

**WSR 17-04-058**  
**EXPEDITED RULES**  
**OLYMPIC COLLEGE**  
[Filed January 27, 2017, 11:59 a.m.]

Title of Rule and Other Identifying Information: Olympic College official seal design, current design needed to be redesigned to work with new embosser.

**NOTICE**

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO Laurie Harmon, Olympic College, 1600 Chester Avenue, Bremerton, WA 98337, AND RECEIVED BY April 3, 2017.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: Redesigning of Olympic College official seal to accommodate new embosser.

Reasons Supporting Proposal: Current seal creates relief cuts in pages when using new embosser.

Statutory Authority for Adoption: Chapter 28B.50 RCW.

Statute Being Implemented: Chapter 28B.50 RCW.

Rule is not necessitated by federal law, federal or state court decision.

Name of Proponent: Laurie Harmon, governmental.

Name of Agency Personnel Responsible for Drafting, Implementation, and Enforcement: Olympic College, 1600 Chester Avenue, Bremerton, WA, (360) 475-7502.

January 27, 2017  
Laurie Harmon  
Rules Coordinator

AMENDATORY SECTION (Amending WSR 08-19-095, filed 9/16/08, effective 9/16/08)

**WAC 132C-10-001 Seal.** (1) Design. The seal of Olympic College shall be the following form and design:

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(2) Use. The seal shall be used only in connection with the transaction of official business of Olympic College or for promotional purposes.

**WSR 17-04-059**  
**EXPEDITED RULES**  
**DEPARTMENT OF**  
**FINANCIAL INSTITUTIONS**

(Securities Division)

[Filed January 27, 2017, 1:34 p.m.]

Title of Rule and Other Identifying Information: The securities division proposes to repeal WAC 460-44A-505 Uniform offering exemption for limited offers and sales of securities not exceeding \$5,000,000, in light of the recent repeal of the corresponding federal exemption from securities registration.

**NOTICE**

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU

MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO Michelle Webster, Washington Department of Financial Institutions, Securities Division, 150 Israel Road S.W., Tumwater, WA 98501, AND RECEIVED BY April 3, 2017.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: WAC 460-44A-505 provides an exemption from state securities registration requirements for offerings made in reliance on the federal Regulation D, Rule 505 exemption from federal registration requirements. On October 26, 2016, the Securities and Exchange Commission (SEC) adopted final rules amending exemptions to facilitate intrastate and regional securities offerings. See SEC Rulemaking Release No. 33-10238, titled "Exemptions to Facilitate Intrastate and Regional Securities Offerings," available at <https://www.sec.gov/rules/final/2016/33-10238.pdf>. Included in these amendments is a repeal of federal Rule 505 in its entirety. The repeal of federal Rule 505 will be effective on May 22, 2017. The securities division's proposed rule making will align state law with recent changes in federal law. Expedited rule making is authorized by RCW 34.05.353 (1)(b), as the proposed amendments adopt, without material change, amendments made to federal law.

Reasons Supporting Proposal: As stated above, WAC 460-44A-505 is available to offerings made in reliance on the federal Regulation D, Rule 505 exemption from federal registration requirements. Once the repeal of federal Rule 505 becomes effective, businesses will be unable to rely on the corresponding exemption from state registration requirements in WAC 460-44A-505.

Statutory Authority for Adoption: RCW 21.20.450, 21.20.320(17).

Statute Being Implemented: RCW 21.20.320(17).

Rule is necessary because of federal law, 17 C.F.R. § 230.505.

Name of Proponent: Department of financial institutions, securities division, governmental.

Name of Agency Personnel Responsible for Drafting: Michelle Webster, 150 Israel Road S.W., Tumwater, WA 98501, (360) 902-8736; Implementation: Gloria Papiez, 150 Israel Road S.W., Tumwater, WA 98501, (360) 902-8707;

and Enforcement: William Beatty, 150 Israel Road S.W., Tumwater, WA 98501, (360) 902-8723.

January 25, 2017  
Gloria Papiez  
Director

REPEALER

The following section of the Washington Administrative Code is repealed:

WAC 460-44A-505 Uniform offering exemption for limited offers and sales of securities not exceeding \$5,000,000.

**WSR 17-04-086**  
**EXPEDITED RULES**  
**BUILDING CODE COUNCIL**

[Filed January 31, 2017, 11:56 a.m.]

Title of Rule and Other Identifying Information: Editorial changes to chapter 51-11C WAC, 2015 Washington State Energy Code—Commercial.

NOTICE

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO Steve Simpson, Chair, State Building Code Council, P.O. Box 41449, Olympia, WA 98504-1449, AND RECEIVED BY April 7, 2017.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: Makes editorial changes to the following sections of the commercial energy portion of the Washington State Energy Code.

Definitions	<b>LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER. A transformer that is air-cooled, does not use oil as a coolant, has an input voltage less than or equal to 600 volts and is rated for operation at a frequency of 60 hertz.</b>	Typo - missing part of sentence
C402.1.5.1	<b>C402.1.5.1 Component U-factors.</b> The <i>U</i> -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 <i>Handbook—Fundamentals</i> , using the framing factors listed in Appendix A. For envelope assemblies containing metal framing, the <i>U</i> -factor shall be determined by one of the following methods: 1. Results of laboratory measurements according to acceptable methods of test.	Typo - holdover from the previous code edition. It should refer to the currently listed edition of 90.1 in Chapter 6 (2013)

	<p>2. ASHRAE <i>Handbook—Fundamentals</i> where the metal framing is bonded on one or both sides to a metal skin or covering.</p> <p>3. The zone method as provided in ASHRAE <i>Handbook—Fundamentals</i>.</p> <p>4. Effective framing/cavity <i>R</i>-values as provided in Appendix A. When return air ceiling plenums are employed, the roof/ceiling assembly shall:</p> <p>a. For thermal transmittance purposes, not include the ceiling proper nor the plenum space as part of the assembly; and</p> <p>b. For gross area purposes, be based upon the interior face of the upper plenum surface.</p> <p>5. Tables in ASHRAE 90.1 <del>2010</del> Normative Appendix A.</p>	
Table C403.2.3(1A)	Test Procedure reference is missing from several columns.	Formatting error
Table C403.2.3(8)	Rows 5 through 8 should all reference CTI ATC-106 in Test Procedure.	Typo
C403.2.11.5	2. Other units including DX cooling units and chilled water units that control the space temperature by modulating the airflow to the space shall have modulating fan control. Minimum speed shall be not greater than 50 percent of full speed. At minimum speed, the fan system shall draw <u>no</u> more than 30 percent of the power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.	Typo
C403.4.3.1	<b>C403.4.3.1 Fan speed control.</b> The fan speed shall be controlled as provided in Sections C403.4.3. <del>2</del> <u>1</u> .1 and C403.4.3. <del>2</del> <u>1</u> .2.	Typo - bad section reference
C403.4.6	<p><b>Section C403.4.<del>7</del><u>6</u>—Hot gas bypass limitation.</b></p> <p><b>C403.4.<del>7</del><u>6</u> Hot gas bypass limitation.</b> 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.<del>7</del><u>6</u>.</p> <p><b>Exception:</b> <del>Unitary packaged systems with cooling capacities not greater than 90,000 Btu/h (26,379 W).</del></p> <p><b>Table C403.4.<del>7</del><u>6</u></b></p>	Typo - changes from model code not incorporated
C403.7	<p>14. Dedicated server rooms, electronic equipment rooms, telecom rooms, or other similar spaces with cooling loads greater than 5 watts/sf shall be provided with separate, independent HVAC systems to allow the VAV air handlers to turn off during unoccupied hours in the office space and to allow the supply air temperature reset to occur.</p> <p><b>Exception:</b> The VAV air handling unit and VAV terminal units may be used for secondary backup cooling when there is a failure of the primary HVAC system.</p> <p><del>Additionally, server rooms, electronic equipment rooms, telecom rooms, or other similar spaces shall be provided with airside economizer per Section 403.3 without using the exceptions to Section C403.3</del></p> <p><u>Additionally, server rooms, electronic equipment rooms, telecom rooms, or other similar spaces shall be provided with airside economizer per Section 403.3 without using the exceptions to Section C403.3.</u></p>	Formatting error - part of the text was incorporated into the exception.

C405.6	Section C405.76—Electrical energy consumption <b>C405.6 Electrical transformers (Mandatory). Electric transformers shall meet ...</b>	Typo
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Reasons Supporting Proposal: Some editorial and typographical errors were identified in the rules filed under WSR 16-03-072. This rule corrects those errors.

Statutory Authority for Adoption: RCW 19.27A.025, 19.27A.045.

Statute Being Implemented: Chapters 19.27, 19.27A, and 34.05 RCW.

Rule is not necessitated by federal law, federal or state court decision.

Name of Proponent: State building code council, governmental.

Name of Agency Personnel Responsible for Drafting and Implementation: Krista Braaksma, P.O. Box 41449, Olympia, WA 98504-1449, (360) 407-9278; and Enforcement: Local jurisdictions.

January 27, 2017  
Steve K. Simpson  
Council Chair

AMENDATORY SECTION (Amending WSR 16-24-070, filed 12/6/16, effective 5/1/17)

**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.

**LINER SYSTEM (LS).** A system that includes the following:

1. A continuous vapor barrier liner membrane that is installed below the purlins and that is uninterrupted by framing members.
2. An uncompressed, unfaced insulation resting on top of the liner membrane and located 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.

**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-SLOPED ROOF.** A roof having a slope less than 2 units vertical in 12 units horizontal.

**LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER.** A transformer that is air-cooled, does not use oil as a coolant, has an input voltage less than or equal to 600 volts and is rated for operation at a frequency of 60 hertz.

**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.

**LUMINAIRE-LEVEL LIGHTING CONTROL.** A lighting system consisting of one or more luminaire(s) each with embedded lighting control logic, occupancy and ambient light sensors, local or central wireless networking capabilities, and local override switching capability.

AMENDATORY SECTION (Amending WSR 16-24-070, filed 12/6/16, effective 5/1/17)

**WAC 51-11C-40215 Section C402.1.5—Component performance alternative.**

**C402.1.5 Component performance alternative.** Building envelope values and fenestration areas determined in accordance with Equation 4-2 shall be permitted in lieu of compliance with the *U*-factors and *F*-factors in Table C402.1.4 and C402.4 and the maximum allowable fenestration areas in Section C402.4.1.

