

Washington State Energy Code Prescriptive Approach - Worksheet Instructions

For the Washington State Energy Code, the prescriptive approach is the simplest method of code compliance. However, depending on the prescriptive option and exceptions used, documentation of compliance can be quite complex.

This set of forms has been developed to assist permit applicants documenting compliance with the Washington State Energy Code, (2006 edition).

The following forms provide much of the required documentation for plan review. The details noted here must also be shown on the drawings (WSEC 104.2).

This form is not a substitute for the energy code itself. To obtain a copy of the energy or ventilation codes, go to the following web address. <http://www.energy.wsu.edu/code/code2006.cfm>

Which worksheets do I need to complete?

There are three worksheets included in this set of forms.

Insulation Worksheet:

Glazing Schedule Worksheet:

Heating Sizing Worksheet:

Heating Sizing Worksheet:

The energy and residential code requires a heating and cooling sizing calculations for all projects. If you are using this set of worksheets to size the heating system, you will need to complete all the worksheets. It is important to note that the codes also require a cooling system size calculation. This form will not provide the cooling calculation. It does not have the needed solar gains function. If a cooling system is included in the submission, you will not be using the heating system sizing worksheet. Perform a Manual J or equivalent calculation.

Glazing Schedule Worksheet:

There are three reasons to complete the Glazing Schedule. If none apply to your project, you do not need to complete this worksheet. A glazing schedule is required to meet the following conditions.

The Prescriptive option includes a glazing to floor area limit (WSEC 602.7.2)

Not all the windows, skylights or doors comply with the maximum U-factor requirement. Qualification will be demonstrated using an area weighted window, skylight or door U-factor (WSEC 602.7.2)

As part of the heating and cooling system sizing calculation (IRC M1401.3 & WSEC 503.2.2)

Insulation worksheet:

The insulation worksheet documents the prescriptive option chosen to show compliance. It also provides a few checks on insulation compliance that need more detailed input. This includes the rules for single rafter joist ceiling insulation, heated slabs and in climate zone 2, header insulation. This worksheet is also used to document the reason for submission of the Glazing Worksheet.

If you are choosing a limited glazing area prescriptive option, completing the Glazing Schedule will be the first task.

Completing the Insulation Worksheet

This is a simple fill in form.

Fill in project information on this worksheet. It will be copied to the other worksheets.

Note what options will be chosen to show compliance.

Note the glazing documentation included.

Note how you will be meeting the single rafter joist requirements.

Completing the Glazing Schedule Worksheet:

Exterior Doors:

The exterior door section is for swinging doors only. Enter sliding doors in the vertical glazing section of the worksheet.

If a swinging door includes glazing, it may be entered in the vertical glazing schedule or in the exterior door schedule.

Obtain NFRC tested U-factors from the door manufacturer or use U-factors from WSEC Tables.

Table 10-6A Default U-Factors for Vertical Glazing (use for doors with greater than 50% glazing.)

Table 10-6C Default U-factors for Doors (limited to doors with less than 50% glazing.)

Area of windows, doors and skylights are measured using the rough opening area.

Glazing area in exterior doors is added to the total glazing area of the project as follows:

If greater than 50%, 100% of the area is entered in the door glazing area.

If less than or equal to 50%, only the glazed area will be entered in the door glazing area.

Exempt Door: One door, 24 feet or less is not included in the U-factor of glazing area calculations. You must calculate the door area to assure it is 24 square feet or less. This also enters the door heat loss into the heating system size calculation.

Vertical and Horizontal Glazing:

Obtain NFRC tested U-factors from the glazing supplier. These will give the most accurate and likely the most favorable results. If you can't obtain this data, the tables in Chapter 10 of the WSEC must be used.

For default U-factors for vertical glazing, refer to table 10-6A

If window manufacturer can legitimately be claimed as a "small business" (as defined in Chapter 2 of the WSEC), you may use table 10-6B for default U-factors. Note: the term "small business" refers to the glazing manufacturer, not the builder or building owner.

For default U-factors for overhead glazing, refer to table 10-6E

If doors are being entered into the vertical glazing table, refer to table 10-6C and 10-6D.

