

# Prescriptive Checklist for the 2018 Washington State Energy Code

Chapter 51-11R WAC

State Building Code Adoption and Amendment of the 2018 Edition  
of the International Energy Conservation Code, Residential Provisions

## Washington State Energy Code – Residential Provisions



Energy Program

WASHINGTON STATE UNIVERSITY

Updated May 2021

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WSUEEP13-060 • revised May 2021

This prescriptive checklist cites [2018 Washington State Energy Code - Residential](#) (WSEC-R) items that apply to most residential new construction projects. This checklist is not a substitute for the energy code itself, nor is it a list of comprehensive energy code requirements. More resources about the energy code are available on the [Washington State University Energy Program website](#).

**R103.2 Information on Construction Documents**

Include details in construction documents regarding insulation materials and their R-values; fenestration U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; equipment and systems controls; duct sealing, duct and pipe insulation and location; and air sealing details.

**R103.3.1 Approval of Construction Documents**

One set of construction documents so reviewed shall be retained by the code official. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the code official or a duly authorized representative.

**R104.1 General**

Construction or work for which a permit is required shall be subject to inspection by the code official or his or her designated agent, and such construction or work shall remain 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.

**R104.2.2.1 Wall Insulation Inspection**

The building official, upon notification, shall make a wall insulation inspection in addition to those inspections required in Section R109 of the *International Residential Code*. This inspection shall be made after all wall and cavity insulation is in place and prior to cover.

**R302.2 Design Conditions for Sizing HVAC**

The heating or cooling outdoor design temperatures shall be selected from [Appendix C](#), page RE-95.

**Useful Links:** [Air Conditioning Contractors of America](#)  
[NEEA HVAC Sizing Tool](#)

**R303.1.1 Insulation Certification**

The insulation installers shall provide a certification listing the type, manufacturer and R-value of insulation installed in each element of the building thermal envelope. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled R-value,

installed density, coverage area and number of bags installed shall be listed on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and R-value of installed thickness shall be listed on the certification. For insulated siding, the R-value shall be labeled on the product's package and shall be listed on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

**Exception:** For roof insulation installed above the deck, the R-value shall be labeled as required by the material standards specified in Table 1508.2 of the *International Building Code* or Table R906.2 of the *International Residential Code*.

### Insulation Certificate for Residential New Construction

**Useful Links:** [North American Insulation Manufacturers Association](#)  
[Spray Polyurethane Foam Alliance](#)  
[Foam Sheathing Coalition](#)

#### **R303.1.1.1 Insulation Markers**

The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 300 square feet (28 m<sup>2</sup>) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch (25 mm) in height.

#### **R303.2.1 Protection of Exposed Foundation Insulation - above grade and 6" below grade**

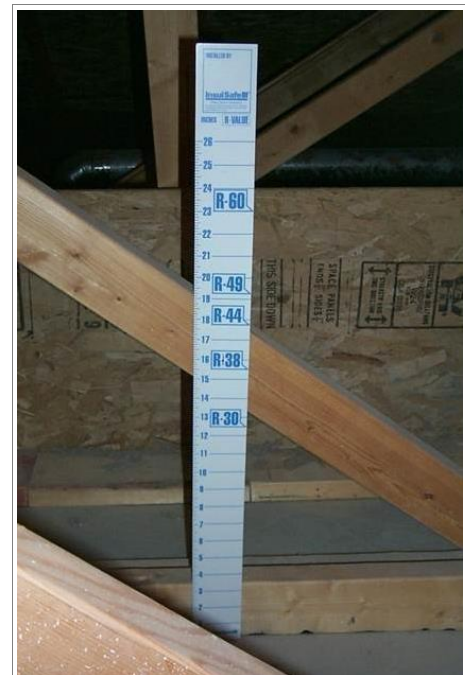
Insulation applied to the exterior of basement walls, crawlspace walls and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance.

