways or ramps, the fire resistance-rating shall be continuous for the length of the stairway or ramp and for the length of the connecting corridor on the adjacent floor leading to the exit.

- EXCEPTIONS:
1. Foyers, lobbies or reception rooms constructed as required for corridors shall not be construed as intervening rooms.
 2. In Group R-2 boarding homes and residential treatment facilities licensed by Washington state, seating areas shall be allowed to be open to the corridor provided:
 - 2.1 The seating area is constructed as required for the corridor;
 - 2.2 The floor is separated into at least two compartments complying with Section ((407.4)) 407.5;
 - 2.3 Each individual seating area does not exceed 150 square feet, excluding the corridor width;
 - 2.4 The combined total space of seating areas per compartment does not exceed 300 square feet, excluding the corridor width;
 - 2.5 Combustible furnishings located within the seating area shall be in accordance with the International Fire Code Section 805; and
 - 2.6 Emergency means of egress lighting is provided as required by Section 1006 to illuminate the area.

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-1101 Section 1101—General.

1101.2 Design. Buildings and facilities shall be designed and constructed to be accessible in accordance with this code and ICC A117.1, except those portions of ICC A117.1 amended by this section.

~~((1101.2.1 (ICC A117.1 Section 403) Landings for walking surfaces. The maximum rise for any run is 30 inches (762 mm). Landings shall be provided at the top and bottom of any run. Landings shall be level and have a minimum dimension measured in the direction of travel of not less than 60 inches (1525 mm).))~~

1101.2.2 (ICC A117.1 Section 403.5) Clear width of accessible route. Clear width of an accessible route shall comply with ICC A117.1 ((Table)) Section 403.5. For exterior routes of travel, the minimum clear width shall be 44 inches (1118 mm).

1101.2.3 (ICC A117.1 Section 404.2.8) Door-opening force. Fire doors shall have the minimum opening force allowable by the appropriate administrative authority. The force for pushing or pulling open doors other than fire doors shall be as follows:

1. Interior hinged door: 5.0 pounds (22.2 N) maximum
2. Interior sliding or folding doors: 5.0 pounds (22.2 N) maximum
3. Exterior hinged, sliding or folding door: 10 pounds (44.4 N) maximum.

EXCEPTION: Interior or exterior automatic doors complying with Section 404.3 of ICC ANSI A117.1.

These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.

1101.2.4 (ICC A117.1 Section 407.4.6.2.2) Arrangement of elevator car buttons. This section is not adopted.

~~((1101.2.5 (ICC A117.1 603.4) Coat hooks and shelves. Coat hooks shall be located within one of the reach ranges specified in Section 308. Shelves shall be installed so the top of the shelf is 40 inches (1015 mm) minimum and 42 inches maximum above the floor.~~

~~**1101.2.6 (ICC A117.1 604.11) Coat hooks and shelves.** Coat hooks provided within toilet compartments shall be located within one of the reach ranges specified in Section 308. Shelves shall be installed so the top of the shelf is 40 inches (1015 mm) minimum and 42 inches maximum above the floor.))~~

1101.2.7 (ICC ANSI A117.1 606.7) Operable parts. Operable parts on drying equipment, towel or cleansing product dispensers, and disposal fixtures shall comply with Table ((606.7, except the maximum reach height shall be 40 inches (1015 mm) for reach depths less than 6 inches)) 603.6.

1101.2.8 (ICC A117.1 Section 604.6) Flush controls. Flush controls shall be hand operated or automatic. Hand operated flush controls shall comply with Section 309, except the max-

imum height above the floor shall be 44 inches. Flush controls shall be located on the open side of the water closet.

EXCEPTION: In ambulatory accessible compartments complying with Section ((604.9)) 604.10, flush controls shall be permitted to be located on either side of the water closet.

1101.2.9 (ICC A117.1 Section 703.6.3.1) International Symbol of Accessibility. Where the International Symbol of Accessibility is required, it shall be proportioned complying with ICC A117.1 Figure 703.6.3.1. All interior and exterior signs depicting the International Symbol of Accessibility shall be white on a blue background.

~~((1101.2.10 (ICC A117.1 Section 404.3.5) Control switches. Manually operated control switches shall comply with Section 309, except they shall be placed 32 inches minimum (815 mm) and 40 inches maximum (1015 mm) above the floor. The clear floor space adjacent to the control switch shall be located beyond the arc of the door swing and centered on the control switch.))~~

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1106 Section 1106—Parking and passenger loading facilities.

~~((1106.3 Group I-2 outpatient facilities. Ten percent, but not less than one, of patient and visitor parking spaces provided to serve Group I-2 outpatient facilities shall be accessible.))~~

1106.6 Location. Accessible parking spaces shall be located on the shortest accessible route of travel from adjacent parking to an accessible building entrance. In parking facilities that do not serve a particular building, accessible parking spaces shall be located on the shortest route to an accessible pedestrian entrance to the parking facility. Where buildings have multiple accessible entrances with adjacent parking, accessible parking spaces shall be dispersed and located near the accessible entrances. Wherever practical, the accessible route shall not cross lanes of vehicular traffic. Where crossing traffic lanes is necessary, the route shall be designated and marked as a crosswalk.

EXCEPTION:

1. In multilevel parking structures, van accessible parking spaces are permitted on one level.
2. Accessible parking spaces shall be permitted to be located in different parking facilities if substantially equivalent or greater accessibility is provided in terms of distance from an accessible entrance or entrances, parking fee and user convenience.

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-1107 Section 1107—Dwelling units and sleeping units.

1107.6 Group R. Accessible units, Type A units and Type B units shall be provided in Group R Occupancies in accordance with Sections 1107.6.1 through 1107.6.4. Accessible and Type A units shall be apportioned among efficiency dwelling units, single bedroom units and multiple bedroom

units, in proportion to the numbers of such units in the building.

1107.6.2.1.1 Type A units. In Group R-2 Occupancies containing more than 10 dwelling units or sleeping units, at least 5 percent, but not less than one, of the units shall be a Type A unit. All units on a site shall be considered to determine the total number of units and the required number of Type A units. Type A units shall be dispersed among the various classes of units, as described in Section 1107.6.

EXCEPTIONS: 1. The number of Type A units is permitted to be reduced in accordance with Section 1107.7.
2. Existing structures on a site shall not contribute to the total number of units on a site.

1107.6.2.2 Group R-2 other than apartment houses, monasteries and convents. In Group R-2 Occupancies, other than apartment houses, monasteries and convents, Accessible units and Type B units shall be provided in accordance with Sections 1107.6.2.2.1 and 1107.6.2.2.2. Accessible units shall be dispersed among the various classes of units, as described in Section 1107.6.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1203 Section 1203—Ventilation.

1203.1 General. Buildings shall be provided with natural ventilation in accordance with Section 1203.4, or mechanical ventilation in accordance with the *International Mechanical Code*.

1203.2 Attic spaces. Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof framing members shall have cross ventilation for each separate space by ~~((ventilating))~~ ventilation openings protected against the entrance of rain and snow. Blocking and bridging shall be arranged so as not to interfere with the movement of air. ~~((A minimum of))~~ An airspace of not less than 1 inch (25 mm) ((of airspace)) shall be provided between the insulation and the roof sheathing. The net free ventilating area shall not be less than 1/150th of the area of the space ventilated ~~((, with 50 percent of the required ventilating area provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents))~~.

EXCEPTIONS: 1. The ~~((minimum required net free ventilating))~~ net free cross-ventilation area shall be permitted to be reduced to 1/300 ((of the area of the space ventilated.)) provided ~~((a vapor retarder having a transmission rate not exceeding one perm in accordance with ASTM E 96 is installed on the warm side of the attic insulation and provided 50 percent of the required ventilating area provided by ventilators located in the upper portion of the space to be ventilated is at least 3 feet (914 mm) above eave or cornice vents, with the balance of the required ventilation provided by eave or cornice vents))~~ not less than 50 percent and not more than 80 percent of the required ventilating area provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents.

2. The net free cross-ventilation area shall be permitted to be reduced to 1/300 where a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.

3. Attic ventilation shall not be required when determined not necessary by the building official due to atmospheric or climatic conditions.

4. Unvented attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) shall be permitted if all the following conditions are met:

~~((2.1))~~ 4.1 The unvented attic space is completely contained within the building thermal envelope.

~~((2.2))~~ 4.2 No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.

~~((2.3))~~ 4.3 Where wood shingles or shakes are used, a minimum 1/4 inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.

~~((2.4))~~ 4.4 In Climate Zones 5B and 6B, any air-impermeable insulation shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.

~~((2.5))~~ 4.5 Either items a, b, or c below shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.

a. Air-impermeable insulation only. Insulation shall be applied in direct contact to the underside of the structural roof sheathing.

b. Air-permeable insulation only. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified ~~((per WA Climate Zone))~~ in Table 1203.2.1 for condensation control.

~~((i. Climate Zone #1 - R-10 minimum rigid board or air-impermeable insulation R-value.~~

~~ii. Climate Zone #2 - R-25 minimum rigid board or air-impermeable insulation R-value.))~~

c. Air-impermeable and air-permeable insulation. The air-impermeable insulation shall be applied in direct contact to the underside of the structural roof sheathing as specified ~~((per WA Climate Zone))~~ in Table 1203.2.1 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.

i. Climate Zone #1 - R-10 minimum rigid board or air-impermeable insulation R-value.

ii. Climate Zone #2 - R-25 minimum rigid board or air-impermeable insulation R-value.

d. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

**Table 1203.2.1
Insulation for Condensation Control**

CLIMATE ZONE	MINIMUM RIGID BOARD ON AIR-IMPERMEABLE INSULATION R-VALUE ^a
4C	R-15
5B	R-20
6B	R-25

^a Contributes to but does not supercede the requirements for insulation in the Washington State Energy Code (WAC 51-11).

1203.4 Natural ventilation. For other than Group R Occupancies, natural ventilation of an occupied space shall be through windows, doors, louvers or other openings to the out-

doors. The operating mechanism for such openings shall be provided with ready access so that the openings are readily controllable by the building occupants. Group R Occupancies shall comply with the *International Mechanical Code*.

1203.6 Radon resistive construction standards. The criteria of this section establishes minimum radon resistive construction requirements for Group R Occupancies.

1203.6.1 Application. The requirements of Section 1203.6 shall be adopted and enforced by all jurisdictions of the state according to the following subsections.

1203.6.1.1 All jurisdictions of the state shall comply with Section 1203.6.2.

1203.6.1.2 Clark, Ferry, Okanogan, Pend Oreille, Skamania, Spokane, and Stevens counties shall also comply with Section 1203.6.3.

1203.6.2 State wide radon requirements.

1203.6.2.1 Crawlspace. All crawlspaces shall comply with the requirements of this section.

1203.6.2.2 Ventilation. All crawlspaces shall be ventilated as specified in Section 1203.3.

If the installed ventilation in a crawlspace is less than one square foot for each 300 square feet of crawlspace area, or if the crawlspace vents are equipped with operable louvers, a radon vent shall be installed to originate from a point between the ground cover and soil. The radon vent shall be installed in accordance with Sections 1203.6.3.2.6 and 1203.6.3.2.7.

1203.6.2.3 Crawlspace plenum systems. In crawlspace plenum systems used for providing supply air for an HVAC system, aggregate, a permanently sealed soil gas retarder membrane and a radon vent pipe shall be installed in accordance with Section 1203.6.3.2. Crawlspace shall not be used for return air plenums.

In addition, an operable radon vent fan shall be installed and activated. The fan shall be located as specified in Section 1203.6.3.2.7. The fan shall be capable of providing at least 100 cfm at 1-inch water column static pressure. The fan shall be controlled by a readily accessible manual switch. The switch shall be labeled "RADON VENT FAN."

1203.6.3 Radon prescriptive requirements.

1203.6.3.1 Scope. This section applies to those counties specified in Section 1203.6.1.2. This section establishes prescriptive construction requirements for reducing the potential for radon entry into all Group R Occupancies, and for preparing the building for future mitigation if desired.

In all crawlspaces, except crawlspace plenums used for providing supply air for an HVAC system, a continuous air barrier shall be installed between the crawlspace area and the occupied area to limit air transport between the areas. If a wood sheet subfloor or other material is utilized as an air barrier, in addition to the requirements of Section 502.1.6.2 of the Washington State Energy Code, all joints between sheets shall be sealed.

1203.6.3.2 Floors in contact with the earth.

1203.6.3.2.1 General. Concrete slabs that are in direct contact with the building envelope shall comply with the requirements of this section.

EXCEPTION: Concrete slabs located under garages or other than Group R Occupancies need not comply with this chapter.

1203.6.3.2.2 Aggregate. A layer of aggregate of 4-inch minimum thickness shall be placed beneath concrete slabs. The aggregate shall be continuous to the extent practical.

1203.6.3.2.3 Gradation. Aggregate shall:

1. Comply with ASTM Standard C-33 Standard Specification for Concrete Aggregate and shall be size No. 8 or larger size aggregate as listed in Table 2, Grading Requirements for Course Aggregate; or

2. Meet the 1988 Washington State Department of Transportation Specification 9-03.1 (3) "Coarse Aggregate for Portland Cement Concrete," or any equivalent successor standards. Aggregate size shall be of Grade 8 or larger as listed in Section 9-03.1 (3) C, "Grading"; or

3. Be screened, washed pea gravel free of deleterious substances in a manner consistent with ASTM Standard C-33 with 100 percent passing a 1/2-inch sieve and less than 5 percent passing a No. 16 sieve. Sieve characteristics shall conform to those acceptable under ASTM Standard C-33.

EXCEPTION: Aggregate shall not be required if a substitute material or system, with sufficient load bearing characteristics, and having approved capability to provide equal or superior air flow, is installed.

1203.6.3.2.4 Soil-gas retarder membrane. A soil-gas retarder membrane, consisting of at least one layer of virgin polyethylene with a thickness of at least 6 mil, or equivalent flexible sheet material, shall be either placed directly under all concrete slabs so that the slab is in direct contact with the membrane, or on top of the aggregate with 2 inches minimum of fine sand or pea gravel installed between the concrete slab and membrane. The flexible sheet shall extend to the foundation wall or to the outside edge of the monolithic slab. Seams shall overlap at least 12 inches. The membrane shall also be fitted tightly to all pipes, wires, and other penetrations of the membrane and sealed with an approved sealant or tape. All punctures or tears shall be repaired with the same or approved material and similarly lapped and sealed.

1203.6.3.2.5 Sealing of penetrations and joints. All penetrations and joints in concrete slabs or other floor systems and walls below grade shall be sealed by an approved sealant to create an air barrier to limit the movement of soil-gas into the indoor air.

Sealants shall be approved by the manufacturer for the intended purpose. Sealant joints shall conform to manufacturer's specifications. The sealant shall be placed and tooled in accordance with manufacturer's specifications. There shall be no gaps or voids after the sealant has cured.

1203.6.3.2.6 Radon vent. One continuous sealed pipe shall run from a point within the aggregate under each concrete slab to a point outside the building. Joints and connections shall be permanently gas tight. The continuous sealed pipe shall interface with the aggregate in the following manner, or by other approved equal method. The pipe shall be perma-

nently connected to a "T" within the aggregate area so that the two end openings of the "T" lie within the aggregate area. A minimum of 5 feet of perforated drain pipe of 3 inches minimum diameter shall join to and extend from the "T." The perforated pipe shall remain in the aggregate area and shall not be capped at the ends. The "T" and its perforated pipe extensions shall be located at least 5 feet horizontally from the exterior perimeter of the aggregate area.

The continuous sealed pipe shall terminate no less than 12 inches above the eave, and more than 10 horizontal feet from a woodstove or fireplace chimney, or operable window. The continuous sealed pipe shall be labeled "radon vent." The label shall be placed so as to remain visible to an occupant.

The minimum pipe diameter shall be 3 inches unless otherwise approved. Acceptable sealed plastic pipe shall be smooth walled, and may include either PVC schedule 40 or ABS schedule of equivalent wall thickness.

The entire sealed pipe system shall be sloped to drain to the subslab aggregate.

The sealed pipe system may pass through an unconditioned attic before exiting the building; but to the extent practicable, the sealed pipe shall be located inside the thermal envelope of the building in order to enhance passive stack venting.

- EXCEPTION: A fan for subslab depressurization system includes the following:
1. Soil-gas retarder membrane as specified in Section 1203.6.3.2.4;
 2. Sealing of penetrations and joints as specified in Section 1203.6.3.2.5;
 3. A 3-inch continuous sealed radon pipe shall run from a point within the aggregate under each concrete slab to a point outside the building;
 4. Joints and connections shall be gas tight, and may be of either PVC schedule 40 or ABS schedule of equivalent in wall thickness;
 5. A label of "radon vent" shall be placed on the pipe so as to remain visible to an occupant;
 6. Fan circuit and wiring as specified in Section 1203.6.3.2.7 and a fan.

If the subslab depressurization system is exhausted through the concrete foundation wall or rim joist, the exhaust terminus shall be a minimum of 6 feet from operable windows or outdoor air intake vents and shall be directed away from operable windows and outdoor air intake vents to prevent radon reentrainment.

1203.6.3.2.7 Fan circuit and wiring and location. An area for location of an in-line fan shall be provided. The location shall be as close as practicable to the radon vent pipe's point of exit from the building, or shall be outside the building shell; and shall be located so that the fan and all downstream piping is isolated from the indoor air.

Provisions shall be made to allow future activation of an in-line fan on the radon vent pipe without the need to place new wiring. A 110 volt power supply shall be provided at a junction box near the fan location.

1203.6.3.2.8 Separate aggregate areas. If the 4-inch aggregate area underneath the concrete slab is not continuous, but is separated into distinct isolated aggregate areas by a footing

or other barrier, a minimum of one radon vent pipe shall be installed into each separate aggregate area.

- EXCEPTION: Separate aggregate areas may be considered a single area if a minimum 3-inch diameter connection joining the separate areas is provided for every 30 feet of barrier separating those areas.

1203.6.3.2.9 Concrete block walls. Concrete block walls connected to below grade areas shall be considered unsealed surfaces. All openings in concrete block walls that will not remain accessible upon completion of the building shall be sealed at both vertical and horizontal surfaces, in order to create a continuous air barrier to limit the transport of soil-gas into the indoor air.

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-1204 Section 1204—Temperature control.

1204.1 Equipment and systems. Interior spaces intended for human occupancy shall be provided with active or passive space-heating systems capable of maintaining a minimum indoor temperature of 68°F (20°C) at a point 3 feet (914 mm) above the floor on the design heating day.

- EXCEPTION:
1. Interior spaces where the primary purpose is not associated with human comfort.
 2. Group R-1 Occupancies not more than 500 square feet.

1204.2.1 Definitions. For the purposes of this section only, the following definitions apply.

DESIGNATED AREAS are those areas designated by a county to be an urban growth area in chapter 36.70A RCW and those areas designated by the U.S. Environmental Protection Agency as being in nonattainment for particulate matter.

SUBSTANTIALLY REMODELED means any alteration or restoration of a building exceeding 60 percent of the appraised value of such building within a 12-month period. For the purpose of this section, the appraised value is the estimated cost to replace the building and structure in-kind, based on current replacement costs.

1204.2.2 Primary heating source. Primary heating sources in all new and substantially remodeled buildings in designated areas shall not be dependent upon wood stoves.

1204.2.3 Solid fuel burning devices. No new or used solid fuel burning device shall be installed in new or existing buildings unless such device is United States Environmental Protection Agency certified (~~or a pellet stove either certified~~) or exempt from certification by the United States Environmental Protection Agency and conforms with RCW 70.94.011, 70.94.450, 70.94.453 and 70.94.457.

- EXCEPTION:
1. ~~Antique~~ Wood cook stoves (~~and~~).
 2. Antique wood heaters manufactured prior to 1940.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1208 Section 1208—Interior space dimensions.

1208.2 Minimum ceiling heights. Occupiable spaces and habitable spaces shall have a ceiling height of not less than 7 feet 6 inches (2286 mm). Bathrooms, toilet rooms, kitchen, storage rooms and laundry rooms shall be permitted to have a ceiling height of not less than 7 feet (2134 mm).

EXCEPTIONS:

1. In one- and two-family dwellings, beams or girders spaced not less than 4 feet (1219 mm) on center (~~and projecting~~) shall be permitted to project not more than 6 inches (152 mm) below the required ceiling height.
2. If any room in a building has a sloped ceiling, the prescribed ceiling height for the room is required in one-half the area thereof. Any portion of the room measuring less than 5 feet (1524 mm) from the finished floor to the ceiling shall not be included in any computation of the minimum area thereof.
3. The height of mezzanines (constructed) and spaces below mezzanines shall be in accordance with Section 505.1.

1208.3 Room area. Every dwelling unit shall have (~~at least~~) no fewer than one room that shall have not less than 120 square feet (13.9 m²) of net floor area. Other habitable rooms shall have a net floor area of not less than 70 square feet (6.5 m²).

EXCEPTION: Kitchens (~~in one- and two-family dwellings~~) are not required to be of a minimum floor area.

Portions of a room with a sloped ceiling measuring less than 5 feet (1524 mm) or a flat ceiling measuring less than 7 feet (2134 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum habitable area for that room.

AMENDATORY SECTION (Amending WSR 05-01-014, filed 12/2/04, effective 7/1/05)

WAC 51-50-1210 Section 1210—(~~Surrounding materials~~) Toilet and bathroom requirements.

~~(1210.5)~~ **1210.4 Toilet rooms.** This section is not adopted.

(The requirements of this section have been moved to Section (~~2902.2.1.1~~) 2902.3.1.1)

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1403 Section 1403—Performance requirements.

1403.2 Weather protection. Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing as described in Section 1405.4. The exterior wall envelope shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer, as described in Section 1404.2, and a means (~~(of)~~) for draining water that enters the assembly to the exterior. An air space cavity is not required under the exterior cladding for an exterior wall clad

with lapped or panel siding made of plywood, engineered wood, hardboard, or fiber cement. Protection against condensation in the exterior wall assembly shall be provided in accordance with Section 1405.3.

EXCEPTIONS:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapters 19 and 21, respectively.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections 1404.2 and (~~(1405.3)~~) 1405.4, shall not be required for an exterior wall envelope that has been demonstrated through testing to resist wind-driven rain, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
 - 2.1 Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
 - 2.2 Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
 - 2.3 Exterior wall envelope assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (psf) (0.297 kN/m²).
 - 2.4 Exterior wall envelope assemblies shall be subjected to a minimum test exposure duration of 2 hours. The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings or intersections of terminations with dissimilar materials.
3. Exterior insulation and finish systems (EIFS) complying with Section 1408.4.1.

1403.5 Vertical and lateral flame propagation. Exterior walls on buildings of Type I, II, III, or IV construction that are greater than 40 feet (12,192 mm) in height above grade plane and contain a combustible water-resistive barrier shall be tested in accordance with and comply with the acceptance criteria of NFPA 285.

EXCEPTION:

Walls that contain less than 500 gm/m² combustible material and where the water-resistive barrier has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1405 Section 1405—(~~Installation of wall coverings~~) Reserved.

~~(1405.6.2 Seismic requirements.~~ Anchored masonry veneer located in Seismic Design Category C, D, E, or F shall conform to the requirements of Section 6.2.2.10, except Section 6.2.2.10.3.2, of TMS 402/ACI 530/ASCE 5-))

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1609 Section 1609—(~~Wind loads~~) Reserved.

~~(1609.1.1 Determination of wind loads.~~ Wind loads on every building or structure shall be determined in accordance with Chapter 6 of ASCE 7 or provisions of the alternate all-

heights method in Section 1609.6. The type of opening protection required, the basic wind speed and the exposure category for a site is permitted to be determined in accordance with Section 1609 or ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

~~6. Wind tunnel test in accordance with Section 6.6 of ASCE 7, subject to the limitations in Section 1609.1.1.2.)~~

- EXCEPTIONS:
1. Subject to the limitations of Section 1609.1.1.1, the provisions of ICC 600 shall be permitted for applicable Group R-2 and R-3 buildings.
 2. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of the AF&PA WFCM.
 3. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of AISI S230.
 4. Designs using NAAMM FP 1001.
 5. Designs using TIA 222 for antenna supporting structures and antennas. In section 2.6.6.2, the extent of Topographic Category 2, escarpments, shall extend 16 times the height of the escarpment.

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-1702 Section 1702—Definitions.

1702.1 ((General)) Definitions. The following terms are defined in Chapter 2: (add terms from 2012 IBC pg 379)

~~SMALL BUSINESS. ((Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other businesses, which has the purpose of making a profit, and which has fifty or fewer employees, or which has a million dollars or less per year in gross sales, of window and door products.))~~

NEW SECTION

WAC 51-50-1705 Required verification and inspection.

Modify Table 1705.3. Remainder of Table 1705.3 remains as published in the 2012 IBC.

**Table 1705.3
Required Verification and Inspection of Concrete Construction**

Verification and Inspection	Continuous	Periodic	Referenced Standard ^a	IBC Reference
3. Inspection of anchors cast in concrete.	—	X	ACI 318: D.9.2	
4. Inspection of anchors post-installed in hardened concrete members ^b .				
a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads.	X	—	ACI 318: D.9.2.4	
b. Mechanical anchors and adhesive anchors not defined in 4a.	—	X	ACI 318: D.9.2	

- a. Where applicable, see also Section 1705.11, Special inspections for seismic resistance.
- b. Specific requirements for special inspection shall be included in the research report for the anchor issued by an approved source in accordance with D.9.2 in ACI 318, or other qualification procedures. Where specific requirements are not provided, special inspection requirements shall be specified by the registered design professional and shall be approved by the building official prior to the commencement of the work.

NEW SECTION

WAC 51-50-1710 Section 1710—Preconstruction load tests.

1710.5 Exterior window and door assemblies. The design pressure rating of exterior windows and doors in buildings shall be determined in accordance with Section 1710.5.1 or 1710.5.2.

- EXCEPTIONS:
1. Structural wind load design pressures for window units smaller than the size tested in accordance with

Section 1710.5.1 or 1710.5.2 shall be permitted to be higher than the design value of the tested unit provided such higher pressures are determined by accepted engineering analysis. All components of the small unit shall be the same as the tested unit. Where such calculated design pressures are used, they shall be validated by an additional test of the window unit having the highest allowable design pressure.

2. Custom exterior windows and doors manufactured by a small business shall be exempt from all testing requirements in Section 1710 of the International Building Code provided they meet the applicable pro-

visions of Chapter 24 of the International Building Code.

faces exposed to the weather shall be not less than 3000 psi.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-1715 Section 1715—(~~Preconstruction load tests~~) Reserved.

~~((1715.5 Exterior window and door assemblies. The design pressure rating of exterior windows and doors in buildings shall be determined in accordance with Section 1715.5.1 or 1715.5.2.~~

EXCEPTIONS:

- ~~1. Structural wind load design pressures for window units smaller than the size tested in accordance with Section 1715.5.1 or 1715.5.2 shall be permitted to be higher than the design value of the tested unit provided such higher pressures are determined by accepted engineering analysis. All components of the small unit shall be the same as the tested unit. Where such calculated design pressures are used, they shall be validated by an additional test of the window unit having the highest allowable design pressure.~~
- ~~2. Custom exterior windows and doors manufactured by a small business shall be exempt from all testing requirements in Section 1715 of the International Building Code provided they meet the applicable provisions of Chapter 24 of the International Building Code.~~

NEW SECTION

WAC 51-50-1901 Section 1901—General.

1901.2.1 Anchoring to concrete. Anchoring to concrete shall be in accordance with ACI 318 as amended in Section 1905, and applies to cast-in (headed bolts, headed studs, and hooked J-or L-bolts) anchors and post-installed expansion (torque-controlled and displacement-controlled), undercut, and adhesive anchors.

NEW SECTION

WAC 51-50-1903 Section 1903—Specifications for tests and materials.

1903.1 General. Materials used to produce concrete, concrete itself and testing thereof shall comply with the applicable standards listed in ACI 318 where required, special inspections and tests shall be in accordance with Chapter 17.

EXCEPTION: The following standards as referenced in Chapter 35 shall be permitted to be used.

1. ASTM C 150
2. ASTM C 595
3. ASTM C 1157

NEW SECTION

WAC 51-50-1904 Section 1904—Durability requirements.

1904.1 Structural concrete. Structural concrete shall conform to the durability requirements of ACI 318.

EXCEPTION: For Group R-2 and R-3 occupancies not more than three stories above grade plane, the specified compressive strength, f'_c , for concrete in basement walls, foundation walls, exterior walls and other vertical sur-

1904.2 Nonstructural concrete. The registered design professional shall assign nonstructural concrete a freeze-thaw exposure class, as defined in ACI 318, based on the anticipated exposure of nonstructural concrete. Nonstructural concrete shall have a minimum specified compressive strength, f'_c , of 2500 psi for Class F0; 3000 psi for Class F1; and 3500 psi for Classes F2 and F3. Nonstructural concrete shall be air entrained in accordance with ACI 318.

NEW SECTION

WAC 51-50-1905 Section 1905—Modifications to ACI 318.

1905.1 General. The text of ACI 318 shall be modified as indicated in Sections 1905.1.1 through 1905.1.10.

WALL PIER. This definition is not adopted.

(Other definition remains unchanged)

1905.1.3 ACI 318, Section 21.4. Modify ACI 318, Section 21.4, by adding new Section 21.4.3 and renumbering existing Section 21.4.3 to become 21.4.4.

21.4.3 - Connections that are designed to yield shall be capable of maintaining 80 percent of their design strength at the deformation induced by the design displacement or shall use Type 2 mechanical splices.

21.4.4 - Elements of the connection that are not designed to yield shall develop at least 1.5 S_y .

1905.1.4 ACI 318, Section 21.9. This section is not adopted.

1905.1.9 ACI 318, Section D.3.3.

Modify ACI 318 Sections D.3.3.4.2 and D.3.3.5.2 to read as follows:

D.3.3.4.2 - Where the tensile component of the strength-level earthquake force applied to anchors exceeds 20 percent of the total factored anchor tensile force associated with the same load combination, anchors and their attachments shall be designed in accordance with D.3.3.4.3. The anchor design tensile strength shall be determined in accordance with D.3.3.4.4.

EXCEPTIONS:

1. Anchors designed to resist wall out-of-plane forces with design strengths equal to or greater than the force determined in accordance with ASCE 7 Equation 12.11-1 or 12.14-10 need not satisfy Section D.3.3.4.3.
2. Anchors in concrete designed to support nonstructural components in accordance with ASCE 7 Section 13.4.2 need not satisfy Section D.3.3.4.3.

D.3.3.5.2 - Where the shear component of the strength-level earthquake force applied to anchors exceeds 20 percent of the total factored anchor shear force associated with the same load combination, anchors and their attachments shall be designed in accordance with D.3.3.5.3. The anchor design shear strength for resisting earthquake forces shall be determined in accordance with D.6.

EXCEPTIONS:

1. D.3.3.5.3 need not apply and the design shear strength in accordance with D.6.2.1(c) need not be computed for anchor bolts attaching wood sill plates of bearing or nonbearing walls of light-frame wood structures to foundations or foundation stem walls provided all of the following are satisfied:

1.1. The allowable in-plane shear strength of the anchor is determined in accordance with AF&PANDS Table 11E for lateral design values parallel to grain.

1.2. The maximum anchor nominal diameter is 5/8 inches (16 mm).

1.3. Anchor bolts are embedded into concrete a minimum of 7 inches (178 mm).

1.4. Anchor bolts are located a minimum of 1 3/4 inches (45 mm) from the edge of the concrete parallel to the length of the wood sill plate.

1.5. Anchor bolts are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the wood sill plate.

1.6. The sill plate is 2-inch or 3-inch nominal thickness.

2. Section D.3.3.5.3 need not apply and the design shear strength in accordance with Section D.6.2.1(c) need not be computed for anchor bolts attaching cold-formed steel track of bearing or nonbearing walls of light-frame construction to foundations or foundation stem walls provided all of the following are satisfied:

2.1. The maximum anchor nominal diameter is 5/8 inches (16 mm).

2.2. Anchors are embedded into concrete a minimum of 7 inches (178 mm).

2.3. Anchors are located a minimum of 1 3/4 inches (45 mm) from the edge of the concrete parallel to the length of the track.

2.4. Anchors are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the track.

2.5. The track is 33 to 68 mil designation thickness.

Allowable in-plane shear strength of exempt anchors, parallel to the edge of concrete shall be permitted to be determined in accordance with AISI S100 Section E3.3.1.

3. Anchors in concrete designed to support nonstructural components in accordance with ASCE 7 Section 13.4.2 need not satisfy Section D.3.3.5.3.

4. In light-frame construction, bearing or nonbearing walls, shear strength of concrete anchors less than or equal to 1 inch (25 mm) in diameter connecting sill plate or track to foundation or foundation stem wall need not satisfy D.3.3.5.3 when the design strength of the anchors is determined in accordance with D.6.2.1(c).

1905.1.10 ACI 318, Section D.4.2.2. Delete ACI 318, Section D.4.2.2, and replace with the following:

D.4.2.2 - For anchors with diameters not exceeding 4 in., the concrete breakout strength requirements shall be considered satisfied by the design procedure of D.5.2 and D.6.2. For anchors in shear with diameters exceeding 4 inches, shear anchor reinforcement shall be provided in accordance with the procedures of D.6.2.9.

NEW SECTION

WAC 51-50-1908 Section 1908—Anchorage to concrete—Allowable stress design. This section is not adopted.

NEW SECTION

WAC 51-50-1909 Section 1909—Anchorage to concrete—Strength design. This section is not adopted.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-2104 Section 2104—(~~Construction~~) Reserved.

~~(2104.1 Masonry construction. Masonry construction shall comply with the requirements of Sections 2104.1.1 through 2104.6 and with TMS 602/ACI 530.1/ASCE 6 except as modified by Sections 2104.5 and 2104.6.~~

2104.5 TMS 602/ACI 530.1/ASCE 6, Article 3.5 D, grout lift heights. Modify items 1.b, 1.e, and 2.b of Article 3.5 D as follows:

3.5 D.1.b When the conditions of Articles 3.5 D.1.a.i and 3.5 D.1.a.ii are met but there are intermediate bond beams within the grout pour, limit the grout lift height to the bottom of the lowest bond beam that is more than 5.33 ft. (1.63 m) above the bottom of the lift, but do not exceed a grout lift height of 12.67 ft. (3.86 m).

3.5 D.1.e When the conditions of Article 3.5 D.1.a.i or Article 3.5 D.1.a.ii are not met, place grout in lifts not exceeding 5.33 ft. (1.63 m).

3.5 D.2.b When placed in masonry that has not cured for at least 4 hours, place in lifts not exceeding 5.33 ft. (1.63 m).

~~2104.6 TMS 602/ACI 530.1/ASCE 6, Article 3.2F, cleanouts.~~ Modify the first sentence of Article 3.2F as follows:

Provide cleanouts in the bottom course of masonry for each grout pour when the grout pour height exceeds 5.33 ft. (1.63 m).)

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-2107 Section 2107—Allowable stress design.

2107.1 General. The design of masonry structures using *allowable stress design* shall comply with Sections 2106, 2107.2 and the requirements of Chapters 1 and 2 of TMS 402/ACI 530/ASCE 5 except as modified by Sections ~~(2107.3))~~ 2107.2 through 2107.5.

~~(2107.2 Load combinations. Structures and portions thereof shall be designed to resist the most critical effects resulting from the load combinations of Section 1605.3. When using the alternative load combinations of Section 1605.3.2 that include wind or seismic loads, allowable stresses are permitted to be increased by one-third.~~

2107.6 TMS 402/ACI 530/ASCE 5, Section 1.16.1 anchor bolts. Modify the second paragraph of Section 1.16.1 as follows: Anchor bolts placed in the top of grouted cells and bond beams shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the bolts and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the bolts and the masonry unit. Anchor bolts placed in drilled holes in the face shells of hollow masonry units shall be per-

mitted to contact the masonry unit where the bolt passes through the face shell, but the portion of the bolt that is within the grouted cell shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the head or bent leg of the bolt and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the head or bent leg of the bolt and the masonry unit.)

2107.2 TMS 402/ACI 530/ASCE 5, Section 2.1.8.7.1.1, lap splices. In lieu of Section 2.1.8.7.1.1, it shall be permitted to design lap splices in accordance with Section 2107.2.1.

2107.2.1 Lap splices. The minimum length of lap splices for reinforcing bars in tension or compression, l_d , shall be $l_d = 0.002d_b f_s$ (Equation 21-1)

$$\text{For SI: } l_d \equiv 0.29d_b f_s$$

but not less than 12 inches (305 mm). In no case shall the length of the lapped splice be less than 40 bar diameters.

(a) For members having an h/r ratio not greater than 99:

$$P_a = (0.33 f' mAn + 0.65A_{st}F_s) [1 - (h/140r)^2] \quad (\text{Equation 2-21})$$

(b) For members having an h/r ratio not greater than 99:

$$P_a = (0.33 f' mAn + 0.65F_s A_{st}) (70r/h)^2 \quad (\text{Equation 2-22})$$

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency and appear in the Register pursuant to the requirements of RCW 34.08.040.

Reviser's note: RCW 34.05.395 requires the use of underlining and deletion marks to indicate amendments to existing rules. The rule published above varies from its predecessor in certain respects not indicated by the use of these markings.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-2108 Section 2108—((Strength design of masonry.)) Reserved.

~~((2108.4 TMS 402/ACI 530/ASCE 5, Section 3.1.6. Modify Section 3.1.6 as follows:~~

~~**3.1.6 Headed and bent bar anchor bolts.** All embedded bolts shall be grouted in place, except that 1/4 inch (6.4 mm) diameter bolts are permitted to be placed in bed joints that are at least 1/2 inch (12.7 mm) in thickness.~~

~~**2108.5 TMS 402/ACI 530/ASCE 5, Section 1.16.1 anchor bolts.** Modify the second paragraph of Section 1.16.1 as follows: Anchor bolts placed in the top of grouted cells and bond beams shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the bolts and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the bolts and the masonry unit. Anchor bolts placed in drilled holes in the face shells of hollow masonry units shall be permitted to contact the masonry unit where the bolt passes through the face shell, but the portion of the bolt that is within the grouted cell shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the head or bent leg of the bolt and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the head or bent leg of the bolt and the masonry unit.)~~

where:

$d_b \equiv$ Diameter of reinforcement, inches (mm).

$f_s \equiv$ Computed stress in reinforcement due to design loads, psi (MPa).

In regions of moment where the design tensile stresses in the reinforcement are greater than 80 percent of the allowable steel tension stress, F_s , the lap length of splices shall be increased not less than 50 percent of the minimum required length, but need not be greater than $72d_b$. Other equivalent means of stress transfer to accomplish the same 50 percent increase shall be permitted. Where epoxy coated bars are used, lap length shall be increased by 50 percent.

2107.5 TMS 402/ACI 530/ASCE 5, Modify Section 2.3.4 Axial compression and flexure, as follows:

2.3.4.2.1 The compressive force in reinforced masonry due to axial load only shall be permitted to not exceed that given by Equation 2-21 or Equation 2-22.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-2111 Section 2111—Masonry fireplaces.

2111.7 Fireplaces. Fireplaces shall be provided with each of the following:

1. Tightly fitting flue dampers, operated by a readily accessible manual or approved automatic control.

EXCEPTION: Fireplaces with gas logs shall be installed in accordance with the International Mechanical Code Section 901, except that the standards for liquefied petroleum gas installations shall be NFPA 58 (Liquefied Petroleum Gas Code) and NFPA 54 (National Fuel Gas Code).

2. An outside source for combustion air ducted into the firebox. The duct shall be at least 6 square inches, and shall be provided with an operable outside air duct damper.

EXCEPTION: Washington certified fireplaces shall be installed with the combustion air systems necessary for their safe and efficient combustion and specified by the manufacturer in accordance with ((the Washington State Building Standard 31-2 (WAC 51-50-31200) and)) IBC Section 2114 (WAC 51-50-2114).

3. Site built fireplaces shall have tight fitting glass or metal doors, or a flue draft induction fan or as approved for minimizing back-drafting. Factory built fireplaces shall use doors listed for the installed appliance.

2111.7.1 Lintel and throat. Masonry over a fireplace opening shall be supported by a lintel of noncombustible material. The minimum required bearing length on each end of the fire-

place opening shall be 4 inches (102 mm). The fireplace throat or damper shall be located a minimum of 8 inches (203 mm) above the top of the fireplace opening.

AMENDATORY SECTION (Amending WSR 04-01-108, filed 12/17/03, effective 7/1/04)

WAC 51-50-2114 Section 2114—Emission standards.

2114.1 Emission Standards for Factory-built Fireplaces. ~~((After January 1, 1997,))~~ No new or used factory-built fireplace shall be installed in Washington state unless it is certified and labeled in accordance with procedures and criteria specified in ((the Washington State Building Code Standard 31-2)) ASTM E2558 Standard Test Method for determining particulate matter emission from fires in low mass wood burning fireplaces.

To certify an entire fireplace model line, the internal assembly shall be tested to determine its particulate matter emission performance. Retesting and recertifying is required if the design and construction specifications of the fireplace model line internal assembly change. Testing for certification shall be performed by a Washington state department of ecology (DOE) approved and U.S. Environmental Protection Agency (EPA) accredited laboratory.

2114.2 Emission Standards for Certified Masonry and Concrete Fireplaces. ~~((After January 1, 1997, new certified masonry or concrete fireplaces installed in Washington state shall be tested and labeled in accordance with procedures and criteria specified in the Washington State Building Code Standard 31-2.~~

To certify an entire fireplace model line, the internal assembly shall be tested to determine its particulate matter emission performance. Retesting and recertifying is required if the design and construction specifications of the fireplace model line internal assembly change. Testing for certification shall be performed by a Washington state department of ecology (DOE) approved and U.S. Environmental Protection Agency (EPA) accredited laboratory.)) Masonry and concrete fireplace model lines certified to Washington State Building Code Standard 31-2 prior to July 1, 2013, may retain certification provided the design and construction specifications of the fireplace model line internal assembly do not change.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-2900 Chapter 29—~~((Minimum))~~ Plumbing ((fixtures and sanitation facilities)) systems.

SECTION 2901—GENERAL.

2901.1 Scope. The provisions of this chapter and the state plumbing code shall ((apply to the number of plumbing fixtures and sanitation facilities to be provided in an occupancy regulated by this Code)) govern the erection, installation, alteration, repairs, relocation, replacement, addition to, use or maintenance of plumbing equipment and systems. Toilet and bathing rooms shall be constructed in accordance with Section 1210. Plumbing systems and equipment shall be

constructed, installed and maintained in accordance with the state plumbing code.

~~**2901.2 ((Minimum requirements.** Plumbing fixtures and sanitation facilities shall be provided in the minimum number shown in Table 2902.1 and in this chapter. Where the proposed occupancy is not listed in Table 2902.1, the building official shall determine the fixture and facility requirements based on the occupancy which most nearly resembles the proposed occupancy. The number of occupants used for determining minimum fixtures and facilities shall be computed at the rate of one occupant per unit of net floor area as prescribed in Table 2902.1.~~

~~Plumbing fixtures need not be provided for unoccupied buildings or facilities.)) **Health codes.** In food preparation, serving and related storage areas, additional fixture requirements may be dictated by health codes.~~

SECTION 2902—~~((FIXTURES))~~ MINIMUM PLUMBING FACILITIES.

2902.1 Minimum number of fixtures. Plumbing fixtures shall be provided for the type of occupancy and in the minimum number shown in Table 2902.1. Types of occupancies not shown in Table 2902.1 shall be determined individually by the building official based on the occupancy which most nearly resembles the proposed occupancy. The number of occupants shall be determined by this code. Occupancy classification shall be determined in accordance with Chapter 3. Plumbing fixtures need not be provided for unoccupied buildings or facilities.

2902.1.1 Fixture calculations. To determine the occupant load of each sex, the total occupant load shall be divided in half. To determine the required number of fixtures, the fixture ratio or ratios for each fixture type shall be applied to the occupant load of each sex in accordance with Table 2902.1. Fractional numbers resulting from applying the fixture ratios of Table 2902.1 shall be rounded up to the next whole number. For calculations involving multiple occupancies, such fractional numbers for each occupancy shall first be summed and then rounded up to the next whole number.

EXCEPTION: The total occupant load shall not be required to be divided in half where approved statistical data indicate a distribution of the sexes of other than 50 percent of each sex.

~~**(2902.1.1)**~~ **2902.1.1.1 Private offices.** Fixtures only accessible to private offices shall not be counted to determine compliance with this section.

2902.1.1.2 Urinals. Where urinals are provided, one water closet less than the number specified may be provided for each urinal installed, except the number of water closets in such cases shall not be reduced to less than one quarter (25%) of the minimum specified. For men's facilities serving 26 or more persons, not less than one urinal shall be provided.

