Residential Energy Code Prescriptive Compliance Form Effective 1-1-2011
(Please submit 2 copies)

CITY OF NORMANDY PARK WASHINGTON

801 SW 174th Street, Normandy Park, Washington 98166-3679
Telephone (206) 248-7603 Facsimile (206) 439-8674
Police Department Telephone (206) 248-7600 Facsimile (206) 246-9732
www.normandyparkwa.gov

2009 WSEC & IRC Ventilation (Effective January 1, 2011)

One & Two Family Dwelling Unit Prescriptive Compliance Form

This set of forms has been developed to assist permit applicants documenting compliance with the 2009 Washington State Energy Code
The following forms provide much of the required documentation for plan review. The details noted here must also be shown on the drawings.

Check the box in front of the option which you will use to meet the prescriptive requirements:

	Option	Glazing Area[10]: % of floor	Glazing U - Factor		Door[9] U-Factor	Ceiling[2]	Vaulted Ceiling[3]	Wall Above Grade[12]	Wall • int[4] Below Grade	Wall • ext[4] Below Grade	Floor[5]	Slab on Grade[6]
			Vertical	Overhead[9]								
☐	**I.**	13 %	0.34	0.50	0.20	R-38 Adv. or R-49	R-38	R-21 Int.[7]	R-21 TB	R-10	R-30	R-10 2′
☐	**II.**	25%	0.32	0.50	0.20	R-38 Adv. or R-49	R-38	R-21 Int.[7]	R-21 TB	R-10	R-30	R-10 2′
☐	**III.**	Unlimited	0.30	0.50	0.20	R-38 Adv. or R-49	R-38	R-21 Int.[7]	R-21 TB	R-10	R-30	R-10 2′

See WSEC table 6-1 for footnotes

Radiant Slab:

☐ R-10 foam insulation, continuous with thermal break (WSEC 502.1.4.9)

Lighting Efficiency:

☐ 1. A minimum of 50 percent of all light fixtures will be high efficacy. (WSEC 505.1)

☐ 2. Permanently mounted light fixtures providing outdoor lighting will be high efficacy unless equipped with built in photo control photo sensor. (WSEC 505.2)

Glazing Schedule Attached to Document

Please check the box in front of the option which you will use to meet the requirements:

☐ 1. Does not apply. Using Prescriptive Option III. All glazing and doors meet maximum U-factor. Alternate heating size method submitted.

☐ 2. Option I or II, Glazing to floor area limit (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 (Prescriptive)

Please check the appropriate box to describe which of the four prescriptive Whole House Ventilation Systems you will be using.

☐ 1. Intermittent Whole House Ventilation Using Exhaust Fans & Fresh Air Inlets. (IRC M1508.4)

☐ 2. Intermittent Whole House Ventilation Integrated with a Forced Air System. (IRC M1508.5)

☐ 3. Intermittent Whole House Ventilation using a Supply Fan. (IRC M1508.6)

☐ 4. Intermittent Whole House Ventilation Using a Heat Recovery Ventilation System (IRC M1508.7)

Source Specific Exhaust Ventilation

Required in each kitchen, bathroom, water closet compartment, laundry room, indoor swimming pool, spa and other rooms where water vapor or cooking odor is produced.

Minimum Source Specific Ventilation Capacity Requirements

	Bathrooms – Toilet Rooms	Kitchens

Intermittently operating	**50 cfm**	**100 cfm**
Continuous operation	**20 cfm**	**25 cfm**

Chapter 9 options

Total of 1 credit required: Please circle the option to be used and fill in the applicable credits