#### **R401.3 Certificate**

A permanent certificate shall be completed by the builder or other approved party and posted on a wall in the space where the furnace is located, a utility room, or an approved location inside the building.

### 2018 Compliance Certificate

### 2018 Compliance Certificate Instructions



#### **R303.1.3 Insulation Markers**

*Insulation marker installed in attic. Make sure the marker is applicable to the type of insulation installed (fiberglass, cellulose, etc.)*

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

CLIMATE ZONE 5 AND MARINE 4	
Fenestration U-Factor <sup>b</sup>	0.30
Skylight <sup>b</sup> U-Factor	0.50
Ceiling R-Value <sup>e</sup>	49
Wood Frame Wall <sup>g,h</sup> R-Value	21 int
Floor R-Value	30
Below-Grade <sup>c,h</sup> Wall R-value	10/15/21 int + 5TB
Slab <sup>d,f</sup> R-Value & Depth	10, 2 ft

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

- R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the compressed R-value of the insulation from Appendix Table A101.4 shall not be less than the R-value specified in the table.
- The fenestration U-factor column excludes skylights.
- "10/15/21 +5TB" means R-10 continuous insulation on the exterior of the wall, or R-15 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. "5TB" means R-5 thermal break between floor slab and basement wall.
- R-10 continuous insulation is required under heated slab on grade floors. See Section R402.2.9.1.
- 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.
- 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.
- For log structures developed in compliance with Standard ICC 400, log walls shall meet the requirements for *climate zone 5* of ICC 400.
- 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.

**Table 402.1.1 Footnote "d" Slab R-Value**

R-10 continuous insulation (CI) is required under heated slab on grade floors. See R402.2.9.1.

**Table 402.1.1 Footnote "e" Ceiling R-Value**

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.



**Table R402.1.1 Footnote "d" Slab R-Value**  
*R-10 fully insulated slab for heated slab-on-grade floors*

□ **Table 402.1.1 Footnote “f” Existing Slab R-Value**

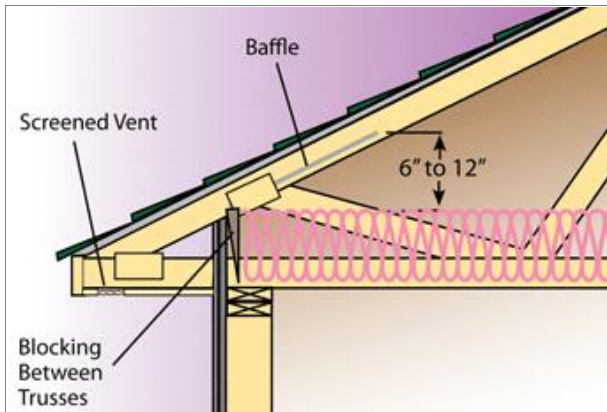
R-7.5 CI installed over an existing slab is deemed equivalent to the required perimeter slab insulation when applied to existing slabs complying with Section R503.1.1. If foam plastic is used, it shall meet requirements for thermal barriers protecting foam plastics.

□ **Table 402.1.1 Footnote “h” Intermediate Framing**

Intermediate framing denotes framing and insulation as described in Section A103.2.2 including standard framing 16 inches on center, 78% of wall cavity insulated and headers insulated with a minimum of R-10 insulation.