Single Glazing and Garden Window Exception Schedule

The WSEC allows single glazing and unrated garden windows to be exempt from the U-factor calculation under the following rules

Prescriptive Energy Code Compliance for Single Family and Duplex Housing: Zone 2

Project Information

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Contact Information

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This set of forms has been developed to assist permit applicants documenting compliance with the Washington State Energy Code, (2006 edition). This set is for type R-3 and R-4 structures located in climate zone 2.

The following forms provide much of the required documentation for plan review. The details noted here must also be shown on the drawings (WSEC 104.2).

This form is not a substitute for the energy code itself. To obtain a copy of the energy or ventilation codes, go to the following web address. <http://www.energy.wsu.edu/code/code2006.cfm>

| Option | Glazing Area ¹⁰ : % of Floor | Glazing U-Factor | | Door ⁹ U-Factor | Ceiling ² | Vaulted Ceiling ³ | Wall ¹² Above Grade | Wall· int ⁴ Below Grade | Wall· ext ⁴ Below Grade | Floor ⁵ | Slab ⁶ on Grade |
|-------------------------------|--|------------------|------------------------|----------------------------|----------------------|------------------------------|--------------------------------|------------------------------------|------------------------------------|--------------------|----------------------------|
| | | Vertical | Overhead ¹¹ | | | | | | | | |
| <input type="checkbox"/> I. | 12% | 0.35 | 0.58 | 0.2 | R-38 | R-30 | R-21 int ⁷ | R-21 | R-12 | R-30 | R-10 |
| <input type="checkbox"/> III. | 17% | 0.32 | 0.58 | 0.2 | R-38 | R-30 | R-19 + R-5 ⁸ | R-21 | R-12 | R-30 | R-10 |
| <input type="checkbox"/> V. | Unlimited Group R-3 and R-4 Occupancies Only | 0.35 | 0.58 | 0.2 | R-38 | R-30 | R-19+ R-5 ⁸ | R-21 | R-12 | R-30 | R-10 |
| <input type="checkbox"/> VI. | Unlimited Group R-3 and R-4 Occupancies Only | 0.30 | 0.58 | 0.2 | R-49 or R-38 Adv | R-38 | R-21 int ⁷ | R-21 | R-12 | R-30 | R-10 |

See WSEC Table 6-2 for footnotes

Glazing Schedule Attached to Document

- Does not apply. Using Prescriptive Option V or VI, all glazing and doors meet maximum U-factor, alternate heating size calculation submitted
- Option I, Glazing to floor area limit (WSEC 602.7.2)
- Area weighted window, skylight or door U-factor (WSEC 602.7.2)
- As part of the heating and cooling system sizing calculation (IRC M1401.3 & WSEC 503.2.2)

Single Rafter Joist R-value (Table 6-1 or 6-2, footnote 3)

Rafter Area (square feet) Rafter Depth (inches)
 First 500 Square feet: R-30 R-38 required, joist depth exceeds 13"
 Area exceeding 500 Square feet: R-38 required in all cases

- Radiant slab:** R-10 insulation, continuous with thermal break (WSEC 502.1.4.9)
- R-21int insulated header** detail on plans.

Overhead Glazing

| Plan ID | Component Description | Ref. | Glazing U |
|---------|-----------------------|------|-----------|
| | | | |
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| Qt. | Width | | Height | |
|-----|-------|------|--------|------|
| | Feet | Inch | Feet | Inch |
| | | | | |
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| Area | UA |
|------|----|
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Sum of Area and UA
 Area Weighted U = UA/Area

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Single Glazing and Garden Windows Section 602.7.2 Exception

| Plan ID | Component Description |
|---------|-----------------------|
| | |
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| Qt. | Width | | Height | |
|-----|-------|------|--------|------|
| | Feet | Inch | Feet | Inch |
| | | | | |
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| Area |
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Sum of Area
 Sum of Area X 3 (enter this value in the glazing area total)
 Glazing UA for Heating System Size Only = Area X 1.2

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Simple Heating System Size: Climate Zone 1