Opt.	Option description	Credit Value	Credit applied
1a	**HIGH EFFICIENCY HVAC EQUIPMENT 1:** Gas, propane or oil-fired furnace or boiler with minimum AFU of 92% **OR** Air-source heat pump with minimum HSPF of 8.5	1.0	
1b	**HIGH EFFICIENCY HVAC EQUIPMENT 2:** Closed-loop ground source heat pump; with a minimum COP of 3.3	2.0	
1c	**HIGH EFFICIENCY HVAC EQUIPMENT 3:** Ductless split system heat pumps, zonal control: In home where the primary space heating system is zonal electric heating, a ductless heat pump system shall be installed and provide heating to at least one zone of the housing unit.	1.0	
2	**HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM:[1]** 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.	1.0	
3a	**EFFICIENT BUILDING ENVELOPE 1:** Prescriptive compliance is based on Table 6-1, Option III with the following modifications: Window U .= 0.28 floor R-38, slab on grade R-10 full, below grade slab R-10 full or Component performance compliance: Reduce the Target UA from Table 5-1 by 5%, as determined using EQ. 1.[1]	0.5	
3b	**EFFICIENT BUILDING ENVELOPE 2:** Prescriptive compliance is based on Table 6-1, Option III with the following modifications: Window U .= 0.25 and wall R-21 plus R- 4 and R-38 floor, slab on grade R-10 full, below grade slab R-10 full, and R-21 plus R-5 below grade basement walls, or Component performance compliance: Reduce the Target UA from Table 5.1 by 15%, as determined using EQ. 1.[1]	1.0	
3c	**SUPER-EFFICIENT BUILDING ENVELOPE 3:** Prescriptive compliance is based on Table 6-1, Option III with the following modifications: Window U .= 0.22 and wall R-21 plus R- 12 and R-38 floor, slab on grade R-10 full, below grade slab R-10 full and R-21 plus R-12 below grade basement walls and R-49 advanced ceiling and vault. **OR** Component performance compliance: Reduce the Target UA from Table 5.1 by 30%, as determined using EQ. 1.[1]	2.0	
4a	**AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION:** Envelope leakage reduced to SLA of 0.00020 building envelope tightness shall be considered acceptable when tested air leakage is less than specific leakage area of 0.00020 when tested with a blower door at a pressure difference of 50 PA. Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances. **AND** All whole house ventilation requirements as determined by Section M1508 of the Washington State Residential Code shall be met with a heat recovery ventilation system in accordance with Section M1508.7 of that Code.	0.5	
4b	**ADDITIONAL AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION:** Envelope leakage reduced to SLA of 0.00015 building envelope tightness shall be considered acceptable when tested air leakage is less than specific leakage area of 0.00015 when tested with a blower door at a pressure difference of 50 PA. Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances **AND** All whole house ventilation requirements as determined by Section M1508 of the Washington State Residential Code shall be met with a heat recovery ventilation system in accordance with Section M1508.7 of that Code.	1.0	
5a	**EFFICIENT WATER HEATING:[1]** Water heating system shall include one of the following: Gas, propane or oil water heater with a minimum EF of 0.62 **OR** Electric Water Heater with a minimum EF of 0.93 **AND** for both cases All showerhead and kitchen sink faucets installed in the house shall meet be rated at 1.75 GPM or less. All other lavatory faucets shall be rated at 1.0 GPM or less.[2]	0.5	
5b	**HIGH EFFICIENCY WATER HEATING:[1]** Water heating system shall include one of the following: Gas, propane or oil water heater with a minimum EF of 0.82 **OR** Solar water heating supplementing a minimum standard water heater. Solar water heating will provide a rated minimum savings of 85 therms or 2000 kWh based on the Solar Rating and Certification Corporation (SRCC) Annual Performance of OG-300 Certified Solar Water Heating Systems **OR** Electric heat pump water heater with a minimum EF of 2.0.	1.5	
6	**SMALL DWELLING UNIT 1:[1]** Dwelling units less than 1500 square feet in floor area with less than 300 square feet of window + door area. Additions to existing building that are less than 750 square feet of heated floor area. (Must complete attached glazing schedule to use this option.	1.0	
7	**LARGE DWELLING UNIT 1:[1]** Dwelling units exceeding 5000 square feet of floor area shall be assessed a deduction for purposes of complying with Section 901 of this WSEC.	-1.0	
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.	0.5	

	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 height of the tower.		
See WSEC table 9-1 for footnotes	**TOTAL CREDITS FOR THIS PROJECT**		

Glazing Schedule (Electronic version available at: http://www.energy.wsu.edu/Documents/Prescriptive_Zone1.xlsx)