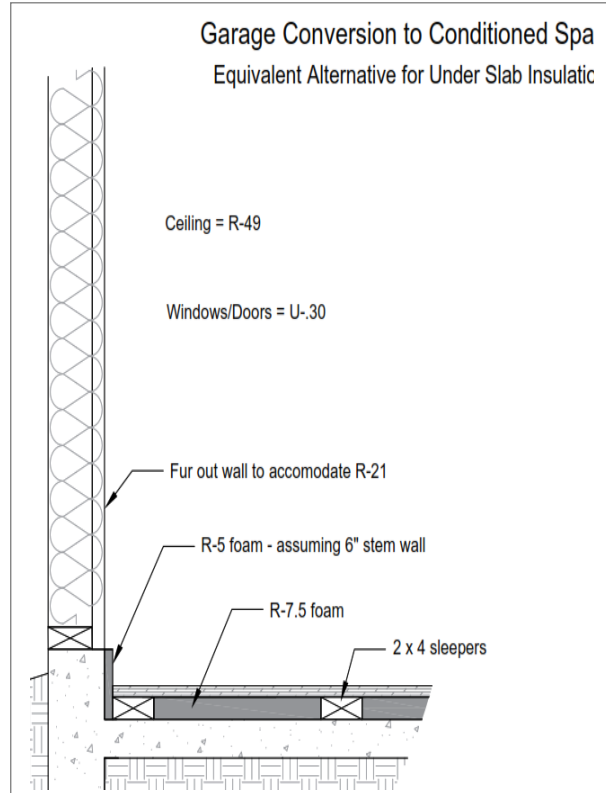
□ **R402.2.1 Ceilings with Attic Spaces**

Where Section R402.1.1 would require R-49 in the ceiling, installing R-38 over 100% of the ceiling area requiring insulation shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and total UA alternative in Section R402.1.4.



**R402.2.1 Ceilings with Attic Spaces**

*You can reduce ceiling insulation R-value to 38 if you have R-38 extending to the exterior wall line*



**Table 402.1.1 Footnote “f” Existing Slab Insulation**  
*R-7.5 CI installed over an existing slab is deemed equivalent to the required perimeter slab insulation*



**Table 402.1.1 Footnote “h” Intermediate Framing**  
*“INT” walls require R-10 insulated headers*

**R402.2.1.1 Loose Fill Insulation in Attic Spaces**

Open-blown or poured loose fill insulation may be used in attic spaces where the slope of the ceiling is not more than 3 feet in 12 and there is at least 30 inches of clear distance from the top of the bottom chord of the truss or ceiling joist to the underside of the sheathing at the roof ridge.

**R402.2.3 Eave Baffle**

For air permeable insulation in vented attics, a baffle shall be installed adjacent to soffit and eave vents.

**R402.2.4 Access Hatches and Doors**

Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weather stripped and insulated to a level equivalent to the insulation on the surrounding surfaces.

**R402.2.7 Floors**

Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. Insulation supports shall be installed so spacing is no more than 24 inches on center. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation.

**R402.2.7 Floors Exception**

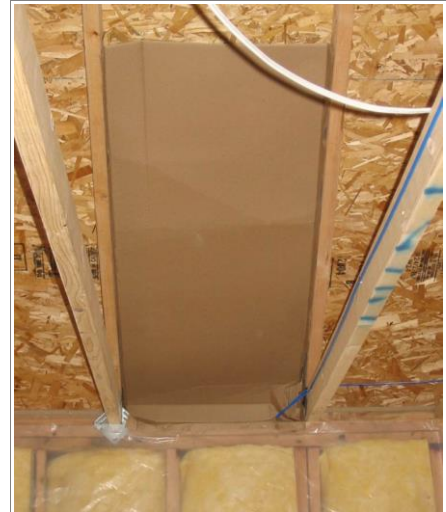
The floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or CI installed on the bottom side of floor framing where combined with insulation that meets or exceeds the minimum Wood Frame R-value in Table R402.1.1 and extends from the bottom to the top of all perimeter floor framing members.

**R402.2.7 Floors Exception**

When foundation vents are not placed so that the top of the vent is below the lower surface of the floor insulation, a permanently attached baffle shall be installed at an angle of 30° from horizontal, to divert air flow below the lower surface of the floor insulation.

**R402.2.7 Floors Exception**

Substantial contact with the surface being insulated is not required in enclosed floor/ceiling assemblies containing ducts where full R value insulation is installed between the duct and the exterior surface.



