



TOWN OF FRIDAY HARBOR
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APPLICANT IS TO COMPLETE PAGES 1-8 - INCOMPLETE ENERGY FORMS WILL NOT BE ACCEPTED

Project Name & Location: _____

Select applicable item(s) from options provided:

JOB TYPE:	NEW CONSTRUCTION		ADDITION		REMODEL
BUILDING TYPE:	1 OR 2 FAMILY RESIDENCE; TOWNHOUSE		GARAGE, WORKSHOP, OTHER ACCESSORY BLDG.		
HEATING SOURCE:	ELECTRIC	OIL	PROPANE (LPG)		OTHER _____
HEATING SYSTEM:	FORCED AIR	ROOM HEATERS	RADIANT		HYDRONIC
	HEAT PUMP	EXISTING SYSTEM	WOOD STOVE		OTHER:

LOCATION OF HEATING EQUIPMENT:
 Check the box below for the compliance option you are choosing for this project. Carefully review all of the included forms and fill them out completely, unless otherwise exempted. All the information relating to energy code compliance must clearly be shown on the submitted construction documents. These forms are provided as a compliance tool. They are not a substitute for the actual full text of the energy code. This can be found at <http://www.energy.wsu.edu/code>. The WSU website also has similar compliance forms in an excel format for completion and would be accepted.

PLEASE CHECK ONLY ONE:

- I will meet the prescriptive requirements of the 2009 Washington State Energy Code and have completed all the forms in this packet. (Reference WSEC Ch. 6)
- I will meet the 2009 WSEC using a component performance approach. I have completed the "component performance worksheet" (not included) in addition to the glazing worksheet, Ch. 9 credit worksheet, and heat sizing worksheets found in this packet. (Reference WSEC Ch. 5)
- I will meet the 2009 WSEC using a Building Design By Systems Analysis. I have included all necessary documentation demonstrating compliance. (Reference WSEC Ch. 4)
- I am constructing an unheated accessory structure (garage, workshop, or similar). It is NOT necessary to complete any additional forms

The following is a list of the pages in this packet and a brief description. Please read all forms and complete as required.

- 1) Information Page. Must fill out and pick compliance option
- 2) Ventilation info, glazing info, acknowledgement of compliance. Read, fill out, and acknowledge with signature
- 3) Prescriptive Energy Code Compliance: choose prescriptive path for insulation
- 4) Chapter 9 Energy Credit Options: select option for compliance with Ch. 9 credit requirement
- 5) Glazing Schedule Worksheet: check box on page 2 indicating reason for completion or if exempt.
- 6) Glazing Schedule Worksheet (con't): additional space, including boxes for totaling
- 7) Residential Heating System Sizing: to be completed for prescriptive and component compliance paths
- 8) Building Heat Loss Calculation: worksheet to obtain heat loss for completing Heating System Sizing.

GLAZING SCHEDULE: Check reason(s) for completion of glazing schedule; pages 5&6 of this packet

1) Does not apply. (See Instructions) <u>Using Prescriptive Option III</u> (pg. 3). All glazing and doors meet maximum U-Factor. Alternate heating size method submitted. Also check if N/A for UNHEATED ACCESSORY STRUCTURES.
2) <u>Prescriptive Option I or II</u> (pg. 3) Glazing to floor area limits. (WSEC 602.7.2)
3) Area weighted window, skylight or door U-Factor (WSEC 602.7.2)
4) As part of the heating system sizing calculation (IRC M1401.3 & WSEC 503.2.2)

WHOLE HOUSE VENTILATION SYSTEMS: Check the box corresponding to the WH Ventilation system to be used