**Equation 4-2**

$$A + B + C + D = \leq \text{Zero}$$

Where:

A = Sum of the (UA Dif) values for each distinct assembly type of the building thermal envelope, other than slabs on grade

$$UA \text{ Dif} = UA \text{ Proposed} - UA \text{ Table}$$

$$UA \text{ Proposed} = \text{Proposed } U\text{-value} \times \text{Area}$$

$$UA \text{ Table} = (U\text{-factor from Table C402.1.4 or C402.4}) \times \text{Area}$$

B = Sum of the (FL Dif) values for each distinct slab on grade perimeter condition of the building thermal envelope

$$FL \text{ Dif} = FL \text{ Proposed} - FL \text{ Table}$$

$$FL \text{ Proposed} = \text{Proposed } F\text{-value} \times \text{Perimeter length}$$

$$FL \text{ Table} = (F\text{-factor specified in Table C402.1.4}) \times \text{Perimeter length}$$

The maximum allowed prescriptive vertical fenestration area, identified as "Vertical Fenestration Area allowed" in factor CA below, as a percent of the gross above-grade wall area ratio is either:

1. 30%
2. 40% if the building complies with Section C402.4.1.1 or Section C402.1.4.1; or
3. 40% if the *U*-values used in calculating A for vertical fenestration are taken from Section C402.4.1.3 rather than Table C402.4

Where the proposed vertical fenestration area is less than or equal to the maximum allowed prescriptive vertical fenestration area, the value of C (Excess Vertical Glazing Value) shall be zero. Otherwise:

$$C = (CA \times UV) - (CA \times U_{Wall}), \text{ but not less than zero}$$

CA	=	(Proposed Vertical Fenestration Area) - (Vertical Fenestration Area allowed)
UA Wall	=	Sum of the (UA Proposed) values for each opaque assembly of the exterior wall
UAW	=	Sum of the (UA proposed) values for each above-grade wall assembly
$U_{Wall}$	=	$UAW / \text{sum of wall area (excludes vertical fenestration area)}$
UAV	=	Sum of the (UA Proposed) values for each vertical fenestration assembly
UV	=	$UAV / \text{total vertical fenestration area}$

Where the proposed skylight area is less than or equal to the skylight area allowed by Section C402.4.1, the value of D (Excess Skylight Value) shall be zero. Otherwise:

$$D = (DA \times US) - (DA \times U_{Roof}), \text{ but not less than zero}$$

DA	=	(Proposed Skylight Area) - (Allowable Skylight Area from Section C402.4.1)
UAR	=	Sum of the (UA Proposed) values for each roof assembly
$U_{Roof}$	=	$UAR / \text{sum of roof area (excludes skylight area)}$
UAS	=	Sum of the (UA Proposed) values for each skylight assembly
US	=	$UAS / \text{total skylight area}$

**C402.1.5.1 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~~)) 90.1 Normative Appendix A.

**C402.1.5.2 SHGC rate calculations.** Solar heat gain coefficient shall comply with Table C402.4. The target  $SHGCA_t$  and the proposed  $SHGCA_p$  shall be calculated using Equations 4-3 and 4-4 and the corresponding areas and SHGCs from Table C402.4.

**Equation 4-3—Target  $SHGCA_t$**

$$\text{Equation C402-3} \\ \text{Target } SHGCA_t$$

$$SHGCA_t = SHGC_{ogt}(A_{ogt}) + SHGC_{vgt} (A_{vgt} + A_{vgmt} + A_{vgmot} + A_{vgdt})$$

Where:

- |              |   |   |
|--------------|---|---|
| $SHGCA_t$    | = | The target combined solar heat gain of the target fenestration area.  |
| $SHGC_{ogt}$ | = | The solar heat gain coefficient for skylight fenestration found in Table C402.4.  |
| $A_{ogt}$    | = | The proposed skylight area.   |
| $SHGC_{vgt}$ | = | The solar heat gain coefficient for vertical fenestration found in Table C402.4 which corresponds to the proposed total fenestration area as a percentage of gross exterior wall. |
| $A_{vgt}$    | = | The proposed vertical fenestration area with nonmetal framing.  |
| $A_{vgmt}$   | = | The proposed vertical fenestration area with fixed metal framing.   |

$A_{vgmot}$  = The proposed vertical fenestration area with operable metal framing.  
 $A_{vgdt}$  = The proposed vertical fenestration area of entrance doors.  
 NOTE: The vertical fenestration area does not include opaque doors and opaque spandrel panels.

$SHGCA_t$  = The combined proposed solar 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.  
 NOTE: The vertical fenestration area does not include opaque doors and opaque spandrel panels.

**Equation 4-4  
Proposed SHGCA<sub>p</sub>**

$$SHGCA_p = SHGC_{og}A_{og} + SHGC_{vg}A_{vg}$$

Where:

AMENDATORY SECTION (Amending WSR 16-03-072, filed 1/19/16, effective 7/1/16)

**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 <sup>A</sup>
Air conditioners, air cooled	< 65,000 Btu/h <sup>b</sup>	All	Split System	13.0 SEER	<u>AHRI 210/240</u>
			Single Package	14.0 SEER	
Through-the-wall (air cooled)	≤ 30,000 Btu/h <sup>b</sup>	All	Split system	12.0 SEER	
			Single Package	12.0 SEER	
Small duct high velocity, air cooled	< 65,000 Btu/h <sup>b</sup>	All	Split system	11.0 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 12.9 IEER	
		All other	Split System and Single Package	11.0 EER 12.7 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 12.4 IEER	
		All other	Split System and Single Package	10.8 EER 12.2 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.0 EER 11.6 IEER	
		All other	Split System and Single Package	9.8 EER 11.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.7 EER 11.2 IEER	
		All other	Split System and Single Package	9.5 EER 11.6 IEER	

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure <sup>A</sup>		
Air conditioners, water cooled	< 65,000 Btu/h <sup>b</sup>	All	Split System and Single Package	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	12.1 EER 13.9 IEER	AHRI 210/240		
		All other	Split System and Single Package	11.9 EER 13.7 IEER			
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.5 EER 13.9 IEER			
		All other	Split System and Single Package	12.3 EER 13.7 IEER			
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.4 EER 13.6 IEER			
		All other	Split System and Single Package	12.2 EER 13.4 IEER			
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.2 EER 13.5 IEER			
		All other	Split System and Single Package	12.0 EER 13.3 IEER			
	Air conditioners, evaporatively cooled	< 65,000 Btu/h <sup>b</sup>	All	Split System and Single Package		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		12.1 EER 12.3 IEER	AHRI 340/360
			All other	Split System and Single Package		11.9 EER 12.1 IEER	
≥ 135,000 Btu/h and < 240,000 Btu/h		Electric Resistance (or None)	Split System and Single Package	12.0 EER 12.2 IEER			
		All other	Split System and Single Package	11.8 EER 12.0 IEER			
≥ 240,000 Btu/h and < 760,000 Btu/h		Electric Resistance (or None)	Split System and Single Package	11.9 EER 12.1 IEER			
		All other	Split System and Single Package	11.7 EER 11.9 IEER			
≥ 760,000 Btu/h		Electric Resistance (or None)	Split System and Single Package	11.7 EER 11.9 EER			
		All other	Split System and Single Package	11.5 EER 11.7 EER			
Condensing units, air cooled		≥ 135,000 Btu/h			10.5 EER 11.8 IEER	AHRI 365	
Condensing units, water cooled		≥ 135,000 Btu/h			13.5 EER 14.0 IEER		
Condensing units, evaporatively cooled		≥ 135,000 Btu/h			13.5 EER 14.0 IEER		

For SI: 1 British thermal unit per hour = 0.2931 W.

- a Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.
- b Single-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—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

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System	11.2 EER 13.1 IEER (before 1/1/2017) 15.5 IEER (as of 1/1/2017)	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System	11.0 EER 12.9 IEER (before 1/1/2017) 14.9 IEER (as of 1/1/2017)	
	≥ 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-split System	10.0 EER 11.6 IEER (before 1/1/2017) 13.9 IEER (as of 1/1/2017)	

**Table C403.2.3(1)C**

**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 (before 1/1/2017) 14.6 IEER (as of 1/1/2017)	
	≥ 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 (before 1/1/2017) 14.4 IEER (as of 1/1/2017)	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System	10.6 EER 12.3 IEER (before 1/1/2017) 13.9 IEER (as of 1/1/2017)	
	≥ 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 (before 1/1/2017) 13.7 IEER (as of 1/1/2017)	
	≥ 240,000 Btu/h	Electric Resistance (or none)	VRF Multi-Split System	9.5 EER 11.0 IEER (before 1/1/2017) 12.7 IEER (as of 1/1/2017)	



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 (before 1/1/2017) 12.5 IEER (as of 1/1/2017)	
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	
	≥ 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	

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
	≥ 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	

**AMENDATORY SECTION** (Amending WSR 16-03-072, filed 1/19/16, effective 7/1/16)

**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 <sup>a</sup>	Total System Heat Rejection Capacity at Rated Conditions	Subcategory or Rating Condition	Performance Required <sup>b,c,d,g,h</sup>	Test Procedure <sup>e,f</sup>
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
Propeller or axial fan evaporative condensers	All	R-507A Test Fluid 165°F Entering Gas Temperature 105°F Condensing Temperature 75°F Entering wb	≥ 157,000 Btu/h • hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	Ammonia Test Fluid 140°F Entering Gas Temperature 96.3°F Condensing Temperature 75°F Entering wb	≥ 134,000 Btu/h • hp	CTI ((ATC-160)) <u>ATC-106</u>
Centrifugal fan evaporative condensers	All	R-507A Test Fluid 165°F Entering Gas Temperature 105°F Condensing Temperature 75°F Entering wb	≥ 135,000 Btu/h • hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia Test Fluid 140°F Entering Gas Temperature 96.3°F Condensing Temperature 75°F Entering wb	≥ 110,000 Btu/h • hp	CTI ATC-106

Equipment Type <sup>a</sup>	Total System Heat Rejection Capacity at Rated Conditions	Subcategory or Rating Condition	Performance Required <sup>b,c,d,g,h</sup>	Test Procedure <sup>e,f</sup>
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.
- a 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 Where 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, where 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.
- g Cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project-specific accessories and/or options included in the capacity of the cooling tower.
- h For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table, divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power.
- i Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in this table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A must meet the minimum efficiency requirements listed above with R-507A as the test fluid.

**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 16-03-072, filed 1/19/16, effective 7/1/16)

**WAC 51-11C-403291 Section C403.2.11—Air system design and control.**

**C403.2.11 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 comply with the provisions of Sections C403.2.11.1 through C403.2.11.3.

The air flow requirements of Section C403.2.11.5 shall apply to all fan motors. Group R occupancy exhaust fans shall also comply with Section C403.2.11.4.

**C403.2.11.1 Allowable fan motor 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 C403.2.11.1(1). This includes supply fans, exhaust 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.

- EXCEPTIONS:**
1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust 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 are exempt from allowable fan motor horsepower requirements.

**C403.2.11.2 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.

**C403.2.11.3 Fan efficiency.** Fans shall have a fan efficiency grade (FEG) of 67 or higher based on manufacturers' certified data, as defined by AMCA 205. The total efficiency of the

fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan.

- EXCEPTION: The following fans are not required to have a fan efficiency grade:
1. Fans of 5 hp (3.7 kW) or less as follows:
    - 1.1. Single fan with a motor nameplate horsepower of 5 hp (3.7 kW) or less, unless Exception 1.2. applies.
    - 1.2. Multiple fans in series or parallel that have a combined motor nameplate horsepower of 5 hp (3.7 kW) or less and are operated as the functional equivalent of a single fan.
  2. Fans that are part of equipment covered under Section C403.2.3.
  3. Fans included in an equipment package certified by an approved agency for air or energy performance.
  4. Powered wall/roof ventilators.
  5. Fans outside the scope of AMCA 205.
  6. Fans that are intended to operate only during emergency conditions.

**C403.2.11.4 Group R occupancy exhaust fan efficacy.** The Group R occupancies of the building shall be provided with ventilation that meets the requirements of the *International Mechanical Code*, as applicable, or with other approved means of ventilation. Mechanical ventilation system fans with 400 cfm or less in capacity shall meet the efficacy requirements of Table C403.2.11.4.

