

Prescriptive Checklist for the 2012 Washington State Energy Code



Prepared by
Washington State University Energy Program
Building Sciences

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WASHINGTON STATE UNIVERSITY
 **EXTENSION ENERGY PROGRAM**

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The following Prescriptive checklist cites 2012 Washington State Energy Code (WSEC) 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. To obtain a copy of the energy code, go to: www.energy.wsu.edu/code

R103.2

Include details in construction documents regarding insulation materials and their R-values; fenestration U-factors; area-weighted U-factor 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 Approved Drawings on Site

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.

R104.2.1 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 the **WSEC Appendix:** <http://www.energy.wsu.edu/Documents/2012%20Energy%20Appendices.pdf>

R303.1 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. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

Insulation Certificate for Residential New Construction:

http://www.energy.wsu.edu/Documents/Insulation%20Certificate%205_20.pdf

R303.1.1.1 Insulation Markers

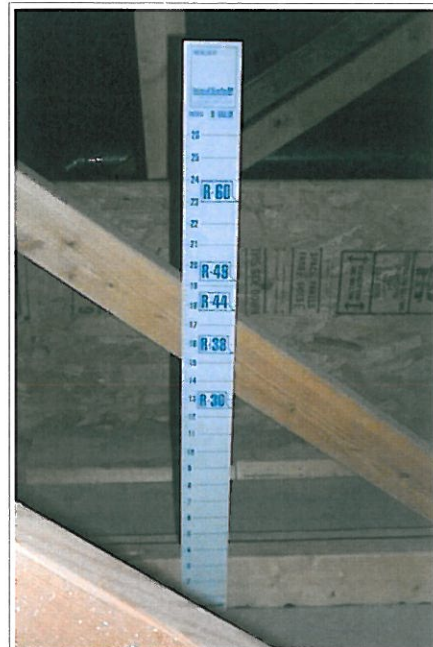
The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 300 square feet (28 m²) throughout the attic space.

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 and posted on or within three feet of the electrical distribution panel by the builder or registered design professional. The certificate shall be completed by the builder or registered design professional. The certificate must list the energy features of the structure.



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.).

Design Certificate: http://www.energy.wsu.edu/Documents/WSEC-2012-Avery-6573_2_Per_Sheet.pdf

Table 402.1.1 Footnote "d" Slab

R-Value

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

Table 402.1.1 Footnote "k" Ceiling

R-Value

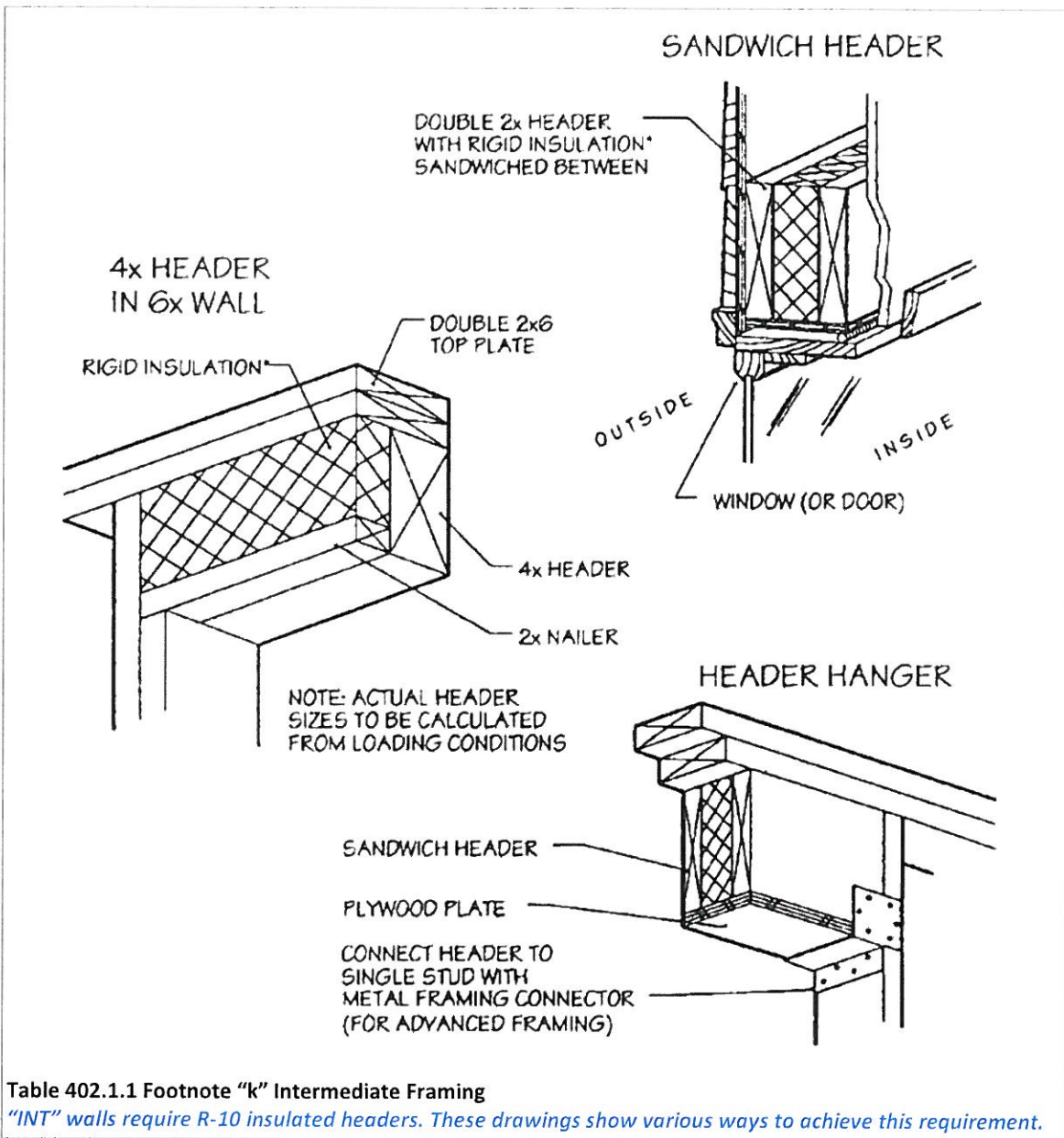
For single rafter or joist-vaulted ceilings, the insulation may be reduced to R-38.