~~**2902.1.2 ((Occupancy load distribution.** The occupant load shall be divided equally between the sexes, unless data approved by the building official indicates a different distribution of the sexes.~~

2902.1.3 Food preparation areas. In food preparation, serving and related storage areas, additional fixture requirements may be dictated by health codes.

2902.1.4 Other requirements. For other requirements for plumbing facilities, see Section 1210 and Chapter 11.) **Family or assisted-use toilet and bath fixtures.** Fixtures located within family or assisted-use toilet and bathing rooms required by Section 1109.2.1 are permitted to be included in the number of required fixtures for either the male or female occupants in assembly and mercantile occupancies.

2902.2 ((Access to fixtures)) Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

EXCEPTIONS:

1. Separate facilities shall not be required for *dwelling units* and *sleeping units*.
2. Separate facilities shall not be required in structures or tenant spaces with a total *occupant load*, including both employees and customers, of 15 or less.
3. Separate facilities shall not be required in mercantile occupancies in which the maximum occupant load is 100 or less.

2902.2.1 ((Location. Plumbing fixtures shall be located in each building or conveniently in a building adjacent thereto on the same property.

2902.2.1.1 Toilet rooms. Toilet rooms shall not open directly into a room used for the preparation of food for service to the public or residents of Group R-2 boarding homes and residential treatment facilities licensed by Washington state.

2902.2.2 Multiple tenants. Access to toilets serving multiple tenants shall be through a common use area and not through an area controlled by a tenant.

2902.2.3 Multistory buildings. Required fixtures shall not be located more than one vertical story above or below the area served.

SECTION 2903 — FACILITIES:

2903.3 Facilities:

2903.3.1 Requirements. Separate toilet facilities shall be provided for each sex.

((EXCEPTION: In occupancies serving 15 or fewer persons, one toilet facility designed for use by no more than one person at a time shall be permitted for use by both sexes.

2903.3.2 Food service establishments. When customers and employees share the same toilet rooms, customer access to the to the toilet rooms shall not pass through food preparation and unpackaged food storage areas.

2903.4 Pay facilities. Required facilities shall be free of charge. Where pay facilities are installed, they shall be in addition to the minimum required facilities.

2903.5 is not adopted.

SECTION 2904 — SPECIAL PROVISIONS:

2904.1 Dwelling units. Dwelling units shall be provided with a kitchen sink.

2904.2 Water closet space requirements. The water closet stool in all occupancies shall be located in a clear space not less than 30 inches (762 mm) in width, with a clear space in front of the stool of not less than 24 inches (610 mm).

2904.3 Water. Each required sink, lavatory, bathtub and shower stall shall be equipped with hot and cold running water necessary for its normal operation.

2904.4 Drinking fountains:

2904.4.1 Number. Occupant loads over 30 shall have one drinking fountain for the first 150 occupants, then one per each additional 500 occupants.

((EXCEPTIONS:

1. Sporting facilities with concessions serving drinks shall have one drinking fountain for each 1000 occupants.
2. A drinking fountain need not be provided in a drinking or dining establishment.

2904.4.2 Multistory buildings. Drinking fountains shall be provided on each floor having more than 30 occupants in schools, dormitories, auditoriums, theaters, offices and public buildings.

2904.4.3 Penal institutions. Penal institutions shall have one drinking fountain on each cell block floor and one on each exercise floor.

2904.4.4 Location. Drinking fountains shall not be located in toilet rooms.

TABLE 2902.1 — MINIMUM PLUMBING FIXTURES^{1,2,4,6}

TYPE OF BUILDING OR OCCUPANCY ⁸	WATER CLOSETS (fixtures per person)		LAVATORIES ⁵ (fixtures per person)		BATHTUB OR SHOWER (fixtures per person)
	MALE ³	FEMALE	MALE	FEMALE	
For the occupancies listed below, use 30 square feet (2.79 m ²) per occupant for the minimum number of plumbing fixtures.					
Group A Assembly places— Conference rooms, dining rooms, drinking establishments, exhibit rooms, gymnasiums, lounges, stages and similar uses including restaurants classified as Group B Occupancies	1:1-25 2:26-75 3:76-125 4:126-200 5:201-300 6:301-400 Over 400, add one fixture for each additional 200 males or 150 females	1:1-25 2:26-75 3:76-125 4:126-200 5:201-300 6:301-400	One per 2 water closets		
For the assembly occupancies listed below, use the number of fixed seating or, where no fixed seating is provided, use 15 square feet (1.39 m ²) per occupant for the minimum number of plumbing fixtures.					
Assembly places— ⁹ Theaters, auditoriums, convention halls, dance floors, lodge rooms, casinos, and such places which have limited time for fixture use (intermissions)	1:1-100 2:101-200 3:201-400 Over 400, add one fixture for each additional 250 males or 50 females	One per 25 Up to 400	1:1-200 2:201-400 3:401-750 Over 750, add one fixture for each additional 500 persons	1:1-200 2:201-400 3:401-750	
Assembly places— Stadiums, arena and other sporting facilities where fixture use is not limited to intermissions	1:1-100 2:101-200 3:201-400 Over 400, add one fixture for each additional 300 males or 100 females	One per 50 Up to 400	1:1-200 2:201-400 3:401-750 Over 750, add one fixture for each additional 500 persons	1:1-200 2:201-400 3:401-750	
For the assembly occupancies listed below, use the number of fixed seating or, where no fixed seating is provided, use 30 square feet (2.79 m ²) per occupant for the minimum number of plumbing fixtures.					
Worship places Principal assembly area Educational & activity unit	One per 150 One per 125	One per 75 One per 75	One per 2 water closets One per 2 water closets		
For the occupancies listed below, use 200 square feet (18.58 m ²) per occupant for the minimum number of plumbing fixtures.					
Group B and other clerical or administrative employee accessory use	1:1-15 2:16-35 3:36-55 Over 55, add one for each additional 50 persons	1:1-15 2:16-35 3:36-55	One per 2 water closets		
For the occupancies listed below, use 100 square feet (9.3 m ²) per student for the minimum number of plumbing fixtures.					
Group E Schools— for staff use All schools (One staff per 20 students) Schools— for student use Day care	1:1-15 2:16-35 3:36-55 Over 55, add one fixture for each additional 40 persons 1:1-20 2:21-50	1:1-15 2:16-35 3:36-55	One per 2 water closets 1:1-20 2:21-50		

TYPE OF BUILDING OR OCCUPANCY ⁸	WATER CLOSETS (fixtures per person)		LAVATORIES ⁵ (fixtures per person)		BATHTUB OR SHOWER (fixtures per person)
	MALE ³	FEMALE	MALE	FEMALE	
Elementary Secondary	Over 50, add one fixture for each additional 50 persons One per 30 One per 25 One per 40 One per 30		Over 50, add one fixture for each additional 50 persons One per 2 water-closets One per 2 water-closets		
For the occupancies listed below, use 50 square feet (4.65 m ²) per occupant for the minimum number of plumbing fixtures.					
Education facilities other than Group E Others (colleges, universities, adult centers, etc.)	One per 40	One per 25	One per 2 water-closets		
For the occupancies listed below, use 2,000 square feet (185.8 m ²) per occupant for the minimum number of plumbing fixtures.					
Group F and Group H Workshop, foundries and similar establishments, and hazardous occupancies	1:1-10 2:11-25 3:26-50 4:51-75 5:76-100 Over 100, add one fixture for each additional 30 persons	1:1-10 2:11-25 3:26-50 4:51-75 5:76-100	One per 2 water-closets		One shower for each 15 persons exposed to excessive heat or to skin contamination with irritating materials
For the occupancies listed below, use the designated application and 200 square feet (18.58 m ²) per occupant of the general use area for the minimum number of plumbing fixtures.					
Group I⁷ Hospital waiting rooms Hospital general use areas	One per room (usable by either sex) 1:1-15 1:1-15 2:16-35 3:16-35 3:36-55 3:36-55 Over 55, add one fixture for each additional 40 persons		One per room One per 2 water-closets		
Hospital patient rooms: Single Bed Isolation Multibed Long-term	One adjacent to and directly accessible from One adjacent to and directly accessible from One per 4 patients One per 4 patients		One per toilet room One per toilet room One per 4 patients One per 4 patients		One per toilet room One per toilet room One per 8 patients One per 15 patients
Jails and reformatories Cell Exercise room	One per cell One per exercise room		One per cell One per exercise room		
Other institutions (on each occupied floor)	One per 25	One per 25	One per 2 water-closets		One per 8
For the occupancies listed below, use 200 square feet (18.58 m ²) per occupant for the minimum number of plumbing fixtures.					
Group M Retail or wholesale stores	1:1-50 2:51-100 3:101-400	1:1-50 2:51-100 3:101-200	One per 2 water-closets		

TYPE OF BUILDING OR OCCUPANCY ⁶	WATER CLOSETS (fixtures per person)		LAVATORIES ⁵ (fixtures per person)		BATHTUB OR SHOWER (fixtures per person)
	MALE ³	FEMALE	MALE	FEMALE	
	4:201-300 5:301-400 Over 400, add one fixture for each additional 300 males or 150 females				
For Group R Occupancies containing dwelling units or guest rooms, use the table below. For dormitories, use 200 square feet (18.58 m ²) per occupant for the minimum number of plumbing fixtures.					
Group R					
Dwelling units	One per dwelling unit		One per dwelling unit		One per dwelling unit
Hotel, motel, and boarding-house guest rooms	One per guest room		One per guest room		One per guest room
Boarding homes licensed by the department of social and health services	One per 8	One per 8	One per 8	One per 8	One per 12
Dormitories	One per 10 Over 10, add one fixture for each additional 25 males and over 8, add one for each additional 20 females	One per 8	One per 12 Over 12, add one fixture for each additional 20 males and one for each additional 15 females	One per 12	One per 8 For females, add one additional unit per each additional 30. Over 150 persons, add one additional unit per each additional 20 persons
For the occupancies listed below, use 5,000 square feet (464.5 m ²) per occupant for the minimum number of plumbing fixtures.					
Group S	1:1-10	1:1-10	One per 40 occupants of each sex		One shower for each 15 persons exposed to excessive heat or to skin contamination with poisonous, infectious or irritating materials
Warehouses	2:11-25 3:26-50 4:51-75 5:76-100 Over 100, add one for each 30 persons	2:11-25 3:26-50 4:51-75 5:76-100			

¹The figures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction thereof.

²For occupancies not shown, see Section 2901.2.

³Where urinals are provided, one water closet less than the number specified may be provided for each urinal installed, except the number of water closets in such cases shall not be reduced to less than one quarter (25%) of the minimum specified. For men's facilities serving 26 or more persons, not less than one urinal shall be provided.

⁴For drinking fountains, see Section 2904.4.

⁵Twenty-four inches (610 mm) of wash sink or 18 inches (457 mm) of a circular basin, when provided with water outlets for such space, shall be considered equivalent to one lavatory.

⁶For when a facility may be usable by either sex, see Section 2903.3.1.

⁷See WAC 246-320 for definitions, other fixtures and equipment for hospitals.

⁸When a space is accessory to or included as a part of a different occupancy group per Chapter 3, the area per occupant for the minimum plumbing fixture number is to be determined by its own specific use or purpose, not by that of the building's occupancy group.

⁹In multiplex movie theaters, where shows are scheduled at different times, the number of occupants for toilet fixture use may be based

upon one-half (50%) of the total in all the auditoriums, but no less than the number in the largest auditorium.)

Family or assisted-use toilet facilities serving as separate facilities. Where a building or tenant space requires a separate toilet facility for each sex and each toilet facility is required to have only one water closet, two family/assisted-use toilet facilities shall be permitted to serve as the required separate facilities. Family or assisted-use toilet facilities shall not be required to be identified for exclusive use by either sex as required by Section 2902.4.

2902.3 Employee and public toilet facilities. Customers, patrons and visitors shall be provided with public toilet facilities in structures and tenant spaces intended for public utilization. The number of plumbing fixtures located within the required toilet facilities shall be provided in accordance with Section 2902.1 for all users. Employees shall be provided with toilet facilities in all occupancies. Employee toilet facilities shall either be separate or combined employee and public toilet facilities.

EXCEPTION: Public toilet facilities shall not be required in open or enclosed parking garages. Toilet facilities shall not be required in parking garages where there are no parking attendants.

2902.3.1 Access. The route to the public toilet facilities required by Section 2902.3 shall not pass through kitchens, food preparation areas, unpackaged food storage areas, storage rooms or closets. Access to the required facilities shall be from within the building or from the exterior of the building. Access to toilets serving multiple tenants shall be through a common use area and not through an area controlled by a tenant. All routes shall comply with the accessibility requirements of this code. The public shall have access to the required toilet facilities at all times that the building is occupied. For other requirements for plumbing facilities, see Chapter 11.

2902.3.1.1 Food preparation areas. Toilet rooms shall not open directly into a room used for the preparation of food for service to the public or residents of Group R-2 boarding homes and residential treatment facilities licensed by Washington state.

2902.3.2 Location of toilet facilities in occupancies other than malls. In occupancies other than covered and open mall buildings, the required *public* and employee toilet facilities shall be located in each building not more than one story above or below the space required to be provided with toilet facilities, or conveniently in a building adjacent thereto on the same property, and the path of travel to such facilities shall not exceed a distance of 500 feet (152 m).

EXCEPTION: The location and maximum travel distances to required employee facilities in factory and industrial occupancies are permitted to exceed that required by this section, provided that the location and maximum travel distance are *approved*.

2902.3.3 Location of toilet facilities in malls. In covered and open mall buildings, the required *public* and employee toilet facilities shall be located not more than one story above or below the space required to be provided with toilet facilities, and the path of travel to such facilities shall not exceed a distance of 300 feet (91,440 mm). In mall buildings, the required facilities shall be based on total square footage (m²) within a covered mall building or within the perimeter line of an open mall building, and facilities shall be installed in each individual store or in a central toilet area located in accordance with this section. The maximum travel distance to central toilet facilities in mall buildings shall be measured from the main entrance of any store or tenant space. In mall buildings, where employees' toilet facilities are not provided in the individual store, the maximum travel distance shall be measured from the employees' work area of the store or tenant space.

2902.3.4 Pay facilities. Where pay facilities are installed, such facilities shall be in excess of the required minimum facilities. Required facilities shall be free of charge.

2902.3.5 Door locking. Where a toilet room is provided for the use of multiple occupants, the egress door for the room shall not be lockable from the inside of the room. This section does not apply to family or assisted-use toilet rooms.

2902.4 Signage. Required public facilities shall be designated by a legible sign for each sex. Signs shall be readily visible and located near the entrance to each toilet facility. Signs for accessible toilet facilities shall comply with Section 1110.

2902.4.1 Directional signage. Directional signage indicating the route to the public facilities shall be posted in accordance with Section 3107. Such signage shall be located in a *corridor* or aisle, at the entrance to the facilities for customers and visitors.

2902.5 Drinking fountain location. Drinking fountains shall not be required to be located in individual tenant spaces provided that public drinking fountains are located within a travel distance of 500 feet of the most remote location in the tenant space and not more than one story above or below the tenant space. Where the tenant space is in a covered or open mall, such distance shall not exceed 300 feet. Drinking fountains shall be located on an accessible route. Drinking fountains shall not be located in toilet rooms.

2902.5.1 Drinking fountain number. Occupant loads over 30 shall have one drinking fountain for the first 150 occupants, then one per each additional 500 occupants.

EXCEPTIONS:

1. Sporting facilities with concessions serving drinks shall have one drinking fountain for each 1000 occupants.
2. A drinking fountain need not be provided in a drinking or dining establishment.

2902.5.2 Multistory buildings. Drinking fountains shall be provided on each floor having more than 30 occupants in schools, dormitories, auditoriums, theaters, offices and public buildings.

2902.5.3 Penal institutions. Penal institutions shall have one drinking fountain on each cell block floor and one on each exercise floor.

2902.6 Dwelling units. Dwelling units shall be provided with a kitchen sink.

2902.7 Water closet space requirements. The water closet stool in all occupancies shall be located in a clear space not less than 30 inches (762 mm) in width, with a clear space in front of the stool of not less than 24 inches (610 mm).

2902.8 Water. Each required sink, lavatory, bathtub and shower stall shall be equipped with hot and cold running water necessary for its normal operation.

SECTION 2903—RESERVED.

SECTION 2904—RESERVED.

Table 2902.1
Minimum Number of Required Plumbing Fixtures^a
 (See Sections 2902.2 and 2902.3)

No.	Classification	Occupancy	Description	Water Closets		Lavatories		Bathtubs /Showers
				Male	Female	Male	Female	
1	Assembly	A-1 ^d	Theaters and other buildings for the performing arts and motion pictures	1 per 125	1 per 65	1 per 200		=
		A-2 ^d	Nightclubs, bars, taverns, dance halls and buildings for similar purposes	1 per 40	1 per 40	1 per 75		=
			Restaurants, banquet halls and food courts	1 per 75	1 per 75	1 per 200		=
		A-3 ^d	Auditoriums without permanent seating, art galleries, exhibition halls, museums, lecture halls, libraries, arcades and gymnasiums	1 per 125	1 per 65	1 per 200		=
			Passenger terminals and transportation facilities	1 per 500	1 per 500	1 per 750		=
			Places of worship and other religious services	1 per 150	1 per 75	1 per 200		=
		A-4	Coliseums, arenas, skating rinks, pools, and tennis courts for indoor sporting events and activities	1 per 75 for first 1,500 and 1 per 120 for remainder exceeding 1,500	1 per 40 for first 1,520 and 1 per 60 for remainder exceeding 1,520	1 per 200	1 per 150	
A-5	Stadiums amusement parks, bleachers and grandstands for outdoor sporting events and activities	1 per 75 for first 1,500 and 1 per 120 for remainder exceeding 1,500	1 per 40 for first 1,520 and 1 per 60 for remainder exceeding 1,520	1 per 200	1 per 150		=	
2	Business	B	Buildings for the transaction of business, professional services, other services involving merchandise, office buildings, banks, light industrial and similar uses	1 per 25 for first 50 and 1 per 50 for the remainder exceeding 50		1 per 40 for first 80 and 1 per 80 for remainder exceeding 80		=
3	Educational	E	Educational facilities	1 per 50	1 per 30	1 per 100	1 per 60	=
4	Factory and industrial	F-1 and F-2	Structures in which occupants are engaged in work fabricating, assembly or processing of products or materials	1 per 100		1 per 100		Check State (UPC)
5	Institutional	I-1	Residential care	1 per 10		1 per 10		1 per 8
		I-2	Hospitals, ambulatory nursing home care recipient ^b	1 per room ^c		1 per room ^c		1 per 15
			Employees, other than residential care ^b	1 per 25		1 per 35		=

No.	Classification	Occupancy	Description	Water Closets		Lavatories		Bathtubs /Showers
				Male	Female	Male	Female	
			Visitors other than residential care	1 per 75		1 per 100		=
		I-3	Prisons ^b	1 per cell		1 per cell		1 per 15
			Reformatories, detention centers and correctional centers ^b	1 per 15		1 per 15		1 per 15
			Employees ^b	1 per 25		1 per 35		=
		I-4	Adult day care and child day care	1 per 15		1 per 15		1
6	Mercantile	M	Retail stores, service stations, shops, salesrooms, markets and shopping centers	1 per 500		1 per 750		=
7	Residential	R-1	Hotels, motels, boarding houses (transient)	1 per sleeping unit		1 per sleeping unit		1 per sleeping unit
		R-2	Dormitories, fraternities, sororities and boarding houses (not transient)	1 per 10		1 per 10		1 per 8
			Apartment house	1 per dwelling unit		1 per dwelling unit		1 per dwelling unit
		R-3	One- and two-family dwellings	1 per dwelling unit		1 per 10		1 per dwelling unit
			Congregate living facilities with 16 or fewer persons	1 per 10		1 per 10		1 per 8
		R-4	Congregate living facilities with 16 or fewer persons	1 per 10		1 per 10		1 per 8
8	Storage	S-1 S-2	Structures for the storage of goods, warehouses, storehouses and freight depots, low and moderate hazard	1 per 100		1 per 100		Check State (UPC)

- a. The fixtures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by this code.
- b. Toilet facilities for employees shall be separate from facilities for inmates or care recipients.
- c. A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient sleeping units shall be permitted where such room is provided with direct access from each patient sleeping unit and with provisions for privacy.
- d. The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-3001 Reserved.

Section 3002—Hoistway enclosures.

3002.4 Elevator car to accommodate ambulance stretcher. In buildings four stories in height or more, and in buildings which are required to have an elevator and contain Group R-1, R-2 or I Occupancies on a level other than the exit discharge level, at least one elevator shall be provided for fire department emergency access to all floors. ~~((Such))~~ The elevator car shall be of such a size and arrangement to accommodate a 24-inch by 84-inch (610 mm by 2134 mm) ambulance stretcher with not less than 5-inch (127 mm) radius cor-

ners, in the horizontal, open position and shall be identified by the international symbol for emergency medical services (star of life). The symbol shall not be less than 3 inches (76 mm) ~~((high))~~ in height and shall be placed inside on both sides of the hoistway door frame.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-3108 Section 3108—~~((Telecommunications and broadcast towers.))~~ Reserved.

~~((3108.1 General. Towers shall be designed and constructed in accordance with the provisions of TIA-222. In Section 2.6.6.2, the extent of Topographic Category 2, escarpments, shall extend 16 times the height of the escarpment. Towers~~

shall be designed for seismic loads. The exceptions to the requirement of seismic design listed in Section 2.7.3 shall not apply. Class I structures per Table 2-1 of the standard may be exempted from seismic design, if approved by the building official.

EXCEPTION: Single free-standing poles used to support antennas not greater than 75 feet (22,860 mm), measured from the top of the pole to grade, shall not be required to be nonecombustible.)

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-3401 Section 3401—General.

3401.5 Alternative compliance. Work performed in accordance with the ((2009)) 2012 International Existing Building Code as amended in WAC 51-50-480000 shall be deemed to comply with the provisions of this chapter.

3401.6 Dangerous conditions. The building official shall have the authority to require the elimination of conditions deemed dangerous.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-3411 Section 3411—Accessibility for existing buildings.

3411.7 Alterations affecting an area containing a primary function. Where an alteration affects the accessibility to, or contains an area of *primary function*, the route to the *primary function* area shall be accessible. The accessible route to the *primary function* area shall include toilet facilities, telephones or drinking fountains serving the area of *primary function*.

EXCEPTIONS:

1. The costs of providing the *accessible route* are not required to exceed 20 percent of the costs of the *alteration* affecting the area of *primary function*.
2. This provision does not apply to *alterations* limited solely to windows, hardware, operating controls, electrical outlets and signs.
3. This provision does not apply to *alterations* limited solely to mechanical systems, electrical systems, installation or *alteration* of fire protection systems and abatement of hazardous materials.
4. This provision does not apply to *alterations* undertaken for the primary purpose of increasing the accessibility of ((an existing building)) a *facility* ((or element)).
5. This provision does not apply to altered areas limited to *Type B dwellings* and *sleeping units*.

3411.8.11 Toilet rooms. Where it is technically infeasible to alter existing toilet and bathing ((facilities)) rooms to be accessible, an accessible family or assisted use toilet or bathing ((facility)) room constructed in accordance with Section 1109.2.1 is permitted. The family or assisted-use ((facility)) toilet or bathing room shall be located on the same floor and in the same area as the existing ((facility)) toilet or bathing rooms. The number of toilet ((facilities)) or bathing rooms and water closets required by the State Building Code is permitted to be reduced by one, in order to provide accessible features.

NEW SECTION

WAC 51-50-3500 Chapter 35—Reference standards.

Add new standards to Chapter 35:

ASTM

C150-12 Specification for Portland Cement.
C595-12 Specification for Blended Hydraulic Cement.
C1157-11 Standard Performance Specification for Hydraulic Cement.

NFPA

720-12 Standard for the Installation of Carbon Monoxide (CO) Warning Equipment in Dwelling Units 908.7.1

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-480000 ((2009)) 2012 International Existing Building Code.

**INTERNATIONAL EXISTING BUILDING CODE
((2009)) 2012 EDITION**

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-480101 Section 101—General.

101.4 Applicability. When requested by the permit applicant, this code shall apply to the repair, alteration, change of occupancy and relocation of buildings existing on the date of adoption of this code, regardless of occupancy, subject to the criteria of Sections 101.4.1 and 101.4.2. When compliance with this code has not been requested, compliance with the State Building Code as adopted in Title 51 WAC shall be demonstrated.

101.4.1 Buildings not previously occupied. A building or portion of a building that has not been previously occupied or used for its intended purpose in accordance with the laws in existence at the time of its completion shall comply with the provisions of the State Building Code adopted in Title 51 WAC, for new construction or with any current permit for such occupancy.

101.4.2 Buildings previously occupied. The legal occupancy of any building existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Fire Code, or as deemed necessary by the code official to mitigate an unsafe building. For the purpose of this section, "unsafe building" is not to be construed as mere lack of compliance with the current code.

((401.7)) 101.6 Appendices. The code official is authorized to require rehabilitation and retrofit of buildings, structures, or individual structural members in accordance with the appendices of this code if such appendices have been individually adopted. Appendix A, Guidelines for the Seismic Retrofit of Existing Buildings, is hereby adopted as part of this code without any specific adoption by the local jurisdiction.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-480102 Section 102—Applicability.

~~((102.4.1))~~ **102.4.1.1 Fire prevention.** The provisions of the International Fire Code shall apply to matters affecting or relating to structures, processes and premises regarding: The hazard of fire and explosion arising from the storage, handling or use of structures, materials or devices; conditions hazardous to life, property or public welfare in the occupancy of structures or premises; and the construction, extension, repair, alteration or removal of fire suppression and alarm systems or fire hazards in the structure or on the premises from occupancy or operation except as specifically provided for in this Code.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-480307 Section 307—((Change of occupancy:)) Reserved.

~~((B) 307.1 Conformance.~~ No change shall be made in the use or occupancy of any building that would place the building in a different division of the same group of occupancy or in a different group of occupancies, unless such building is made to comply with the requirements of the International Building Code for such division or group of occupancy. Subject to the approval of the building official, the use or occupancy of existing buildings shall be permitted to be changed and the building is allowed to be occupied for purposes in other groups without conforming to all the requirements of the International Building Code for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use. The hazard tables of Chapter 9 may be used to demonstrate the relative fire and life risk of the existing and the new proposed uses.))

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-480405 Section 405—((Alteration—Level 3:)) Reserved.

~~((405.1 Scope.~~ Level 3 alterations apply where the work area exceeds 50% of the floor area of the building.))

NEW SECTION

WAC 51-50-480407 Change of occupancy.

407.1 Conformance. No change shall be made in the use or occupancy of any building that would place the building in a different division of the same group of occupancy or in a different group of occupancies, unless such building is made to comply with the requirements of the International Building Code for such division or group of occupancy. Subject to the approval of the building official, the use or occupancy of existing buildings shall be permitted to be changed and the building is allowed to be occupied for purposes in other groups without conforming to all the requirements of the International Building Code for those groups, provided the

new or proposed use is less hazardous, based on life and fire risk, than the existing use. The hazard tables of Chapter 10 may be used to demonstrate the relative fire and life risk of the existing and the new proposed uses.

NEW SECTION

WAC 51-50-480505 Alteration—Level 3.

505.1 Scope. Level 3 alterations apply where the work area exceeds 50% of the floor area of the building.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-480607 Section 607—((Energy conservation:)) Reserved.

~~((607.1 Minimum requirements.~~ Level 1 alterations to existing buildings or structures shall comply with the Washington State Energy Code (chapter 51-11 WAC:))

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-480704 Section 704—((Fire protection:)) Reserved.

~~((704.1 Scope.~~ The requirements of this section shall be limited to work areas in which Level 2 alterations are being performed, and where specified they shall apply throughout the floor on which the work areas are located or otherwise beyond the work area.

EXCEPTION: For Level 2 alteration projects in which the fire protection requirements constitute an excessive burden, the fire protection requirements may be modified or waived by the fire code official.

~~**704.2 Automatic sprinkler systems.** Automatic sprinkler systems shall be provided in accordance with the requirements of Sections 704.2.1 through 704.2.5. Installation requirements shall be in accordance with the International Fire Code and NFPA 13 or NFPA 13R:))~~

NEW SECTION

WAC 51-50-480707 Energy conservation.

707.1 Minimum requirements. Level 1 alterations to existing buildings or structures shall comply with the Washington State Energy Code (chapter 51-11 WAC).

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-480711 Section 711—((Energy conservation:)) Reserved.

~~((711.1 Minimum requirements.~~ Level 2 alterations to existing buildings or structures shall comply with the Washington State Energy Code (chapter 51-11 WAC:))

NEW SECTION**WAC 51-50-480804 Fire protection.**

804.1 Scope. The requirements of this section shall be limited to work areas in which Level 2 alterations are being performed, and where specified they shall apply throughout the floor on which the work areas are located or otherwise beyond the work area.

EXCEPTION: For Level 2 alteration projects in which the fire protection requirements constitute an excessive burden, the fire protection requirements may be modified or waived by the fire code official.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-480807 Section 807—(~~Structural.~~) Reserved.

~~(**807.4.1 Evaluation and analysis.** An engineering evaluation and analysis that establishes the structural adequacy of the altered structure shall be prepared by a registered design professional and submitted to the code official. For structures assigned to Seismic Design Category D, the registered design professional shall submit to the code official a seismic evaluation report of the existing building based on one of the procedures specified in Section 101.5.4.2. This seismic evaluation report shall not be required for buildings in compliance with the benchmark building provisions of ASCE 31, Section 3.2.~~

~~**807.4.2 Substantial structural alteration.** Any building or structure undergoing substantial improvement shall have an evaluation and analysis to demonstrate that the altered building or structure complies with the *International Building Code* for wind loading and with reduced *International Building Code* level seismic forces as specified in Section 101.5.4.2 for seismic loading. For seismic considerations, the analysis shall be based on one of the procedures specified in Section 101.5.4.~~

~~**807.4.3 Limited structural alteration.** Where any building or structure undergoes less than substantial improvement, the evaluation and analysis shall demonstrate that the altered building or structure complies with the loads applicable at the time the building was constructed.)~~

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-480808 Section 808—(~~Energy conservation.~~) Reserved.

~~(**808.1 Minimum requirements.** Level 3 alterations to existing buildings or structures shall comply with the Washington State Energy Code (chapter 51-11 WAC).)~~

NEW SECTION**WAC 51-50-480811 Energy conservation.**

811.1 Minimum requirements. Level 2 alterations to existing buildings or structures shall comply with the Washington State Energy Code (chapter 51-11 WAC).

NEW SECTION**WAC 51-50-480907 Structural.**

907.4.1 Evaluation and analysis. An engineering evaluation and analysis that establishes the structural adequacy of the altered structure shall be prepared by a registered design professional and submitted to the code official. For structures assigned to Seismic Design Category D, the registered design professional shall submit to the code official a seismic evaluation report of the existing building based on one of the procedures specified in Section 301.1.4.2. This seismic evaluation report shall not be required for buildings in compliance with the benchmark building provisions of ASCE 31, Section 3.2.

NEW SECTION**WAC 51-50-480908 Energy conservation.**

908.1 Minimum requirements. Level 3 alterations to existing buildings or structures shall comply with the Washington State Energy Code (chapter 51-11 WAC).

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-480912 Section 912—(~~Change of occupancy classification.~~) Reserved.

~~(**912.1.1 Compliance with Chapter 8.** The requirements of Chapter 8 shall be applicable throughout the building for the new occupancy classification based on the separation conditions set forth in Sections 912.1.1.1 and 912.1.1.2. All existing buildings with a change of occupancy classification shall comply with the seismic provisions of Section 907.3.)~~

NEW SECTION**WAC 51-50-481012 Change of occupancy classification.**

1012.1.1 Compliance with Chapter 9. The requirements of Chapter 9 shall be applicable throughout the building for the new occupancy classification based on the separation conditions set forth in Sections 1012.1.1.1 and 1012.1.1.2. All existing buildings with a change of occupancy classification shall comply with the seismic provisions of Section 1007.3.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-481101 Chapter 11—(~~Historic buildings—Section 1101—General.~~) Reserved.

~~((1101.1 Scope. It is the intent of this chapter to provide means for the preservation of historic buildings as defined in Chapter 2. It is the purpose of this chapter to encourage cost-effective preservation of original or restored architectural elements and features and to provide a historic building that will result in a reasonable degree of safety, based on accepted life and fire safety practices, compared to the existing building. Historical buildings shall comply with the provisions of this chapter relating to their repair, alteration, relocation and change of occupancy.))~~

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-481103 Section 1103—((Fire safety.)) Reserved.

~~((1103.7 One-hour fire-resistant assemblies. Where one-hour fire-resistance-rated construction is required by these provisions, it need not be provided, regardless of construction or occupancy, where the existing wall and ceiling finish is wood lath or metal lath and plaster.))~~

~~1103.9 ((Stairway railings. Historically significant stairways shall be accepted without complying with the handrail and guard requirements. Existing handrails and guards at all stairs shall be permitted to remain, provided they are not structurally dangerous.)) Reserved.~~

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-481104 ((Alterations.)) Reserved.

~~((1104.1 Accessibility requirements. The provisions of Sections 605 and 706 shall apply to buildings and facilities designated as historic structures that undergo alterations, unless technically infeasible. Where compliance with the requirements for accessible routes, ramps, entrances, or toilet facilities would threaten or destroy the historic significance of the building or facility, as determined by the professional responsible for the historical documentation of the project, the alternative requirements of Sections 1104.1.1 through 1104.1.4 for that element shall be permitted.))~~

AMENDATORY SECTION (Amending WSR 07-01-091, filed 12/19/06, effective 7/1/07)

WAC 51-50-481105 Section 1105—((Change of occupancy.)) Reserved.

~~((1105.10 One-hour fire-resistant assemblies. Where one-hour fire-resistance-rated construction is required by these provisions, it need not be provided, regardless of construction or occupancy, where the existing wall and ceiling finish is wood lath or metal lath and plaster.))~~

~~1105.14 Natural light. When it is determined by the professional responsible for the historical documentation of the project that compliance with the natural light requirements of Section 911.1 will lead to loss of historic character or historic materials in the building, the existing level of natural lighting shall be considered acceptable.))~~

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-481201 Section 1201—Historic buildings—General.

~~((1201.1 Conformance. Buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code, the International Residential Code (chapter 51-51 WAC), the International Mechanical Code (chapter 51-52 WAC), the International Fire Code (chapter 51-54 WAC), the Uniform Plumbing Code and Standards (chapters 51-56 and 51-57 WAC), the Washington State Energy Code (chapter 51-11 WAC) and the Washington State Ventilation and Indoor Air Quality Code (chapter 51-13 WAC) for new buildings or structures.))~~

~~((EXCEPTION: Group R-3 buildings or structures are not required to comply if:~~

- ~~1. The original occupancy classification is not changed; and~~
- ~~2. The original building is not substantially remodeled or rehabilitated.~~

~~For the purposes of this section, a building shall be considered to be substantially remodeled when the costs of remodeling exceed 60 percent of the value of the building exclusive of the costs relating to preparation, construction, demolition or renovation of foundations.))~~

1201.1 Scope. It is the intent of this chapter to provide means for the preservation of historic buildings as defined in Chapter 2. It is the purpose of this chapter to encourage cost-effective preservation of original or restored architectural elements and features and to provide a historic building that will result in a reasonable degree of safety, based on accepted life and fire safety practices, compared to the existing building. Historical buildings shall comply with the provisions of this chapter relating to their repair, alteration, relocation and change of occupancy.

~~SECTION 1202—((REQUIREMENTS. This section not adopted.)) Reserved.~~

NEW SECTION

WAC 51-50-481203 Fire safety.

1203.9 Stairway railings. Historically significant stairways shall be accepted without complying with the handrail and guard requirements. Existing handrails and guards at all stairs shall be permitted to remain, provided they are not structurally dangerous.

NEW SECTION

WAC 51-50-481204 Alterations.

1204.1 Accessibility requirements. The provisions of Sections 705, 806, and 906, as applicable, shall apply to facilities designated as historic structures that undergo alterations, unless technically infeasible. Where compliance with the requirements for accessible routes, entrances, or toilet rooms would threaten or destroy the historic significance of the building or facility, as determined by the professional responsible for the historical documentation of the project, the alter-

native requirements of Sections 1204.1.1 through 1204.1.4 for that element shall be permitted.

EXCEPTION: Type B dwelling or sleeping units required by Section 1107 of the International Building Code are not required to be provided in historical buildings.

NEW SECTION

WAC 51-50-481205 Change of occupancy.

1205.10 One-hour fire-resistant assemblies. Where one-hour fire-resistance-rated construction is required by these provisions, it need not be provided, regardless of construction or occupancy, where the existing wall and ceiling finish is wood lath or metal lath and plaster.

1205.14 Natural light. When it is determined by the professional responsible for the historical documentation of the project that compliance with the natural light requirements of Section 1011.1 will lead to loss of historic character or historic materials in the building, the existing level of natural lighting shall be considered acceptable.

AMENDATORY SECTION (Amending WSR 10-03-097, filed 1/20/10, effective 7/1/10)

WAC 51-50-481301 (~~(Reserved-)~~) Relocated or moved buildings—General.

1301.1 Conformance. Buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code, the International Residential Code (chapter 51-51 WAC), the International Mechanical Code (chapter 51-52 WAC), the International Fire Code (chapter 51-54 WAC), the Uniform Plumbing Code and Standards (chapters 51-56 and 51-57 WAC), the Washington State Energy Code (chapter 51-11 WAC) and the Washington State Ventilation and Indoor Air Quality Code (chapter 51-13 WAC) for new buildings or structures.

EXCEPTION: Group R-3 buildings or structures are not required to comply if:

1. The original occupancy classification is not changed; and
2. The original building is not substantially remodeled or rehabilitated.

For the purposes of this section, a building shall be considered to be substantially remodeled when the costs of remodeling exceed 60 percent of the value of the building exclusive of the costs relating to preparation, construction, demolition or renovation of foundations.

NEW SECTION

WAC 51-50-481302 Requirements.

This section is not adopted.

REPEALER

The following section of the Washington Administrative Code is repealed:

WAC 51-50-31200	Section 31-2—Standard test method for particulate emissions from fireplaces.
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WSR 13-04-068

PERMANENT RULES

BUILDING CODE COUNCIL

[Filed February 1, 2013, 5:58 p.m., effective July 1, 2013]

Effective Date of Rule: July 1, 2012.

Purpose: The proposed rules will adopt and amend the 2012 edition of the International Residential Code for all jurisdictions in the state. State amendments to the base code were developed to more closely meet the needs of Washington state local jurisdictions that enforce the code and to ensure fairness to small business in the state.

Citation of Existing Rules Affected by this Order: Amending chapter 51-51 WAC.

Statutory Authority for Adoption: RCW 19.27.031.

Other Authority: Chapters 19.27 and 34.05 RCW.

Adopted under notice filed as WSR 12-16-091 on July 31, 2012.

Changes Other than Editing from Proposed to Adopted Version: Section R303 was modified to comply with chapter 70.94 RCW, and exempt certain wood stoves and heaters.

Section R315 is clarified to reference NFPA 720-2012.

Section R325 Adult family homes is modified to clarify requirements for grab bars in adult family homes.

A final cost-benefit analysis is available by contacting Tim Nogler, P.O. Box 41449, Olympia, WA 98504-1449, phone (360) 407-9277, fax (360) 586-9088, e-mail Tim.Nogler@des.wa.gov.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 5, Amended 33, Repealed 0.

Date Adopted: November 9, 2012.

C. Ray Allshouse
Council Chair

Chapter 51-51 WAC

STATE BUILDING CODE ADOPTION AND AMENDMENT OF THE ~~((2009))~~ 2012 EDITION OF THE INTERNATIONAL RESIDENTIAL CODE

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-003 International Residential Code. The ~~((2009))~~ 2012 edition of the *International Residential Code* as published by the International Code Council is hereby adopted by reference with the following additions, deletions, and exceptions: Provided that chapters 11 and 25 through 43 of this code are not adopted. Energy Code is regulated by chapter ~~((51-11))~~ 51-11R WAC; Plumbing Code is regulated by chapter 51-56 WAC; Electrical Code is regulated by chapter 296-46B WAC or Electrical Code as adopted by the local jurisdiction. Appendix F, Radon Control Methods, Appendix G, Swimming Pools, Spas and Hot Tubs, ~~((is))~~ and Appendix R, Dwelling Unit Fire Sprinkler Systems, are included in adoption of the International Residential Code.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-008 Implementation. The International Residential Code adopted by chapter 51-51 ~~((Washington Administrative Code))~~ WAC ~~((3))~~ shall become effective in all counties and cities of this state on July 1, ~~((2010))~~ 2013.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-0102 Section R102—Applicability.

R102.5 Appendices. Provisions in the appendices shall not apply unless specifically referenced in the adopting ordinance. Except for Appendix S, Fire Sprinklers, an appendix adopted by a local jurisdiction shall not be effective unless approved by the state building code council pursuant to RCW 19.27.060 (1)(a). The state building code council has determined that a local ordinance requiring fire sprinklers in accordance with Appendix S of this chapter may be adopted by any local government upon notification of the council.

Appendix F, Radon Control Methods, Appendix G, Swimming Pools, Spas and Hot Tubs, and Appendix R, Dwelling Unit Fire Sprinkler Systems, are included in adoption of the International Residential Code.

R102.7.1 Additions, alterations or repairs. Additions, alterations or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. Additions, alterations or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building.

EXCEPTIONS:

1. Additions with less than 500 square feet of conditioned floor area are exempt from the requirements for Whole House Ventilation Systems, Section M1508.
2. Additions or alterations to existing buildings which do not require the construction of foundations, crawl-

spaces, slabs or basements shall not be required to meet the requirements for radon protection in Section R327.1 and Appendix F.

R102.7.2 Moved buildings. Buildings or structures moved into or within a jurisdiction shall comply with the provisions of this code, the International Building Code (chapter 51-50 WAC), the International Mechanical Code (chapter 51-52 WAC), the International Fire Code (chapter 51-54 WAC), the Uniform Plumbing Code and Standards (chapter ~~((s))~~ 51-56 ~~((and 51-57))~~ WAC), and the Washington State Energy Code (chapter ~~((51-11))~~ 51-11R WAC) ~~((and the Washington State Ventilation and Indoor Air Quality Code (chapter 51-13 WAC)))~~ for new buildings or structures.

EXCEPTION:

Group R-3 buildings or structures are not required to comply if:

1. The original occupancy classification is not changed; and
2. The original building is not substantially remodeled or rehabilitated. For the purposes of this section a building shall be considered to be substantially remodeled when the costs of remodeling exceed 60 percent of the value of the building exclusive of the costs relating to preparation, construction, demolition or renovation of foundations.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-0202 Section R202—Definitions.

ADULT FAMILY HOME means a dwelling in which a person or persons provide personal care, special care, room and board to more than one but not more than six adults who are not related by blood or marriage to the person or persons providing the services.

AIR-IMPERMEABLE INSULATION. An insulation having an air permeance equal to or less than 0.02 L/s-m² at 75 Pa pressure differential tested in accordance with ASTM E2178 or ASTM E283.

ATTIC, HABITABLE. A conditioned area ~~((, not considered a story,))~~ complying with all of the following requirements:

1. The occupiable floor area is at least 70 square feet (6.5 m²), in accordance with Section R304.
2. The occupiable floor area has a ceiling height in accordance with Section R305.
3. The occupiable space is entirely enclosed by the roof assembly above, knee walls (if applicable) on the sides, and the floor-ceiling assembly below.

A habitable attic is not considered a story.

CHILD DAY CARE, shall, for the purposes of these regulations, mean the care of children during any period of a 24 hour day.

~~((CHILD DAY CARE HOME, FAMILY is a child day care facility, licensed by the state, located in the dwelling of the person or persons under whose direct care and supervision the child is placed, for the care of twelve or fewer children, including children who reside at the home.))~~ **CHILD CARE, FAMILY HOME.** A child care facility, licensed by Washington state, located in the dwelling of the person or persons under whose direct care and supervision the child is placed, for the care of

twelve or fewer children, including children who reside at the home.

DWELLING UNIT. A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation. Dwelling units may also include the following uses:

1. Adult family homes, foster family care homes and family day care homes licensed by the Washington state department of social and health services.

2. Offices, mercantile, food preparation for off-site consumption, personal care salons or similar uses which are conducted primarily by the occupants of the dwelling unit and are secondary to the use of the unit for dwelling purposes, and which do not exceed 500 square feet (46.4 m²).

3. ~~((Owner-occupied dwellings with 5 or fewer guest rooms:))~~ One accessory dwelling unit, which need not be considered a separated dwelling unit, provided:

a. The accessory dwelling unit is constructed within an existing dwelling unit.

b. Either the accessory dwelling unit or primary dwelling unit is owner-occupied.

c. All required smoke alarms in the accessory dwelling unit and the primary dwelling unit are interconnected in such a manner that the actuation of one alarm will activate all alarms in both the primary dwelling unit and the accessory dwelling unit.

