



# RULE-MAKING ORDER PERMANENT RULE ONLY

## CR-103P (December 2017) (Implements RCW 34.05.360)

CODE REVISER USE ONLY

OFFICE OF THE CODE REVISER  
STATE OF WASHINGTON  
FILED

DATE: January 16, 2024  
TIME: 5:20 PM

WSR 24-03-084

**Agency:** Washington State Building Code Council

**Effective date of rule:**

**Permanent Rules**

- 31 days after filing.
- Other (specify) March 15, 2024 (If less than 31 days after filing, a specific finding under RCW 34.05.380(3) is required and should be stated below)

**Any other findings required by other provisions of law as precondition to adoption or effectiveness of rule?**

- Yes
  - No
- If Yes, explain:

**Purpose:** To modify sections in the commercial and residential energy codes to address legal uncertainty stemming from the decision in California Restaurant Association v. City of Berkeley recently issued by the Ninth Circuit Court of Appeals. While the requirements in the 2021 Washington State Energy Code are not exactly analogous to the Berkeley prohibition on gas infrastructure, the Council moved forward to address the ruling expanding the scope of the Energy Policy and Conservation Act of 1975 (EPCA) preemption provisions. The Council sought public input on areas where the code may be impacted by a preemption issue and developed a proposed rule addressing those areas while retaining the efficiency gains made towards the goal of RCW 19.27A.160. The rule also makes some editorial corrections to the previously filed 2021 residential energy code, WAC 51-11R.

**Citation of rules affected by this order:**

New:  
 Repealed:  
 Amended: 28 Sections in WAC 51-11R  
 Suspended:

**Statutory authority for adoption:** RCW 19.27A.020, 19.27A.045, 19.27A.160

**Other authority:** RCW 19.27A

**PERMANENT RULE (Including Expedited Rule Making)**

Adopted under notice filed as WSR 23-21-105 on October 18, 2023 (date).  
Describe any changes other than editing from proposed to adopted version:

**WAC 51-11R-40211:** The proposed change to Table R402.1.2, **Insulation and Fenestration Requirements by Component**, for the above-grade wall U-factor was not made and is no longer included in the rule filing.

**WAC 51-11R-40551:** Table R405.4.2(1) **Specifications for the Standard Reference and Proposed Designs**, under Service water heating, the standard reference design was changed to "...a heat pump water heater meeting the efficiency standards of Table C404.2." to provide a reference to a EPCA covered product.

**WAC 51-11R-40621:** Table R406.3, **Energy Credits**, was modified to:

- Reorder the high efficiency HVAC equipment options and update the user notes for those options, as well as provide HSPF2 efficiency values in addition to the HSPF values.
- The missing credit values in Option 5.8 were added.
- Footnotes c and f were adjusted to match the reordering of the HVAC options.

**WAC 51-11R-50300:** The section references within Section R503.1.1 were corrected.

If a preliminary cost-benefit analysis was prepared under RCW 34.05.328, a final cost-benefit analysis is available by contacting:

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Other:

**Note: If any category is left blank, it will be calculated as zero.  
No descriptive text.**

**Count by whole WAC sections only, from the WAC number through the history note.  
A section may be counted in more than one category.**

**The number of sections adopted in order to comply with:**

Federal statute:	New	___	Amended	___	Repealed	___
Federal rules or standards:	New	___	Amended	___	Repealed	___
Recently enacted state statutes:	New	___	Amended	___	Repealed	___

**The number of sections adopted at the request of a nongovernmental entity:**

New	___	Amended	<u>28</u>	Repealed	___
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**The number of sections adopted on the agency's own initiative:**

New	___	Amended	___	Repealed	___
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**The number of sections adopted in order to clarify, streamline, or reform agency procedures:**

New	___	Amended	___	Repealed	___
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**The number of sections adopted using:**

Negotiated rule making:	New	___	Amended	___	Repealed	___
Pilot rule making:	New	___	Amended	___	Repealed	___
Other alternative rule making:	New	___	Amended	<u>28</u>	Repealed	___

**Date Adopted:** November 28, 2023

**Name:** Tony Doan

**Title:** Council Chair

**Signature:**



**Chapter 51-11R WAC**  
**STATE BUILDING CODE ADOPTION AND AMENDMENT OF THE ((2018)) 2021 EDI-**  
**TION OF THE INTERNATIONAL ENERGY CONSERVATION CODE, RESIDENTIAL**

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

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

**R101.1 Title.** This code shall be known as the *Washington State Energy Code-Residential*, and shall be cited as such. It is referred to herein as "this code."

The 2021 edition of the *Washington State Energy Code* is hereby adopted. The *Washington State Energy Code* adopted under chapter 51-11R WAC shall become effective in all counties and cities of this state on ((~~July 1, 2023~~)) March 15, 2024.

**R101.2 Scope.** This code applies to *residential buildings* and the buildings sites and associated systems and equipment. This code shall be the maximum and minimum energy code for residential construction in each town, city and county. Residential *sleeping units*, Group I-1, Condition 2 assisted living facilities licensed by Washington state under chapter 388-78A WAC and Group I-1, Condition 2 residential treatment facilities licensed by Washington state under chapter 246-337 WAC shall utilize the commercial building sections of the energy code regardless of the number of stories of height above grade plane.

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

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

**R101.4.1 Mixed residential and commercial buildings.** Where a building includes both *residential* building and *commercial* building portions, each portion shall be separately considered and meet the applicable provisions of the WSEC - Commercial or WSEC - Residential Provisions.

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

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

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-10400 Section R104—Fees.**

**R104.1 Fees.** A permit shall not be issued until the fees prescribed in Section ((R107.2)) R104.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

**R104.2 Schedule of permit fees.** A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

**R104.3 Work commencing before permit issuance.** Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official*, which shall be in addition to the required permit fees.

**R104.4 Related fees.** The payment of the fee for the construction, alteration, removal, or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

**R104.5 Refunds.** The *code official* is authorized to establish a refund policy.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-10500 Section R105—Inspections.**

**R105.1 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 visible and able to be accessed for inspection purposes until *approved*. It shall be the duty of the permit applicant to cause the work to remain visible and able to be accessed 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.

**R105.2 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)) R105.2.1 through R105.2.5.

**R105.2.1 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.

**R105.2.2 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.

**R105.2.2.1 Wall insulation inspection.** The *code 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.

**R105.2.3 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.

**R105.2.4 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.

**R105.2.5 Final inspection.** The building shall have a final inspection and not be occupied until *approved*.

**R105.3 Reinspection.** A building shall be reinspected when determined necessary by the *code official*.

**R105.4 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.

**R105.5 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.

**R105.6 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.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-10800 Section R108—Referenced standards.**

**R108.1 Referenced codes and standards.** The codes and standards referenced in this code shall be those listed in Chapter ((5)) 6, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections ((R106.1.1 and R106.1.2)) R108.1.1 and R108.1.2.

**R108.1.1 Conflicts.** Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

**R108.1.2 Provisions in referenced codes and standards.** Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

**R108.2 Application of references.** References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section, or provision of this code.

**R108.3 Other laws.** The provisions of this code shall not be deemed to nullify any provisions of local, state, or federal law. In addition to the requirements of this code, all occupancies shall conform to the provisions included in the state building code (chapter 19.27 RCW). In case of conflicts among codes enumerated in RCW 19.27.031 (1) through (4) and this code, an earlier named code shall govern over those following. In the case of conflict between the duct sealing and insulation requirements of this code and the duct insulation requirements of Sections 603 and 604 of the *International Mechanical Code*, the duct insulation requirements of this code shall govern.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-20201 Section R202.1—A.**

**ABOVE-GRADE WALL.** A wall enclosing *conditioned space* that is not a below-grade wall. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.

**ACCESS (TO).** That which enables a device, appliance, or equipment to be reached by *ready access* or by a means that first requires the removal or movement of a panel or similar obstruction.

**ADDITION.** An extension or increase in the *conditioned space* floor area, number of stories or height of a building or structure.

**ADVANCED FRAMED WALLS.** Studs framed on 24-inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners, and one stud is used to support each header. Headers consist of double 2x material with R-10 insulation between the header and exterior sheathing. Interior partition wall/exterior wall intersections are fully insulated in the exterior wall. (See **Standard Framing** and Appendix A(~~(, of this code)~~) of chapter 51-11C WAC.)

**AIR BARRIER.** One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies.

**ALTERATION.** Any construction, retrofit or renovation to an existing structure other than repair or addition. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.

**APPROVED.** Acceptable to the *code official*.

**APPROVED AGENCY.** An established and recognized agency that is regularly engaged in conducting tests or furnishing inspection services, or furnishing product certification, where such agency has been approved by the *code official*.

**AUTOMATIC.** Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "Manual").

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

**WAC 51-11R-30200 Section R302—Design conditions.**

**R302.1 Interior design conditions.** The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

**R302.2 Exterior design conditions.** The heating or cooling outdoor design temperatures shall be selected from Appendix RC.

AMENDATORY SECTION (Amending WSR 20-01-047, filed 12/9/19, effective 7/1/20)

**WAC 51-11R-30312 Table R303.1.3(2)—Default opaque door U-factors.**

TABLE R303.1.3(2)  
DEFAULT OPAQUE DOOR U-FACTORS

Door Type	No Glazed Fenestration	Single Glazing	Double Glazing with 1/4 in. Airspace	Double Glazing with 1/2 in. Airspace	Double Glazing with e = 0.10, 1/2 in. Argon
<b>SWINGING DOORS (Rough opening - 38 in. x 82 in.)</b>					
<b>Slab Doors</b>					
Wood slab in wood frame <sup>a</sup>	0.46				
6% glazed fenestration (22 in. x 8 in. lite)	-	0.48	0.47	0.46	0.44
25% glazed fenestration (22 in. x 36 in. lite)	-	0.58	0.48	0.46	0.42
45% glazed fenestration (22 in. x 64 in. lite)	-	0.69	0.49	0.46	0.39
More than 50% glazed fenestration	Use Table R303.1.3(1)				
Insulated steel slab with wood edge in wood frame <sup>a</sup>	0.16				
6% glazed fenestration (22 in. x 8 in. lite)	-	0.21	0.20	0.19	0.18

Door Type	No Glazed Fenestration	Single Glazing	Double Glazing with 1/4 in. Airspace	Double Glazing with 1/2 in. Airspace	Double Glazing with e = 0.10, 1/2 in. Argon
25% glazed fenestration (22 in. x 36 in. lite)	-	0.39	0.28	0.26	0.23
45% glazed fenestration (22 in. x 64 in. lite)	-	0.58	0.38	0.35	0.26
More than 50% glazed fenestration	Use Table R303.1.3(1)				
Foam insulated steel slab with metal edge in steel frame <sup>b</sup>	0.37				
6% glazed fenestration (22 in. x 8 in. lite)	-	0.44	0.42	0.41	0.39
25% glazed fenestration (22 in. x 36 in. lite)	-	0.55	0.50	0.48	0.44
45% glazed fenestration (22 in. x 64 in. lite)	-	0.71	0.59	0.56	0.48
More than 50% glazed fenestration	Use Table R303.1.3(1)				
Cardboard honeycomb slab with metal edge in steel frame <sup>b</sup>	0.61				
<b>Style and Rail Doors</b>					
Sliding glass doors/French doors	Use Table R303.1.3(1)				
<b>Site-Assembled Style and Rail Doors</b>					
Aluminum in aluminum frame	-	1.32	0.99	0.93	0.79
Aluminum in aluminum frame with thermal break	-	1.13	0.80	0.74	0.63

Note: Appendix A Tables A107.1(2) through A107.1(4) of chapter 51-11C WAC may also be used if applicable.