**R402.2.3 Eave Baffle**  
*Baffle at eave vent. Minimum 1" unobstructed air space required*

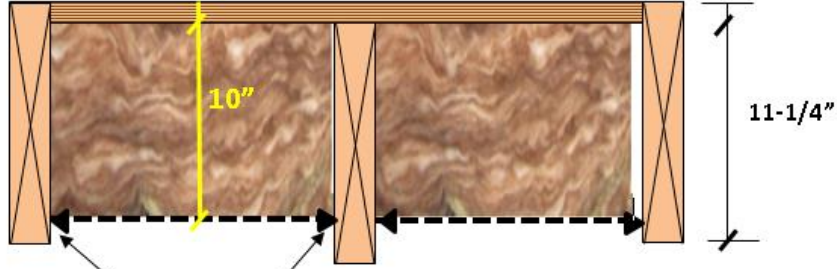


**R402.2.4 Access Hatches and Doors**  
*Insulated crawl space access. The same method applies to attic access hatches*

### Fiberglass Batt Insulation Installation for Dimensional Lumber\*

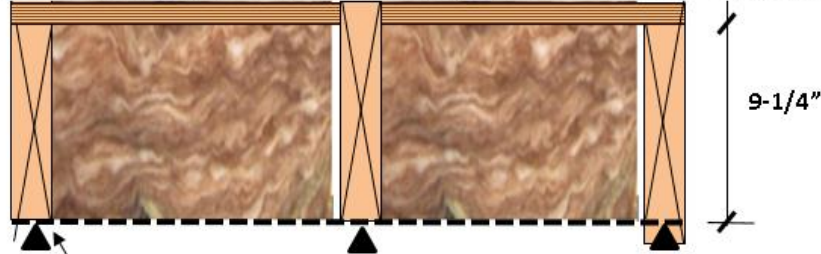
\* For manufactured joists, (TJI, BCI, etc.) batt products for metal components are required because they require a wider dimension batt to fill the width

R 30 Standard Density Fiberglass Batt (10") installed in a 12" (11 1/4") joist cavity



Support & securley fasten to inside of each joist

R 30 Standard Density Fiberglass Batt (10") installed in a 10" (9 1/4") joist cavity



Fastening points

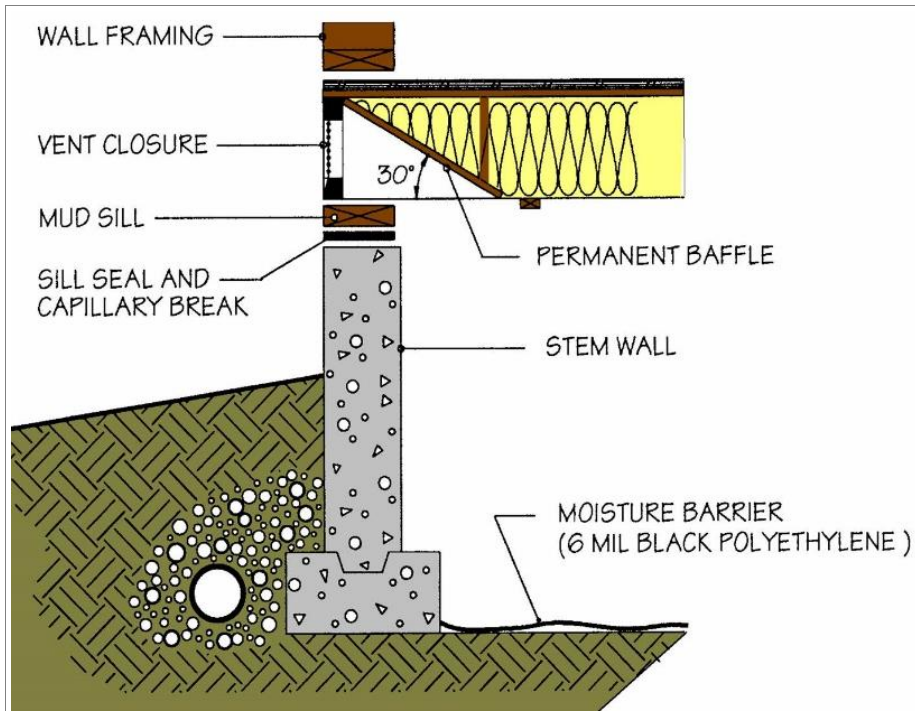
Install an R 30 High Density (HD) Fiberglass Batt (8-1/4") in an 8" (7 1/4") joist cavity