FIRE SEPARATION DISTANCE. The distance measured from the foundation wall or face of the wall framing, whichever is closer, to one of the following:

1. To the closest interior lot line; or
2. To the centerline of a street, an alley or public way; or
3. To an imaginary line between two buildings on the lot.

The distance shall be measured at a right angle from the wall.

MEZZANINE, LOFT. An intermediate level or levels between the floor and ceiling of any story.

SMALL BUSINESS. Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other businesses, which has the purpose of making a profit, and which has fifty or fewer employees ~~(, or which has a million dollars or less per year in gross sales, of window products.~~

~~**SOURCE SPECIFIC VENTILATION SYSTEM.** A mechanical ventilation system including all fans, controls, and ducting,~~

~~which is dedicated to exhausting contaminant laden air to the exterior of the building from the room or space in which the contaminant is generated).~~

WHOLE HOUSE VENTILATION SYSTEM. A mechanical ventilation system, including fans, controls, and ducts, which replaces, by direct or indirect means, air from the habitable rooms with outdoor air.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-0301 ~~((Reserved.))~~ Design criteria.

R301.2.2.3.1 Height limitations. Wood-framed buildings shall be limited to three stories above grade plane or the limits given in Table R602.10.3(3). Cold-formed, steel-framed buildings shall be limited to less than or equal to three stories above grade plane in accordance with AISI S230. Mezzanines that comply with Section R328 shall not be considered as stories. Structural insulated panel buildings shall be limited to two stories above grade plane.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-0302 Section R302—Fire-resistant construction.

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

- EXCEPTIONS:
1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
 2. Walls of dwellings and accessory structures located on the same lot.
 3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
 4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
 5. Foundation vents installed in compliance with this code are permitted.

**TABLE R302.1(1)
EXTERIOR WALLS**

Exterior Wall Element		Minimum Fire-Resistance Rating	Minimum Fire Separation Distance
Walls	(()) Fire-resistance rated(()))	1-hour tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	(()) Not fire-resistance rated(()))	0 hours	(()) ≥ 5 feet
Projections	(()) Fire-resistance rated(()))	1 hour on the underside ^{ab}	(()) ≥ 2 feet to ≤5 feet

Exterior Wall Element		Minimum Fire-Resistance Rating	Minimum Fire Separation Distance
	(()) Not fire-resistance rated(()))	0 hours	≥5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area per story	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For IS: 1 foot = 304.8 mm. N/A = Not Applicable

- a. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fire blocking is provided from the wall top plate to the underside of the roof sheathing.
- b. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided no gable vent openings are installed.

~~(R302.2 Townhouses. Each townhouse shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.~~

EXCEPTION:

- (1) A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses where an automatic sprinkler system is installed in accordance with NFPA 13-D, if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with chapter 296-46B WAC or electrical code as adopted by the local jurisdiction. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.
- (2) A common 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with chapter 296-46B WAC or electrical code as adopted by the local jurisdiction. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.)

Exterior Wall Element		Minimum Fire-Resistance Rating	Minimum Fire Separation Distance
Openings in walls	Not allowed	N/A	< 3 feet
	Unlimited	0 hours	3 feet ^a
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet ^a

For IS: 1 foot = 304.8 mm. N/A = Not Applicable

^aFor residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

^bRoof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fire blocking is provided from the wall top plate to the underside of the roof sheathing.

^cRoof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided no gable vent openings are installed.

R302.2.1 Continuity. The fire-resistance-rated wall or assembly separating townhouses shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed accessory structures.

Where a story extends beyond the exterior wall of a story below:

1. The fire-resistance-rated wall or assembly shall extend to the outside edge of the upper story; or
2. The underside of the exposed floor-ceiling assembly shall be protected as required for projections in Section R302.

R302.2.4 Structural independence. Each individual townhouse shall be structurally independent.

EXCEPTIONS:

1. Foundation supporting exterior walls or common walls.
2. Structural roof and wall sheathing from each unit may be fastened to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.

Table R302.1(2)
Exterior Walls—Dwellings with Fire Sprinklers

Exterior Wall Element		Minimum Fire-Resistance Rating	Minimum Fire Separation Distance
Walls	Fire-resistance rated	1-hour tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	0 feet
	Not fire-resistance rated	0 hours	3 feet ^a
Projections	Fire-resistance rated	1 hour on the underside ^{b,c}	2 feet ^a
	Not fire-resistance rated	0 hours	3 feet

5. Townhouses separated by a common ((2)) 1-hour fire-resistance-rated wall as provided in Section R302.2.
6. Floor sheathing may fasten to the floor framing of both units.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-0303 Section R303—Light, ventilation and heating.

R303.1 Natural light. All habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms.

EXCEPTION: The glazed areas need not be installed in rooms where artificial light is provided capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

~~((R303.1.1))~~ **R303.2 Adjoining rooms.** For the purpose((s)) of determining light requirements, any room shall be considered as a portion of an adjoining room when at least one-half of the area of the common wall is open and unobstructed and provides an opening of not less than one-tenth of the floor area of the interior room but not less than 25 square feet (2.3 m²).

EXCEPTION: Openings required for light shall be permitted to open into a ((thermally-isolated)) sunroom ((addition)) with thermal isolation or a patio cover, provided ((that)) there is an openable area between the adjoining room and the sunroom ((addition)) or a patio cover of not less than one-tenth of the floor area of the interior room but not less than 20 square feet (2 m²).

~~((R303.2 Minimum Ventilation Performance. Every space intended for human occupancy shall be equipped with source specific and whole house ventilation systems designed and installed as specified in Sections R1507 and R1508.))~~

R303.3 Bathrooms. This section is not adopted.

~~((R303.4.1 Intake Openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in this code. Where a source of contaminant is located within 10 feet (3048 mm) of an intake opening, such opening shall be located a minimum of 3 feet (914 mm) below the contaminant source.~~

For the purposes of this section, the exhaust from dwelling unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.))

R303.4 Minimum ventilation performance. Dwelling units shall be equipped with local exhaust and whole house ventilation systems designed and installed as specified in Section M1507.

EXCEPTION: Additions with less than 500 square feet of conditioned floor area are exempt from the requirements in this Code for Whole House Ventilation Systems.

R303.5 Opening location. Outdoor intake and exhaust openings shall be located in accordance with Sections R303.5.1 and R303.5.2.

R303.5.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in this code. Where a source of contaminant is located within 10 feet (3048 mm) of an intake opening, such opening shall be located a minimum of 3 feet (914 mm) below the contaminant source.

For the purpose of this section, the exhaust from dwelling unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

R303.5.2 Exhaust openings. Exhaust air shall not be directed onto walkways. All exhaust ducts shall terminate outside the building. Terminal elements shall have at least the equivalent net free area of the duct work.

R303.5.2.1 Exhaust ducts. Exhaust ducts shall be equipped with back-draft dampers. All exhaust ducts in unconditioned spaces shall be insulated to a minimum of R-4.

~~((R303.6))~~ **R303.7 Stairway illumination.** All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Stairway illumination shall receive primary power from the building wiring. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. For interior stairs the artificial light sources shall be capable of illuminating treads and landings to levels not less than 1 foot-candle (11 lux) measured at the center of treads and landings. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a basement from the outside grade level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway.

EXCEPTION: An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each stairway section.

~~((R303.6.1 Light Activation. Where lighting outlets are installed in interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the stairway has six or more risers. The illumination of exterior stairways shall be controlled from inside the dwelling unit.~~

EXCEPTION: Lights that are continuously illuminated or automatically controlled.

R303.8.1 Definitions. For the purposes of this section only, the following definitions apply:

DESIGNATED AREAS are those areas designated by a county to be an urban growth area in chapter 36.70A RCW and those areas designated by the U.S. Environmental Protection Agency as being in nonattainment for particulate matter.

SUBSTANTIALLY REMODELED means any alteration or restoration of a building exceeding 60 percent of the appraised value of such building within a 12 month period. For the pur-

pose of this section, the appraised value is the estimated cost to replace the building and structure in kind, based on current replacement costs.

R303.8.2 Primary Heating Source. Primary heating sources in all new and substantially remodeled buildings in designated areas shall not be dependent upon wood stoves.

R303.8.3 Solid Fuel Burning Devices. No used solid fuel burning device shall be installed in new or existing buildings unless such device is United States Environmental Protection Agency certified or a pellet stove either certified or exempt from certification by the United States Environmental Protection Agency.

EXCEPTION: Antique wood cook stoves and wood heaters manufactured prior to 1940.)

R303.9 Required heating. When the winter design temperature in Table R301.2(1) is below 60°F (16°C), every *dwelling unit* shall be provided with heating facilities capable of maintaining a minimum room temperature of 68°F (20°C) at a point 3 feet (914 mm) above the floor and 2 feet (610 mm) from exterior walls in all habitable rooms at design temperature. The installation of one or more portable heaters shall not be used to achieve compliance with this section.

EXCEPTION: Unheated recreational tents or yurts not exceeding 500 square feet provided it is not occupied as a permanent dwelling.

R303.9.1 Definitions. For the purposes of this section only, the following definitions apply.

DESIGNATED AREAS are those areas designated by a county to be an urban growth area in chapter 36.70A RCW and those areas designated by the U.S. Environmental Protection Agency as being in nonattainment for particulate matter.

SUBSTANTIALLY REMODELED means any alteration or restoration of a building exceeding 60 percent of the appraised value of such building within a 12 month period. For the purpose of this section, the appraised value is the estimated cost to replace the building and structure in kind, based on current replacement costs.

R303.9.2 Primary heating source. Primary heating sources in all new and substantially remodeled buildings in designated areas shall not be dependent upon wood stoves.

R303.9.3 Solid fuel burning devices. No new or used solid fuel burning device shall be installed in new or existing buildings unless such device is U.S. Environmental Protection Agency certified or exempt from certification by the United States Environmental Protection Agency and conforms with RCW 70.94.011, 70.94.450, 70.94.453, and 70.94.457.

EXCEPTIONS: 1. Wood cook stoves.
2. Antique wood heaters manufactured prior to 1940.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-0314 Section R314—Smoke alarms.

R314.3 Location. Smoke alarms shall be installed in the following locations:

1. In each sleeping room.

2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.

3. On each additional story of the dwelling, including basements and habitable attics but not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

4. In napping areas in a family home child ((day)) care ((homes)).

((When more than one smoke alarm is required to be installed within an individual dwelling unit, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit.))

R314.3.1 Alterations, Repairs and Additions. When alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms as required for new dwellings.

EXCEPTIONS:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck are exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing, electrical or mechanical systems are exempt from the requirements of this section.

AMENDATORY SECTION (Amending WSR 12-01-099, filed 12/20/11, effective 4/1/12)

WAC 51-51-0315 Section R315—Carbon monoxide alarms.

R315.1 Carbon Monoxide Alarms. For new construction, an approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in dwelling units and on each level of the dwelling and in accordance with the manufacturer's recommendations.

R315.2 ((Existing Dwellings. Existing dwellings shall be equipped with carbon monoxide alarms when alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created.

EXCEPTIONS:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, or electrical permits, are exempt from the requirements of this section.
2. Installation, alteration or repairs of noncombustion plumbing or mechanical systems are exempt from the requirements of this section.))

Carbon monoxide detection systems. Carbon monoxide detection systems that include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720-2012, shall be permitted. The carbon monoxide detectors shall be listed as complying with UL 2075. Where a household carbon monoxide detection system is

installed, it shall become a permanent fixture of the occupancy.

EXCEPTION: Where carbon monoxide alarms are installed meeting the requirements of Section R315.1, compliance with Section R315.2 is not required.

R315.3 ((Alarm Requirements-)) Where required in existing dwellings. Existing dwellings shall be equipped with carbon monoxide alarms in accordance with Section R315.1. An inspection will occur when alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created.

EXCEPTIONS:

1. Work involving only the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, or electrical permits, are exempt from the inspection requirements of this section.
2. Installation, alteration or repairs of nonfuel burning plumbing or mechanical systems are exempt from the inspection requirements of this section.
3. Owner-occupied single-family residences legally occupied before July 26, 2009. RCW 19.27.530 (2)(b).

R315.4 Alarm requirements. Single station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code, NFPA 720-2012 and the manufacturer's installation instructions.

AMENDATORY SECTION (Amending WSR 10-18-036, filed 8/25/10, effective 9/25/10)

WAC 51-51-0325 Section R325—Adult family homes.

**SECTION R325
ADULT FAMILY HOMES**

R325.1 General. This section shall apply to all newly constructed adult family homes and all existing single family homes being converted to adult family homes. This section shall not apply to those adult family homes licensed by the state of Washington department of social and health services prior to July 1, 2001.

R325.2 Submittal standards. In addition to those requirements in Section 106.1, the submittal shall identify the project as a Group R-3 Adult Family Home Occupancy. A floor plan shall be submitted identifying the means of egress and the components in the means of egress such as stairs, ramps, platform lifts and elevators. The plans shall indicate the rooms used for clients and the sleeping room classification of each room.

R325.3 Sleeping room classification. Each sleeping room in an adult family home shall be classified as:

1. Type S - Where the means of egress contains stairs, elevators or platform lifts.
2. Type NS1 - Where one means of egress is at grade level or a ramp constructed in accordance with R325.9 is provided.
3. Type NS2 - Where two means of egress are at grade level or ramps constructed in accordance with R325.9 are provided.

R325.4 Types of locking devices and door activation. All bedroom and bathroom doors shall be openable from the outside when locked.

Every closet shall be readily openable from the inside.

Operable parts of door handles, pulls, latches, locks and other devices installed in adult family homes shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. Pocket doors shall have graspable hardware available when in the closed or open position.

The force required to activate operable parts shall be 5.0 pounds (22.2 N) maximum. Required exit doors shall have no additional locking devices.

Required exit door hardware shall unlock inside and outside mechanisms when exiting the building allowing reentry into the adult family home without the use of a key, tool or special knowledge.

R325.5 Smoke and carbon monoxide alarm requirements. All adult family homes shall be equipped with smoke and carbon monoxide alarms installed as required in Sections R314 and R315.1. Alarms shall be installed in such a manner so that the ((fire)) detection device warning ((may be)) is audible ((to)) from all ((parts)) areas of the dwelling upon activation of a single ((device)) alarm.

R325.6 Escape windows and doors. Every sleeping room shall be provided with emergency escape and rescue windows as required by Section R310. No alternatives to the sill height such as steps, raised platforms or other devices placed by the openings will be approved as meeting this requirement.

R325.7 Fire apparatus access roads and water supply for fire protection. Adult family homes shall be served by fire apparatus access roads and water supplies meeting the requirements of the local jurisdiction.

R325.8 Grab bar((s)) general requirements. Where facilities are designated for use by adult family home clients, grab bars ((shall be installed)) for ((all)) water closets ((and)), bathtubs and shower((s)) stalls shall be installed according to this section. ((The grab bars shall comply with ICC/ANSI A117.1 Sections 604.5 and 607.4 and 608.3.

EXCEPTION: Grab bars are not required for water closets and bathtubs and showers used exclusively by staff of the adult family home.)

R325.8.1 Grab bar cross section. Grab bars with a circular cross section shall have an outside diameter of 1 1/4 inches minimum and 2 inches maximum. Grab bars with noncircular cross section shall have a cross section dimension of 2 inches maximum and a perimeter dimension of 4 inches minimum and 4 5/8 inches maximum.

R325.8.2 Grab bar installation. Grab bars shall have a spacing of 1 1/2 inches between the wall and the bar. Projecting objects, control valves and bathtub or shower stall enclosure features above, below and at the ends of the grab bar shall have a clear space of 1 1/2 inches to the grab bar.

EXCEPTION: Swing-up grab bars shall not be required to meet the 1 1/2 inch spacing requirement.

Grab bars shall have a structural strength of 250 pounds applied at any point on the grab bar, fastener, mounting device or supporting structural member. Grab bars shall not be supported directly by any residential grade fiberglass bathing or showering unit. Acrylic bars found in bathing units shall be removed.

Fixed position grab bars, when mounted, shall not rotate, spin or move and have a graspable surface finish.

R325.8.3 Grab bars at water closets. Water closets shall have grab bars mounted on both sides. Grab bars can be a combination of fixed position and swing-up bars. Grab bars shall meet the requirements of R325.8. Grab bars shall mount between 33 inches and 36 inches above floor grade. Centerline distance between grab bars, regardless of type used, shall be between 25 inches minimum and 30 inches maximum.

R325.8.3.1 Fixed position grab bars. Fixed position grab bars shall be a minimum of 36 inches in length and start 12 inches from the rear wall.

R325.8.3.2 Swing-up grab bars. Swing-up grab bars shall be a minimum of 28 inches in length from the rear wall.

R325.8.4 Grab bars at bathtubs. Horizontal and vertical grab bars shall meet the requirements of R325.8.

R325.8.4.1 Vertical grab bars. Vertical grab bars shall be a minimum of 18 inches long and installed at the control end wall and head end wall. Grab bars shall mount within 4 inches of the exterior of the bath tub edge or within 4 inches within the bath tub. The bottom end of the bar shall start between 36 inches and 42 inches above floor grade.

EXCEPTION: The required vertical grab bar can be substituted with a floor to ceiling grab bar meeting the requirements of R325.8 at the control end and head end entry points.

R325.8.4.2 Horizontal grab bars. Horizontal grab bars shall be provided at the control end, head end, and the back wall within the bathtub area. Grab bars shall be mounted between 33 inches and 36 inches above floor grade. Control end and head end grab bars shall be 24 inches minimum in length. Back wall grab bar shall be 36 inches minimum in length.

R325.8.5 Grab bars at shower stalls. Where shower stalls are provided to meet the requirements for bathing facilities, grab bars shall meet the requirements of R325.8.

EXCEPTION: Shower stalls with permanent built-in seats are not required to have vertical or horizontal grab bars at the seat end wall. A vertical floor to ceiling grab bar shall be installed within 4 inches of the exterior of the shower aligned with the nose of the built-in seat.

R325.8.5.1 Vertical grab bars. Vertical grab bars shall be 18 inches minimum in length and installed at the control end wall and head end wall. Vertical bars shall be mounted within 4 inches of the exterior of the shower stall or within 4 inches inside the shower stall. The bottom end of vertical bars mount between 36 inches and 42 inches above floor grade.

R325.8.5.2 Horizontal grab bars. Horizontal grab bars shall be installed on all sides of the shower stall mounted

between 33 inches and 36 inches above the floor grade. Horizontal grab bars shall be a maximum of 6 inches from adjacent walls. Horizontal grab bars shall not interfere with shower control valves.

R325.9 Ramps. All interior and exterior ramps, when provided, shall be constructed in accordance with Section R311.8 with a maximum slope of 1 vertical to 12 horizontal. The exception to R311.8.1 is not allowed for adult family homes. Handrails shall be installed in accordance with R325.9.1.

R325.9.1 Handrails for ramps. Handrails shall be installed on both sides of ramps between the slope of 1 vertical to 12 horizontal and 1 vertical and 20 horizontal in accordance with R311.6.3.1 through R311.6.3.3.

R325.10 Stair treads and risers. Stair treads and risers shall be constructed in accordance with R311.7.4. Handrails shall be installed in accordance with R325.10.1.

R325.10.1 Handrails for treads and risers. Handrails shall be installed on both sides of treads and risers numbering from one riser to multiple risers. Handrails shall be installed in accordance with R311.7.7 through R311.7.7.4.

R325.11 Shower stalls. Where provided to meet the requirements for bathing facilities, the minimum size of shower stalls for an adult family home shall be 30 inches deep by 48 inches long.

AMENDATORY SECTION (Amending WSR 07-01-090, filed 12/19/06, effective 7/1/07)

WAC 51-51-0326 Section R326—Family home child ((day)) care ((homes)).

**((SECTION R326
FAMILY CHILD DAY CARE HOMES))**

R326 Family home child ((Day)) care ((Homes)). For family home child ((day)) care ((homes)) with more than six children, each floor level used for family child ((day)) care purposes shall be served by two remote means of egress. Exterior exit doors shall be operable from the inside without the use of keys or any special knowledge or effort.

Basements located more than 4 feet below grade level shall not be used for family home child ((day)) care ((homes)) unless one of following conditions exist:

1. Stairways from the basement open directly to the exterior of the building without entering the first floor; or
2. One of the two required means of egress discharges directly to the exterior from the basement level, and a self-closing door is installed at the top or bottom of the interior stair leading to the floor above; or
3. One of the two required means of egress is an operable window or door, approved for emergency escape or rescue, that opens directly to a public street, public alley, yard or exit court; or
4. A residential sprinkler system is provided throughout the entire building in accordance with ((National Fire Protection Association Standard)) NFPA 13d.

Floors located more than 4 feet above grade level shall not be occupied by children in family ~~((day))~~ home child care ~~((homes))~~.

- EXCEPTIONS:
1. Use of toilet facilities while under supervision of an adult staff person.
 2. Family home child ~~((day))~~ care ~~((homes))~~ may be allowed on the second story if one of the following conditions exists:
 - 2.1 Stairways from the second story open directly to the exterior of the building without entering the first floor; or
 - 2.2 One of the two required means of egress discharges directly to the exterior from the second story level, and a self-closing door is installed at the top or bottom of the interior stair leading to the floor below; or
 - 2.3 A residential sprinkler system is provided throughout the entire building in accordance with ~~((National Fire Protection Association Standard))~~ NFPA 13d.

Every sleeping or napping room in a family home child ~~((day))~~ care ~~((home))~~ shall have at least one operable window for emergency rescue.

- EXCEPTION:
- Sleeping or napping rooms having doors leading to two separate means of egress, or a door leading directly to the exterior of the building.

Rooms or spaces containing a commercial-type cooking kitchen, boiler, maintenance shop, janitor closet, laundry, woodworking shop, flammable or combustible storage, or painting operation shall be separated from the family home child ~~((day))~~ care area by at least one-hour fire-resistive construction.

- EXCEPTION:
- A fire-resistive separation shall not be required where the food preparation kitchen contains only a domestic cooking range, and the preparation of food does not result in the production of smoke or grease laden vapors.

NEW SECTION

WAC 51-51-0328 Section R328—Mezzanines.

R328.1 General. Mezzanines shall comply with Section R328.

R328.2 Mezzanines. The clear height above and below *mezzanine* floor construction shall meet the requirements of R305.1.

R328.3 Area limitation. The aggregate area of a *mezzanine* shall be not greater than one-third of the floor area of the room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the *mezzanine* is located.

R328.4 Means of egress. The *means of egress* for *mezzanines* shall comply with the applicable provisions of Section R311.

R328.5 Openness. A *mezzanine* shall be open and unobstructed to the room in which the *mezzanine* is located except for walls not more than 42 inches (1067 mm) in height, columns and posts.

- EXCEPTIONS:
1. *Mezzanines* or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed

space is not greater than 10 percent of the *mezzanine* area.

2. *Mezzanines* that are no more than two *stories* above *grade plane* and equipped throughout with an *automatic sprinkler system* in accordance with NFPA 13R, NFPA 13D or Appendix S, ~~((a mezzanine))~~ and having two or more *means of egress*, shall not be required to be open to the room in which the *mezzanine* is located.

AMENDATORY SECTION (Amending WSR 10-24-061, filed 11/29/10, effective 7/1/11)

WAC 51-51-0403 Section R403—Footings.

~~((R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, wood foundations, or other approved structural systems which shall be of sufficient design to accommodate all loads specified in Section R301 and to transmit the resulting loads to the supporting soil within the limitations determined from the characteristics of the soil. Footings shall be supported on undisturbed natural soil or engineered fill. Foundation walls complying with Section R404 or stem walls complying with Section R403.1.3 shall be permitted to support exterior walls, exterior braced wall lines and exterior braced wall panels provided they are supported by continuous footings.))~~

TABLE R403.1
MINIMUM WIDTH OF CONCRETE,
PRECAST OR MASONRY FOOTINGS
(inches)

	LOAD-BEARING VALUE OF SOIL (psf)			
	1,500	2,000	3,000	≥4,000
Conventional light-frame construction				
1 floor ^{b, c}	12	12	12	12
2 floors ^{b, c}	15	12	12	12
3 floors ^{b, c}	23	17	12	12
4-inch brick veneer over light frame or 8-inch hollow concrete masonry				
1-story	12	12	12	12
2-story	21	16	12	12
3-story	32	24	16	12
8-inch solid or fully grouted masonry				
1-story	16	12	12	12
2-story	29	21	14	12
3-story	42	32	21	16

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479kPa.

- a. Where minimum footing width is 12 inches, use of a single wythe of solid or fully grouted 12-inch nominal concrete masonry units is permitted.
- b. Represents the number of floors supported.
- c. Footings shall be permitted to support a roof in addition to the stipulated number of floors. Footings supporting a roof only shall be as required for supporting one floor.

R403.1.2 Continuous Footing in Seismic Design Categories D₀, D₁ and D₂. The braced wall panels at exterior walls of buildings located in Seismic Design Categories D₀, D₁ and D₂ shall be supported by continuous footings. All required interior braced wall panels shall be supported on footings at intervals not exceeding 50 feet (15,240 mm).

~~((Figure 403.4(1). Note corrected title and labels:))~~

~~BASEMENT OR CRAWL SPACE WITH PRECAST CONCRETE
FOUNDATION WALL BEARING ON CRUSHED STONE
PRECAST CONCRETE FOUNDATION WALL
CRUSHED STONE FOOTING~~

~~Figure 403.4(2). Note corrected title and label:~~

~~BASEMENT OR CRAWL SPACE WITH PRECAST CONCRETE
FOUNDATION WALL ON SPREAD FOOTING
PRECAST CONCRETE FOUNDATION WALL))~~

AMENDATORY SECTION (Amending WSR 10-24-061, filed 11/29/10, effective 7/1/11)

WAC 51-51-0404 Section R404—Foundation and retaining walls.

~~((Table R404.1.1(3). Note corrected title:~~

~~10-INCH MASONRY FOUNDATION WALLS WITH REINFORCING
WHERE $d > 6.75$ INCHES^(a-e)))~~

R404.1.2.2 Reinforcement for foundation walls. Concrete foundation walls shall be laterally supported at the top except where permitted in R404.1.2.2.1 and R404.1.2.2.2, and at the bottom where required elsewhere in this code. Horizontal reinforcement shall be provided in accordance with Table R404.1.2(1). Vertical reinforcement shall be provided in accordance with Table R404.1.2(2), R404.1.2(3), R404.1.2(4), R404.1.2(5), R404.1.2(6), R404.1.2(7) or R404.1.2(8). Vertical reinforcement for flat basement walls retaining 4 feet (1,219 mm) or more of unbalanced backfill is permitted to be determined in accordance with Table R404.1.2(9).

For basement walls supporting above-grade concrete walls, vertical reinforcement shall be the greater of that required by Tables R404.1.2(2) through R404.1.2(8) or by Section 611.6 for the above-grade wall. In buildings assigned to Seismic Design Category D₀, D₁ or D₂, concrete foundation walls shall also comply with Section R404.1.4.2.

R404.4 Retaining walls. Retaining walls not supporting a structure that are not laterally supported at the top and that retain in excess of 24 inches (610 mm) of unbalanced fill shall be designed to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning.

AMENDATORY SECTION (Amending WSR 10-18-036, filed 8/25/10, effective 9/25/10)

WAC 51-51-0408 Section R408—Under-floor space.

R408.1 Ventilation. The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement) shall have ventilation openings through foundation walls or exterior walls.

R408.2 Openings for under-floor ventilation. The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m²) for each 300 square feet (28 m²) of under-floor area. ~~((One ventilating opening shall be within 3 feet (914 mm) of each corner of the building.))~~ Required openings shall be evenly placed to provide cross ventilation of the space except one side of the building shall be permitted

to have no ventilation openings. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed 1/4 inch (6.4 mm):

1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast-iron grill or grating.
4. Extruded load-bearing brick vents.
5. Hardware cloth of 0.035 inch (0.89 mm) wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension being 1/8 inch (3.2 mm).

EXCEPTION:

The total area of ventilation openings shall be permitted to be reduced to 1/1,500 of the under-floor area where the ground surface is covered with an approved Class I vapor retarder material and the required openings are placed to provide cross ventilation of the space. The installation of operable louvers shall not be prohibited. If the installed ventilation is less than 1/300, or if operable louvers are installed, a radon vent shall be installed to originate from a point between the ground cover and soil. The radon vent shall be installed in accordance with the requirements of Appendix F (Radon) of this code.

R408.3 Unvented crawl space. Ventilation openings in under-floor spaces specified in Sections R408.1 and R408.2 shall not be required where:

1. Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall; and a radon system shall be installed that meets the requirements of Appendix F (Radon) of this code.

2. Continuously operated mechanical exhaust ventilation is provided at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of crawlspace floor area. Exhaust ventilation shall terminate to the exterior.

EXCEPTION:

Plenum in existing structures complying with Section M1601.5, if under-floor space is used as a plenum.

NEW SECTION

WAC 51-51-0501 Section R501—General.

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wall-board membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

EXCEPTIONS:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
 - 3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story.

3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
 4. Wood floor assemblies using dimensional lumber or structural composite lumber with a cross sectional area equal to or greater than 2-inch by 10-inch nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-0502 Section R502—((Wood floor framing)) Reserved.

~~((R502.2.2.2 Alternate Deck Ledger Connections. Deck ledger connections not conforming to Table R502.2.2.1 shall be attached with approved fasteners having equivalent withdrawal capacity or be designed in accordance with accepted engineering practice. Girders supporting deck joists shall not be supported on deck ledgers or band joists. Deck ledgers shall not be supported on stone or masonry veneer.~~

~~**R502.2.2.3 Deck Lateral Load Connections.** The lateral load connection required by Section R502.2.2 shall be permitted to be in accordance with Figure R502.2.2.3. Hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).~~

EXCEPTION: Decks not more than 30 inches above grade at any point may be unattached.))

NEW SECTION

WAC 51-51-0507 Section R507—Decks.

R507.2.2 Alternate deck ledger connections. Deck ledger connections not conforming to Table R507.2 shall be attached with approved fasteners having equivalent withdrawal capacity or be designed in accordance with accepted engineering practice. Girders supporting deck joists shall not be supported on deck ledgers or band joists. Deck ledgers shall not be supported on stone or masonry veneer.

R507.2.3 Deck lateral load connections. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2.3. Where the lateral load connection is provided in accordance with Figure R507.2.3, hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).

- EXCEPTIONS:**
1. Decks not more than 30 inches above grade at any point may be unattached.
 2. Where a new deck is being added to an existing structure, the lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2.4.

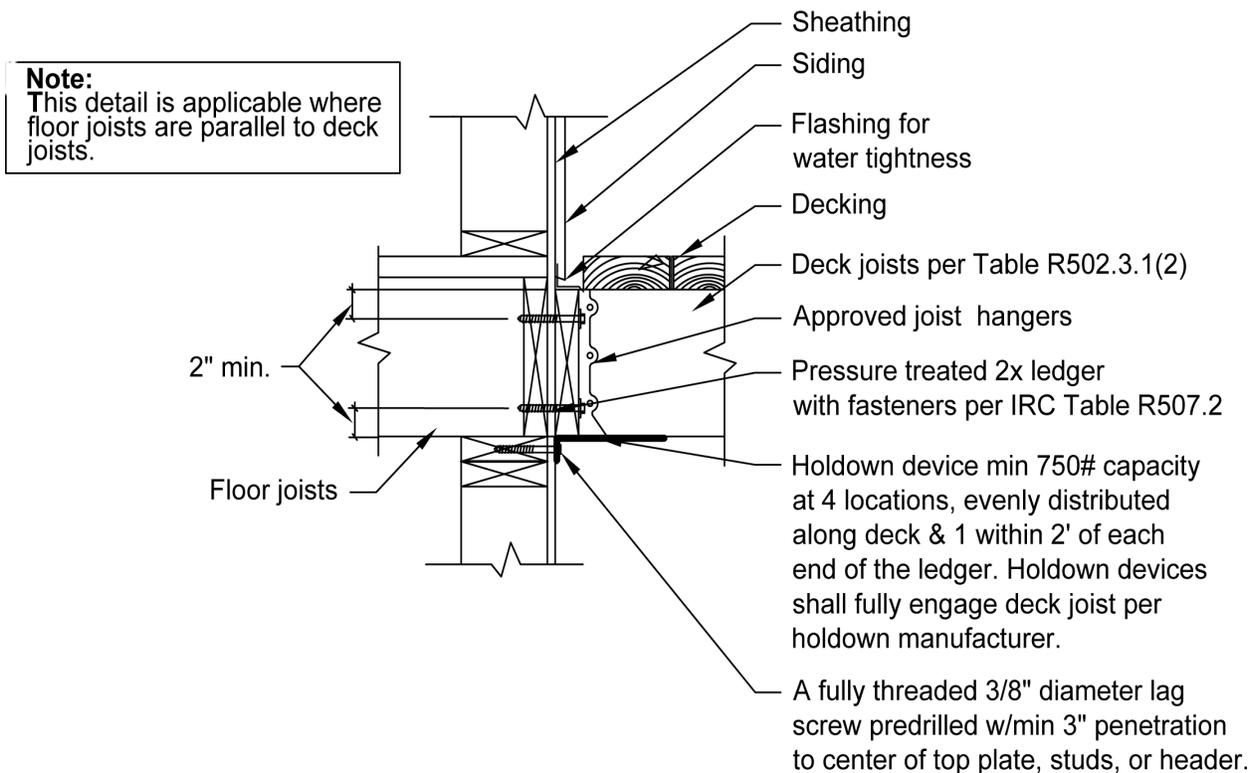


Figure R507.2.4

**Table 507.2.1
Placement of Lag Screws and Bolts in Deck Ledgers and
Band Joists**

MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger ^a	2 inches ^d	3/4 inch	2 inches ^b	1 5/8 inches ^b
Band joist ^e	3/4 inch	2 inches ^e	2 inches ^b	1 5/8 inches ^b

For SI: 1 inch = 25.4 mm.

^aLag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1).

^bMaximum 5 inches.

^cFor engineered rim joists, the manufacturer's recommendations shall govern.

^dThe minimum distance from bottom row of lag screws to the top edge of the ledger shall be in accordance with Figure R507.2.1(1).

^eThe 2 inches may be reduced to 3/4 inch when the band joist is directly supported by a mudsill, a header or by double top wall plates

AMENDATORY SECTION (Amending WSR 10-18-036, filed 8/25/10, effective 9/25/10)

WAC 51-51-0602 Section R602—Wood wall framing.

R602.9 Foundation cripple walls. Foundation cripple walls shall be framed of studs not smaller than the studding above. When exceeding 4 feet (1219 mm) in height, such walls shall be framed of studs having the size required for an additional story.

Cripple walls supporting bearing walls or exterior walls or interior braced wall panels as required in Sections R403.1.2 and ~~((R602.10.7.1))~~ **R602.10.9.1** with a stud height less than 14 inches (356 mm) shall be continuously sheathed on ~~((at least))~~ one side with ~~((a))~~ wood structural panels ~~((that is))~~ fastened to both the top and bottom plates in accordance with Table R602.3(1), or the cripple walls shall be constructed of solid blocking. All cripple walls shall be supported on continuous footings or foundations.

EXCEPTION: Footings supporting cripple walls used to support interior braced wall panels as required in Sections R403.1.2 and ~~((R602.10.7.1))~~ **R602.10.9.1** shall be continuous for the required length of the cripple wall and constructed beyond the cripple wall for a minimum distance of 4 inches and a maximum distance of the footing thickness. The footings extension is not required at intersections with other footings.

~~((R602.10.1.2 Length of bracing.~~ The length of bracing along each braced wall line shall be the greater of that required by the design wind speed and braced wall line spacing in accordance with Table R602.10.1.2(1) as adjusted by the factors in the footnotes or the Seismic Design Category and braced wall line length in accordance with Table R602.10.1.2(2) as adjusted by the factors in Table R602.10.1.2(3). Braced wall panel locations shall comply with the requirements of Section R602.10.1.4. Only walls that are parallel to the braced wall line shall be counted

toward the bracing requirement of that line, except angled walls shall be counted in accordance with Section R602.10.1.3. In no case shall the minimum total length of bracing in a braced wall line, after all adjustments have been taken, be less than 48 inches (1219 mm) total.

R602.10.1.5 Braced wall line spacing for Seismic Design Categories D₀, D₁ and D₂. Spacing between braced wall lines in each story shall not exceed 25 feet (7620 mm) on center in both the longitudinal and transverse directions.

((EXCEPTION: In one-story and two-story buildings, spacing between two adjacent braced wall lines shall not exceed 35 feet (10,668 mm) on center in order to accommodate one single room not exceeding 900 square feet (84 m²) in each dwelling unit or accessory structure. Spacing between all other braced wall lines shall not exceed 25 feet (7,620 mm). A spacing of 35 feet (10,668 mm) or less shall be permitted between braced wall lines where the length of wall bracing required by Table R602.10.1.2(2) is multiplied by the appropriate adjustment factor from Table R602.10.1.5, the length-to-width ratio for the floor/roof diaphragm does not exceed 3:1, and the top plate lap splice face nailing is twelve 16d nails on each side of the splice.

R602.10.2.3 Redesignation of cripple walls. In any Seismic Design Category, cripple walls are permitted to be redesignated as the first story walls for purposes of determining wall bracing requirements. If the cripple walls are redesignated, the stories above the redesignated story shall be counted as the second and third stories, respectively.

R602.10.7.1 Braced wall panel support for Seismic Design Category D₂. In one-story buildings located in Seismic Design Category D₂, braced wall panels shall be supported on continuous foundations at intervals not exceeding 50 feet (15,240 mm). In two-story buildings located in Seismic Design Category D₂, all braced wall panels shall be supported on continuous foundations.

R602.10.9 Cripple wall bracing. In Seismic Design Categories other than D₂, cripple walls supporting bearing walls or exterior walls or interior braced wall panels as required in R403.1.2 and R602.10.7.1 shall be braced with a length and type of bracing as required for the wall above in accordance with Tables R602.10.1.2(1) and R602.10.1.2(2) with the following modifications for cripple wall bracing:

1. The length of bracing as determined from Tables R602.10.1.2(1) and R602.10.1.2(2) shall be multiplied by a factor of 1.15, and
2. The wall panel spacing shall be decreased to 18 feet (5486 mm) instead of 25 feet (7620 mm).

R602.10.9.1 Cripple wall bracing in Seismic Design Categories D₀, D₁ and D₂. In addition to the requirements of Section R602.10.9, where braced wall lines at interior walls occur without a continuous foundation below, the length of parallel exterior cripple wall bracing shall be 1 1/2 times the length required by Tables R602.10.1.2(1) and R602.10.1.2(2). Where cripple walls braced using Method WSP of Section R602.10.2 cannot provide this additional length, the capacity of the sheathing shall be increased by reducing the spacing of fasteners along the perimeter of each piece of sheathing to 4 inches (102 mm) on center.

In Seismic Design Category D₂, cripple walls supporting bearing walls or exterior walls or interior braced wall panels as required in Sections R403.1.2 and R602.10.7.1 shall be braced in accordance with Tables R602.10.1.2(1) and R602.10.1.2(2).)

R602.10.11 Cripple wall bracing. Cripple walls shall be constructed in accordance with Section R602.9 and braced in accordance with this section. Cripple walls supporting bearing walls or exterior walls or interior braced wall panels as required in Section R403.1.2 shall be braced with the length and method of bracing used for the wall above in accordance with Tables R602.10.3(1) and R602.10.3(3), and the applicable adjustment factors in Table R602.10.3(2) or R602.10.3(4), respectively, except the length of the cripple wall bracing shall be multiplied by a factor of 1.15. The distance between adjacent edges of braced wall panels shall be reduced from 20 feet (6096 mm) to 14 feet (4267 mm).

R602.10.11.2 Cripple wall bracing for Seismic Design Category D₂. In Seismic Design Category D₂, cripple walls supporting bearing walls or exterior walls or interior braced wall panels as required in Section R403.1.2 shall be braced in accordance with Tables R602.10.3(3) and R602.10.3(4).

AMENDATORY SECTION (Amending WSR 10-18-036, filed 8/25/10, effective 9/25/10)

WAC 51-51-0612 Section R612—Exterior windows and ((glass)) doors.

~~((R612.6))~~ R612.3 Testing and labeling. Exterior windows and sliding doors shall be tested by an approved independent laboratory, and bear a label identifying manufacturer, performance characteristics and approved inspection agency to ~~((indicated))~~ indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and labeled as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or comply with Section ~~((R612.6))~~ R612.5.

EXCEPTIONS:

1. Decorative glazed openings.
2. Custom exterior windows and doors manufactured by a small business shall be exempt from all testing requirements in Section R612 ~~((of the International Residential Code))~~ provided they meet the applicable provisions of Chapter 24 of the International Building Code.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-0703 Section R703—Exterior covering.

R703.1 General. Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing as described in Section R703.8.

R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2 and a means of draining water that enters the assembly to the exterior. Protection against

condensation in the exterior wall assembly shall be provided in accordance with Section ~~((601.3))~~ R702.7 of this code.

EXCEPTIONS:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed according to Section R703.7 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Section R703.2 and R703.8, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
 - 2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
 - 2.2. Exterior wall envelope test assemblies shall be at least 4 feet (1219 mm) by 8 feet (2438 mm) in size.
 - 2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299Pa).
 - 2.4. Exterior wall envelope assemblies shall be subjected to a minimum test exposure duration of 2 hours.
 The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate: Control joints in the exterior wall envelope; joints at the perimeter of opening penetration; or intersections of terminations with dissimilar materials.
3. The requirement for a means of drainage shall not be construed to mean an air space cavity under the exterior cladding for an exterior wall clad with panel or lapped siding made of plywood, engineered wood, hardboard, or fiber cement. A water-resistive barrier as required by Section R703.2 and Table R703.4 will be required on exterior walls.

R703.8 Flashing. Approved corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structure framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish. Approved corrosion-resistant flashing shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water resistive barrier for subsequent drainage.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

**WAC 51-51-0806 Section R806—((Roof ventilation))
Reserved.**

~~((R806.4 Unvented attic assemblies. Unvented attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) shall be permitted if all of the following conditions are met:~~

~~1. The unvented attic space is completely contained within the building thermal envelope.~~

~~2. No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.~~

~~3. Where wood shingles or shakes are used, a minimum 1/4-inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.~~

~~4. Any air impermeable insulation shall be a vapor retarder, or shall have a vapor retarder coating or covering in direct contact with the underside of the insulation.~~

~~5. Either items a, b or c below shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.~~

~~a. Air impermeable insulation only. Insulation shall be applied in direct contact to the underside of the structural roof sheathing.~~

~~b. Air permeable insulation only. In addition to the air permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified per Washington climate zone for condensation control.~~

~~i. Climate Zone #1 – R-10 minimum rigid board or air impermeable insulation R-value.~~

~~ii. Climate Zone #2 – R-25 minimum rigid board or air impermeable insulation R-value.~~

~~e. Air impermeable and air permeable insulation. The air impermeable insulation shall be applied in direct contact to the underside of the structural roof sheathing as specified per Washington climate zone for condensation control. The air permeable insulation shall be installed directly under the air impermeable insulation.~~

~~i. Climate Zone #1 – R-10 minimum rigid board or air impermeable insulation R-value.~~

~~ii. Climate Zone #2 – R-25 minimum rigid board or air impermeable insulation R-value.))~~

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-0903 Section R903—Weather protection.

R903.4.1 ((Overflow)) Secondary (emergency overflow) drains ((and)) or scuppers. Where roof drains are required, secondary emergency overflow drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow buildup for any reason. Overflow drains having the same size as the roof drains shall be installed with the inlet flow line located 2 inches (51 mm) above the low point of the roof, or overflow scuppers having

three times the size of the roof drains and having a minimum opening height of 4 inches (102 mm) shall be installed in the adjacent parapet walls with the inlet flow located 2 inches (51 mm) above the low point of the roof served. The installation and sizing of overflow drains, leaders and conductors shall comply with the plumbing code. Overflow drains shall discharge to an approved location.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-1001 Section R1001—Masonry fireplaces.

R1001.7.1 Damper. Masonry fireplaces shall be equipped with a ferrous metal damper located at least 8 inches (203 mm) above the top of the fireplace opening. Dampers shall be installed in the fireplace or the chimney venting the fireplace, and shall be operable from the room containing the fireplace.

Fireplaces shall be provided with each of the following:

1. Tightly fitting flue dampers, operated by a readily accessible manual or approved automatic control.

EXCEPTION: Fireplaces with gas logs shall be installed in accordance with the International Mechanical Code Section 901, except that the standards for liquefied petroleum gas installations shall be NFPA 58 (Liquefied Petroleum Gas Code) and NFPA 54 (National Fuel Gas Code).

2. An outside source for combustion air ducted into the firebox. The duct shall be at least 6 square inches, and shall be provided with an operable outside air duct damper.