<sup>a</sup> Thermally broken sill (add 0.03 for nonthermally broken sill).

<sup>b</sup> Nonthermally broken sill.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40210 Section R402.1—General.**

**R402.1 General.** The *building thermal envelope* shall meet the requirements of Sections R402.1.1 through R402.1.6.

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> 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 Vapor retarder.** Wall assemblies in the *building thermal envelope* shall comply with the vapor retarder requirements of Section R702.7 of the *International Residential Code* or Section ((1405.3)) 1404.3 of the *International Building Code*, as applicable.

**R402.1.2 Insulation and fenestration criteria.** The *building thermal envelope* shall meet the requirements of Table R402.1.2 based on the climate zone specified in Chapter 3. Assemblies shall have a U-factor



equal to or less than that specified in Table R402.1.2. Fenestration shall have a U-factor equal to or less than specified in Table R402.1.2.

**R402.1.3 R-value alternative.** Assemblies with R-value of insulation materials equal to or greater than that specified in Table R402.1.3 shall be an alternative to the U-factor in Table R402.1.2.

**R402.1.4 R-value computation.** *Cavity insulation* alone shall be used to determine compliance with the *cavity insulation R-value* requirement in Table R402.1.3. Where *cavity insulation* is installed in multiple layers, the R-values of the *cavity insulation* layers shall be summed to determine compliance with the *cavity insulation R-value* requirements. The manufacturer's settled R-value shall be used for blown insulation. *Continuous insulation* (ci) alone shall be used to determine compliance with the continuous insulation R-value requirements in Table R402.1.3. Where *continuous insulation* is installed in multiple layers, the R-values of the *continuous insulation* layers shall be summed to determine compliance with the *continuous insulation R-value* requirements. 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 R402.1.3, the manufacturer's labeled R-value for insulated siding shall be reduced by R-0.6.

**R402.1.5 Total UA alternative.** If the proposed *building thermal envelope* UA is less than or equal to the target UA, the building shall be considered in compliance with Table R402.1.2. The proposed UA shall be calculated in accordance with Equation 2. The target UA shall be calculated in accordance with Equation 1. U-factors shall be determined as specified in Section R402.1.6. In addition to UA compliance, the maximum fenestration U-factors of Section R402.5 shall be met.

**R402.1.6 U-factor reference and calculations.** 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.

Fenestration U-factors shall comply with Section R303.1.3, Fenestration product rating.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40213 Table R402.1.3—Insulation minimum R-values and fenestration requirements by components.**

TABLE R402.1.3  
INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENTS<sup>a</sup>

Climate Zone 5 and Marine 4	
Fenestration <sup>bj</sup> U-Factor	0.30

Climate Zone 5 and Marine 4	
Skylight <sup>b</sup> <i>U</i> -Factor	0.50
Ceiling <sup>c</sup> <i>R</i> -Value	60
Wood Frame Wall <sup>g,i</sup> <i>R</i> -Value	20+5 or 13+10
Floor <i>R</i> -Value	30
Below-Grade Wall <sup>c,h</sup> <i>R</i> -Value	10/15/21 int + 5TB
Slab <sup>d,f</sup> <i>R</i> -Value and Depth	10, 4 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 A Table A101.4 of chapter 51-11C WAC shall not be less than the *R*-value specified in the table.

<sup>b</sup> The fenestration *U*-factor column excludes skylights.

<sup>c</sup> "10/15/21+5TB" 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+5TB" 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. "TB" means R-5 thermal break between floor slab and basement wall.

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

<sup>e</sup> For single rafter- or joist-vaulted ceilings, the insulation may be reduced to R-38 if the full insulation depth extends over the top plate of the exterior wall.

<sup>f</sup> R-7.5 continuous insulation installed over an existing slab is deemed to be equivalent to the required perimeter slab insulation when applied to existing slabs complying with Section R503.1.1. If foam plastic is used, it shall meet the requirements for thermal barriers protecting foam plastics.

<sup>g</sup> For log structures developed in compliance with Standard ICC 400, log walls shall meet the requirements for *climate zone 5* of ICC 400.

<sup>h</sup> Int. (intermediate framing) denotes framing and insulation as described in Section A103.2.2 including standard framing 16 inches on center, 78 percent of the wall cavity insulated and headers insulated with a minimum of R-10 insulation.

<sup>i</sup> The first value is cavity insulation, the second value is continuous insulation. Therefore, as an example "13+10" means R-13 cavity insulation plus R-10 continuous insulation.

<sup>j</sup> A maximum *U*-factor of 0.32 shall apply to vertical fenestration products installed in buildings located above 4000 feet in elevation above sea level, or in windborne debris regions where protection of openings is required under Section R301.2.1.2 of the *International Residential Code*.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

#### **WAC 51-11R-40230 Section R402.3—Fenestration.**

**R402.3 Fenestration.** In addition to the requirements of Section R402, fenestration shall comply with Sections R402.3.1 through ~~((R402.3.5))~~ R402.3.6.

**R402.3.1 *U*-factor.** An area-weighted average of fenestration products shall be permitted to satisfy the *U*-factor requirements.

**R402.3.2 Glazed fenestration SHGC.** An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the SHGC requirements.

**R402.3.3 Glazed fenestration exemption.** Up to 15 square feet (1.4 m<sup>2</sup>) of glazed fenestration per dwelling unit shall be permitted to be exempt from *U*-factor and SHGC requirements in Section R402.1.2. This exemption shall not apply to the total UA alternative in Section R402.1.5.

**R402.3.4 Opaque door exemption.** One side-hinged opaque door assembly up to 24 square feet (2.22 m<sup>2</sup>) in area is exempted from the *U*-factor requirement in Section R402.1.2. This exemption shall not apply to the total UA alternative in Section R402.1.5.

**R402.3.5 Combustion air openings.** ~~((In Climate Zones 3 through 8,))~~ Where open combustion air ducts provide combustion air to open combustion, space conditioning fuel burning appliances, the appliances and

combustion air openings shall be located outside of the *building thermal envelope*, or enclosed in a room isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.3, where the walls, floors, and ceilings shall meet the minimum of the below-grade wall R-value requirements. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section R403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

EXCEPTIONS: 1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.  
2. Fireplaces and stoves complying with Section(s) R402.3.6 of this code and Section R1006 of the *International Residential Code*.

**R402.3.6 Fireplaces.** New wood-burning fireplaces shall have tight-fitting flue dampers or doors, and outdoor combustion air. When using tight-fitting doors on factory-built fireplaces listed and labeled in accordance with UL 127, the doors shall be tested and listed for the fireplace. Where using tight-fitting doors on masonry fireplaces, the doors shall be listed and labeled in accordance with UL 907. Gas fireplaces shall comply with the efficiency requirements in Section R403.7.2.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40240 Section R402.4—Air leakage.**

**R402.4 Air leakage.** The *building thermal envelope* shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through ((R402.4.5)) R402.4.4.

**R402.4.1 Building thermal envelope air leakage.** The *building thermal envelope* shall comply with Sections R402.4.1.1 through R402.4.1.3. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

**R402.4.1.1 Installation.** The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

**R402.4.1.2 Testing.** The building or dwelling unit shall be tested for air leakage. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827. Test pressure and leakage rate shall comply with Section R402.1.3. A written report of the test results, including verified location and time stamp of the date of the test, shall be signed by the testing agency and provided to the building owner and *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*. Once visual inspection has confirmed air sealing has been conducted in accordance with Table R402.4.1.1, operable windows and doors manufactured by *small business* are permitted to be sealed off at the frame prior to the test.

Testing of single-family dwellings and townhouses shall be conducted in accordance with RESNET/ICC 380. Test pressure and leakage rate shall comply with Section R402.1.3.1.

For Group R-2 occupancies, testing shall be conducted in accordance with ASTM E779, ASTM E1827, or ASTM E3158. Test pressure and leakage rate shall comply with Section R402.1.3.2. The individual performing the air leakage test shall be trained and certified by a certification body that is, at the time of permit application, ~~((and))~~ an ISO 17024 accredited certification body including, but not limited to, the Air Barrier Association of America.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;

2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;

3. Interior doors, if installed at the time of the test, shall be open, access hatches to conditioned crawl spaces and conditioned attics shall be open;

4. Exterior or interior terminations for continuous ventilation systems and heat recovery ventilators shall be sealed;

5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and

6. Supply and return registers, if installed at the time of the test, shall be fully open.

EXCEPTION: Additions less than 500 square feet of conditioned floor area.

**R402.4.1.3 Leakage rate.** Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) shall comply with Section R402.4.1.3.1. Group R-2 multifamily buildings shall comply with Section R402.4.1.3.2.

**R402.4.1.3.1 Dwelling unit leakage rate.** The maximum air leakage rate for any dwelling unit under any compliance path shall not exceed 4.0 air changes per hour. Testing shall be conducted with a blower door test at a test pressure of 0.2 inches w.g. (50 Pa).

EXCEPTION: *Additions* tested with the existing home having a combined maximum air leakage rate of 7 air changes per hour. To qualify for this exception, the date of construction of the existing dwelling must be prior to the 2009 Washington State Energy Code.

**R402.4.1.3.2 Group R-2 multifamily building leakage rate.** For Group R-2 multifamily buildings, the maximum leakage rate for any *dwelling unit* shall not exceed 0.25 cfm per square foot of the *dwelling unit* enclosure area. Testing shall be conducted with a blower door at a test pressure of 0.2 inches w.g. (50 Pa). Doors and windows of adjacent *dwelling units* (including top and bottom units) shall be open to the outside during the test.

**~~((R402.4.3))~~ R402.4.2 Air leakage of fenestration.** Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L/s/m<sup>2</sup>), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m<sup>2</sup>), when tested according to NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and *listed* and *labeled* by the manufacturer.

EXCEPTIONS: 1. Field-fabricated fenestration products (windows, skylights and doors).  
2. Custom exterior fenestration products manufactured by a small business provided they meet the applicable provisions of Chapter 24 of the *International Building Code*. Once visual inspection has confirmed the presence of a gasket, operable windows and doors manufactured by *small business* shall be permitted to be sealed off at the frame prior to the test.

