











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*

537.2	161.15
	0.30

**Overhead Glazing (Skylights)**

Component Description	Ref.	U-factor
W.I.C.	MILG.	0.50

Qt.	Width		Height	
	Feet	Inch	Feet	Inch
1	2	0	2	0

Area	UA
4.0	2.00
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*

4.0	2.00
	0.50

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

541.2	163.15
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# Simple Heating System Size: Washington State

This heating system sizing calculator is based on the Prescriptive Requirements of the 2018 and 2021 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](mailto: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 Washington State Energy Code.

## Project Information

LEE REMODEL (AI: 23050)  
 8448 N MERCER WAY, MERCER ISLAND, WA

## Contact Information

ARCHITECTURAL INNOVATIONS  
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 425-641-5320

### 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 ( $\Delta T$ ) 45

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

### Area of Building

#### Conditioned Floor Area

[Instructions](#)

Conditioned Floor Area (sq ft)

1,963

#### Average Ceiling Height

[Instructions](#)

Average Ceiling Height (ft)

9.0

Conditioned Volume

17,667

### Glazing and Doors

[Instructions](#)

U-0.30

**U-Factor X Area = UA**

0.300 X 537 = 161.16

### Skylights

[Instructions](#)

**U-Factor X Area = UA**

0.50 X 4 = 2.00

### Insulation

#### Attic

[Instructions](#)

R-60

**U-Factor X Area = UA**

0.024 X 2,055 = 49.32

#### 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 1,749 = 97.94

#### Floors

[Instructions](#)

Select R-Value

**U-Factor X Area = UA**

No selection X 119 = --

#### 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 48 = 17.28

### Location of Ducts

[Instructions](#)

Conditioned Space

Duct Leakage Coefficient

1.000

**Sum of UA 327.70**

**Envelope Heat Load 14,747 Btu / Hour**

*Sum of UA x  $\Delta T$*

**Air Leakage Heat Load 8,586 Btu / Hour**

*Volume x 0.6 x  $\Delta T$  x 0.018*

**Building Design Heat Load 23,333 Btu / Hour**

*Air leakage + envelope heat loss*

**Building and Duct Heat Load 23,333 Btu / Hour**

*Ducts in unconditioned space: sum of building heat loss x 1.10*

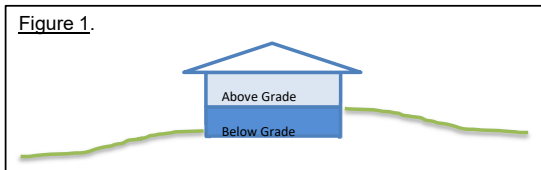
*Ducts in conditioned space: sum of building heat loss x 1*

**Maximum Heat Equipment Output 32,666 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.



# 2021 WSEC-R 2<sup>nd</sup> Edition

## Remodel / Alteration Worksheet

Will you be exposing the walls?

Yes  No

If yes,

2 X 4 wall studs require R-15 insulation

2 X 6 wall studs require R-21 insulation

If siding is replaced C.I. equal to R-5 may need installed under the siding.

Will the roof/ceiling framing cavities or attic be exposed?

Yes  No

If yes,

Exposed roof or ceiling assemblies must be insulated -

Vaulted ceilings, Insulate to the full depth of the framing member

Flat ceilings, install R-60 insulation or what the attic space can accommodate based on the roof pitch

Will the 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

If yes,

New windows and doors (+frames) 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 the 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 10% of the light fixtures being changed?

Yes  No

If yes,

100% of all lamps must be high efficacy

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

**R503.1.1 Building envelope.**

Building envelope assemblies that are part of the alteration shall comply with Section R402.1.3 or R402.1.5, Sections R402.2.1 through R402.2.11, R402.3.1, R402.3.2, R402.3.5 and R402.4.2.

**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 R402.1.3. 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.

**R503.1.4 Lighting.**

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

Exception: Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

**R503.1.3 Service hot water systems.**

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