

Chuck Murray

Change the leakage rate in Table R405.4.2(1) to match the required leakage rate in the prescriptive code

WAC 51-11R-40551 Table ((R405.5.2(1))) R405.4.2(1) — Specifications for the standard reference and proposed designs.

TABLE ((R405.5.2(1))) R402.4.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

Air exchange rate	<p>Air leakage rate of 5 3 air changes per hour at a pressure of 0.2 inches w.g. (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$</p> <p>where: CFA = conditioned floor area N_{br} = number of bedrooms - <u>The mechanical ventilation system type shall be the same as in the proposed design.</u> Energy recovery shall not be assumed for mechanical ventilation.</p>	As proposed ^a . The mechanical ventilation rate ^b shall be in addition to the air leakage rate and shall be as proposed.
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This would also need to be modified to 4 ACH

Kjell Anderson

I have a two minor comments to clarify and clean up language:

- To clarify what is meant by primary living spaces, add to footnote a to R406.3. “primary living areas include living, dining, kitchen, ~~bedrooms,~~ family rooms, and similar areas.”
- In Section R406 tables...we need to clean up the language to use back-up, secondary or supplemental but not all interchangeably. This includes changing table R406.2 option 2 from secondary to supplemental as well as some other editorial changes.

TABLE R406.2
FUEL NORMALIZATION CREDITS

TABLE R406.2 OPTION 1 (TAG Recommendation based on initial proposal to achieve targeted energy savings for the cycle)

System Type	Description of Primary Space Heating Sources	Credits	
		All Other	Group R-2 ^a

1	Combustion heating equipment meeting minimum federal efficiency standards for the equipment listed in Table C403.3.2(4) or C403.3.2(5)	0	0
<u>2</u>	For an initial heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(1)C or C403.3.2(2) or Air to water heat pump units that are configured to provide both heating and cooling and are rated in accordance with AHRI 550/590	1.0	1.0
<u>3</u>	For heating system based on electric resistance only (either forced air or Zonal)	-1.0	-1.0
<u>4</u>	For heating system based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	0.5	N/A
<u>5</u>	All other heating systems	-1	-0.5))
<u>1</u>	For combustion heating system using equipment meeting minimum federal efficiency standards for the equipment listed in Table C403.3.2(4) Table C403.3.2(5) or C403.3.2(5) C403.3.2(6)	<u>0</u>	<u>0</u>
<u>2</u>	For a primary heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(2) and secondary-supplemental heating provided by electric resistance or a combustion furnace meeting minimum standards listed in Table C403.3.2(4) ^b Table C403.3.2(5) ^b	<u>1.5</u>	<u>0</u>
<u>3</u>	For heating system based on electric resistance only (either forced air or zonal)	<u>0.5</u>	<u>-0.5</u>
<u>4^c</u>	For an initial a heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(4)C Table C403.3.2(9) or C403.3.2(2) or Air to water heat pump units that are configured to provide both heating and cooling and are rated in accordance with AHRI 550/590	<u>3.0</u>	<u>2.0</u>
<u>5</u>	For heating system based on electric resistance with: <u>1. Inverter-driven ductless mini-split heat pump system installed in the largest zone in the dwelling</u> or <u>2. With 2 kW or less total installed heating capacity per dwelling</u>	<u>2.0</u>	<u>0</u>

^a See Section R401.1 and *residential building* in Section R202 for Group R-2 scope.

^b The gas back-up furnace will operate as fan-only when the heat pump is operating. The heat pump shall operate at all temperatures above 38°F (3.3°C) (or lower). Below that "changeover" temperature, the heat pump would not operate to provide space heating. The gas furnace provides heating below 38°F ((3.3°C) (or lower).

^c Additional points for this HVAC system are included in Table R406.3.

