

Prescriptive Checklist for the 2015 Washington State Energy Code

Chapter 51-11R WAC

STATE BUILDING CODE ADOPTION AND AMENDMENT OF
THE 2015 EDITION OF THE
INTERNATIONAL ENERGY CONSERVATION CODE,
RESIDENTIAL PROVISIONS

WASHINGTON STATE ENERGY CODE, RESIDENTIAL PROVISIONS

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The following Prescriptive checklist cites 2015 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.

R104.2.2.1 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/ga_2015WSEC_Appx.pdf

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. 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-2015-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**

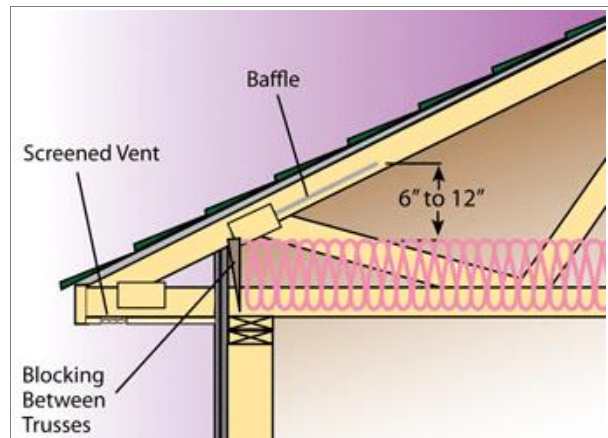
Int. (intermediate framing) denotes standard framing 16 inches on center with headers insulated with a minimum of R-10 insulation.



Table 402.1.1 Footnote “k” Intermediate Framing
“INT” walls require R-10 insulated headers..

□ **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.



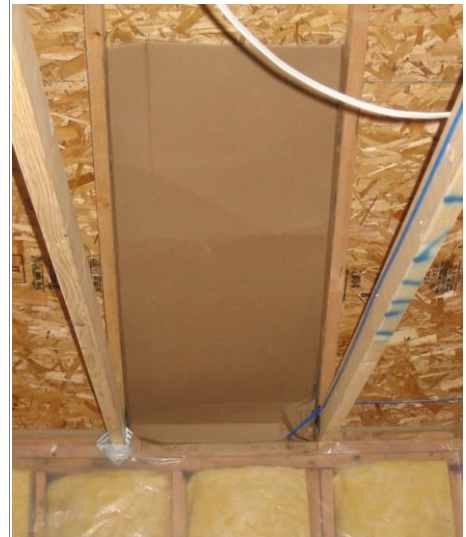
R402.2.1 Ceilings with Attic Spaces
You can reduce ceiling insulation R-value to 38 if you have R-38 extending to the exterior wall line.

R402.2.1.1 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.



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

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.



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

□ **R402.2.7 Floors**

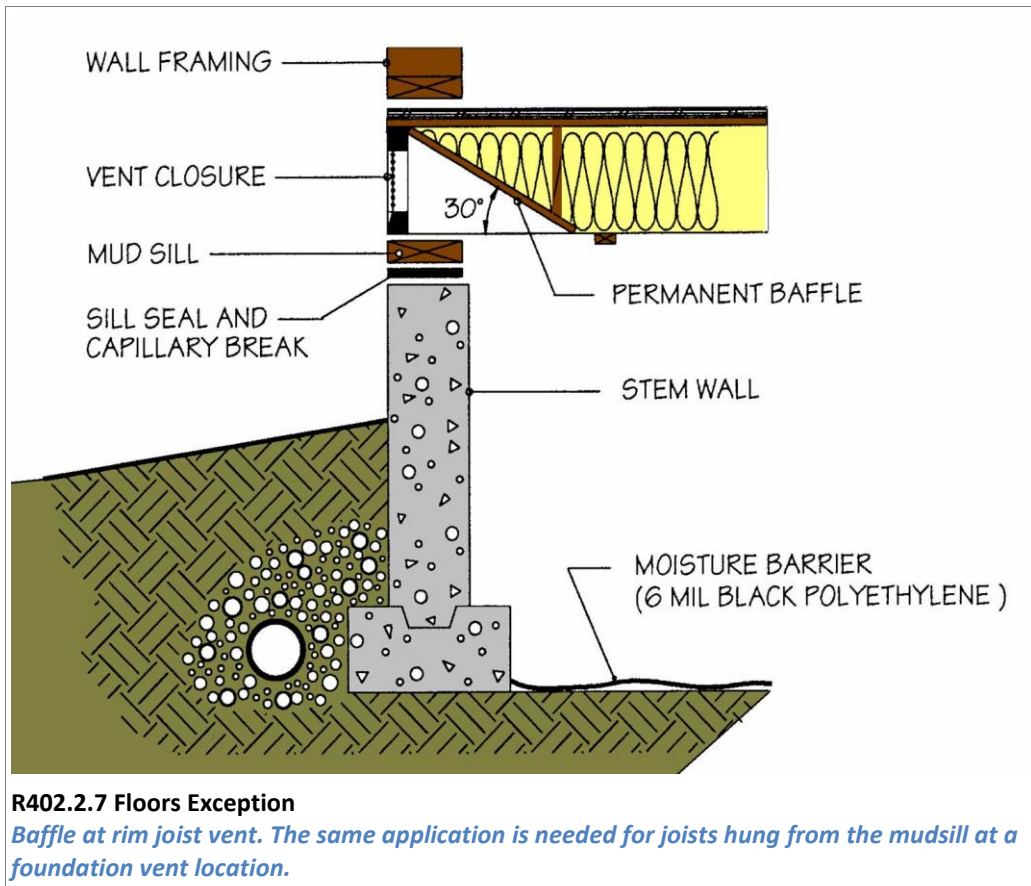
Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. Insulation supports shall be installed so spacing is no more than 24 inches on center. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation.