**~~(R402.4.5)~~ R402.4.3 Recessed lighting.** Recessed luminaires installed in the *building thermal envelope* shall be Type IC-rated and certified under ASTM E283 as having an air leakage rate not more than 2.0 cfm (0.944 L/s) when tested at a 1.57 psf (75 Pa) pressure differential and shall have a label attached showing compliance with this test method. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

**~~(R402.4.6)~~ R402.4.4 Electrical and communication outlet boxes (air-sealed boxes).** Electrical and communication outlet boxes installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. Electrical and communication outlet boxes shall be tested in accordance with NEMA OS 4, *Requirements for Air-Sealed Boxes for Electrical and Communication Applications*, and shall have an air leakage rate of not greater than 2.0 cubic feet per minute (0.944 L/s) at a pressure differential of 1.57 psf (75 Pa). Electrical and communication outlet boxes shall be marked "NEMA OS 4" or "OS 4" in accordance with NEMA OS 4. Electrical and communication outlet boxes shall be installed per the manufacturer's instructions and with any supplied components required to achieve compliance with NEMA OS 4.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40241 Table R402.4.1.1—Air barrier and insulation installation.**

TABLE R402.4.1.1  
AIR BARRIER, AIR SEALING AND INSULATION INSTALLATION<sup>a</sup>

COMPONENT	AIR BARRIER CRITERIA	INSULATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building envelope. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.

COMPONENT	AIR BARRIER CRITERIA	INSULATION CRITERIA
Cavity insulation installation		<p>All cavities in the thermal envelope shall be filled with insulation. The density of the insulation shall be at the manufacturers' product recommendation and said density shall be maintained for all volume of each cavity. Batt type insulation will show no voids or gaps and maintain an even density for the entire cavity. Batt insulation shall be installed in the recommended cavity depth. Where an obstruction in the cavity due to services, blocking, bracing or other obstruction exists, the batt product will be cut to fit the remaining depth of the cavity. Where the batt is cut around obstructions, loose fill insulation shall be placed to fill any surface or concealed voids, and at the manufacturers' specified density. Where faced batt is used, the installation tabs must be stapled to the face of the stud. There shall be no compression to the batt at the edges of the cavity due to inset stapling installation tabs.</p> <p>Insulation that upon installation readily conforms to available space shall be installed filling the entire cavity and within the manufacturers' density recommendation.</p>
Ceiling/attic	<p>The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed.</p> <p>Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.</p>	<p>The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.</p> <p>Batt insulation installed in attic roof assemblies may be compressed at exterior wall lines to allow for required attic ventilation.</p>
Walls	<p>The junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Knee walls shall be sealed.</p>	<p>Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum.</p> <p>Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.</p>
Windows, skylights and doors	<p>The space between window/door jambs and framing and skylights and framing shall be sealed.</p>	
Rim joists	<p>Rim joists shall include an exterior air barrier<sup>b</sup>.</p> <p>The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed.</p>	<p>Rim joists shall be insulated so that the insulation maintains permanent contact with the exterior rim board<sup>b</sup>.</p>
Floors (including above garage and cantilevered floors)	<p>The air barrier shall be installed at any exposed edge of insulation.</p>	<p>Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking or floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the underside of floor framing and extend from the bottom to the top of all perimeter floor framing members.</p>
Basement, crawl space, and slab foundations	<p>Exposed earth in unvented crawl spaces shall be covered with a Class I, black vapor retarder with overlapping joints taped.</p>	<p>Crawl space insulation, where provided instead of floor insulation, shall be installed in accordance with Section R402.2.10.</p>

COMPONENT	AIR BARRIER CRITERIA	INSULATION CRITERIA
	<p>Penetrations through concrete foundation walls and slabs shall be air sealed.</p> <p>Class I vapor retarders shall not be used as an air barrier on below-grade <i>walls</i> and shall be installed in accordance with Section R702.7 of the <i>International Residential Code</i>.</p>	<p>Conditioned basement foundation wall insulation shall be installed in accordance with Section ((R402.2.8.1)) <u>R402.2.8</u>.</p> <p>Slab on grade floor insulation shall be installed in accordance with Section R402.2.10.</p>
Shafts, penetrations	<p>Duct and flue shafts to exterior or unconditioned space shall be air sealed.</p> <p>Utility penetrations of the air barrier shall be caulked, gasketed, or otherwise sealed and shall allow for expansion and contraction of materials and mechanical vibration.</p>	Insulation shall be fitted tightly around utilities passing through shafts and penetrations in the building thermal envelope to maintain required <i>R</i> -value.
Narrow cavities	Narrow cavities, of an inch or less, not able to be insulated, shall be air sealed.	Batts in narrow cavities shall be cut to fit and installed to the correct density without any voids or gaps or compression, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	Insulated portions of the garage separation assembly shall be installed in accordance with Sections R303 and R402.2.8.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air sealed in accordance with Section ((R402.4.5)) <u>R402.4.3</u> .	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated and shall be buried or surrounded with insulation.
Plumbing, wiring, or other obstructions	All holes created by wiring, plumbing, or other obstructions in the air barrier assembly shall be air sealed.	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls. There shall be no voids or gaps or compression where cut to fit. Insulation that on installation readily conforms to available space shall extend behind piping and wiring. Insulation shall be installed to fill the available space and surround wiring, plumbing, or other obstructions, unless the required <i>R</i> -value can be met by installing insulation and air barrier systems completely to the exterior side of the obstructions.
Shower/tub on exterior wall	The air barrier installed at exterior walls adjacent to showers and tubs shall separate the wall from the showers and tubs.	Exterior walls adjacent to showers and tubs shall be insulated.
Electrical/phone box on exterior wall	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.	
HVAC register boots	HVAC supply and return register boots shall be sealed to the subfloor, wall covering or ceiling penetrated by the boot.	
Concealed sprinklers	When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.	

IC = insulation contact.

<sup>a</sup> In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

<sup>b</sup> Insulation installed in unconditioned/ventilated attic spaces is not required to be enclosed within an air barrier assembly.

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

**R403.3 Ducts.** Ducts and air handlers shall be installed in accordance with Sections R403.3.1 through R403.3.7.

**R403.3.1 Ducts located outside conditioned space.** Supply and return ducts located outside *conditioned space* shall be insulated to ((and)) an R-value of not less than R-8 for ducts 3 inches (76 mm) in diameter and larger and not less than R-6 for ducts smaller than 3 inches (76 mm) in diameter. Ducts buried beneath a building shall be insulated as required per this section or have an equivalent thermal distribution efficiency. Ducts within a concrete slab or in the ground shall be insulated to R-10 with insulation designed to be used below grade. Underground ducts utilizing the *thermal distribution efficiency* method shall be listed and labeled to indicate the R-value equivalency.

**R403.3.2 Ducts located in conditioned space.** For ducts to be considered as being located inside a conditioned space, such ducts shall comply with the following:

1. All duct systems shall be located completely within the *continuous air barrier* and within the *building thermal envelope*.

2. All heating, cooling, and ventilation system components shall be installed inside the conditioned space including, but not limited to, forced air ducts, hydronic piping, hydronic floor heating loops, convectors and radiators. Combustion equipment shall be direct vent or sealed combustion.

3. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts is permitted to be located outside the conditioned space, provided they are insulated to a minimum of R-8.

3.1. Metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic.

3.2. 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.

4. Ductwork in floor cavities located over unconditioned space shall comply with all of the following:

4.1. A *continuous air barrier* installed between unconditioned space and the duct.

4.2. Insulation installed in accordance with Section R402.2.7.

4.3. A minimum R-19 insulation installed in the cavity width separating the duct from unconditioned space.

5. Ductwork located within *exterior walls* of the *building thermal envelope* shall comply with the following:

5.1. A *continuous air barrier* installed between unconditioned space and the duct.

5.2. A minimum R-10 insulation installed in the cavity width separating the duct from unconditioned space.

5.3. The remainder of the cavity insulation shall be fully insulated to the drywall side.

**R403.3.3 Ducts buried within ceiling insulation.** Where supply and return air ducts are partially or completely buried in ceiling insulation, such ducts shall comply with all of the following:



1. The supply and return ducts shall have an insulation R-value not less than R-8.

2. At all points along each duct, the sum of the ceiling insulation R-value against and above the top of the duct, and against and below the bottom of the duct, shall be not less than R-19, excluding the R-value of the duct insulation.

EXCEPTION: Sections of the supply duct that are less than 3 feet (914 mm) from the supply outlet shall not be required to comply with these requirements.

**R403.3.3.1 Effective R-value of deeply buried ducts.** Where using ((~~a simulated energy performance analysis~~)) the total building performance compliance option in Section R405, sections of ducts that are: Installed in accordance with Section R403.3.3; located directly on, or within 5.5 inches (140 mm) of the ceiling; surrounded with blown-in attic insulation having an R-value of R-30 or greater and located such that the top of the duct is not less than 3.5 inches (89 mm) below the top of the insulation, shall be considered as having an effective duct insulation R-value of R-25.

**R403.3.4 Sealing.** 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.

**R403.3.4.1 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.

**R403.3.5 Duct testing.** Ducts shall be leak tested in accordance with WSU RS-33, using the maximum duct leakage rates specified.

EXCEPTION: A duct air leakage test shall not be required for ducts serving ventilation systems that are not integrated with the ducts serving heating or cooling systems.

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

**R403.3.6 Duct leakage.** The total leakage of the ducts, where measured in accordance with Section R403.3.3, shall be as follows:

1. Rough-in test: Total leakage shall be less than or equal to 4.0 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 3.0 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 4.0 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 4.0 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.

3. Test for ducts within thermal envelope: Where all ducts and air handlers are located entirely within the *building thermal envelope*, total leakage shall be less than or equal to 8.0 cubic feet per

minute (226.6 L/min) per 100 square feet (9.29 m<sup>2</sup>) of conditioned floor area. 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.

**R403.3.7 Building cavities.** 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 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40340 Section R403.5—Service hot water systems.**

**R403.5 Service hot water systems.** Energy conservation measures for service hot water systems shall be in accordance with this section. Service water-heating equipment shall meet the requirements of DOE 10 C.F.R. Part 430 Uniform Energy Factor or the equipment shall meet the requirements of Section C404.2.

**R403.5.1 Heated water circulation and temperature maintenance systems.** Heated water circulation systems shall be in accordance with Section R403.5.1.1. Heat trace temperature maintenance systems shall be in accordance with Section R403.5.1.2. Automatic controls, temperature sensors and pumps shall be in a location with access. Manual controls shall be in a location with *ready access*.

**R403.5.1.1 Circulation systems.** Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe. Gravity and thermo-syphon circulation systems are prohibited. Controls automatically turn off the circulation pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

**R403.5.1.1.1 Demand recirculation water systems serving an individual dwelling unit.** *Demand recirculation water systems* shall have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.

**R403.5.1.2 Heat trace systems.** Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

**R403.5.2 Water volume determination.** The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters, and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. Water heaters, circulating water systems, and heat trace temperature maintenance systems shall be considered to be

sources of heated water. The volume in the piping shall be determined from Table C404.3.1 in the Washington State Energy Code, Commercial Provisions or Table L502.7 of the *Uniform Plumbing Code*. The volume contained within fixture shutoff valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

**R403.5.3 Hot water pipe insulation.** Insulation for service hot water pipe, both within and outside the conditioned space, shall have a minimum thermal resistance (*R*-value) of R-3.

