

2018 Washington State Energy Code – Residential  
**Prescriptive Energy Code Compliance for All Climate Zones in Washington**  
**Single Family – New & Additions (effective February 1, 2021)**

**These requirements apply to all IRC building types, including detached one- and two-family dwellings and multiple single-family dwellings (townhouses).**

Project Information	Contact Information
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**Instructions:** This single-family project will use the requirements of the Prescriptive Path below and incorporate the minimum values listed. Based on the size of the structure, the appropriate number of additional credits are checked as chosen by the permit applicant.

Provide all information from the following tables as building permit drawings: Table R402.1 - Insulation and Fenestration Requirements by Component, Table R406.2 - Fuel Normalization Credits and 406.3 - Energy Credits.

<b>Authorized Representative</b>		<b>Date</b>	03/08/2024
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All Climate Zones (Table R402.1.1)		
	R-Value <sup>a</sup>	U-Factor <sup>a</sup>
Fenestration U-Factor <sup>b</sup>	n/a	0.30
Skylight U-Factor <sup>b</sup>	n/a	0.50
Glazed Fenestration SHGC <sup>b,e</sup>	n/a	n/a
Ceiling <sup>e</sup>	49 <sup>j</sup>	0.026
Wood Frame Wall <sup>g,h</sup>	21 int	0.056
Floor	30	0.029
Below Grade Wall <sup>c,h</sup>	10/15/21 int + TB	0.042
Slab <sup>d,f</sup> R-Value & Depth	10, 2 ft	n/a
a	R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity that 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.	
c	"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.	
d	R-10 continuous insulation is required under heated slab on grade floors. See Section R402.2.9.1.	
e	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.	
f	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.	
g	For log structures developed in compliance with Standard ICC 400, log walls shall meet the requirements for <i>climate zone 5</i> of ICC 400.	
h	Int. (intermediate framing) denotes framing and insulation as described in Section A103.2.2 including standard framing 16 inches on center, 78% of the wall cavity insulated and headers insulated with a minimum of R-10 insulation.	

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Each dwelling unit *in a residential building* shall comply with sufficient options from Table R406.2 (fuel normalization credits) and Table 406.3 (energy credits) to achieve the following minimum number of credits. To claim this credit, the building permit drawings shall specify the option selected and the maximum tested building air leakage, and show the qualifying ventilation system and its control sequence of operation.

1. **Small Dwelling Unit: 3 credits**  
 Dwelling units less than 1,500 sf in conditioned floor area with less than 300 sf of fenestration area.  
 Additions to existing building that are greater than 500 sf of heated floor area but less than 1,500 sf.
2. **Medium Dwelling Unit: 6 credits**  
 All dwelling units that are not included in #1 or #3
3. **Large Dwelling Unit: 7 credits**  
 Dwelling units exceeding 5,000 sf of conditioned floor area
4. **Additions less than 500 square feet: 1.5 credits**  
**All other additions shall meet 1-3 above**

Before selecting your credits on this Summary table, review the details in Table 406.3 (Single Family), on page 4.

Summary of Table R406.2				
Heating Options	Fuel Normalization Descriptions	Credits - select ONE heating option		User Notes
1	Combustion heating minimum NAECA <sup>b</sup>	0.0	<input checked="" type="checkbox"/>	
2	Heat pump <sup>c</sup>	1.0	<input type="checkbox"/>	
3	Electric resistance heat only - furnace or zonal	-1.0	<input type="checkbox"/>	
4	DHP with zonal electric resistance per option 3.4	0.5	<input type="checkbox"/>	
5	All other heating systems	-1.0	<input type="checkbox"/>	
Energy Options	Energy Credit Option Descriptions	Credits - select ONE energy option from each category <sup>d</sup>		User Notes
1.1	Efficient Building Envelope	0.5	<input type="checkbox"/>	
1.2	Efficient Building Envelope	1.0	<input type="checkbox"/>	
1.3	Efficient Building Envelope	0.5	<input checked="" type="checkbox"/>	
1.4	Efficient Building Envelope	1.0	<input type="checkbox"/>	
1.5	Efficient Building Envelope	2.0	<input type="checkbox"/>	
1.6	Efficient Building Envelope	3.0	<input type="checkbox"/>	
1.7	Efficient Building Envelope	0.5	<input type="checkbox"/>	
2.1	Air Leakage Control and Efficient Ventilation	0.5	<input checked="" type="checkbox"/>	
2.2	Air Leakage Control and Efficient Ventilation	1.0	<input type="checkbox"/>	
2.3	Air Leakage Control and Efficient Ventilation	1.5	<input type="checkbox"/>	
2.4	Air Leakage Control and Efficient Ventilation	2.0	<input type="checkbox"/>	
3.1 <sup>a</sup>	High Efficiency HVAC	1.0	<input checked="" type="checkbox"/>	
3.2	High Efficiency HVAC	1.0	<input type="checkbox"/>	
3.3 <sup>a</sup>	High Efficiency HVAC	1.5	<input type="checkbox"/>	
3.4	High Efficiency HVAC	1.5	<input type="checkbox"/>	
3.5	High Efficiency HVAC	1.5	<input type="checkbox"/>	
3.6 <sup>a</sup>	High Efficiency HVAC	2.0	<input type="checkbox"/>	
4.1	High Efficiency HVAC Distribution System	0.5	<input checked="" type="checkbox"/>	
4.2	High Efficiency HVAC Distribution System	1.0	<input type="checkbox"/>	