1) Whole House Ventilation using exhaust fans. (IRC 1508.4)	
2) Whole House Ventilation integrated with a forced-air system. (IRC 1508.5)	
3) Whole House Ventilation using a supply fan. (IRC 1508.6)	
4) Whole House Ventilation using a heat recovery ventilation system. (IRC 1508.7)	
5) Engineered "Whole House Ventilation" system designed in accordance with IMC 403.8.10	
LOCATION OF WHOLE HOUSE FAN:	SIZE: (CFM)
6) Exempt from WHV for building with less than 500 square feet of conditioned floor area	
7) Exempt from WHV for replacement of HVAC equipment without altering or repairing the associated air distribution system	
<p>**NOTE:** In addition to the required "whole house ventilation system", "source specific exhaust ventilation" is required in each kitchen, bathroom, water closet, laundry room, indoor swimming pool, spa, and other rooms where excess water vapor or cooking odors are produced.</p> <p>***Additional note*** Accessory structures are not required to comply with the WHV system requirements. They shall, however, comply with any applicable source specific exhaust requirements.</p>	

By signing below, you are acknowledging that:

- 1) You have read and completed the attached forms to demonstrate compliance with the current Washington State Energy Codes & Ventilation and Indoor Air Quality provisions of the IRC.
- 2) These forms are provided as a compliance tool but do not represent all the intricacies of the codes.
- 3) You are aware that a complete copy of the energy code is available at www.energy.wsu/code
- 4) You are aware that the 2009 International Residential Code contains requirements and provisions for insulation and ventilation and copies of the Washington St. Amendments to this code are available at <https://fortress.wa.gov/ga/apps/sbcc/Default.aspx>
- 5) You have included all necessary details demonstrating compliance with these codes on your submitted construction drawings.
- 6) San Juan County is not responsible for any errors or omissions on these forms.
- 7) All elements of construction are subject to field inspection and correction.

Signature _____

Date _____

(owner or other authorized agent)

(required)

2009 WSEC PRESCRIPTIVE ENERGY CODE COMPLIANCE FOR SINGLE FAMILY RESIDENCES IN SAN JUAN COUNTY

CHECK THE OPTION below that will apply to your project. The insulation values and construction details are required to be shown on the submitted construction drawings. (WSEC 104.2)

TABLE 6-1 PRESCRIPTIVE REQUIREMENTS^{0,1}

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="radio"/> I	13%	0.34	0.50	0.20	R-49 or R-38 adv.	R-38	R-21 Int. ⁷	R-21 TB	R-10	R-30	R-10 2ft.
<input type="radio"/> II	25%	0.32	0.50	0.20	R-49 or R-38 adv.	R-38	R-21 Int. ⁷	R-21 TB	R-10	R-30	R-10 2ft.
<input type="radio"/> III	Unlimited	0.30	0.50	0.20	R-49 or R-38 adv.	R-38	R-21 Int. ⁷	R-21 TB	R-10	R-30	R-10 2ft.

Footnotes:

0. Nominal R-values are for wood frame assemblies only or assemblies built in accordance with Section 601.1.
1. Minimum requirements for each option listed. For example, if a proposed design has a glazing ratio to the conditioned floor area of 15%, it shall comply with all of the requirements of the 25% glazing option (or higher). Proposed designs which cannot meet the specific requirements of a listed option above may calculate compliance by Chapters 4 or 5 of this Code.
2. Requirement applies to all ceilings except single rafter or joist vaulted ceilings complying with note 3. 'Adv' denotes Advanced Framed Ceiling.
3. Requirement applicable only to single rafter or joist vaulted ceilings.
4. Below grade walls shall be insulated either on the exterior to a minimum level of R-10 continuous, or on the interior as a framed wall. Exterior insulation installed on below grade walls shall be a water resistant material, manufactured for its intended use, and installed according to the manufacturer's specifications. See Section 602.2.
5. Floors over crawl spaces or exposed to ambient air conditions.
6. Required slab perimeter insulation shall be a water resistant material, manufactured for its intended use, and installed according to manufacturer's specifications. See Section 602.4. For slabs inside a foundation wall, the insulation shall be installed to provide a thermal break (TB) between the slab edge and the foundation. Monolithic slabs shall include insulation, installed outside the foundation wall, and shall extend downward from the top of the slab for a minimum distance of 24 inches or downward and then horizontally for a minimum combined distance of 24 inches. Monolithic slabs shall also include R-10 insulation under the non-load-bearing portions of the slab.
7. Int. denotes standard framing 16 inches on center with headers insulated with a minimum of R-10 insulation.
8. Reserved.
9. Doors, including all fire doors, shall be assigned default U-factors from Table 10-6C.
10. Where a maximum glazing area is listed, the total glazing area (combined vertical plus overhead) as a percent of gross conditioned floor area shall be less than or equal to that value. Overhead glazing with U-factor of U=0.35 or less is not included in glazing area limitations.
11. Overhead glazing shall have U-factors determined in accordance with NFRC 100 or as specified in Section 502.1.5.
12. Log and solid timber walls with a minimum average thickness of 3.5" are exempt from this insulation requirement.