EXCEPTION: Pipe insulation is permitted to be discontinuous where it passes through studs, joists or other structural members and where the insulated pipes pass other piping, conduit or vents, provided the insulation is installed tight to each obstruction.

**R403.5.4 Drain water heat recovery units.** Drain water heat recovery units shall comply with CSA 55.2 or IAPMO PS 92. Drain water heat recovery units shall be in accordance with CSA 55.1 or IAPMO IGC 346-2017.

**R403.5.5 Water heater installation location.** Service hot water systems shall be installed within the *building thermal envelope*.

EXCEPTIONS: 

1. Where the hot water system efficiency is greater than or equal to 2.0 UEF.
2. Tankless water heaters.
3. Gas heat pump water heaters intended for exterior installation.
4. Atmospheric vented gas water heaters.

**R403.5.6 ((Electric)) Water heater insulation.** All ((electric)) tank-type water heaters in unconditioned spaces, or on concrete floors in conditioned spaces, shall be placed on an insulated surface with a minimum thermal resistance of R-10, and a minimum compressive strength of 40 psi or engineered to support the appliance.

~~**R403.5.7 ((Heat pump water heating.** Service hot water in one- and two-family dwellings and multiple single-family dwellings (townhouses) shall be provided by a heat pump system. The heat pump water heating system shall be sized to provide 100 percent of peak hot water demand. Where the heat pump is located in unconditioned space, the heat pump water heating system shall be sized to provide 100 percent of peak hot water demand at an entering source dry bulb (or wet bulb if rated for wet bulb temperatures) air temperature of 40°F (4°C).~~

EXCEPTIONS: 

1. Resistance heating elements integrated into heat pump equipment.
2. Electric water heaters with a rated water storage volume of no greater than 20 gallons.
3. *Dwelling units* with no more than 1,000 square feet of *conditioned floor area*.
4. Supplementary water heating systems in accordance with Section R403.5.7.1, provided the system capacity does not exceed the capacity of the heat pump water heating system.
5. Solar water heating systems.
6. Waste heat and energy recovery systems.
7. Heat trace freeze protection systems.
8. Snow and ice melt systems.

~~**R403.5.7.1)) Supplementary heat for heat pump water heating systems.** Heat pumps used for water heating and having supplementary water heating equipment shall have controls that limit supplementary water heating equipment operation to only those times when one of the following applies:~~

1. The heat pump water heater cannot meet hot water demand.
2. For heat pumps located in unconditioned space, the outside air temperature is below 40°F (4°C).
3. The heat pump is operating in defrost mode.
4. The vapor compression cycle malfunctions or loses power.

EXCEPTION: Heat trace temperature maintenance systems, provided the system capacity does not exceed the capacity of the heat pump water heating system.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40392 ((Section R403.13 Heat pump space heating.))  
Reserved.**

~~((R403.13 Heat pump space heating. Space heating shall be provided by a heat pump system.~~

- EXCEPTIONS:
1. Detached one- and two-family dwellings and multiple single family dwellings (townhouses up to three stories in height above grade having an installed HVAC heating capacity no greater than 1.5 watts of electric resistance heating per square foot of *dwelling unit conditioned floor area*, or up to 500 watts, whichever is greater.
  2. Group R-2 *dwelling or sleeping units* having an installed HVAC heating capacity no greater than 750 watts in Climate Zone 4, and 1,000 watts in Climate Zone 5, in any separate habitable room with exterior fenestration are permitted to be heated using electric resistance appliances. For buildings in location with exterior design conditions below 4°F (-15.6°C), an additional 250 watts above that allowed for Climate Zone 5 is permitted.
  - 2.1. A room within a dwelling or sleeping unit that has two primary walls facing different cardinal directions, each with exterior fenestration, is permitted to have an installed HVAC heating capacity no greater than 1,000 watts in Climate Zone 4, and 1,300 watts in Climate Zone 5. Bay windows and other minor offsets are not considered primary walls. For buildings in location with exterior design conditions below 4°F (-15.6°C), an additional 250 watts above that allowed for Climate Zone 5 is permitted.
  3. Resistance heating elements integrated into heat pump equipment.
  4. Solar thermal systems.
  5. Waste heat, radiant heat exchanger, and energy recovery systems.
  6. Supplementary heat in accordance with Section R403.1.2.
  7. Where there is no electric utility service available at the building site.
  8. Heating systems that rely primarily on biomass are allowed in Climate Zone 5.)

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40520 Section R405.2—Performance based compliance.**

**R405.2 Performance based compliance.** Compliance based on total building performance requires that a proposed design meet all of the following:

1. The requirements of the sections indicated within Table R405.2 ~~((1))~~.
2. For structures less than 1,500 square feet of conditioned floor area, the annual ~~((carbon emissions))~~ site energy consumption shall be less than or equal to 64 percent of the annual ~~((carbon emissions))~~ site energy consumption of the *standard reference design*.
3. For structures 1,500 to 5,000 square feet of conditioned floor area, the annual ~~((carbon emissions))~~ site energy consumption shall be no more than 47 percent of the *standard reference design*.
4. For structures over 5,000 square feet of conditioned floor area, the annual ~~((carbon emissions))~~ site energy consumption shall be no more than 41 percent of the *standard reference design*.
5. For structures serving Group R-2 occupancies, the annual ~~((carbon emissions))~~ site energy consumption shall be less than or equal to 61 percent of the annual site energy consumption of the *standard reference design*. See Section R401.1 and *residential building* in Section R202 for Group R-2 scope.

~~((Carbon emissions for both the *standard reference design* and the *proposed design* shall be calculated using Table R405.2(2).))~~ Energy

use derived from simulation analysis shall be expressed in ((pounds of carbon)) Btu per square foot of *conditioned floor area per year*.

**TABLE R405.2 ((-1))**  
**MANDATORY COMPLIANCE MEASURES FOR TOTAL BUILDING PERFORMANCE**

Section <sup>a</sup>	Title	Comments
<b>General</b>		
R401.3	Certificate	
<b>Envelope</b>		
R402.1.1	Vapor retarder	
R402.2.3	Eave baffle	
R402.2.4.1	Access hatches and doors	
((R402.2.10.1 ‡ Crawlspace wall insulation installations))		
R402.4	Air leakage	
R402.5	Maximum fenestration <i>U</i> -factor	
<b>Systems</b>		
R403.1	Controls	
R403.3	Ducts	Except for R403.3.2 and R403.3.3
R403.4	Mechanical system piping insulation	
R403.5.1	Heated water circulation and temperature maintenance system	
R403.5.3	Drain water heat recovery units	
((R403.5.7 Heat pump water heating))		
R403.6	Mechanical ventilation	
R403.7	Equipment sizing and efficiency rating	
R403.8	Systems serving multiple dwelling units	
R403.9	Snow melt system controls	
R403.10	Energy consumption of pools and spas	
R403.11	Portable spas	
R403.12	Residential pools and permanent residential spas	
((R403.13 Heat pump space heating))		
<b>Electrical Power and Lighting</b>		
R404.1	Lighting equipment	
R404.2	Interior lighting controls	

<sup>a</sup> Reference to a code section includes all the relative subsections except as indicated in the table.

(( **TABLE R405.2 (2)** ))

**CARBON EMISSIONS FACTORS**

Type	CO <sub>2</sub> e (lb/unit)	Unit
Electricity	0.44	kWh
Natural gas	11.7	Therm
Oil	19.2	Gallon
Propane	10.5	Gallon
Other <sup>a</sup>	195.00	mmBtu
On-site renewable energy	0.00	

<sup>a</sup> District energy systems may use alternative emission factors supported by calculations *approved by the code official.*)

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40530 Section R405.3—Documentation.**

**R405.3 Documentation.** Documentation of the software used for the performance design and the parameters for the building shall be in accordance with Sections R405.3.1 through ~~((R405.3.3))~~ R405.3.2.2.

**R405.3.1 Compliance software tools.** Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official*.

**R405.3.2 Compliance report.** Compliance software tools shall generate a report that documents that the *proposed design* complies with Section R405.2.

A compliance report on the *proposed design* shall be submitted with the application for the building permit. Upon completion of the building, a confirmed compliance report based upon the confirmed condition of the building shall be submitted to the *code official* before a certificate of occupancy is issued.

Compliance reports shall include information in accordance with Sections R405.3.2.1 and R405.3.2.2.

**R405.3.2.1 Compliance report for permit application.** A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other building site identification.
2. The name, organization, and contact information of the individual performing the analysis and generating the compliance report.
3. The name and version of the compliance software tool.
4. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home.
5. A certificate indicating that the *proposed design* complied with Section R405.2. The certificate shall document the building components' energy specifications that are included in the calculation including: Component-level insulation *R*-values or *U*-factors; duct system and building envelope air leakage testing assumptions; and the type and rated efficiencies of proposed heating, cooling, mechanical ventilation, and service water-heating equipment to be installed. If on-site renewable energy systems will be installed, the certificate

shall report the type and production size of the proposed system. Additional documentation reporting estimated annual energy production shall be provided.

6. When a site-specific report is not generated, the *proposed design* shall be based on the worst-case orientation and configuration of the rated home.

**R405.3.2.2 Compliance report for certificate of occupancy.** A compliance report submitted for obtaining the certificate of occupancy shall include all of the following:

1. Building street address, or other building site identification.

2. Declaration of the total building performance path on the title page of the energy report and the title page of the building plans.

3. A statement bearing the name of the individual performing the analysis and generating the report, along with their organization and contact information, indicating that the as-built building complies with Section R405.2.

4. The name and version of the compliance software tool.

5. A site-specific energy analysis report that is in compliance with Section R405.2.

6. A final confirmed certificate indicating compliance based on inspection, and a statement indicating that the confirmed rated design of the built home complies with Section R405.2. The certificate shall report the energy features that were confirmed to be in the home, including component level insulation *R*-values or *U*-factors; results from any required duct system and building envelope air leakage testing; and the type and rated efficiencies of the heating, cooling, mechanical ventilation, and service water-heating equipment installed.