Project Information

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Contact Information

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Indoor Design Temperature

Outdoor Design Temperature

Design Temperature Difference

Indoor - Outdoor Design Temp

Conditioned Floor Area

Conditioned Volume

Glazing

Copy Sum of UA from Glazing Schedule

| Attic | U-Factor | X | Area | = | UA |
|----------------------|----------|---|----------------------|---|----------------------|
| R-38 | 0.031 | | <input type="text"/> | | <input type="text"/> |
| R-38 Scissor | 0.035 | | <input type="text"/> | | <input type="text"/> |
| R-38 Advanced | 0.026 | | <input type="text"/> | | <input type="text"/> |
| R-49 | 0.027 | | <input type="text"/> | | <input type="text"/> |
| <input type="text"/> | | | <input type="text"/> | | <input type="text"/> |

| Single Rafter Joist | U-Factor | X | Area | = | UA |
|----------------------|----------|---|----------------------|---|----------------------|
| R-30 | 0.034 | | <input type="text"/> | | <input type="text"/> |
| R-38 | 0.027 | | <input type="text"/> | | <input type="text"/> |
| <input type="text"/> | | | <input type="text"/> | | <input type="text"/> |

| Above Grade Walls | U-Factor | X | Area | = | UA |
|----------------------|----------|---|----------------------|---|----------------------|
| R-21 int | 0.054 | | <input type="text"/> | | <input type="text"/> |
| R-19 + R-5 foam | 0.044 | | <input type="text"/> | | <input type="text"/> |
| <input type="text"/> | | | <input type="text"/> | | <input type="text"/> |

| Floors | U-Factor | X | Area | = | UA |
|----------------------|----------|---|----------------------|---|----------------------|
| R-30 | 0.029 | | <input type="text"/> | | <input type="text"/> |
| <input type="text"/> | | | <input type="text"/> | | <input type="text"/> |

| Below Grade Walls | U-Factor | X | Area | = | UA |
|----------------------|----------|---|----------------------|---|----------------------|
| R-21 interior | 0.037 | | <input type="text"/> | | <input type="text"/> |
| R-10 exterior | 0.056 | | <input type="text"/> | | <input type="text"/> |
| <input type="text"/> | | | <input type="text"/> | | <input type="text"/> |

| Slab Below Grade | F-factor | X | Length | = | UA |
|----------------------|----------|---|----------------------|---|----------------------|
| R-21 interior walls | 0.57 | | <input type="text"/> | | <input type="text"/> |
| R-10 exterior walls | 0.42 | | <input type="text"/> | | <input type="text"/> |
| <input type="text"/> | | | <input type="text"/> | | <input type="text"/> |

| Slab on Grade | F-factor | X | Length | = | UA |
|----------------------|----------|---|----------------------|---|----------------------|
| R-10 perimeter | 0.54 | | <input type="text"/> | | <input type="text"/> |
| R-10 Full - Heated | 0.51 | | <input type="text"/> | | <input type="text"/> |
| <input type="text"/> | | | <input type="text"/> | | <input type="text"/> |

Sum of UA

Envelope Heat Load Btu / Hour
Sum of UA X Design Temperature Difference

Air Leakage Heat Load Btu / Hour
((Volume X 0.6) X Design Outdoor Temp) X .018))

Building Design Heat Load Btu / Hour
Air Leakage + Envelope Heat Loss

Building and Duct Heat Load Btu / Hour
If ducts are located in unconditioned space: Sum of Building Heat Loss X 1.15
 If ducts are located in conditioned space: Sum of Building Heat Loss X 1