((EXCEPTION: Washington certified fireplaces shall be installed with the combustion air systems necessary for their safe and efficient combustion and specified by the manufacturer in accordance with the Washington State Building Standard 31-2 (WAC 51-50-31200) and IBC Section 2114 (WAC 51-50-2114).))

3. Site built fireplaces shall have tight fitting glass or metal doors, or a flue draft induction fan or as approved for minimizing back-drafting. Factory built fireplaces shall use doors listed for the installed appliance.

NEW SECTION

WAC 51-51-1002 Section R1002—Masonry heaters.

R1002.2 Installation. Masonry heaters shall be installed in accordance with this section and shall be a masonry heater type approved by the department of ecology. Masonry heaters shall comply with one of the following:

1. Masonry heaters shall comply with the requirements of ASTM E 1602; or

2. Masonry heaters shall be *listed* and *labeled* in accordance with UL 1482 and installed in accordance with the manufacturer's installation instructions.

R1002.2.1 Combustion air and doors. Masonry heaters shall be provided with both of the following:

1. Primary combustion air ducted from the outside of the structure to the appliance.

2. Tight fitting ceramic glass or metal doors. Flue dampers, when provided, shall have an external control and when

in the closed position shall have a net free area of not less than 5% of the flue cross sectional area.

AMENDATORY SECTION (Amending WSR 04-01-109, filed 12/17/03, effective 7/1/04)

WAC 51-51-1004 Section R1004—Factory-built fireplaces.

R1004.1.1 Emission Standards for Factory-built Fireplaces. ~~((After January 1, 1997,))~~ No new or used factory-built fireplace shall be installed in Washington state unless it is certified and labeled in accordance with procedures and criteria specified in ((the Washington State Building Code Standard 31-2)) ASTM E2558 Standard Test Method for determining particulate matter emission from fires in low mass wood burning fireplaces.

To certify an entire fireplace model line, the internal assembly shall be tested to determine its particulate matter emission performance. Retesting and recertifying is required if the design and construction specifications of the fireplace model line internal assembly change. Testing for certification shall be performed by a Washington state department of ecology (DOE) approved and U.S. Environmental Protection Agency (EPA) accredited laboratory.

R1004.1.2 Emission Standards for Certified Masonry and Concrete Fireplaces. ~~((After January 1, 1997, new certified masonry or concrete fireplaces installed in Washington state shall be tested and labeled in accordance with procedures and criteria specified in the Washington State Building Code Standard 31-2.~~

~~To certify an entire fireplace model line, the internal assembly shall be tested to determine its particulate matter emission performance. Retesting and recertifying is required if the design and construction specifications of the fireplace model line internal assembly change. Testing for certification shall be performed by a Washington state department of ecology (DOE) approved and U.S. Environmental Protection Agency (EPA) accredited laboratory.))~~ Masonry and concrete fireplace model lines certified to Washington State Building Code Standard 31-2 prior to July 1, 2013, may retain certification provided the design and construction specifications of the fireplace model line internal assembly do not change.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-1006 Section R1006—Exterior air supply.

R1006.2 Solid fuel burning appliances and fireplaces. Solid fuel burning appliances and fireplaces shall be provided with tight fitting metal or ceramic glass doors, and:

1. A source from outside the structure of primary combustion air, connected to the appliance as per manufacturer's specification. The air inlet shall originate at a point below the fire box. The duct shall be 4 inches or greater in diameter, not exceed 20 feet in length, and be installed as per manufacturer's instructions; or

2. The appliance and manufacturer's recommended combustion air supply, as an installed unit, shall be certified by an independent testing laboratory to have passed Test No. 11-Negative Pressure Test, Section 12.3, of ULC S627-M1984 "Space Heaters for Use with Solid Fuels," modified as follows:

Negative pressure of 8 Pascal shall be initially established with the chamber sealed and the air supply, if not directly connected to the appliance, closed off.

The air supply if not directly connected to the appliance, shall then be opened.

The maximum allowable air exchange rate from chamber leakage and intentional air supply for the unit (appliance with combustion air supply) in the test chamber is 3.5 air changes per hour, or 28 cfm (cubic feet of air per minute), whichever is less.

EXCEPTION: Combustion air may be supplied to the room in which the solid fuel burning appliance is located in lieu of direct ducting, provided that one of the following conditions is met:

1. The solid fuel burning appliance is part of a central heating plant and installed in an unconditioned space in conformance with the International Mechanical Code; or
2. The solid fuel burning appliance is installed in existing construction directly on a concrete floor or surrounded by masonry materials as in a fireplace. The combustion air terminus shall be located as close to the solid fuel burning appliance as possible and shall be provided with a barometric damper or equivalent. The combustion air source shall be specified by the manufacturer or no less than 4 inches in diameter or the equivalent in area or as approved.

~~((R1006.1.1 Factory built fireplaces. This section is not adopted.~~

~~R1006.1.2 Masonry fireplaces. This section is not adopted.~~

~~R1006.2 Exterior air intake.))~~ **R1006.4 Passageway.** This section is not adopted.

AMENDATORY SECTION (Amending WSR 07-01-090, filed 12/19/06, effective 7/1/07)

WAC 51-51-1201 Section M1201—General.

M1201.1 Scope. The provisions of Chapters 12 through 24 shall regulate the design, installation, maintenance, alteration and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions within buildings. These chapters shall also regulate those mechanical systems, system components, equipment and appliances specifically addressed in this code.

EXCEPTION: The standards for liquefied petroleum gas installations shall be the ((2004)) 2011 Edition of NFPA 58 (Liquefied Petroleum Gas Code) and the ((2006)) 2012 Edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code).

M1201.3 Construction documents. The plans and specifications shall show in sufficient detail pertinent data and features of the materials, equipment and systems as herein governed including, but not limited to: Design criteria, size and type of apparatus and equipment, systems and equipment controls, provisions for combustion air to fuel burning appli-

ances, and other pertinent data to indicate conformance with the requirements of this code.

M1201.4 Testing. At the discretion of the building official, flow testing may be required to verify that the mechanical system(s) satisfies the requirements of this code. Specific testing required by other sections of this code shall be performed. Flow testing may be performed using flow hoods measuring at the intake or exhaust points of the system, in-line pitot tube, or pitot-traverse type measurement systems in the duct, short-term tracer gas measurements, or other means approved by the building official.

NEW SECTION

WAC 51-51-1301 Section M1301—General.

M1301.2 Identification. Each length of pipe and tubing and each pipe fitting utilized in a mechanical system shall bear the identification of the manufacturer.

EXCEPTION: The manufacturer identification for fittings and pipe nipples shall be on each piece or shall be printed on the fitting or nipple packaging or provided documentation.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-1302 Section M1302—(~~General mechanical system requirements~~) Reserved.

~~(**M1302.2 Construction Documents.** The plans and specifications shall show in sufficient detail pertinent data and features of the materials, equipment and systems as herein governed, including, but not limited to: Design criteria, size and type of apparatus and equipment, systems and equipment controls, provisions for combustion air to fuel burning appliances, and other pertinent data to indicate conformance with the requirements of this code.~~

~~**M1302.3 Testing.** At the discretion of the building official, flow testing may be required to verify that the mechanical system(s) satisfies the requirements of this code. Flow testing may be performed using flow hoods measuring at the intake or exhaust points of the system, in-line pitot tube, or pitot-traverse type measurement systems in the duct, short-term tracer gas measurements, or other means approved by the building official.~~

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-1415 Section M1415—(~~Masonry heaters~~) Reserved.

~~(**M1415.1 General.** Masonry heaters shall be approved by the department of ecology and shall contain both of the following:~~

1. Primary combustion air ducted from the outside of the structure to the appliance.
2. Tight fitting ceramic glass or metal doors. Flue damper, when provided, shall have an external control and

~~when in the closed position shall have a net free area of not less than 5% of the flue cross sectional area.)~~

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-1507 Section M1507—Mechanical ventilation.

~~**M1507.1 General.** ((Source specific exhaust ventilation is required in each kitchen, bathroom, water closet, laundry room, indoor swimming pool, spa, and other rooms where water vapor or cooking odor is produced. The minimum source specific ventilation effective exhaust capacity shall not be less than levels specified in Table M1507.3.~~

~~**M1507.3.1 Source Specific Exhaust Fans.** Exhaust fans providing source specific ventilation shall have a minimum fan flow rating not less than 50 cfm at 0.25 inches water gauge for bathrooms, laundries, or similar rooms and 100 cfm at 0.25 inches water gauge for kitchens. Manufacturers' fan flow ratings shall be determined as per HVI 916 (April 1995) or AMCA 210.~~

EXCEPTION: Where a range hood or down draft exhaust fan is used to satisfy the source specific ventilation requirements for kitchens, the range hood or down draft exhaust shall not be less than 100 cfm at 0.10 inches water gauge.

~~**M1507.3.2 Source Specific Ventilation Controls.** Source specific ventilation systems shall be controlled by manual switches, dehumidistats, timers, or other approved means. Source specific ventilation system controls shall be readily accessible.~~

~~**M1507.3.3 Source Specific Ventilation Ducts.** Source specific ventilation ducts shall terminate outside the building. Exhaust ducts shall be equipped with back draft dampers. All exhaust ducts in unconditioned spaces shall be insulated to a minimum of R-4. Terminal elements shall have at least the equivalent net free area of the duct work. Terminal elements for exhaust fan duct systems shall be screened or otherwise protected from entry by leaves or other material. Minimum 50% net free area shall meet the requirements of R303.5.)~~
Local exhaust and whole-house mechanical ventilation systems and equipment shall be designed in accordance with this section.

M1507.2 Recirculation of air. Exhaust air from bathrooms and toilet rooms shall not be recirculated within a residence or to another dwelling unit and shall be exhausted directly to the outdoors. Exhaust air from bathrooms and toilet rooms shall not discharge into an attic, crawl space or other areas of the building.

M1507.3 Whole-house mechanical ventilation system. Whole-house mechanical ventilation systems shall be designed in accordance with Sections M1507.3.1 through M1507.3.3.

M1507.3.1 System design. Each dwelling unit or guestroom shall be equipped with a ventilation system complying with Section M1507.3.4, M1507.3.5, M1507.3.6 or M1507.3.7.

Compliance is also permitted to be demonstrated through compliance with the International Mechanical Code.

M1507.3.2 Control and operation.

1. Location of controls. Controls for all ventilation systems shall be readily accessible by the occupant.

2. Instructions. Operating instructions for whole-house ventilation systems shall be provided to the occupant by the installer of the system.

3. Local exhaust systems. Local exhaust systems shall be controlled by manual switches, dehumidistats, timers, or other approved means.

4. Continuous whole-house ventilation systems. Continuous whole-house ventilation systems shall operate continuously. Exhaust fans, forced-air system fans, or supply fans shall be equipped with "fan on" as override controls. Controls shall be capable of operating the ventilation system without energizing other energy-consuming appliances. A label shall be affixed to the controls that reads "Whole House Ventilation (see operating instructions)."

5. Intermittent whole-house ventilation systems. Intermittent whole-house ventilation systems shall comply with the following:

5.1. They shall be capable of operating intermittently and continuously.

5.2. They shall have controls capable of operating the exhaust fans, forced-air system fans, or supply fans without energizing other energy-consuming appliances.

5.3. The ventilation rate shall be adjusted according to the exception in Section 403.8.5.1.

5.4. The system shall be designed so that it can operate automatically based on the type of control timer installed.

5.5. The intermittent mechanical ventilation system shall operate at least one hour out of every four.

5.6. The system shall have a manual control and automatic control, such as a 24-hour clock timer.

5.7. At the time of final inspection, the automatic control shall be set to operate the whole-house fan according to the schedule used to calculate the whole-house fan sizing.

5.8. A label shall be affixed to the control that reads "Whole House Ventilation (see operating instructions)."

M1507.3.2.1 Operating instructions. Installers shall provide the manufacturer's installation, operating instructions, and a whole-house ventilation system operation description.

M1507.3.3 Mechanical ventilation rate. The whole-house mechanical ventilation system shall provide outdoor air to each habitable space at a continuous rate of not less than that determined in accordance with Table M1507.3.3(1).

EXCEPTION: The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table M1507.3.3(1) is multiplied by the factor determined in accordance with Table M1507.3.3(2).

**Table M1507.3.3(1)
Continuous Whole-House Mechanical Ventilation System Airflow Rate Requirements**

<u>Dwelling Unit Floor Area (square feet)</u>	<u>NUMBER OF BEDROOMS</u>				
	<u>0 - 1</u>	<u>2 - 3</u>	<u>4 - 5</u>	<u>6 - 7</u>	<u>> 7</u>
	<u>Airflow in CFM</u>				
<u>< 1,500</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<u>1,501 - 3,000</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>	<u>105</u>
<u>3,001 - 4,500</u>	<u>60</u>	<u>75</u>	<u>90</u>	<u>105</u>	<u>120</u>
<u>4,501 - 6,000</u>	<u>75</u>	<u>90</u>	<u>105</u>	<u>120</u>	<u>135</u>
<u>6,001 - 7,500</u>	<u>90</u>	<u>105</u>	<u>120</u>	<u>135</u>	<u>150</u>
<u>> 7,501</u>	<u>105</u>	<u>120</u>	<u>135</u>	<u>150</u>	<u>165</u>

For SI: 1 square foot = 0.0929 m², 1 cubic foot per minute = 0.0004719 m³/S.

**Table M1507.3.3(2)
Intermittent Whole-House Mechanical Ventilation Rate Factors^{a, b}**

<u>Run-Time Percentage in Each 4-Hour Segment</u>	<u>25%</u>	<u>33%</u>	<u>50%</u>	<u>66%</u>	<u>75%</u>	<u>100%</u>
<u>Factor^a</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1.5</u>	<u>1.3</u>	<u>1.0</u>

^a For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.

^b Extrapolation beyond the table is prohibited.

M1507.3.4 Whole-house ventilation using exhaust fans. This section establishes minimum prescriptive requirements for whole-house ventilation systems using exhaust fans. A system which meets all the requirements of this section shall be deemed to satisfy the requirements for a whole-house ventilation system.

M1507.3.4.1 Whole-house ventilation fans. Exhaust fans providing whole-house ventilation shall have a flow rating at 0.25 inches water gauge as specified in Table M1507.3.3(1). Manufacturers' fan flow ratings shall be determined according to HVI 916 or AMCA 210.

M1507.3.4.2 Fan noise. Whole-house fans located 4 feet or less from the interior grille shall have a sone rating of 1.0 or less measured at 0.1 inches water gauge. Manufacturer's noise ratings shall be determined as per HVI 915 (March 2009). Remotely mounted fans shall be acoustically isolated from the structural elements of the building and from attached duct work using insulated flexible duct or other approved material.

M1507.3.4.3 Fan controls. The whole-house ventilation fan shall meet the requirements of Section M1507.3.2 and M1507.3.2.1.

M1507.3.4.4 Outdoor air inlets. Outdoor air shall be distributed to each habitable space by individual outdoor air inlets. Where outdoor air supplies are separated from exhaust points by doors, provisions shall be made to ensure air flow by installation of distribution ducts, undercutting doors, installation of grilles, transoms, or similar means. Doors shall be undercut to a minimum of 1/2 inch above the surface of the finish floor covering.

Individual room outdoor air inlets shall:

1. Have controllable and secure openings;
2. Be sleeved or otherwise designed so as not to compromise the thermal properties of the wall or window in which they are placed;
3. Provide not less than 4 square inches of net free area of opening for each habitable space. Any inlet or combination of inlets which provide 10 cfm at 10 Pascals are deemed equivalent to 4 square inches net free area.

Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1507.3.5 Whole-house ventilation integrated with a forced-air system. This section establishes minimum prescriptive requirements for whole-house ventilation systems integrated with forced-air ventilation systems. A system which meets all the requirements of this section shall be deemed to satisfy the requirements for a whole-house ventilation system.

M1507.3.5.1 Integrated whole-house ventilation systems. Integrated whole-house ventilation systems shall provide outdoor air at the rate calculated using Section M1507.3.3. Integrated forced-air ventilation systems shall distribute outdoor air to each habitable space through the forced-air system ducts. Integrated forced-air ventilation systems shall have an outdoor air inlet duct connecting a terminal element on the outside of the building to the return air plenum of the forced-air system, at a point within 4 feet upstream of the air handler.

The outdoor air inlet duct connection to the return air stream shall be located upstream of the forced-air system blower and shall not be connected directly into a furnace cabinet to prevent thermal shock to the heat exchanger. The system will be equipped with a motorized damper connected to the automatic ventilation control as specified in Section M1507.3.2. The required flow rate shall be verified by field testing with a flow hood or a flow measuring station.

M1507.3.5.2 Ventilation duct insulation. All supply ducts in the conditioned space shall be insulated to a minimum of R-4.

M1507.3.5.3 Outdoor air inlets. Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1507.3.6 Whole-house ventilation using a supply fan. This section establishes minimum prescriptive requirements for whole-house ventilation systems using an inline supply fan. A system which meets all the requirements of this section shall be deemed to satisfy the requirements for a whole-house ventilation system.

M1507.3.6.1 Outdoor air. Supply fan ventilation systems shall distribute outdoor air to each habitable space through the forced-air system ducts or through dedicated ducts to each habitable space. Supply fans shall have the capacity to provide the amount of outdoor air specified in Table M1507.3.3(1) at 0.40 inches water gauge as per HVI 916. The outdoor air must be filtered before it is delivered to habitable spaces. The filter may be located at the intake device, in line with the fan, or, in the case of a connection to the return plenum of the air handler, using the furnace filter. An outdoor air inlet shall be connected to either the supply or return air stream.

M1507.3.6.2 Ducts. An outdoor air inlet duct connection to the supply air stream shall be located downstream of the forced-air system blower. An outdoor air inlet duct connection to the return air stream shall be located at least 4 feet upstream of the forced-air system blower and its filter. Neither type of duct shall be connected directly into a furnace cabinet to prevent thermal shock to the heat exchanger. The outdoor air inlet duct shall be prescriptively sized in accordance with Table M1507.3.6.2. The terminal element on the outside of the building shall be sized 2 inches in diameter larger than the outdoor air inlet duct.

**Table M1507.3.6.2
Prescriptive Supply Fan Duct Sizing**

Supply Fan Tested cfm at 0.40" wg		
Specified Volume from Table 1507.3.3(1)	Minimum Smooth Duct Diameter	Minimum Flexible Duct Diameter
50 - 90 cfm	4 inch	5 inch
90 - 150 cfm	5 inch	6 inch
150 - 250 cfm	6 inch	7 inch
250 - 400 cfm	7 inch	8 inch

M1507.3.6.3 Dampers. The system shall be equipped with a back-draft damper and one of the following:

1. A calibrated manual volume damper installed and set to meet the measured flow rates specified in Table M1507.3.3(1) by field testing with a pressure gauge and/or following manufacturer's installation instructions; or
2. A manual volume damper installed and set to meet the measured flow rates specified in Table M1507.3.3(1) by field testing with a flow hood or a flow measuring station; or
3. An automatic flow-regulating device sized to the specified flow rates in Table M1507.3.3(1) which provides constant flow over a pressure range of 0.20 to 0.60 inches water gauge.

M1507.3.6.4 Ventilation duct insulation. All supply ducts in the conditioned space shall be insulated to a minimum of R-4.

M1507.3.6.5 Outdoor air inlets. Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1507.3.7 Whole-house ventilation using a heat recovery ventilation system. This section establishes minimum prescriptive requirements for whole-house ventilation using a heat recovery ventilation system.

M1507.3.7.1 Heat recovery ventilation systems. All duct work in heat recovery systems shall be sized and installed per the manufacturer's instructions. System minimum flow rating shall be not less than that specified in Table M1507.3.3 (1). Heat recovery ventilation systems shall have a filter on the upstream side of the heat exchanger in both the intake and exhaust airstreams with a minimum efficiency rating value (MERV) of 6.

M1507.3.7.2 Ventilation duct insulation. All supply ducts in the conditioned space installed upstream of the heat exchanger shall be insulated to a minimum of R-4.

M1507.3.7.3 Outdoor air inlets. Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1507.4 Local exhaust. Local exhaust shall be provided in each kitchen, bathroom, water closet, laundry room, indoor swimming pool, spa, and other rooms where water vapor or cooking odor is produced. Local exhaust systems shall be designed to have the capacity to exhaust the minimum air flow rate determined in accordance with Table M1507.4.

**Table M1507.4
Minimum Required Local Exhaust Rates
For One- and Two-Family Dwellings**

Area to Be Exhausted	Exhaust Rates
Kitchens	100 cfm intermittent or 25 cfm continuous
Bathrooms - Toilet rooms Laundry rooms, indoor swimming pools, and spas	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

For SI: 1 cubic foot per minute = 0.0004719 m³/s.

M1507.4.1 Local exhaust fans. Exhaust fans providing local exhaust shall have a minimum fan flow rating not less than 50 cfm at 0.25 inches water gauge for bathrooms, laundries, or similar rooms and 100 cfm at 0.25 inches water gauge for kitchens. Manufacturers' fan flow ratings shall be determined as per HVI 916 (April 1995) or AMCA 210.

EXCEPTION: Where a range hood or down draft exhaust fan is used to satisfy the local exhaust requirements for kitchens, the range hood or down draft exhaust shall not be less than 100 cfm at 0.10 inches water gauge.

M1507.4.2 Local exhaust controls. Local exhaust systems shall be controlled by manual switches, dehumidistats, timers, or other approved means. Local exhaust system controls shall be readily accessible.

AMENDATORY SECTION (Amending WSR 12-07-019, filed 3/12/12, effective 4/12/12)

WAC 51-51-1508 Section M1508—(~~Whole house ventilation~~) Reserved.

~~(**M1508.1 General.** This section establishes minimum prescriptive design requirements for whole house ventilation systems. Each dwelling unit or guest room shall be equipped with a ventilation system complying with Section M1508.4, M1508.5, M1508.6 or M1508.7. Compliance is also permitted to be demonstrated through compliance with the International Mechanical Code.~~

M1508.1.1 Control and Operation:

1. ~~Location of controls. Controls for all ventilation systems shall be readily accessible by the occupant.~~

2. ~~Instructions. Operating instructions for whole house ventilation systems shall be provided to the occupant by the installer of the system.~~

3. ~~Source specific ventilation systems. Source specific ventilation systems shall be controlled by manual switches, dehumidistats, timers, or other approved means.~~

4. ~~Continuous whole house ventilation systems. Continuous whole house ventilation systems shall operate continuously. Exhaust fans, forced air system fans, or supply fans shall be equipped with "fan on" as override controls. Controls shall be capable of operating the ventilation system without energizing other energy-consuming appliances. A label shall be affixed to the controls that reads "Whole House Ventilation (see operating instructions)."~~

5. ~~Intermittent whole house ventilation systems. Intermittent whole house ventilation systems shall comply with the following:~~

5.1 ~~They shall be capable of operating intermittently and continuously.~~

5.2 ~~They shall have controls capable of operating the exhaust fans, forced air system fans, or supply fans without energizing other energy-consuming appliances.~~

5.3 ~~The ventilation rate shall be adjusted in accordance with Section M1508.3.~~

5.4 ~~The system shall be designed so that it can operate automatically based on the type of control timer installed.~~

5.5 ~~The intermittent mechanical ventilation system shall operate at least one hour out of every twelve.~~

5.6 ~~The system shall have a manual control and automatic control, such as a 24 hour clock timer.~~

5.7 ~~At the time of final inspection, the automatic control shall be set to operate the whole house fan according to the schedule used to calculate the whole house fan sizing.~~

5.8 ~~A label shall be affixed to the control that reads "Whole House Ventilation (see operating instructions)."~~

M1508.2 Continuously Operating Exhaust Ventilation Systems. Continuously operating exhaust ventilation systems shall provide the minimum flow rates specified in Table M1508.2.

**TABLE M1508.2
MINIMUM VENTILATION RATES
(Continuously operating systems)**

	Bedrooms				
	0-1	2-3	4-5	6-7	>7
<1500	30	45	60	75	90
1501-3000	45	60	75	90	105
3001-4500	60	75	90	105	120
4501-6000	75	90	105	120	135
6001-7500	90	105	120	135	150
>7500	105	120	135	150	165

M1508.3 Intermittently Operating Ventilation Systems. The delivered ventilation rate for intermittently operating ventilation systems shall be the combination of its delivered capacity from Table M1508.2, and its ventilation effectiveness and daily fractional operation time from Table M1508.3.

$$Q_t = Q_r / (\epsilon \cdot f)$$

Where:

- Q_t = Fan flow rate
- Q_r = Ventilation air requirement (from Table M1508.2)
- ε = Ventilation effectiveness (from Table M1508.3)
- f = Fractional operation time

**TABLE M1508.3
VENTILATION EFFECTIVENESS FOR INTERMITTENT FANS**

Daily Fractional Operation Time, f	Ventilation Effectiveness, ε
f ≤ 35%	0.33
35% ≤ f < 60%	0.50
60% ≤ f < 80%	0.75
80% ≤ f	1.0

For systems designed to operate at least once every three hours, ventilation effectiveness can be 1.0.

M1508.4 Whole House Ventilation Using Exhaust Fans. This section establishes minimum prescriptive requirements for whole house ventilation systems using exhaust fans. A system which meets all the requirements of this section shall be deemed to satisfy the requirements for a whole house ventilation system.

M1508.4.1 Whole House Ventilation Fans. Exhaust fans providing whole house ventilation shall have a flow rating at 0.25 inches water gauge as specified in Table M1508.2 or M1508.3, as applicable. Manufacturers' fan flow ratings shall be determined according to HVI 916 (April 1995) or AMCA 210.

M1508.4.2 Fan Noise. Whole house fans located 4 feet or less from the interior grille shall have a sone rating of 1.0 or less measured at 0.1 inches water gauge. Manufacturer's

noise ratings shall be determined as per HVI 915 (October 1995). Remotely mounted fans shall be acoustically isolated from the structural elements of the building and from attached duct work using insulated flexible duct or other approved material.

M1508.4.3 Exhaust Ducts. All exhaust ducts shall terminate outside the building. Exhaust ducts shall be equipped with back-draft dampers. All exhaust ducts in unconditioned spaces shall be insulated to a minimum of R-4.

M1508.4.4 Outdoor Air Inlets. Outdoor air shall be distributed to each habitable room by individual outdoor air inlets. Where outdoor air supplies are separated from exhaust points by doors, provisions shall be made to ensure air flow by installation of distribution ducts, undercutting doors, installation of grilles, transoms, or similar means. Doors shall be undercut to a minimum of 1/2 inch above the surface of the finish floor covering.

Individual room outdoor air inlets shall:

1. Have controllable and secure openings;
2. Be sleeved or otherwise designed so as not to compromise the thermal properties of the wall or window in which they are placed;
3. Provide not less than 4 square inches of net free area of opening for each habitable space. Any inlet or combination of inlets which provide 10 cfm at 10 Pascals as determined by the Home Ventilating Institute Air Flow Test Standard (HVI 901 November 1996) are deemed equivalent to 4 square inches net free area.

Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1508.5 Whole House Ventilation Integrated With a Forced Air System. This section establishes minimum prescriptive requirements for whole house ventilation systems integrated with forced air ventilation systems. A system which meets all the requirements of this section shall be deemed to satisfy the requirements for a whole house ventilation system.

M1508.5.1 Integrated Whole House Ventilation Systems. Integrated whole house ventilation systems shall provide outdoor air at the rate calculated using Section M1508.2 or M1508.3, as applicable. Integrated forced air ventilation systems shall distribute outdoor air to each habitable room through the forced air system ducts. Integrated forced air ventilation systems shall have an outdoor air inlet duct connecting a terminal element on the outside of the building to the return air plenum of the forced air system, at a point

within 4 feet upstream of the air handler. The outdoor air inlet duct connection to the return air stream shall be located upstream of the forced air system blower and shall not be connected directly into a furnace cabinet to prevent thermal shock to the heat exchanger. The system will be equipped with a motorized damper connected to the automatic ventilation control as specified in Section M1508.5.2. The required flow rate shall be verified by field testing with a flow hood or a flow measuring station.

M1508.5.2 Ventilation Duct Insulation. All supply ducts in the conditioned space shall be insulated to a minimum of R-4.

M1508.5.3 Outdoor Air Inlets. Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1508.6 Whole House Ventilation Using a Supply Fan. This section establishes minimum prescriptive requirements for whole house ventilation systems using an inline supply fan. A system which meets all the requirements of this section shall be deemed to satisfy the requirements for a whole house ventilation system.

M1508.6.1 Outdoor Air. Supply fan ventilation systems shall distribute outdoor air to each habitable room through the forced air system ducts or through dedicated ducts to each habitable room. Supply fans shall have the capacity to provide the amount of outdoor air specified in Table M1508.2 or M1508.3, as applicable, at 0.40 inches water gauge as per HVI 916 (April 1995). The outdoor air must be filtered before it is delivered to habitable rooms. The filter may be located at the intake device, in line with the fan, or, in the case of a connection to the return plenum of the air handler, using the furnace filter. An outdoor air inlet shall be connected to either the supply or return air stream.

M1508.6.2 Ducts. An outdoor air inlet duct connection to the supply air stream shall be located downstream of the forced air system blower. An outdoor air inlet duct connection to the return air stream shall be located at least 4 feet upstream of the forced air system blower and its filter. Neither type of duct shall be connected directly into a furnace cabinet to prevent thermal shock to the heat exchanger. The outdoor air inlet duct shall be prescriptively sized in accordance with Table M1508.6.2. The terminal element on the outside of the building shall be sized 2 inches in diameter larger than the outdoor air inlet duct.

TABLE M1508.6.2
PRESCRIPTIVE SUPPLY FAN DUCT SIZING

Supply Fan Tested cfm at 0.40" wg		
Specified Volume from Table M1508.2	Minimum Smooth Duct Diameter	Minimum Flexible Duct Diameter
50–90 cfm	4 inch	5 inch
90–150 cfm	5 inch	6 inch
150–250 cfm	6 inch	7 inch
250–400 cfm	7 inch	8 inch

M1508.6.3 Dampers. The system shall be equipped with a back-draft damper and one of the following:

1. A calibrated manual volume damper installed and set to meet the measured flow rates specified in Table M1508.3 by field testing with a pressure gauge and/or following manufacturer's installation instructions; or
2. A manual volume damper installed and set to meet the measured flow rates specified in Table M1508.3 by field testing with a flow hood or a flow measuring station; or
3. An automatic flow-regulating device sized to the specified flow rates in Table M1508.2 which provides constant flow over a pressure range of 0.20 to 0.60 inches water gauge.

M1508.6.4 Ventilation Duct Insulation. All supply ducts in the conditioned space shall be insulated to a minimum of R-4.

M1508.6.5 Outdoor Air Inlets. Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1508.7 Whole House Ventilation Using a Heat Recovery Ventilation System. This section establishes minimum prescriptive requirements for whole house ventilation using a heat recovery ventilation system.

M1508.7.1 Heat Recovery Ventilation Systems. All duct work in heat recovery systems shall be sized and installed per the manufacturer's instructions. System minimum flow rating shall be not less than that specified in Table M1508.2 or M1508.3, as applicable. Heat recovery ventilation systems shall have a filter on the upstream side of the heat exchanger in both the intake and exhaust airstreams with a minimum efficiency ratings value (MERV) of 6.

M1508.7.2 Ventilation Duct Insulation. All supply ducts in the conditioned space installed upstream of the heat exchanger shall be insulated to a minimum of R-4.

M1508.7.3 Outdoor Air Inlets. Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.)

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-1600 Chapter 16—Duct systems.

M1601.1.1 Above-ground duct systems. Above-ground duct systems shall conform to the following:

1. Equipment connected to duct systems shall be designed to limit discharge air temperature to a maximum of 250°F (121°C).

2. Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated in Table M1601.1.1(1).

3. Fibrous duct construction shall conform to the SMACNA Fibrous Glass Duct Construction Standards or NAIMA Fibrous Glass Duct Construction Standards.

4. Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2). Galvanized steel shall conform to ASTM A 653. Metallic ducts shall be fabricated in accordance with SMACNA Duct Construction Standards Metal and Flexible.

5. Use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.

6. Duct systems shall be constructed of materials having a flame spread index not greater than 200.

7. Stud wall cavities and the spaces between solid floor joists shall not be used as a duct or an air plenum in new construction. For existing systems, stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following:

7.1. These cavities or spaces shall not be used as a plenum for supply air.

7.2. These cavities or spaces shall not be part of a required fire-resistance-rated assembly.

7.3. Stud wall cavities shall not convey air from more than one floor level.

7.4. Stud wall cavities and joist-space plenums shall be isolated from adjacent concealed spaces by tight-fitting fire blocking in accordance with Section R602.8.

7.5. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-1700 Chapter 17—Combustion air.

M1701.1 Scope. Solid-fuel-burning appliances shall be provided with combustion air in accordance with the appliance manufacturer's installation instructions. Oil-fired appliances shall be provided with combustion air in accordance with NFPA 31. The methods of providing combustion air in this chapter do not apply to fireplaces, fireplace stoves and direct-vent appliances. The requirements for combustion and dilution air for gas-fired appliances shall be in accordance with Chapter 24.

Fireplaces shall comply with ~~((Section 1001))~~ Chapter 10.

AMENDATORY SECTION (Amending WSR 04-01-109, filed 12/17/03, effective 7/1/04)

WAC 51-51-2000 Chapter 20—Boilers and water heaters. ~~((Boilers and Unfired Pressure Vessels are regulated by chapter 70.79 RCW and chapter 296-104 WAC.~~

~~SECTION M2001—BOILERS, is not adopted.~~

~~SECTION M2002—OPERATING AND SAFETY CONTROLS, is not adopted.~~

~~SECTION M2003—EXPANSION TANKS, is not adopted.))~~ Informational Note: Boilers, water heaters and pressure vessels are regulated by chapter 70.79 RCW and chapter 296-104 WAC in addition to the requirements of this code.

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-4400 Chapter 44—Referenced standards.

~~((Washington State Building Code Standard 31-2 STANDARD TEST METHOD FOR PARTICULATE EMISSIONS FROM FIREPLACES~~

~~See Section R1004.1, *International Residential Code Standard is located in International Building Code, Chapter 35*))~~

NFPA 720-12 Standard for the Installation of Carbon Monoxide (CO) Detectors and Warning Equipment R316.4

AMENDATORY SECTION (Amending WSR 10-03-098, filed 1/20/10, effective 7/1/10)

WAC 51-51-60105 Appendix R—Dwelling unit fire sprinkler systems.

~~((AR105.1 General. Where installed, residential fire sprinkler systems, or portions thereof, shall be in accordance with NFPA 13D or Appendix R, which shall be considered equivalent to NFPA 13D. Appendix R shall apply to stand-alone and multipurpose wet-pipe sprinkler systems that do not include the use of antifreeze. A multipurpose fire sprinkler~~

system shall supply domestic water to both fire sprinklers and plumbing fixtures. A stand-alone sprinkler system shall be separate and independent from the water distribution system.

~~**AR105.1.1 Required sprinkler locations.** Sprinklers shall be installed to protect all areas of a dwelling unit.~~

- EXCEPTIONS:
1. Attics, crawl spaces and normally unoccupied concealed spaces that do not contain fuel-fired appliances do not require sprinklers. In attics, crawl spaces and normally unoccupied concealed spaces that contain fuel-fired equipment, a sprinkler shall be installed above the equipment; however, sprinklers shall not be required in the remainder of the space.
 2. Clothes closets, linen closets and pantries not exceeding 24 square feet (2.2 m²) in area, with the smallest dimension not greater than 3 feet (915 mm) and having wall and ceiling surfaces of gypsum board.
 3. Bathrooms not more than 55 square feet (5.1 m²) in area.
 4. Garages; carports; exterior porches; unheated entry areas, such as mud rooms, that are adjacent to an exterior door; and similar areas.

~~**AR105.2 Sprinklers.** Sprinklers shall be new listed residential sprinklers and shall be installed in accordance with the sprinkler manufacturer's installation instructions.~~

~~**AR105.2.1 Temperature rating and separation from heat sources.** Except as provided for in Section AR105.2.2, sprinklers shall have a temperature rating of not less than 135°F (57°C) and not more than 170°F (77°C). Sprinklers shall be separated from heat sources as required by the sprinkler manufacturer's installation instructions.~~

~~**AR105.2.2 Intermediate temperature sprinklers.** Sprinklers shall have an intermediate temperature rating not less than 175°F (79°C) and not more than 225°F (107°C) where installed in the following locations:~~

1. Directly under skylights, where the sprinkler is exposed to direct sunlight.
2. In attics.
3. In concealed spaces located directly beneath a roof.
4. Within the distance to a heat source as specified in Table AR105.2.2.

~~**AR105.2.3 Freezing areas.** Piping shall be protected from freezing. Where sprinklers are required in areas that are subject to freezing, dry side wall or dry pendent sprinklers extending from a nonfreezing area into a freezing area shall be installed.~~

TABLE AR105.2.2 LOCATIONS WHERE INTERMEDIATE TEMPERATURE SPRINKLERS ARE REQUIRED

HEAT SOURCE	RANGE OF DISTANCE FROM HEAT SOURCE WITHIN WHICH INTERMEDIATE TEMPERATURE SPRINKLERS ARE REQUIRED ^{a,b} (inches)
Fireplace, side of open or recessed fireplace	12 to 36
Fireplace, front of recessed fireplace	36 to 60
Coal and wood burning stove	12 to 42
Kitchen range top	9 to 18

HEAT SOURCE	RANGE OF DISTANCE FROM HEAT SOURCE WITHIN WHICH INTERMEDIATE TEMPERATURE SPRINKLERS ARE REQUIRED ^{a,b} (inches)
Oven	9 to 18
Vent connector or chimney connector	9 to 18
Heating duct, not insulated	9 to 18
Hot water pipe, not insulated	6 to 12
Side of ceiling or wall warm-air register	12 to 24
Front of wall mounted warm-air register	18 to 36
Water heater, furnace or boiler	3 to 6
Luminaire up to 250 watts	3 to 6
Luminaire 250 watts up to 499 watts	6 to 12

For IS: 1 inch = 25.4 mm.

a. Sprinklers shall not be located at distances less than the minimum table distance unless the sprinkler listing allows a lesser distance.

b. Distances shall be measured in a straight line from the nearest edge of the heat source to the nearest edge of the sprinkler.

AR105.2.4 Sprinkler coverage. Sprinkler coverage requirements and sprinkler obstruction requirements shall be in accordance with Sections AR105.2.4.1 and AR105.2.4.2.

AR105.2.4.1 Coverage area limit. The area of coverage of a single sprinkler shall not exceed 400 square feet (37 m²) and shall be based on the sprinkler listing and the sprinkler manufacturer's installation instructions.

AR105.2.4.2 Obstructions to coverage. Sprinkler discharge shall not be blocked by obstructions unless additional sprinklers are installed to protect the obstructed area. Sprinkler separation from obstructions shall comply with the minimum distances specified in the sprinkler manufacturer's instructions.

AR105.2.4.2.1 Additional requirements for pendent sprinklers. Pendent sprinklers within 3 feet (915 mm) of the center of a ceiling fan, surface-mounted ceiling luminaire or similar object shall be considered to be obstructed, and additional sprinklers shall be installed.

AR105.2.4.2.2 Additional requirements for sidewall sprinklers. Sidewall sprinklers within 5 feet (1524 mm) of the center of a ceiling fan, surface-mounted ceiling luminaire or similar object shall be considered to be obstructed, and additional sprinklers shall be installed.

AR105.2.5 Sprinkler installation on systems assembled with solvent cement. The solvent cementing of threaded adapter fittings shall be completed and threaded adapters for sprinklers shall be verified as being clear of excess cement prior to the installation of sprinklers on systems assembled with solvent cement.

AR105.2.6 Sprinkler modifications prohibited. Painting, caulking or modifying of sprinklers shall be prohibited. Sprinklers that have been painted, caulked, modified or damaged shall be replaced with new sprinklers.

AR105.3 Sprinkler piping system. Sprinkler piping shall be supported in accordance with the requirements for cold water distribution piping. Sprinkler piping shall comply with all requirements for cold water distribution piping. For multi-purpose piping systems, the sprinkler piping shall connect to and be a part of the cold water distribution piping system.

AR105.3.1 Nonmetallic pipe and tubing. Nonmetallic pipe and tubing, such as CPVC and PEX, shall be listed for use in residential fire sprinkler systems.

AR105.3.1.1 Nonmetallic pipe protection. Nonmetallic pipe and tubing systems shall be protected from exposure to the living space by a layer of not less than 3/8-inch (9.5 mm) thick gypsum wallboard, 1/2-inch thick plywood (13 mm), or other material having a 15-minute fire rating.

- EXCEPTIONS:
1. Pipe protection shall not be required in areas that do not require protection with sprinklers as specified in Section AR105.1.1.
 2. Pipe protection shall not be required where exposed piping is permitted by the pipe listing.

AR105.3.2 Shutoff valves prohibited. With the exception of shutoff valves for the entire water distribution system, valves shall not be installed in any location where the valve would isolate piping serving one or more sprinklers.

AR105.3.3 Single dwelling limit. Piping beyond the service valve located at the beginning of the water distribution system shall not serve more than one dwelling.

AR105.3.4 Drain. A means to drain the sprinkler system shall be provided on the system side of the water distribution shutoff valve.

AR105.4 Determining system design flow. The flow for sizing the sprinkler piping system shall be based on the flow rating of each sprinkler in accordance with Section AR105.4.1 and the calculation in accordance with Section AR105.4.2.

AR105.4.1 Determining required flow rate for each sprinkler. The minimum required flow for each sprinkler shall be determined using the sprinkler manufacturer's published data for the specific sprinkler model based on all of the following:

1. The area of coverage.
2. The ceiling configuration.
3. The temperature rating.
4. Any additional conditions specified by the sprinkler manufacturer.

AR105.4.2 System design flow rate. The design flow rate for the system shall be based on the following:

1. The design flow rate for a room having only one sprinkler shall be the flow rate required for that sprinkler, as determined by Section AR105.4.1.
2. The design flow rate for a room having two or more sprinklers shall be determined by identifying the sprinkler in that room with the highest required flow rate, based on Section AR105.4.1, and multiplying that flow rate by 2.
3. Where the sprinkler manufacturer specifies different criteria for ceiling configurations that are not smooth, flat and horizontal, the required flow rate for that room shall comply with the sprinkler manufacturer's instructions.

4. The design flow rate for the sprinkler system shall be the flow required by the room with the largest flow rate, based on Items 1, 2 and 3.

5. For the purpose of this section, it shall be permissible to reduce the design flow rate for a room by subdividing the space into two or more rooms, where each room is evaluated separately with respect to the required design flow rate. Each room shall be bounded by walls and a ceiling. Openings in walls shall have a lintel not less than 8 inches (203 mm) in depth and each lintel shall form a solid barrier between the ceiling and the top of the opening.

AR105.5 Water supply. The water supply shall provide not less than the required design flow rate for sprinklers in accordance with Section AR105.4.2 at a pressure not less than that used to comply with Section AR105.6.

AR105.5.1 Water supply from individual sources. Where a dwelling unit water supply is from a tank system, a private well system or a combination of these, the available water supply shall be based on the minimum pressure control setting for the pump.

AR105.5.2 Required capacity. The water supply shall have the capacity to provide the required design flow rate for sprinklers for a period of time as follows:

1. 7 minutes for dwelling units one story in height and less than 2,000 square feet (186 m²) in area.
2. 10 minutes for dwelling units two or more stories in height or equal to or greater than 2,000 square feet (186 m²) in area.

Where a well system, a water supply tank system or a combination thereof is used, any combination of well capacity and tank storage shall be permitted to meet the capacity requirement.

AR105.6 Pipe sizing. The piping to sprinklers shall be sized for the flow required by Section AR105.4.2. The flow required to supply the plumbing fixtures shall not be required to be added to the sprinkler design flow.

AR105.6.1 Method of sizing pipe. Piping supplying sprinklers shall be sized using the prescriptive method in Section AR105.6.2 or by hydraulic calculation in accordance with NFPA 13D. The minimum pipe size from the water supply source to any sprinkler shall be 3/4 inch (19 mm) nominal. Threaded adapter fittings at the point where sprinklers are attached to the piping shall be a minimum of 1/2 inch (13 mm) nominal.

AR105.6.2 Prescriptive pipe sizing method. Pipe shall be sized by determining the available pressure to offset friction loss in piping and identifying a piping material, diameter and length using the equation in Section AR105.6.2.1 and the procedure in Section AR105.6.2.2.

AR105.6.2.1 Available pressure equation. The pressure available to offset friction loss in the interior piping system (P_t) shall be determined in accordance with Equation AR-1.

$$P_t = P_{sup} - PL_{svc} - PL_m - PL_d - PL_e - P_{sp}$$

(Equation AR-1)

Where:

- P_t = Pressure used in applying Tables AR105.6.2(4) through AR105.6.2(9).
- P_{sup} = Pressure available from the water supply source.
- PL_{svc} = Pressure loss in the water service pipe.
- PL_m = Pressure loss in the water meter.
- PL_d = Pressure loss from devices other than the water meter.
- PL_e = Pressure loss associated with changes in elevation.
- P_{sp} = Maximum pressure required by a sprinkler.