7. Where on-site renewable energy systems have been installed, the certificate shall report the type and production size of the installed system. Additional documentation reporting estimated annual energy production shall be provided.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40551 Table R405.4.2(1)—Specifications for the standard reference and proposed designs.**

TABLE ((R402-4.2(1))) R405.4.2(1)  
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: Mass wall if proposed wall is mass; otherwise wood frame. Gross area: Same as proposed <i>U</i> -factor: From Table R402.1.2 Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed As proposed As proposed
Below-grade walls	Type: Same as proposed Gross area: Same as proposed <i>U</i> -factor: From Table R402.1.2, with insulation layer on interior side of walls.	As proposed As proposed As proposed

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade floors	Type: Wood frame Gross area: Same as proposed U-factor: From Table R402.1.2	As proposed As proposed As proposed
Ceilings	Type: Wood frame Gross area: Same as proposed U-factor: From Table R402.1.2	As proposed As proposed As proposed
Roofs	Type: Composition shingle on wood sheathing Gross area: Same as proposed Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed As proposed
Attics	Type: Vented with aperture = 1 ft <sup>2</sup> per 300 ft <sup>2</sup> ceiling area	As proposed
Foundations	Type: Same as proposed foundation wall area above and below-grade Soil characteristics: Same as proposed.	As proposed As proposed
Opaque doors	Area: 40 ft <sup>2</sup> Orientation: North U-factor: Same as fenestration from Table R402.1.2.	As proposed As proposed As proposed
Vertical fenestration other than opaque doors <sup>a</sup>	Total area <sup>h</sup> = (a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area. (b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area.	As proposed
	Orientation: Equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: From Table R402.1.2	As proposed
	SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
	Interior shade fraction: 0.92 - (0.21 × SHGC for the standard reference design) External shading: None	0.92 - (0.21 × SHGC as proposed) As proposed
Skylights	None	As proposed
Air exchange rate	Air leakage rate of 4 air changes per hour at a pressure of 0.2 inches w.g. (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: CFA = conditioned floor area N <sub>br</sub> = number of bedrooms - The mechanical ventilation system type shall be the same as in the proposed design. Energy recovery shall not be assumed for mechanical ventilation.	As proposed <sup>a</sup> . The mechanical ventilation rate <sup>b</sup> shall be in addition to the air leakage rate and shall be as proposed.
Mechanical ventilation	None, except where mechanical ventilation is specified by the proposed design, in which case: Annual vent fan energy use: $kWh/yr = (1e_f) \times (0.0876 \times CFA + 65.7 \times (N_{br} + 1))$ where: e <sub>f</sub> = the minimum fan efficacy from Table R403.6.1 corresponding to the system type at a flow rate of $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ CFA = conditioned floor area N <sub>br</sub> = number of bedrooms	As proposed
Internal gains	IGain = 17,900 + 23.8 × CFA + 4104 × N <sub>br</sub> (Btu/day per dwelling unit)	Same as standard reference design



BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Internal mass	An internal mass for furniture and contents of 8 pounds per square foot of floor area.	Same as standard reference design, plus any additional mass specifically designed as a thermal storage element <sup>c</sup> but not integral to the building envelope or structure.
Structural mass	For masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air.	As proposed
	For masonry basement walls, as proposed, but with insulation required by Table R402.1.2 located on the interior side of the walls.	As proposed
	For other walls, for ceilings, floors, and interior walls, wood frame construction.	As proposed
Heating systems <sup>d, e</sup>	The standard reference design shall be an air source heat pump meeting the requirements of Section C403 of the WSEC—Commercial Provisions. Capacity: Sized in accordance with Section ((R403.6)) R403.7	As proposed
Cooling systems <sup>d, f</sup>	Same system type as proposed. Same system efficiency as required by prevailing minimum federal standard. Capacity: Sized in accordance with Section ((R403.6.)) R403.7	As proposed
Service water heating <sup>d, e, f, g</sup>	The standard reference design shall be a heat pump water ((heating)) heater meeting the efficiency standards ((for Tier 1 of NEEA's Advanced Water Heating Specifications)) of Table C404.2. Use, in units of gal/day = 25.5 + (8.5 x N <sub>br</sub> ) Where N <sub>br</sub> = number of bedrooms	As proposed Use, in units of gal/day = 25.5 + (8.5 x N <sub>br</sub> ) x (1 - HWDS) Where: N <sub>br</sub> = number of bedrooms HWDS = factor for the compactness of the hot water distribution system
Thermal distribution systems	Duct insulation: From Section R403.3.3.	Duct insulation: As proposed. Duct location: As proposed. As specified in Table R405.5.2(2).
	Duct location: Same as proposed design. A thermal distribution system efficiency (DSE) of 0.93 shall be applied to both the heating and cooling system efficiencies for all systems. <b>Exception:</b> For nonducted heating and cooling systems that do not have a fan, the standard reference design distribution system efficiency ( DSE) shall be 1.	
Thermostat	Type: Manual, cooling temperature setpoint = 75°F; Heating temperature setpoint = 72°F	Same as standard reference

Compactness ratio <sup>1</sup> factor		HWDS
1 story	2 or more stories	
>60%	>30%	0
>30% to ≤60%	>15% to ≤30%	0.05
>15% to ≤30%	>7.5% to ≤15%	0.10
≤15%	≤7.5%	0.15

For SI: 1 square foot = 0.93 m<sup>2</sup>, 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m<sup>2</sup>, 1 gallon (U.S.) = 3.785 L, °C = (°F-3)/1.8, 1 degree = 0.79 rad

<sup>a</sup> Where required by the code official, testing shall be conducted by an approved party. Hourly calculations as specified in the ASHRAE Handbook of Fundamentals, or the equivalent, shall be used to determine the energy loads resulting from infiltration.

- b The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE *Handbook of Fundamentals*, page 26.24 and the "Whole-house Ventilation" provisions of 2001 ASHRAE *Handbook of Fundamentals*, page 26.19 for intermittent mechanical ventilation.
- c Thermal storage element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element must be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or must be connected to such a room with pipes or ducts that allow the element to be actively charged.
- d For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.
- e For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.
- f For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.
- g For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.
- h For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine fenestration area:

$$AF = A_s \times FA \times F$$

Where:

- $AF$  = Total fenestration area.
- $A_s$  = Standard reference design total fenestration area.
- $FA$  = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 x below-grade boundary wall area).
- $F$  = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.

and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.

Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.

Below-grade boundary wall is any thermal boundary wall in soil contact.

Common wall area is the area of walls shared with an adjoining dwelling unit.

$L$  and  $CFA$  are in the same units.

- i The factor for the compactness of the hot water distribution system is the ratio of the area of the rectangle that bounds the source of hot water and the fixtures that it serves (the "hot water rectangle") divided by the floor area of the dwelling.
  1. Sources of hot water include water heaters, or in multifamily buildings with central water heating systems, circulation loops, or electric heat traced pipes.
  2. The hot water rectangle shall include the source of hot water and the points of termination of all hot water fixture supply piping.
  3. The hot water rectangle shall be shown on the floor plans and the area shall be computed to the nearest square foot.
  4. Where there is more than one water heater and each water heater serves different plumbing fixtures and appliances, it is permissible to establish a separate hot water rectangle for each hot water distribution system and add the area of these rectangles together to determine the compactness ratio.
  5. The basement or attic shall be counted as a story when it contains the water heater.
  6. Compliance shall be demonstrated by providing a drawing on the plans that shows the hot water distribution system rectangle(s), comparing the area of the rectangle(s) to the area of the dwelling and identifying the appropriate compactness ratio and HWDS factor.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40552 Table R405.4.2(2)—Default distribution system efficiencies for proposed designs.**

**TABLE ((R402-4.2(2))) R405.4.2(2)  
DEFAULT DISTRIBUTION SYSTEM EFFICIENCIES FOR PROPOSED  
DESIGNS<sup>a</sup>**

DISTRIBUTION SYSTEM CONFIGURATION AND CONDITION	DISTRIBUTION SYSTEM EFFICIENCY
Distribution system components located in unconditioned space	0.88
Distribution systems entirely located in conditioned space <sup>b</sup>	0.93
Zonal systems <sup>c</sup>	1.00

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093m<sup>2</sup>, 1 pound per square inch = 6895 Pa, 1 inch water gauge = 1250 Pa.

<sup>a</sup> Values given by this table are for distribution systems, which must still meet all prescriptive requirements for duct and pipe system insulation and leakage.

<sup>b</sup> Entire system in conditioned space shall mean that no component of the distribution system, including the air-handler unit, is located outside of the conditioned space. All components must be located on the interior side of the thermal envelope (inside the insulation) and also inside of the air barrier. Refrigerant compressors and piping are allowed to be located outside.

<sup>c</sup> Zonal systems are systems where the heat source is located within each room. Systems shall be allowed to have forced airflow across a coil but shall not have any ducted airflow external to the manufacturer's air-handler enclosure. Hydronic systems do not qualify.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40560 Section R405.5—Calculation software tools.**

**R405.5 Calculation software tools.** Calculation software, where used, shall be in accordance with Sections R405.5.1 through R405.5.3.

**R405.5.1 Minimum capabilities.** Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the *standard reference design* and the *proposed design* and shall include the following capabilities:

1. Calculation of whole-building (as a single zone) sizing for the heating and cooling equipment in the *standard reference design* residence in accordance with Section R403.6.

2. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.

3. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table ((R405.5.2(1))) R405.4.2(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., R-value, U-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

**R405.5.2 Specific approval.** Performance analysis tools meeting the applicable sections of Section R405 shall be permitted to be *approved*. Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official* shall be permitted to approve tools for a specified application or limited scope.

**R405.5.3 Input values.** When calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from an approved source.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40610 Section R406.1—Scope.**

**R406.1 Scope.** This section establishes additional energy efficiency requirements for all new construction covered by this code, including additions subject to Section R502 and change of occupancy or use sub-

ject to Section R505 unless specifically exempted in Section R406. Credits from both Sections R406.2 and R406.3 are required.

**R406.2 Carbon emission equalization.** This section establishes a base equalization between fuels used to define the equivalent carbon emissions of the options specified. The permit shall define the base fuel selection to be used and the points specified in Table R406.2 shall be used to modify the requirements in Section R406.3.

**TABLE R406.2**  
**(~~(FUEL NORMALIZATION)~~) ENERGY EQUALIZATION CREDITS**

System Type	Description of Heating Sources	Credits	
		All Other	Group R-2 <sup>a</sup>
<b>1</b>	For combustion heating system using equipment meeting minimum federal efficiency standards for the equipment listed in Table C403.3.2(5) or C403.3.2(6)	<del>((-3.0))</del> <u>0</u>	0
<b>2</b>	For an initial heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(2) and supplemental heating provided by electric resistance or a combustion furnace meeting minimum standards listed in Table C403.3.2(5) <sup>b</sup>	<del>((0))</del> <u>1.5</u>	0
<b>3</b>	For heating system based on electric resistance only (either forced air or zonal)	<del>((-1.0))</del> <u>0.5</u>	-0.5
<b>4<sup>c</sup></b>	For a heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(2) or C403.3.2(9)  <b>or</b>  Air to water heat pump units that are configured to provide both heating and cooling and are rated in accordance with AHRI 550/590	<del>((1.5))</del> <u>3.0</u>	2.0
<b>5</b>	For heating system based on electric resistance with: 1. Inverter-driven ductless mini-split heat pump system installed in the largest zone in the dwelling  <b>or</b> 2. With 2 kW or less total installed heating capacity per dwelling	<del>((0.5))</del> <u>2.0</u>	0

<sup>a</sup> See Section R401.1 and *residential building* in Section R202 for Group R-2 scope.

<sup>b</sup> The gas back-up furnace will operate as fan-only when the heat pump is operating. The heat pump shall operate at all temperatures above 38°F (3.3°C) (or lower). Below that "changeover" temperature, the heat pump would not operate to provide space heating. The gas furnace provides heating below 38°F (3.3°C) (or lower).

