



# Northwest ENERGY STAR<sup>®</sup> Homes Program Requirements For Multi-family Homes (Three stories or fewer above grade)

**NWBOP1 MF**  
Gas and Heat Pump  
Heated Dwellings

This BOP was developed to provide construction guidelines for energy-efficient multi-family homes. Multi-family builders shall use these specifications and complete the Mandatory Requirements for all Qualified Homes, listed in Exhibit 4.

## Exhibit 1: Northwest ENERGY STAR Homes BOP1 - Consistent Elements for All Dwellings

Heating & Cooling Equipment									
Heating equipment shall meet the following efficiency levels: <ul style="list-style-type: none"> <li>• ≥ 85 AFUE gas furnace, boiler or unit heater</li> <li>• ≥ 8.5 HSPF / 14 SEER / 12 EER air-source, package terminal or mini-split heat pump</li> </ul> Cooling-only equipment shall meet the following efficiency level: <ul style="list-style-type: none"> <li>• ≥ 13 SEER</li> </ul>									
Envelope, Windows & Doors									
Walls:									
• Heating zone 4	Above Grade: ≥ R-21 Intermediate framed <b>AND</b> achieve Grade I installation per RESNET standards <sup>3</sup>								
	Below Grade: ≥ R-21 Intermediate framed <b>AND</b> achieve Grade I installation per RESNET standards <sup>3</sup>								
• Heating zones 5 & 6	Above Grade: ≥ R-21 + R-5 exterior Intermediate framed <b>AND</b> achieve Grade II installation per RESNET standards <sup>3</sup>								
	Below Grade: ≥ R-21 + R-5 exterior Intermediate framed <b>AND</b> achieve Grade II installation per RESNET standards <sup>3</sup>								
Ceiling:	≥ R-60 with ≥ R-21 at ceiling edge								
Floor:	≥ R-38								
Slab:	≥ R-15 2' perimeter insulation with minimum R-5 thermal break. Insulation must extend from the top of slab for a total distance ≥ 2ft. vertical, horizontal, or combined								
Infiltration:	≤ 4 ACH <sub>50</sub>								
Windows:	≤ 0.30 U-Value								
Skylights:	≤ 0.40 U-Value <sup>4, 5, 6</sup>								
Doors:	R-5, One door up to 28 sq. ft. exempt								
Buildings with total window-to-floor area (WFA) greater than 21% shall have adjusted U-Values as outlined in Footnote 5									
Water Heating									
DHW equipment shall meet the following efficiency requirements:									
Natural Gas	0.61	Gas commercial tank water heaters may be used if they have standby losses that do not exceed the following (Btu/hr):							
Electric <sup>13</sup>	0.93	Gallons	70-74	75-79	80-84	85-89	90-94	95-99	100+
		Max Standby Losses	930	960	980	1010	1030	1060	1080
Ventilation, Thermostat & Ductwork									
<ul style="list-style-type: none"> <li>• All ducts in unconditioned space shall have insulation ≥ R-8</li> <li>• Total duct leakage shall be ≤ 0.06 CFM50 per ft<sup>2</sup> of conditioned floor area or ≤ 75 CFM50, whichever is greater<sup>7</sup></li> <li>• Exhaust ventilation equipment must be ENERGY STAR qualified<sup>8</sup></li> <li>• Whole-house mechanical ventilation system must be designed and installed in accordance with local code <b>OR</b> ASHRAE Standard 62.2-2010, whichever is more stringent; <b>AND</b> must also be ENERGY STAR qualified Exhaust<sup>8</sup> <b>OR</b> HRV<sup>9</sup></li> </ul>									
Lighting, Appliances & Fixtures									
<ul style="list-style-type: none"> <li>• All builder-installed appliances and exhaust fans<sup>10</sup> shall be ENERGY STAR qualified</li> <li>• ENERGY STAR qualified CFLs or pin-based lighting in 90% of fixtures<sup>11</sup>, <b>OR</b> use any efficient light source and lighting design to reach 0.59 Watts per square foot, while meeting the requirements outlined in Footnote 12</li> <li>• Low-flow fixtures: 1.75 gpm showerheads<sup>13</sup></li> </ul>									



# Northwest ENERGY STAR<sup>®</sup> Homes Program Requirements For Multi-family Homes (Three stories or fewer above grade)

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**Qualifying Homes**

Multi-family homes in WA, OR, ID and MT may earn the ENERGY STAR label using the following ENERGY STAR Prescriptive Path. Note that compliance with these guidelines is not intended to imply compliance with all local code requirements that may be applicable to the units to be built. The following types of units are eligible to earn the ENERGY STAR under the Northwest ENERGY STAR “low-rise multi-family” Program:

- In buildings with 3 stories or fewer above grade, and with 3 or more total units, and with one or more horizontal surfaces that separate units, OR
- In buildings with 3 stories or fewer above grade, and with 5 or more total units, and with one or more vertical surfaces that separate units.