- EXCEPTIONS:
1. Group R heat recovery ventilator and energy recovery ventilator fans that are less than 400 cfm.
  2. Where whole house ventilation fans are integrated with forced-air systems that are tested and listed HVAC equipment, they shall be powered by an electronically commutated motor where required by Section C405.8.
  3. Domestic clothes dryer booster fans, domestic range hood exhaust fans, and domestic range booster fans that operate intermittently.

**C403.2.11.5 Fan airflow control.** Each cooling system listed in Table C403.2.11.5 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements:

1. Direct expansion (DX) and chilled water cooling units that control the capacity of the mechanical cooling directly based on space temperature shall have not fewer than two stages of fan control. Low or minimum speed shall not be greater than 66 percent of full speed. At low or minimum speed, the fan system shall draw not more than 40 percent of the fan power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.
2. Other units including DX cooling units and chilled water units that control the space temperature by modulating the airflow to the space shall have modulating fan control. Minimum speed shall be not greater than 50 percent of full speed. At minimum speed, the fan system shall draw no more than 30 percent of the power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.
3. Units that include an airside economizer in accordance with Section C403.3 shall have not fewer than two speeds of fan control during economizer operation.

- EXCEPTIONS:
1. Modulating fan control is not required for chilled water and evaporative cooling units with fan motors of less than 1 hp (0.746 kW) where the units are not used to provide ventilation air and the indoor fan cycles with the load.
  2. Where the volume of outdoor air required to comply with the ventilation requirements of the *International Mechanical Code* at low speed exceeds the air that would be delivered at the minimum speed defined in this section, the minimum speed shall be selected to provide the required ventilation air.

**AMENDATORY SECTION** (Amending WSR 16-03-072, filed 1/19/16, effective 7/1/16)

**WAC 51-11C-40344 Section C403.4.3—Heat rejection equipment.**

**C403.4.3 Heat rejection equipment.** Heat rejection equipment such as air-cooled condensers, dry coolers, open-circuit cooling towers, closed-circuit cooling towers and evaporative condensers used for comfort cooling applications shall comply with this section.

- EXCEPTION: Heat rejection devices where energy usage is included in the equipment efficiency ratings listed in Tables C403.2.3(1)A, C403.2.3(1)B, C403.2.3(1)C, C403.2.3(2), C403.2.3(3), C403.2.3(7) and C403.2.3(9).

**C403.4.3.1 Fan speed control.** The fan speed shall be controlled as provided in Sections (~~C403.4.3.2.1 and C403.4.3.2.2~~) C403.4.3.1.1 and C403.4.3.1.2.

**C403.4.3.1.1 Fan motors not less than 7.5 hp.** 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.

**C403.4.3.1.2 Multiple-cell heat rejection equipment.** Multiple-cell heat rejection equipment with variable speed fan drives shall be controlled in both of the following manners:

1. To operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components.
2. So all fans can operate at the same fan speed required for the instantaneous cooling duty, as opposed to staged (on/off) operation. Minimum fan speed shall be the minimum allowable speed of the fan drive system in accordance with the manufacturer's recommendations.

**C403.4.3.2 Limitation on centrifugal fan open-circuit cooling towers.** Centrifugal fan open-circuit cooling towers with a combined rated capacity of 1,100 gpm (4164 L/m) or greater at 95°F (35°C) condenser water return, 85°F (29°C) condenser water supply, and 75°F (24°C) outdoor air wet-bulb temperature shall meet the energy efficiency requirement for axial fan open-circuit cooling towers listed in Table C403.2.3(8).

- EXCEPTION: Centrifugal open-circuit cooling towers that are designed with inlet or discharge ducts or require external sound attenuation.

**C403.4.3.3 Tower flow turndown.** Open-circuit cooling towers used on water-cooled chiller systems that are config-

ured with multiple- or variable-speed condenser water pumps shall be designed so that all open circuit cooling tower cells can be run in parallel with the larger of the flow that is produced by the smallest pump at its minimum expected flow rate or at 50 percent of the design flow for the cell.

**AMENDATORY SECTION** (Amending WSR 13-04-056, filed 2/1/13, effective 7/1/13)

**WAC 51-11C-40347 Section ((C403.4.7)) C403.4.6—Hot gas bypass limitation.**

**((C403.4.7)) C403.4.6 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)) C403.4.6, as limited by Section C403.3.1.

((EXCEPTION: Unitary packaged systems with cooling capacities not greater than 90,000 Btu/h (26,379 W):))

**Table ((C403.4.7)) C403.4.6  
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.

**AMENDATORY SECTION** (Amending WSR 16-13-089, filed 6/15/16, effective 7/16/16)

**WAC 51-11C-40360 Section C403.6—Dedicated outdoor air systems (DOAS).**

**C403.6 Dedicated outdoor air systems (DOAS) (This section is optional until June 30, 2017; and becomes prescriptive as of July 1, 2017).** For office, retail, education, libraries and fire stations. Outdoor air shall be provided to each occupied space by a dedicated outdoor air system (DOAS) which delivers 100 percent outdoor air without requiring operation of the heating and cooling system fans for ventilation air delivery.

EXCEPTIONS: 1. Occupied spaces that are not ventilated by a mechanical ventilation system and are only ventilated by a natural ventilation system per Section 402 of the *International Mechanical Code*.  
2. High efficiency variable air volume (VAV) systems complying with Section C403.7. This exception shall not be used as a substitution for a DOAS per Section C406.6 or as a modification to the requirements for the Standard Reference Design per Section C407.

**C403.6.1 Energy recovery ventilation with DOAS.** The DOAS shall include *energy recovery ventilation* that complies with the minimum energy recovery efficiency and energy recovery bypass requirements, where applicable, of Section C403.5.1.

EXCEPTIONS: 1. Occupied spaces under the threshold of Section C403.5 with an average occupant load greater than 25 people per 1000 square feet (93 m<sup>2</sup>) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) that include demand control ventilation configured to reduce outdoor air by at least 50% below design minimum ventilation rates when the actual occupancy of the space served by the system is less than the design occupancy.  
2. Systems installed for the sole purpose of providing makeup air for systems exhausting toxic, flammable, paint, or corrosive fumes or dust, dryer exhaust, or commercial kitchen hoods used for collecting and removing grease vapors and smoke.

**C403.6.2 Heating/cooling system fan controls.** Heating and cooling equipment fans, heating and cooling circulation pumps, and terminal unit fans shall cycle off and terminal unit primary cooling air shall be shut off when there is no call for heating or cooling in the zone.

EXCEPTION: Fans used for heating and cooling using less than 0.12 watts per cfm may operate when space temperatures are within the setpoint deadband (Section C403.2.4.1.2) to provide destratification and air mixing in the space.

**C403.6.3 Impracticality.** Where the code official determines that full compliance with all the requirements of Sections C403.6.1 and C403.6.2 would be impractical, it is permissible to provide an approved alternate means of compliance that achieves a comparable level of energy efficiency. For the purposes of this section, impractical means that an HVAC system complying with Section C403.6 cannot effectively be utilized due to an unusual use or configuration of the building.

**C403.7 High efficiency variable air volume (VAV) systems.** For HVAC systems subject to the requirements of Section C403.6 but utilizing Exception 2 of that section, a high efficiency VAV system may be provided without a separate parallel DOAS when the system is designed, installed, and configured to comply with all of the following criteria (this exception shall not be used as a substitution for a DOAS per Section C406.6 or as a modification to the requirements for the Standard Reference Design per Section C407):

1. The VAV systems are provided with airside economizer per Section 403.3 without exceptions.
2. A direct-digital control (DDC) system is provided to control the VAV air handling units and associated terminal units per Section C403.2.4.12 regardless of sizing thresholds of Table C403.2.4.12.1.
3. Multiple-zone VAV systems with a minimum outdoor air requirement of 2,500 cfm (1180 L/s) or greater shall be equipped with a device capable of measuring outdoor airflow intake under all load conditions. The system shall be capable of increasing or reducing the outdoor airflow intake based on feedback from the VAV terminal units as required by Section C403.4.4.3, without exceptions, and Section C403.2.6.2 demand controlled ventilation.
4. Multiple-zone VAV systems with a minimum outdoor air requirement of 2,500 cfm (1180 L/s) or greater shall be equipped with a device capable of measuring supply airflow to the VAV terminal units under all load conditions.

5. In addition to meeting the zone isolation requirements of C403.2.4.4 a single VAV air handling unit shall not serve more than 50,000 square feet (2323 m<sup>2</sup>) unless a single floor is greater than 50,000 square feet (2323 m<sup>2</sup>) in which case the air handler is permitted to serve the entire floor.

6. The primary maximum cooling air for the VAV terminal units serving interior cooling load driven zones shall be sized for a supply air temperature that is a minimum of 5°F greater than the supply air temperature for the exterior zones in cooling.

7. Air terminal units with a minimum primary airflow setpoint of 50% or greater of the maximum primary airflow setpoint shall be sized with an inlet velocity of no greater than 900 feet per minute.

8. DDC systems be designed and configured per the guidelines set by high performance sequences of operation for HVAC systems (ASHRAE GPC 36, RP-1455).

9. Allowable fan motor horsepower shall not exceed 90% of the allowable HVAC *fan system bhp* (Option 2) as defined by Section C403.2.11.1.

10. All fan powered VAV terminal units (series or parallel) shall be provided with electronically commutated motors. The DDC system shall be configured to vary the speed of the motor as a function of the heating and cooling load in the space. Minimum speed shall not be greater than 66% of design airflow required for the greater of heating or cooling operation. Minimum speed shall be used during periods of low heating and cooling operation and ventilation-only operation.

EXCEPTION: For series fan powered terminal units where the volume of primary air required to deliver the ventilation requirements at minimum speed exceeds the air that would be delivered at the speed defined above, the minimum speed setpoint shall be configured to exceed the value required to provide the required ventilation air.

11. Fan-powered VAV terminal units shall only be permitted at perimeter zones with an envelope heating load requirement. All other VAV terminal units shall be single duct terminal units.

12. When in occupied heating or in occupied deadband between heating and cooling all fan powered VAV terminal units shall be configured to reset the primary air supply setpoint, based on the VAV air handling unit outdoor air vent fraction, to the minimum ventilation airflow required per *International Mechanical Code* without utilizing the exceptions 2, 3, or 4 of Section C403.4.4.

13. Spaces that are larger than 150 square feet (14 m<sup>2</sup>) and with an occupant load greater than or equal to 25 people per 1000 square feet (93 m<sup>2</sup>) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) shall be provided with all of the following features:

13.1. A dedicated VAV terminal unit capable of controlling the space temperature and minimum ventilation shall be provided.

13.2. Demand control ventilation (DCV) shall be provided that utilizes a carbon dioxide sensor to reset the ventilation setpoint of the VAV terminal unit from the design minimum to design maximum ventilation rate as required by Chapter 4 of the *International Mechanical Code*.

13.3. Occupancy sensors shall be provided that are configured to reduce the minimum ventilation rate to zero and setback room temperature setpoints by a minimum of 5°F, for both cooling and heating, when the space is unoccupied.

14. Dedicated server rooms, electronic equipment rooms, telecom rooms, or other similar spaces with cooling loads greater than 5 watts/sf shall be provided with separate, independent HVAC systems to allow the VAV air handlers to turn off during unoccupied hours in the office space and to allow the supply air temperature reset to occur.

EXCEPTION: The VAV air handling unit and VAV terminal units may be used for secondary backup cooling when there is a failure of the primary HVAC system.

((Additionally, server rooms, electronic equipment rooms, telecom rooms, or other similar spaces shall be provided with airside economizer per Section 403.3 without using the exceptions to Section C403.3.))