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Summary of Table R406.2 (cont.)				
Energy Options	Energy Credit Option Descriptions (cont.)	Credits - select ONE energy option from each category <sup>d</sup>		User Notes
5.1 <sup>d</sup>	Efficient Water Heating	0.5	<input type="checkbox"/>	
5.2	Efficient Water Heating	0.5	<input checked="" type="checkbox"/>	
5.3	Efficient Water Heating	1.0	<input type="checkbox"/>	
5.4	Efficient Water Heating	1.5	<input type="checkbox"/>	
5.5	Efficient Water Heating	2.0	<input type="checkbox"/>	
5.6	Efficient Water Heating	2.5	<input type="checkbox"/>	
6.1 <sup>e</sup>	Renewable Electric Energy (3 credits max)	1.0	<input type="checkbox"/>	
7.1	Appliance Package	0.5	<input type="checkbox"/>	
<b>Total Credits</b>		<b>3.0</b>	<input type="checkbox"/>	<b>CLEAR FORM</b>

- a. An alternative heating source sized at a maximum of 0.5 W/sf (equivalent) of heated floor area or 500 W, whichever is bigger, may be installed in the dwelling unit.
- b. Equipment listed in Table C403.3.2(4) or C403.3.2(5)
- c. Equipment listed in Table C403.3.2(1) or C403.3.2(2)
- d. You cannot select more than one option from any category EXCEPT in category 5. Option 5.1 may be combined with options 5.2 through 5.6. See Table 406.3.**
- e. 1.0 credit for each 1,200 kWh of electrical generation provided annually, up to 3 credits max. See the complete Table R406.2 for all requirements and option descriptions.

**Please print only pages 1 through 3 of this worksheet for submission to your building official.**





## Window and Door Schedule - Summary

### *Project Information*

Seifert Remodel & Addition  
3261 67th Ave SE  
Mercer Island, WA 98040

### *Contact Information*

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	Area	UA
Sheet 1	1027.9	297.04
Sheet 2	387.2	93.01
Sum of Vertical Fenestration Area	1415.1	390.05
Vertical Fenestration Weighted U -		0.28

# Simple Heating System Size: Washington State

This heating system sizing calculator is based on the Prescriptive Requirements of the 2018 Washington State Energy Code (WSEC) . This tool will calculate heating loads only. ACCA procedures for sizing cooling systems should be used to determine cooling loads.

Please complete 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 contact the WSU Energy Program at energycode@energy.wsu.edu or (360) 956-2042 for assistance.

This tool is for the permitting purposes only. A Manual J calculation is required to meet the requirement of the 2018 Washington State Energy Code.

## Project Information

Seifert Remodel & Addition  
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 Mercer Island, WA 98040

## Contact Information

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### 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](#)

Mercer Island

Design Temperature 25  
 Design Temperature Difference (ΔT) 45  
 ΔT = Indoor (70 degrees) - Outdoor Design Temp

### Area of Building

#### Conditioned Floor Area

[Instructions](#)

Conditioned Floor Area (sq ft)

6,566

#### Average Ceiling Height

[Instructions](#)

Average Ceiling Height (ft)

9.0

Conditioned Volume 58,963

### Glazing and Doors

[Instructions](#)

U-0.28

U-Factor X Area = UA  
 0.280 X 1,451 = 406.28

### Skylights

[Instructions](#)

U-Factor X Area = UA  
 0.50 X 185 = 92.50

### Insulation

#### Attic

[Instructions](#)