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 “m” Intermediate Framing

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



R402.2.1 Ceilings with Attic Spaces

R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves.

R402.2.1.1 Loose Fill Insulation in Attic Spaces

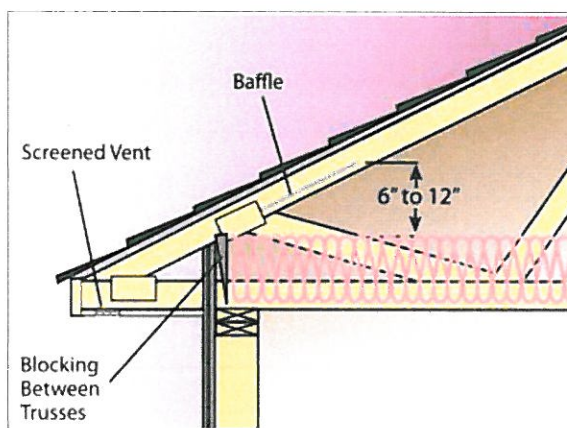
Open-blown or poured loose fill insulation may be used in attic spaces where the slope of the ceiling is not more than 3 feet in 12 and there is at least 30 inches of clear distance from the top of the bottom chord of the truss or ceiling joist to the underside of the sheathing at the roof ridge.

R402.2.3 Eave Baffle

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

R402.2.4 Access Hatches and Doors

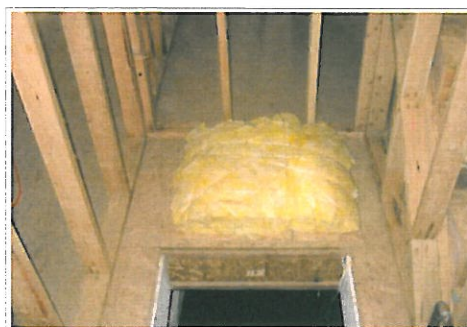
Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weather stripped and insulated to a level equivalent to the insulation on the surrounding surfaces.



R402.2.1 Ceilings with Attic Spaces
You can reduce ceiling insulation R-value to 38 if you have R-38 extending to the exterior wall line.



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.