WSEC Chapter 9 Energy Credit Options. Check all that apply. Total of 1 Point required.

+1pt	1A	HIGH EFFICIENCY HVAC EQUIP. 1: Gas, propane, or oil fired furnace or boiler with minimum AFUE of 92% or air-source heat pump with minimum HSPF of 8.5
+2pts	1B	HIGH EFFICIENCY HVAC EQUIP 2: Closed loop ground source heat pump with minimum COP of 3.3
+1pt	1C	HIGH EFFICIENCY HVAC EQUIP 3: Where primary space heating system is zonal electric heating, a ductless heat pump system shall be installed to provide heating to at least one zone
+1pt	2	HIGH EFFICIENCY HVAC DISTRIBUTION: All heating and cooling system components installed inside the conditioned space. All combustion equipment shall be direct vent or sealed combustion. Locating system components in conditioned crawl spaces is not permitted under this option. Electric resistance heat is not permitted under this option. Direct combustion heating equipment with AFUE less than 80% is not permitted under this option.
+½ pt	3A	EFFICIENT BUILDING ENVELOPE 1: Prescriptive compliance per Table 6-1, Option III **as modified per CH 9** or component performance compliance: reduce the Target UA from table 5-1 by 5% as determined using EQ. 1
+1pt	3B	EFFICIENT BUILDING ENVELOPE 2: Prescriptive compliance per Table 6-1, Option III **as modified per CH 9** or component performance compliance: reduce the Target UA from table 5-1 by 15% as determined using EQ. 1
+2pts	3C	EFFICIENT BUILDING ENVELOPE 3: Prescriptive compliance per Table 6-1, Option III **as modified per CH 9** or component performance compliance: reduce the Target UA from table 5-1 by 30% as determined using EQ. 1
+½ pt	4a	AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION: Envelope leakage reduced to SLA of 0.00020 building envelope tightness when tested with blower door at pressure difference of 50 Pa after rough in and installation of all building envelope penetrations, and all whole house ventilation requirements met by heat recovery ventilation system per IRC section 1508.7
+1pt	4B	AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION: Envelope leakage reduced to SLA of 0.00015 building envelope tightness when tested with blower door at pressure difference of 50 Pa after rough in and installation of all building envelope penetrations, and all whole house ventilation requirements met by heat recovery ventilation system per IRC section 1508.7
+½ pt	5A	EFFICIENT WATER HEATING: Water heating system shall include one of the following: gas, propane, or oil water heater with minimum EF of 0.62; OR electric water heater with minimum EF of 0.93 AND for both cases all showerheads and kitchen sink faucets shall be rated at 1.75gpm or less, all others 1.0gpm or less when tested in accordance with ASME A112.18/CSA B125.1
+1.5pts	5B	EFFICIENT WATER HEATING: Water heating system shall include one of the following: gas, propane or oil water heater with minimum EF of 0.82; OR solar water heating supplementing minimum standard water heater. Solar water heating will provide minimum savings of 85 therms or 2000kWh based on Solar Rating and Certification Corp. (SRCC) Annual performance of OG-300 Certified Solar Water Heating Systems; OR Electric heat pump water heater with minimum EF of 2.0
+1pt	6	SMALL DWELLING UNIT: Dwelling less than 1500 sq. ft. with less than 300 sq. ft. window and door openings. Additions to existing buildings that are less than 750 sq. ft of heated floor area
-1pt	7	LARGE DWELLING UNIT: Dwelling exceeding 5000 sq. ft. floor area shall be assessed a deduction
+½ pt	8	RENEWABLE ELECTRIC ENERGY: For each 1200 kWh of electrical generation provided annually by on-site wind or solar equipment, a 0.5 credit shall be allowed, up to 3 credits. Generation shall be calculated as follows: For solar electric systems, the design shall be demonstrated to meet this requirement using the National Renewable Energy Laboratory calculator PVWATTS. Documentation noting solar access shall be included on the plans For wind generation projects, designs shall document annual power generation based on the following factors: the wind turbine power curve, average annual wind speed at the site, frequency distribution of the wind speed at the site, and the height of the tower.