AR105.6.2.2 Calculation procedure. Determination of the required size for water distribution piping shall be in accordance with the following procedure:

Step 1—Determine P_{sup}

Obtain the static supply pressure that will be available from the water main from the water purveyor, or for an individual source, the available supply pressure shall be in accordance with Section AR105.5.1.

Step 2—Determine PL_{svc}

Use Table P2904.6.2(1) to determine the pressure loss in the water service pipe based on the selected size of the water service.

Step 3—Determine PL_m

Use Table P2904.6.2(2) to determine the pressure loss from the water meter, based on the selected water meter size.

Step 4—Determine PL_d

Determine the pressure loss from devices other than the water meter installed in the piping system supplying sprinklers, such as pressure reducing valves, backflow preventers, water softeners or water filters. Device pressure losses shall be based on the device manufacturer's specifications. The flow rate used to determine pressure loss shall be the rate from Section AR105.4.2, except that 5 gpm (0.3 L/S) shall be added where the device is installed in a water service pipe that supplies more than one dwelling. As alternative to deducting pressure loss for a device, an automatic bypass valve shall be installed to divert flow around the device when a sprinkler activates.

Step 5—Determine PL_e

Use Table P2904.6.2(3) to determine the pressure loss associated with changes in elevation. The elevation used in applying the table shall be the difference between the elevation where the water source pressure was measured and the elevation of the highest sprinkler.

Step 6—Determine P_{sp}

Determine the maximum pressure required by any individual sprinkler based on the flow rate from Section AR105.4.1. The required pressure is provided in the sprinkler manufacturer's published data for the specific sprinkler model based on the selected flow rate.

Step 7—Calculate P_i

Using Equation AR-1, calculate the pressure available to offset friction loss in water distribution piping between the service valve and the sprinklers.

Step 8—Determine the maximum allowable pipe length

Use Tables P2904.6.2(4) through P2904.6.2(9) to select a material and size for water distribution piping. The piping material and size shall be acceptable if the developed length of pipe between the service valve and the most remote sprinkler does not exceed the maximum allowable length specified by the applicable table. Interpolation of P_i between the tabular values shall be permitted.

The maximum allowable length of piping in Tables P2904.6.2(4) through P2904.6.2(9) incorporates an adjustment for pipe fittings, and no additional consideration of friction losses associated with pipe fittings shall be required.

AR105.7 Instructions and signs. An owner's manual for the fire sprinkler system shall be provided to the owner. A sign or valve tag shall be installed at the main shutoff valve to the water distribution system stating the following: "Warning, the water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shutoff the water to the fire sprinkler system, such as water softeners, filtration systems and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign."

AR105.8 Inspections. The water distribution system shall be inspected in accordance with Sections AR105.8.1 and AR105.8.2.

AR105.8.1 Preconcealment Inspection. The following items shall be verified prior to the concealment of any sprinkler system piping:

1. Sprinklers are installed in all areas as required by Section AR105.1.1.
2. Where sprinkler water spray patterns are obstructed by construction features, luminaires or ceiling fans, additional sprinklers are installed as required by Section AR105.2.4.2.
3. Sprinklers are the correct temperature rating and are installed at or beyond the required separation distances from heat sources as required by Sections AR105.2.1 and AR105.2.2.
4. The pipe size equals or exceeds the size used in applying Tables P2904.6.2(4) through P2904.6.2(9) or, if the piping system was hydraulically calculated in accordance with Section AR105.6.1, the size used in the hydraulic calculation.
5. The pipe length does not exceed the length permitted by Tables AR105.6.2(4) through AR105.6.2(9) or, if the piping system was hydraulically calculated in accordance with Section AR105.6.1, pipe lengths and fittings do not exceed those used in the hydraulic calculation.
6. Nonmetallic piping that conveys water to sprinklers is listed for use with fire sprinklers.
7. Piping is supported in accordance with the pipe manufacturer's and sprinkler manufacturer's installation instructions.

8. The piping system is tested in accordance with the plumbing code.

AR105.8.2 Final inspection. The following items shall be verified upon completion of the system:

1. Sprinklers are not painted, damaged or otherwise hindered from operation.
2. Where a pump is required to provide water to the system, the pump starts automatically upon system water demand.
3. Pressure-reducing valves, water softeners, water filters or other impairments to water flow that were not part of the original design have not been installed.
4. The sign or valve tag required by Section AR105.7 is installed and the owner's manual for the system is present.)
(The design and installation of residential fire sprinkler systems shall be in accordance with the 2012 International Residential Code Section P2904 Dwelling Unit Fire Sprinkler Systems.)

WSR 13-04-073**PERMANENT RULES****DEPARTMENT OF****LABOR AND INDUSTRIES**

[Filed February 4, 2013, 10:44 a.m., effective April 1, 2013]

Effective Date of Rule: April 1, 2013.

Purpose: In 2007, the division of occupational safety and health (DOSH) began working with a fall protection stakeholder group to consolidate the fall protection requirements located in chapter 296-155 WAC, Safety standards for construction work, into one coherent set of requirements. DOSH is merging Parts C-1 and K, creating one location where fall protection requirements are located for construction. In addition, we asked the stakeholder group to help identify any technical changes needed due to industry developments and to ensure that any gap in current fall protection requirements would be addressed and rectified by this rule update. Throughout the process, clear and concise language in the rule was a focal point.

Citation of Existing Rules Affected by this Order:

NEW SECTIONS:**WAC 296-155-24601 Scope and application.**

- This section was moved from the previous WAC 296-155-24501 and rewritten to cover any activities performed under chapter 296-155 WAC requiring fall protection.

WAC 296-155-24603 Definitions.

- This section was moved from the previous WAC 296-155-24503 and 296-155-500. Definitions that are not used in the adopted language were removed; new definitions were added to clarify new language. The following definitions were added: Affected area, catch platform, equivalent, fall distance, floor hole, floor opening, handrail, hazardous slope, personal fall arrest system, personal fall restraint system, platform, qualified person, runway, safety net

system, safety watch system, self-rescue device, standard guardrail system, standard strength and construction, toeboard, and wall opening.

- The following definitions were removed: Approved, body belt, continuous fall protection, control zone, failure, positioning belt, roll out, strength member, and work area.

WAC 296-155-24605 General requirements.

- This section contains requirements previously located in WAC 296-155-505, to include clarifying language that all walking/working surfaces upon which employees work are to be structurally sound.
- This section contains inspection criteria previously located in WAC 296-155-24510 relating to all components of personal fall arrest systems, personal fall restraint systems, positioning device systems, and safety nets.
- This section contains new exemption language relating to when employees would be exempt from WAC 296-155-24609 and 296-155-24611.

WAC 296-155-24607 Fall protection required regardless of height.

- This section contains requirements previously located in WAC 296-155-505 relating to regardless of height, open sided floors, walkways, platforms or runways must be guarded with a standard guardrail system.
- Language was amended to "standard guardrail system" throughout the proposal for consistency.
- Added language previously located in WAC 296-155-680 relating to impalement hazards.

WAC 296-155-24609 Fall protection required at four feet or more.

- This section contains requirements previously located in WAC 296-155-505 relating to requiring fall protection at four feet or more and also addresses guardrails, handrails, and covers. These requirements parallel the requirements previously located in WAC 296-155-24510.
- Language added relating to hazardous slopes changing from six feet to four feet.
- Language throughout this section was rewritten to clarify and combine existing standards.
- Language was rewritten to clarify the relationship between walking/working surfaces and unprotected sides and edges.
- New language clarifying the requirements relating to using stilts behind guardrails was added.
- A list of options for how to provide fall protection at four feet has been placed in this section.
- New language has been added to explain the requirements of fall protection at four feet.
- Language relating to roofing work has been rewritten to correct an error in the current WAC. This section clarifies that a roof is a walking/working surface and as such, fall protection starts at four feet.

WAC 296-155-24611 Fall protection required at ten feet or more.

- This section contains requirements previously located in WAC 296-155-24505 Fall protection work plan and 296-155-24510 Appropriate fall protection systems. This language was rewritten for clarity and updated to provide consistency with the Occupational Safety and Health Administration (OSHA).
- Language from WISHA Regional Directive (WRD) 30.25 relating to fall protection during excavation and trenching operations was incorporated into this section.

WAC 296-155-24613 Fall arrest specifications.

- This section contains requirements previously located in WAC 296-155-24510 relating to fall arrest specifications. This language was rewritten for clarity.

WAC 296-155-24615 Fall restraint specifications.

- This section contains requirements previously located in WAC 296-155-24510 relating to fall restraint. This language was rewritten for clarity.
- Removed the language relating to body belts since they are no longer allowed as an option for fall restraint. To further clarify, the term "full body harness" is now being used throughout the rule.
- The section contains requirements previously located in WAC 296-155-505 relating to guardrails.
- This section contains requirements previously located in WAC 296-155-24510, 296-155-24513, and 296-155-24520 relating to warning lines. This language was rewritten for clarity. Language from WRD 29.50 relating to warning lines used for fall protection in construction was incorporated into this section.
- This section contains requirements previously located in WAC 296-155-24515 relating to access paths. This language was rewritten for clarity.
- This section contains requirements previously located in WAC 296-155-24521 relating to a safety monitor system. This language was rewritten for clarity.
- This section contains requirements previously located in WAC 296-155-505 relating to toeboards.
- Specifications governing safety watch systems have been put into this section. Since using a safety watch system is an option, not a requirement for employers, this is not considered as an increase in requirements.

WAC 296-155-24617 Positioning device system specifications.

- This section contains requirements previously located in WAC 296-155-24510 relating to positioning device systems. This language was rewritten for clarity to provide consistency with other requirements in this proposal and with American National Standards Institute (ANSI) 357.3, 2007.

WAC 296-155-24619 Other specifications.

- This section contains miscellaneous requirements previously located in chapter 296-155 WAC, Parts C-1 and K. This language was rewritten for clarity.
- Added language making it clear that crawling boards and chicken ladders are not considered a fall protection system.
- Language has been added to this section outlining the specifications using a self rescue device system.

WAC 296-155-24621 Training.

- This section contains requirements previously located in WAC 296-155-24505 relating to training. This language was rewritten for clarity.

WAC 296-155-24623 Appendix A—Determining roof widths—Nonmandatory guidelines for complying with WAC 296-155-24615.

- This section contains information previously located in WAC 296-155-24523. This language was updated with housekeeping changes.

WAC 296-155-24624 Appendix B—Calculating fall clearance distance using a shock-absorbing lanyard and D-ring anchorage connector—Nonmandatory guidelines for complying with WAC 296-155-24613 (1)(d).

- This section was created to assist employers in calculating fall clearance distances.

AMENDED SECTIONS: WAC 296-36-170 Stairs and ladders, 296-45-25510 Fall protection, 296-155-477 Stairways, 296-155-655 General protection requirements, 296-155-682 Requirements for equipment and tools, 296-155-706 Structural steel assembly, 296-155-716 Fall protection, 296-155-740 Cofferdams, 296-155-745 Compressed air, 296-874-20008 Make sure platforms are properly planked or decked, 296-874-20030 Make sure ramps and walkways used to access scaffolds meet these requirements, 296-874-20052 Provide fall protection for employees on scaffolds, 296-874-20058 Make sure personal fall arrest systems meet these requirements, 296-874-40020 Meet these requirements when using integral prefabricated scaffold access frames and 296-874-40034 Meet these requirements when using repair bracket scaffolds, updated references.

REPEALED SECTIONS: WAC 296-155-245 Reserve, 296-155-24501 Scope and application, 296-155-24503 Definitions, 296-155-24505 Fall protection work plan, 296-155-24507 Reserve, 296-155-24510 Fall restraint, fall arrest systems, 296-155-24515 Guarding of low pitched roof perimeters, 296-155-24519 Reserve, 296-155-24520 Leading edge control zone, 296-155-24521 Safety monitor system, 296-155-24522 Reserve, 296-155-24523 Appendix A to Part C-1—Determining roof widths nonmandatory guidelines for complying with WAC 296-155-24515 (2)(b), 296-155-24524 Reserve, 296-155-24525 Appendix B to Part C-1—Fall restraint and fall arrest (employer information only), 296-155-500 Definitions applicable to this part, 296-155-505 Guardrails, handrails and covers, 296-155-50503 Roofing brackets, 296-155-50505 Reserved, 296-155-510 Reserved, and 296-155-515 Ramps, runways, and inclined walkways.

The requirements in these sections have been moved to WAC 296-155-24601 through 296-155-24624.

Statutory Authority for Adoption: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060.

Other Authority: 29 C.F.R. 1926, Subpart M, Fall Protection.

Adopted under notice filed as WSR 12-17-118 on August 21, 2012.

Changes Other than Editing from Proposed to Adopted Version: As a result of written and oral comments received, the following sections are being changed as indicated below:

CHANGES TO THE RULES (Proposed rule versus rule actually adopted):

WAC 296-155-24603 Definitions.

- Added the word "surface" into the definitions of "floor holes" and "floor openings" to be at-least-as-effective-as OSHA. They now read, "Floor hole means an opening measuring less than twelve inches but more than one inch in its least dimension in any floor, roof, platform, or surface through which materials but not persons may fall, such as a belt hole, pipe opening, or slot opening." "Floor opening means an opening measuring twelve inches or more in its least dimension in any floor, roof, platform, or surface through which persons may fall."
- Added a definition for "positioning harness/belt" to match what is required by a National Consensus Standard and based on comment that reads, "Positioning harness/belt means a body support that meets the requirements specified in ANSI Z359.3-2007 that encircles and closes around the waist and legs with attachment elements appropriate for positioning work."
- Added a sentence at the end of the definition "walking/working surface," based on comment. It now reads, "Walking/working surface means any area including, but not limited to, floors, a roof surface, bridge, the ground, and any other surfaces whose dimensions are forty-five inches or more in all directions, through which workers can pass or conduct work. A walking/working surface does not include vehicles or rolling stock on which employees must be located in order to perform their job duties."

WAC 296-155-24607 Fall protection required regardless of height.

- Subsection (1): Replaced the words "rock crushing equipment" with "dip tanks," based on comment. It now reads, "Regardless of height, open sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment, such as dip tanks and material handling equipment, and similar hazards shall be guarded with a standard guardrail system."
- Added a new subsection (2) relating to the guarding of floor holes or floor openings, based on comment. This was moved from WAC 296-155-24609. It reads, "(2) Floor holes or floor openings, into which persons can accidentally walk, shall be guarded by either a standard railing with standard toe board on

all exposed sides, or a cover of standard strength and construction that is secured against accidental displacement. While the cover is not in place, the floor hole opening shall be protected by a standard railing." This language is almost identical to what was previously in WAC.

- Added a note for clarity, it reads, "Note: Requirements for when guarding floor openings at heights of four feet or more are located in WAC 296-155-24609(4)."
- Renumbered subsection (2) to (3).

WAC 296-155-24609 Fall protection required at four feet or more.

- Moved subsection (4) to WAC 296-155-24607 based on comment and renumbered the rest of this section.

WAC 296-155-24611 Fall protection required at ten feet or more.

- Subsection (1)(b): Removed the words "on low pitched surfaces," it now reads, "Constructing a leading edge";. This language was inadvertently left in the proposed rule.

WAC 296-155-24613 Fall arrest specifications.

- Subsection (1)(l): Added the words "or equivalent" and "rope" to be consistent with chapter 296-59 WAC, Safety standards for ski area facilities and operations. It now reads, "Droplines or lifelines used on rock scaling operations, or in areas where the lifeline may be subjected to cutting or abrasion, shall be a minimum of seven-eighths inch wire core manila rope or equivalent. For all other lifeline applications, a minimum of three-fourths inch manila rope or equivalent, with a minimum breaking strength of five thousand pounds, shall be used."

A final cost-benefit analysis is available by contacting Cindy Ireland, P.O. Box 44620, Olympia, WA 98504-4620, phone (360) 902-5522, fax (360) 902-5619, e-mail cynthia.ireland@lni.wa.gov.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 13, Amended 15, Repealed 20; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 13, Amended 15, Repealed 20.

Number of Sections Adopted on the Agency's Own Initiative: New 13, Amended 15, Repealed 20.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 13, Amended 15, Repealed 20.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 0, Repealed 0.

Date Adopted: February 4, 2013.

Joel Sacks
Director

AMENDATORY SECTION (Amending Order 90-10, filed 8/13/90, effective 9/24/90)

WAC 296-36-170 Stairs and ladders. The requirements of chapter 296-155 WAC Parts ((~~K~~) C-1 and J shall apply.

AMENDATORY SECTION (Amending WSR 12-01-086, filed 12/20/11, effective 2/1/12)

WAC 296-45-25510 Fall protection. (1) Personal fall arrest equipment shall meet the requirements of chapter 296-155 WAC ((296-155-245)), Part C-1, Fall protection requirements for construction.

(2) Specific requirements for lineman's belts, safety straps and lanyards.

(a) All fabric used for safety straps must withstand an A.C. dielectric test of not less than 25,000 volts per foot "dry" for 3 minutes, without visible deterioration.

(b) All fabric and leather used must be tested for leakage current and must not exceed 1 milliamperes when a potential of 3,000 volts is applied to the electrodes positioned 12 inches apart.

(c) Direct current tests may be permitted in lieu of alternating current tests.

(d) The cushion part of the body belt must:

(i) Contain no exposed rivets on the inside;

(ii) Be at least three (3) inches in width;

(iii) Be at least five thirty-seconds (5/32) inch thick, if made of leather; and

(iv) Have pocket tabs that extended at least 1 1/2 inches down and three (3) inches back of the inside of circle of each D ring for riveting on plier or tool pockets. On shifting D belts, this measurement for pocket tabs must be taken when the D ring section is centered.

(e) A maximum of four (4) tool loops must be so situated on the body belt that four (4) inches of the body belt in the center of the back, measuring from D ring to D ring, must be free of tool loops, and any other attachments.

(f) Suitable copper, steel, or equivalent liners must be used around bar of D rings to prevent wear between these members and the leather or fabric enclosing them.

(g) All stitching must be of a minimum 42-pound weight nylon or equivalent thread and must be lock stitched. Stitching parallel to an edge must not be less than three-sixteenths (3/16) inch from edge of narrowest member caught by the thread. The use of cross stitching on leather is prohibited.

(h) The keeper of snaphooks must have a spring tension that will not allow the keeper to begin to open with a weight of 2 1/2 pounds or less, but the keeper of snaphooks must begin to open with a weight of four (4) pounds, when the weight is supported on the keeper against the end of the nose.

(i) Testing of lineman's safety straps, body belts and lanyards must be in accordance with the following procedure:

(i) Attach one end of the safety strap or lanyard to a rigid support, the other end must be attached to a 250-pound canvas bag of sand;

(ii) Allow the 250-pound canvas bag of sand to free fall 4 feet for (safety strap test) and 6 feet for (lanyard test); in each case stopping the fall of the 250-pound bag;

(iii) Failure of the strap or lanyard must be indicated by any breakage, or slippage sufficient to permit the bag to fall free of the strap or lanyard. The entire "body belt assembly" must be tested using one D ring. A safety strap or lanyard must be used that is capable of passing the "impact loading test" and attached as required in (i)(i) of this subsection. The body belt must be secured to the 250-pound bag of sand at a point to simulate the waist of a man and allowed to drop as stated in (i)(ii) of this subsection. Failure of the body belt must be indicated by any breakage, or slippage sufficient to permit the bag to fall free of the body belt.

(3) Body belts, safety straps, lanyards, lifelines, and body harnesses shall be inspected before use each day to determine that the equipment is in safe working condition. Defective equipment may not be used.

(4) Employees shall not wear climbers while doing work where they are not required. Employees shall not continue to wear their climbers while working on the ground; except for momentary or short periods of time on the ground.

(5) Employees, when working from a hook ladder, must either belt themselves securely to the ladder, attach themselves to the structures by means of a safety line, or belt themselves to ladder safety equipment, which shall consist of a safety rope or belting threaded through the rungs or secured to the ladder at intervals of not more than three feet.

(6) Before an employee throws his/her weight on a belt, the employee shall determine that the snap or fasteners are properly engaged.

(7) Safety straps shall not be placed around poles above the cross-arm except where it is not possible for the strap to slide or be slipped over the top of the pole by inadvertence of the employee. Neither end of the strap shall be allowed to hang loose or dangle while the employee is ascending or descending poles or other structures.

(8) Body belts and safety straps shall not be stored with sharp-edged tools or near sharp objects. When a body belt, safety strap and climbers are kept in the same container, they shall be stored in such a manner as to avoid cutting or puncturing the material of the body belt or safety strap with the gaffs or climbers.

(9) Employees shall not attach metal hooks or other metal devices to body belts. Leather straps or rawhide thongs shall have hardwood or fibre crossbars. Leather straps and rawhide thongs shall not have metal or other conductive crossbars on them.

(10) Climbing gaffs shall be kept properly sharpened and shall be at least 1-1/8 inches in length.

(11) Lifelines shall be protected against being cut or abraded.

(12) Fall arrest equipment, work positioning equipment, or travel restricting equipment shall be used by employees working at elevated locations more than 4 feet (1.2 m) above the ground on poles, towers, or similar structures if other fall protection has not been provided. Fall protection equipment is not required to be used by a qualified employee climbing or changing location on poles, towers, or similar structures, unless conditions, such as, but not limited to, ice, high winds, the design of the structure (for example, no provision for holding on with hands), or the presence of contaminants on

the structure, could cause the employee to lose his or her grip or footing.

Note 1: This subsection applies to structures that support overhead electric power generation, transmission, and distribution lines and equipment. It does not apply to portions of buildings, such as loading docks, to electric equipment, such as transformers and capacitors, nor to aerial lifts. Requirements for fall protection associated with walking and working surfaces are contained in chapter 296-155 WAC ((296-155-245-)), Part C-1, Fall protection requirements for construction requirements for fall protection associated with aerial lifts are contained in chapter 296-869 WAC, Elevating work platforms.

Note 2: Employees undergoing training are not considered "qualified employees" for the purposes of this provision. Unqualified employees (including trainees) are required to use fall protection any time they are more than 4 feet (1.2 m) above the ground.

(13) The following requirements apply to personal fall arrest systems:

(a) When stopping or arresting a fall, personal fall arrest systems shall limit the maximum arresting force on an employee to 1800 pounds (8 kN) if used with a body harness.

(b) Personal fall arrest systems shall be rigged such that an employee can neither free fall more than 6 feet (1.8 m) nor contact any lower level.

(14) If vertical lifelines or droplines are used, not more than one employee may be attached to any one lifeline.

(15) Snaphooks may not be connected to loops made in webbing-type lanyards.

(16) Snaphooks may not be connected to each other.

NEW SECTION

WAC 296-155-24601 Scope and application. Chapter 296-155 WAC, Part C-1 sets forth requirements for employers to provide and enforce the use of fall protection for employees performing activities covered under this chapter.

Note: Additional standards requiring fall protection include:

- Chapter 296-869 WAC, vehicle mounted aerial platforms, and boom supported elevating work platforms.
- Chapter 296-874 WAC, Scaffolds.
- Chapter 296-876 WAC, Ladders, portable and fixed.
- Chapter 296-155 WAC, Part J: Stairways; Part L: Cranes, rigging, and personnel lifting; Part M: Pile driving; Part O: Placing and removal of forms, and vertical slip forms; Part P: Steel erection temporary floors.

NEW SECTION

WAC 296-155-24603 Definitions. Affected area means the distance away from the edge of an excavation equal to the depth of the excavation up to a maximum distance of fifteen feet. For example, an excavation ten feet deep has an affected area extending ten feet from the edge of any side of the excavation.

Anchorage means a secure point of attachment for lifelines, lanyards, or deceleration devices which is capable of withstanding the forces specified in this part.

Catch platform means a type of fall arrest system that consists of a platform installed within four vertical feet of the fall hazard, is at least forty-five inches wide and is equipped with a standard guardrail system on all exposed sides.

Catenary line - See horizontal lifeline.

Competent person means an individual knowledgeable of fall protection equipment, including the manufacturer's recommendations and instructions for the proper use, inspection, and maintenance; and who is capable of identifying existing and potential fall hazards; and who has the authority to take prompt corrective action to eliminate those hazards; and who is knowledgeable of the rules contained in this part regarding the installation, use, inspection, and maintenance of fall protection equipment and systems.

Connector means a device which is used to connect parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or D-ring sewn into a harness, or a snap hook spliced or sewn to a lanyard or self-retracting lanyard).

Deceleration device means any mechanism, such as a rope grab, ripstitch lanyard, specifically woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

Deceleration distance means the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's full body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

Dropline means a vertical lifeline secured to an upper anchorage for the purpose of attaching a lanyard or device.

Equivalent means alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate and will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in this standard.

Fall arrest system means a fall protection system that will arrest a fall from elevation. Fall arrest systems include personal fall arrest systems that are worn by the user, catch platforms, and safety nets.

Fall distance means the actual distance from the worker's support to the level where a fall would stop.

Fall protection work plan means a written planning document in which the employer identifies all areas on the job site where a fall hazard of ten feet or more exists. The plan describes the method or methods of fall protection to be used to protect employees, and includes the procedures governing the installation, use, inspection, and removal of the fall protection method or methods which are selected by the employer. See WAC 296-155-24611(2).

Fall restraint system means a system in which all necessary components function together to restrain/prevent an employee from falling to a lower level. Types of fall restraint systems include standard guardrail systems, personal fall restraint systems, warning line systems, or a warning line system and safety monitor.

Floor hole means an opening measuring less than twelve inches but more than one inch in its least dimension in any

floor, roof, platform, or surface through which materials but not persons may fall, such as a belt hole, pipe opening, or slot opening.

Floor opening means an opening measuring twelve inches or more in its least dimension in any floor, roof, platform, or surface through which persons may fall.

Free fall means the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Free fall distance means the vertical displacement of the fall arrest attachment point on the employee's full body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

Full body harness means a configuration of connected straps that meets the requirements specified in ANSI Z359.1-2007, that may be adjustable to distribute a fall arresting force over at least the thighs, shoulders and pelvis, with provisions for attaching a lanyard, lifeline, or deceleration devices.

Full body harness system means a full body harness and lanyard which is either attached to an anchorage meeting the requirements of this part; or it is attached to a horizontal or vertical lifeline which is properly secured to an anchorage(s) capable of withstanding the forces specified in this part.

Handrail means a rail used to provide employees with a handhold for support.

Hardware means snap hooks, D-rings, bucklers, carabiners, adjusters, O-rings, that are used to attach the components of a fall protection system together.

Hazardous slope means a slope where normal footing cannot be maintained without the use of devices due to the pitch of the surface, weather conditions, or surface material.

Horizontal lifeline means a rail, rope, wire, or synthetic cable that is installed in a horizontal plane between two anchorages and used for attachment of a worker's lanyard or lifeline device while moving horizontally; used to control dangerous pendulum like swing falls.

Lanyard means a flexible line of webbing, rope, or cable used to secure a positioning harness or full body harness to a lifeline or an anchorage point usually two, four, or six feet long.

Leading edge means the advancing edge of a floor, roof, or formwork which changes location as additional floor, roof, or formwork sections are placed, formed, or constructed.

Lifeline means a vertical line from a fixed anchorage or between two horizontal anchorages, independent of walking or working surfaces, to which a lanyard or device is secured. Lifeline as referred to in this text is one which is part of a fall protection system used as back-up safety for an elevated worker or as a restraint for workers on a flat or sloped surface.

Locking snap hook means a connecting snap hook that requires two separate forces to open the gate; one to deactivate the gatekeeper and a second to depress and open the gate which automatically closes when released; used to minimize roll out or accidental disengagement.

Low pitched roof means a roof having a slope equal to or less than four in twelve.

Mechanical equipment means all motor or human propelled wheeled equipment except for wheelbarrows, mop-carts, robotic thermoplastic welders and robotic crimpers.

Personal fall arrest system means a fall arrest system that is worn by the employee to arrest the employee in a fall from elevation. It consists of an anchor point, connectors, a full body harness, and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

Personal fall restraint system means a fall restraint system that is worn by the employee to keep the employee from reaching a fall point, such as the edge of a roof or elevated work surface. It consists of an anchor point, hardware assemblies, a full body harness and may include a lanyard, restraint lines, or suitable combinations of these.

Platform means a work surface elevated above the surrounding floor or ground.

Positioning device system means a full body harness or positioning harness that is worn by an employee, and is rigged to allow an employee to be supported on an elevated vertical or inclined surface, such as a wall, pole or column and work with both hands free from the body support.

Positioning harness means a body support that meets the requirements specified in ANSI Z359.3-2007 that encircles and closes around the waist and legs with attachment elements appropriate for positioning work.

Qualified person means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.

Restraint line means a line from a fixed anchorage or between two anchorages to which an employee is secured in such a way as to prevent the worker from falling to a lower level.

Roof means the exterior surface on the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily become the top surface of a building.

Roofing work means the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

Rope grab means a fall arrester that is designed to move up or down a lifeline suspended from a fixed overhead or horizontal anchorage point, or lifeline, to which the full body harness is attached. In the event of a fall, the rope grab locks onto the lifeline rope through compression to arrest the fall. The use of a rope grab device is restricted for all restraint applications. See WAC 296-155-24615 (1)(f).

Runway means a passageway for persons, elevated above the surrounding floor or ground level, such as a foot-walk along shafting or a walkway between buildings.

Safety line - See lifeline.

Safety monitoring system means a type of fall restraint system in which a competent person whose only job responsibility is to recognize and warn employees of their proximity to fall hazards when working between the warning line and

the unprotected sides and edges, including the leading edge of a low pitch roof or other walking/working surface.

Safety net system means a type of fall arrest system, as described in WAC 296-155-24613(2).

Safety watch system means a fall protection system as described in WAC 296-155-24615(6), in which a competent person monitors one worker who is engaged in repair work or servicing equipment on low pitch roofs only.

Self-rescue device means a piece of equipment designed to allow a person, who is suspended in a personal fall arrest system, to independently rescue themselves after the fall by moving the device up or down until they reach a surface and are no longer suspended.

Self-retracting lifeline means a deceleration device which contains a wound line which may be slowly extracted from, or retracted onto, the device under slight tension during normal employee movement, and which after onset of a fall, automatically locks the drum and arrests the fall.

Shock absorbing lanyard means a flexible line of webbing, cable, or rope used to secure a full body harness to a lifeline or anchorage point that has an integral shock absorber.

Snap hook - See "locking snap hook."

Standard guardrail system means a type of fall restraint system that is a vertical barrier consisting of a top rail and mid rail, and toe board when used as falling object protection for persons who may work or pass below, that is erected along all open sides or edges of a walking/working surface, a floor opening, a floor hole, wall opening, ramp, platform, or runway.

Standard strength and construction means any construction of railings, covers, or other guards that meets the requirements of this part.

Static line - See horizontal lifeline.

Steep pitched roof means a roof having a slope greater than four in twelve.

Toe board means a vertical barrier at floor level erected along all open sides or edges of a floor opening, platform, runway, ramp, or other walking/working surface to prevent materials, tools, or debris from falling onto persons passing through or working in the area below.

Unprotected sides and edges means any open side or edge of a floor, roof, balcony/deck, platform, ramp, runway, or walking/working surface where there is no standard guardrail system, or parapet wall of solid strength and construction that is at least thirty-nine inches in vertical height.

Walking/working surface means any area including, but not limited to, floors, a roof surface, bridge, the ground, and any other surfaces whose dimensions are forty-five inches or more in all directions, through which workers can pass or conduct work. A walking/working surface does not include vehicles or rolling stock on which employees must be located in order to perform their job duties.

Wall opening means an opening at least thirty inches high and eighteen inches wide, in any wall or partition, through which persons may fall, such as an opening for a window, a yard arm doorway or chute opening.

Warning line system means a barrier erected on a walking and working surface or a low pitch roof (four in twelve or

less), to warn employees that they are approaching an unprotected fall hazard(s).

NEW SECTION

WAC 296-155-24605 General requirements. (1) The employer shall ensure that all surfaces on which employees will be working or walking on are structurally sound and will support them safely prior to allowing employees to work or walk on them.

(2) Inspection criteria.

(a) All components (including hardware, lanyards, and positioning harnesses or full body harnesses depending on which system is used) of personal fall arrest systems, personal fall restraint systems and positioning device systems shall be inspected prior to each use according to manufacturer's specifications for mildew, wear, damage, and other deterioration. Defective components shall be removed from service if their function or strength has been adversely affected.

(b) Safety nets shall be inspected at least once a week according to manufacturer's specifications for wear, damage, and other deterioration. Safety nets shall also be inspected after any occurrence which could affect the integrity of the safety net system. Defective components shall be removed from service. Defective nets shall not be used.

(3) Personal fall arrest systems, personal fall restraint system, positioning device systems, and their components

shall be used only for employee protection and not to hoist materials.

(4) Exemptions. Employees are exempt from WAC 296-155-24609 and 296-155-24611 only under the following conditions:

(a) During initial installation of the fall protection anchor (prior to engaging in any work activity), or the disassembly of the fall protection anchor after the work has been completed.

(b) An employee directly involved with inspecting or estimating roof-level conditions only on low pitched roofs prior to the actual start of construction work or after all construction work has been completed.

Examples of activities the department recognizes as inspecting or estimating include:

- Measuring a roof to determine the amount of materials needed for a project.
- Inspecting the roof for damage without removing equipment or components.
- Assessing the roof to determine what method of fall protection will be provided to employees.

Examples the department does not recognize as inspecting or estimating under this exemption include:

- Delivering, staging or storing materials on a roof.
- Persons estimating or inspecting on roofs that would be considered a "hazardous slope" by definition.

Fall Arrest Stopped after the fall with a 6 ft. maximum free fall distance
WAC 296-155-24613

- Personal fall arrest WAC 296-155-24613(1)
- Safety nets WAC 296-155-24613(2)
- Catch platforms WAC 296-155-24613(3)

Fall Restraint Restrained from falling
WAC 296-155-24615

- Personal fall restraint WAC 296-155-24615(1)
- Guardrails WAC 296-155-24615(2)
- Covers WAC 296-155-24615(3)
- Warning line system WAC 296-155-24615(4)
- Safety monitor WAC 296-155-24615(5)
- Safety watch WAC 296-155-24615(6)

Positioning Device WAC 296-155-24617

- Positioning harness/full body harness with a 2 ft. maximum free fall distance.
- Vertical walls, columns, poles, hazardous slopes, and steep pitches.

Examples of what personal fall arrest, personal fall restraint and positioning device systems look like:



Fall Arrest



Fall Restraint



Positioning

NEW SECTION

WAC 296-155-24607 Fall protection required regardless of height. (1) Regardless of height, open sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment, such as dip tanks and material handling equipment, and similar hazards shall be guarded with a standard guardrail system.

(2) Floor holes or floor openings, into which persons can accidentally walk, shall be guarded by either a standard railing with standard toe board on all exposed sides, or a cover of standard strength and construction that is secured against accidental displacement. While the cover is not in place, the floor hole opening shall be protected by a standard railing.

Note: Requirements for when guarding floor openings at heights of four feet or more are located in WAC 296-155-24609(4).

(3) Regardless of height employees shall be protected from falling into or onto impalement hazards, such as: Reinforcing steel (rebar), or exposed steel or wood stakes used to set forms.

NEW SECTION

WAC 296-155-24609 Fall protection required at four feet or more. (1) The employer shall ensure that the appropriate fall protection system is provided, installed, and implemented according to the requirements in this part when employees are exposed to fall hazards of four feet or more to the ground or lower level when on a walking/working surface.

(2) Guarding of walking/working surfaces with unprotected sides and edges. Every open sided walking/working surface or platform four feet or more above adjacent floor or ground level shall be guarded by one of the following fall protection systems.

(a) A standard guardrail system, or the equivalent, as specified in WAC 296-155-24615(2), on all open sides, except where there is entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a standard toe board wherever, beneath the open sides, persons can pass, there is moving machinery, or there is equipment with which falling materials could create a hazard.

(i) When employees are using stilts, the height of the top rail or equivalent member of the standard guardrail system must be increased (or additional railings may be added) an

amount equal to the height of the stilts while maintaining the strength specifications of the guardrail system.

(ii) Where employees are working on platforms above the protection of the guardrail system, the employer must either increase the height of the guardrail system as specified in (a)(i) of this subsection, or select and implement another fall protection system as specified in (b), (c), (d), (e), or (f) of this subsection.

(iii) When guardrails must be temporarily removed to perform a specific task, the area shall be constantly attended by a monitor until the guardrail is replaced. The only duty the monitor shall perform is to warn persons entering the area of the fall hazard.

- (b) A fall restraint system;
- (c) A personal fall arrest system;
- (d) A safety net system;
- (e) A catch platform; and
- (f) A warning line.

(3) Guarding of ramps, runways, and inclined walkways.

(a) Ramps, runways, and inclined walkways that are four feet or more above the ground or lower level shall be equipped with a standard guardrail system or the equivalent, as specified in WAC 296-155-24615(2), along each open side. Wherever tools, machine parts, or materials are likely to be used on the runway, a toe board shall also be installed on each open side to protect persons working or passing below.

(b) Runways used exclusively for special purposes may have the railing on one side omitted where operating conditions necessitate such omission, provided the falling hazard is minimized by using a runway not less than eighteen inches wide.

Note: See WAC 296-155-24619(1) for other specific criteria for ramps, runways, and inclined walkways.

(4) Guarding of floor openings.

(a) Floor openings shall be guarded by one of the following fall restraint systems.

(i) A standard guardrail system, or the equivalent, as specified in WAC 296-155-24615(2), on all open sides, except where there is entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a standard toe board wherever, beneath the open sides, persons can pass, or there is moving machinery, or there is equipment with which falling materials could create a hazard.

(ii) A cover, as specified in WAC 296-155-24615(3).

(iii) A warning line system erected at least fifteen feet from all unprotected sides or edges of the floor opening and meets the requirements of WAC 296-155-24615(4).

(iv) If it becomes necessary to remove the cover, the guardrail system, or the warning line system, then an employee shall remain at the opening until the cover, guardrail system, or warning line system is replaced. The only duty the employee shall perform is to prevent exposure to the fall hazard by warning persons entering the area of the fall hazard.

(b) Ladderway floor openings or platforms shall be guarded by standard guardrail system with standard toe boards on all exposed sides, except at entrance to opening, with the passage through the railing either provided with a swinging gate or so offset that a person cannot walk directly into the opening.

(c) Hatchways and chute floor openings shall be guarded by one of the following:

(i) Hinged covers of standard strength and construction and a standard guardrail system with only one exposed side. When the opening is not in use, the cover shall be closed or the exposed side shall be guarded at both top and intermediate positions by removable standard guardrail systems.

(ii) A removable standard guardrail system with toe board on not more than two sides of the opening and fixed standard guardrail system with toe boards on all other exposed sides. The removable railing shall be kept in place when the opening is not in use and shall be hinged or otherwise mounted so as to be conveniently replaceable.

(d) Wherever there is a danger of falling through an unprotected skylight opening, or the skylight has been installed and is not capable of sustaining the weight of a two hundred pound person with a safety factor of four, standard guardrails shall be provided on all exposed sides in accordance with WAC 296-155-24615(2) or the skylight shall be covered in accordance with WAC 296-155-24615(3). Personal fall arrest equipment may be used as an equivalent means of fall protection when worn by all employees exposed to the fall hazard.

(e) Pits and trap door floor openings shall be guarded by floor opening covers of standard strength and construction. While the cover is not in place, the pit or trap openings shall be protected on all exposed sides by removable standard guardrail system.

(f) Manhole floor openings shall be guarded by standard covers which need not be hinged in place. While the cover is not in place, the manhole opening shall be protected by standard guardrail system.

(5) Guarding of wall openings.

(a) Wall openings, from which there is a fall hazard of four feet or more, and the bottom of the opening is less than thirty-nine inches above the working surface, shall be guarded as follows:

(i) When the height and placement of the opening in relation to the working surface is such that either a standard rail or intermediate rail will effectively reduce the danger of falling, one or both shall be provided;

(ii) The bottom of a wall opening, which is less than four inches above the working surface, regardless of width, shall be protected by a standard toe board or an enclosing screen

either of solid construction or as specified in WAC 296-155-24615 (2)(c).

(b) An extension platform, outside a wall opening, onto which materials can be hoisted for handling shall have standard guardrails on all exposed sides or equivalent. One side of an extension platform may have removable railings in order to facilitate handling materials.

(c) When a chute is attached to an opening, the provisions of subsection (5)(c) of this section shall apply, except that a toe board is not required.

(6) Fall protection during form and rebar work. When exposed to a fall height of four feet or more, employees placing or tying reinforcing steel on a vertical face are required to be protected by personal fall arrest systems, safety net systems, or positioning device systems.

(7) Fall protection on steep pitched and low pitched roofs.

(a) Steep pitched roofs. Regardless of the work activity, employers shall ensure that employees exposed to fall hazards of four feet or more while working on a roof with a pitch greater than four in twelve use one of the following:

(i) Fall restraint system. Safety monitors and warning line systems are prohibited on steep pitched roofs;

(ii) Fall arrest system; or

(iii) Positioning device system.

(b) Low pitched roofs. Employers shall ensure that employees exposed to fall hazards of four feet or more while engaged in work, other than roofing work or leading edge work, on low pitched roofs use one of the following:

(i) Fall restraint system;

(ii) Fall arrest system;

(iii) Positioning device system;

(iv) Safety monitor and warning line system; or

(v) Safety watch system.

(8) Hazardous slopes. Employees exposed to falls of four feet or more while working on a hazardous slope shall use personal fall restraint systems or positioning device systems.

NEW SECTION

WAC 296-155-24611 Fall protection required at ten feet or more. (1) The employer shall ensure that the appropriate fall protection system is provided, installed, and implemented according to the requirements in this part when employees are exposed to fall hazards of ten feet or more to the ground or lower level, while:

(a) Engaged in roofing work on a low pitched roof;

(b) Constructing a leading edge;

Note: Employees not directly involved with constructing the leading edge, or are not performing roofing work must comply with WAC 296-155-24609, Fall protection required at four feet or more.

(c) Working on any surface that does not meet the definition of a walking/working surface not already covered in WAC 296-155-24609;

(d) Engaged in excavation and trenching operations.

(i) Exceptions. Fall protection is not required at excavations when employees are:

(A) Directly involved with the excavation process and on the ground at the top edge of the excavation; or

(B) Working at an excavation site where appropriate sloping of side walls has been implemented as the excavation protective system.

(ii) Fall protection is required for employees standing in or working in the affected area of a trench or excavation exposed to a fall hazard of ten feet or more and:

(A) The employees are not directly involved with the excavation process; or

(B) The employees are on the protective system or any other structure in the excavation.

Note: Persons considered directly involved in the excavation process include:

- Foreman of the crew.
- Signal person.
- Employee hooking on pipe or other materials.
- Grade person.
- State, county, or city inspectors inspecting the excavation or trench.
- An engineer or other professional conducting a quality-assurance inspection.

(2) Fall protection work plan. The employer shall develop and implement a written fall protection work plan including each area of the work place where the employees are assigned and where fall hazards of ten feet or more exist.

(a) The fall protection work plan shall:

(i) Identify all fall hazards in the work area;

(ii) Describe the method of fall arrest or fall restraint to be provided;

(iii) Describe the proper procedures for the assembly, maintenance, inspection, and disassembly of the fall protection system to be used;

(iv) Describe the proper procedures for the handling, storage, and securing of tools and materials;

(v) Describe the method of providing overhead protection for workers who may be in, or pass through the area below the worksite;

(vi) Describe the method for prompt, safe removal of injured workers; and

(vii) Be available on the job site for inspection by the department.

(b) Prior to permitting employees into areas where fall hazards exist the employer shall ensure employees are trained and instructed in the items described in (a)(i) through (vii) of this subsection.

NEW SECTION

WAC 296-155-24613 Fall arrest specifications. Fall arrest protection shall conform to the following provisions:

(1) Personal fall arrest system shall consist of:

(a) A full body harness shall be used.

(b) Full body harness systems or components subject to impact loading shall be immediately removed from service and shall not be used again for employee protection unless inspected and determined by a competent person to be undamaged and suitable for reuse.

(c) Anchorages for full body harness systems shall be capable of supporting (per employee):

(i) Three thousand pounds when used in conjunction with:

(A) A self-retracting lifeline that limits the maximum free fall distances to two feet or less; or

(B) A shock absorbing lanyard that restricts the forces on the body to nine hundred pounds or less.

(ii) Five thousand pounds for all other personal fall arrest system applications, or they shall be designed, installed, and used:

(A) As a part of a complete personal fall arrest system which maintains a safety factor of at least two; and

(B) Under the supervision of a qualified person.

(d) When stopping a fall, personal fall arrest systems must:

(i) Be rigged to allow a maximum free fall distance of six feet so an employee will not contact any lower level;

(ii) Limit maximum arresting force on an employee to one thousand eight hundred pounds (8 kN);

(iii) Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to three and one-half feet (1.07 m); and

(iv) Have sufficient strength to withstand twice the potential impact energy of an employee free falling a maximum distance of six feet (1.8 m).