R402.2.7 Floors

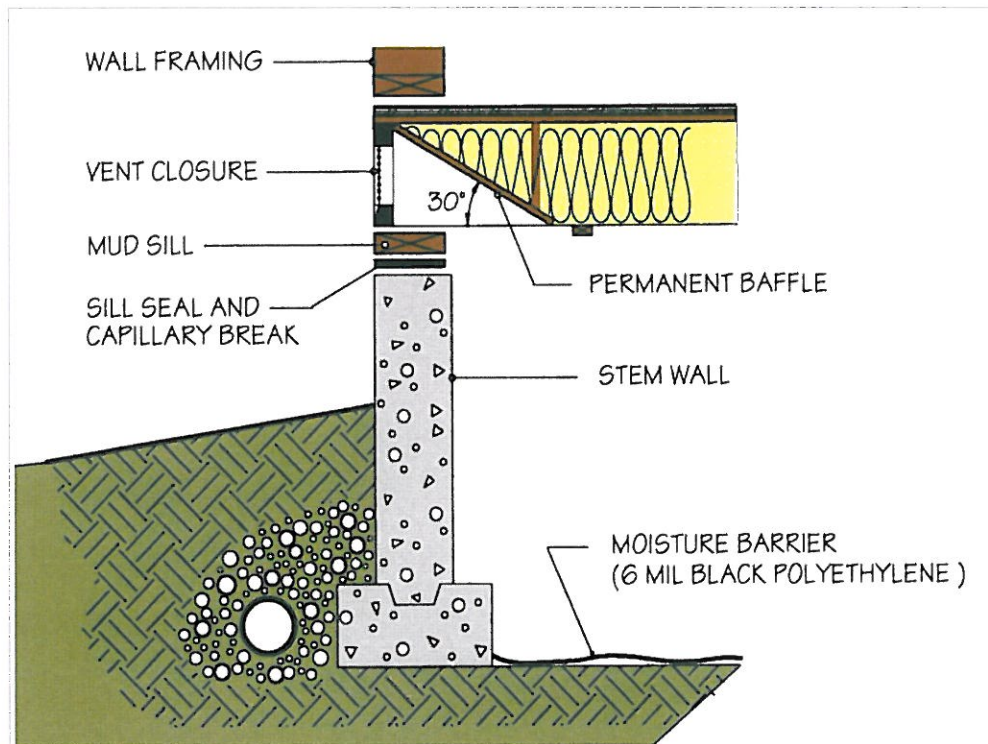
Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. Insulation supports shall be installed so spacing is no more than 24 inches on center. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation.



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

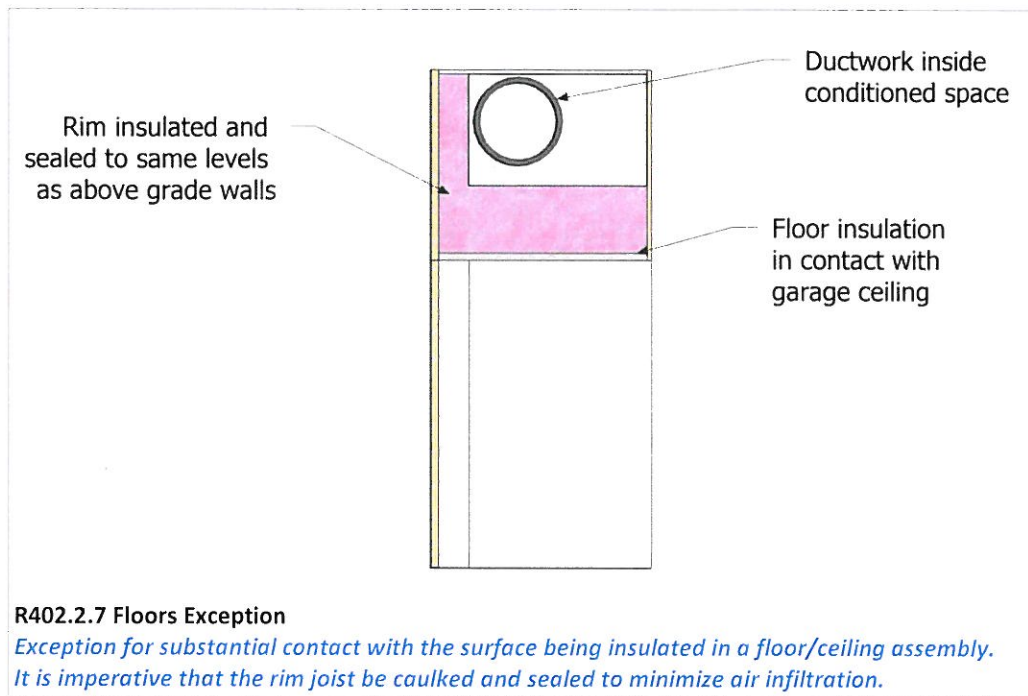
When foundation vents are not placed so that the top of the vent is below the lower surface of the floor insulation, a permanently attached baffle shall be installed at an angle of 30° from horizontal, to divert air flow below the lower surface of the floor insulation.