<sup>c</sup> Additional points for this HVAC system are included in Table R406.3.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40620 Section R406.3—Additional energy efficiency requirements.**

**R406.3 Additional energy efficiency requirements.** Each *dwelling unit* in a *residential building* shall comply with sufficient options from Table R406.2 and R406.3 so as to achieve the following minimum number of credits:

1. Small Dwelling Unit: (~~(2.5))~~ 5.0  
credits

- Dwelling units* less than 1500 square feet in conditioned floor area with less than 300 square feet of fenestration area. *Additions* to existing building that are greater than 500 square feet of heated floor area but less than 1500 square feet.
2. Medium *Dwelling Unit*: ((~~5.0~~) 8.0)  
credits
- All *dwelling units* that are not included in #1, #3, or #4.
3. Large *Dwelling Unit*: ((~~6.0~~) 9.0)  
credits
- Dwelling units* exceeding 5000 square feet of conditioned floor area.
4. *Dwelling units* serving Group R-2 occupancies. See Section R401.1 and *residential building* in Section R202 for Group R-2 scope. ((~~4.5~~) 6.5)  
credits
5. *Additions* 150 square feet to 500 square feet: 2.0 credits

The drawings included with the building permit application shall identify which options have been selected and the point value of each option, regardless of whether separate mechanical, plumbing, electrical, or other permits are utilized for the project.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-40621 Table R406.3—Energy credits.**

TABLE 406.3  
ENERGY CREDITS

OPTION	DESCRIPTION	CREDIT(S)	
		All Other	Group R-2 <sup>b</sup>
<b>1. EFFICIENT BUILDING ENVELOPE OPTIONS</b>			
Only one option from Items 1.1 through 1.4 may be selected in this category. Compliance with the conductive UA targets is demonstrated using Section R402.1.5, Total UA alternative, where [1-(Proposed UA/Target UA)] >; the required %UA reduction			
1.1	Prescriptive compliance is based on Table R402.1.3 with the following modifications: Vertical fenestration U = 0.22.	0.5	0.5
1.2	Prescriptive compliance is based on Table R402.1.3 with the following modifications: Vertical fenestration U = 0.25 Floor R-38 Basement wall R-21 int plus R-5 ci Ceiling and single-rafter or joist-vaulted R-60 advanced 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 R402.1.5: Reduce the Total conductive UA by 15%.	(( <del>0.5</del> ) <u>1.0</u> )	1.0

OPTION	DESCRIPTION	CREDIT(S)	
		All Other	Group R-2 <sup>b</sup>
1.3	<p>Prescriptive compliance is based on Table R402.1.3 with the following modifications:</p> <ul style="list-style-type: none"> <li>Vertical fenestration U = 0.18</li> <li>Ceiling and single-rafter or joist-vaulted R-60 advanced</li> <li>Floor R-38</li> <li>Basement wall R-21 int plus R-12 ci</li> <li>Slab on grade R-10 perimeter and under entire slab</li> <li>Below grade slab R-10 perimeter and under entire slab</li> </ul> <p><b>or</b></p> <p>Compliance based on Section R402.1.5: Reduce the Total conductive UA by 22.5%.</p>	((+0)) <u>1.5</u>	1.5
1.4	<p>Prescriptive compliance is based on Table R402.1.3 with the following modifications:</p> <ul style="list-style-type: none"> <li>Vertical fenestration U = 0.18</li> <li>Ceiling and single-rafter or joist-vaulted R-60 advanced</li> <li>Wood frame wall R-21 int plus R-16 ci</li> <li>Floor R-48</li> <li>Basement wall R-21 int plus R-16 ci</li> <li>Slab on grade R-20 perimeter and under entire slab</li> <li>Below grade slab R-20 perimeter and under entire slab</li> </ul> <p><b>or</b></p> <p>Compliance based on Section R402.1.5: Reduce the Total conductive UA by 30%.</p>	((+5)) <u>2.5</u>	2.0
<b>2. AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION OPTIONS</b>			
Only one option from Items 2.1 through 2.3 may be selected in this category.			
2.1	<p>Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 2.0 air changes per hour maximum at 50 Pascals</p> <p><b>or</b></p> <p>For R-2 Occupancies, optional compliance based on Section R402.4.1.2: Reduce the tested air leakage to 0.25 cfm/ft<sup>2</sup> maximum at 50 Pascals</p> <p><b>and</b></p> <p>All whole house ventilation requirements as determined by Section M1505.3 of the <i>International Residential Code</i> or Section 403.8 of the <i>International Mechanical Code</i> shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.65.</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>	((0-5)) <u>1.0</u>	1.0
2.2	<p>Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 1.5 air changes per hour maximum at 50 Pascals</p> <p><b>or</b></p> <p>For R-2 Occupancies, optional compliance based on Section R402.4.1.2: Reduce the tested air leakage to 0.20 cfm/ft<sup>2</sup> maximum at 50 Pascals</p> <p><b>and</b></p> <p>All whole house ventilation requirements as determined by Section M1505.3 of the <i>International Residential Code</i> or Section 403.8 of the <i>International Mechanical Code</i> shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.75.</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>	((+0)) <u>1.5</u>	1.5

OPTION	DESCRIPTION	CREDIT(S)	
		All Other	Group R-2 <sup>b</sup>
2.3	<p>Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 0.6 air changes per hour maximum at 50 Pascals</p> <p><b>or</b></p> <p>For R-2 Occupancies, optional compliance based on Section R402.4.1.2: Reduce the tested air leakage to 0.15 cfm/ft<sup>2</sup> maximum at 50 Pascals</p> <p><b>and</b></p> <p>All whole house ventilation requirements as determined by Section M1505.3 of the <i>International Residential Code</i> or Section 403.8 of the <i>International Mechanical Code</i> shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.80. Duct installation shall comply with Section <del>((R403.3.7))</del> <u>R403.3.2</u>.</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>	<del>((1.5))</del> <u>2.0</u>	2.0
<p><b>3. HIGH EFFICIENCY HVAC EQUIPMENT OPTIONS</b> Only one option from Items 3.1 through <del>((3.8))</del> <u>3.10</u> may be selected in this category. Item <del>((3.9))</del> <u>3.11</u> may be taken with Items 3.1 or 3.3<sup>c</sup> only.</p>			
3.1 <sup>a</sup>	<p>For a System Type 1 in Table R406.2: Energy Star rated (U.S. North) gas or propane furnace with minimum AFUE of 95%.</p> <p><b>or</b></p> <p>Energy Star rated (U.S. North) gas or propane boiler with minimum AFUE of 90%</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	1.0
3.2 <sup>a</sup>	<p>For secondary heating system serving System Type 2 in Table R406.2: Energy Star rated (U.S. North) Gas or propane furnace with minimum AFUE of 95%</p> <p><b>or</b></p> <p>Energy Star rated (U.S. North) Gas or propane boiler with minimum AFUE of 90%.</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>	0.5	0.5
3.3 <sup>a,c,d</sup>	<p>Air-source centrally ducted heat pump with minimum <u>HSPF2 of 8.1</u> (HSPF of 9.5).</p> <p>In areas where the winter design temperature as specified in Appendix RC is 23°F or below, a cold climate heat pump found on the NEEP cc ASHP qualified product list shall be used.</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>	0.5	N/A
3.4 <sup>a,d</sup>	<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	1.0

OPTION	DESCRIPTION	CREDIT(S)	
		All Other	Group R-2 <sup>b</sup>
3.5 <sup>d</sup>	<p>Ductless mini-split heat pump system, zonal control: In homes where the primary space heating system is zonal electric heating, a ductless mini-split heat pump system with a minimum <u>HSPF2 of 9</u> (HSPF of 10.0) 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>	1.5	2.0
3.6 <sup>a,d</sup>	<p>Air-source, centrally ducted heat pump with minimum <u>HSPF2 of 9.4</u> (HSPF of 11.0).</p> <p>A centrally ducted air source cold climate variable capacity heat pump (cc V<sub>CHP</sub>) found on the NEEP cc V<sub>CHP</sub> qualified product list with a minimum of <u>9 HSPF2</u> (10 HSPF) may be used to satisfy this requirement.</p> <p>In areas where the winter design temperature as specified in Appendix RC is 23°F or below, an air source centrally ducted heat pump shall be a cold climate variable capacity heat pump as listed on the NEEP qualified product list.</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	N/A
3.7 <sup>a,d,e</sup>	<p>Ductless split system heat pumps with no electric resistance heating in the primary living areas. A ductless heat pump system with a minimum <u>HSPF2 of 9</u> (HSPF of 10) shall be sized and installed to provide heat to entire dwelling unit at the design outdoor air temperature.</p> <p><b>Exception:</b> In homes with total heating loads of 24,000 or less using multi-zone mini-split systems with nominal ratings of 24,000 or less, the minimum <u>HSPF2</u> to claim this credit shall be <u>8.1</u> (9 HSPF).</p> <p>To qualify to claim this credit, the building permit drawings shall specify the option being selected, the heated floor area calculation, the heating equipment type(s), the minimum equipment efficiency, and total installed heat capacity (by equipment type).</p>	2.0	3.0
3.8 <sup>a,d</sup>	<p>Air-to-water heat pump with minimum COP of 3.2 at 47°F, rated in accordance with AHRI 550/590 by an accredited or certified testing lab.</p> <p>To qualify to claim this credit, the building permit drawings shall specify the option being selected, the heated floor area calculation, the heating equipment type(s), the minimum equipment efficiency, and total installed heat capacity (by equipment type).</p>	1.0	N/A
3.9 <sup>(*)</sup>	<p><u>Gas-fired heat pump(s) meeting ANSI Z21.40.2 and Z21.40.4 or CSA, with a minimum UEF of 1.15.</u></p> <p><u>For R-2 Occupancy, gas-fired heat pump(s) meeting ANSI Z21.40.2 and Z21.40.4 or CSA, with a minimum UEF of 1.15, shall serve all units.</u></p>	<u>1.5</u>	<u>1.5</u>
3.10 <sup>f</sup>	<p>Combination water heating and space heating system shall include one of the following:</p> <p><u>Gas-fired heat pump water heater(s) meeting Tier 2 of the NEEA Advanced Water Heating Specification for Gas-Fueled Residential Storage Water Heaters Version 1.0.</u></p> <p><b>or</b></p> <p><u>For R-2 Occupancy, gas-fired heat pump water heater(s) meeting Tier 2 of the NEEA Advanced Water Heating Specification for Gas-Fueled Residential Storage Water Heaters Version 1.0., shall serve all units.</u></p> <p><b>or</b></p> <p><u>For R-2 Occupancy, gas-fired heat pump(s) meeting ANSI Z21.40.2 and Z21.40.4 or CSA, with a minimum UEF of 1.15, shall serve all units.</u></p> <p><u>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.</u></p>	<u>2.5</u>	<u>2.5</u>