Conditioned Floor Area		Sum of UA for Heating System Sizing	
Sum of All Glazing Areas From Below			
Glazing to Floor Area Ratio		602.7.2 Exception Ratio (not to exceed 1%)	

Exterior Doors

Plan ID	Component Description	Ref.	Door U-factor	Percent Glazed	Qt.	Width Feet	Inch	Height Feet	Inch	Glazing Area	Door Area	Door UA
	One Exempt Swinging Door < 24 Square Feet											
	Sum of Glazing Area, Door Area, and UA (do not include exempt door)											
	Area Weighted U = UA/Area											
	Sum of Area and UA for Heating system size only (include exempt door)											

Vertical Glazing (Windows, Glazed doors using Exception 602.6 #1)

Plan ID	Component Description	Ref.	Glazing U-factor	Qt.	Width Feet	Inch	Height Feet	Inch	Glazing Area	UA

Overhead Glazing

Plan ID	Component Description	Ref.	Glazing U	Qt.	Width Feet	Width Inch	Height Feet	Height Inch	Area	UA

Sum of Area and UA

Area Weighted U = UA/Area

Doube Glazed Garden Windows Section 602.7.2 Exception

Plan ID	Component Description	Qt.	Width Feet	Width Inch	Height Feet	Height Inch	Area	UA

Sum of Area

Sum of Area X 3 (This total is automatically included in the glazing area total.)

Glazing UA for Heating System Size Only = Area X 0.63

Simple Heating System Size (Electronic version available at: http://www.energy.wsu.edu/Documents/Prescriptive_Zone1.xlsx)

Indoor Design Temperature			70			
Outdoor Design Temperature			24			
Design Temperature Difference (ΔT)						
ΔT = Indoor - Outdoor Design Temp			46			
Conditioned Floor Area			0			
Conditioned Volume						
Glazing						
Copy Sum of UA from Glazing Schedule						
Attic		**U-Factor**	**X**	**Area**	**=**	**UA**
	R-49	0.027				
	R-38 Advanced	0.026				
Single Rafter or Joist Vaulted Ceilings						
		U-Factor	**X**	**Area**	**=**	**UA**
	R-38 Vented	0.027				
Above Grade Walls		**U-Factor**	**X**	**Area**	**=**	**UA**
	R-21	0.056				
Floors		**U-Factor**	**X**	**Area**	**=**	**UA**
	R-30	0.029				
Below Grade Walls		**U-Factor**	**X**	**Area**	**=**	**UA**
	2' Depth Walls	0.042				
	3.5' Depth Walls	0.041				
	7' Depth Walls	0.037				
Slab Below Grade		**F-Factor**	**X**	**Length**	**=**	**UA**
	2' Depth	0.59				
	3.5' Depth	0.64				
	7' Depth	0.57				
Slab on Grade		**F-Factor**	**X**	**Length**	**=**	**UA**
	R-10 2' perimeter	0.54				
	R-10 Full - Heated	0.55				
Sum of UA						
Envelope Heat Load						Btu / Hour
Sum of UA X ΔT						
Air Leakage Heat Load						Btu / Hour
((Volume X 0.6) X ΔT) X .018))						
Building Design Heat Load						Btu / Hour
Air Leakage + Envelope Heat Loss						
Building and Duct Heat Load				1		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
Building and Duct Heat Loss X 1.50						

Duct Testing Calculator

(Electronic version available at: http://www.energy.wsu.edu/Documents/Ductandblowerdoortestingcalculator.xlsx))

House address or lot #:	
Conditioned Floor Area:	
Duct tester location:	
Pressure tap location:	
Ring (if applicable):	Open ☐ 1 ☐ 2 ☐ 3 ☐

At Rough-in (Total Leakage)

Test Method Standard[1]	Test[2] CFM_{25}	Calculated Target
Air Handler Present ≤ 6 CFM_{25} per 100 sf of CFA		.06 x _____CFA ≤ _____ CFM_{25}
Air Handler not Present ≤ 4 CFM_{25} per 100 sf of CFA		.04 x _____CFA ≤ _____ CFM_{25}

Post Construction

Test Method	Test[2] CFM_{25}	Calculated Target
Air Handler Present (Total Leakage) ≤ 8 CFM_{25} per 100 sf of CFA		.08 x _____CFA ≤ _____ CFM_{25}
Air Handler Present (Leakage to Exterior) ≤ 6 CFM_{25} per 100 sf of CFA		.06 x _____CFA ≤ _____ CFM_{25}

1. Test results must comply with one of the Standards options.
2. Test CFM_{25} must be equal to or less than the calculated target.