R402.2.7 Floors Exception
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

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



R402.2.8 Basement Walls

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



R402.2.8 Basement Walls
Exterior insulation R-10 continuous



Interior insulation R-15 continuous



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



R402.2.8 Basement Walls

*Recommended wall assembly
R-13 batt applied over R-5 foam*

Do not install vapor retarders in below grade walls



2012 International Residential Code

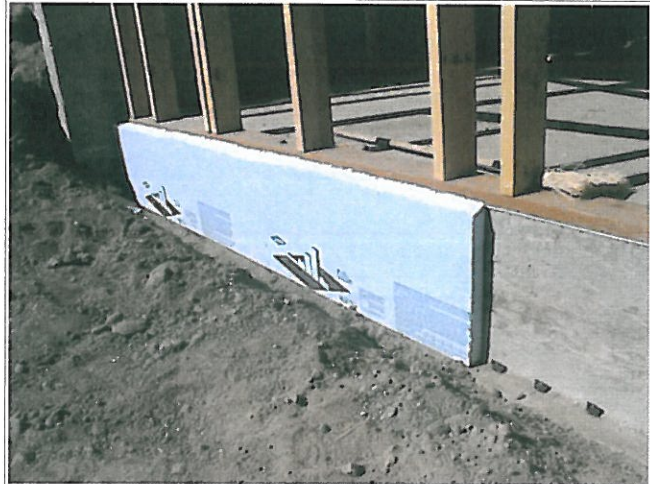
R702.7 Vapor retarders. Class I or II vapor retarders are required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.

Exceptions:

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

R402.2.9 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 two-inch by two-inch (maximum) pressure treated nailer may be placed at the finished floor elevation for attachment of interior finish materials. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil.



R402.2.9 Slab-on-Grade Floors
Exterior applied foundation insulation on a monolithic slab.

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 ft² U = .34 U x A = 3.4
Window #2 area 15 ft² U = .28 U x A = 4.2
Total area 25 ft² Total U x A = 7.6
Area weighted average 7.6/25 = 0.30

R402.3.3 Glazed Fenestration Exemption

Up to 15 square feet (1.4 m²) of glazed fenestration per dwelling unit shall be permitted to be exempt from U-factor requirements in Section R402.3.3.

R402.3.4 Opaque Door Exemption

One side-hinged opaque door assembly up to 24 square feet (2.22 m²) in area is exempted from the U-factor requirement in Section 402.3.4.

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.

Building Air Leakage Testing Specifications:

http://www.energy.wsu.edu/Documents/Air%20Leakage%20Testing%2019_12.pdf

R402.4.2 Fireplaces

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

R402.4.4 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.

Table 402.4.1.1 Air Barrier and Insulation Installation Requirements

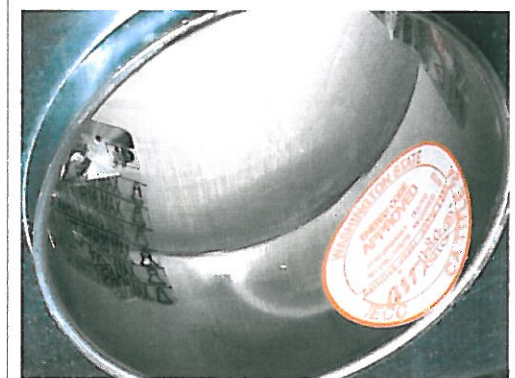
Air barriers and insulation must be installed in accordance with Table 402.4.1.1, below.



Glazed Fenestration Exemption
Up to 15 square feet 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 square feet, is exempt from U-factor requirements.



R402.4.4 Recessed Lighting
Labeled and sealed recessed light.