OPTION	DESCRIPTION	CREDIT(S)	
		All Other	Group R-2 <sup>b</sup>
3.11 <sup>c</sup>	<p>Connected thermostat meeting ENERGY STAR Certified Smart Thermostats/EPA ENERGY STAR specifications.</p> <p>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the thermostat model.</p>	0.5	0.5
<b>4. HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM OPTIONS</b>			
4.1	<p>HVAC equipment and associated duct system(s) installation shall comply with the requirements of Section R403.3.2.</p> <p>Electric resistance heat, hydronic heating and ductless heat pumps are not permitted under this option.</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 shall show the location of the heating and cooling equipment and all the ductwork.</p>	0.5	N/A
<b>5. EFFICIENT WATER HEATING OPTIONS</b>			
Only one option from Items 5.3 through ((5.5)) 5.8 may be selected in this category. Items 5.1 and 5.2 may be combined with any option.			
5.1	<p>A drain water heat recovery unit(s) shall be installed, which captures wastewater heat from at least two showers, including tub/shower combinations. It is acceptable, but not required, for sink water to be connected. Unit shall have a minimum efficiency of 40% if installed for equal flow or a minimum efficiency of 54% if installed for unequal flow. Such units shall be rated in accordance with CSA B55.1 or IAPMO IGC 346-2017 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. Labels or other documentation shall be provided that demonstrates that the unit complies with the standard.</p>	0.5	0.5
5.2	<p>For Compact Hot Water Distribution system credit, the volume shall store not more than 16 ounces of water between the nearest source of heated water and the termination of the fixture supply pipe where calculated using Section R403.5.2. <i>Construction documents</i> shall indicate the ounces of water in piping between the hot water source and the termination of the fixture supply. When the hot water source is the nearest primed plumbing loop or trunk, this must be primed with an On Demand recirculation pump and must run a dedicated ambient return line from the furthest fixture or end of loop to the water heater.</p> <p>To qualify for this credit, the dwelling must have a minimum of 1.5 bathrooms.</p>	0.5	0.5
5.3	<p><u>Water heating system shall include the following:</u>  <u>Energy Star rated gas or propane water heater with a minimum UEF of 0.80.</u></p> <p><u>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.</u></p>	<u>0.5</u>	<u>0.5</u>

OPTION	DESCRIPTION	CREDIT(S)	
		All Other	Group R-2 <sup>b</sup>
<u>5.4</u>	<p><u>Water heating system shall include one of the following:</u>  <u>Energy Star rated gas or propane water heater with a minimum UEF of 0.91.</u></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> <p>Water heater heated by ground source heat pump meeting the requirements of Option ((3-3)) 3.4.</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>	1.0	1.0
((5.4)) <u>5.5</u>	<p><u>Water heating system shall include one of the following:</u>  <u>Gas-fired heat pump water heater(s) meeting Tier 2 of the NEEA Advanced Water Heating Specification for Gas-Fueled Residential Storage Water Heaters Version 1.0.</u></p> <p><b>or</b></p> <p><u>For R-2 Occupancy, gas-fired heat pump water heater(s) meeting Tier 2 of the NEEA Advanced Water Heating Specification for Gas-Fueled Residential Storage Water Heaters Version 1.0. shall supply domestic hot water to all units.</u></p> <p><b>or</b></p> <p><u>For R-2 Occupancy, gas-fired heat pump water heater(s) meeting ANSI Z21.40.2 and Z21.40.4 or CSA, with a minimum UEF of 1.15, shall supply domestic hot water to all units.</u></p> <p><u>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.</u></p>	<u>1.5</u>	<u>1.5</u>
<u>5.6</u>	<p>Water heating system shall include one of the following:  Electric heat pump water heater meeting the standards for Tier III of NEEA's advanced water heating specification.</p> <p><b>or</b></p> <p>For R-2 Occupancy, electric heat pump water heater(s), meeting the standards for Tier III of NEEA's advanced water heating specification, shall supply domestic hot water to all units. If one water heater is serving more than one dwelling unit, all hot water supply and recirculation piping shall be 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>	2.0	2.5

OPTION	DESCRIPTION	CREDIT(S)	
		All Other	Group R-2 <sup>b</sup>
<del>((5-5))</del> 5.7	<p>Water heating system shall include one of the following:            Electric heat pump water heater with a minimum UEF of 2.9 and utilizing a split system configuration with the air-to-refrigerant heat exchanger located outdoors. Equipment shall meet Section 4, requirements for all units, of the NEEA standard <i>Advanced Water Heating Specification</i> with the UEF noted above.</p> <p><b>or</b></p> <p>For R-2 Occupancy, electric heat pump water heater(s), meeting the standards for Tier III of NEEA's advanced water heating specification and utilizing a split system configuration with the air-to-refrigerant heat exchanger located outdoors, shall supply domestic hot water to all units. If one water heater is serving more than one dwelling unit, all hot water supply and recirculation piping shall be 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>	2.5	3.0
5.8	<p><u>Combination water heating and space heating system shall include one of the following:</u>  <u>Gas-fired heat pump water heater(s) meeting Tier 2 of the NEEA Advanced Water Heating Specification for Gas-Fueled Residential Storage Water Heaters Version 1.0.</u></p> <p><b>or</b></p> <p><u>For R-2 Occupancy, gas-fired heat pump water heater(s) meeting Tier 2 of the NEEA Advanced Water Heating Specification for Gas-Fueled Residential Storage Water Heaters Version 1.0., shall supply all units.</u></p> <p><b>or</b></p> <p><u>For R-2 Occupancy, gas-fired heat pump(s) meeting ANSI Z21.40.2 and Z21.40.4 or CSA, with a minimum UEF of 1.15, shall supply all units.</u></p> <p><u>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.</u></p>	<u>2.5</u>	<u>2.5</u>
<b>6. RENEWABLE ELECTRIC ENERGY OPTION</b>			
6.1	<p>For each 600 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 4.5 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 or approved (<del>alternate</del>) <i>alternative</i> by the code official.</p> <p>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 – 4.5	0.5 – 4.5
<b>7. APPLIANCE PACKAGE OPTION</b>			

OPTION	DESCRIPTION	CREDIT(S)	
		All Other	Group R-2 <sup>b</sup>
7.1	<p>All of the following appliances shall be new and installed in the dwelling unit and shall meet the following standards:</p> <ol style="list-style-type: none"> <li>1. Dishwasher, standard - Energy Star rated, Most Efficient 2021 <b>or</b> Dishwasher, compact – Energy Star rated (Version 6.0)</li> <li>2. Refrigerator (if provided) - Energy Star rated (Version 5.1)</li> <li>3. Washing machine (Residential) - Energy Star rated (Version 8.1)</li> <li>4. Dryer - Energy Star rated, Most Efficient 2022</li> </ol> <p>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall show the appliance type and provide documentation of Energy Star compliance. At the time of inspection, all appliances shall be installed and connected to utilities. Dryer ducts and exterior dryer vent caps are not permitted to be installed in the <i>dwelling unit</i>.</p>	0.5	1.5

- <sup>a</sup> An alternative heating source sized at a maximum of 0.5 Watts/ft<sup>2</sup> (equivalent) of heated floor area or 500 Watts, whichever is bigger, may be installed in the dwelling unit.
- <sup>b</sup> See Section R401.1 and *residential building* in Section R202 for Group R-2 scope.
- <sup>c</sup> Option ((3-9)) 3.11 can only be taken with Options 3.1 and 3.3. To qualify to claim option ((3-8)) 3.11 with 3.3, the system shall be a 1-2 speed heat pump system. Variable capacity heat pumps are ineligible from claiming this option.
- <sup>d</sup> This option may only be claimed if serving System Type 4 or 5 from Table R406.2.
- <sup>e</sup> Primary living areas include living, dining, kitchen, family rooms, and similar areas.
- <sup>f</sup> Option 3.10 may only be taken with Efficient Water Heating Options 5.1 or 5.2. Equipment sizing for space heating shall be calculated as provided in Section R403.7 with increased capacity to provide a minimum of 75 percent of peak hot water demand or shall be sized in accordance with approved manufacturer's specifications or guidance. Supplementary heat for water heating system shall be in accordance with Section R403.5.7.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-50100 Section R501—General.**

**R501.1 Scope.** The provisions of this chapter shall control the alteration, repair, addition and change of occupancy of existing buildings and structures.

**R501.1.1 General.** Except as specified in this chapter, this code shall not be used to require the removal, alteration, or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code. Unaltered portions of the existing building or building supply system shall not be required to comply with this code.

**R501.1.2 Thermostats for accessory dwelling units.** Where a separate *dwelling unit*, that provides independent facilities for living, sleeping, cooking, bathing and sanitation, is established within or attached to an existing *dwelling unit*, the heating and cooling for the newly-created *dwelling unit* shall be controllable with a separate programmable thermostat in accordance with Section R403.1.1.

**R501.2 Compliance.** *Additions, alterations, repairs* or changes of occupancy to, or relocation of, an existing building, building system or portion thereof shall comply with Sections R502, R503, R504 or R505, respectively, in this code. Changes where unconditioned space is changed to *conditioned space* shall comply with Section R502.

**R501.3 Maintenance.** Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and systems that are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's au-

thorized agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

**R501.4 Compliance.** *Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for alterations, repairs, additions and changes of occupancy or relocation, respectively, in this code and the International Residential Code, International Building Code, International Existing Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, Uniform Plumbing Code, International Property Maintenance Code, and NFPA 70.*

**R501.5 New and replacement materials.** Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided hazards to life, health or property are not created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

**R501.6 Historic buildings.** The code official may modify the specific requirements of this code for *historic buildings* and require (~~alternate~~) alternative provisions which will result in a reasonable degree of energy efficiency. This modification may be allowed for those buildings or structures that are listed in the state or national register of historic places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a national register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the national or state register of historic places either individually or as a contributing building to a historic district by the state historic preservation officer or the keeper of the *National Register of Historic Places*.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**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, except as specified in this chapter. 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)) R502.3 or R502.4.*

**R502.1.1 Small additions.** *Additions not greater than 150 square feet (13.9 m<sup>2</sup>) shall not be required to comply with Section R406.*

**R502.2 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 total building 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.

**R502.3 Prescriptive compliance.** Additions shall comply with Sections R502.3.1 through R502.3.4.

**R502.3.1 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 R402.1.5, 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.

**R502.3.1.1 Existing ceilings with attic spaces.** Where an *addition* greater than 150 square feet (~~((9.2))~~ 13.9 m<sup>2</sup>) adjoins existing ceilings with attic spaces, the existing attic spaces shall comply with Section R402.

**R502.3.2 Heating and cooling systems.** HVAC ducts newly installed as part of an *addition* shall comply with Section R403.

EXCEPTION: The following need not comply with the testing requirements of Section R403.3.3:  
1. *Additions* of less than 150 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. Existing duct systems constructed, insulated or sealed with asbestos.

**R502.3.3 Service hot water systems.** New service hot water systems that are part of the *addition* shall comply with Section R403.5.

**R502.3.4 Lighting.** New lighting systems that are part of the *addition* shall comply with Section 404.1.

**R502.4 Existing plus addition compliance (Total Building Performance).** 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 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

### **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, without requiring the unaltered portions of the existing building or building system to comply with this code. *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* 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 *code 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 R402.1.3 or R402.1.5, Sections R402.2.1 through ~~((R402.2.11))~~ R402.2.10, R402.3.1, R402.3.2, ~~((R402.4.3, and R402.4.4))~~ R402.3.5, and R402.4.2.