FOOTNOTES:

- 1) Interior duct placement: Ducts included as Option 2 (above) shall be placed wholly within the heated envelope of the housing unit. The placement shall be inspected and certified to receive the credits associated with this option.

Exception: Ducts complying with this section may have up to 5% of the total linear feet of ducts located in the exterior cavities or buffer spaces of the dwelling. If this exception is used, the ducts will be tested to the following standards: Post construction test: Leakage to outdoors shall be less than or equal to 1 CFM per 100 sq. ft. of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
- 2) Plumbing Fixtures Flow Ratings: Low flow plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:
 - a) Residential bath lavatory sinks faucets: Max. flow rate 1.0 gal/min (tested in accordance with ASME 112.18.1/CSA B125.1)
 - b) Residential kitchen faucets: Max. flow rate 1.75 gal/min (tested in accordance with ASME 112.18.1/CSA B125.1)
 - c) Residential shower heads: Max. flow rate 1.75 gal/min (tested in accordance with ASME 112.18.1/CSA B125.1)

(CONTINUED FROM FRONT)

VERTICAL GLAZING (Windows, Glazed doors with >50% glazing)

Plan ID	Component Description	Qty.	width		height		Glazing U-Factor	Glazing Area	Glazing UA
			feet	inch	feet	inch			(area x U)
Sum of Area and UA									
Area Weighted UA = UA ÷ Area									

OVERHEAD GLAZING

Plan ID	Component Description	Qty.	width		height		Glazing U-Factor	Glazing Area	Glazing UA
			feet	inch	feet	inch			(area x U)
Sum of Area and UA									
Area Weighted UA = UA ÷ Area									

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 included in the vertical glazing schedule or the exterior door schedule.

Obtain NFRC tested U-Factors from the door manufacturer or use U-Factors from WSEC tables. (Refer to CH. 10 for tables).

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

Glazing area in exterior doors is added to the total of glazing areas of the project as follows: *If greater than 50%, 100% of the area is entered in the door glazing area. If less than 50%, only the glazed area will be entered in the door glazing area.*

Exempt Door: One door, 24 ft² or less is not included in the U-Factor of the glazing area calculations. You must calculate the door area to verify that it is 24 ft² or less. This also enters the door heat loss into the heat 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 WSEC Ch. 10 must be used.

2009 Residential WSEC CH. 5 & 6 Heating System Sizing

The 2009 Washington State Energy Code (WSEC) requires heating and cooling systems for residential projects to be sized. With few exceptions, heating and cooling systems may not exceed 150% of the design loads as calculated per the 2009 WSEC or 2009 IRC section M1401.3 or 2009 IMC section 312.

This form will only size an electric, natural gas, LPG or oil fired heating system when all the required information has been filled out. The type of insulation and areas involved, skylights, doors, and window sections of this form must be completed accurately.

If your system provides cooling, it must be sized using ASHRAE Manual J or equivalent calculations and they must be attached to this form. Please contact your mechanical contractor for this information.