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

COMPONENT	CRITERIA ^a
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Cavity insulation installation	All cavities in the thermal envelope shall be filled with insulation. The density of the insulation shall be at the manufacturers' product recommendation and said density shall be maintained for all volume of each cavity. Batt type insulation will show no voids or gaps and maintain an even density for the entire cavity. Batt insulation shall be installed in the recommended cavity depth. Where an obstruction in the cavity due to services, blocking, bracing or other obstruction exists, the batt product will be cut to fit the remaining depth of the cavity. Where the batt is cut around obstructions, loose fill insulation shall be placed to fill any surface or concealed voids, and at the manufacturers' specified density. Where faced batt is used, the installation tabs must be stapled to the face of the stud. There shall be no compression to the batt at the edges of the cavity due to inset stapling installation tabs. Insulation that upon installation readily conforms to available space shall be installed filling the entire cavity and within the manufacturers' density recommendation.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed. Batt insulation installed in attic roof assemblies may be compressed at exterior wall lines to allow for required attic ventilation.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.
Crawl space walls	Where provided in lieu of floor insulation*, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped. <i>*Insulation of crawl space walls is not Prescriptively allowed. A Total UA Alternative method is required.</i>
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.

COMPONENT	CRITERIA ^a
Narrow cavities	Batts in narrow cavities shall be cut to fit and installed to the correct density without any voids or gaps or compression. Narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls. There shall be no voids or gaps or compression where cut to fit. Insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

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

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.

R403.2.1 Duct Insulation

Ducts in attics shall be insulated to a minimum of R-8.

Exception: Ducts or portions thereof located completely inside the building thermal envelope. Ducts located in crawl spaces (vented or unvented) do not qualify for this exception.

R403.2.2 Sealing and Testing

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

RS-33 Duct Testing Standards:

http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20modified_new_rev_1_29_12.pdf

R403.2.3 Building Cavities

Installation of ducts in exterior walls, floors or ceilings shall not displace required envelope insulation.

R403.4.2 Hot Water Pipe Insulation

Insulation for hot water pipe shall have a minimum thermal resistance of R-4. 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.

R403.4.3 Electric Water Heater Insulation

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

R403.5 Mechanical Ventilation

A mechanical ventilation system is required to be installed in accordance with the [Washington State amendments to the IRC and/or IMC or to ASHRAE Standard 62.2-2010](#):
<http://apps.leg.wa.gov/WAC/default.aspx?cite=51-50>

R404.1 Lighting Equipment

A minimum of 75 percent of permanently installed lamps in lighting fixtures shall be high-efficacy lamps.

HIGH-EFFICACY LAMPS. Compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:

1. 60 lumens per watt for lamps over 40 watts;
2. 50 lumens per watt for lamps over 15 watts to 40 watts; and
3. 40 lumens per watt for lamps 15 watts or less.

R406.2 Additional Energy Efficiency Requirements

Each dwelling unit in one and two-family dwellings and townhouses, as defined in Section 101.2 of the International Residential Code shall comply with sufficient options from Table R406.2 so as to achieve the following minimum number of credits:

1. **Small Dwelling Unit:** 0.5 points
Dwelling units less than 1500 square feet in conditioned floor area with less than 300 square feet of fenestration area. Additions that are less than 750 square feet of heated floor area to any size existing building.
2. **Medium Dwelling Unit:** 1.5 points
All dwelling units that are not included in #1 or #3.
3. **Large Dwelling Unit:** 2.5 points
Dwelling units exceeding 5000 square feet of conditioned floor area

Table R406.2: http://www.energy.wsu.edu/Documents/Table_406_2_Energy_Credits_2012_WSEC.pdf

WASHINGTON STATE ENERGY CODE, RESIDENTIAL PROVISIONS

**TABLE 406.2
ENERGY CREDITS (DEBITS)**

OPTION	DESCRIPTION	CREDIT(S)
1a	<p>EFFICIENT BUILDING ENVELOPE 1a: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Fenestration U_f = 0.28 Floor R-38 Slab on grade R-10 perimeter and under entire slab Below grade slab R-10 perimeter and under entire slab or Compliance based on Section R402.1.4: Reduce the Total UA by 5%.</p>	0.5
1b	<p>EFFICIENT BUILDING ENVELOPE 1b: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Fenestration U_f = 0.25 Wall R-21 plus R-4 Floor R-38 Basement wall R-21 int plus R-5 ci Slab on grade R-10 perimeter and under entire slab Below grade slab R-10 perimeter and under entire slab or Compliance based on Section R402.1.4: Reduce the Total UA by 15%.</p>	1.0
1c	<p>EFFICIENT BUILDING ENVELOPE 1c: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Fenestration U_f = 0.22 Ceiling and single-rafter or joist-vaulted R-49 advanced Wood frame wall R-21 int plus R-12 ci Floor R-38 Basement wall R-21 int plus R-12 ci Slab on grade R-10 perimeter and under entire slab Below grade slab R-10 perimeter and under entire slab or Compliance based on Section R402.1.4: Reduce the Total UA by 30%.</p>	2.0
2a	<p>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION 2a: Compliance based on R402.4.1.2: Reduce the tested air leakage to 4.0 air changes per hour maximum and All whole house ventilation requirements as determined by Section M1507.3 of the <i>International Residential Code</i> shall be met with a high efficiency fan (maximum 0.35 watts/cfm), not interlocked with the furnace fan ventilation systems using a furnace including an ECM motor are allowed, provided that they are controlled to operate at low speed in ventilation only mode. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the option being selected and shall specify the maximum tested building air leakage and shall show the heat recovery ventilation system.</p>	0.5