(Also make these changes in Option 2)

TABLE R406.2 OPTION 2 (Post-TAG modifications to account for energy savings of other proposals to achieve the targeted energy reduction for the cycle)

System Type	Description of Primary Space Heating Sources	Credits	
		All Other	Group R-2 ^a
(1)	Combustion heating equipment meeting minimum federal efficiency standards for the equipment listed in Table C403.3.2(4) or C403.3.2(5)	0	0
2	For an initial heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(1)C or C403.3.2(2) or Air to water heat pump units that are configured to provide both heating and cooling and are rated in accordance with AHRI 550/590	1.0	1.0
3	For heating system based on electric resistance only (either forced air or Zonal)	-1.0	-1.0
4	For heating system based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	0.5	N/A
5	All other heating systems	-1	-0.5))
<u>1</u>	For combustion heating system using equipment meeting minimum federal efficiency standards for the equipment listed in Table C403.3.2(4) Table C403.3.2(5) or C403.3.2(5)- C403.3.2(6)	<u>-3.0</u>	<u>0</u>
<u>2</u>	For a primary heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(2) and secondary-supplemental heating provided by electric resistance or a combustion furnace meeting minimum standards listed in Table Table C403.3.2(4)^b Table C403.3.2(5)^b	<u>0</u>	<u>0</u>
<u>3</u>	For heating system based on electric resistance only (either forced air or zonal)	<u>-1.0</u>	<u>-0.5</u>
<u>4^c</u>	For an initial a heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(1)C Table C403.3.2(9) or C403.3.2(2) or Air to water heat pump units that are configured to provide both heating and cooling and are rated in accordance with AHRI 550/590	<u>1.5</u>	<u>2.0</u>
<u>5</u>	For heating system based on electric resistance with: 1. <u>Inverter-driven ductless mini-split heat pump system installed in the largest zone in the dwelling</u> or 2. <u>With 2 kW or less total installed heating capacity per dwelling</u>	<u>0.5</u>	<u>0</u>

^d See Section R401.1 and *residential building* in Section R202 for Group R-2 scope.

- ^e The gas back-up furnace will operate as fan-only when the heat pump is operating. The heat pump shall operate at all temperatures above 38°F (3.3°C) (or lower). Below that "changeover" temperature, the heat pump would not operate to provide space heating. The gas furnace provides heating below 38°F (3.3°C) (or lower).
- ^f Additional points for this HVAC system are included in Table R406.3.

- Add point value for R406 Option 3.9 in Option 2 and correct the footnote reference.

<u>3.9^c</u>	<u>Connected thermostat meeting ENERGY STAR Certified Smart Thermostats/EPA ENERGY STAR specifications.</u>	<u>0.5</u>	<u>0.5</u>
<u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the thermostat model.</u>			

^c Option 3.9 can only be taken with Options 3.1 and ~~3.23.3~~.

Amend Footnote b to read:

OPTION 1: "Option 3.8 can only be taken with option 3.1 or 3.2. To qualify to claim option 3.8 with 3.2, the system shall be a 1-2 speed heat pump system. Variable capacity heat pumps are ineligible from claiming this option."

<u>3. HIGH EFFICIENCY HVAC EQUIPMENT OPTIONS</u>				
<u>Only one option from Items 3.1 through 3.7 may be selected in this category.</u>				
<u>3.1^a</u>	<u>Energy Star rated (U.S. North) Gas or propane furnace with minimum AFUE of 95%</u>	<u>1.0</u>	<u>N/A</u>	<u>1.0</u>
	<u>or</u>			

	<p><u>Energy Star rated (U.S. North) Gas or propane boiler with minimum AFUE of 90%.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>			
<u>3.2^a</u>	<p><u>Air-source centrally ducted heat pump with minimum HSPF of 9.5.</u></p> <p><u>In areas where the winter design temperature as specified in Appendix RC is 23°F or below, a cold climate heat pump found on the NEEP cc ASHP qualified product list shall be used.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>	<u>N/A</u>	<u>0.5</u>	<u>N/A</u>
<u>3.3^a</u>	<p><u>Closed-loop ground source heat pump; with a minimum COP of 3.3</u></p> <p><u>or</u></p> <p><u>Open loop water source heat pump with a maximum pumping hydraulic head of 150 feet and minimum COP of 3.6.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>	<u>N/A</u>	<u>1.5</u>	<u>1.0</u>
<u>3.4</u>	<p><u>Ductless mini-split heat pump system, zonal control: In homes where the primary space heating system is zonal electric heating, a ductless mini-split heat pump system with a minimum HSPF of 10.0 shall be installed and provide heating to the largest zone of the housing unit.</u></p>	<u>N/A</u>	<u>1.5</u>	<u>2.0</u>