Install an R 38 High Density (HD) Fiberglass Batt (10-1/4") in a 10" (9-1/4") joist cavity

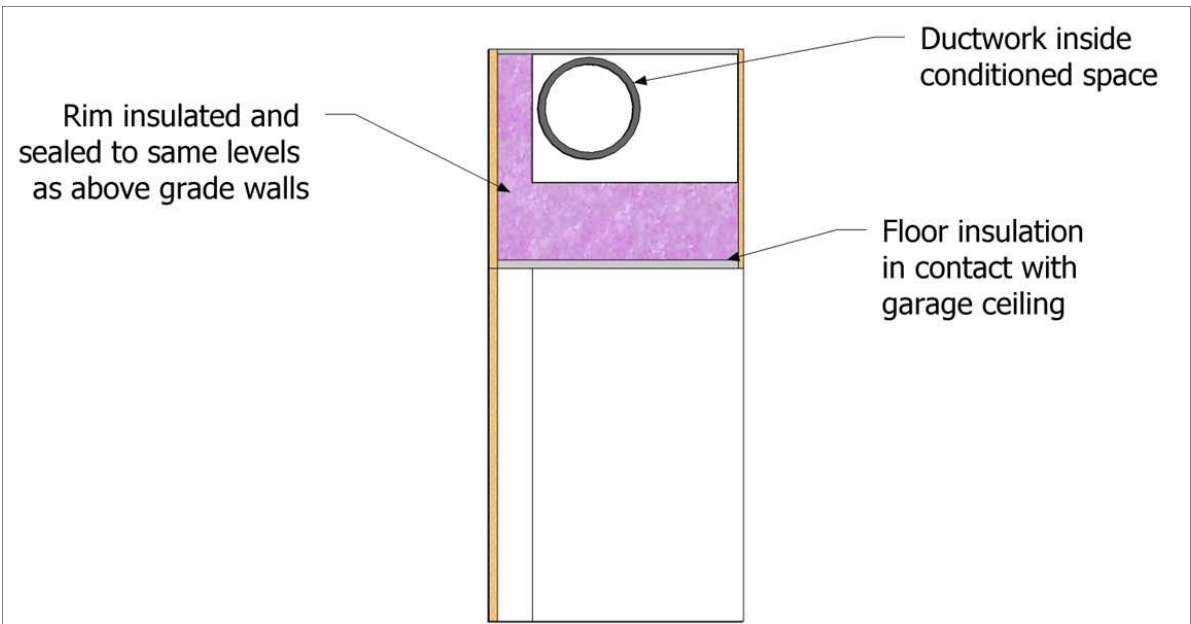


#### R402.2.7 Floors

*Floor insulation installed with contact to the underside of the floor decking. Note the inset stapled twine.*



**R402.2.7 Floors Exception**  
*Baffle at rim joist vent. The same application is needed for joists hung from the mudsill at a foundation vent location.*



**R402.2.7 Floors Exception**  
*Exception for substantial contact with the surface being insulated in a floor/ceiling assembly. It is imperative that the rim joist be caulked and sealed to minimize air infiltration.*



□ **R402.2.8 Basement Walls**

Below-grade exterior wall insulation used on the exterior (cold) side of the wall shall extend from the top of the below-grade wall to the top of the footing and shall be approved for below-grade use. Above-grade insulation shall be protected. Insulation used on the interior (warm) side of the wall shall extend from the top of the below-grade wall to the below-grade floor level and shall include R-5 rigid board providing a thermal break between the concrete wall and the slab.