- Notes:**
- Shock absorbers that meet the requirements of ANSI Z359.1-2007 that are used as a part of a personal fall arrest system in accordance with manufacturer's recommendations and instructions for use and installation will limit the maximum arresting forces on an employee's body to one thousand eight hundred pounds or less.
 - To calculate fall clearance distance using a shock absorbing lanyard and D-ring anchorage connector, see WAC 296-155-24624, Appendix B.

(e) All safety lines and lanyards shall be protected against being cut or abraded.

(f) The attachment point of the full body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.

(g) Hardware shall be drop forged, pressed or formed steel, or made of materials equivalent in strength.

(h) Hardware shall have a corrosion resistant finish, and all surfaces and edges shall be smooth to prevent damage to the attached full body harness or lanyard.

(i) When vertical lifelines (droplines) are used, not more than one employee shall be attached to any one lifeline.

- Note:** The system strength needs in the following items are based on a total combined weight of employee and tools of no more than three hundred and ten pounds. If combined weight is more than three hundred and ten pounds, appropriate allowances must be made or the system will not be in compliance. For more information on system testing see WAC 296-24-88050, Appendix C, Part II.

(j) Vertical lifelines (droplines) shall have a minimum breaking strength of five thousand pounds (22.2 kN), except that self-retracting lifelines and lanyards which automatically limit free fall distance to two feet (.61 m) or less shall have a minimum breaking strength of three thousand pounds (13.3 kN).

(k) Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a

complete personal fall arrest system, which maintains a safety factor of at least two.

(l) Droplines or lifelines used on rock scaling operations, or in areas where the lifeline may be subjected to cutting or abrasion, shall be a minimum of seven-eighths inch wire core manila rope or equivalent. For all other lifeline applications, a minimum of three-fourths inch manila rope or equivalent, with a minimum breaking strength of five thousand pounds, shall be used.

(m) Lanyards shall have a minimum breaking strength of five thousand pounds (22.2 kN).

(n) All components of full body harness systems whose strength is not otherwise specified in this subsection shall be capable of supporting a minimum fall impact load of five thousand pounds (22.2 kN) applied at the lanyard point of connection.

(o) D-rings and snap hooks shall be proof-tested to a minimum tensile load of three thousand six hundred pounds (16 kN) without cracking, breaking, or taking permanent deformation.

(p) Snap hooks shall be a locking type snap hook designed and used to prevent disengagement of the snap hook by the contact of the snap hook keeper by the connected member.

(q) Unless the snap hook is designed for the following connections, snap hooks shall not be engaged:

- (i) Directly to the webbing, rope or wire rope;
- (ii) To each other;
- (iii) To a D-ring to which another snap hook or other connector is attached;
- (iv) To a horizontal lifeline; or
- (v) To any object which is incompatibly shaped or dimensioned in relation to the snap hook such that unintentional disengagement could occur by the connected object being able to depress the snap hook keeper and release itself.

(2) Safety net systems. Safety net systems and their use shall comply with the following provisions:

(a) Safety nets shall be installed as close as practicable under the surface on which employees are working, but in no case more than thirty feet (9.1 m) below such level unless specifically approved in writing by the manufacturer. The potential fall area to the net shall be unobstructed.

(b) Safety nets shall extend outward from the outermost projection of the work surface as follows:

Vertical distance from working levels to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 5 feet	8 feet
More than 5 feet up to 10 feet	10 feet
More than 10 feet	13 feet

(c) Safety nets shall be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified in (d) of this subsection.

(d) Safety nets and their installations shall be capable of absorbing an impact force equal to that produced by the drop test.

(i) Except as provided in (d)(ii) of this subsection, safety nets and safety net installations shall be drop-tested at the job site after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at six-month intervals if left in one place. The drop-test shall consist of a four hundred pound (180 kg) bag of sand 30 ± 2 inches (76 ± 5 cm) in diameter dropped into the net from the highest walking/working surface at which employees are exposed to fall hazards, but not from less than forty-two inches (1.1 m) above that level.

(ii) When the employer can demonstrate that it is unreasonable to perform the drop-test required by (d)(i) of this subsection, the employer (or a designated competent person) shall certify that the net and net installation is in compliance with (c) and (d)(i) of this subsection by preparing a certification record prior to the net being used as a fall protection system. The certification record must include an identification of the net and net installation for which the certification record is being prepared; the date that it was determined that the identified net and net installation were in compliance with (c) of this subsection and the signature of the person making the determination and certification. The most recent certification record for each net and net installation shall be available at the job site for inspection.

(e) Materials, scrap pieces, equipment, and tools which have fallen into the safety net shall be removed as soon as possible from the net and at least before the next work shift.

(f) The maximum size of each safety net mesh opening shall not exceed thirty-six square inches (230 cm²) nor be longer than six inches (15 cm) on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not be longer than six inches (15 cm). All mesh crossings shall be secured to prevent enlargement of the mesh opening.

(g) Each safety net (or section of it) shall have a border rope or webbing with a minimum breaking strength of five thousand pounds (22.2 kN).

(h) Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than six inches (15 cm) apart.

(3) Catch platforms.

(a) A catch platform shall be installed within four vertical feet of the work area.

(b) The catch platform's width shall be a minimum of forty-five inches wide and shall be equipped with standard guardrails and toe boards on all open sides.

NEW SECTION

WAC 296-155-24615 Fall restraint specifications. Fall restraint protection shall conform to the following provisions:

(1) Personal fall restraint systems shall be rigged to allow the movement of employees only as far as the unprotected sides and edges of the walking/working surface, and shall consist of:

- (a) A full body harness shall be used.

(b) The full body harness must be attached to securely rigged restraint lines.

(c) All hardware assemblies for full body harness shall be capable of withstanding a tension loading of four thousand pounds without cracking, breaking, or taking a permanent deformation.

(d) The employer shall ensure component compatibility.

(e) Anchorage points used for fall restraint shall be capable of supporting four times the intended load.

(f) Rope grab devices are prohibited for fall restraint applications unless they are part of a fall restraint system designed specifically for the purpose by the manufacturer, and used in strict accordance with the manufacturer's recommendations and instructions.

(2) Guardrail specifications.

(a) A standard guardrail system shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of thirty-nine to forty-five inches from upper surface of top rail to floor, platform, runway, or ramp level. When conditions warrant, the height of the top edge may exceed the forty-five inch height, provided the guardrail system meets all other criteria of this subsection. The intermediate rail shall be half-way between the top rail and the floor, platform, runway, or ramp. The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard.

(b) Minimum requirements for standard guardrail systems under various types of construction are specified in the following items:

(i) For wood railings, the posts shall be of at least two-inch by four-inch stock spaced not to exceed eight feet; the top rail shall be of at least two-inch by four-inch stock and each length of lumber shall be smooth surfaced throughout the length of the railing. The intermediate rail shall be of at least one-inch by six-inch stock. Other configurations may be used for the top rail when the configuration meets the requirements of (b)(vii) of this subsection.

(ii) For pipe railings, posts and top and intermediate railings shall be at least one and one-half inches nominal OD diameter with posts spaced not more than eight feet on centers. Other configurations may be used for the top rail when the configuration meets the requirements of (b)(vii) of this subsection.

(iii) For structural steel railings, posts and top and intermediate rails shall be of two-inch by two-inch by three-eighths inch angles or other metal shapes of equivalent bending strength, with posts spaced not more than eight feet on centers. Other configurations may be used for the top rail when the configuration meets the requirements of (b)(vii) of this subsection.

(iv) For wire rope railings, the top and intermediate railings shall meet the strength factor and deflection of (b)(v) of this subsection. The top railing shall be flagged at not more than six foot intervals with high-visibility material. Posts shall be spaced not more than eight feet on centers. The rope shall be stretched taut and shall be between thirty-nine and forty-five inches in height at all points. Other configurations may be used for the top rail when the configuration meets the requirements of (b)(vii) of this subsection.

(v) The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least two hundred pounds applied in any direction at any point on the top rail. The top rail shall be between thirty-nine and forty-five inches in height at all points when this force is applied.

(vi) Railings receiving heavy stresses from employees trucking or handling materials shall be provided additional strength by the use of heavier stock, closer spacing of posts, bracing, or by other means.

(vii) Other types, sizes, and arrangements of railing construction are acceptable, provided they meet the following conditions:

(A) A smooth surfaced top rail at a height above floor, platform, runway, or ramp level between thirty-nine and forty-five inches;

(B) When the two hundred pound (890 N) load specified in (b)(v) of this subsection is applied in a downward direction, the top edge of the guardrail shall not deflect to a height less than thirty-nine inches (1.0 m) above the walking/working level. Guardrail system components selected and constructed in accordance with this part will be deemed to meet this requirement;

(C) Protection between top rail and floor, platform, runway, ramp, or stair treads, equivalent at least to that afforded by a standard intermediate rail;

(D) Elimination of overhang of rail ends unless such overhang does not constitute a hazard.

(c) Toe board specifications.

(i) A standard toe board shall be a minimum of four inches nominal in vertical height from its top edge to the level of the floor, platform, runway, or ramp. It shall be securely fastened in place with not more than one-quarter inch clearance above floor level. It may be made of any substantial material, either solid, or with openings not over one inch in greatest dimension.

(ii) Where material is piled to such height that a standard toe board does not provide protection, paneling, or screening from floor to intermediate rail or to top rail shall be provided.

(3) Cover specifications.

(a) Floor opening or floor hole covers shall be of any material that meets the following strength requirements:

(i) Conduits, trenches, and manhole covers and their supports, when located in roadways, and vehicular aisles shall be designed to carry a truck rear axle load of at least two times the maximum intended load;

(ii) All floor opening and floor hole covers shall be capable of supporting the maximum potential load but never less than two hundred pounds (with a safety factor of four).

(A) All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.

(B) All covers shall be color coded or they shall be marked with the word "hole" or "cover" to provide warning of the hazard.

(b) Barriers and screens used to cover wall openings shall meet the following requirements:

(i) Barriers shall be of such construction and mounting that, when in place at the opening, the barrier is capable of

withstanding a load of at least two hundred pounds applied in any direction (except upward), with a minimum of deflection at any point on the top rail or corresponding member.

(ii) Screens shall be of such construction and mounting that they are capable of withstanding a load of at least two hundred pounds applied horizontally at any point on the near side of the screen. They may be of solid construction of either grill work with openings not more than eight inches long, or of slat work with openings not more than four inches wide with length unrestricted.

(4) Warning line system specifications on pitches four in twelve or less for roofing work, leading edge work, and on low pitched open sided surfaces for work activities other than roofing work or leading edge work. The employer shall ensure the following:

(a) Warning lines shall be erected around all unprotected sides and edges of the work area.

(i) Warning lines used during roofing work.

(A) When roofing work is taking place or when mechanical equipment is not being used, the warning line shall be erected not less than six feet (1.8 m) from the edge of the roof.

(B) When mechanical equipment is being used, the warning line shall be erected not less than six feet (1.8 m) from the roof edge which is parallel to the direction of mechanical equipment operation, and not less than ten feet (3.1 m) from the roof edge which is perpendicular to the direction of mechanical equipment operation.

(ii) Warning lines erected for leading edge work.

Warning lines shall be erected to separate employees who are engaged in leading edge work (between the forward edge of the warning line and the leading edge), from other work areas on the low pitched surface. The employer shall ensure:

(A) The warning line is erected not less than six feet nor more than twenty-five feet from the leading edge; and

(B) When fall arrest systems as described in WAC 296-155-24613, or fall restraint systems as described in subsections (1) and (2) of this section are not used, a safety monitor system as described in subsection (5) of this section shall be implemented to protect employees engaged in constructing the leading edge who are working between the forward edge of the warning line and the leading edge.

(iii) Warning lines erected on low pitched open sided surfaces for work activities other than roofing work or leading edge work, shall be erected not less than fifteen feet from the unprotected sides or edges of the open sided surface.

(b) The warning line shall consist of a rope, wire, or chain and supporting stanchions erected as follows:

(i) The rope, wire, or chain shall be flagged at not more than six foot (1.8 m) intervals with high visibility material. Highly visible caution or danger tape as described in (b)(iv) of this subsection, does not need to be flagged.

(ii) The rope, wire, or chain shall be rigged and supported in such a way that its lowest point (including sag) is no less than thirty-six inches from the surface and its highest point is no more than forty-five inches from the surface.

(iii) After being erected, with the rope, wire or chain attached, stanchions shall be capable of resisting, without tipping over, a force of at least sixteen pounds (71 N) applied

horizontally against the stanchion, thirty inches (0.76 m) above the surface, perpendicular to the warning line, and in the direction of the unprotected sides or edges of the surface.

(iv) The rope, wire, or chain shall have a minimum tensile strength of two hundred pounds (90 k), and after being attached to the stanchions, shall be capable of supporting, without breaking, the loads applied to the stanchions.

Highly visible caution or danger tape may be used in lieu of rope, wire, or chain as long as it is at least three inches wide and three mils thick, and has a tensile strength of at least two hundred pounds.

(v) The line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.

(c) Access paths shall be erected as follows:

(i) Points of access, materials handling areas, and storage areas shall be connected to the work area by a clear access path formed by two warning lines.

(ii) When the path to a point of access is not in use, a rope, wire, or chain, equal in strength and height to the warning line, shall be placed across the path at the point where the path intersects the warning line erected around the work area.

(5) Safety monitor system specifications.

(a) A safety monitor system may be used in conjunction with a warning line system as a method of fall protection during roofing work on low pitched roofs or leading edge work on low pitched surfaces.

Note: The warning line is not required when performing roofing work on low pitched roofs less than fifty feet wide. For information on determining roof widths, see WAC 296-155-24623, Appendix A, determining roof widths.

(b) When selected, the employer shall ensure that the safety monitor system is addressed in the fall protection work plan, including the name of the safety monitor(s) and the extent of their training in both the safety monitor and warning line systems. The employer shall ensure that the following requirements are met:

(i) The safety monitor system shall not be used when adverse weather conditions create additional hazards.

(ii) Employees working outside of the warning line system, (between the forward edge of the warning line and the unprotected sides or edges of a low pitched surface), shall be readily distinguishable from other members of the crew that are working inside the warning line system by wearing highly visible, distinctive, and uniform apparel.

(iii) Employees must promptly comply with fall hazard warnings from the safety monitor.

(iv) A person acting in the capacity of safety monitor(s) shall be trained in the function of both the safety monitor and warning line systems, and shall:

(A) Be a competent person as defined in WAC 296-155-24603.

(B) Have control authority over the work as it relates to fall protection.

(C) Be instantly distinguishable over members of the work crew.

(D) Perform no other duties while acting as safety monitor.

(E) Be positioned in relation to the workers under their protection, so as to have a clear, unobstructed view and be able to maintain normal voice communication.

(F) Not supervise more than eight exposed workers at one time.

(G) Warn the employee when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner.

(6) Safety watch system specifications.

(a) When one employee is conducting any repair work or servicing equipment on a roof that has a pitch no greater than four in twelve, employers are allowed to use a safety watch system.

(b) Ensure the safety watch system meets the following requirements:

(i) There can only be two people on the roof while the safety watch system is being used: The one employee acting as the safety watch and the one employee engaged in the repair work or servicing equipment;

(ii) The employee performing the task must comply promptly with fall hazard warnings from the safety watch;

(iii) Mechanical equipment is not used; and

(iv) The safety watch system is not used when weather conditions create additional hazards.

(c) Ensure the employee acting as the safety watch meets all of the following:

(i) Is a competent person as defined in WAC 296-155-24603;

(ii) Has full control over the work as it relates to fall protection;

(iii) Has a clear, unobstructed view of the worker;

(iv) Is able to maintain normal voice communication; and

(v) Performs no other duties while acting as the safety watch.

NEW SECTION

WAC 296-155-24617 Positioning device system specifications. Positioning device systems and their use shall conform to the following provisions:

(1) Positioning harnesses or full body harnesses shall be used.

(2) Positioning devices shall be rigged to prevent an employee from a free fall greater than two feet.

(3) Positioning devices shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or three thousand pounds (13.3 kN), whichever is greater.

(4) Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

(5) Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of this system.

(6) Connecting assemblies shall have a minimum breaking strength of five thousand pounds (22.2 kN).

(7) D-rings and snap hooks shall be proof-tested to a minimum tensile load of three thousand six hundred pounds (16 kN) without cracking, breaking, or taking permanent deformation.

(8) Snap hooks shall be a locking type snap hook designed and used to prevent disengagement of the snap hook by the contact of the snap hook keeper by the connected member.

(9) Unless the snap hook is designed for the following connections, snap hooks shall not be engaged:

(a) Directly to webbing, rope or wire rope;

(b) To each other;

(c) To a D-ring to which another snap hook or other connector is attached;

(d) To a horizontal lifeline; or

(e) To any object which is incompatibly shaped or dimensioned in relation to the snap hook such that unintentional disengagement could occur by the connected object being able to depress the snap hook keeper and release itself.

NEW SECTION

WAC 296-155-24619 Other specifications. (1) Ramps, runways and inclined walkways shall:

(a) Be at least eighteen inches wide; and

(b) Not be inclined more than twenty degrees from horizontal and when inclined, they shall be cleated or otherwise treated to prevent a slipping hazard on the walking surface.

Note: See WAC 296-155-24609(3) for guarding ramps, runways, and inclined walkways that are four feet or more above the ground or lower level.

(2) Self-rescue devices. Self-rescue devices are not a fall protection system. Self-rescue devices used to self-rescue after a fall shall meet the following requirements:

(a) Use self-rescue devices according to the manufacturer's instructions; and

(b) Self-rescue devices must be addressed by the fall protection work plan.

(3) Canopy. Canopies, when used as falling object protection, shall be strong enough to prevent collapse and to prevent penetration by any objects which may fall onto the canopy.

(4) Roofing bracket specifications. Roofing brackets are not a fall protection system.

(a) Roofing brackets shall be constructed to fit the pitch of the roof.

(b) In addition to securing brackets using the pointed metal projections, brackets shall also be secured in place by nailing. When it is impractical to nail brackets, rope supports shall be used. When rope supports are used, they shall consist of first grade manila of at least three-quarters inch diameter, or equivalent.

(5) Crawling board and chicken ladder specifications. Crawling boards and chicken ladders are not fall protection systems.

(a) Crawling boards shall be not less than ten inches wide and one inch thick, having cleats one by one and one-half inches.

(i) The cleats shall be equal in length to the width of the board and spaced at equal intervals not to exceed twenty-four inches.

(ii) Nails shall be driven through and clinched on the underside.

(iii) The crawling board shall extend from the ridge pole to the eaves when used in connection with roof construction, repair, or maintenance.

(b) Crawling boards shall be secured to the roof using ridge hooks or other equivalent means.

(6) Roof edge materials handling areas and materials storage specifications.

(a) When guardrails are used at hoisting areas, a minimum of four feet of guardrail shall be erected along each side of the access point through which materials are hoisted.

(b) A chain or gate shall be placed across the opening between the guardrail sections when hoisting operations are not taking place.

(c) When guardrails are used at bitumen pipe outlet, a minimum of four feet of guardrail shall be erected along each side of the pipe.

(d) Mechanical equipment shall be used or stored only in areas where employees are protected using a fall arrest system as described in WAC 296-155-24613, or a fall restraint system as described in WAC 296-155-24615 (1), (2), or (4). Mechanical equipment may not be used or stored where the only protection is provided by the use of a safety monitor.

(e) The hoist shall not be used as an attachment/anchorage point for fall arrest or fall restraint systems.

(f) Materials shall not be stored within six feet of the roof edge unless guardrails are erected at the roof edge. Guardrails shall include a toe board if employees could be working or passing below.

mine its width. Section views or elevation views are shown where appropriate. Some examples show "correct" and "incorrect" subdivisions of irregularly shaped roofs divided into smaller, regularly shaped areas. In all examples, the dimension selected to be the width of an area is the lesser of the two primary dimensions of the area, as viewed from above. Example A shows a simple rectangular roof. The width is the lesser of the two primary overall dimensions, which is also the case with roofs sloped toward or away from the roof center, as shown in Example B.

(2) Many roofs are not simple rectangles. Such roofs may be broken down into subareas as shown in Example C. The process of dividing a roof area can produce many different configurations. Example C gives the general rule of using dividing lines of minimum length to minimize the size and number of the areas which are potentially less than fifty feet (15.25 m) wide. The intent is to minimize the number of roof areas where safety monitoring systems alone are sufficient protection.

(3) Roofs which are comprised of several separate, non-contiguous roof areas, as in Example D, may be considered as a series of individual roofs. Some roofs have penthouses, additional floors, courtyard openings, or similar architectural features; Example E shows how the rule for dividing roofs into subareas is applied to such configurations. Irregular, nonrectangular roofs must be considered on an individual basis, as shown in Example F.

NEW SECTION

WAC 296-155-24621 Training. (1) All training required by this part, must be documented and documentation kept on file.

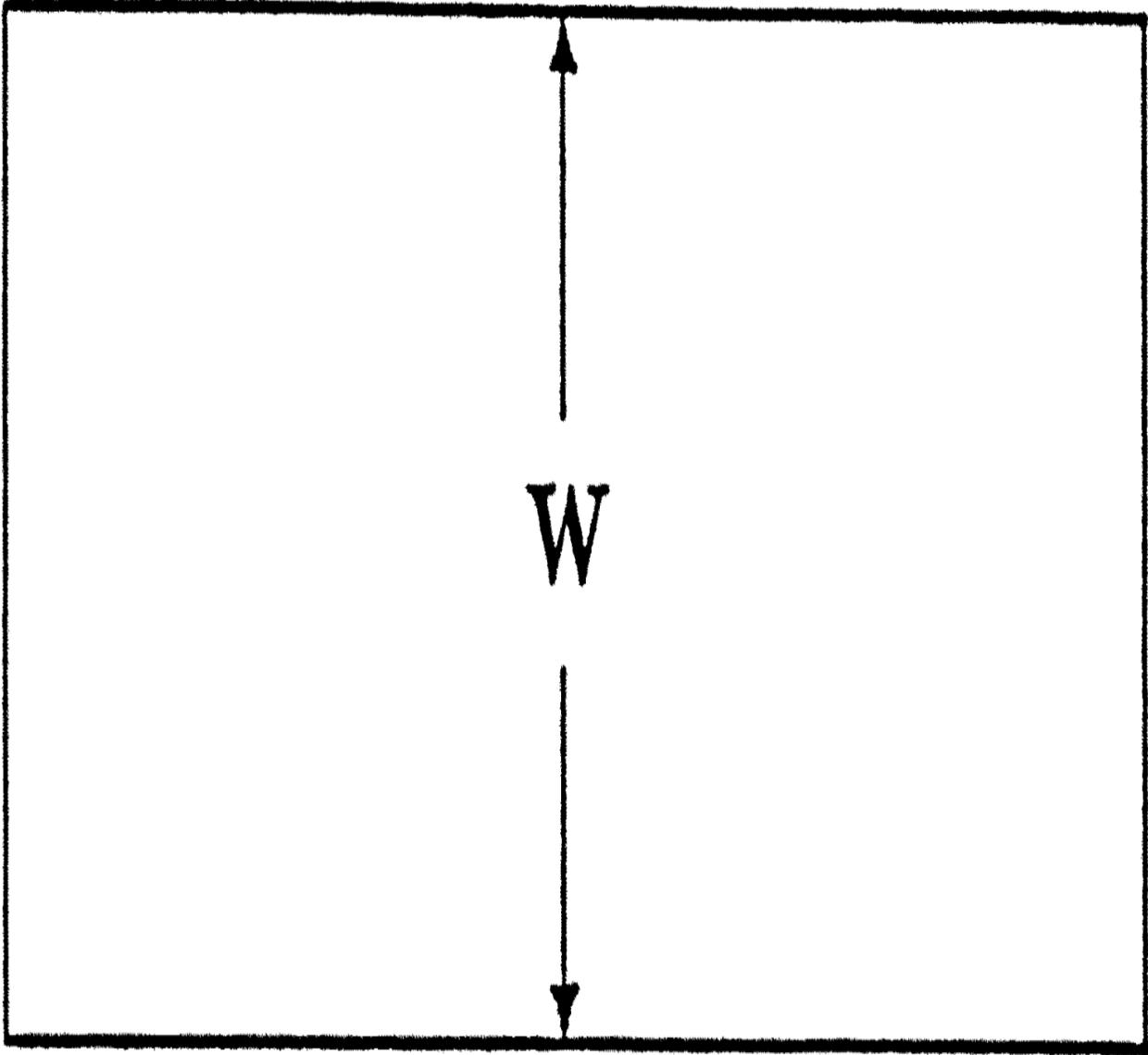
(2) "Retraining." When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by subsection (1) of this section, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

- Changes in the workplace render previous training obsolete; or
- Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or
- Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

NEW SECTION

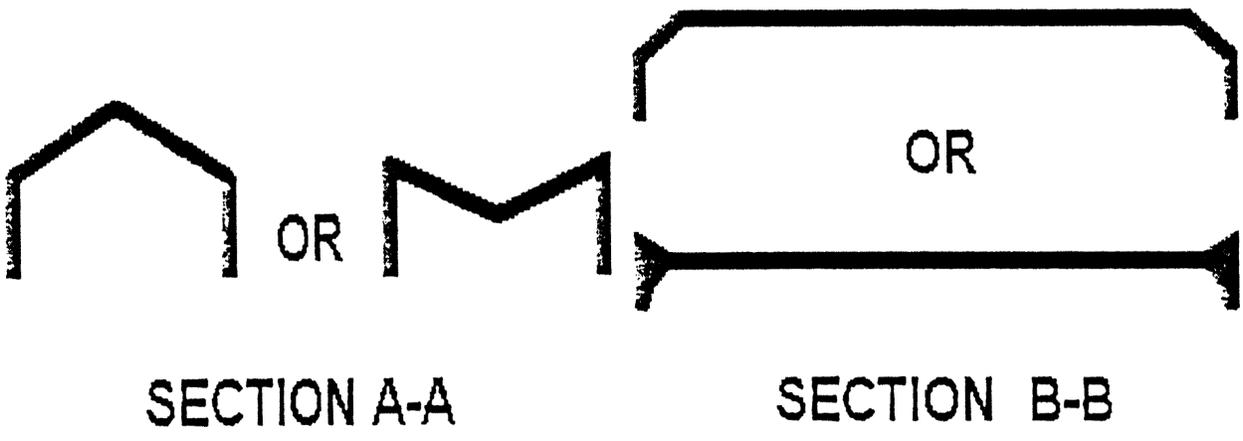
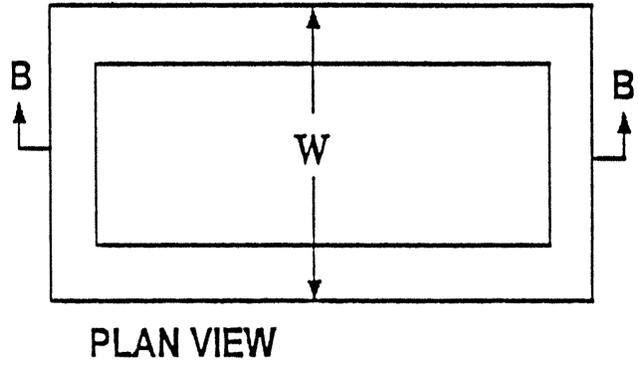
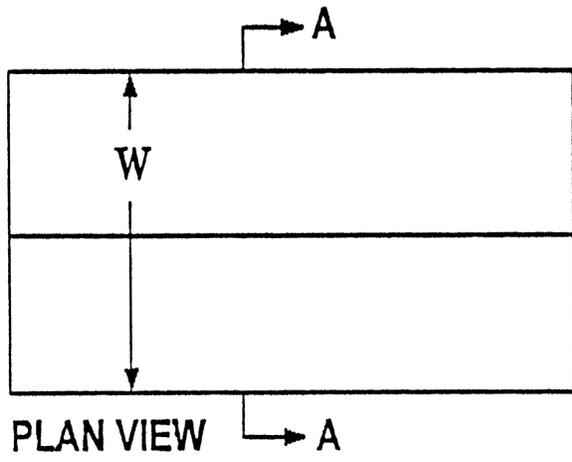
WAC 296-155-24623 Appendix A—Determining roof widths—Nonmandatory guidelines for complying with WAC 296-155-24615. (1) This appendix serves as a guideline to assist employers complying with the requirements of WAC 296-155-24615 which allows the use of a safety monitoring system alone as a means of providing fall protection during the performance of roofing operations on low-sloped roofs fifty feet (15.25 m) or less in width. Each example in the appendix shows a roof plan or plans and indicates where each roof or roof area is to be measured to deter-

Example A
Rectangular Shaped Roof

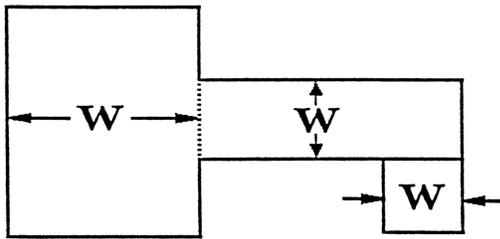


PLAN VIEW

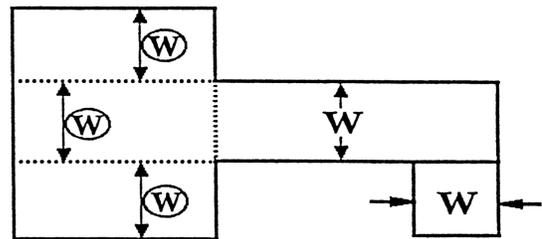
Example B
Sloped Rectangular Shaped Roofs



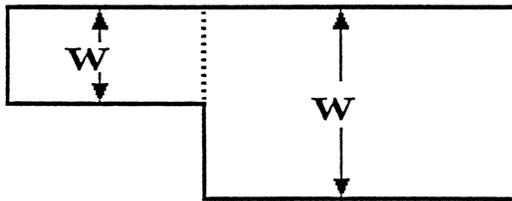
Example C
Irregularly Shaped Roofs With Rectangular Shaped Sections



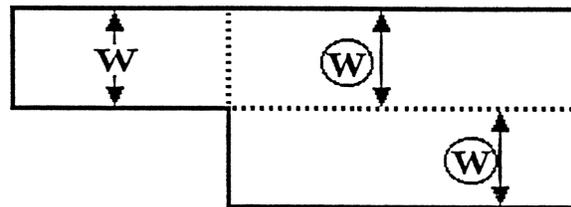
Correct



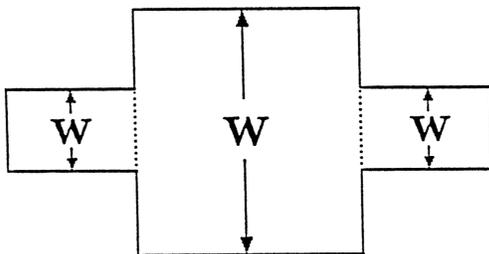
Incorrect



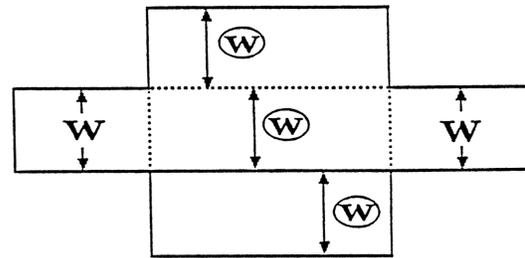
Correct



Incorrect



Correct



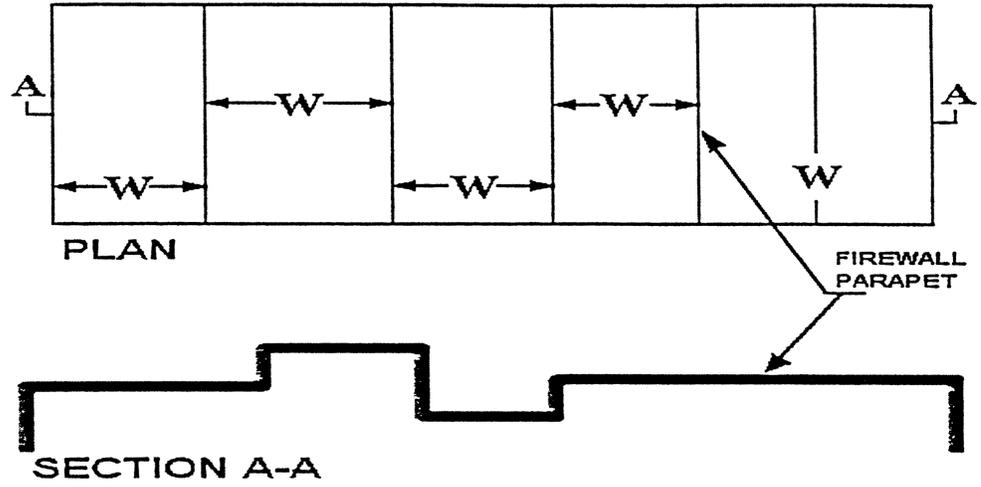
Incorrect

Such roofs are to be divided into subareas by using dividing lines of minimum length to minimize the size and number of the areas which are potentially less than or equal to fifty feet (15.25 m) in width, in order to limit the size of roof areas where the safety monitoring system alone can be used (WAC 296-155-24615 (2)(b)). Dotted lines are used in the examples to show the location of dividing lines.

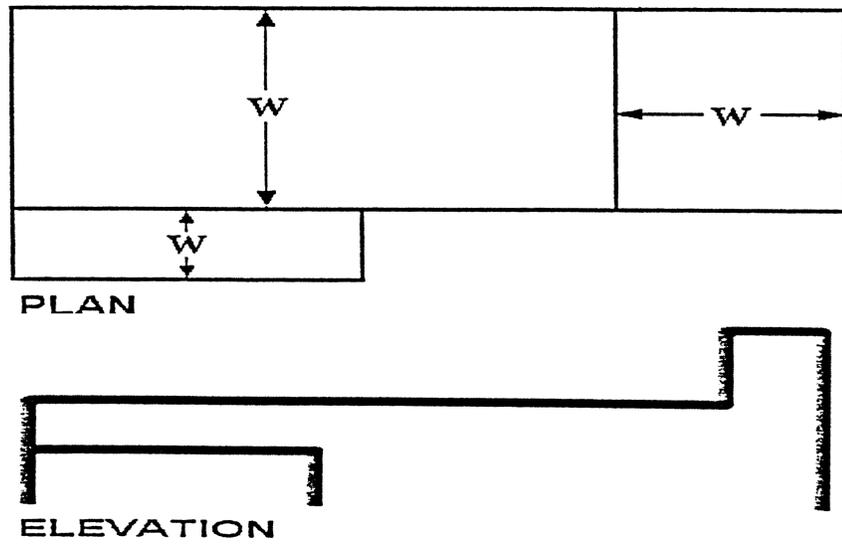
Ⓜ denotes incorrect measurements of width.

Example D
Separate, Noncontiguous Roof Areas

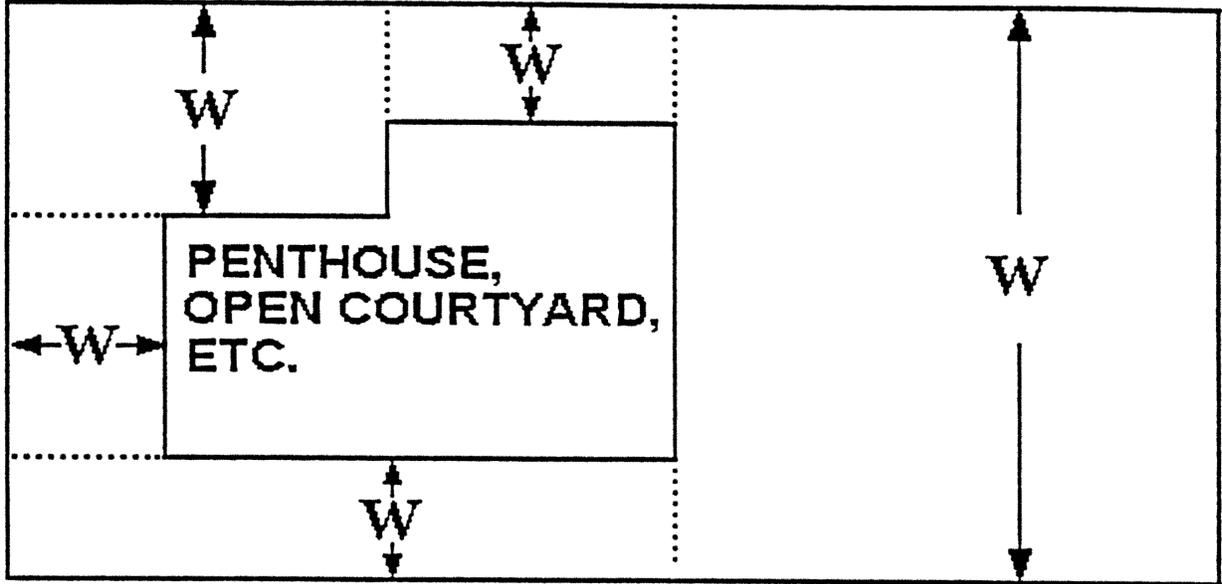
1.



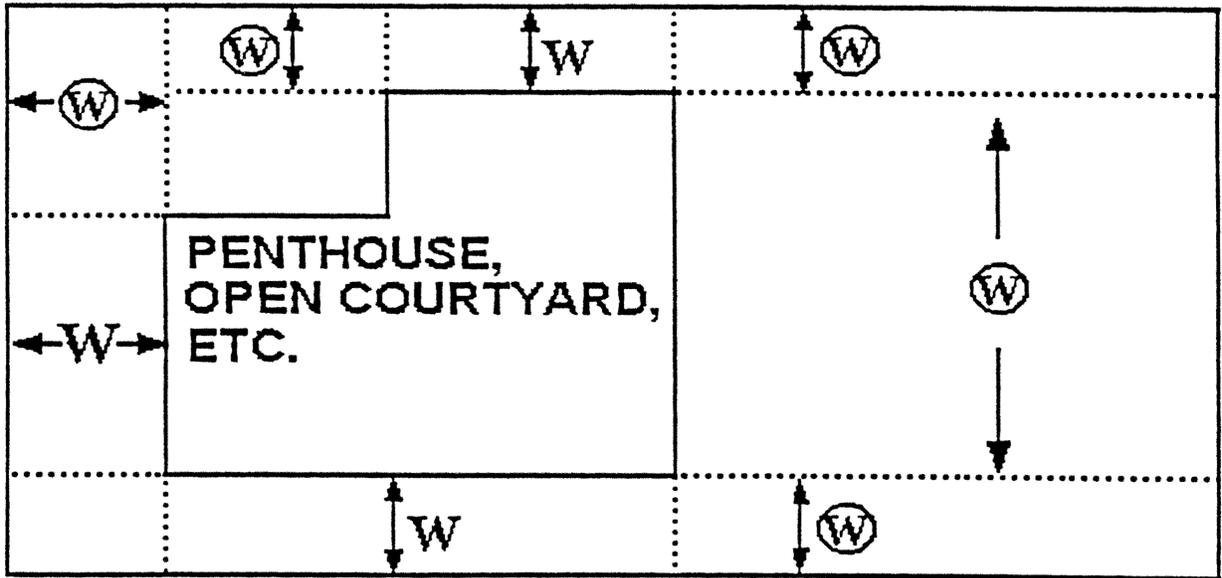
2.



Example E
Roofs with Penthouses, Open Courtyards, Additional Floors, etc.



CORRECT

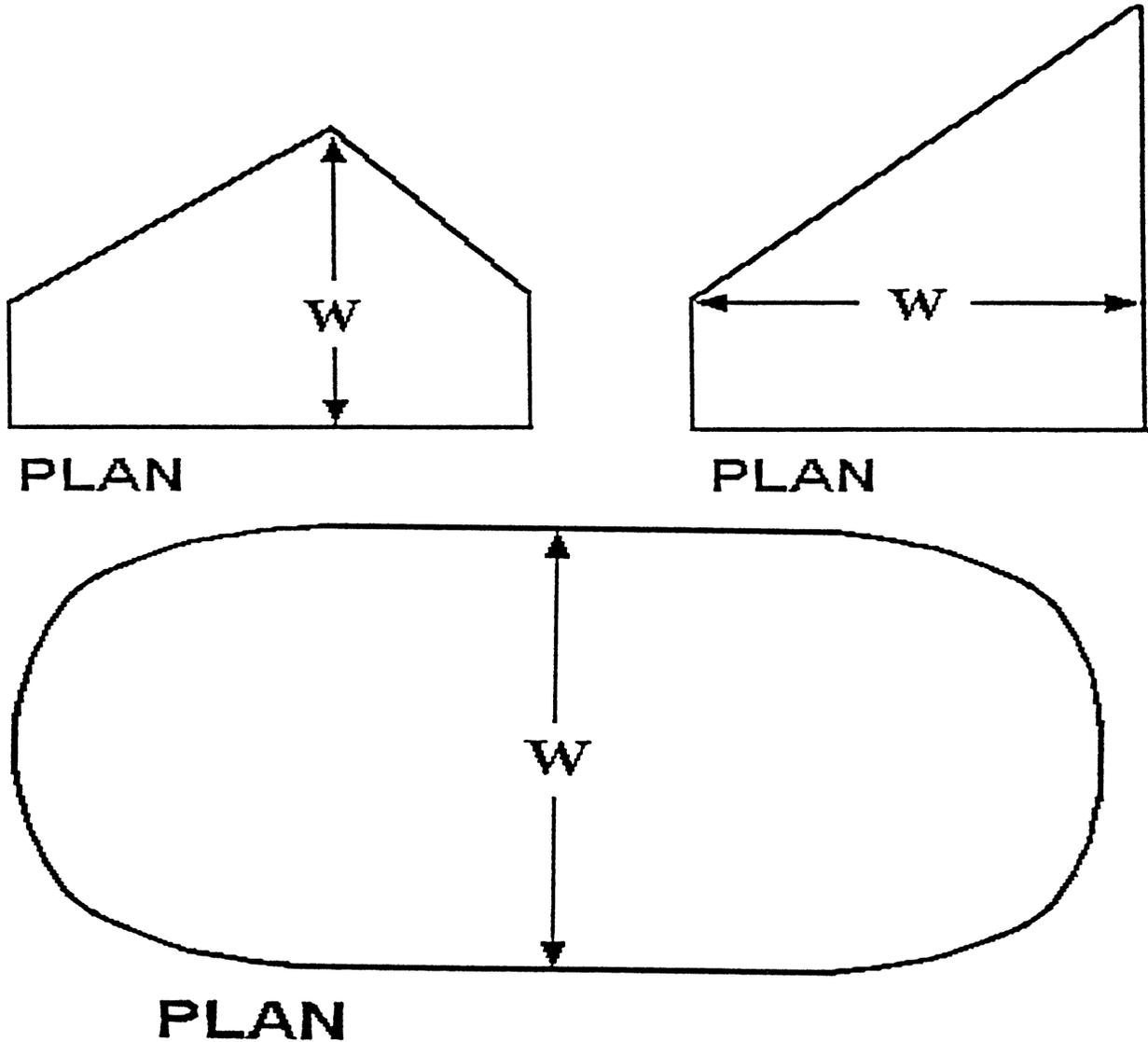


INCORRECT

Such roofs are to be divided into subareas by using dividing lines of minimum length to minimize the size and number of the areas which are potentially less than or equal to fifty feet (15.25 m) in width in order to limit the size of roof areas where the safety monitoring system alone can be used. Dotted lines are used in the examples to show the location of dividing lines.

Ⓜ denotes incorrect measurements of width.

Example F
Irregular, Nonrectangular Shaped Roofs



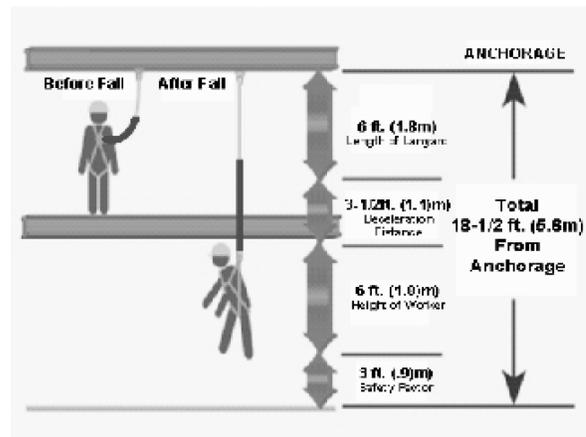
NEW SECTION

WAC 296-155-24624 Appendix B—Calculating fall clearance distance using a shock-absorbing lanyard and D-ring anchorage connector—Nonmandatory guidelines for complying with WAC 296-155-24613 (1)(d). Do the following to calculate the fall clearance distance using a shock-absorbing lanyard and D-ring anchorage connector:

- First, add the length of the shock-absorbing lanyard (six feet) to the maximum elongation of the shock absorber during deceleration (three and one-half feet) to the average height of a worker (six feet).