	<p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>			
3.5 ^a	<p><u>Air-source, centrally ducted heat pump with minimum HSPF of 11.0.</u></p> <p><u>A centrally ducted air source cold climate variable capacity heat pump (cc VHP) found on the NEEP cc VCHP qualified product list with a minimum of 10 HSPF may be used to satisfy this requirement.</u></p> <p><u>In areas where the winter design temperature as specified in Appendix RC is 23°F or below, an air source centrally ducted heat pump shall be a cold climate variable capacity heat pump as listed on the NEEP qualified product list.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>	N/A	1.0	N/A
3.6 ^a	<p><u>Ductless split system heat pumps with no electric resistance heating in the primary living areas. A ductless heat pump system with a minimum HSPF of 10 shall be sized and installed to provide heat to entire dwelling unit at the design outdoor air temperature.</u></p> <p><u>Exception:</u> <u>In homes with total heating loads of 24,000 or less using multi-zone mini-split systems with nominal ratings of 24,000 or less, the minimum HSPF to claim this credit shall be 9 HSPF.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected, the heated floor area calculation, the heating equipment type(s), the minimum equipment efficiency, and total installed heat capacity (by equipment type).</u></p>	N/A	2.0	3.0

3.7 ^a	<u>Air-to-water heat pump with minimum COP of 3.2 at 47°F, rated in accordance with AHRI 550/590 by an accredited or certified testing lab.</u> <u>To qualify to claim this credit, the building permit drawings shall specify the option being selected, the heated floor area calculation, the heating equipment type(s), the minimum equipment efficiency, and total installed heat capacity (by equipment type).</u>	N/A	1.0	N/A
3.8 ^c	<u>Connected thermostat meeting ENERGY STAR Certified Smart Thermostats/EPA ENERGY STAR specifications.</u> <u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the thermostat model.</u>	0.5	0.5	0.5

OPTION 2: “For 3.3....Option 3.9 can only be taken with option 3.1 or 3.3. To qualify to claim option 3.9 with 3.3, the system shall be a 1-2 speed heat pump system. Variable capacity heat pumps are ineligible from claiming this option.”

<p><u>3. HIGH EFFICIENCY HVAC EQUIPMENT OPTIONS</u></p> <p><u>Only one option from Items 3.1 through 3.8 may be selected in this category.</u></p>				
3.1 ^a	<u>For a System Type 1 in Table R406.2:</u> <u>Energy Star rated (U.S. North) gas or propane furnace with minimum AFUE of 95%.</u> <u>or</u> <u>Energy Star rated (U.S. North) gas or propane boiler with minimum AFUE of 90%</u>	1.0	1.0	

	<p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>		
3.2 ^a	<p><u>For secondary heating system serving System Type 2 in Table R406.2:</u></p> <p><u>Energy Star rated (U.S. North) Gas or propane furnace with minimum AFUE of 95%</u></p> <p><u>or</u></p> <p><u>Energy Star rated (U.S. North) Gas or propane boiler with minimum AFUE of 90%.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>	<u>0.5</u>	<u>0.5</u>
3.3 ^{a,d}	<p><u>Air-source centrally ducted heat pump with minimum HSPF of 9.5.</u></p> <p><u>In areas where the winter design temperature as specified in Appendix RC is 23°F or below, a cold climate heat pump found on the NEEP cc ASHP qualified product list shall be used.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>	<u>0.5</u>	<u>N/A</u>
3.4 ^{a,d}	<p><u>Closed-loop ground source heat pump; with a minimum COP of 3.3</u></p> <p><u>or</u></p> <p><u>Open loop water source heat pump with a maximum pumping hydraulic head of 150 feet and minimum COP of 3.6.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>	<u>1.5</u>	<u>1.0</u>
3.5 ^d	<p><u>Ductless mini-split heat pump system, zonal control: In homes where the primary space heating system is zonal electric heating, a ductless mini-</u></p>	<u>1.5</u>	<u>2.0</u>