□ **R402.2.9 Slab-on-Grade Floors**

The minimum thermal resistance (R-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors shall be as specified in Table R402.1.1. The insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. A 2-inch by 2-inch (maximum) pressure treated nailer may be placed at the finished floor elevation for attachment of interior finish materials. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil.



**R402.2.9 Slab-on-Grade Floors**

*Exterior applied foundation insulation on a monolithic slab*

**R402.2.8 Basement Walls**



*Exterior insulation R-10 continuous*



*Interior insulation R-15 continuous*



*Recommended wall assembly. R-13 batt applied over R-5 foam. This is equivalent to an R-21 wall.*



*R-21 cavity allowed but not recommended due to potential moisture problems*

***Do not install vapor retarders in below-grade walls***

**2012 International Residential Code**

**R702.7 Vapor retarders.** Class I or II vapor retarders are required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.

**Exceptions:**

1. Basement walls.
2. Below grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.



**R402.3.1 U-factor**

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

**Example of Area Weighted U-Value Calculation:**

Window #1 area 10 sf U = .34     $U \times A = 3.4$

Window #2 area 15 sf U = .28     $U \times A = 4.2$

Total area 25 sf    Total  $U \times A = 7.6$

Area weighted average  $7.6/25 = 0.30$

The [Glazing Schedule](#) can help with this computation.

**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 R402.1.1. This exemption shall not apply to the U-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

**R402.3.4 Opaque Door Exemption**

One side-hinged opaque door assembly up to 24 square feet (2.22 m<sup>2</sup>) in area is exempted from the U-factor requirement in Section 402.1.1. This exemption shall not apply to the U-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

**Table 402.4.1.1 Air Barrier and Insulation Installation Requirements**

Air barriers and insulation must be installed in accordance with Table 402.4.1.1, below.

**R402.4.1.2 Testing**

The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour.

[Air Leakage Testing Specifications](#)



**Glazed Fenestration Exemption**

*Up to 15 sf of glazing are exempt from U-factor requirements. This does not apply if you are doing a UA tradeoff approach.*



**R402.3.4 Opaque Door Exemption**

*One door assembly, up to 24 sf, is exempt from U-factor requirements*

**TABLE R402.4.1.1  
AIR BARRIER AND INSULATION INSTALLATION**

<b>COMPONENT</b>	<b>AIR BARRIER CRITERIA<sup>a</sup></b>	<b>INSULATION CRITERIA<sup>a</sup></b>
General Requirements	<p>A continuous air barrier shall be installed in the building envelope.</p> <p>Exterior thermal envelope contains a continuous air barrier.</p> <p>Breaks or joints in the air barrier shall be sealed.</p>	<p>Air-permeable insulation shall not be used as a sealing material.</p>
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>	

**TABLE R402.4.1.1 (continued)  
AIR BARRIER AND INSULATION INSTALLATION**

<b>COMPONENT</b>	<b>AIR BARRIER CRITERIA<sup>a</sup></b>	<b>INSULATION CRITERIA<sup>a</sup></b>
Rim Joists	Rim joists shall include the air barrier.	Rim joists shall be insulated.
Floors (including above garage and cantilevered floors)	The air barrier shall be installed at any exposed edge of insulation.	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.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I, black vapor retarder with overlapping joints taped.	Where provided instead of floor insulation, insulation shall be permanently attached to the crawlspace walls.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.	
Narrow cavities		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.	
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the finished surface.	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated.
Plumbing and wiring		Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls. There shall be no voids or gaps or compression where cut to fit. Insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	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

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

#### **R402.4.2 Fireplaces**

New wood-burning fireplaces shall have tight-fitting flue dampers or doors and outdoor combustion air.

#### **R402.4.2.1 Gas Fireplace Efficiency**

All gas fireplace heaters rated to ANSI Z21.88 shall be listed and labeled with a fireplace efficiency (FE) rating of 50% or greater in accordance with CSA P.4.1. Vented gas fireplaces (decorative appliances) certified to ANSI Z21.50 shall be listed and labeled, including their FE ratings, in accordance with CSA P.4.1.