2b	<p>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION 2b: Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 2.0 air changes per hour maximum and All whole house ventilation requirements as determined by Section M1507.3 of the <i>International Residential Code</i> shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.70. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the maximum tested building air leakage and shall show the heat recovery ventilation system.</p>	1.0
2c	<p>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION 2c: Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 1.5 air changes per hour maximum and All whole house ventilation requirements as determined by Section M1507.3 of the <i>International Residential Code</i> shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.85. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the maximum tested building air leakage and shall show the heat recovery ventilation system.</p>	1.5
3a	<p>HIGH EFFICIENCY HVAC EQUIPMENT 3a: Gas, propane or oil-fired furnace with minimum AFUE of 95% To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	0.5
3b	<p>HIGH EFFICIENCY HVAC EQUIPMENT 3b: Air-source heat pump with minimum HSPF of 8.5 To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	1.0
3c	<p>HIGH EFFICIENCY HVAC EQUIPMENT 3c: Closed-loop ground source heat pump; with a minimum COP of 3.3 or Open loop water source heat pump with a maximum pumping hydraulic head of 150 feet and minimum COP of 3.6 To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	2.0
3d	<p>HIGH EFFICIENCY HVAC EQUIPMENT 3d: DUCTLESS SPLIT SYSTEM HEAT PUMPS, ZONAL CONTROL: In homes where the primary space heating system is zonal electric heating, a ductless heat pump system shall be installed and provide heating to at least one zone of the housing unit. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	1.0
4	<p>HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM:^a All heating and cooling system components installed inside the conditioned space. All combustion equipment shall be direct vent or sealed combustion. Locating system components in conditioned crawl spaces is not permitted under this option. Electric resistance heat is not permitted under this option. Direct combustion heating equipment with AFUE less than 80% is not permitted under this option. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and shall show the location of the heating and cooling equipment and all the ductwork.</p>	1.0

5a	<p>EFFICIENT WATER HEATING 5a: Water heating system shall include one of the following: Gas, propane or oil water heater with a minimum EF of 0.62 or Electric water heater with a minimum EF of 0.93. and for both cases All showerhead and kitchen sink faucets installed in the house shall be rated at 1.75 GPM or less. All other lavatory faucets shall be rated at 1.0 GPM or less.^b To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the water heater equipment type and the minimum equipment efficiency and shall specify the maximum flow rates for all showerheads, kitchen sink faucets, and other lavatory faucets.</p>	0.5
5b	<p>EFFICIENT WATER HEATING 5b: Water heating system shall include one of the following: Gas, propane or oil water heater with a minimum EF of 0.82 or Solar water heating supplementing a minimum standard water heater. Solar water heating will provide a rated minimum savings of 85 therms or 2000 kWh based on the Solar Rating and Certification Corporation (SRCC) Annual Performance of OG-300 Certified Solar Water Heating Systems or Electric heat pump water heater with a minimum EF of 2.0 and meeting the standards of NEEA's Northern Climate Specifications for Heat Pump Water Heaters or Water heater heated by ground source heat pump meeting the requirements of Option 3c. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the water heater equipment type and the minimum equipment efficiency and, for solar water heating systems, the calculation of the minimum energy savings.</p>	1.5
6	<p>RENEWABLE ELECTRIC ENERGY: For each 1200 kWh of electrical generation provided annually by on-site wind or solar equipment a 0.5 credit shall be allowed, up to 3 credits. Generation shall be calculated as follows: For solar electric systems, the design shall be demonstrated to meet this requirement using the National Renewable Energy Laboratory calculator PVWATTS. Documentation noting solar access shall be included on the plans. For wind generation projects designs shall document annual power generation based on the following factors: The wind turbine power curve; average annual wind speed at the site; frequency distribution of the wind speed at the site and height of the tower. To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall show the photovoltaic or wind turbine equipment type, provide documentation of solar and wind access, and include a calculation of the minimum annual energy power production.</p>	0.5