- Then, add a safety factor of three feet to allow for the possibility of an improperly fit full body harness, a taller than average worker and/or a miscalculation of distance.

- The suggested safe fall clearance distance for this example is eighteen and one-half feet.



PART C-1

FALL (~~RESTRAINT AND FALL ARREST~~) PROTECTION REQUIREMENTS FOR CONSTRUCTION

AMENDATORY SECTION (Amending WSR 96-24-051, filed 11/27/96, effective 2/1/97)

WAC 296-155-477 Stairways. (1) General. The following requirements apply to all stairways as indicated:

(a) Stairways that will not be a permanent part of the structure on which construction work is being performed shall have landings of not less than thirty inches (76 cm) in the direction of travel and extend at least twenty-two inches (56 cm) in width at every twelve feet (3.7 m) or less of vertical rise.

(b) Stairs shall be installed between 30 deg. and 50 deg. from horizontal.

(c) In all buildings or structures two or more stories or twenty-four feet or more in height or depth, suitable permanent or temporary stairways shall be installed.

(d) Stairways, ramps or ladders shall be provided at all points where a break in elevation of eighteen inches or more occurs in a frequently traveled passageway, entry or exit.

(e) A minimum of one stairway shall be provided for access and exit for buildings and structures to three stories or thirty-six feet; if more than three stories or thirty-six feet, two or more stairways shall be provided. Where two stairways are provided and work is being performed in the stairways, one shall be maintained clear for access between levels at all times.

(f) Wood frame buildings.

(i) The stairway to a second or higher floor shall be completed before studs are raised to support the next higher floor.

(ii) Roof and attic work areas of all buildings shall be provided with a safe means of access and egress, such as stairways, ramps or ladders.

(iii) Cleats shall not be nailed to studs to provide access to and egress from roof or other work areas.

(g) Steel frame buildings. Stairways shall extend to the uppermost floor that has been planked or decked. Ladders may be used above that point.

(h) Reinforced concrete or composite steel—Concrete buildings. Stairways shall extend to the lowermost floor upon which a complete vertical shoring system is in place. A minimum of two ladders at different locations for each floor may be used above this floor but not to exceed three floors.

(i) Riser height and tread depth shall be uniform within each flight of stairs, including any foundation structure used as one or more treads of the stairs. Variations in riser height or tread depth shall not be over 1/4-inch (0.6 cm) in any stairway system.

(j) Where doors or gates open directly on a stairway, a platform shall be provided, and the swing of the door shall not reduce the effective width of the platform to less than twenty inches (51 cm).

(k) Metal pan landings and metal pan treads, when used, shall be secured in place before filling with concrete or other material.

(l) All parts of stairways shall be free of hazardous projections, such as protruding nails.

(m) Slippery conditions on stairways shall be eliminated before the stairways are used to reach other levels.

(n) Employers are permitted to use alternating tread type stairs as long as they install, use, and maintain the stairs in accordance with manufacturer's recommendations and the following:

(i) The stair must be installed at an angle of seventy degrees or less.

(ii) The stair must be capable of withstanding a minimum uniform load of one hundred pounds per square foot with a design factor of 1.7, and the treads must be capable of carrying a minimum concentrated load of three hundred pounds at the center of any treadspan or exterior arc with a design factor of 1.7. If the stair is intended for greater loading, construction must allow for that loading.

(iii) The stair must be equipped with a handrail on each side to assist the user in climbing or descending.

(o) Due to space limitations, when a permanent stairway must be installed at an angle above fifty degrees, such an installation (commonly called an inclined or ship's ladder) shall have treads, open risers and handrails on both sides.

(p) Where ladders are permitted for access under subsection (1) of this section, means shall be provided for employee hoisting of tools and material, such as a well wheel and hoisting line or the equivalent, so employees will have both hands free for ascending and descending ladders.

(2) Temporary service. The following requirements apply to all stairways as indicated:

(a) Except during stairway construction, foot traffic is prohibited on stairways with pan stairs where the treads and/or landings are to be filled in with concrete or other material at a later date, unless the stairs are temporarily fitted with wood or other solid material at least to the top edge of each pan. Such temporary treads and landings shall be replaced when worn below the level of the top edge of the pan.

(b) Except during stairway construction, foot traffic is prohibited on skeleton metal stairs where permanent treads and/or landings are to be installed at a later date, unless the stairs are fitted with secured temporary treads and landings long enough to cover the entire tread and/or landing area.

(c) Treads for temporary service shall be made of wood or other solid material, and shall be installed the full width and depth of the stair.

(3) Stairrails and handrails. The following requirements apply to all stairways as indicated:

(a) Stairways having four or more risers or rising more than thirty inches (76 cm), whichever is less, shall be equipped with:

(i) At least one handrail; and

(ii) One stairrail system along each unprotected side or edge.

Note: When the top edge of a stairrail system also serves as a handrail, subdivision (g) of this subsection applies.

(b) Winding and spiral stairways shall be equipped with a handrail offset sufficiently to prevent walking on those portions of the stairways where the tread width is less than six inches (15 cm).

(c) The height of stairrails shall be as follows:

(i) Stairrails installed after the effective date of this standard, shall be not less than thirty-six inches (91.5 cm) from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

(ii) Stairrails installed before the effective date of this standard, shall be not less than thirty inches (76 cm) nor more than thirty-four inches (86 cm) from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

(d) Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members, shall be provided between the top rail of the stairrail system and the stairway steps.

(i) Midrails, when used, shall be located at a height midway between the top edge of the stairrail system and the stairway steps.

(ii) Screens or mesh, when used, shall extend from the top rail to the stairway step, and along the entire opening between top rail supports.

(iii) When intermediate vertical members, such as balusters, are used between posts, they shall be not more than (~~nineteen~~) nineteen inches (48 cm) apart.

(iv) Other structural members, when used, shall be installed such that there are no openings in the stairrail system that are more than nineteen inches (48 cm) wide.

(e) Handrails and the top rails of stairrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 n) applied within two inches (5 cm) of the top edge, in any downward or outward direction, at any point along the top edge.

(f) The height of handrails shall be not more than thirty-seven inches (94 cm) nor less than thirty inches (76 cm) from the upper surface of the handrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

(g) When the top edge of a stairrail system also serves as a handrail, the height of the top edge shall be not more than thirty-seven inches (94 cm) nor less than thirty-six inches (91.5 cm) from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

(h) Stairrail systems and handrails shall be so surfaced as to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.

(i) Handrails shall provide an adequate handhold for employees grasping them to avoid falling.

(j) The ends of stairrail systems and handrails shall be constructed so as not to constitute a projection hazard.

(k) Handrails that will not be a permanent part of the structure being built shall have a minimum clearance of three inches (8 cm) between the handrail and walls, stairrail systems, and other objects.

(l) Unprotected sides and edges of stairway landings shall be provided with guardrail systems. Guardrail system criteria are contained in chapter 296-155 WAC, Part (~~(K)~~) C-1, Fall protection requirements for construction.

AMENDATORY SECTION (Amending WSR 05-20-055, filed 10/3/05, effective 12/1/05)

WAC 296-155-655 General protection requirements.

(1) Surface encumbrances. All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

(2) Underground installations.

(a) The location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be located prior to opening an excavation.

(b) Utility companies or owners shall be contacted within established or customary local response times, advised of the proposed work, and asked to locate the underground utility installation prior to the start of actual excavation.

(c) When excavation operations approach the location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

(d) While the excavation is open, underground installations shall be protected, supported, or removed as necessary to safeguard employees.

(3) Access and egress.

(a) Structural ramps.

(i) Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

(ii) Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.

(iii) Structural members used for ramps and runways shall be of uniform thickness.

(iv) Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

(v) Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

(b) Means of egress from trench excavations. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

(4) Exposure to vehicular traffic. Employees exposed to vehicular traffic shall be provided with and shall wear high-visibility garments meeting the requirements of WAC 296-155-200, General requirements for personal protective equipment (PPE).

(5) Exposure to falling loads. No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with WAC 296-155-610 (2)(g),

to provide adequate protection for the operator during loading and unloading operations.

(6) Warning system for mobile equipment. When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

(7) Hazardous atmospheres.

(a) Testing and controls. In addition to the requirements set forth in parts B-1, C, and C-1 of this chapter (296-155 WAC) to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

(i) Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.

(ii) Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with chapter 296-842 WAC.

(iii) Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 10 percent of the lower flammable limit of the gas.

(iv) When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

(b) Emergency rescue equipment.

(i) Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

(ii) Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a lifeline securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

Note: See chapter 296-62 WAC, Part M for additional requirements applicable to confined space operations.

(8) Protection from hazards associated with water accumulation.

(a) Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins,

water removal to control the level of accumulating water, or use of a safety harness and lifeline.

(b) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

(c) If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with subdivisions (a) and (b) of this subsection.

(9) Stability of adjacent structures.

(a) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

(b) Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:

(i) A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

(ii) The excavation is in stable rock; or

(iii) A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or

(iv) A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

(c) Sidewalks, pavements, and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

(10) Protection of employees from loose rock or soil.

(a) Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

(b) Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

(11) Inspections.

(a) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous

atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

(b) Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

(12) Fall protection.

(a) Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with chapter 296-155 WAC, Part ((K)) C-1 shall be provided where walkways are 4 feet or more above lower levels.

(b) Adequate barrier physical protection shall be provided at all remotely located excavations. All wells, pits, shafts, etc., shall be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc., shall be backfilled.

AMENDATORY SECTION (Amending WSR 04-14-028, filed 6/29/04, effective 1/1/05)

WAC 296-155-682 Requirements for equipment and tools. (1) Bulk cement storage. Bulk storage bins, containers, and silos shall be equipped with the following:

(a) Conical or tapered bottoms; and

(b) Mechanical or pneumatic means of starting the flow of material.

(2) No employee shall be permitted to enter storage facilities unless the ejection system has been shut down and locked out in accordance with WAC 296-155-429.

(3) (~~(Safety belts.)~~) Harnesses, lanyards, lifelines or droplines, independently attached or attended, shall be used as prescribed in chapter 296-155 WAC, Part C-1, Fall protection requirements for construction.

(4) Concrete mixers. Concrete mixers with one cubic yard (.8 m³) or larger loading skips shall be equipped with the following:

(a) A mechanical device to clear the skip of materials; and

(b) Guardrails installed on each side of the skip.

(5) Power concrete trowels. Powered and rotating type concrete troweling machines that are manually guided shall be equipped with a control switch that will automatically shut off the power whenever the hands of the operator are removed from the equipment handles.

(6) Concrete buggies. Concrete buggy handles shall not extend beyond the wheels on either side of the buggy.

Note: Installation of knuckle guards on buggy handles is recommended.

(7) Runways.

(a) Runways shall be constructed to carry the maximum contemplated load with a safety factor of four, have a smooth running surface, and be of sufficient width for two buggies to pass. Single runs to have a minimum width of forty-two

inches with turnouts. Runways to have standard railings. Where motor driven concrete buggies are used, a minimum four-inches by four-inches wheel guard shall be securely fastened to outside edge of runways.

(b) All concrete buggy runways which are 12 inches or more above a work surface or floor, or ramps with more than 4 percent incline shall be considered "elevated" runways.

Exception: Small jobs utilizing only one concrete buggy, or larger jobs utilizing a "one-way traffic pattern" may be exempt from the requirements for "turnouts" or for "sufficient width for two buggies to pass."

Exemption: Runways less than 12 inches above the floor or ground which are utilized by hard-powered buggies only, may be exempt from the requirements for guardrails and wheelguards.

(8) Concrete pumps and placing booms.

(a) Definitions.

"Concrete delivery hose" means a flexible concrete delivery hose which has two end couplings.

"Concrete pump" means a construction machine that pumps concrete.

"Controls" means the devices used to operate a machine.

"Delivery systems" means the pipe, hoses and components, through which the concrete is pumped.

"Grooved end" means a pipe clamp pipe connection where a groove is machined or rolled directly into the outside of the pipe wall (for example: Victualic).

"Material pressure" means the pressure exerted on the concrete inside the delivery system.

"Placing boom and placing unit" means a manual or power driven, slewable working device which:

- Consists of one or more extendable or folding parts for supporting the concrete delivery system, and directs the discharge into the desired location; and

- May be mounted on trucks, trailers, or special vehicles.

"Qualified person" means someone who:

- Possesses a recognized degree or certificate of professional standing; or

- Has extensive knowledge, training, and experience; or

- Successfully demonstrated the ability to resolve problems relating to the work.

"Restraining devices" means a sling, cable, or equivalent device used to minimize excess movement of a delivery system in case of separation.

"Whip hoses" means a suspended hose that has only one coupling and is used to direct the delivery of concrete.

(b) Equipment requirements.

(i) Equipment identification tag.

The employer must ensure the following identification is furnished if originally identified by the manufacturer and on all pumps manufactured after January 1, 1998:

- The manufacturer's name;

- The year of manufacture;

- The model and serial number;

- The maximum material pressure;

- The maximum allowable pressure in the hydraulic system; and

and

- The maximum weight per foot of delivery system including concrete.

(ii) Manufacturer's manual.

The employer must have the manufacturer's operation/safety manual or equivalent available for each concrete pump or placing boom.

(iii) Unsafe condition of equipment.

If during an equipment inspection a condition is revealed that might endanger workers, the equipment must not be returned to service until the condition is corrected.

(iv) Controls.

Controls must have their function clearly marked.

(v) Hydraulic systems.

(A) Concrete pumps and placing booms hydraulic systems must have pressure relief valves to prevent cylinder and boom damage.

(B) Hydraulic systems must have hydraulic holding valves if hose or coupling failure could result in uncontrolled vertical movement.

(vi) Certification.

In the event of failure of a structural member, overloading, or contact with energized electric power lines and before return to service, the equipment must be certified safe by:

- The manufacturer; or
- An agent of the manufacturer; or
- A professional engineer.

(vii) Marking weight. A permanent, legible notice stating the total weight of the unit must be marked on:

- Trailer or skid mounted concrete pumps;
- Placing booms; and
- All major detachable components over five hundred pounds.

(viii) Lifting a pump.

A concrete pump must be lifted using the lift points specified by the manufacturer or a professional engineer.

(ix) Emergency shutoff.

A concrete pump must have a clearly labeled emergency stop switch that stops the pumping action.

(x) Inlet and outlet guarding.

(A) The waterbox must have a fixed guard to prevent unintentional access to the moving parts.

(B) The agitator must be guarded with a point of operation guard in accordance with chapter 296-806 WAC, Machine safety, and the guard must be:

- Hinged or bolted in place;
- At least three inches distance from the agitator;
- Be capable of supporting a load of two hundred fifty pounds.

(C) A person must not stand on the guard when the pump or agitator is running.

(xi) Outriggers.

(A) Outriggers must be used in accordance with the manufacturer's specifications.

(B) Concrete pump trucks manufactured after January 1, 1998, must have outriggers or jacks permanently marked to indicate the maximum loading they transmit to the ground.

(xii) Load on a placing boom.

(A) The manufacturer's or a licensed, registered, structural engineer's specifications for the placing boom must not be exceeded by:

- The weight of the load;
- The length and diameter of suspended hose;

- The diameter and weight of mounted pipe.

(B) A concrete placing boom must not be used to drag hoses or lift other loads.

(C) All engineering calculations regarding modifications must be:

- Documented;
- Recorded; and
- Available upon request.

(xiii) Pipe diameter thickness. The pipe wall thickness must be measured in accordance with the manufacturer's instruction, and:

- Be sufficient to maintain a burst pressure greater than the maximum pressure the pump can produce;
- The pipe sections must be replaced when measurements indicate wall thickness has been reduced to the limits specified by the manufacturer.

(xiv) Pipe clamps.

(A) Concrete must not be pumped through a delivery system with grooved ends, such as those for Victualic-type couplers.

(B) Pipe clamps must have a pressure rating at least equal to the pump pressure rating.

(C) Pipe clamp contact surfaces must be free of concrete and other foreign matter.

(D) If quick connect clamps are used, they must be pinned or secured to keep them from opening when used in a vertical application.

(xv) Delivery pipe.

(A) Delivery pipe between the concrete pump and the placing system must be supported and anchored to prevent movement and excessive loading on clamps.

(B) Double ended hoses must not be used as whip hoses.

(C) Attachments must not be placed on whip hoses (i.e., "S" hooks, valves, etc.).

Table 1, Nonmandatory
Recommended maximum yards per hour through hose

Hose Diameter	Hose Length (12' and less) Max. yards per hour	Hose Length (12' and longer) Max. yards per hour
2"	30	30
3"	90	50
4"	160	110
5"	See manufacturer specs	See manufacturer specs

• The above figures are based on a minimum of a 4" slump and a 5 sack mix.

• Variables in mix design can have an effect on these ratings.

• Aggregate should not exceed 1/3 the diameter of the delivery system.

(xvi) Restraining. A restraining device must:

- Be used on attachments suspended from the boom tips; and
- Have a load rating not less than one-fifth of its ultimate breaking strength.

(xvii) Equipment inspection.

(A) An inspection must be conducted annually for the first five years and semiannually thereafter and must include the following:

- Nondestructive testing of all sections of the boom by a method capable of ensuring the structural integrity of the boom;
- Be conducted by a qualified person or by a private agency.

(B) The inspection report must be documented and a copy maintained by the employer and in each unit inspected. It must contain the following:

- The identification, including the serial numbers and manufacturer's name, of the components and parts inspected and tested;
- A description of the test methods and results;
- The names and qualifications of the people performing the inspection;
- A listing of necessary repairs; and
- The signature of the manufacturer, an agent of the manufacturer, or a qualified person.

Note: See WAC 296-155-628 (8)(d) for the inspection worksheet criteria.

(xviii) Equipment repair.

(A) Replacement parts must meet or exceed the original manufacturer's specifications or be certified by a registered professional structural engineer.

(B) A properly certified welder must perform any welding on the boom, outrigger, or structural component.

(xix) Compressed air cleaning of the piping system. To clean the piping system:

(A) The pipe system must be securely anchored before it is cleaned out.

(B) The flexible discharge hose must be removed.

(C) Workers not essential to the cleaning process must leave the vicinity.

(D) The compressed air system must have a shutoff valve.

(E) Blow out caps must have a bleeder valve to relieve air pressure.

(F) A trap basket or containment device (i.e., concrete truck, concrete bucket) must be available and secured to receive the clean out device.

(G) Delivery pipes must be depressurized before clamps and fittings are released.

(c) Qualification and training requirements.

(i) Operator trainee—Qualification requirements. To be qualified to become a concrete pump operator, the trainee must meet the following requirements unless it can be shown that failure to meet the requirements will not affect the operation of the concrete pump boom.

(A) Vision requirements:

- At least 20/30 Snellen in one eye and 20/50 in the other. Corrective lenses may be used to fulfill this requirement;
- Ability to distinguish colors, regardless of position, if color differentiation is required;
- Normal depth perception and field of vision.

(B) Hearing requirements: Hearing adequate to meet operational demands. Corrective devices may be used to fulfill this requirement.

(ii) Operator trainee—Training requirements. Operator trainee training requirements include, but are not limited to, the following:

(A) Demonstrated their ability to read and comprehend the pump manufacturer's operation and safety manual.

(B) Be of legal age to perform the duties required.

(C) Received documented classroom training and testing (as applicable) on these recommended subjects:

- Driving, operating, cleaning and maintaining concrete pumps, placing booms, and related equipment;

- Jib/boom extensions;

- Boom length/angle;

- Manufacturer's variances;

- Radii;

- Range diagram, stability, tipping axis; and

- Structural/tipping determinations.

(D) Maintain and have available upon request a copy of all training materials and a record of training.

(E) Satisfactorily completed a written examination for the concrete pump boom for which they are becoming qualified. It will cover:

- Safety;

- Operational characteristics and limitations; and

- Controls.

(ii) Operator—Qualification requirements. Operators will be considered qualified when they have:

(A) Completed the operator trainee requirements listed in (c)(i) and (ii) of this subsection.

(B) Completed a program of training conducted by a qualified person, including practical experience under the direct supervision of a qualified person.

(C) Passed a practical operating examination of their ability to operate a specific model and type of equipment. Possess the knowledge and the ability to implement emergency procedures.

(D) Possess the knowledge regarding the restart procedure after emergency stop has been activated.

(E) Possess the proper class of driver's license to drive the concrete pump truck.

(F) Demonstrate the ability to comprehend and interpret all labels, safety decals, operator's manuals, and other information required to safely operate the concrete pump.

(G) Be familiar with the applicable safety requirements.

(H) Understand the responsibility for equipment maintenance.

(d) Concrete pump inspection worksheet criteria. Concrete pump trucks will be inspected using the following criteria: The manufacturer's required inspection criteria will be followed in all instances.

Note: DOT requirements for inspections - Ref. 49.C.F.R.396.11, Driver Vehicle Inspections and 396.13, Driver Pre-Trip Inspections; and WAC 296-155-610.

(i) Hydraulic systems.

(A) Oil level;

(B) Hoses;

(C) Fittings;

(D) Holding valves;

(E) Pressure settings;

(F) Hydraulic cylinders;

(G) Ensure that the emergency stop system is functioning properly;

(H) All controls clearly marked.

(ii) Electrical.

(A) All systems functioning properly.

(B) All remote control functions are operating properly.

Ensure that the emergency stop system is functioning properly.

(C) All controls clearly marked.

(iii) Structural.

(A) Visual inspection for cracks, corrosion, and deformations of the concrete pump with placing boom structure, and all load carrying components such as outriggers, cross frames, torsion box beams, and delivery line support structures that may lead to nondestructive testing.

(B) Visual examination of all links, pivots, pins, and bolts.

(C) Vertical and horizontal movement at the turret, turntable, rotation gear lash, bearing tolerances, not to exceed manufacturer's specifications.

(iv) Piping systems.

(A) Wall thickness must not exceed original manufacturer's specifications.

(B) Mounting hardware for attaching delivery system.

(C) Correct clamps and safety pins.

(v) Safety decals.

All safety decals shall be in place as required by the manufacturer.

(9) Concrete buckets.

(a) Concrete buckets equipped with hydraulic or pneumatic gates shall have positive safety latches or similar safety devices installed to prevent premature or accidental dumping.

(b) Concrete buckets shall be designed to prevent concrete from hanging up on top and the sides.

(c) Riding of concrete buckets for any purpose shall be prohibited, and vibrator crews shall be kept out from under concrete buckets suspended from cranes or cableways.

(d) When discharging on a slope, the wheels of ready-mix trucks shall be blocked and the brakes set to prevent movement.

(10) Tremies. Sections of tremies and similar concrete conveyances shall be secured with wire rope (or equivalent materials in addition to the regular couplings or connections).

(11) Bull floats. Bull float handles, used where they might contact energized electrical conductors, shall be constructed of nonconductive material or insulated with a nonconductive sheath whose electrical and mechanical characteristics provide the equivalent protection of a handle constructed of nonconductive material.

(12) Masonry saws shall be constructed, guarded, and operated in accordance with WAC 296-155-367 (1) through (4).

(13) Lockout/tagout procedures. No employee shall be permitted to perform maintenance or repair activity on equipment (such as compressors, mixers, screens, or pumps used for concrete and masonry construction activities) where the inadvertent operation of the equipment could occur and cause injury, unless all potentially hazardous energy sources have been locked out and tagged in accordance with chapter 296-155 WAC, Part I.

AMENDATORY SECTION (Amending WSR 10-22-105, filed 11/2/10, effective 1/1/11)

WAC 296-155-706 Structural steel assembly. (1) Structural stability must be maintained at all times during the erection process.

Note: Federal Highway Administration (FHWA) regulations incorporate by reference a number of standards, policies, and standard specifications published by the American Association of State Highway and Transportation Officials (AASHTO) and other organizations. (See 23 C.F.R. 625.4.) Many of these incorporated provisions may be relevant to maintaining structural stability during the erection process. For instance, as of May 17, 2010, in many cases FHWA requires a registered engineer to prepare and seal working drawings for falsework used in highway bridge construction. (See *AASHTO Specifications for Highway Bridges, Div. II, Sec. 3.2.1, 15th edition, 1992*, which FHWA incorporates by reference in 23 C.F.R. 625.4.) FHWA also encourages compliance with AASHTO Specifications that the FHWA regulations do not currently incorporate by reference. (See <http://www.fhwa.dot.gov/bridge/lrfd/index.htm>.)

• Make sure that multistory structures have the following:

– Permanent floors installed as the erection of structural members progress;

– No more than eight stories between the erection floor and the upper-most permanent floor; and

– No more than four floors or forty-eight feet (14.6 m), whichever is less, of unfinished bolting or welding above the foundation or uppermost permanent secured floor.

Exception: The above applies except where the structural integrity is maintained as a result of design.

(2) Walking/working surfaces.

(a) Shear connectors and other similar devices.

(i) Shear connectors, reinforcing bars, deformed anchors or threaded studs must not be attached to the top flanges of beams, joists or beam attachments so they project vertically from or horizontally across the top flange of the member until after the metal decking, or other walking/working surface has been installed. This becomes a tripping hazard. Examples of shear connectors are headed steel studs, steel bars or steel lugs.

(ii) Installation of shear connectors on composite floors. When shear connectors are used in construction of composite floors, roofs and bridge decks, employees must lay out and install the shear connectors after the metal decking has been installed, using the metal decking as a working platform.

(b) Slip resistance of metal decking.

(c) Safe access must be provided to the working level. Employees must not slide down ropes, columns, or ladders.

(3) Plumbing-up.

(a) When deemed necessary by a competent person, plumbing-up equipment must be installed in conjunction with the steel erection process to ensure the stability of the structure.

(b) When used, plumbing-up equipment must be in place and properly installed before the structure is loaded with construction material such as loads of joists, bundles of decking or bundles of bridging.

(c) Plumbing-up equipment must be removed only with the approval of a competent person.

(4) Metal decking.

(a) Hoisting, landing and placing of metal decking bundles.

(i) Bundle packaging and strapping must not be used for hoisting unless specifically designed for that purpose.

(ii) If loose items such as dunnage, flashing, or other materials are placed on the top of metal decking bundles to be hoisted, such items must be secured to the bundles.

(iii) Bundles of metal decking on joists must be landed in accordance with WAC 296-155-709 (5)(d).

(iv) Metal decking bundles must be landed on framing members so that enough support is provided to allow the bundles to be unbanded without dislodging the bundles from the supports.

(v) At the end of the shift or when environmental or job site conditions require, metal decking must be secured against displacement.

(b) Roof and floor holes and openings. Metal decking at roof and floor holes and openings must be installed as follows:

(i) Framed metal deck openings must have structural members turned down to allow continuous deck installation except where not allowed by structural design constraints or constructibility.

(ii) Roof and floor holes and openings must be decked over. Where large size, configuration or other structural design does not allow openings to be decked over (such as elevator shafts, stair wells, etc.) employees must be protected in accordance with chapter 296-155 WAC, Part C-1 (~~or Part K~~), Fall protection requirements for construction.

(iii) Metal decking holes and openings must not be cut until immediately prior to being permanently filled with the equipment or structure needed or intended to fulfill its specific use and which meets the strength requirements of (c) of this subsection, or must be immediately covered.

(c) **Covering roof and floor openings.** Smoke dome or skylight fixtures that have been installed are not considered covers for the purpose of this section unless they meet the strength requirements of (~~WAC 296-155-505 (4)(g) (Part K)~~) chapter 296-155 WAC, Part C-1, Fall protection requirements for construction.

(d) **Decking gaps around columns.** Wire mesh, exterior plywood, or equivalent, must be installed around columns where planks or metal decking do not fit tightly. The materials used must be of sufficient strength to provide fall protection for personnel and prevent objects from falling through.

(e) Installation of metal decking.

(i) Metal decking must be laid tightly and immediately secured upon placement to prevent accidental movement or displacement.

(ii) During initial placement, metal decking panels must be placed to ensure full support by structural members.

(f) Derrick floors.

(i) A derrick floor must be fully decked and or planked and the steel member connections completed to support the intended floor loading.

(ii) Temporary loads placed on a derrick floor must be distributed over the underlying support members so as to prevent local overloading of the deck material.

AMENDATORY SECTION (Amending WSR 02-13-115, filed 6/19/02, effective 9/1/02)

WAC 296-155-716 Fall protection. (1) General requirements.

(a) Fall protection will be in accordance with chapter 296-155 WAC, Part(~~(s)~~) C-1 (~~(and K)~~), Fall protection requirements for construction.

(b) During steel erection activities, fall protection must be as required by chapter 296-155 WAC, Part(~~(s)~~) C-1 (~~(and K)~~). Additionally, on multistory structures, perimeter safety cables must be installed at the final interior and exterior perimeters of the floors as soon as metal decking has been installed. See Appendix D.

(2) **Connectors.** Each connector must: Have completed connector training in accordance with WAC 296-155-717.

(3) **Custody of fall protection.** Fall protection provided by the steel erector must remain in the area where steel erection activity has been completed, to be used by other trades, only if the controlling contractor or its authorized representative:

(a) Has directed the steel erector to leave the fall protection in place; and

(b) Has inspected and accepted control and responsibility of the fall protection prior to authorizing persons other than steel erectors to work in the area.

AMENDATORY SECTION (Amending WSR 96-24-051, filed 11/27/96, effective 2/1/97)

WAC 296-155-740 Cofferdams. (1) If overtopping of the cofferdam by high waters is possible, means shall be provided for controlled flooding of the work area.

(2) Warning signals for evacuation of employees in case of emergency shall be developed and posted.

(3) Cofferdam walkways, bridges, or ramps with at least two means of rapid exit, shall be provided with guardrails as specified in Part (~~K~~) C-1 of this chapter.

(4) Manways and ladderways shall be installed separately from the hoistways and partitioned off to prevent hoisted materials from protruding into or falling into manways and/or ladderways.

(5) Pumping equipment shall be located on substantially constructed platforms and where installed in such a position that persons must work below, toe boards shall be installed on the platform.

(6) Cofferdams located close to navigable shipping channels shall be protected from vessels in transit, where possible.

AMENDATORY SECTION (Amending WSR 01-17-033, filed 8/8/01, effective 9/1/01)

WAC 296-155-745 Compressed air. (1) General provisions.

(a) There shall be present, at all times, at least one competent person designated by and representing the employer,

who shall be familiar with this part in all respects and responsible for full compliance with these and other applicable parts.

(b) Every employee shall be instructed in the rules and regulations which concern their safety or the safety of others.

(2) Medical attendance, examination, and regulations.

(a) There shall be retained one or more licensed physicians familiar with and experienced in the physical requirements and the medical aspects of compressed air work and the treatment of decompression illness. They shall be available at all times while work is in progress in order to provide medical supervision of employees employed in compressed air work. They shall be physically qualified and be willing to enter a pressurized environment.

(b) No employee shall be permitted to enter a compressed air environment until they have been examined by the physician and reported to be physically qualified to engage in such work.

(c) In the event an employee is absent from work for 10 days, or is absent due to sickness or injury, they shall not resume work until they are reexamined by the physician, and their physical condition reported, as provided in this subsection, to be such as to permit them to work in compressed air.

(d) After an employee has been employed continuously in compressed air for a period designated by the physician, but not to exceed 1 year, the employee shall be reexamined by the physician to determine if they are still physically qualified to engage in compressed air work.

(e) Such physician shall at all times keep a complete and full record of examinations made by themselves. The physician shall also keep an accurate record of any decompression illness or other illness or injury incapacitating any employee for work, and of all loss of life that occurs in the operation of a tunnel, caisson, or other compartment in which compressed air is used.

(f) Records shall be available for the inspection by the director or his/her representatives, and a copy thereof shall be forwarded to the department within 48 hours following the occurrence of the accident, death, injury, or decompression illness. It shall state as fully as possible the cause of said death or decompression illness, and the place where the injured or sick employee was taken, and such other relative information as may be required by the director.

(g) A fully equipped first-aid station shall be provided at each tunnel project regardless of the number of persons employed. An ambulance or transportation suitable for a litter case shall be at each project.

(h) Where tunnels are being excavated from portals more than 5 road miles apart, a first-aid station and transportation facilities shall be provided at each portal.

(i) A medical lock shall be established and maintained in immediate working order whenever air pressure in the working chamber is increased above the normal atmosphere.

(j) The medical lock shall:

(i) Have at least 6 feet of clear headroom at the center, and be subdivided into not less than two compartments;

(ii) Be readily accessible to employees working under compressed air;

(iii) Be kept ready for immediate use for at least 5 hours subsequent to the emergence of any employee from the working chamber;

(iv) Be properly heated, lighted and ventilated;

(v) Be maintained in a sanitary condition;

(vi) Have a nonshatterable port through which the occupant(s) may be kept under constant observation;

(vii) Be designed for a working pressure of 75 p.s.i.g.;

(viii) Be equipped with internal controls which may be overridden by external controls;

(ix) Be provided with air pressure gauges to show the air pressure within each compartment to observers inside and outside the medical lock;

(x) Be equipped with a manual type sprinkler system that can be activated inside the lock or by the outside lock tender;

(xi) Be provided with oxygen lines and fittings leading into external tanks. The lines shall be fitted with check valves to prevent reverse flow. The oxygen system inside the chamber shall be of a closed circuit design and be so designed as to automatically shut off the oxygen supply whenever the fire system is activated.

(xii) Be in constant charge of an attendant under the direct control of the retained physician. The attendant shall be trained in the use of the lock and suitably instructed regarding steps to be taken in the treatment of employee exhibiting symptoms compatible with a diagnosis of decompression illness;

(xiii) Be adjacent to an adequate emergency medical facility;

(xiv) The medical facility shall be equipped with demand-type oxygen inhalation equipment approved by the U.S. Bureau of Mines or Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH);

(xv) Be capable of being maintained at a temperature, in use, not to exceed 90°F. nor be less than 70°F.; and

(xvi) Be provided with sources of air, free of oil and carbon monoxide, for normal and emergency use, which are capable of raising the air pressure in the lock from 0 to 75 p.s.i.g. in 5 minutes.

(k) Identification badges shall be furnished to all employees, indicating that the wearer is a compressed air worker. A permanent record shall be kept of all identification badges issued. The badge shall give the employee's name, address of the medical lock, the telephone number of the licensed physician for the compressed air project, and contain instructions that in case of emergency of unknown or doubtful cause or illness, the wearer shall be rushed to the medical lock. The badge shall be worn at all times—off the job, as well as on the job.

(3) Telephone and signal communication. Effective and reliable means of communication, such as bells, whistles, or telephones, shall be maintained at all times between all the following locations;

(a) The working chamber face;

(b) The working chamber side of the man lock near the door;

(c) The interior of the man lock;

(d) Lock attendant's station;

(e) The compressor plant;

- (f) The first-aid station;
 - (g) The emergency lock (if one is required); and
 - (h) The special decompression chamber (if one is required).
- (4) Signs and records.
- (a) The time of decompression shall be posted in each man lock as follows:

TIME OF DECOMPRESSION FOR THIS LOCK

..... pounds to pounds in minutes.
 pounds to pounds in minutes.

(Signed by)
 (Superintendent)

This form shall be posted in the man lock at all times.

(b) Any code of signals used shall be conspicuously posted near workplace entrances and such other locations as may be necessary to bring them to the attention of all employees concerned.

(c) For each 8-hour shift, a record of employees employed under air pressure shall be kept by an employee who shall remain outside the lock near the entrance. This record shall show the period each employee spends in the air chamber and the time taken from decompression. A copy shall be submitted to the appointed physician after each shift.

(5) Compression.

(a) Every employee going under air pressure for the first time shall be instructed on how to avoid excessive discomfort.

(b) During the compression of employees, the pressure shall not be increased to more than 3 p.s.i.g. within the first minute. The pressure shall be held at 3 p.s.i.g. and again at 7 p.s.i.g. sufficiently long to determine if any employees are experiencing discomfort.

(c) After the first minute the pressure shall be raised uniformly and at a rate not to exceed 10 p.s.i. per minute.

(d) If any employee complains of discomfort, the pressure shall be held to determine if the symptoms are relieved. If, after 5 minutes the discomfort does not disappear, the lock attendant shall gradually reduce the pressure until the employee signals that the discomfort has ceased. If the employee does not indicate that the discomfort has disappeared, the lock attendant shall reduce the pressure to atmospheric and the employee shall be released from the lock.

(e) No employee shall be subjected to pressure exceeding 50 pounds per square inch except in an emergency.

(6) Decompression.

(a) Decompression to normal condition shall be in accordance with the decompression tables in Appendix A of this part.

(b) In the event it is necessary for an employee to be in compressed air more than once in a 24-hour period, the appointed physician shall be responsible for the establishment of methods and procedures of decompression applicable to repetitive exposures.

(c) If decanting is necessary, the appointed physician shall establish procedures before any employee is permitted to be decompressed by decanting methods. The period of time that the employees spend at atmospheric pressure

between the decompression following the shift and recompression shall not exceed 5 minutes.

(7) Man locks and special decompression chambers.

(a) Man locks.

(i) Except in emergency, no employees employed in compressed air shall be permitted to pass from the working chamber to atmospheric pressure until after decompression, in accordance with the procedures in this part.

(ii) The lock attendant in charge of a man lock shall be under the direct supervision of the appointed physician. The lock attendant shall be stationed at the lock controls on the free air side during the period of compression and decompression and shall remain at the lock control station whenever there are persons in the working chamber or in the man lock.

(iii) Except where air pressure in the working chamber is below 12 p.s.i.g., each man lock shall be equipped with automatic controls which, through taped programs, cams, or similar apparatus, shall automatically regulate decompressions. It shall also be equipped with manual controls to permit the lock attendant to override the automatic mechanism in the event of an emergency, as provided in item (viii) of this subdivision.

(iv) A manual control, which can be used in the event of an emergency, shall be placed inside the man lock.

(v) A clock, thermometer, and continuous recording pressure gauge with a 4-hour graph shall be installed outside of each man lock and shall be changed prior to each shift's decompression. The chart shall be of sufficient size to register a legible record of variations in pressure within the man lock and shall be visible to the lock attendant. A copy of each graph shall be submitted to the appointed physician after each shift. In addition, a pressure gauge, clock, and thermometer shall also be installed in each man lock. Additional fittings shall be provided so that the test gauges may be attached whenever necessary

(vi) Except where air pressure is below 12 p.s.i.g. and there is no danger of rapid flooding, all caissons having a working area greater than 150 square feet, and each bulkhead in tunnels of 14 feet or more in diameter, or equivalent area, shall have at least two locks in perfect working condition, one of which shall be used exclusively as a man lock, the other, as a materials lock.

(vii) Where only a combination man-and-materials lock is required, this single lock shall be of sufficient capacity to hold the employees constituting two successive shifts.

(viii) Emergency locks shall be large enough to hold an entire heading shift and a limit maintained of 12 p.s.i.g. There shall be a chamber available for oxygen decompression therapy to 28 p.s.i.g.

(ix) The man lock shall be large enough so that those using it are not compelled to be in a cramped position and shall not have less than 5 feet clear head room at the center and a minimum of 30 cubic feet of air space per occupant.

(x) Locks on caissons shall be so located that the bottom door shall be not less than 3 feet above the water level surrounding the caisson on the outside. (The water level, where it is affected by tides, is construed to mean high tide.)

(xi) In addition to the pressure gauge in the locks, an accurate pressure gauge shall be maintained on the outer and

inner side of each bulkhead. These gauges shall be accessible at all times and shall be kept in accurate working order.

(xii) Man locks shall have an observation port at least 4 inches in diameter located in such a position that all occupants of the man lock may be observed from the working chamber and from the free air side of the lock.

(xiii) Adequate ventilation in the lock shall be provided.

(xiv) Man locks shall be maintained at a minimum temperature of 70°F.

(xv) When locks are not in use and employees are in the working chamber, lock doors shall be kept open to the working chamber, where practicable.

(xvi) Provision shall be made to allow for rescue parties to enter the tunnel if the working force is disabled.

(xvii) A special decompression chamber of sufficient size to accommodate the entire force of employees being decompressed at the end of a shift shall be provided whenever the regularly established working period requires total time of decompression exceeding 75 minutes.

(b) Special decompression chamber.

(i) The headroom in the special decompression chamber shall be not less than a minimum 7 feet and the cubical content shall provide at least 50 cubic feet of airspace for each employee. For each occupant, there shall be provided 4 square feet of free walking area and 3 square feet of seating space, exclusive of area required for lavatory and toilet facilities. The rated capacity shall be based on the stated minimum space per employee and shall be posted at the chamber entrance. The posted capacity shall not be exceeded, except in case of emergency.

(ii) Each special decompression chamber shall be equipped with the following:

(A) A clock or clocks suitably placed so that the attendant and the chamber occupants can readily ascertain the time;

(B) Pressure gauges which will indicate to the attendants and to the chamber occupants the pressure in the chamber;

(C) Valves to enable the attendant to control the supply and discharge of compressed air into and from the chamber.

(D) Valves and pipes, in connection with the air supply and exhaust, arranged so that the chamber pressure can be controlled from within and without;

(E) Effective means of oral intercommunication between the attendant, occupants of the chamber, and the air compressor plant; and

(F) An observation port at the entrance to permit observation of the chamber occupants.

(iii) Seating facilities in special decompression chambers shall be so arranged as to permit a normal sitting posture without cramping. Seating space, not less than 18 inches by 24 inches wide, shall be provided per occupant.

(iv) Adequate toilet and washing facilities, in a screened or enclosed recess, shall be provided. Toilet bowls shall have a built-in protector on the rim so that an air space is created when the seat lid is closed.

(v) Fresh and pure drinking water shall be available. This may be accomplished by either piping water into the special decompression chamber and providing drinking fountains, or by providing individual canteens, or by some other sanitary means. Community drinking vessels are prohibited.

(vi) No refuse or discarded material of any kind shall be permitted to accumulate, and the chamber shall be kept clean.

(vii) Unless the special decompression chamber is serving as the man lock to atmospheric pressure, the special decompression chamber shall be situated, where practicable, adjacent to the man lock on the atmospheric pressure side of the bulkhead. A passageway shall be provided, connecting the special chamber with the man lock, to permit employees in the process of decompression to move from the man lock to the special chamber without a reduction in the ambient pressure from that designated for the next stage of decompression. The passageway shall be so arranged as to not interfere with the normal operation of the man lock, nor with the release of the occupants of the special chamber to atmospheric pressure upon the completion of the decompression procedure.

(8) Compressor plant and air supply.

(a) At all times there shall be a thoroughly experienced, competent, and reliable person on duty at the air control valves as a gauge tender who shall regulate the pressure in the working areas. During tunneling operations, one gauge tender may regulate the pressure in not more than two headings: Provided; That the gauges and controls are all in one location. In caisson work, there shall be a gauge tender for each caisson.

(b) The low air compressor plant shall be of sufficient capacity to not only permit the work to be done safely, but shall also provide a margin to meet emergencies and repairs.

(c) Low air compressor units shall have at least two independent and separate sources of power supply and each shall be capable of operating the entire low air plant and its accessory systems.

(d) The capacity, arrangement, and number of compressors shall be sufficient to maintain the necessary pressure without overloading the equipment and to assure maintenance of such pressure in the working chamber during periods of breakdown, repair, or emergency.

(e) Switching from one independent source of power supply to the other shall be done periodically to ensure that workability of the apparatus in an emergency.

(f) Duplicate low-pressure air feedlines and regulating valves shall be provided between the source of air supply and a point beyond the locks with one of the lines extending to within 100 feet of the working face.

(g) All high-pressure and low-pressure air supply lines shall be equipped with check valves.

(h) Low-pressure air shall be regulated automatically. In addition, manually operated valves shall be provided for emergency conditions.

(i) The air intakes for all air compressors shall be located at a place where fumes, exhaust gases, and other air contaminants will be at a minimum.

(j) Gauges indicating the pressure in the working chamber shall be installed in the compressor building, the lock attendant's station, and at the employer's field office.

(9) Ventilation and air quality.

(a) Exhaust valves and exhaust pipes shall be provided and operated so that the working chamber shall be well ventilated, and there shall be no pockets of dead air. Outlets may be required at intermediate points along the main low-pres-

sure air supply line to the heading to eliminate such pockets of dead air. The quantity of ventilation air shall be not less than 30 cubic feet per minute.

(b) The air in the workplace shall be analyzed by the employer not less than once each shift, and records of such tests shall be kept on file at the place where the work is in progress. The test results shall be within the threshold limit values specified in part B of this chapter, for hazardous gases, and within 10 percent of the lower explosive limit of flammable gases. If these limits are not met, immediate action to correct the situation shall be taken by the employer.

(c) The temperature of all working chambers which are subjected to air pressure shall, by means of after-coolers or other suitable devices, be maintained at a temperature not to exceed 85°F.

(d) Forced ventilation shall be provided during decompression. During the entire decompression period, forced ventilation through chemical or mechanical air purifying devices that will ensure a source of fresh air shall be provided.

(e) Whenever heat-producing machines (moles, shields) are used in compressed air tunnel operations, a positive means of removing the heat build-up at the heading shall be provided.