R-49

U-Factor X Area = UA  
 0.026 X 3,247 = 84.42

#### Single Rafter or Joist Vaulted Ceilings

[Instructions](#)

None

U-Factor X Area = UA  
 -- X -- = --

#### Above Grade Walls (see Figure 1)

[Instructions](#)

R-21 Intermediate

U-Factor X Area = UA  
 0.056 X 5,640 = 315.86

#### Floors

[Instructions](#)

R-30

U-Factor X Area = UA  
 0.029 X 1,990 = 57.71

#### Below Grade Walls and Slabs (see Figure 1)

[Instructions](#)

Wall & Slab None  
 Depth Select nearest slab depth

Wall U-Factor X Area = UA  
 -- X -- = --

Slab F-Factor X Length = UA  
 -- X -- = --

#### Slab on Grade (see Figure 1)

[Instructions](#)

R-10 Fully Insulated

F-Factor X Length = UA  
 0.360 X 13 = 4.56

### Location of Ducts

[Instructions](#)

Unconditioned Space

### Duct Leakage Coefficient

1.100

Sum of UA 961.33  
 Envelope Heat Load 43,260 Btu / Hour  
 Sum of UA x ΔT  
 Air Leakage Heat Load 28,656 Btu / Hour  
 Volume x 0.6 x ΔT x 0.018  
 Building Design Heat Load 71,916 Btu / Hour  
 Air leakage + envelope heat loss  
 Building and Duct Heat Load 79,107 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 110,750 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

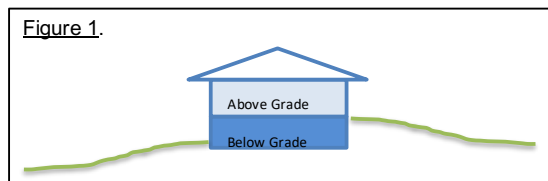


Figure 1.

## Alterations Worksheet - 2018 Washington State Energy Code

### Project Information

Seifert Remodel & Addition

3261 67th Ave. SE.

Mercer Island, WA 98-40

### Contact Information

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The WSEC requirements for alterations are located in Chapter 5 of the code text.

**Alterations (remodels) do not need to obtain energy credits from Table R406.3**

Additions must meet the requirements for new construction. This includes nonconditioned space being altered to become conditioned space.

**Will the wall cavities be exposed?**  Yes  No

**If yes:** Exposed wall cavities must be insulated -  
2 X 4 wall studs require **R-15** insulation  
2 X 6 wall studs require **R-21** insulation

**Will the roof/ceiling framing cavities or attic be exposed?**  Yes  No

**If yes:** Exposed roof/ceiling assemblies must be insulated -  
Vaulted ceilings: Insulate to the full depth of the framing member while allowing for the minimum 1" ventilated space  
Flat ceilings: Install R-49 insulation or what the attic space can accommodate based on the roof pitch

**Will the floor framing cavities be exposed?**  Yes  No

**If yes:** Exposed floor cavities must be insulated to R-30

**Are the windows and/or doors being replaced?**  Yes  No

(includes both window or door and frames)

**If yes:** New windows and doors must have an area weighted average U-factor of  $\leq 0.30$

**Will the heating or cooling system be replaced?**  Yes  No

**If yes:** New equipment must meet current requirements and ducts need to be tested

**Will the hot water system be altered?**  Yes  No

**If yes:** New water heating equipment must meet current code requirements

**Are more than 50% of the light fixtures being changed?**  Yes  No

**If yes:** 90% of all lamps must be high efficacy (LED or CFL)



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

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

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation. 2x4 framed walls shall be insulated to a minimum of R-15 and 2x6 framed walls shall be insulated to a minimum of R-21.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Roof recover.
5. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Surface-applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided the code does not require the glazing fenestration to be replaced.

**R503.1.1.1 Replacement fenestration.** Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for  $U$ -factor and SHGC in Table R402.1.1. Where more than one replacement fenestration unit is being installed, an area-weighted average of the  $U$ -factor and SHGC of all replacement fenestration shall be permitted to be used to demonstrate compliance.

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

**Exceptions:**

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

**R502.1.1.2 Heating and cooling systems.** New heating, cooling and duct systems that are part of the addition shall comply with Section R403.

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

1. Additions of less than 750 square feet.
2. Duct systems that are documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in WSU RS-33.
3. Ducts with less than 40 linear feet in unconditioned spaces.
4. Existing duct systems constructed, insulated or sealed with asbestos.

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

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

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

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