#### **R402.4.4 Combustion Air Openings**

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 R402.1.1, where the walls, floors and ceilings shall meet the minimum of the below-grade wall R-value requirement. 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 R402.4.2 and Section R1006 of the International Residential Code.

#### **R402.4.5 Recessed Lighting**

Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be Type IC-rated and labeled certified under ASTM E283 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.



**R402.4.4 Recessed Lighting**  
*Labeled and sealed recessed light*

#### **R403.1.1 Programmable Thermostats for Forced Air Furnaces**

Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. The thermostat shall allow for, at a minimum, a 5-2 programmable schedule (weekdays/weekends) and be capable of providing at least two programmable setback periods per day.

**□ R403.1.2 Heat Pump Supplementary Heat**

Unitary air cooled heat pumps shall include controls that minimize supplemental heat usage during start-up, set-up, and defrost conditions. See R403.1.2 for control and set-up requirements.

**□ R403.3.1 Insulation**

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

**□ R403.3.2 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.

**□ R403.3.3 Duct Testing**

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



**[RS-33 Duct Testing Standards](#)**

**Exceptions:**

1. The total leakage test or leakage to the outdoors is not required for ducts and air handlers located entirely within the building thermal envelope. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts may be located outside the conditioned space. All metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic. If flex ducts are used, they cannot

### Programmable T-stats

- Primary space conditioning systems in each dwelling unit require a programmable thermostat
- Heat pumps with supplemental electric resistance heaters shall have strip heat lockout controls
  - Max. setting of 40° F
  - Set to 35° F or less at final inspection



**R403.1.2 Heat Pump Supplementary Heat**  
*Heat pumps with supplemental heat shall have lockout controls. Maximum setting of 40° F, set to 35° F or less.*

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.

2. A duct air leakage test shall not be required for ducts serving heat or energy recovery ventilators that are not integrated with ducts serving heating or cooling systems.

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

#### **R403.3.4 Duct Leakage**

The total leakage of 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 cfm (113.3 L/min) per 100 square feet (9.29 m<sup>2</sup>) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m<sup>2</sup>) of conditioned floor area.
2. Postconstruction test: Leakage to outdoors shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m<sup>2</sup>) of conditioned floor area or total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m<sup>2</sup>) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

#### **R403.3.5 Building Cavities**

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.

#### **R403.3.6 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.



### **R403.3.7 Ducts Located in Conditioned Space**

For ducts to be considered as inside a conditioned space, such ducts shall comply with either of 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.

### **R403.5.3 Hot Water Pipe Insulation**

Insulation for hot water pipe shall have a minimum thermal resistance of R-3. An SBCC interpretation states that insulation can be discontinuous where passing through framing members or where necessary to pass another pipe in a stud space.

### **R403.5.5 Electric Water Heater Insulation**

All electric water heaters in unheated spaces or on concrete floors shall be placed on an incompressible, insulated surface with a minimum thermal resistance of R-10.

### **R403.6.1 Mechanical Ventilation**

A mechanical ventilation system is required to be installed in accordance with the [Washington State amendments to the 2018 International Residential Code](#). ASHRAE Standard 62.2 is an acceptable alternative for a single-family and townhouses, but is not an acceptable equivalent for IMC low-rise multifamily.

### **R404.1 Lighting Equipment**

A minimum of 90% of permanently installed lamps in lighting fixtures shall be high-efficacy lamps.

## Section R406 Additional Energy Efficiency Requirements

These tools are available to assist in determining energy and fuel neutrality credits (right-click the form name and save it to your computer so you can use the form's automated functions):

- [Single-Family Prescriptive Worksheet](#)
- [Multifamily Prescriptive Worksheet](#)
- [Code Compliance Calculator](#)

### 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 subject to Section R505 unless specifically exempted in Section R406. Credit 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. The sum of credits from Tables R406.2 and R406.3 shall meet the requirements of Section R406.3.

