

# Prescriptive Energy Code Compliance for All Climate Zones in Washington

Project Information

Contact Information

Pratt Lot 4
7233 80th Ave SE Mercer Island
AI# 19037

Architectural Innovations
14311 SE 16th Street - Bellevue, WA 98007
(425) 641-5320

This project will use the requirements of the Prescriptive Path below and incorporate 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 <sup>d</sup>	U-Factor <sup>d</sup>
Fenestration U-Factor <sup>b</sup>	n/a	0.30
Skylight U-Factor	n/a	0.50
Glazed Fenestration SHGC <sup>b,e</sup>	n/a	n/a
Ceiling <sup>k</sup>	49 <sup>j</sup>	0.026
Wood Frame Wall <sup>g,m,n</sup>	21 int	0.056
Mass Wall R-Value <sup>l</sup>	21/21 <sup>n</sup>	0.056
Floor	30 <sup>g</sup>	0.029
Below Grade Wall <sup>c,m</sup>	10/15/21 int + TB	0.042
Slab <sup>d</sup> 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 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 that are 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.
4. **Additions less than 500 square feet: .5 credits**

## 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"/>	
1d	Efficient Building Envelope 1d	0.5	<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	1.0	<input checked="" type="checkbox"/>	1.0
3b	High Efficiency HVAC 3b	1.0	<input type="checkbox"/>	
3c	High Efficiency HVAC 3c	1.5	<input type="checkbox"/>	
3d	High Efficiency HVAC 3d	1.0	<input type="checkbox"/>	
4	High Efficiency HVAC Distribution System	1.0	<input checked="" type="checkbox"/>	1.0
5a	Efficient Water Heating 5a	0.5	<input type="checkbox"/>	
5b	Efficient Water Heating 5b	1.0	<input type="checkbox"/>	
5c	Efficient Water Heating 5c	1.5	<input checked="" type="checkbox"/>	1.5
5d	Efficient Water Heating 5d	0.5	<input type="checkbox"/>	
6	Renewable Electric Energy	0.5	<input type="checkbox"/>	

\*1200 kwh

### Total Credits

**3.50**

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

**Table R402.1.1 Footnotes**

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

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

<sup>b</sup> The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

<sup>c</sup> "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.

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

<sup>e</sup> There are no SHGC requirements in the Marine Zone.

<sup>f</sup> Reserved.

<sup>g</sup> Reserved.

<sup>h</sup> Reserved.

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

<sup>j</sup> Reserved.

<sup>k</sup> For single rafter- or joist-vaulted ceilings, the insulation may be reduced to R-38.

<sup>l</sup> Reserved.

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

**Table R402.1.3 Footnote**

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

## Window, Skylight and Door Schedule

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	Ref.	U-factor	Width		Height		Area	UA	
			Qt.	Feet	Inch	Feet			Inch
Exempt Swinging Door (24 sq. ft. max.)	Simp	0.30	1	3		6	8	20.0	6.00
Exempt Glazed Fenestration (15 sq. ft. max.)	Milg	0.30	1	1	5	4	10	6.8	2.05