(10) Electricity.

(a) All lighting in compressed-air chambers shall be by electricity exclusively, and two independent electric-lighting systems with independent sources of supply shall be used. The emergency source shall be arranged to become automatically operative in the event of failure of the regularly used source.

(b) The minimum intensity of light on any walkway, ladder, stairway, or working level shall be not less than 10 foot-candles, and in all workplaces the lighting shall at all times be such as to enable employees to see clearly.

(c) All electrical equipment, and wiring for light and power circuits, shall comply with requirements of Part I, of this standard, for use in damp, hazardous, high temperature, and compressed air environments.

(d) External parts of lighting fixtures and all other electrical equipment, when within 8 feet of the floor, shall be constructed of noncombustible, nonabsorptive, insulating materials, except that metal may be used if it is effectively grounded.

(e) Portable lamps shall be equipped with noncombustible, nonabsorptive, insulating sockets, approved handles, basket guards, and approved cords.

(f) The use of worn or defective portable and pendant conductors is prohibited.

(11) Sanitation.

(a) Sanitary, heated, lighted, and ventilated dressing rooms and drying rooms shall be provided for all employees engaged in compressed air work. Such rooms shall contain suitable benches and lockers. Bathing accommodations (showers at the ratio of one to 10 employees per shift), equipped with running hot and cold water, and suitable and adequate toilet accommodations, shall be provided. One toilet for each 15 employees, or fractional part thereof, shall be provided.

(b) When the toilet bowl is shut by a cover, there should be an air space so that the bowl or bucket does not implode when pressure is increased.

(c) All parts of caissons and other working compartments shall be kept in a sanitary condition.

(12) Fire prevention and protection.

(a) Firefighting equipment shall be available at all times and shall be maintained in working condition.

(b) While welding or flame-cutting is being done in compressed air, a firewatch with a fire hose or approved extinguisher shall stand by until such operation is completed.

(c) Shafts and caissons containing flammable material of any kind, either above or below ground, shall be provided with a waterline and a fire hose connected thereto, so arranged that all points of the shaft or caisson are within reach of the hose stream.

(d) Fire hose shall be at least 1 1/2 inches in nominal diameter; the water pressure shall at all times be adequate for efficient operation of the type of nozzle used; and the water supply shall be such as to ensure an uninterrupted flow. Fire hose, when not in use, shall be located or guarded to prevent injury thereto.

(e) The power house, compressor house, and all buildings housing ventilating equipment, shall be provided with at least one hose connection in the waterline, with a fire hose connected thereto. A fire hose shall be maintained within reach of structures of wood over or near shafts.

(f) Tunnels shall be provided with a 2-inch minimum diameter waterline extending into the working chamber and to within 100 feet of the working face. Such line shall have hose outlets with 100 feet of fire hose attached and maintained as follows: One at the working face; one immediately inside of the bulkhead of the working chamber; and one immediately outside such bulkhead. In addition, hose outlets shall be provided at 200-foot intervals throughout the length of the tunnel, and 100 feet of fire hose shall be attached to the outlet nearest to any location where flammable material is being kept or stored or where any flame is being used.

(g) In addition to fire hose protection required by this part, on every floor of every building not under compressed air, but used in connection with the compressed air work, there shall be provided at least one approved fire extinguisher of the proper type for the hazards involved. At least two approved fire extinguishers shall be provided in the working chamber as follows: One at the working face and one immediately inside the bulkhead (pressure side). Extinguishers in the working chamber shall use water as the primary extinguishing agent and shall not use any extinguishing agent which could be harmful to the employees in the working chamber. The fire extinguisher shall be protected from damage.

(h) Highly combustible materials shall not be used or stored in the working chamber. Wood, paper, and similar combustible material shall not be used in the working chamber in quantities which could cause a fire hazard. The compressor building shall be constructed of noncombustible material.

(i) Man locks shall be equipped with a manual type fire extinguisher system that can be activated inside the man lock and also by the outside lock attendant. In addition, a fire hose

and portable fire extinguisher shall be provided inside and outside the man lock. The portable fire extinguisher shall be the dry chemical type.

Note: For additional requirements relating to portable fire extinguishers see WAC 296-800-300.

(j) Equipment, fixtures, and furniture in man locks and special decompression chambers shall be constructed of non-combustible materials. Bedding, etc., shall be chemically treated so as to be fire resistant.

(k) Head frames shall be constructed of structural steel or open frame-work fireproofed timber. Head houses and other temporary surface buildings or structures within 100 feet of the shaft, caisson, or tunnel opening shall be built of fire-resistant materials.

(l) No oil, gasoline, or other combustible materials shall be stored within 100 feet of any shaft, caisson, or tunnel opening, except that oils may be stored in suitable tanks in isolated fireproof buildings, provided such buildings are not less than 50 feet from any shaft, caisson, or tunnel opening, or any building directly connected thereto.

(m) Positive means shall be taken to prevent leaking flammable liquids from flowing into the areas specifically mentioned in the preceding subdivision.

(n) All explosives used in connection with compressed air work shall be selected, stored, transported, and used as specified in part T of this chapter.

(13) Bulkheads and safety screens.

(a) Intermediate bulkheads with locks, or intermediate safety screens or both, are required where there is danger of rapid flooding.

(b) In tunnels 16 feet or more in diameter, hanging walkways shall be provided from the face to the man lock as high in the tunnel as practicable, with at least 6 feet of head room. Walkways shall be constructed of noncombustible material. Standard railings shall be securely installed throughout the length of all walkways on open sides in accordance with Part ((K)) C-1 of this chapter. Where walkways are ramped under safety screens, the walkway surface shall be skidproofed by cleats or by equivalent means.

(c) Bulkheads used to contain compressed air shall be tested, where practicable, to prove their ability to resist the highest air pressure which may be expected to be used.

REPEALER

The following sections of the Washington Administrative Code are repealed:

WAC 296-155-245	Reserve.
WAC 296-155-24501	Scope and application.
WAC 296-155-24503	Definitions.
WAC 296-155-24505	Fall protection work plan.
WAC 296-155-24507	Reserve.
WAC 296-155-24510	Fall restraint, fall arrest systems.
WAC 296-155-24515	Guarding of low pitched roof perimeters.

WAC 296-155-24519	Reserve.
WAC 296-155-24520	Leading edge control zone.
WAC 296-155-24521	Safety monitor system.
WAC 296-155-24522	Reserve.
WAC 296-155-24523	Appendix A to Part C-1—Determining roof widths nonmandatory guidelines for complying with WAC 296-155-24515 (2)(b).
WAC 296-155-24524	Reserve.
WAC 296-155-24525	Appendix B to Part C-1—Fall restraint and fall arrest (employer information only).
WAC 296-155-500	Definitions applicable to this part.
WAC 296-155-505	Guardrails, handrails and covers.
WAC 296-155-50503	Roofing brackets.
WAC 296-155-50505	Reserved.
WAC 296-155-510	Reserved.
WAC 296-155-515	Ramps, runways, and inclined walkways.

AMENDATORY SECTION (Amending WSR 05-01-054, filed 12/7/04, effective 3/1/05)

WAC 296-874-20008 Make sure platforms are properly planked or decked.

You must:

- Fully plank or deck each platform between the front uprights and the guardrail supports on all working levels of a scaffold so that there is no more than one inch (2.5 cm):

- Between adjacent units;

AND

- Between the platform and the uprights.

Exemption: • There may be more than one inch between platform units if all of the following are met:

- You can demonstrate that a wider space is necessary, such as to fit around uprights when side brackets are used to extend the platform width;

- The platform is planked or decked as fully as possible;

- The open space between the platform and the guardrail supports is nine and one-half inches (24.1 cm) or less.

- Platforms used solely as walkways or only by employees erecting or dismantling scaffolds do not have to be fully decked or planked if:

- The planking provided makes for safe working conditions;

AND

- Employees on those platforms are protected from falling.

REFERENCE		
Fall protection requirements for employees:	Are located in the following chapters:	In the following sections:
On walkways within scaffolds	Chapter 296-874 WAC, Scaffolds	WAC 296-874-20056
Erecting or dismantling supported scaffolds	Chapter 296-874 WAC, Scaffolds	WAC 296-874-40010
Erecting or dismantling suspended scaffolds in general industry	Chapter 296-24 WAC, General safety and health standards	Part J-1 Working surfaces, guarding floors and wall openings, ladders AND Part J-3 Powered platforms
Erecting or dismantling suspended scaffolds in construction work	Chapter 296-155 WAC, Safety standards for construction work	Part C-1 Fall (restraint and fall arrest AND Part K Floor openings, wall openings, and stairways)) <u>protection requirements for construction</u>

You must:

- Make sure wood platforms are not covered with an opaque finish.

Exemption: Platform edges may be covered or marked for identification.

Note: Platforms may be coated periodically with wood preservatives, fire-retardant finishes, or slip-resistant finishes if the coating does not obscure the top or bottom wood surfaces.

AMENDATORY SECTION (Amending WSR 07-17-026, filed 8/7/07, effective 10/6/07)

WAC 296-874-20030 Make sure ramps and walkways used to access scaffolds meet these requirements.

You must:

- Make sure ramps and walkways are not inclined at a slope steeper than one vertical in three horizontal (1:3 or twenty degrees from the horizontal).
 - Make sure ramps and walkways that are inclined at a slope steeper than one vertical in eight horizontal (1:8) have cleats to provide footing which are:
 - Securely fastened to the planks;
- AND**
- Spaced not more than fourteen inches (35 cm) apart.

Reference: Ramps and walkways that are four feet (1.2 m) or more above a lower level need to have a guardrail system. Those requirements are found in other chapters.

- For general industry activities, go to:
 - Working surfaces, guarding floors and wall openings, Part J-1, in the general safety and health standards, chapter 296-24 WAC;
- For construction activities, go to:
 - Floor openings, wall openings, and stairways, Parts ((K)) C-1 and J, in the safety standards for construction work, chapter 296-155 WAC.

AMENDATORY SECTION (Amending WSR 07-17-026, filed 8/7/07, effective 10/6/07)

WAC 296-874-20052 Provide fall protection for employees on scaffolds.

You must:

- Protect each employee on a scaffold more than ten feet (3.1 m) above a lower level, from falling to the lower level, by providing either:
 - A personal fall arrest system;
- OR**
- Guardrails.

REFERENCE		
Fall protection requirements for employees:	Are located in the following chapters:	In the following sections:
On walkways within scaffolds	Chapter 296-874 WAC, Scaffolds	WAC 296-874-20056
Erecting or dismantling supported scaffolds	Chapter 296-874 WAC, Scaffolds	WAC 296-874-40010
Erecting or dismantling suspended scaffolds in general industry	Chapter 296-24 WAC, General safety and health standards	Part J-1 Working surfaces, guarding floors and wall openings, ladders AND Part J-3 Powered platforms
Erecting or dismantling suspended scaffolds in construction work	Chapter 296-155 WAC, Safety standards for construction work	Part C-1 Fall (restraint and fall arrest AND Part K Floor openings, wall openings, and stairways)) <u>protection requirements for construction</u>

You must:

- Make sure employees erecting the scaffold install the guardrail system, if required, before the scaffold is used by any other employees.

AMENDATORY SECTION (Amending WSR 05-01-054, filed 12/7/04, effective 3/1/05)

WAC 296-874-20058 Make sure personal fall arrest systems meet these requirements.

You must:

- Make sure personal fall arrest systems used on scaffolds for general industry activities, meet the requirements of personal fall arrest system, Appendix C, Part 1, WAC 296-24-88050, in powered platforms, Part J-3, found in the general safety and health standards, chapter 296-24 WAC.
 - Make sure personal fall arrest systems are attached by a lanyard to one of the following:
 - Vertical lifeline;
 - Horizontal lifeline;
 - Appropriate structural member of the scaffold.

Reference: Requirements for personal fall arrest systems used on scaffolds for construction activities are in ((fall restraint and fall arrest,)) Part C-1, found in the safety standards for construction work, chapter 296-155 WAC.

AMENDATORY SECTION (Amending WSR 05-01-054, filed 12/7/04, effective 3/1/05)

WAC 296-874-40020 Meet these requirements when using integral prefabricated scaffold access frames.

You must:

- Make sure integral prefabricated scaffold access frames meet all of the following:
 - Have been specifically designed and constructed to be used as ladder rungs;
 - Have a rung length of at least eight inches (20 cm);
 - Have a maximum spacing between rungs of sixteen and three quarters inches (43 cm);
 - Are uniformly spaced within each frame section;
 - Have rest platforms at least every twenty feet (6.1 m) on all supported scaffolds more than twenty-four feet (7.3 m) high.

Note: Nonuniform rung spacing caused by joining end frames together is allowed, provided the resulting spacing does not exceed sixteen and three quarters inches (43 cm).

You must:

- Make sure, when panels with rungs that are less than eleven and one-half inches long are used as work platforms, that employees use either:

– A positioning device;

OR

– A personal fall arrest system.

Reference:

- For personal fall arrest system requirements in this chapter, go to WAC 296-874-20058.
- For construction activities, go to ((~~fall-restraint and fall-arrest~~)) Part C-1, in safety standards for construction work, chapter 296-155 WAC.

AMENDATORY SECTION (Amending WSR 05-01-054, filed 12/7/04, effective 3/1/05)

WAC 296-874-40034 Meet these requirements when using repair bracket scaffolds.

You must:

- Make sure brackets are all of the following:
 - Secured in place by at least one wire rope that's at least one-half inch (1.27 cm) in diameter;
 - Attached to the securing wire rope by a positive locking device, or equivalent, that will prevent the bracket from being unintentionally detached from the rope;
 - Provided with a shoe, heel block, foot, or a combination that:
 - Is located at the contact point between the supporting structure and the bottom of the bracket;
- AND**
- Will prevent lateral movement of the bracket.
- Secure the platforms to the brackets in a way that prevents:
 - The platforms from separating from the brackets;
- AND**
- The platforms or brackets from moving on a completed scaffold.
 - Make sure wire rope placed around the structure to provide a safe anchorage for personal fall arrest systems used by employees erecting or dismantling scaffolds:
 - Is at least five-sixteenths inch (0.8 cm) in diameter;

– Provides an anchorage that meets the requirements of WAC 296-874-20058.

■ For construction activities, go to ((~~fall-restraint and fall-arrest~~)) Part C-1, in the safety standards for construction work, chapter 296-155 WAC.

• Make sure each wire rope used for securing brackets in place or as an anchorage for personal fall arrest systems is all of the following:

– Protected from damage due to contact with edges, corners, protrusions, or other parts of the supporting structure or scaffold components;

– Tensioned by a turnbuckle or equivalent means. Turnbuckles must be:

■ At least one inch (2.54 cm) in diameter;

AND

■ Connected to the other end of its rope by an eye splice thimble that's sized appropriate to the turnbuckle.

– **Not** used with U-bolt wire rope clips.

• Make sure materials are not dropped to the outside of the supporting structure.

• Erect the scaffold by progressing around the structure in only one direction.

WSR 13-04-082

PERMANENT RULES

**PROFESSIONAL EDUCATOR
STANDARDS BOARD**

[Filed February 5, 2013, 12:30 p.m., effective March 8, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: Amends WAC 181-79A-251, corrects drafting error from previous filing. Clarifies effective dates and which certificates are affected.

Citation of Existing Rules Affected by this Order: Amending x.

Statutory Authority for Adoption: RCW 28A.410.210.

Adopted under notice filed as WSR 12-23-056 on November 19, 2012.

A final cost-benefit analysis is available by contacting David Brenna, 600 Washington Street South, Room 400, Olympia, WA 98504-7236, phone (360) 725-6238, fax (360) 586-4548, e-mail david.brenna@k12.wa.us.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 1, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 1, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 1, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 1, Repealed 0.

Date Adopted: February 5, 2013.

David Brenna
Senior Policy Analyst

AMENDATORY SECTION (Amending WSR 12-18-005, filed 8/23/12, effective 9/23/12)

WAC 181-79A-251 Residency and professional certification. Renewal and reinstatement.

(1) Residency certificate. Residency certificates shall be renewed under one of the following options:

(a) Teachers.

(i) Individuals who hold, or have held, residency certificates have the following options for renewal past the first three-year certificate:

(A) Candidates who have attempted and failed the professional certificate assessment are eligible for a two-year renewal;

(B) Candidates who have not been employed or employed less than full-time as a teacher during the dated, three-year residency certificate may receive a two-year renewal by submitting an affidavit to the certification office confirming that they will register and submit a uniform assessment portfolio or may permit their certificate to lapse until such time they register for the professional certificate assessment;

(C) Candidates whose three-year residency certificate has lapsed may receive a two-year renewal by submitting an affidavit to the certification office confirming that they will register and submit a uniform assessment portfolio for the professional certificate assessment;

(D) Individuals who complete a National Board Certification assessment but do not earn National Board Certification, may use that completed assessment to renew the residency certificate for two years.

(ii) A residency certificate expires after the first renewal if the candidate has not registered for and submitted a portfolio assessment prior to June 30th of the expiration year, to achieve the professional certificate, provided: When the first two-year renewal on residency certificates expires, teachers have two renewal options:

(A) Teachers who were employed but failed the professional certification assessment, may receive a second two-year renewal;

(B) Teachers who were unemployed or employed less than full-time during the first two-year renewal may permit their certificate to lapse and receive a second two-year renewal by submitting an affidavit to the certification office confirming that they will register and submit a uniform assessment portfolio for the professional certification assessment.

(C) An individual who completes a National Board Certification assessment but does not earn National Board Certification, may use that completed assessment to renew the residency certificate for two years in lieu of submitting an affidavit to the certification office confirming that they will register and submit the Washington uniform assessment portfolio as per this section, WAC 181-79A-251.

(iii) Teachers who hold expired residency certificates may be reinstated by having a district request, under WAC

181-79A-231, a transitional certification not less than five years following the final residency expiration: Provided, That the teacher registers and passes the professional certification assessment within two years.

(iv) Teachers that hold a dated residency certificate prior to September 2011 that have expiration dates past September 2011 are subject to the same renewal options as described in (a)(ii) and (iii) of this subsection.

(b) Principals/program administrators.

(i) Individuals who hold, or have held, a residency certificate and who qualify for enrollment in a professional certificate program pursuant to WAC 181-78A-535 (2)(a) may have the certificate renewed for one additional two-year period upon verification by the professional certificate program administrator that the candidate is enrolled in a state approved professional certificate program.

(ii) Individuals who hold, or have held, residency certificates who do not qualify for enrollment in a professional certificate program under WAC 181-78A-535 (2)(a) may have their residency certificates renewed for an additional five-year period by the completion of fifteen quarter credits (ten semester credits) of college credit course work, directly related to the current performance-based leadership standards as defined in WAC 181-78A-270 (2)(b) from a regionally accredited institution of higher education taken since the issuance of the residency certificate.

(c) School counselors and school psychologists.

(i) Individuals who hold a residency certificate and who qualify for enrollment in a professional certificate program pursuant to WAC 181-78A-535(3) may have the certificate renewed for one additional two-year period upon verification by the professional certificate program administrator that the candidate is enrolled in a state approved professional certificate program.

(ii) Individuals who hold, or have held, a residency certificate who do not qualify for admission to a professional certificate program under WAC 181-78A-535 (3)(a) may have their residency certificates renewed for an additional five-year period by the completion of fifteen quarter credits (ten semester credits) of college credit course work, directly related to the current performance-based standards as defined in WAC 181-78A-270 (5), (7), or (9) from a regionally accredited institution of higher education taken since the issuance of the residency certificate.

(2) Professional certificate.

(a) Teachers.

(i) A valid professional certificate may be renewed for additional five-year periods by the completion of one hundred fifty continuing education credit hours as defined in chapter 181-85 WAC or by completing the professional growth plan as defined in WAC 181-79A-030 (~~until September 1, 2014. Beginning September 1, 2014, only four professional growth plans developed annually since the certificate was issued in collaboration with the professional growth team as defined in WAC 181-79A-030 are required for renewal. Individuals who complete the requirements of the annual professional growth plan to renew their professional certificate shall receive the equivalent of thirty hours of continuing education credit hours. Until September 1, 2014,~~). Individuals who complete the requirements of the annual pro-

professional growth plan to renew their professional certificate shall receive the equivalent of thirty hours of continuing education credit hours: Provided, that professional certificates issued under rules prior to September 1, 2014, retain the option of clock hours or professional growth plans for renewal. An expired professional certificate issued under rules in effect prior to September 1, 2014, may be renewed for an additional five-year period by presenting evidence to the superintendent of public instruction of completing the continuing education credit hour requirement within the five years prior to the date of the renewal application. All continuing education credit hours shall relate to either (a)(i)(A) or (B) of this subsection: Provided, That both categories (a)(i)(A) and (B) of this subsection must be represented in the one hundred fifty continuing education credit hours required for renewal:

(A) One or more of the following three standards:

(I) Effective instruction.

(II) Professional contributions.

(III) Professional development.

(B) One of the salary criteria specified in WAC 392-121-262.

(ii) Individuals not employed as a teacher in a public school or approved private school holding a professional teaching certificate may have their professional certificate renewed for a five-year period by the completion of:

(A) Fifteen quarter credits (ten semester credits) of college credit course work directly related to the current performance-based leadership standards as defined in WAC 181-78A-540; or

(B) One hundred fifty continuing education credit hours as defined in chapter 181-85 WAC since the certificate was issued and which relate to the current performance-based standards as defined in WAC 181-79A-207; or

(C) ~~((Four professional growth plans developed annually since the certificate was issued in collaboration with the professional growth team as defined in WAC 181-79A-030.))~~ Beginning September 1, 2014, four professional growth plans developed annually during the period in which the certificate is valid in collaboration with the professional growth team as defined in WAC 181-79A-030 are required for renewal. The professional growth plans must document formalized learning opportunities and professional development activities that relate to the standards and "career level" benchmarks defined in WAC 181-79A-207. Individuals who complete the requirements of the annual professional growth plan to renew their professional certificate shall receive the equivalent of thirty hours of continuing education credit hours.

(iii) Provided, That a professional certificate may be renewed based on the possession of a valid teaching certificate issued by the National Board for Professional Teaching Standards at the time of application for the renewal of the professional certificate. Such renewal shall be valid for five years or until the expiration of the National Board Certificate, whichever is greater.

(b) Principals/program administrators.

(i) A professional certificate may be renewed for additional five-year periods for individuals employed as a principal, assistant principal or program administrator in a public school or approved private school by:

(A) Completion of four professional growth plans developed annually since the certificate was issued in collaboration with a minimum of three certificated colleagues that documents formalized learning opportunities and professional development activities that relate to the six standards and "career level" benchmarks defined in WAC 181-78A-540(1). Individuals who complete the requirements of the annual professional growth plan to renew their professional certificate shall receive the equivalent of thirty hours of continuing education credit hours.

(B) Documented evidence of results of the professional growth plan on student learning.

(ii) Individuals not employed as a principal, assistant principal, or program administrator in a public school or approved private school may have their professional certificate renewed for a five-year period by the completion of:

(A) Fifteen quarter credits (ten semester credits) of college credit course work directly related to the current performance-based leadership standards as defined in WAC 181-78A-540(1) from a regionally accredited institution of higher education taken since the issuance of the professional certificate; or

(B) Completion of one hundred fifty continuing education credit hours as defined in chapter 181-85 WAC since the certificate was issued and which relate to the current performance-based standards as defined in WAC 181-78A-540(1); or

(C) Completion of four professional growth plans developed annually since the certificate was issued in collaboration with the professional growth team as defined in WAC 181-79A-030 that documents formalized learning opportunities and professional development activities that relate to the standards and "career level" benchmarks defined in WAC 181-78A-540(2). Individuals who complete the requirements of the annual professional growth plan to renew their professional certificate shall receive the equivalent of thirty hours of continuing education credit hours.

(c) School counselors and school psychologists.

(i) For certificates issued prior to September 1, 2014, a valid professional certificate may be renewed for additional five-year periods for individuals employed as a school counselor or school psychologist in a public school, approved private school, or in a state agency which provides educational services to students by:

(A) Completion of one hundred fifty continuing education credit hours as defined in chapter 181-85 WAC since the certificate was issued and which relate to the current performance-based standards as defined in WAC 181-78A-270 (5), (7), or (9);

(B) Completion of four professional growth plans that are developed annually since the certificate was issued in collaboration with a minimum of three certificated colleagues or supervisor, and that documents formalized learning opportunities and professional development activities that relate to the standards and career level benchmarks defined in WAC 181-78A-540(2). Individuals who complete the requirements of the annual professional growth plan to renew their professional certificate shall receive the equivalent of thirty hours of continuing education credit hours; or

(C) Beginning September 1, 2014, a valid professional certificate may be renewed for additional five-year periods for individuals employed as a school counselor or school psychologist in a public school, approved private school, or in a state agency which provides educational services to students by completion of four professional growth plans developed annually since the certificate was issued in collaboration with the professional growth team as defined in WAC 181-79A-030 that documents formalized learning opportunities and professional development activities that relate to the standards and "career level" benchmarks defined in WAC 181-78A-540(2). Individuals who complete the requirements of the annual professional growth plan to renew their professional certificate shall receive the equivalent of thirty hours of continuing education credit hours.

(ii) Individuals not employed as a school counselor or school psychologist in a public school or approved private school may have their professional certificate renewed for an additional five-year period by:

(A) Completion of fifteen quarter credits (ten semester credits) of college credit course work directly related to the current performance-based standards as defined in WAC 181-78A-540(2) from a regionally accredited institution of higher education taken since the issuance of the professional certificate; or

(B) Completion of one hundred fifty continuing education credit hours as defined in chapter 181-85 WAC since the certificate was issued and which relate to the current performance-based standards as defined in WAC 181-78A-540(2);

(C) Completion of four annual professional growth plans developed since the certificate was issued in collaboration with the professional growth team as defined in WAC 181-79A-030 that documents formalized learning opportunities and professional development activities that relate to the standards and "career level" benchmarks defined in WAC 181-78A-540(2). Individuals who complete the requirements of the annual professional growth plan to renew their professional certificate shall receive the equivalent of thirty hours of continuing education credit hours;

(D) Provided, That a school counselor professional certificate may be renewed based on the possession of a valid school counselor certificate issued by the National Board for Professional Teaching Standards at the time of application for the renewal of the professional certificate. Such renewal shall be valid for five years or until the expiration of the National Board Certificate, whichever is greater; or

(E) Provided, That a school psychologist professional certificate may be renewed based on the possession of a valid national certified school psychology certificate issued by the national association of school psychologists at the time of application for the renewal of the professional certificate. Such renewal shall be valid for five years or until the expiration of the national certified school psychology certificate, whichever is greater.

(d) For educators holding multiple certificates in (a), (b), or (c) of this subsection, or in chapter 181-85 WAC, a professional growth plan for teacher, administrator, or education staff associate shall meet the requirement for all certificates held by an individual which is affected by this section.

WSR 13-04-085
PERMANENT RULES
DEPARTMENT OF REVENUE

[Filed February 5, 2013, 2:43 p.m., effective March 8, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: WAC 458-20-162 (Rule 162) explains the business and occupation (B&O) tax-reporting responsibilities of stockbrokers and security houses. The department amended Rule 162 to recognize that stock brokers and security houses engaging in business in multiple states must apportion income for purposes of determining their B&O tax reporting responsibilities. For periods on and after June 1, 2010, the rule refers readers to WAC 458-20-19402 Single factor receipts apportionment—Generally. For periods prior to June 1, 2010, the rule refers readers to WAC 458-20-194 Doing business inside and outside the state.

Citation of Existing Rules Affected by this Order: Amending WAC 458-20-162 Stockbrokers and security houses.

Statutory Authority for Adoption: RCW 82.32.300 and 82.01.060(2).

Adopted under notice filed as WSR 12-23-053 on November 16, 2012.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 1, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 1, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 0, Repealed 0.

Date Adopted: February 5, 2013.

Alan R. Lynn
Rules Coordinator

AMENDATORY SECTION (Amending Order ET 83-16, filed 3/15/83)

WAC 458-20-162 Stockbrokers and security houses.
(1) Introduction. With respect to stockbrokers and security houses, "gross income of the business" means the total of gross income from earnings accounts, specifically gross income from interest, gross income from commissions, gross income from trading, and gross income from all other sources(=). Provided(=) that:

((+)) (a) Gross income from each account is to be computed separately and on a monthly basis;

((+)) (b) Loss sustained upon any earnings account may not be deducted from or offset against gross income upon any other account, nor may a loss sustained upon any earnings account during any month be deducted from the gross income upon any account for any other month;

~~((3))~~ (c) No deductions are allowed on account of salaries or commissions paid to employees or salesmen, rent, or any other overhead or operating expenses paid or incurred, or on account of losses other than under ~~("2" above)~~ (b) of this subsection:

~~((4))~~ (d) No deductions are allowed from commissions received from sales of securities which are delivered to buyers outside the state of Washington.

(2) **Gross income from interest.** Gross income from interest includes all interest received upon bonds or other securities held for sale or otherwise, ~~((excepting only))~~ except direct obligations of the federal government and of the state of Washington. No deduction is allowed for interest paid out even though such interest may have been paid to banks, clearing houses or others upon amounts borrowed to carry debit balances of customers' margin accounts.

Interest accrued upon bonds or other securities sold ~~((shall))~~ must be included in gross income where such interest is carried in an interest account and not as part of the selling price. Conversely, interest accrued upon bonds or other securities at the time of purchase may be deducted from gross income where such interest is carried in an interest account and not as a part of the purchase price.

(3) **Gross income from commissions.** Gross income from commissions is the amount received as commissions upon transactions for the accounts of customers over and above the amount paid to other established security houses associated in such transactions: Provided, however, That no deduction or offset is allowed on account of salaries or commissions paid to salesmen or other employees.

(4) **Gross income from trading.** Gross income from trading is the amount received from the sale of stocks, bonds and other securities over and above the cost or purchase price of such stocks, bonds and other securities. In the case of short sales gross earnings ~~((shall))~~ must be reported in the month during which the transaction is closed, that is, when the purchase is made to cover such sales or the short sale contract is forfeited.

(5) **Gross income from all other sources.** Gross income from all other sources includes all income received by the taxpayer, other than from interest, commissions and trading, such as dividends upon stocks, fees for examinations, fees for reorganizations, etc.

(6) **Services inside and outside the state-apportionment.** ~~Stockbrokers and security houses ((rendering services and maintaining places of business both inside and outside the state may, in computing tax, apportion to this state that portion of the gross income which is derived from services rendered or activities conducted inside this state. Where such apportionment cannot be made accurately by separate accounting methods, the taxpayer shall apportion to this state that portion of his total income which the cost of doing business inside the state bears to the total cost of doing business both inside and outside the state.))~~ engaging in business in multiple states are required to apportion income for B&O tax purposes.

(a) For periods on and after June 1, 2010. Effective June 1, 2010, RCW 82.04.460 requires that any person, including stockbrokers and security houses, earning apportionable income subject to B&O tax, and who is also taxable

in another state, must apportion to this state that portion of the person's apportionable income from business activities pursuant to WAC 458-20-19402.

(b) For periods prior to June 1, 2010. RCW 82.04.460 authorized apportionment of income by either a separate accounting method or cost apportionment. (See WAC 458-20-194.)

WSR 13-04-093

PERMANENT RULES

DEPARTMENT OF

SOCIAL AND HEALTH SERVICES

(Aging and Disability Services Administration)

[Filed February 6, 2013, 9:57 a.m., effective March 9, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: The department is amending these rules to be consistent with federal regulations and newly passed state laws: SHB 2056, relating to assisted living facilities; SHB [ESSB] 5708, relating to reshaping the delivery of long-term care services; 20 United States Code 1140 ("Rosa's law"); 42 Code of Federal Regulations 483.20(d); and Social Security Act section 1128I(h) as added by section 6113 of the Affordable Care Act.

Citation of Existing Rules Affected by this Order: Amending WAC 388-97-0001, 388-97-0040, 388-97-1000, 388-97-1620, 388-97-1640, 388-97-2020, and 388-97-2180.

Statutory Authority for Adoption: Chapters 18.51 and 74.42 RCW.

Adopted under notice filed as WSR 12-23-058 on November 19, 2012.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 4, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 3, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 7, Repealed 0.

Date Adopted: January 31, 2013.

Katherine I. Vasquez

Rules Coordinator

Reviser's note: The material contained in this filing exceeded the page-count limitations of WAC 1-21-040 for appearance in this issue of the Register. It will appear in the 13-05 issue of the Register.

WSR 13-04-094
PERMANENT RULES
HEALTH CARE AUTHORITY
(Medicaid Program)

[Filed February 6, 2013, 10:06 a.m., effective March 9, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: To comply with the agency's federal Transitional Bridge 1115 Waiver, the agency is removing medical care services from the list of eligible programs for hospice services. During the revision of the hospice rules under WSR 12-09-079, the agency incorrectly added "medical care services" as an eligible program under WAC 182-551-1200 [(1)](d).

Citation of Existing Rules Affected by this Order: Amending WAC 182-551-1200.

Statutory Authority for Adoption: RCW 41.05.021.

Adopted under notice filed as WSR 13-02-055 on December 26, 2012.

Changes Other than Editing from Proposed to Adopted Version: No change to the text. The purpose statement in the agency's CR-102 did have a *typo*. The word "medicare" was used when referencing medical care services. The actual text reflected the proper language which was being struck (~~Medical care services~~).

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 1, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 1, Repealed 0.

Date Adopted: February 6, 2013.

Kevin M. Sullivan
 Rules Coordinator

AMENDATORY SECTION (Amending WSR 12-09-079, filed 4/17/12, effective 5/18/12)

WAC 182-551-1200 Client eligibility for hospice care. (1) A client who elects to receive hospice care must be eligible for one of the following medical assistance programs, subject to the restrictions and limitations in this chapter and other WAC:

- (a) Categorically needy (CN);
- (b) Children's health care as described in WAC ((~~388-505-0210~~)) 182-505-0210;
- (c) Medically needy (MN); or
- (d) (~~Medical care services as described in WAC 182-508-0005 (within Washington state or designated border cities); or~~

(~~e~~)) Alien emergency medical (AEM) as described in WAC ((~~388-438-0110~~)) 182-507-0110, when the medical services are necessary to treat a qualifying emergency medical condition.

(2) A hospice agency is responsible to verify a client's eligibility with the client or the client's department of social and health services (DSHS) home and community services (HCS) office or community services office (CSO).

(3) A client enrolled in one of the Medicaid agency's managed care organizations (MCO) must receive all hospice services, including facility room and board, directly through that MCO. The MCO is responsible for arranging and providing all hospice services for an MCO client.

(4) A client who is also eligible for Medicare hospice under part A is not eligible for hospice care through the Medicaid agency's hospice program. The Medicaid agency does pay hospice nursing facility room and board for these clients if the client is admitted to a nursing facility or hospice care center (HCC) and is not receiving general inpatient care or inpatient respite care. See also WAC 182-551-1530.

(5) A client who meets the requirements in this section is eligible to receive hospice care through the Medicaid agency's hospice program when all of the following is met:

(a) The client's physician certifies the client has a life expectancy of six months or less.

(b) The client elects to receive hospice care and agrees to the conditions of the "election statement" as described in WAC 182-551-1310.

(c) The hospice agency serving the client:

(i) Notifies the Medicaid agency's hospice program within five working days of the admission of all clients, including:

- (A) Medicaid-only clients;
- (B) Medicaid-Medicare dual eligible clients;
- (C) Medicaid clients with third party insurance; and
- (D) Medicaid-Medicare dual eligible clients with third party insurance.

(ii) Meets the hospice agency requirements in WAC 182-551-1300 and 182-551-1305.

(d) The hospice agency provides additional information for a diagnosis when the Medicaid agency requests and determines, on a case-by-case basis, the information that is needed for further review.

WSR 13-04-095
PERMANENT RULES
HEALTH CARE AUTHORITY
(Medicaid Program)

[Filed February 6, 2013, 10:17 a.m., effective March 9, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: The health care authority (the agency) is performing the following actions:

Amendment of these rules is necessary due to changes the agency is making to WAC 182-502-0005.

The agency is amending WAC 182-502-0005 to implement 42 C.F.R. 455.410 which mandates states to require all

ordering, prescribing, or referring providers to be enrolled as participating providers.

Citation of Existing Rules Affected by this Order: Amending WAC 182-530-1000 Outpatient drug program—General and 182-531-0100 Scope of coverage for physician-related and health care professional services—General and administrative.

Statutory Authority for Adoption: RCW 41.05.021.

Other Authority: 42 C.F.R. 455.410.

Adopted under notice filed as WSR 12-21-110 on October 23, 2012.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 2, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 0, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 2, Repealed 0.

Date Adopted: February 6, 2013.

Kevin M. Sullivan
Rules Coordinator

AMENDATORY SECTION (Amending WSR 11-14-075, filed 6/30/11, effective 7/1/11)

WAC 182-530-1000 Outpatient drug program—General. (1) The purpose of the outpatient drug program is to reimburse providers for outpatient drugs, vitamins, minerals, devices, and drug-related supplies according to ~~((department))~~ medicaid agency rules and subject to the limitations and requirements in this chapter.

(2) The ~~((department))~~ agency reimburses for outpatient drugs, vitamins, minerals, devices, and pharmaceutical supplies that are:

(a) Covered. Refer to WAC ~~((388-530-2000))~~ 182-530-2000 for covered drugs, vitamins, minerals, devices, and drug-related supplies and to WAC ~~((388-530-2100))~~ 182-530-2100 for noncovered drugs and drug-related supplies;

(b) Prescribed by a provider with prescriptive authority (see exceptions for family planning and emergency contraception for women eighteen years of age and older in WAC ~~((388-530-2000))~~ 182-530-2000 (1)(b), and over-the-counter (OTC) drugs to promote smoking cessation in WAC ~~((388-530-2000))~~ 182-530-2000 (1)(g);

(c) Prescribed by:

(i) A provider with an approved core provider agreement; or

(ii) A provider who is enrolled as a performing provider on an approved core provider agreement;

(d) Within the scope of an eligible client's medical assistance program;

~~((d))~~ (e) Medically necessary as defined in WAC ~~((388-500-0005))~~ 182-500-0070 and determined according to the process found in WAC ~~((388-501-0165))~~ 182-501-0165; ~~((and~~

~~((e))~~ (f) Authorized, as required within this chapter;

~~((f))~~ (g) Billed according to WAC ~~((388-502-0150))~~ 182-502-0150 and ~~((388-502-0160))~~ 182-502-0160; and

~~((g))~~ (h) Billed according to the requirements of this chapter.

(3) Coverage determinations for the ~~((department))~~ agency are made by the ~~((department's))~~ agency's pharmacists or medical consultants in accordance with applicable federal law. The ~~((department's))~~ agency's determination may include consultation with the drug use review (DUR) board.

~~((4) The department may not reimburse for prescriptions written by health care practitioners whose application for a core provider agreement (CPA) has been denied, or whose CPA has been terminated.~~

~~((5) The department may not reimburse for prescriptions written by non-CPA health care practitioners who do not have a current core provider agreement with the department when the department determines there is a potential danger to the client's health and/or safety.)~~

AMENDATORY SECTION (Amending WSR 12-18-062, filed 8/31/12, effective 10/1/12)

WAC 182-531-0100 Scope of coverage for physician-related and health care professional services—General and administrative. (1) The medicaid agency covers health care services, equipment, and supplies listed in this chapter, according to agency rules and subject to the limitations and requirements in this chapter, when they are:

(a) Within the scope of an eligible client's medical assistance program. Refer to WAC 182-501-0060 and 182-501-0065; and

(b) Medically necessary as defined in WAC 182-500-0070.

(2) The agency evaluates a request for a service that is in a covered category under the provisions of WAC 182-501-0065.

(3) The agency evaluates requests for covered services that are subject to limitations or other restrictions and approves such services beyond those limitations or restrictions as described in WAC 182-501-0169.

(4) The agency covers the following physician-related services and health care professional services, subject to the conditions in subsections (1), (2), and (3) of this section:

(a) Allergen immunotherapy services;

(b) Anesthesia services;

(c) Dialysis and end stage renal disease services (refer to chapter 182-540 WAC);

(d) Emergency physician services;

(e) ENT (ear, nose, and throat) related services;

(f) Early and periodic screening, diagnosis, and treatment (EPSDT) services (refer to WAC 182-534-0100);

(g) Reproductive health services (refer to chapter 182-532 WAC);

(h) Hospital inpatient services (refer to chapter 182-550 WAC);

- (i) Maternity care, delivery, and newborn care services (refer to chapter 182-533 WAC);
 - (j) Office visits;
 - (k) Vision-related services (refer to chapter 182-544 WAC for vision hardware for clients twenty years of age and younger);
 - (l) Osteopathic treatment services;
 - (m) Pathology and laboratory services;
 - (n) Physiatry and other rehabilitation services (refer to chapter 182-550 WAC);
 - (o) Foot care and podiatry services (refer to WAC 182-531-1300);
 - (p) Primary care services;
 - (q) Psychiatric services, provided by a psychiatrist;
 - (r) Psychotherapy services for children as provided in WAC 182-531-1400;
 - (s) Pulmonary and respiratory services;
 - (t) Radiology services;
 - (u) Surgical services;
 - (v) Cosmetic, reconstructive, or plastic surgery, and related services and supplies to correct physiological defects from birth, illness, or physical trauma, or for mastectomy reconstruction for post cancer treatment;
 - (w) Oral health care services for emergency conditions for clients twenty-one years of age and older, except for clients of the division of developmental disabilities (refer to WAC 182-531-1025); and
 - (x) Other outpatient physician services.
- (5) The agency covers physical examinations for medical assistance clients only when the physical examination is one or more of the following:
- (a) A screening exam covered by the EPSDT program (see WAC 182-534-0100);
 - (b) An annual exam for clients of the division of developmental disabilities; or
 - (c) A screening pap smear, mammogram, or prostate exam.
- (6) By providing covered services to a client eligible for a medical assistance program, a provider who ~~((has signed an agreement with the agency))~~ meets the requirements in WAC 182-502-0005(3) accepts the agency's rules and fees ~~((as outlined in the agreement,))~~ which includes federal and state law and regulations, billing instructions, and agency issuances.
- (7) Outpatient drugs are not subject to the rules in this chapter. For rules about outpatient drugs see chapter 182-530 WAC.

WSR 13-04-098
PERMANENT RULES
PROFESSIONAL EDUCATOR
STANDARDS BOARD

[Filed February 6, 2013, 10:46 a.m., effective March 9, 2013]

Effective Date of Rule: Thirty-one days after filing.

Purpose: Amending WAC 181-82A-208, the legislature requested the professional educator standards board determine competencies and programs for a mathematics specialty

endorsement (RCW 28A.410.046). WAC 181-82A-208 is amended to reflect that request.

Citation of Existing Rules Affected by this Order: Amending X.

Statutory Authority for Adoption: RCW 28A.410.210.

Adopted under notice filed as WSR 12-23-027 on November 13, 2012.

A final cost-benefit analysis is available by contacting David Brenna, 600 Washington Street South, Room 252, Olympia, WA 98504-7236, phone (360) 725-6238, fax (360) 586-4548, e-mail david.brenna@k12.wa.us.

Number of Sections Adopted in Order to Comply with Federal Statute: New 0, Amended 0, Repealed 0; Federal Rules or Standards: New 0, Amended 0, Repealed 0; or Recently Enacted State Statutes: New 0, Amended 1, Repealed 0.

Number of Sections Adopted at Request of a Nongovernmental Entity: New 0, Amended 0, Repealed 0.

Number of Sections Adopted on the Agency's Own Initiative: New 0, Amended 0, Repealed 0.

Number of Sections Adopted in Order to Clarify, Streamline, or Reform Agency Procedures: New 0, Amended 0, Repealed 0.

Number of Sections Adopted Using Negotiated Rule Making: New 0, Amended 0, Repealed 0; Pilot Rule Making: New 0, Amended 0, Repealed 0; or Other Alternative Rule Making: New 0, Amended 0, Repealed 0.

Date Adopted: February 6, 2013.

David Brenna
Senior Policy Analyst

AMENDATORY SECTION (Amending WSR 11-12-079, filed 5/31/11, effective 7/1/11)

WAC 181-82A-208 Specialty endorsements. The following specialty endorsements may be added to an existing endorsed teaching certificate:

(1) Deaf education (per RCW 28A.410.225).

(a) This specialty endorsement is required for teachers who will be working almost exclusively with students who are deaf or hard of hearing.

(b) Program requirements are waived and this specialty endorsement granted if a candidate possesses a baccalaureate or master's degree in deaf education from a teacher training program approved by the council on education of the deaf.

(2) Environmental and sustainability education.

(3) Teacher of the visually impaired.

(4) Orientation and mobility teacher. Program requirements are waived and this specialty endorsement granted if a teacher possesses an orientation and mobility specialist certificate from the academy for certification of vision rehabilitation and education professionals.

(5) Gifted education.

(6) Elementary mathematics specialist.