- a. **Interior Duct Placement.** Ducts included as Option 4 of Table R406.2 shall be placed wholly within the heated envelope of the housing unit. The placement shall be inspected and certified to receive the credits associated with this option.
- Exception:** Ducts complying with this section may have up to 5% of the total linear feet of ducts located in the exterior cavities or buffer spaces of the dwelling. If this exception is used the ducts will be tested to the following standards:
- Post-construction test: Leakage to outdoors shall be less than or equal to 1 CFM per 100 ft² of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
- b. **Plumbing Fixtures Flow Ratings.** Low flow plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following requirements:
1. Residential bathroom lavatory sink faucets: Maximum flow rate - 3.8 L/min (1.0 gal/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
 2. Residential kitchen faucets: Maximum flow rate - 6.6 L/min (1.75 gal/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
 3. Residential showerheads: Maximum flow rate - 6.6 L/min (1.75 gal/min) when tested in accordance with ASME A112.18.1/CSA B125.1.

Prescriptive Energy Code Compliance for All Climate Zones in Washington

Project Information

Contact Information

This project will use the requirements of the Prescriptive Path below and incorporate the the minimum values listed. In addition, based on the size of the structure, the appropriate number of additional credits are checked as chosen by the permit applicant.

Authorized Representative _____ Date _____

All Climate Zones		
	R-Value ^d	U-Factor ^d
Fenestration U-Factor ^b	n/a	0.30
Skylight U-Factor	n/a	0.50
Glazed Fenestration SHGC ^{b,e}	n/a	n/a
Ceiling	4 ^g	0.026
Wood Frame Wall ^{g,k,l}	21 int	0.056
Mass Wall R-Value ⁱ	21/21 ^h	0.056
Floor	30 ^g	0.029
Below Grade Wall ^{c,k}	10/15/21 int + TB	0.042
Slab ^o R-Value & Depth	10, 2 ft	n/a

*Table R402.1.1 and Table R402.1.3 Footnotes included on Page 2.

Each dwelling unit in one and two-family dwellings and townhouses, as defined in Section 101.2 of the International Residential Code shall comply with sufficient options from Table R406.2 so as to achieve the following minimum number of credits:

1. Small Dwelling Unit: 0.5 points
Dwelling units less than 1500 square feet in conditioned floor area with less than 300 square feet of fenestration area. Additions to existing building that are less than 750 square feet of heated floor area.

2. Medium Dwelling Unit: 1.5 points
All dwelling units that are not included in #1 or #3, including additions over 750 square feet.

3. Large Dwelling Unit: 2.5 points
Dwelling units exceeding 5000 square feet of conditioned floor area.

4. Dwelling unit other than one and two-family dwellings and townhouses: Exempt
As defined in Section 101.2 of the International Residential Code

Table R406.2 Summary

Option	Description	Credit(s)		
1a	Efficient Building Envelope 1a	0.5	<input type="checkbox"/>	
1b	Efficient Building Envelope 1b	1.0	<input type="checkbox"/>	
1c	Efficient Building Envelope 1c	2.0	<input type="checkbox"/>	
2a	Air Leakage Control and Efficient Ventilation 2a	0.5	<input type="checkbox"/>	
2b	Air Leakage Control and Efficient Ventilation 2b	1.0	<input type="checkbox"/>	
2c	Air Leakage Control and Efficient Ventilation 2c	1.5	<input type="checkbox"/>	
3a	High Efficiency HVAC 3a	0.5	<input type="checkbox"/>	
3b	High Efficiency HVAC 3b	1.0	<input type="checkbox"/>	
3c	High Efficiency HVAC 3c	2.0	<input type="checkbox"/>	
3d	High Efficiency HVAC 3d	1.0	<input type="checkbox"/>	
4	High Efficiency HVAC Distribution System	1.0	<input type="checkbox"/>	
5a	Efficient Water Heating	0.5	<input type="checkbox"/>	
5b	Efficient Water Heating	1.5	<input type="checkbox"/>	
6	Renewable Electric Energy	0.5	<input type="checkbox"/>	
				*1200 kwh
Total Credits				0.0
				0.00

*Please refer to Table R406.2 for complete option descriptions

http://www.energy.wsu.edu/Documents/Table_406_2_Energy_Credits_2012_WSEC.pdf

Table R402.1.1 Footnotes

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

^a R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the compressed R-value of the insulation from Appendix Table A101.4 shall not be less than the R-value specified in the table.