### Vertical Fenestration (Windows and doors)

Component Description	Ref.	U-factor	Width		Height		Area	UA	
			Qt.	Feet	Inch	Feet			Inch
A2.1 Rec Room	Milg	0.30	1	5		4		20.0	6.00
A2.1 Rec Room Sl Gl Dr	Milg	0.30	1	7		7		49.0	14.70
A2.1 Bedroom 5	Milg	0.30	1	5	6	5		27.5	8.25
A2.1 Bedroom 6	Milg	0.30	1	6		5	6	33.0	9.90
								0.0	0.00
A3 Foyer Door	Simp	0.30	1	3	6	8		28.0	8.40
A3 Stair	Milg	0.30	1	2	6	3	6	8.8	2.63
A3 Great Room	Milg	0.30	1	8		6		48.0	14.40
A3 Great Room	Milg	0.30	2	4		2	6	20.0	6.00
A3 Great Room Sl Gl Dr	Milg	0.30	1	12		8		96.0	28.80
A3 Dining Room	Milg	0.30	1	8		8		64.0	19.20
A3 Kitchen	Milg	0.30	3	7		6		126.0	37.80
A3 Kitchen	Milg	0.30	6	3	6	2		42.0	12.60
A3 Pantry	Milg	0.30	1	3		4	6	13.5	4.05
A3 Powder	Milg	0.30	1	2		3	6	7.0	2.10
A3 Office	Milg	0.30	1	8		6		48.0	14.40
								0.0	0.00
A5 Above Foyer	Milg	0.30	1	3	6	3	3	11.4	3.41
A5 Stair	Milg	0.30	1	5		4	9	23.8	7.13
A5 Bedroom 2	Milg	0.30	1	8		5	6	44.0	13.20
A5 Master Bedroom	Milg	0.30	1	6		5		30.0	9.00
A5 Master Bedroom	Milg	0.30	1	9		5		45.0	13.50
A5 Master Bedroom	Milg	0.30	1	9		2		18.0	5.40
A5 Master Bath	Milg	0.30	1	6	6	5		32.5	9.75
A5 Walk In Closet	Milg	0.30	1	2		6		12.0	3.60
A5 Utility Room	Milg	0.30	1	4		5		20.0	6.00
A5 Bedroom #4	Milg	0.30	1	4		3	9	15.0	4.50
A5 Bedroom #4	Milg	0.30	1	8		5	6	44.0	13.20
A5 Bath	Milg	0.30	1	2		3	6	7.0	2.10
A5 Bedroom #3	Milg	0.30	1	8		5	6	44.0	13.20
								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
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*

977.4	293.21
	0.30

**Overhead Glazing (Skylights)**

Component Description	Ref.	U-factor
A5 Above Foyer	Milg	0.50
A5 Master Bath	Milg	0.50

Qt.	Width		Height	
	Feet	Inch	Feet	Inch
1	2		4	
1	2		4	

Area	UA
8.0	4.00
8.0	4.00
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*

16.0	8.00
	0.50

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

1020.2	309.27
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# Simple Heating System Size: Washington State

This heating system sizing calculator is based on the Prescriptive Requirements of the 2015 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.

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.

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

45

### Area of Building

#### Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

4,622

#### Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.3

Conditioned Volume

43,123

### Glazing and Doors

Instructions

U-0.30

**U-Factor X Area = UA**  
0.300 X 1,004 = 301.20

### Skylights

Instructions

**U-Factor X Area = UA**  
0.50 X 16 = 8.00

### Insulation

#### Attic

Instructions

R-49

**U-Factor X Area = UA**  
0.026 X 2,023 = 52.60

#### Single Rafter or Joist Vaulted Ceilings

Instructions

Select R-Value

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

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

Instructions

R-21 Intermediate

**U-Factor X Area = UA**  
0.056 X 3,131 = 175.34

#### Floors

Instructions

R-30

**U-Factor X Area = UA**  
0.029 X 445 = 12.91

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

Instructions

R-21 Interior

**U-Factor X Area = UA**  
0.042 X 1,335 = 56.07

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

Instructions

R-5 Thermal Break at slab edge

**F-Factor X Length = UA**  
0.570 X 152 = 86.41

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

Instructions

No Slab on Grade in this project.

**F-Factor X Length = UA**  
--- = ---

### Location of Ducts

Instructions

Conditioned Space

**Duct Leakage Coefficient**  
1.00

**Sum of UA** 692.52

**Envelope Heat Load** 31,163 Btu / Hour  
*Sum of UA X  $\Delta T$*

**Air Leakage Heat Load** 20,958 Btu / Hour  
*Volume X 0.6 X  $\Delta T$  X .018*

**Building Design Heat Load** 52,121 Btu / Hour  
*Air Leakage + Envelope Heat Loss*

**Building and Duct Heat Load** 52,121 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** 65,152 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.