Maximum Heat Equipment Output 150% Btu / Hour

| | Heating Design Temp | | Heating Design Temp |
|-------------------|---------------------------|--------------------|---------------------------|
| Aberdeen 20 NNE | 25.0 | Medical Lake | 4.0 |
| Anacortes | 24.0 | Medina | 24.0 |
| Anatone | -4.0 | Mercer Island | 25.0 |
| Appleton | 11.0 | Metaline Falls | -1.0 |
| Auburn | 25.0 | Methow 2 W | 1.0 |
| Battleground | 19.0 | Mountlake Terrace | 22.0 |
| Bellevue | 24.0 | Mt. Spokane Summit | -2.0 |
| Bellingham 2N | 19.0 | Mount Vernon 3 WNW | 20.0 |
| Benton City 2 NW | 11.0 | Moxee City 10 E | 8.0 |
| Bickleton | 4.0 | Mud Mtn. Dam | 23.0 |
| Blaine | 17.0 | Nespelem 2 S | -4.0 |
| Bothell 2 N | 17.0 | Newhalem | 19.0 |
| Bremerton | 29.0 | Newport | -5.0 |
| Brier | 24.0 | Normandy Park | 24.0 |
| Buckley 1 NE | 26.0 | Northport | 2.0 |
| Bumping Lake | -5.0 | Oak Harbor | 16.0 |
| Burlington | 19.0 | Oakville | 20.0 |
| Camas | 21.0 | Odessa | 7.0 |
| Castle Rock | 23.0 | Olga 2 SE | 24.0 |
| Cedar Lake | 20.0 | Olympia, AP. | 17.0 |
| Centralia | 21.0 | Omak 2 NW | 3.0 |
| Central Park | 27.0 | Opportunity | 8.0 |
| Chehalis | 21.0 | Oroville | 5.0 |
| Chelan | 10.0 | Othello | 9.0 |
| Cheney | 4.0 | Packwood | 16.0 |
| Chesaw | -11.0 | Palmer 3 SE | 22.0 |
| Chewalah 2 S | -9.0 | Parkland | 20.0 |
| Chief Joseph Dam | 6.0 | Pasco | 13.0 |
| Clallam Bay 1 NNE | 28.0 | Plain | -3.0 |
| Clarkston | 10.0 | Pleasant View | 16.0 |
| Clearbrook | 19.0 | Pt. Grenville | 27.0 |
| Clearwater | 26.0 | Pomeroy | 3.0 |
| Cle Elum | 1.0 | Port Angeles | 28.0 |
| Clyde Hill | 24.0 | Port Orchard | 29.0 |
| Colfax 1 NW | 2.0 | Pon Townsend | 25.0 |
| College Place | 6.0 | Priest Rapids Dam | 14.0 |
| Colville AP | -2.0 | Prosser | 12.0 |
| Conconully | -7.0 | Pullman Exp. Sta. | 1.0 |
| Concrete | 19.0 | Puyallup | 19.0 |
| Connell 4 NNW | 6.0 | Quilcene 2 SW | 23.0 |
| Cougar 5 E | 25.0 | Quillayute AP | 23.0 |
| Coulee Dam 1 SW | 9.0 | Quinault RS | 25.0 |
| Coupeville 1 S | 21.0 | Quincy 1 NE | 4.0 |
| Cushman Dam | 22.0 | Rainier, Longmire | 15.0 |
| Dallesport AP | 14.0 | Paradise RS | 8.0 |
| Darrington RS | 13.0 | Raymond | 28.0 |
| Davenport | 5.0 | Redmond | 17.0 |
| Dayton 1 WSW | 5.0 | Renton | 24.0 |
| Deer Park 2 E | -5.0 | Republic | -9.0 |
| Des Moines | 25.0 | Richland | 11.0 |
| Diablo Dam | 15.0 | Rimrock Tieton Dam | 4.0 |
| Dishman | 9.0 | Ritzville | 6.0 |
| East Bremerton | 29.0 | Rosalia | 6.0 |
| Edmonds | 24.0 | Ross Dam | 14.0 |
| Electron Headwks | 16.0 | St. John | 15.0 |