^b The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

^c "10/15/21.+TB" means R-10 continuous insulation on the exterior of the wall, or R-15 on the continuous insulation on the interior of the wall, or R-21 cavity insulation plus a thermal break between the slab and the basement wall at the interior of the basement wall. "10/15/21.+TB" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the wall. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall. "TB" means thermal break between floor slab and basement wall.

^d R-10 continuous insulation is required under heated slab on grade floors. See R402.2.9.1.

^e There are no SHGC requirements in the Marine Zone.

^f Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.

^g Reserved.

^h First value is cavity insulation, second is continuous insulation or insulated siding, so "13.+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used to maintain a consistent total sheathing thickness.

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

^j For single rafter- or joist-vaulted ceilings, the insulation may be reduced to R-38.

^k Int. (intermediate framing) denotes standard framing 16 inches on center with headers insulated with a minimum of R-10 insulation.

^l Log and solid timber walls with a minimum average thickness of 3.5 inches are exempt from this insulation requirement.

Table R402.1.3 Footnote

^a Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source or as specified in Section R402.1.3.

0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00

Sum of Vertical Fenestration Area and UA
 Vertical Fenestration Area Weighted U = UA/Area

0.0	0.00
	0.00

Overhead Glazing (Skylights)

Component Description	Ref.	U-factor

Width Qt. Feet	Height Inch	Width Qt. Feet	Height Inch

Area	UA
0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00
0.0	0.00

Sum of Overhead Glazing Area and UA
 Overhead Glazing Area Weighted U = UA/Area

0.0	0.00
	0.00

Total Sum of Fenestration Area and UA (for heating system sizing calculations)

0.0	0.00
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Simple Heating System Size: Washington State

This heating system sizing calculator is based on the Prescriptive Requirements of the 2012 Washington State Energy Code (WSEC) and ACCA Manuals J and S. This calculator will calculate heating loads only. ACCA procedures for sizing cooling systems should be used to determine cooling loads.

The glazing (window) and door portion of this calculator assumes the installed glazing and door products have an area weighted average U-factor of 0.30. The incorporated insulation requirements are the minimum prescriptive amounts specified by the 2012 WSEC. Please fill out all of the green drop-downs and boxes that are applicable to your project. As you make selections in the drop-downs for each section, some values will be calculated for you. If you do not see the selection you need in the drop-down options, please call the WSU Energy Extension Program at (360) 956-2042 for assistance.

Project Information

Contact Information

Heating System Type:

All Other Systems Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions".

Design Temperature

[Instructions](#)

Design Temperature Difference (ΔT) _____

$\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

[Instructions](#)

Conditioned Floor Area (sq ft)

Average Ceiling Height

[Instructions](#)

Average Ceiling Height (ft)

Conditioned Volume _____

Glazing and Doors

[Instructions](#)

U-Factor X Area = UA
 0.30 ---

U-Factor X Area = UA
 0.50 ---

Skylights

[Instructions](#)

U-Factor X Area = UA
 No selection ---

U-Factor X Area = UA
 No selection ---

Insulation

Attic

[Instructions](#)

Single Rafter or Joist Vaulted Ceilings

[Instructions](#)

Above Grade Walls (see Figure 1)

[Instructions](#)

Floors

[Instructions](#)

Below Grade Walls (see Figure 1)

[Instructions](#)

Slab Below Grade (see Figure 1)

[Instructions](#)

Slab on Grade (see Figure 1)

[Instructions](#)

U-Factor X Area = UA
 No selection ---

F-Factor X Length = UA
 No selection ---

F-Factor X Length = UA
 No selection ---

Location of Ducts

[Instructions](#)

Duct Leakage Coefficient

1.10

Sum of UA _____

Envelope Heat Load _____ Btu / Hour

Sum of UA X ΔT

Air Leakage Heat Load _____ Btu / Hour

Volume X 0.6 X ΔT X 0.18

Building Design Heat Load _____ Btu / Hour

Air Leakage + Envelope Heat Loss

Building and Duct Heat Load _____ Btu / Hour

Ducts in unconditioned space: Sum of Building Heat Loss X 1.10

Ducts in conditioned space: Sum of Building Heat Loss X 1

Maximum Heat Equipment Output _____ Btu / Hour

Building and Duct Heat Loss X 1.40 for Forced Air Furnace

Building and Duct Heat Loss X 1.25 for Heat Pump

Figure 1.