Additionally, server rooms, electronic equipment rooms, telecom rooms, or other similar spaces shall be provided with airside economizer per Section 403.3 without using the exceptions to Section C403.3.

EXCEPTION: Heat recovery per exception 9 of Section 403.3 may be in lieu of airside economizer for the separate, independent HVAC system.

15. HVAC system central heating or cooling plant will include a minimum of one of the following options:

15.1. VAV terminal units with hydronic heating coils connected to systems with hot water generation equipment limited to the following types of equipment: Gas-fired hydronic boilers with a thermal efficiency,  $E_t$ , of not less than 90%, air-to-water heat pumps or heat recovery chillers.

15.2. Chilled water VAV air handling units connected to systems with chilled water generation equipment with IPLV values more than 25% higher than the 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. The smallest chiller or compressor in the central plant shall not exceed 20% of the total central plant cooling capacity or the chilled water system shall include thermal storage sized for a minimum of 20% of the total central cooling plant capacity.

16. The DDC system shall include a fault detection and diagnostics (FDD) system complying with the following:

16.1. The following temperature sensors shall be permanently installed to monitor system operation:

16.1.1. Outside air.

16.1.2. Supply air.

16.1.3. Return air.

16.2. Temperature sensors shall have an accuracy of  $\pm 2^\circ\text{F}$  ( $1.1^\circ\text{C}$ ) over the range of 40°F to 80°F ( $4^\circ\text{C}$  to  $26.7^\circ\text{C}$ ).

16.3. The VAV air handling unit controller shall be configured to provide system status by indicating the following:

16.3.1. Free cooling available.

16.3.2. Economizer enabled.

16.3.3. Compressor enabled.

16.3.4. Heating enabled.

16.3.5. Mixed air low limit cycle active.

16.3.6. The current value of each sensor.

16.4. The VAV air handling unit controller shall be capable of manually initiating each operating mode so that the operation of compressors, economizers, fans and the heating system can be independently tested and verified.

16.5. The VAV air handling unit shall be configured to report faults to a fault management application accessible by day-to-day operating or service personnel or annunciated locally on zone thermostats.

16.6. The VAV terminal unit shall be configured to report if the VAV inlet valve has failed by performing the following diagnostic check at a maximum interval of once a month:

16.6.1. Command VAV terminal unit primary air inlet valve closed and verify that primary airflow goes to zero.

16.6.2. Command VAV terminal unit primary air inlet valve to design airflow and verify that unit is controlling to within 10% of design airflow.

16.7. The VAV terminal unit shall be configured to report and trend when the zone is driving the following VAV air handling unit reset sequences. The building operator shall have the capability to exclude zones used in the reset sequences from the DDC control system graphical user interface:

16.7.1. Supply air temperature setpoint reset to lowest supply air temperature setpoint for cooling operation.

16.7.2. Supply air duct static pressure setpoint reset for the highest duct static pressure setpoint allowable.

16.8. The FDD system shall be configured to detect the following faults:

16.8.1. Air temperature sensor failure/fault.

16.8.2. Not economizing when the unit should be economizing.

16.8.3. Economizing when the unit should not be economizing.

16.8.4. Outdoor air or return air damper not modulating.

16.8.5. Excess outdoor air.

16.8.6 VAV terminal unit primary air valve failure.

**AMENDATORY SECTION** (Amending WSR 16-13-089, filed 6/15/16, effective 7/16/16)

**WAC 51-11C-40507 Section ((~~C405.7~~) C405.6—Electrical energy consumption.**

**C405.6 Electrical transformers (Mandatory).** Electric transformers shall meet the minimum efficiency requirements of Table C405.6 as tested and rated in accordance with the test procedure listed in DOE 10 C.F.R. 431. The efficiency shall be verified through certification under an approved certification program or, where no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the transformer manufacturer.

EXCEPTION: The following transformers are exempt:

1. Transformers that meet the Energy Policy Act of 2005 exclusions based on the DOE 10 C.F.R. 431 definition of special purpose applications.
2. Transformers that meet the Energy Policy Act of 2005 exclusions that are not to be used in general purpose applications based on information provided in DOE 10 C.F.R. 431.

3. Transformers that meet the Energy Policy Act of 2005 exclusions with multiple voltage taps where the highest tap is at least 20 percent more than the lowest tap.

4. Drive transformers.

5. Rectifier transformers.

6. Auto-transformers.

7. Uninterruptible power system transformers.

8. Impedance transformers.

9. Regulating transformers.

10. Sealed and nonventilating transformers.

11. Machine tool transformer.

12. Welding transformer.

13. Grounding transformer.

14. Testing transformer.

**Table C405.6**

**Minimum Nominal Efficiency Levels For 10 C.F.R. 431 Low Voltage Dry-Type Distribution Transformers**

Single Phase Transformers		Three Phase Transformers	
kVA <sup>a</sup>	Efficiency (%) <sup>b</sup>	kVA <sup>a</sup>	Efficiency (%) <sup>b</sup>
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6
333	98.9	500	98.7
		750	98.8
		1000	98.9

<sup>a</sup> kiloVolt-Amp rating.

<sup>b</sup> Nominal efficiencies shall be established in accordance with the DOE 10 C.F.R. 431 test procedure for low voltage dry-type transformers.

**C405.7 Dwelling unit electrical energy consumption (Mandatory).** Each dwelling unit located in a Group R-2 building shall have a separate electrical meter. A utility tenant meter meets this requirement. See Section C409 for additional requirements for energy metering and energy consumption management.

**WSR 17-04-087**

**EXPEDITED RULES**

**BUILDING CODE COUNCIL**

[Filed January 31, 2017, 11:57 a.m.]

Title of Rule and Other Identifying Information: Editorial changes to chapter 51-11R WAC, 2015 Washington State Energy Code—Residential.

NOTICE

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU

MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO Steve Simpson, Chair, State Building Code Council, P.O. Box 41449, Olympia, WA 98504-1449, AND RECEIVED BY April 7, 2017.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: Makes editorial changes to the following sections of the residential energy portion of the Washington State Energy Code.

R104.2.3	<b>R104.2.3 Plumbing rough-in inspection.</b> Inspections at plumbing rough-in shall verify compliance as required by the code and approved plans and specifications as to types of insulation and corresponding <i>R</i> -values and protection, <u>and</u> required controls.	Typo
Definitions	<b>FENESTRATION.</b> Products classified as either vertical fenestration or skylights. <b>VERTICAL FENESTRATION.</b> Windows (fixed or moveable), glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees from horizontal. Opaque areas such as spandrel panels are not considered vertical fenestration. <b>SKYLIGHT.</b> Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees from horizontal. <del><b>SKYLIGHT.</b> 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.</del>	Previous, outdated skylight definition left in the code
R402.1	1. Those with a peak design rate of energy usage less than 3.4 Btu/h ft <sup>2</sup> (10.7 W/m <sup>2</sup> ) or 1.0 watt/ft <sup>2</sup> ( <del>10.7 W/m<sup>2</sup></del> ) of floor area for space conditioning purposes.	Typo
R402.1.2	<b>R402.1.2 R-value computation.</b> Insulation material used in layers, such as framing cavity insulation; or continuous insulation, shall be summed to compute the corresponding component <i>R</i> -value.	Typo
Table R402.1.1	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. <del>"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.</del> "TB" means thermal break between floor slab and basement wall.	Extraneous, now confusing language left over from previous code version
R403.3.4	2. Postconstruction test: Leakage to outdoors shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m <sup>2</sup> ) of conditioned floor areas or total leakage shall be less than or equal to 4 cfm...	Typo



R406.1	<b>R406.1 Scope.</b> 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 <i>International Residential Code</i> , <u>and dwelling units in residential buildings</u> to demonstrate compliance with this code.	Missing reference to R-2 occupancies added in Section R406.2
Table R406.2	1b EFFICIENT BUILDING ENVELOPE 1b: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Vertical fenestration $U^o=0.25$ Wall R-21 plus R-4 <i>ci</i> Floor R-38 Basement wall R-21 int plus R-5 <i>ci</i> Slab on grade R-10 perimeter and under entire slab Below grade slab R-10 perimeter and under entire slab <b>or</b> Compliance based on Section R402.1.4: Reduce the Total UA by 15%.	Typo/missing CI notation
R502.1.1.3/ R503.1.3	<b>Additions/Alterations</b> sections both reference Section R403.4 for water heater requirements. Should be Section R403.5.	Typo/bad section reference

Reasons Supporting Proposal: Some editorial and typographical errors were identified in the rules filed under WSR 16-02-127. This rule corrects those errors.

Statutory Authority for Adoption: RCW 19.27A.025, 19.27A.045.

Statute Being Implemented: Chapters 19.27, 19.27A, and 34.05 RCW.

Rule is not necessitated by federal law, federal or state court decision.

Name of Proponent: State building code council, governmental.

Name of Agency Personnel Responsible for Drafting and Implementation: Krista Braaksma, P.O. Box 41449, Olympia, WA 98504-1449, (360) 407-9278; and Enforcement: Local jurisdictions.

January 27, 2017  
Steve K. Simpson  
Council Chair

**AMENDATORY SECTION** (Amending WSR 16-02-127, filed 1/6/16, effective 7/1/16)

**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* or his or her designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

**R104.2 Required inspections.** The *code official* or his or her designated agent, upon notification, shall make the inspections set forth in Sections R104.2.1 through R104.2.5.

**R104.2.1 Footing and foundation inspection.** Inspections associated with footings and foundations shall verify compliance with the code as to *R*-value, location, thickness, depth of burial and protection of insulation as required by the code and approved plans and specifications.

**R104.2.2 Framing and rough-in inspection.** Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding *R*-values and their correct location and proper installation; fenestration properties (*U*-factor and SHGC) and proper installation; and air leakage controls as required by the code and approved plans and specifications.

**R104.2.2.1 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.

**R104.2.3 Plumbing rough-in inspection.** Inspections at plumbing rough-in shall verify compliance as required by the code and approved plans and specifications as to types of insulation and corresponding *R*-values and protection, and required controls.

**R104.2.4 Mechanical rough-in inspection.** Inspections at mechanical rough-in shall verify compliance as required by the code and approved plans and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding *R*-value, system air leakage control, programmable thermostats, dampers, whole-house ventilation and minimum fan efficiency.

EXCEPTION: Systems serving multiple dwelling units shall be inspected in accordance with Section C104.2.4.

**R104.2.5 Final inspection.** The building shall have a final inspection and not be occupied until *approved*.

**R104.3 Reinspection.** A building shall be reinspected when determined necessary by the *code official*.

**R104.4 Approved inspection agencies.** The *code official* is authorized to accept reports of third-party inspection agencies not affiliated with the building design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

**R104.5 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.

**R104.6 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.

**R104.7 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*.

**R104.7.1 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.

**AMENDATORY SECTION** (Amending WSR 13-04-055, filed 2/1/13, effective 7/1/13)

**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.

**AMENDATORY SECTION** (Amending WSR 16-02-127, filed 1/6/16, effective 7/1/16)

**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 R402.1.5.

**EXCEPTION:** 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 ft<sup>2</sup> (10.7 W/m<sup>2</sup>) or 1.0 watt/ft<sup>2</sup> ((40.7 W/m<sup>2</sup>)) 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.