R402.2.7 Floors
Floor insulation installed with contact to the underside of the floor decking. Note the inset stapled twine.

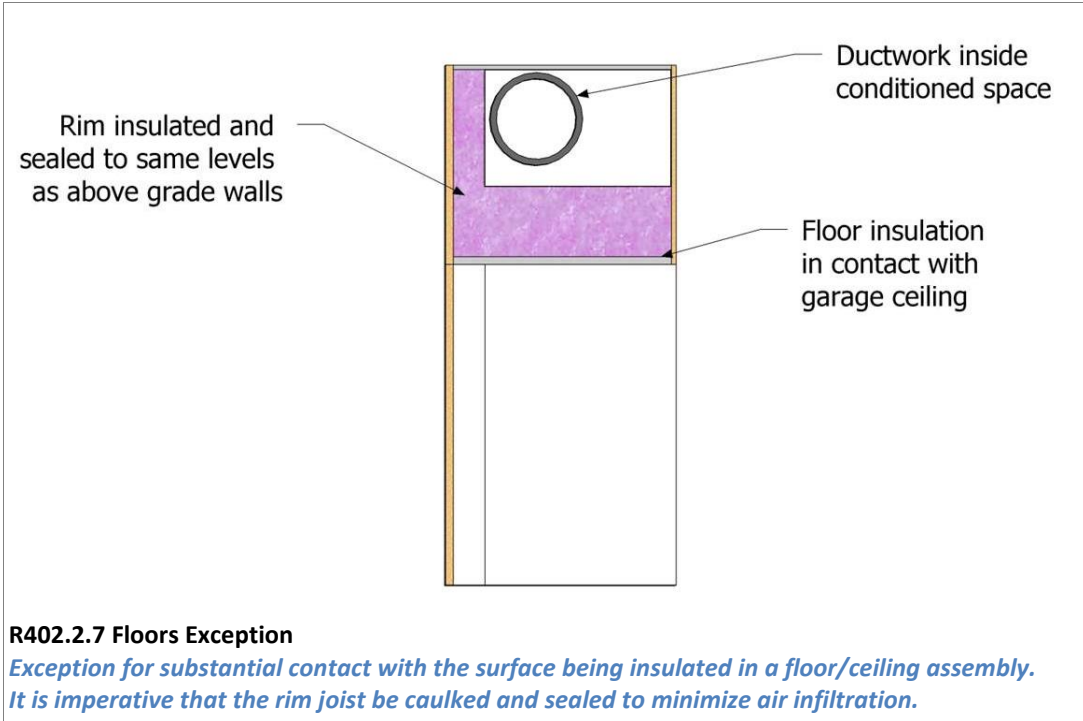
□ **R402.2.7 Floors Exception**

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**

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. This is equivalent to an R-21 wall

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 $U \times A = 3.4$
Window #2 area 15 ft² U = .28 $U \times A = 4.2$
Total area 25 ft² Total $U \times A = 7.6$
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%201_29_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	AIR BARRIER CRITERIA ^a	INSULATION CRITERIA ^a
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</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</p>

	sealed.	ventilation.
Walls	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.	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. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.	
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 drywall.	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 them 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 register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.	
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.

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 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. Ducts within a slab or in the ground shall be insulated to R-10.

R403.3.3 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_modified_2015_WSEC.pdf

R403.3.3 Building Cavities

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

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 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.

SECTION R406 ADDITIONAL ENERGY EFFICIENCY REQUIREMENTS

R406.1 Scope. This section establishes options for additional criteria to be met for one- and two-family dwellings and townhouses, as defined in Section 101.2 of the International Residential Code to demonstrate compliance with this code.