	<p><u>split heat pump system with a minimum HSPF of 10.0 shall be installed and provide heating to the largest zone of the housing unit.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>		
3.6 ^{a,d}	<p><u>Air-source, centrally ducted heat pump with minimum HSPF of 11.0.</u></p> <p><u>A centrally ducted air source cold climate variable capacity heat pump (cc VHP) found on the NEEP cc VCHP qualified product list with a minimum of 10 HSPF may be used to satisfy this requirement.</u></p> <p><u>In areas where the winter design temperature as specified in Appendix RC is 23°F or below, an air source centrally ducted heat pump shall be a cold climate variable capacity heat pump as listed on the NEEP qualified product list.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</u></p>	1.0	N/A
3.7 ^{a,d}	<p><u>Ductless split system heat pumps with no electric resistance heating in the primary living areas. A ductless heat pump system with a minimum HSPF of 10 shall be sized and installed to provide heat to entire dwelling unit at the design outdoor air temperature.</u></p> <p><u>Exception:</u> <u>In homes with total heating loads of 24,000 or less using multi-zone mini-split systems with nominal ratings of 24,000 or less, the minimum HSPF to claim this credit shall be 9 HSPF.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected, the heated floor area calculation, the heating equipment type(s), the minimum equipment efficiency, and total installed heat capacity (by equipment type).</u></p>	2.0	3.0
3.8 ^{a,d}	<p><u>Air-to-water heat pump with minimum COP of 3.2 at 47°F, rated in accordance with AHRI 550/590 by an accredited or certified testing lab.</u></p> <p><u>To qualify to claim this credit, the building permit drawings shall specify the option being selected, the heated floor area calculation, the heating</u></p>	1.0	N/A

	<u>equipment type(s), the minimum equipment efficiency, and total installed heat capacity (by equipment type).</u>		
3.9 ^c	<u>Connected thermostat meeting ENERGY STAR Certified Smart Thermostats/EPA ENERGY STAR specifications.</u> <u>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the thermostat model.</u>	0.5	0.5

~~((R403.3.2.1))~~ **R403.3.4.1 Sealed air handler ~~and location~~.** Air handlers shall have a manufacturer's designation for an air leakage of no more than 2 percent of the design air flow rate when tested in accordance with ASHRAE 193. ~~Air handlers shall be located in the conditioned space.~~

WAC 51-11R-40211 Table ((R402.1.1)) R402.1.2—Insulation and fenestration requirements by component. TABLE ((R402.1.1)) R402.1.2

INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a	
<u>CLIMATE ZONE 5 AND MARINE 4</u>	
<u>Fenestration U-factor^b</u>	0.28 0.30
<u>Skylight U-factor</u>	0.50
<u>Ceiling U-factor</u>	0.024
<u>Above-Grade Wall U-factor</u>	0.056
<u>Floor U-factor</u>	0.029
<u>Slab on Grade F-factor</u>	0.54
<u>Below Grade 2' Depth</u>	
<u>Wall U-factor</u>	0.042

<u>CLIMATE ZONE 5 AND MARINE 4</u>	
<u>Slab F-factor</u>	<u>0.59</u>
<u>Below Grade 3.5' Depth</u>	
<u>Wall U-factor</u>	<u>0.040</u>
<u>Slab F-factor</u>	<u>0.56</u>
<u>Below Grade 7' Depth</u>	
<u>Wall U-factor</u>	<u>0.035</u>
<u>Slab F-factor</u>	<u>0.50</u>

WAC 51-11R-40213 Table R402.1.3—((Equivalent U-factors)) Insulation minimum R-values and fenestration requirements by components.

**TABLE R402.1.3
INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENTS***

<u>Climate Zone 5 and Marine 4</u>	
<u>Fenestration^{b,j} U-Factor</u>	0.28 <u>0.30</u>
<u>Skylight^b U-Factor</u>	<u>0.50</u>
<u>Ceiling^e R-Value</u>	<u>60</u>
<u>Wood Frame Wall^{g,i} R-Value</u>	<u>20+5 or 13+10</u>
<u>Floor R-Value</u>	<u>30</u>
<u>Below-Grade Wall^{c,h} R-Value</u>	<u>10/15/21 int + 5TB</u>
<u>Slab^{d,f} R-Value and Depth</u>	<u>10, 4 ft.</u>

R402.4.1.3.1 Dwelling unit leakage rate. The maximum air leakage rate for any dwelling unit under any compliance path shall not exceed ~~3.0~~ **4.0**

air changes per hour. Testing shall be conducted with a blower door test at a test pressure of 0.2 inches w.g. (50 Pa).

EXCEPTION: *Additions* tested with the existing home having a combined maximum air leakage rate of 7 air changes per hour. To qualify for this exception, the date of construction of the existing dwelling must be prior to the 2009 Washington State Energy Code.