**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(±) or continuous insulation, shall be summed to compute the corresponding 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. Where insulated siding is used for the purpose of complying with the continuous insulation requirements of Table R402.1.1, the manufacturer must supply an ICC Report that the *R*-factor has been certified, or use R-5 per inch for extruded polystyrene, and R-6 per inch for polyisocyanurate rigid insulation.

**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 calcu-

lated 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.

**R402.1.5 Vapor retarder.** Wall assemblies in the building thermal envelope shall comply with the vapor retarder requirements of Section R702.7 of the *International Residen-*

*tial Code* or Section 1405.3 of the *International Building Code*, as applicable.

AMENDATORY SECTION (Amending WSR 16-02-127, filed 1/6/16, effective 7/1/16)

**WAC 51-11R-40211 Table R402.1.1—Insulation and fenestration requirements by component.**

TABLE R402.1.1  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a</sup>

Climate Zone	Fenestration U-Factor <sup>b</sup>	Skylight <sup>b</sup> U-Factor	Glazed Fenestration SHGC <sup>b, c</sup>	Ceiling R-Value <sup>k</sup>	Wood Frame Wall <sup>g, m, n</sup> R-Value	Mass Wall R-Value <sup>i</sup>	Floor R-Value	Below-Grade <sup>c, m</sup> Wall R-Value	Slab <sup>d</sup> R-Value & Depth
5 and Marine 4	0.30	0.50	NR	49	21 int	21/ 21	30	10/15/ 21int+TB	10, 2 ft

For SI: 1 foot = 304.8 mm, ci = continuous insulation, int = intermediate framing.

<sup>a</sup> *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.

<sup>b</sup> The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

<sup>c</sup> "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.

<sup>d</sup> R-10 continuous insulation is required under heated slab on grade floors. See R402.2.9.1.

<sup>e</sup> There are no SHGC requirements in the Marine Zone.

<sup>f</sup> Reserved.

<sup>g</sup> Reserved.

<sup>h</sup> Reserved.

<sup>i</sup> The second *R*-value applies when more than half the insulation is on the interior of the mass wall.

<sup>j</sup> Reserved.

<sup>k</sup> For single rafter- or joist-vaulted ceilings, the insulation may be reduced to R-38.

<sup>l</sup> Reserved.

<sup>m</sup> Int. (intermediate framing) denotes standard framing 16 inches on center with headers insulated with a minimum of R-10 insulation.

<sup>n</sup> Log and solid timber walls with a minimum average thickness of 3.5 inches are exempt from this insulation requirement.

**R403.3.1 Insulation (Prescriptive).** Ducts outside the building thermal envelope shall be insulated to a minimum of R-8. Ducts within a concrete slab or in the ground shall be insulated to R-10 with insulation designed to be used below grade.

EXCEPTION: Ducts or portions thereof located completely inside the *building thermal envelope*. Ducts located in crawl spaces do not qualify for this exception.

**R403.3.2 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. For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams, and locking-type joints and seams of other than the snap-lock and button-lock types.

**R403.3.2.1 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.

**R403.3.3 Duct testing (Mandatory).** Ducts shall be leak tested in accordance with WSU RS-33, using the maximum duct leakage rates specified.

EXCEPTION: The total leakage or leakage to the outdoors test is not required for ducts and air handlers located entirely within the building thermal envelope. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts may be located outside the conditioned space. All metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool. Ducts located in crawl spaces do not qualify for this exception.

A written report of the results shall be signed by the party conducting the test and provided to the *code official*.

**R403.3.4 Duct leakage (Mandatory).** The total leakage of the ducts, where measured in accordance with Section R403.3.3, shall be as follows:

AMENDATORY SECTION (Amending WSR 16-02-127, filed 1/6/16, effective 7/1/16)

**WAC 51-11R-40320 Section R403.3—Ducts.**

**R403.3 Ducts.** Ducts and air handlers shall be in accordance with Sections R403.3.1 through R403.3.5.

1. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m<sup>2</sup>) 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 m<sup>2</sup>) of conditioned floor area.

2. Postconstruction test: Leakage to outdoors shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m<sup>2</sup>) of conditioned floor area(⊕) or total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m<sup>2</sup>) 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.

**R403.3.5 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.

AMENDATORY SECTION (Amending WSR 13-04-055, filed 2/1/13, effective 7/1/13)

**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, and dwelling units in residential buildings* to demonstrate compliance with this code.

AMENDATORY SECTION (Amending WSR 16-02-127, filed 1/6/16, effective 7/1/16)

**WAC 51-11R-40621 Table R406.2—Energy credits.**

**TABLE 406.2  
ENERGY CREDITS**

OPTION	DESCRIPTION	CREDIT(S)
1a	<p>EFFICIENT BUILDING ENVELOPE 1a:</p> <p>Prescriptive compliance is based on Table R402.1.1 with the following modifications:</p> <p>Vertical fenestration U = 0.28</p> <p>Floor R-38</p> <p>Slab on grade R-10 perimeter and under entire slab</p> <p>Below grade slab R-10 perimeter and under entire slab</p> <p><b>or</b></p> <p>Compliance based on Section R402.1.4: Reduce the Total UA by 5%.</p>	0.5

OPTION	DESCRIPTION	CREDIT(S)
1b	<p>EFFICIENT BUILDING ENVELOPE 1b:</p> <p>Prescriptive compliance is based on Table R402.1.1 with the following modifications:</p> <p>Vertical fenestration U = 0.25</p> <p>Wall R-21 plus R-4 ci</p> <p>Floor R-38</p> <p>Basement wall R-21 int plus R-5 ci</p> <p>Slab on grade R-10 perimeter and under entire slab</p> <p>Below grade slab R-10 perimeter and under entire slab</p> <p><b>or</b></p> <p>Compliance based on Section R402.1.4: Reduce the Total UA by 15%.</p>	1.0
1c	<p>EFFICIENT BUILDING ENVELOPE 1c:</p> <p>Prescriptive compliance is based on Table R402.1.1 with the following modifications: Vertical fenestration U = 0.22</p> <p>Ceiling and single-rafter or joist-vaulted R-49 advanced</p> <p>Wood frame wall R-21 int plus R-12 ci</p> <p>Floor R-38</p> <p>Basement wall R-21 int plus R-12 ci</p> <p>Slab on grade R-10 perimeter and under entire slab</p> <p>Below grade slab R-10 perimeter and under entire slab</p> <p><b>or</b></p> <p>Compliance based on Section R402.1.4: Reduce the Total UA by 30%.</p>	2.0
1d <sup>a</sup>	<p>EFFICIENT BUILDING ENVELOPE 1d:</p> <p>Prescriptive compliance is based on Table R402.1.1 with the following modifications:</p> <p>Vertical fenestration U = 0.24</p>	0.5
2a	<p>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION 2a:</p> <p>Compliance based on R402.4.1.2: Reduce the tested air leakage to 3.0 air changes per hour maximum <b>and</b></p> <p>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.</p> <p>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 qualified ventilation system.</p>	0.5

OPTION	DESCRIPTION	CREDIT(S)
2b	<p><b>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION 2b:</b></p> <p>Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 2.0 air changes per hour maximum</p> <p><b>and</b></p> <p>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.</p> <p>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><b>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION 2c:</b></p> <p>Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 1.5 air changes per hour maximum</p> <p>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.</p> <p>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 <sup>b</sup>	<p><b>HIGH EFFICIENCY HVAC EQUIPMENT 3a:</b></p> <p>Gas, propane or oil-fired furnace with minimum AFUE of 94%, or gas, propane or oil-fired boiler with minimum AFUE of 92%.</p> <p>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
3b <sup>b</sup>	<p><b>HIGH EFFICIENCY HVAC EQUIPMENT 3b:</b></p> <p>Air-source heat pump with minimum HSPF of 9.0</p> <p>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

OPTION	DESCRIPTION	CREDIT(S)
3c <sup>b</sup>	<p><b>HIGH EFFICIENCY HVAC EQUIPMENT 3c:</b></p> <p>Closed-loop ground source heat pump; with a minimum COP of 3.3</p> <p><b>or</b></p> <p>Open loop water source heat pump with a maximum pumping hydraulic head of 150 feet and minimum COP of 3.6</p> <p>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>	1.5
3d <sup>b</sup>	<p><b>HIGH EFFICIENCY HVAC EQUIPMENT 3d:</b></p> <p><b>DUCTLESS SPLIT SYSTEM HEAT PUMPS, ZONAL CONTROL:</b></p> <p>In homes where the primary space heating system is zonal electric heating, a ductless heat pump system shall be installed and provide heating to the largest zone of the housing unit.</p> <p>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><b>HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM:</b></p> <p>All heating and cooling system components installed inside the conditioned space. This includes all equipment and distribution system components such as forced air ducts, hydronic piping, hydronic floor heating loop, convectors and radiators. All combustion equipment shall be direct vent or sealed combustion.</p> <p>For forced air ducts: A maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts may be located outside the conditioned space. All metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool. Ducts located outside the conditioned space must be insulated to a minimum of R-8.</p> <p>Locating system components in conditioned crawl spaces is not permitted under this option.</p> <p>Electric resistance heat and ductless heat pumps are not permitted under this option.</p> <p>Direct combustion heating equipment with AFUE less than 80% is not permitted under this option.</p>	1.0

OPTION	DESCRIPTION	CREDIT(S)
	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.	
5a	<p><b>EFFICIENT WATER HEATING 5a:</b></p> <p>All showerheads 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.<sup>c</sup></p> <p>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the maximum flow rates for all showerheads, kitchen sink faucets, and other lavatory faucets.</p>	0.5
5b	<p><b>EFFICIENT WATER HEATING 5b:</b></p> <p>Water heating system shall include one of the following:                      Gas, propane or oil water heater with a minimum EF of 0.74</p> <p><b>or</b></p> <p>Water heater heated by ground source heat pump meeting the requirements of Option 3c.</p> <p><b>or</b></p> <p>For R-2 occupancy, a central heat pump water heater with an EF greater than 2.0 that would supply DHW to all the units through a central water loop insulated with R-8 minimum pipe insulation.</p> <p>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.</p>	1.0
5c	<p><b>EFFICIENT WATER HEATING 5c:</b></p> <p>Water heating system shall include one of the following:                      Gas, propane or oil water heater with a minimum EF of 0.91</p> <p><b>or</b></p> <p>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.</p> <p><b>or</b></p>	1.5

OPTION	DESCRIPTION	CREDIT(S)
	<p>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.</p> <p>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>	
5d	<p><b>EFFICIENT WATER HEATING 5d:</b></p> <p>A drain water heat recovery unit(s) shall be installed, which captures waste water heat from all the showers, and has a minimum efficiency of 40% if installed for equal flow or a minimum efficiency of 52% if installed for unequal flow. Such units shall be rated in accordance with the CSA B55.1 standard and be so labeled.</p> <p>To qualify to claim this credit, the building permit drawings shall include a plumbing diagram that specifies the drain water heat recovery units and the plumbing layout needed to install it and labels or other documentation shall be provided that demonstrates that the unit complies with the standard.</p>	0.5
6	<p><b>RENEWABLE ELECTRIC ENERGY:</b></p> <p>For each 1200 kWh of electrical generation per housing unit 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.</p> <p>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.</p> <p>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: <sup>a</sup> Projects using this option may not use option 1a, 1b, or 1c.

<sup>b</sup> Projects may only include credit from one space heating option, 3a, 3b, 3c or 3d. When a housing unit has two pieces of equipment (i.e., two furnaces) both must meet the standard to receive the credit.

<sup>c</sup> **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.