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 R402.1.3. Where more than one replacement *fenestration* unit is being installed, an area-weighted average of the *U*-factor and SHGC of all replacement *fenestration* shall be permitted to be used to demonstrate compliance.

**R503.1.2 Heating and cooling systems.** New heating, cooling and duct systems that are part of the *alteration* shall comply with Section R403.

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.
- ~~((3- Replacements of space heating equipment shall not be required to comply with Section R403.13 where the rated capacity of the new equipment does not exceed the rated capacity of the existing equipment.))~~

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

EXCEPTION((S)): ~~((1-))~~ Replacement of water heating equipment shall not be required to comply with Section R403.5.5. ~~((2- Replacement of water heating equipment shall not be required to comply with Section R403.5.7 where the rated capacity of the new equipment does not exceed the rated capacity of the existing equipment.))~~

**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 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

AMENDATORY SECTION (Amending WSR 23-02-060, 23-12-102, and 23-20-022, filed 1/3/23, 6/7/23, and 9/25/23, effective 3/15/24)

**WAC 51-11R-51000 Chapter 6—Referenced standards.** This chapter lists the standards that are referenced in various sections of this

document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section R106.

<b>AAMA</b>	American Architectural Manufacturers Association 1827 Walden Office Square Suite 550 Schaumburg, IL 60173-4268	
Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A C440-17	North American Fenestration Standard/Specifications for Windows, Doors and Unit Skylights .....	((R402.4.3)) <u>R402.4.2</u>
<b>ACCA</b>	Air Conditioning Contractors of America 2800 Shirlington Road, Suite 300 Arlington, VA 22206	
Standard reference number	Title	Referenced in code section number
Manual J-16	Residential Load Calculation Eighth Edition .....	R403.7
Manual S-14	Residential Equipment .....	R403.7
<b>ANSI</b>	American National Standards Institute 25 West 43rd Street, 4th Floor New York, NY 10036	
Standard reference number	Title	Referenced in code section number
Z21.50-2016/CSA 2.22-2016	Vented Decorative Gas Appliances .....	((R402.4.2.1, R403.1.3)) <u>R403.7.1</u>
Z21.88-2017/CSA 2.33-2017	Vented Gas Fireplace Heaters .....	((R402.4.2.1)) <u>R403.7.1</u>
<u>Z21.40.2-1996</u>	<u>Gas-fired, Work Activated Air-Conditioning and Heat Pump Appliances (Internal Combustion)</u> .....	<u>Table R406.3</u>
<u>Z21.40.4-1996</u>	<u>Performance Testing and Rating of Gas-Fired, Air-Conditioning and Heat Pump Appliances</u> .....	<u>Table R406.3</u>
<b>APSP</b>	The Association of Pool and Spa Professionals 2111 Eisenhower Avenue, Suite 500 Alexandria, VA 22206	
Standard reference number	Title	Referenced in code section number
ANSI/APSP/ICC 14-2019	American National Standard for Portable Electric Spa Energy Efficiency .....	R403.11
ANSI/APSP/ICC 15a-2011	American National Standard for Residential Swimming Pool and Spa Energy Efficiency— Includes Addenda A approved January 9, 2013 .....	R403.12
<b>ASHRAE</b>	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1791 Tullie Circle, N.E. Atlanta, GA 30329-2305	
Standard reference number	Title	Referenced in code section number
ASHRAE-2021	ASHRAE Handbook of Fundamentals .....	R402.1.5, Table R405.5.2(1)
ASHRAE 193-2010 (RA 2014)	Method of Test for Determining the Airtightness of HVAC Equipment .....	((R403.3.2.1)) <u>R403.3.4.1</u>
<b>ASTM</b>	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2859	
Standard reference number	Title	Referenced in code section number
C1363-11	Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus .....	R303.1.4.1
E283-2004 (2012)	Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen .....	((R402.4.5)) <u>R402.4.3</u>
E779-2010 (2018)	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization .....	R402.4.1.2



E1554/E1554M-E2013	Standard Test Method for Determining Air Leakage of Air Distribution Systems by Fan Pressurization	.....	R403.3.5
E1827-2011 (2017)	Standard Test Methods for Determining Airtightness of Building Using an Orifice Blower Door	.....	R402.4.1.2
E2178-2013	Standard Test Method for Air Permeance of Building Materials	.....	R303.1.5
E3158-2018	Standard Test Method for Measuring the Air Leakage Rate of a Large or Multizone Building	.....	R402.4.1.2
<b>CSA</b>	Canadian Standards Association 5060 Spectrum Way Mississauga, Ontario, Canada L4W 5N6		
Standard reference number	Title		Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A440-17	North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights	.....	((R402.4.3)) <u>R402.4.2</u>
CSA 55.1-2015	Test Method for Measuring Efficiency and Pressure Loss of Drain Water Heat Recovery Systems	.....	R403.5.4, Table R406.2
CSA 55.2-2015	Drain Water Heat Recovery Units	.....	R403.5.4
CSA P.4.1-15	Testing Method for Measuring Annual Fireplace Efficiency	.....	((R402.4.2.1)) <u>R403.7.1</u>
<b>DASMA</b>	Door and Access Systems Manufacturers Association 1300 Sumner Avenue Cleveland, OH 44115-2851		
105-2017	Test Method for Thermal Transmittance and Air Infiltration of Garage Doors and Rolling Doors	.....	R303.1.3
<b>HVI</b>	Home Ventilating Institute 1000 North Rand Road, Suite 214 Wauconda, IL 60084		
916-18	Airflow Test Procedure	.....	R303.1.3
<b>ICC</b>	International Code Council, Inc. 500 New Jersey Avenue, N.W. 6th Floor Washington, DC 20001		
Standard reference number	Title		Referenced in code section number
ANSI/APSP/ICC 14-2019	American National Standard for Portable Electric Spa Energy Efficiency	.....	R403.11
ANSI/APSP/ICC 15a-2011	American National Standard for Residential Swimming Pool and Spa Energy Efficiency— Includes Addenda A approved January 9, 2013	.....	R403.12
ANSI/RESNET/ICC 380-2019	Standard for Testing Airtightness of building, Dwelling Unit and Sleeping Unit Enclosures; Airtightness of Heating and Cooling Air Distribution Systems, and Airflow of Mechanical Ventilation Systems	.....	R402.4.1.2
IBC-21	International Building Code	.....	R201.3, R303.2, R402.11, R4501.4
ICC 400-17	Standard on the Design and Construction of Log Structures	.....	Table R402.1.1
ICC 500-2020	ICC/NSSA Standard for the Design and Construction of Storm Shelters	.....	R402.5
IFC-21	International Fire Code	.....	R201.3, R501.4
IFGC-21	International Fuel Gas Code	.....	R201.3, R501.4
IFGC-21	International Mechanical Code	.....	R201.3, R403.3.2, R403.6, R501.4
IPMC-21	International Property Maintenance Code	.....	R501.4
IRC-21	International Residential Code	.....	R104.2.1, R201.3, R303.2, R401.2, R403.2.2, R403.5, R406.1, R406.2, Table R406.2
<b>IEEE</b>	The Institute of Electrical and Electronic Engineers, Inc. 3 Park Avenue New York, NY 10016-5997		
Standard reference number	Title		Referenced in code section number

515.1-2012	IEEE Standard for the Testing, Design, Installation and Maintenance of Electrical Resistance Trace Heating for Commercial Applications	R403.5.1.2
<b>ISO</b>	International Organization for Standardization 1, rue de Varembe, Case postale 56, CH-1211 Geneva, Switzerland	
Standard reference number	Title	Referenced in code section number
ISO/IEC ((17024-212)) 17024-2012	Conformity Assessment: General requirements for bodies operating certification of persons	R402.4.1.2
<b>NEEA</b>	Northwest Energy Efficiency Alliance 421 S.W. 6th Ave., Suite 600 Portland, OR 97204	
Standard reference number	Title	Referenced in code section number
NEEA-2011	Northern Climate Specification for Heat Pump Water Heaters, Vers. 4.0	Table ((R406:2)) R406.3
<u>NEEA-2019</u>	<u>Advanced Water Heating Specifications for Gas-Fueled Residential Storage Water Heaters, Version 1.0.</u>	Table R406.3
<b>NEEP</b>	Northeast Energy Efficiency Partnership, Inc. 24 School Street, 2nd Floor Boston, MA 02108-4314	
Standard reference number	Title	Referenced in code section number
ccASHP Version 3.1	Cold Climate Air Source Heat Pump (ccASHP) Product List and Specifications: <a href="https://neep.org/heating-electrification/ccashp-specification-product-list">https://neep.org/heating-electrification/ccashp-specification-product-list</a>	Table R406.3
<b>NEMA</b>	National Electrical Manufacturers Association 1300 17th Street N No. 900 Arlington, VA 22209	
Standard reference number	Title	Referenced in code section number
OS4-2016	Requirements for Air-Sealed Boxes for Electrical and Communications Applications	((R402.4:6)) R402.4.4
<b>NFPA</b>	National Fire Protection Association 1 Batterymarch Park Quincy, MA 02169-7417	
Standard reference number	Title	Referenced in code section number
70-20	National Electrical Code	R501.4
<b>NFRC</b>	National Fenestration Rating Council, Inc. 6305 Ivy Lane, Suite 140 Greenbelt, MD 20770	
Standard reference number	Title	Referenced in code section number
100-2020	Procedure for Determining Fenestration Products <i>U</i> -factors	R303.1.3
200-2020	Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence	R303.1.3
400-2020	Procedure for Determining Fenestration Product Air Leakage	((R402.4:3)) R402.4.2
<b>UL</b>	Underwriters Laboratory 333 Pfingsten Road Northbrook, IL 60062	
Standard reference number	Title	Referenced in code section number
UL 127-11	Factory Built Fireplace	((R402.4:2)) R402.3.6
UL 515-11	Electric Resistance Heat Tracing for Commercial and Industrial Applications	R403.5.1.2
UL 907-94	Fireplace Accessories (with revisions through April 2010)	((R402.4:2)) R402.3.6
<b>US-FTC</b>	United States-Federal Trade Commission 600 Pennsylvania Avenue N.W. Washington, DC 20580	

Standard reference number	Title	Referenced in code section number
C.F.R. Title 16 (2015)	R-value Rule .....	Rule R303.1.4
<b>WDMA</b>	Window and Door Manufacturers Association 1400 East Touhy Avenue, Suite 470 Des Plaines, IL 60018	
Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A440-17	North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights .....	(( <del>R402.4.3</del> ) <u>R402.4.2</u> )
<b>WSU</b>	Washington State University Energy Extension Program 905 Plum Street S.E., Bldg 3 P.O. Box 43165 Olympia, WA 98506-3166	
Standard reference number	Title	Referenced in code section number
WSU RS 33	Duct Testing Standard for New and Existing Construction Publication No. WSUEEP15-016 .....	R403.3.3