### R406.3 Additional Energy Efficiency Requirements

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

**1. Small Dwelling Unit: 3.0 credits**

Dwelling units less than 1,500 sf in conditioned floor area with less than 300 sf of fenestration area. Additions to existing building greater than 500 sf of heated floor area but less than 1,500 sf.

**2. Medium Dwelling Unit: 6.0 credits**

All dwelling units that are not included in #1, #3 or #4.

**3. Large Dwelling Unit: 7.0 credits**

Dwelling units exceeding 5,000 sf of conditioned floor area.





**4. Dwelling units serving R-2 occupancies: 4.5 credits**

**5. Additions less than 500 square feet: 1.5 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.






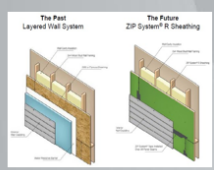
Examples of how to obtain 6.0 credits for single-family residences:

## All Electric Heat Pump 1,500 to 5,000 sf homes (6.0 credits)

Opt	Description – Feb. 1, 2021	Pts
3.2 (a)	HSPF 9.5 centrally ducted heat pump	1.0
4.2	All ducts and furnace inside the conditioned space	1.0
2.1	3 ACH <sub>50</sub> , Energy Star 0.3 cfm/sf	0.5
1.3	R-38 floors (R10 under slab) and U-0.28 windows and door average	0.5
5.5	Heat pump water heater NEEA Tier III	2.0
Heat HP	Fuel normalization heat pump credit	1.0
<b>Total</b>		<b>6.0</b>

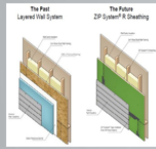
## Heat Pump & Gas DHW 1,500 to 5,000 sf homes (6.0 credits)

Opt	Description – Feb. 1, 2021	Pts
3.5a	11.0 HSPF centrally ducted heat pump	1.5
4.2	All ducts and furnace inside conditioned space	1.0
2.1	3 ACH <sub>50</sub> , Energy Star 0.3 cfm/sf	0.5
1.4	U-0.25 windows, R38 crawl/R10 under slab, R21 with R4 CI on exterior walls	1.0
5b	Gas water heater ≥ 0.91 UEF	1.0
Heat HP	Fuel normalization heat pump credit	1.0
<b>Total</b>		<b>6.0</b>

## Gas Heat + HPWH

1,500 to 5,000 sf homes (6.0 credits)



Opt	Description – Feb. 1, 2021	Pts
3.1a	95% AFUE gas furnace	1.0
4.2	All ducts and furnace inside conditioned space	1.0
2.1	3 ACH <sub>50</sub> , Energy Star 0.3 cfm/sf	0.5
1.4	U-0.25 windows, R38 crawl/R10 under slab, R21 with R4 CI exterior walls	1.0
7.1	Appliance Credit: Energy Star dishwasher, washer, refrigerator (if provided) and vent-less dryer (CEF 5.2)	0.5
5b	Heat pump water heater NEEA Tier III	2.0
<b>Total</b>		<b>6.0</b>



Examples of how to obtain 6.0 credits for multifamily residences:

## DHP + Electric Heat

### Multifamily – Low-Rise R2



Opt	Description – Feb. 1, 2021	Pts
3.4	DHP with electric resistance	2.0
1.2	Triple pane window U=0.22	1.0
2.1	0.25 cfm50/sf unit sf (or 2 ACH <sub>50</sub> ) + 65% HRV/ERV – tested!!!	1.5
<b>Total</b>		<b>4.5</b>



## HSPF 10 VRF-HP Multifamily - Low-Rise R2

Opt	Description – Feb. 1, 2021	Pts
2	Fuel normalization – HP	1.0
3.6	All HSPF 10 (ducted cassette)	3.0
2.2	0.25 cfm 50/sf unit sf (or 2 ACH <sub>50</sub> ) + 65% HRV/ERV – tested!!!	1.5
<b>Total</b>		<b>5.5</b>