R406.2 Additional energy efficiency requirements (Mandatory). 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: 1.5 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 greater than 500 square feet of heated floor area but less than 1500 square feet.

2. Medium Dwelling Unit: 3.5 credits

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

Exception: Dwelling units serving R-2 occupancies shall require 2.5 credits.

3. Large Dwelling Unit: 4.5 credits

Dwelling units exceeding 5000 square feet of conditioned floor area.

Exception: Dwelling units serving R-2 occupancies shall require 2.5 credits.

4. Additions less than 500 square feet: 0.5 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.

Table R406.2: http://www.energy.wsu.edu/Documents/Table_406.2_2015_Energy_Credits.pdf

Examples of how to obtain 3.5 credits:

Table 406.2
How to meet the mark
1,501-5,000 sf homes (3.5 credits)

Opt	Description	Pts
3a or 3b	94 AFUE Gas Furnace or 9.0 HSPF heat pump	1.0
4	All ducts and furnace located inside the conditioned space	1.0
5a	Kitchen sink and showerheads \leq 1.75 GPM, lavatory faucets \leq 1.0 GPM	0.5
5b	Gas water heater \geq 0.74 EF	1.0
Total		3.5

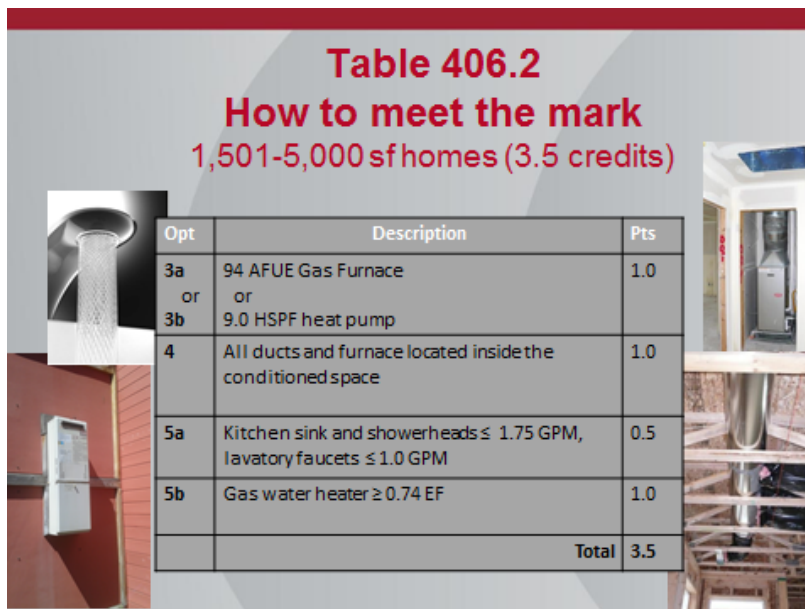


Table 406.2
How to meet the mark
1,501-5,000 sf homes (3.5 credits)

Opt	Description	Pts
1a	R-38 Floors and U-0.28 Windows	0.5
3a or 3b	94 AFUE Gas Furnace or 9.0 HSPF heat pump	1.0
5a	Kitchen sink and showerheads \leq 1.75 GPM, lavatory faucets \leq 1.0 GPM	0.5
5c	Gas water heater \geq 0.91 EF or Electric water heater \geq 2.0 EF	1.5
Total		3.5

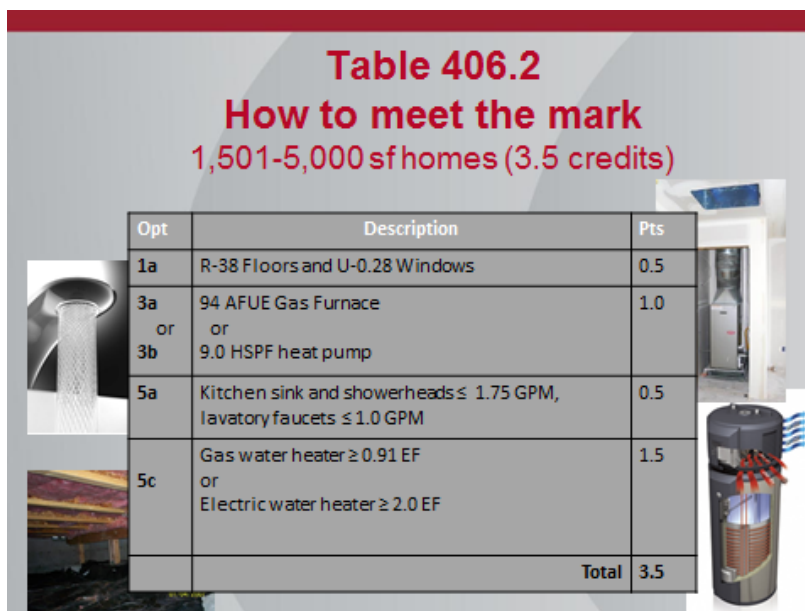


Table 406.2
How to meet the mark
 1,501-5,000 sf homes (3.5 credits)