AMENDATORY SECTION (Amending WSR 16-02-127, filed 1/6/16, effective 7/1/16)

**WAC 51-11R-50200 Section R502—Additions.**

**R502.1 General.** Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code where the addition alone complies, where the existing building and addition comply with this code as a single building, or where the building with the addition uses no more energy than the existing building. Additions shall be in accordance with Section R502.1.1 or R502.1.2.

**R502.1.1 Prescriptive compliance.** Additions shall comply with Sections R502.1.1.1 through R502.1.1.4.

**R502.1.1.1 Building envelope.** New building envelope assemblies that are part of the addition shall comply with Sections R402.1, R402.2, R402.3.1 through R402.3.5, and R402.4.

EXCEPTION: Where nonconditioned space is changed to conditioned space, the building envelope of the addition shall comply where the UA, as determined in Section R402.1.4, of the existing building and the addition, and any alterations that are part of the project, is less than or equal to UA generated for the existing building.

**R502.1.1.2 Heating and cooling systems.** New heating, cooling and duct systems that are part of the addition shall comply with Sections R403.1, R403.2, R403.3, R403.5, and R403.6.

EXCEPTION: The following need not comply with the testing requirements of Section R403.3.3:

1. Additions of less than 750 square feet.
2. 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.
3. Ducts with less than 40 linear feet in unconditioned spaces.

4. Existing duct systems constructed, insulated or sealed with asbestos.

**R502.1.1.3 Service hot water systems.** New service hot water systems that are part of the addition shall comply with Section ((R403.4)) R403.5.

**R502.1.1.4 Lighting.** New lighting systems that are part of the addition shall comply with Section 404.1.

**R502.1.2 Existing plus addition compliance (Simulated Performance Alternative).** Where nonconditioned space is changed to conditioned space the addition shall comply where the annual energy use of the addition and the existing building, and any alterations that are part of the project, is less than or equal to the annual energy use of the existing building when modeled in accordance with Section R405. The addition and any alterations that are part of the project shall comply with Section R405 in its entirety.

AMENDATORY SECTION (Amending WSR 16-02-127, filed 1/6/16, effective 7/1/16)

**WAC 51-11R-50300 Section R503—Alterations.**

**R503.1 General.** Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the alteration.

Alterations 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 portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations shall be such that the existing building or structure uses no more energy than the existing building or structure prior to the alteration. Alterations to existing buildings shall comply with Sections R503.1.1 through R503.2

The *code official* may approve designs of alterations which do not fully conform to 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:

The alteration improves the energy efficiency of the building; or

The alteration is energy efficient and is necessary for the health, safety, and welfare of the general public.

**R503.1.1 Building envelope.** Building envelope assemblies that are part of the alteration shall comply with Section R402.1.1 or R402.1.4, Sections R402.2.1 through R402.2.11, R402.3.1, R402.3.2, R402.4.3, and R402.4.4.

EXCEPTION: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.

2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation. 2 x 4 framed walls shall be insulated to a minimum of R-15 and 2 x 6 framed walls shall be insulated to a minimum of R-21.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Roof recover.
5. 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. Surface-applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided the code does not require the glazing fenestration to be replaced.

**R503.1.1.1 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.

**R503.1.2 Heating and cooling systems.** New heating, cooling and duct systems that are part of the alteration shall comply with Sections R403.1, R403.2, R403.3, and R403.6.

- EXCEPTIONS:
1. Where ducts from an existing heating and cooling system are extended, duct systems with less than 40 linear feet in unconditioned spaces shall not be required to be tested in accordance with Section R403.2.2.
  2. Existing duct systems constructed, insulated or sealed with asbestos.

**R503.1.3 Service hot water systems.** New service hot water systems that are part of the alteration shall comply with Section ((R403-4)) R403.5.

**R503.1.4 Lighting.** New lighting systems that are part of the alteration shall comply with Section R404.1.

- EXCEPTION:
- Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

**R503.2 Change in space conditioning.** Any nonconditioned or low-energy space that is altered to become conditioned space shall be required to be brought into full compliance with this code.

- EXCEPTION:
- Where the simulated performance option in Section R405 is used to comply with this section, the annual energy use of the proposed design is permitted to be 110 percent of the annual energy use otherwise allowed by Section R405.3.

**WSR 17-04-088**  
**EXPEDITED RULES**  
**BUILDING CODE COUNCIL**  
 [Filed January 31, 2017, 11:58 a.m.]

Title of Rule and Other Identifying Information: Editorial changes to chapter 51-52 WAC, Washington state adoption and amendment of the 2015 International Mechanical Code.

NOTICE

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO Steve Simpson, Chair, State Building Code Council, P.O. Box 41449, Olympia, WA 98504-1449, AND RECEIVED BY April 7, 2017.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: Makes editorial changes to the following sections of the state amendments to the 2015 International Mechanical Code.

Section 102.4	<p><del><b>102.4 Additions, alterations or repairs.</b> 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.</del></p>	This section no longer has a state amendment
Table 403.3.1.1	<p><b>Public Spaces</b>                  Shower Room<sup>g,k</sup> — — — <u>50/20<sup>f</sup></u>                  (per showerhead)                  Toilet rooms — — — <del>50/20<sup>f</sup></del> <u>50/70<sup>e</sup></u>                  Public<sup>g,k</sup></p> <p>k. Kitchenettes require exhaust when they contain a domestic cooking appliance range or oven that is installed in accordance with Table 507.2.2. Kitchenettes that only contain a microwave oven are not required to have mechanical exhaust. A kitchenette may</p>	Typo



	not contain commercial cooking appliances that require Type I or Type II exhaust as these occupancies are required to be exhausted to the kitchen category in Table 403.3.1.1.	
Section 403.8	<b>403.8 Ventilation systems for Group R occupancies.</b> Each dwelling unit or sleeping unit shall be equipped with local exhaust and whole house ventilation systems and shall comply with Sections 403.8.1 through 403.8.11. All occupied spaces, including public corridors, other than the Group R dwelling and sleeping unit, that support the Group R occupancy shall meet the ventilation requirements of Section 402 or Sections 403.1 to 403.7 the applicable rates from Table 403.3.1.1.	This section was not updated after the reformatting of Section 403
Table 403.8.4.2	<del>1a.</del> For each additional elbow, subtract 10 feet from length. <del>2b.</del> Flex ducts of this diameter are not permitted with fans of this size.	Formatting error

Reasons Supporting Proposal: Some editorial and typographical errors were identified in the rules filed under WSR 16-01-148. This rule corrects those errors.

Statutory Authority for Adoption: RCW 19.27.031, 19.27.074.

Statute Being Implemented: Chapters 19.27 and 34.05 RCW.

Rule is not necessitated by federal law, federal or state court decision.

Name of Proponent: State building code council, governmental.

Name of Agency Personnel Responsible for Drafting and Implementation: Krista Braaksma, P.O. Box 41449, Olympia, WA 98504-1449, (360) 407-9278; and Enforcement: Local jurisdictions.

January 27, 2017  
Steve K. Simpson  
Council Chair

**AMENDATORY SECTION** (Amending WSR 16-01-148, filed 12/21/15, effective 7/1/16)

**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.)~~ **Reserved.**

**AMENDATORY SECTION** (Amending WSR 16-01-148, filed 12/21/15, effective 7/1/16)

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

**403.1 Ventilation system.** Mechanical ventilation shall be provided by a method of supply air and return or exhaust air. The amount of supply air shall be approximately equal to the amount of return and exhaust air. The system shall not be prohibited from producing negative or positive pressure. The

system to convey ventilation air shall be designed and installed in accordance with Chapter 6.

**403.2 Outdoor air required.** The minimum *outdoor airflow rate* 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 403.3.1.1, 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 403.3.1.1.

(Item 4 is not adopted.)

**403.3 Outdoor air and local exhaust airflow rates.** Group R-2, R-3 and R-4 occupancies three stories and less in height above grade plane shall be provided with outdoor air and local exhaust in accordance with Section 403.8. All other buildings intended to be occupied shall be provided with outdoor air and local exhaust in accordance with Section 403.3.1.

**403.3.1.1 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. In each occupiable space, the ventilation system shall be designed to deliver the required rate of outdoor airflow to the breathing zone. 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 403.3.1.1. Ventilation rates for occupancies not represented in Table 403.3.1.1 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 403.3.1.1 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 403.3.1.1 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 403.3.1.1 estimated maximum occupancy rates.

**Table 403.3.1.1**  
**REQUIRED OUTDOOR VENTILATION AIR**

Occupancy Classification	Occupant Density #/1000 ft <sup>2a</sup>	People Outdoor Airflow Rate in Breathing Zone R <sub>p</sub> cfm/Person	Area Outdoor Airflow Rate in Breathing Zone R <sub>a</sub> cfm/ft <sup>2a</sup>	Exhaust Airflow Rate cfm/ft <sup>2a</sup>
<b>Offices</b>				
Conference rooms	50	5	0.06	—
Kitchenettes <sup>k</sup>	—	—	—	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	—
<b>Private dwellings, single and multiple</b>				
Garages, common for multiple units <sup>b</sup>	—	—	—	0.75
Kitchens <sup>b</sup>	—	—	—	25/100 <sup>f</sup>
Living areas <sup>c</sup>	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 <sup>g,1</sup>	—	—	—	20/50 <sup>f</sup>
<b>Public spaces</b>				
Corridors serving other than Group R occupancies	—	—	0.06	—
Corridors serving Group R dwelling or sleeping units with whole house exhaust system	—	—	0.12	—
Corridors serving Group R dwelling or sleeping units with other than whole house exhaust system	—	—	0.06	—
Courtrooms	70	5	0.06	—
Elevator car	—	—	—	1
Elevator lobbies in parking garage	—	—	1.0	—
Legislative chambers	50	5	0.06	—
Libraries	10	5	0.12	—
Museums (children's)	40	7.5	0.12	—
Museums/galleries	40	7.5	0.06	—
Places of religious worship	120	5	0.06	—
Shower room (per showerhead) <sup>g, k</sup>	—	—	—	((—)) 50/20 <sup>f</sup>
Smoking lounges <sup>b</sup>	70	60	—	—
Toilet rooms—Public <sup>g, k</sup>	—	—	—	((50/20 <sup>f</sup> )) 50/70 <sup>e</sup>

Occupancy Classification	Occupant Density #/1000 ft <sup>2a</sup>	People Outdoor Airflow Rate in Breathing Zone R <sub>p</sub> cfm/Person	Area Outdoor Airflow Rate in Breathing Zone R <sub>a</sub> cfm/ft <sup>2a</sup>	Exhaust Airflow Rate cfm/ft <sup>2a</sup>
<b>Sports and amusement</b>				
Disco/dance floors	100	20	0.06	—
Bowling alleys (seating areas)	40	10	0.12	—
Game arcades	20	7.5	0.18	—
Ice arenas, without combustion engines <sup>j</sup>	—	—	0.30	0.5
Gym, stadium, arena (play area) <sup>j</sup>	—	—	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	—
<b>Storage</b>				
Janitor closets, trash rooms, recycling rooms	—	—	—	1.0
Repair garages, enclosed parking garage <sup>b, d</sup>	—	—	—	0.75
Storage rooms, chemical	—	—	—	1.5
Warehouses	—	—	0.06	—
<b>Workrooms</b>				
Bank vaults/safe deposit	5	5	0.06	—
Darkrooms	—	—	—	1.0
Copy, printing rooms	4	5	0.06	0.5
Freezer and refrigerated spaces (<50°F)	0	10	0	0
Meat processing <sup>c</sup>	10	15	—	—
Pharmacy (prep. area)	10	5	0.18	—
Photo studios	10	5	0.12	—
Computer (without printing)	4	5	0.06	—

- For SI: 1 cubic foot per minute = 0.0004719 m<sup>3</sup>/s, 1 ton = 908 kg, 1 cubic foot per minutes per square foot = 0.00508 m<sup>3</sup>/(s•m<sup>2</sup>), °C = [(°F) -32]/1.8, 1 square foot = 0.0929 m<sup>2</sup>.
- Based upon *net occupiable floor area*.
  - Mechanical exhaust required and the recirculation of air from such spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Item 3).
  - Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.
  - Ventilation systems in enclosed parking garages shall comply with Section 404.
  - Rates are per water closet or urinal. 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 while occupied.
  - 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 while occupied.
  - Mechanical exhaust is required and recirculation is prohibited.
  - For nail salons, each manicure and pedicure station shall be provided with a *source capture system* capable of exhausting not less than 50 cfm per station. Exhaust inlets shall be located in accordance with Section 502.20. Where one or more required source capture systems operate continuously during occupancy, the exhaust rate from such systems shall be permitted to be

applied to the exhaust flow rate required by Table 403.3.1.1 for the nail salon.