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|----------------------|------|-----------------------|-------|
| Ellensburg AP | 2.0 | Sappho 8 E | 23.0 |
| Elma | 24.0 | Satus Pass | 10.0 |
| Eitopia 6 W | 9.0 | Seattle: Sea-Tac AP | 24.0 |
| Eiwha RS | 24.0 | Sedro Woolley 1 E | 19.0 |
| Enumclaw | 26.0 | Selah | 11.0 |
| Ephrata AP | 7.0 | Sequim | 23.0 |
| Everett JC | 23.0 | Shelton | 23.0 |
| Everett Paine AFB | 21.0 | Shoultes | 23.0 |
| Fircrest | 29.0 | Skamania Fish Hatch. | 24.0 |
| Forks I E | 23.0 | Smyrna | 8.0 |
| Fort Lewis | 24.0 | Snohomish | 21.0 |
| Fruitvale | 1.1 | Snoqualmie Falls | 22.0 |
| Glacier RS | 13.0 | Snoqualmie Pass | 6.0 |
| Glenoma (Kosmos) | 18.0 | South Broadway | 11.0 |
| Goldendale | 7.0 | So. Olympic Tree Farm | 24.0 |
| Grandview | 12.0 | Spanaway | 20.0 |
| Grapeview | 30.0 | Spokane AP | 4.0 |
| Grayland 2 S | 28.0 | Spokane CO | 10.0 |
| Grays River Hatchery | 24.0 | Spokane Fairchild AFB | 4.0 |
| Greenwater | 1.4 | Sprague | 4.0 |
| Grotto | 21.0 | Stampede Pass | 7.0 |
| Harrington 2 S | 3.0 | Startup 1 E | 20.0 |
| Hartline | 7.0 | Stehekin 3 NW | 12.0 |
| Hatton 8 E | 1.0 | Steilacoom | 21.0 |
| Holden Village | 4.0 | Stevens Pass | 6.0 |
| Hoquiam AP | 26.0 | Stockdill Ranch | -14.0 |
| Ice Harbor Dam | 17.0 | Sumner | 19.0 |
| Inchelium 2 NW | 0.0 | Sunnyside | 12.0 |
| Issaquah | 23.0 | Tacoma McChord | 21.0 |
| John Day Dam | 19.0 | Tacoma CO | 29.0 |
| Kelso AP | 24.0 | Tatoosh Island | 31.0 |
| Kennewick 10 SW | 13.0 | Thompson Place | 20.0 |
| Kent | 21.0 | Tietort Intake | 6.0 |
| Kid Valley | 20.0 | Toledo AP | 17.0 |
| Kirkland | 17.0 | Toppenish | 11.0 |
| Lacey | 17.0 | Trinidad 2 SSE | 13.0 |
| Lacrosse 3 ESE | -3.0 | Tukwila | 24.0 |
| La Grande | 23.0 | Tumwater | 17.0 |
| Lake Cle Elum | -4.0 | University Place | 29.0 |
| Lake Forest Park | 20.0 | Upper Baker Dam | 14.0 |
| Lake Kachess | -2.0 | Vancouver | 22.0 |
| Lake Keechelus | 0.0 | Vashon Island | 28.0 |
| Lakewood Center | 23.0 | Walla Walla AP | 6.0 |
| Landsburg | 18.0 | Walla Walla CO | 13.0 |
| Larson AFB | 6.0 | Wapato | 10.0 |
| Laurier | -8.0 | Washougal 8 ENE | 21.0 |
| Leavenworth | -3.0 | Waterville | 1.0 |
| Lemanasky Lake | -7.0 | Wawawai 2 NW | 14.0 |
| Lind 3 NE | 6.0 | Wellpinit | 1.0 |
| Linwood | 10.0 | Wenatchee AP | 13.0 |
| Little Goose Dam | 22.0 | Wenatchee CO | 10.0 |
| Long Beach 3 NNE | 25.0 | West Clarkston | 10.0 |
| Longview | 24.0 | Whidbey Island | 11.0 |
| Lower Granite Dam | 14.0 | White River RS | 12.0 |
| Lower Monument Dam | 18.0 | White Swan RS | 8.0 |
| Lynden | 18.0 | Whitman Mission | 11.0 |
| Lynnwood | 24.0 | Wilbur | 4.0 |
| Maloft | 4.0 | Willapa Harbor | 26.0 |
| Marietta 3 NNW | 18.0 | Wilson Creek | 3.0 |
| Marysville | 23.0 | Wind River | 15.0 |
| McMillin Res. | 21.0 | Winthrop 1 WSW | -12.0 |
| McNary Dam | 11.0 | Yakima AP | 11.0 |

Completing the Heating System Size Worksheet

This worksheet is used to calculate the design heat load of the structure. It also calculates the maximum heating system size required by code. This worksheet does not perform required cooling load calculations. Use Manual J or equivalent for cooling system size calculations.

Go to the Outdoor Design Temperature Worksheet Tab. Locate the outdoor design temperature for a location near the project site.

Calculate and enter the volume of the interior space in the building.

Measure the dimensions of each exterior building assembly, wall, attic floor etc. Enter the area next to the R-value description that matches the construction. If a construction method is selected that is not represented here, select values from Chapter 10 of the WSEC and enter it in one of the blank spaces at the end of each components section.

Enter the correction factor for duct location. If the ducts are indoors, enter 1. If the ducts are in the crawl space, attic or garage, enter 1.15.