Opt	Description	Pts
1a	R-38 Floors and U-0.28 Windows	0.5
2a	Air leakage ≤ 3.0 ACH @ 50pa	0.5
3a or 3b	94 AFUE Gas Furnace or 9.0 HSPF heat pump	1.0
5a	Kitchen sink and showerheads ≤ 1.75 GPM, lavatory faucets ≤ 1.0 GPM	0.5
5b	Gas water heater ≥ 0.74 EF	1.0
	Total	3.5

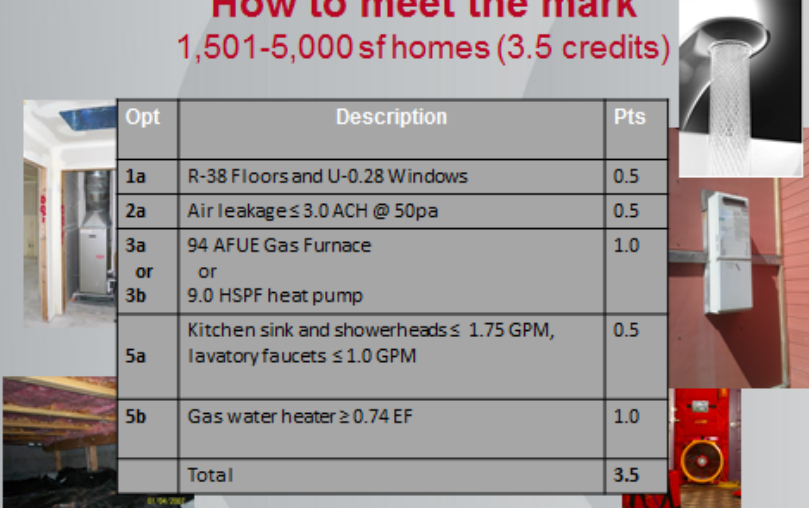


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Opt	Description	Pts
2a	Air leakage ≤ 3.0 ACH @ 50pa	0.5
3a or 3b	94 AFUE Gas Furnace or 9.0 HSPF heat pump	1.0
5a	Kitchen sink and showerheads ≤ 1.75 GPM, lavatory faucets ≤ 1.0 GPM	0.5
5c	Gas water heater ≥ 0.91 EF or Electric water heater ≥ 2.0 EF	1.5
	Total	3.5

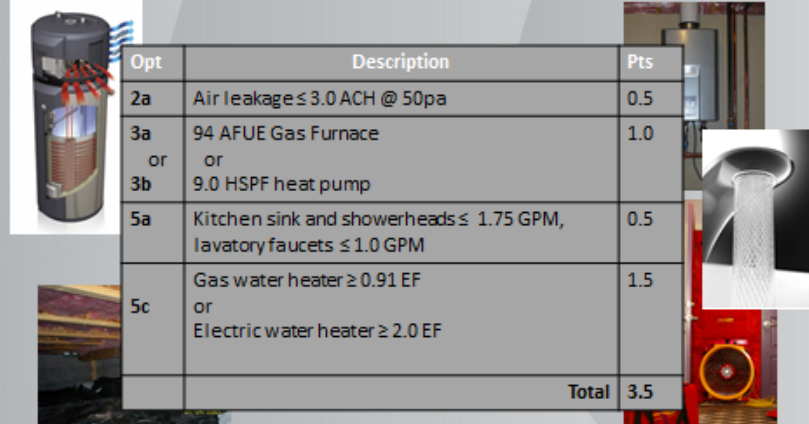


Table 406.2
How to meet the mark
 1,501-5,000 sf homes (3.5 credits)



Opt	Description	Pts
1a	R-38 Floors and U-0.28 Windows	0.5
3d	Ductless Heat Pump	1.0
5a	Kitchen sink and showerheads \leq 1.75 GPM, lavatory faucets \leq 1.0 GPM	0.5
5c	Electric water heater \geq 2.0 EF	1.5
Total		3.5



Table 406.2
How to meet the mark
 1,501-5,000 sf homes (3.5 credits)

Opt	Description	Pts
3a	92 AFUE Gas Boiler	1.0
4	All heating and cooling system components installed within the conditioned space. Electric resistance and ductless heat pumps not permitted under this option.	1.0
5c	Gas water heater \geq 0.91 EF	1.5
Total		3.5