- A laundry area within a kitchen or bathroom is not required to have 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.
- When combustion equipment is intended to be used on the playing surface, additional dilution ventilation and/or source control shall be provided.
- Kitchenettes require exhaust when they contain a domestic cooking appliance range or oven that is installed in accordance with Table 507.2.2. Kitchenettes that only contain a microwave oven are not required to have mechanical exhaust. A kitchenette may not contain commercial cooking appliances that require Type I or Type II exhaust as these occupancies are required to be exhausted to the kitchen category in Table ((403.1.1)) 403.3.1.1.

**403.3.2 Group R-2, R-3 and R-4 occupancies.** This section is not adopted. See Section 403.8.

**403.3.2.1 Outdoor air for dwelling units.** This section is not adopted.

**403.3.2.2 Outdoor air for other spaces.** This section is not adopted.

**403.3.2.3 Local exhaust.** This section is not adopted.

**403.8 Ventilation systems for Group R occupancies.** Each dwelling unit or sleeping unit shall be equipped with local

exhaust and whole house ventilation systems and shall comply with Sections 403.8.1 through 403.8.11. All occupied spaces, including public corridors, other than the Group R dwelling and sleeping unit, that support the Group R occupancy shall meet the ventilation requirements of Section 402 or ((Sections 403.1 to 403.7)) the applicable rates from Table 403.3.1.1.

**403.8.1 Minimum ventilation performance.** Ventilation systems shall be designed and installed to satisfy the ventilation requirements of Table 403.3.1.1 or Table 403.8.1. Breathing zone ventilation rates from Table 403.3.1.1 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 <sup>2</sup> )	Bedrooms <sup>1</sup>				
	0-1	2-3	4-5	6-7	>5
<500	30	40	45	55	60
500 - 1000	45	55	60	70	75
1001 - 1500	60	70	75	85	90
1501 - 2000	75	85	90	100	105
2001 - 2500	90	100	105	115	120
2501 - 3000	105	115	120	130	135
3001 - 3500	120	130	135	145	150
>3500	135	145	150	160	165

<sup>1</sup>Ventilation 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. Local exhaust ventilation systems. 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 and be equipped with an override control. A "fan on" switch shall be permitted as an override control. Controls shall be capable of operating the ventilation system without energizing other energy-consuming appliances. A clearly visible 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)."

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.

8. Intake openings shall not be located on asphalt roofs unless it is shown that no other location is permissible. In such cases, the inlet opening shall be located a minimum of 2

feet from the nearest surface of the asphalt roofing, measured from the intake opening.

**403.8.4 Local exhaust ventilation requirements.** Local exhaust ventilation systems shall exhaust at least the volume of air required for exhaust in Table 403.3.1.1. 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 Local exhaust systems.** Exhaust systems shall be designed and installed to meet all of the criteria below:

1. Local exhaust shall be discharged outdoors.
2. Exhaust outlets shall comply with Section 501.3.
3. Pressure equalization shall comply with Section 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 501.3.2.
8. Exhaust fans in separate dwelling units or sleeping units shall not share common exhaust ducts unless the system is engineered for this operation.
9. Where permitted by Chapter 5, multiple local exhaust ducts may be combined. If more than one of the exhaust fans in a dwelling unit or 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 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 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 403.3.1.1. 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.

- 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 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 <sup>(+)</sup> a
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 <sup>(±)</sup> b	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 <sup>(±)</sup> b	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

(+)) a. For each additional elbow, subtract 10 feet from length.  
 (±)) b. Flex ducts of this diameter are not permitted with fans of this size.

**403.8.5 Whole house ventilation requirements.** Each dwelling unit or 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.

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.

**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 403.3.1.1 or Table 403.8.1.

EXCEPTION: Intermittently operating ventilation systems: 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 403.3.1.1 or Table 403.8.1 is multiplied by the factor determined in accordance with Table 403.8.5.1.

TABLE 403.8.5.1  
INTERMITTENT WHOLE HOUSE MECHANICAL VENTILATION RATE FACTORS<sup>a, b</sup>

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

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

<sup>b</sup> 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 intermittent operation shall 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. The air inlets shall comply with all of the following:

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

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.

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

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 403.3.1.1 or Table 403.8.1.

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.

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. *Outdoor air* may be drawn in through operable openings to the outdoors. Each habitable space shall be provided with operable openings with an openable area of not less than 4 square inches of net free area of opening for each 10 cfm of outdoor air required by Table 403.3.1.1 or Table 403.8.1. Doors exiting to a corridor, court or public way shall not be used to provide *outdoor air*. The operable openings shall comply with the following:

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

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.

2.3 Openings shall be screened or otherwise protected from entry by leaves or other material.

3. For interior adjoining spaces 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 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 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 local exhaust ducts. If more than one of the exhaust fans in a dwelling unit or 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 403.3.1.1 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 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 sleeping units shall supply *outdoor air* to the return side of the forced air system fan.

3. For interior adjoining spaces 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.

**403.8.7.2 Whole house forced-air system.** Where *outdoor air* is provided to each habitable dwelling unit or 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.

Each habitable space in the dwelling or sleeping unit shall be served by a forced-air system with outdoor air connection.

**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 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 sleeping units.

3. For interior adjoining spaces 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.

**403.8.8.2 Whole house supply system.** Where *outdoor air* is provided to each habitable dwelling unit or 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 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 sleeping units.

3. For interior adjoining spaces 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.

**403.8.9.2 Whole house heat recovery ventilator system.** Where *outdoor air* is provided to each habitable dwelling unit or 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.

Each habitable space in the dwelling or sleeping unit shall be served by a heat recovery ventilator with outdoor air connection.

**403.8.10 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 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.



**WSR 17-04-089**  
**EXPEDITED RULES**  
**BUILDING CODE COUNCIL**  
 [Filed January 31, 2017, 11:59 a.m.]

Title of Rule and Other Identifying Information: Editorial changes to chapter 51-56 WAC, Washington state adoption and amendment of the 2015 Uniform Plumbing Code.

**NOTICE**

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS

ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO Steve Simpson, Chair, State Building Code Council, P.O. Box 41449, Olympia, WA 98504-1449, AND RECEIVED BY April 7, 2017.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: Makes editorial changes to the following sections of the state amendments to the 2015 Uniform Plumbing Code.

Section 408.6	The area and dimensions shall be maintained to a point of not less than seventy (70) inches ( <del>4.778</del> 1.778 mm) 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.	Typo
Table 501.1	<sup>3</sup> For replacement water heaters, see Section <del>402.4</del> 101.4.1.1.1.	Referenced section moved
Section 507. 2	At the lower point, a distance of not less than four (4) inches ( <del>9</del> , 102 mm) shall be maintained from the controls to the strapping.	Typo
Section 603.5.14	<del>603.5.14</del> <b>14 Protection from Fire Systems.</b> Except as provided under Sections 603.5. <del>14</del> 1.1 and 603.5. <del>14</del> 1.2, potable water supplies to fire protection systems that are normally under pressure ...	Typo
Section 608.5	<del>608.5</del> <b>Drains Discharge Piping.</b> <del>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. The discharge piping serving a temperature relief valve, pressure relief valve, or combination of both shall have no valves, obstructions, or means of isolation and be provided with the following:</del> <u>(1) Equal to the size of the valve outlet and shall discharge full size to the flood level of the area receiving the discharge and pointing down.</u> <u>(2) Materials shall be rated at not less than the operating temperature of the system and approved for such use.</u> <u>(3) Discharge pipe shall discharge independently by gravity through an air gap into the drainage system or outside of the building with the end of the pipe not exceeding 2 feet (610 mm) and not less than 6 inches (152 mm) above the ground and pointing downwards.</u> <u>(4) Discharge in such a manner that does not cause personal injury or structural damage.</u> <u>(5) No part of such discharge pipe shall be trapped or subject to freezing.</u> <u>(6) The terminal end of the pipe shall not be threaded.</u> <u>(7) Discharge from a relief valve into a water heater pan shall be prohibited.</u> <b>Exception:</b> 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 (2) feet (610 mm) and six (6) inches (152 mm) from the floor. No additional floor drain need be provided.	Reformatting and rewording from model code lost in transition

Section 701.2	<p>2. ABS and PVC DWV piping installations shall be installed in accordance with applicable standards in Table <del>4401.1</del> <u>1701.1</u>. Except for individual single family dwelling units, materials exposed within ducts or plenums shall have a maximum flame-spread index of 25 and a maximum smoke developed index of 50, when tested in accordance with ASTM E-84 and UL 723.</p> <p>6. Cast-iron soil pipe and fittings shall be listed and tested in accordance with standards referenced in Table <del>4401.1</del> <u>1701.1</u>. 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.</p>	Reference chapter moved, not updated in Ch. 7
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Reasons Supporting Proposal: Some editorial and typographical errors were identified in the rules filed under WSR 16-02-044. This rule corrects those errors.

Statutory Authority for Adoption: RCW 19.27.031, 19.27.074.

Statute Being Implemented: Chapters 19.27 and 34.05 RCW.

Rule is not necessitated by federal law, federal or state court decision.

Name of Proponent: State building code council, governmental.

Name of Agency Personnel Responsible for Drafting and Implementation: Krista Braaksma, P.O. Box 41449, Olympia, WA 98504-1449, (360) 407-9278; and Enforcement: Local jurisdictions.

January 27, 2017  
 Steve K. Simpson  
 Council Chair

AMENDATORY SECTION (Amending WSR 16-02-044, filed 12/30/15, effective 7/1/16)

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

**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-four (24) inches (610 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.

- EXCEPTIONS:
1. The clear space in front of a water closet, lavatory or bidet in dwelling units and sleeping units shall be not less than 21 inches (533 mm).
  2. The installation of paper dispensers or accessibility grab bars shall not be considered obstructions.

**405.4 Application.** 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 chapter.

**407.2 Water Consumption.** 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

**407.4 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.

**408.2 Water Consumption.** Showerheads shall have a maximum flow rate of not more than 2.5 gpm at 80 psi (9.5 L/m at 552 kPa), in accordance with ASME A112.18.1/CSA B125.1.