Air Leakage testing Calculator (Blower Door Test)

Standard	Tested CFM_{50}	Test Result (SLA)
0.00030 SLA		((CFM_{50} X 0.055) / (CFA X 144)) _____ divided by _____ = SLA SLA = _____

Glossary

Rough-In: After installation of the complete air distribution system but before installation of insulation and sheet rock. Allows for access to all duct seams and connections for re-evaluation of seal integrity if standard is not met in initial test.

Post Construction: At or near final inspection. The home must be complete enough to pressurize the home to 25 pa.

Total Leakage: Aggregation of the entire systems duct leakage in a duct test.

Leakage to Exterior: Aggregation of all duct system leaks to the exterior of the CFA in a duct test.

CFA: Conditioned floor area

CFM_{25}: Cubic feet per minute of air leakage at 25 pascals of pressure

CFM_{50}: Cubic feet per minute of air leakage at 50 pascals of pressure

Pascal (pa): Unit of pressure

SLA: Specific leakage area

Duct Testing Code Language

503.10.3 Sealing: All ducts, air handlers, filter boxes, and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.3 of the International Residential Code or Section 603.9 of the International Mechanical Code. Duct tightness testing shall be conducted to verify that the ducts are sealed. A signed affidavit documenting the test results shall be provided to the jurisdiction having authority by the testing agent. When required by the building official, the test shall be conducted in the presence of department staff. Duct tightness shall be verified by either of the following:

1. Post-construction test: Leakage to outdoors shall be less than or equal to 6 cfm per 100 square feet of conditioned floor area or a total leakage less than or equal to 8 cfm per 100 square feet of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pascals) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

2. Rough-in test: Total leakage shall be less than or equal to 6 cfm per 100 square feet of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pascals) across the roughed-in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm per 100 square feet of conditioned floor area.

EXCEPTIONS:
1. Duct tightness test is not required if the air handler and all ducts are located within conditioned space.

2. Duct tightness test is not required if the furnace is a non-direct vent type combustion appliance installed in an unconditioned space. A maximum of six feet of connected ductwork in the unconditioned space is allowed. All additional supply and return ducts shall be within the conditioned space. Ducts outside the conditioned space shall be sealed with a mastic type duct sealant and insulated on the exterior with R-8 insulation for above grade ducts and R-5 water resistant insulation when within a slab or earth.

Air Leakage Testing Code Language

502.4.5 Building Air Leakage Testing: Building envelope air leakage control shall be considered acceptable when tested to have an air leakage less than 0.00030 Specific Leakage Area (SLA) when tested with a blower door at a pressure of 50 Pascals (0.2 inch w.g.). Testing shall occur at any time after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances and sealing thereof. When required by the building official, the test shall be conducted in the presence of department staff. The blower door test results shall be recorded on the certificate required in Section 105.4.

EXCEPTIONS:
1. Additions less than 750 square feet.
2. Once visual inspection has confirmed the presence of a gasket (see Section 502.4), operable windows and doors manufactured by small business shall be permitted to be sealed off at the frame prior to the test.

Specific Leakage Area (SLA) shall be calculated as follows:

SLA = (CFM50 x 0.055)/(CFA x 144)

Where:

CFM50 = Blower door fan flow at 50 Pascal pressure difference

CFA = Conditioned Floor Area of the housing unit

During testing:
- Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed.
- Dampers shall be closed, but not sealed; including exhaust, intake, makeup air, back draft, and flue dampers;
- Interior doors connecting conditioned spaces shall be open; access hatches to conditioned crawl spaces and conditioned attics shall be open; doors connecting to unconditioned spaces shall be closed but not sealed;
- Exterior openings for continuous operation ventilation systems and heat recovery ventilators shall be closed and sealed;
- Heating and cooling system(s) shall be turned off;
- HVAC ducts supply and return registers shall not be sealed.