PLEASE READ AND CHECK THE APPROPRIATE BOX

<input type="checkbox"/>	A	I am using this form to define my project and to size the heating system
<input type="checkbox"/>	B	I am using this form to define my project and to size the heating system. The heating system installed will be fueled by LPG or Oil with an annual fuel utilization efficiency (AFUE) of 90% or greater. The minimum heat output of the heating system may be exceeded by no more than 250%
<input type="checkbox"/>	C	This project is using ASHRAE Manual J or an approved equivalent method for the sizing of the heating system. I have attached the form that sizes my equipment.
<input type="checkbox"/>	D	This project uses a heating and cooling system. An ASHRAE Manual J equivalent method for sizing the heating and cooling system is attached. I have attached the form that sizes my equipment.
<input type="checkbox"/>	E	This project uses a heating system <u>fueled by LPG or Oil</u> , is <u>less than 1500 sq. ft.</u> in size, and is in compliance with <u>Prescriptive Path Option I</u> . A heating system not to exceed <u>40,000 BTU/H</u> total output will be installed. The following sizing calculations are not required to be completed.
<input type="checkbox"/>	F	NOT APPLICABLE. UNHEATED ACCESSORY STRUCTURE.

SIMPLE HEATING SYSTEM SIZE: Climate Zone 1. Outdoor Design Temp = 24° for entire County

Design Temperature Difference=	46° ^F	Conditioned Floor Area =	Ft. ²
SUM OF UA (heat loss of building, calculation on back of this page)		Conditioned Volume (CV)=	Ft. ³

	Other Fuels: <u>Btu/Hr.</u>	ELECTRIC: <u>KW</u> (convert BTU→KW: Btu÷3413)
ENVELOPE HEAT LOAD (Sum of UA X Design Temp. Difference)		
AIR LEAKAGE HEAT LOAD (CV X 0.6) X (Outdoor Design Temp) X (.018)		
BUILDING DESIGN HEAT LOAD (Air Leakage + Envelope Heat Load)		
MINIMUM HEATING EQUIPMENT OUTPUT: (Use 1.15 x Building Design Heat Load if ducts are in unconditioned space) (Use 1.0 x Building Design Heat Load if ducts are in conditioned space)		
MAXIMUM HEATING EQUIPMENT OUTPUT (Min. Output x 1.5)		
INCREASE Max. Heating Equip. Output (Requires 90% High Efficiency Furnace from Option B. = Min Output x 2.5)		

2009 WSEC Ch. 5&6 Heating System Sizing - Building Heat Loss Calculations

ATTIC (type)	U-FACTOR	X	AREA (sq. ft)	=	UA
R-49	0.027	X		=	
R-38	0.026	X		=	
(other):		X		=	

SINGLE RAFTER or JOIST VAULTED CEILINGS	U-FACTOR	X	AREA (sq. ft)	=	UA
R-38 Vented	0.027	X		=	
(other):		X		=	

ABOVE GRADE WALLS	U-FACTOR	X	AREA (sq. ft)	=	UA
R-21	0.056	X		=	
(other):		X		=	

FLOORS	U-FACTOR	X	AREA (sq. ft)	=	UA
R-30	0.029	X		=	
(other):		X		=	

SLAB ON GRADE	F-FACTOR	X	LENGTH (perimeter)	=	UA
R-10 2 ft @perimeter	0.54	X		=	
R-10 Full (heated slab)	0.55	X		=	
(other):		X		=	

BELOW GRADE WALLS	U-FACTOR	X	AREA (sq. ft)	=	UA
2 Ft. Depth	0.042	X		=	
3.5 Ft. Depth	0.041	X		=	
7 Ft. Depth	0.037	X		=	
(other):		X		=	

SLAB BELOW GRADE	F-FACTOR	X	LENGTH (perimeter)	=	UA
2 Ft. Depth	0.59	X		=	
3.5 Ft. Depth	0.64	X		=	
7 Ft. Depth	0.57	X		=	
(other):		X		=	

SUBTOTAL OF UA VALUES FROM WORKSHEET ABOVE	=	
COPY SUM OF UA VALUE FROM GLAZING WORKSHEET	=	
BUILDING HEAT LOSS CALCULATION VALUE	=	