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

**408.4 Waste Outlet.** Showers shall have a waste outlet and fixture tailpiece not less than two (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 m<sup>2</sup>) and shall also be capable of encompassing a thirty (30) 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))~~ 1,778 mm) 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.

**411.2 Water Consumption.** Water closets shall have a maximum consumption not to exceed 1.6 gallons (6.0 L) of water per flush in accordance with ASME A112.19.2/CSA B45.1. No water closet that operates on a continuous flow or continuous flush basis shall be permitted.

- 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.

**412.1 Application.** Urinals shall comply with ASME A112.19.2/CSA B45.1, ASME A112.19.19, or CSA B45.5/IAPMO Z124. Urinals shall have an average water consumption not to exceed 1 gallon (3.8 L) of water per flush. No urinal that operates on a continuous flow or continuous flush basis shall be permitted.

**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 disposer. Commercial dishwashing machines shall discharge indirectly through an air gap.

**415.2 Drinking Fountain Alternatives.** This section is not adopted. See Building Code chapter 29.

**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 422.1 through 422.5 and Table 422.1 are not adopted.

AMENDATORY SECTION (Amending WSR 16-02-044, filed 12/30/15, effective 7/1/16)

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

**501.1 Applicability.** The regulations of this chapter shall govern the construction, location, and installation of fuel burning and other types of water heaters heating potable water. The minimum capacity for water heaters shall be in accordance with the first hour rating listed in Table 501.1. See the Mechanical Code for combustion air and installation of all vents and their connectors. No water heater shall be hereinafter installed that does not comply with the manufacturer's installation instructions and the type and model of each size thereof approved by the authority having jurisdiction. A list of accepted water heater appliance standards is referenced in Table 501(2). Listed appliances shall be installed in accordance with the manufacturer's installation instructions. Unlisted water heaters shall be permitted in accordance with Section 504.3.2.

TABLE 501.1<sup>1,3</sup>

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

- Notes:
- <sup>1</sup>The first hour rating is found on the "Energy Guide" label.
  - <sup>2</sup>Nonstorage and solar water heaters shall be sized to meet the appropriate first hour rating as shown in the table.
  - <sup>3</sup>For replacement water heaters, see Section ((402.4)) 101.4.1.1.1.

**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.

**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.

**506.0 Combustion Air.** For issues relating to combustion air, see the Mechanical Code.

Sections 506.1 through 506.9 are not adopted.

Sections 507.6 through 507.9 are not adopted.

**507.2 Seismic Provisions.** Water heaters shall be anchored or strapped to resist horizontal displacement due to earthquake motion. Strappings shall be at points within the upper one-third and lower one-third of its vertical dimensions. At the lower point, a distance of not less than four (4) inches (~~((9,+02))~~ 102 mm) shall be maintained from the controls to the strapping.

**507.13 Installation in Garages.** Appliances in 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 eighteen (18) inches above the floor unless listed as flammable vapor ignition resistant.

**507.16 Venting of Flue Gases - Delete entire section.**

Sections 507.18 through 507.22 are not adopted.

**509.0 Venting of Equipment.** Delete entire section.

**510.0 Sizing of Category I Venting Systems.** Delete entire section.

**511.0 Direct Vent Equipment.** Delete entire section.

AMENDATORY SECTION (Amending WSR 16-02-044, filed 12/30/15, effective 7/1/16)

**WAC 51-56-0600 Chapter 6—Water supply and distribution.**

**601.1 Applicability.** This chapter shall govern the materials, design and installation of *water supply systems*, including backflow prevention devices, assemblies and methods used for backflow prevention.

**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.

**603.2 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 603.2, except for specific applications and provisions as stated in Section 603.5.1 through 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 603.4.2 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 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.

**603.4.2 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 Washing-

ton 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.

**603.4.9 Prohibited Location.** Backflow prevention devices with atmospheric vents or ports shall not be installed in pits, underground or in submerged locations. Backflow preventers shall not be located in any area containing fumes or aerosols that are toxic, poisonous, infectious, or corrosive.

**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:

- (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 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.

**603.5.10 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.

**603.5.12 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 603.4.3. The piping downstream of the backflow preventer shall not be of copper, copper alloy, or other material that is affected by carbon dioxide.

~~((603.5.15))~~ **603.5.14 Protection from Fire Systems.** Except as provided under Sections ~~((603.5.15.1 and 603.5.15.2))~~ **603.5.14.1 and 603.5.14.2**, 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 assemblies:

1. Double check valve backflow prevention assembly (DC).
2. Double check detector fire protection backflow prevention assembly.
3. Reduced pressure principle backflow 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 1401.1.

**604.14 Plastic Pipe Termination.** 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.

**606.5 Control Valve.** A control valve shall be installed immediately ahead of each water-supplied appliance and immediately ahead of each slip joint or appliance supply.

Parallel water distribution systems shall provide a control valve either immediately ahead of each fixture being supplied or installed at the manifold, and shall be identified with the fixture being supplied. Where parallel water distribution system manifolds are located in attics, crawl spaces, or other locations not accessible, a separate shutoff valve shall be required immediately ahead of each individual fixture or appliance served.

**608.3 Expansion Tanks, and Combination Temperature and Pressure-Relief Valves.** A water system provided with a check valve, backflow preventer, or other normally closed device that prevents dissipation of building pressure back into the water main, independent of the type of water used, shall be provided with an approved, listed, and adequately sized expansion tank or other approved device having a similar function to control thermal expansion. Such expansion tank or other approved device shall be installed on the building side of the check valve, backflow preventer, or other device and shall be sized and installed in accordance with the manufacturer's installation instructions.

EXCEPTION: Instantaneous hot water systems installed in accordance with the manufacturer's installation instructions.

**608.3.1** A water system containing storage water heating equipment shall be provided with an approved, listed, adequately sized combination temperature and pressure-relief valve, except for listed nonstorage instantaneous heater having an inside diameter of not more than three (3) inches (80 mm). Each such approved combination temperature and pressure-relief valve shall be installed on the water-heating device in an approved location based on its listing requirements and the manufacturer's installation instructions. Each such combination temperature and pressure-relief valve shall be provided with a drain in accordance with Section 608.5.

~~**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.))**~~ **Discharge Piping.** The discharge piping serving a temperature relief valve, pressure relief valve or combination of both shall have no valves, obstructions or means of isolation and be provided with the following:

- (1) Equal to the size of the valve outlet and shall discharge full size to the flood level of the area receiving the discharge and pointing down.

(2) Materials shall be rated at not less than the operating temperature of the system and approved for such use.

(3) Discharge pipe shall discharge independently by gravity through an air gap into the drainage system or outside of the building with the end of the pipe not exceeding 2 feet (610 mm) and not less than 6 inches (152 mm) above the ground pointing downwards.

(4) Discharge in such a manner that does not cause personal injury or structural damage.

(5) No part of such discharge pipe shall be trapped or subject to freezing.

(6) The terminal end of the pipe shall not be threaded.

(7) Discharge from a relief valve into a water heater pan shall be prohibited.

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 (2) feet (610 mm) and six (6) inches (152 mm) from the floor. No additional floor drain need be provided.

**609.9 Disinfection of Potable Water System.** New or repaired *potable water* systems shall be disinfected prior to use where required by the *authority having jurisdiction*. The method to be followed shall be that prescribed by the health authority or, in case no method is prescribed by it, the following:

(1) The *pipe system* shall be flushed with clean, *potable water* until *potable water* appears at the points of outlet.

(2) The system or parts thereof shall be filled with a water-chlorine solution containing not less than 50 parts per million of chlorine, and the system or part thereof shall be valved-off and allowed to stand for twenty-four hours; or, the system or part thereof shall be filled with a water-chlorine solution containing not less than 200 parts per million of chlorine and allowed to stand for three hours.

(3) Following the allowed standing time, the system shall be flushed with clean, *potable water* until the chlorine residual in the water coming from the system does not exceed the chlorine residual in the flushing water.

(4) The procedure shall be repeated when a standard bacteriological test for drinking water, performed by a laboratory certified for drinking water in Washington state, shows unsatisfactory results indicating that *contamination* persists in the system.

**609.11 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.

**610.4 Sizing Water Supply and Distribution Systems.** Systems within the range of Table 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.

**611.1 Application.** Drinking water treatment units shall comply with NSF 42 or NSF 53. Water softeners shall comply with NSF 44. Ultraviolet water treatment systems shall comply with NSF 55. Reverse osmosis drinking water treat-

ment systems shall comply with NSF 58. Drinking water distillation systems shall comply with NSF 62.

The owner of a building that serves potable water to twenty-five or more people at least sixty or more days per year and that installs drinking water treatment units including, but not limited to, the treatment units in Section 611.1, may be regulated (as a Group A public water system) by the Washington state department of health under chapter 246-290 WAC. See Washington state department of health publication 331-488 for guidance.

**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.

Sections 612.2 through 612.7.2 are not adopted.

AMENDATORY SECTION (Amending WSR 16-02-044, filed 12/30/15, effective 7/1/16)

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

**701.2 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 ((401-4)) 1701.1. Except for individual single family dwelling units, materials exposed within ducts or plenums shall have a maximum flame-spread index of 25 and a maximum smoke developed index of 50, when tested in accordance with ASTM E-84 and 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 ((401-4)) 1701.1. 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 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, appurtenances, and appliances shall be directly connected to the drainage system of the building or premises.

**707.4 Location.** Each horizontal drainage *pipe shall* be provided with a cleanout at its upper terminal, and each run of piping, that is more than 100 feet (30,480 mm) in total *developed length, shall* be provided with a cleanout for each 100 feet (30,480 mm), or fraction thereof, in length of such piping. An additional cleanout *shall* be provided in a drainage line for each aggregate horizontal change of direction exceeding 135 degrees (2.36 rad).

EXCEPTIONS:

1. Cleanouts *shall* be permitted to be omitted on a horizontal *drain* line less than 5 feet (1,524 mm) in length unless such line is serving sinks or urinals.
2. Cleanouts *shall* be permitted to be omitted on a horizontal drainage *pipe* installed on a *slope* of 72 degrees (1.26 rad) or less from the vertical angle (one-fifth bend).
3. Except for the *building drain*, its *horizontal branches*, and urinals, a cleanout *shall* not be required on a *pipe* or piping that is above the floor level of the lowest floor of the *building*.
4. An *approved* type of two-way cleanout fitting, installed inside the *building* wall near the connection between the *building drain* and the *building sewer* or installed outside of a *building* at the lower end of a *building drain* and extended to *grade, shall* be permitted to be substituted for an upper terminal cleanout.

**707.9 Clearance.** Each cleanout in piping 2 inches (50 mm) or less in size *shall* be so installed that there is a clearance of not less than 12 inches (457 mm) in front of the cleanout. Cleanouts in piping exceeding 2 inches (50 mm) *shall* have a clearance of not less than 18 inches (610 mm) in front of the cleanout. Cleanouts in under-floor piping *shall* be extended to or above the finished floor or *shall* be extended outside the *building* where there is less than 18 inches (457 mm) vertical overall, allowing for obstructions such as ducts, beams, and piping, and 30 inches of (762 mm) horizontal clearance from the means of access to such cleanout. No under-floor clea-

nout *shall* be located exceeding 20 feet (1,524 mm) from an access door, trap door, or crawl hole.

#### CHAPTER 7, PART II—BUILDING SEWERS

**Part II Building Sewers.** Delete all of Part II (Sections 713 through 723, and Tables 717.1 and 721.1).