Duct Leakage Affidavit

(Electronic version available at: http://www.energy.wsu.edu/Documents/Duct_Leakage_Affidavit_Existing.pdf)

Testing shall occur at any time after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances and sealing thereof. When required by the inspector, the test shall be conducted in the presence of department staff. The blower door test results shall be recorded on the certificate required to be posted near the electrical panel.

This document must be submitted at or before the Final Inspection.

Permit #: _____

House address or lot number: _____

City: _____ Zip: _____

Cond. Floor Area (ft^2): _____ Source (circle one): Plans Estimated Measured

☐ Duct tightness testing is not required for this residence per exceptions listed at the end of this document

Air Handler in conditioned space? ☐ Yes ☐ no Air Handler present during test? ☐ Yes ☐ no

Circle Test Method: Leakage to Outside Total Leakage

Maximum duct leakage:

Post Construction, total duct leakage: (floor area x .08) = _____CFM@25 Pa

Post Construction, leakage to outdoors: (floor area x .06) = _____CFM@25 Pa

Rough-In, total duct leakage with air handler installed: (floor area x .06) = _____CFM@25 Pa

Rough-In, total duct leakage with air handler not installed: (floor area x .04) = _____CFM@25 Pa

Test Result: _____CFM@25Pa

Ring (circle one if applicable): Open 1 2 3

Duct Tester Location: _____ Pressure Tap Location: _____

I certify that these duct leakage rates are accurate and determined using standard duct testing protocol.

Company Name: _____ Technician: _____

Technician Signature: _____ Date: _____ Phone Number: _____

Washington State Energy Code reference:

503.10.3 Sealing. All ducts, air handlers, filter boxes, and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.3 of the *International Residential Code* or 603.9 of the *International Mechanical Code*. Duct tightness testing shall be conducted to verify that the ducts are sealed. A signed affidavit documenting the test results shall be provided to the jurisdiction having authority by the testing agent. When required by the building official, the test shall be conducted in the presence of department staff.

Exceptions: 1. Duct tightness test is not required if the air handler and all ducts are located within conditioned space.

2. Duct testing is not required if the furnace is a non-direct vent type combustion appliance installed in an unconditioned space. A maximum of six feet of connected ductwork in the unconditioned space is allowed. All additional supply and return ducts shall be within the conditioned space. Ducts outside the conditioned space shall be sealed with a mastic type duct sealant and insulated on the exterior with R-8 insulation for above grade ducts and R-5 water resistant insulation when within a slab or earth.

Certificate (Electronic version available at: http://www.energy.wsu.edu/Documents/Qtr_Sheet_WSEC_2009_Certificate.pdf)

A permanent certificate shall be posted within three feet of the electrical distribution panel. The certificate shall be completed by the builder or registered design professional and include all of the information as follows:

2009 WSEC Residential Energy Compliance Certificate

Property Address: _____

Conditioned Floor Area _____ Date ___/___/___

Builder or registered design professional :

_____

Signature: _____

R-Values

Ceiling: Vaulted R-_____ **Floors** Over unconditioned space R-_____

Attic R-_____ Slab on grade floor R-_____

Walls: Above grade R-_____ **Doors** _____ R-_____

Below, int. R-_____ _____ R-_____

Below, ext. R-_____ _____ R-_____

U-Factors and SHGC

NFRC rating (or) Windows U-_____ SHGC-_____

Default rating (Chapter 10 WSEC 2009) Skylights U-_____ SHGC-_____

Chapter 9 Option(s) _____ ***Total Chpt. 9 Credits*** _____

Heating, Cooling & Domestic Hot Water

System	Type	Efficiency
Heating		
Cooling		
DHW		

Duct & Building Air Leakage

All ducts & HVAC in conditioned space (yes / no) Insulation R-_____

Test Method: __Total leakage __Leakage to exterior __Air handler present

Test Target _____ CFM@25Pa Test Result _____ CFM@25Pa

Building air leakage target: SLA<0.00030 - Tested leakage: SLA= _____

Onsite Renewable Energy Electric Power System

System type: _____ Rated annual generation _____ **Kwh**