**Mandatory Requirements for All ENERGY STAR Qualified Homes**

All ENERGY STAR Qualified Multi-family buildings must meet the requirements of the checklists in Exhibit 4. The Water Management System builder checklist is not required for homes that also qualify for Indoor airPLUS.<sup>16</sup>

**Exhibit 4: Mandatory Requirements for All Qualified Homes**

Checklist
<ul style="list-style-type: none"> <li>• Thermal Enclosure System Verifier Checklist</li> </ul>
<ul style="list-style-type: none"> <li>• HVAC System Quality Installation Contractor and Verifier Checklists</li> </ul>
<ul style="list-style-type: none"> <li>• Water Management System Builder Checklist<sup>16</sup></li> </ul>

**Effective Date**

Any multi-family unit permitted after 1/1/2013 shall use this version of the guidelines to earn the ENERGY STAR for homes label. For more details regarding the effective date of this BOP, please reference Exhibit 5 below.

**Exhibit 4: Specification Timeline**

**Northwest ENERGY STAR<sup>®</sup> Homes Specification Timeline for Low-Rise Multi-Family Homes**

Permit Date <sup>2</sup>	Date of Final Inspection <sup>1</sup>			
	1/1/2013	7/1/2013	1/1/2013	7/1/2013
<b>Before 1/1/2013</b>	Interim MF BOP		MF NW BOP 1 & 2	
<b>On or after 1/1/2013</b>	MF NW BOP 1 & 2			
<div style="display: flex; justify-content: space-between;"> <div style="background-color: #cccccc; padding: 2px 5px; font-weight: bold;">Interim MF BOP</div> <div>Interim MF BOP may still be used if the home was permitted before January 1, 2013 and will be complete prior to July 1, 2013.</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="background-color: #00aaff; padding: 2px 5px; font-weight: bold; color: white;">MF NW BOP 1 &amp; 2</div> <div>MF NW BOP 1 &amp; 2 must be used for homes permitted on or after January 1, 2013.</div> </div>				

1. The date of the final inspection for the home (i.e., the date at which all of the field inspections are complete for the home and data is entered into the Northwest ENERGY STAR Homes database, not necessarily the date when the label is issued).
2. The Verifier may define the “permit date” as either the date that the permit was issued, the date of the contract on the home, or the date the home was initiated in the Northwest ENERGY STAR Homes database.



# Northwest ENERGY STAR Homes Notes

1. Where requirements of the local codes, manufacturers' installation instructions, engineering documents, or regional ENERGY STAR programs overlap with the requirements of these guidelines, EPA offers the following guidance:
  - a) In cases where the overlapping requirements exceed the ENERGY STAR guidelines, these overlapping requirements shall be met;
  - b) In cases where overlapping requirements conflict with a requirement of these ENERGY STAR guidelines (e.g., slab insulation is prohibited to allow visual access for termite inspections), then the conflicting requirement within these guidelines shall not be met. Qualification shall only be allowed if the rater has determined that no equivalent option is available that could meet the intent of the conflicting requirement of these ENERGY STAR guidelines (e.g., switching from exterior to interior slab edge insulation).

2. Climate Zones based on 2009 IECC Figure 301.1. Homes with heat pumps shall have an HSPF  $\geq$  8.5 which exceeds the ENERGY STAR minimum of 8.2 HSPF.
3. Insulation levels in a home shall meet or exceed those specified in the relevant state energy code. Note that the U-factor for steel-frame envelope assemblies shall be calculated using the ASHRAE zone method or Washington State Energy Code Table 10-5A. Additionally, reduction of ceiling insulation in space-constrained roof/ceiling assemblies shall be limited to 500 ft<sup>2</sup> or 20% of ceiling area, whichever is less. Finally, slab insulation shall extend to the top of the slab to provide a complete thermal break.

Insulation shall be verified by a Building Performance Specialist (BPS) to achieve Grade I installation as defined in the RESNET Standards, except for wall framing systems with rigid insulation sheathing. For such homes, Grade II installation is acceptable for the cavity insulation.

4. All windows, doors, and skylights shall meet ENERGY STAR Program Requirements for Residential Windows, Doors, and Skylights – Version 5.0 as outlined at [www.energystar.gov/windows](http://www.energystar.gov/windows) except fenestration utilized as part of a passive solar design. These windows shall be facing within 15 degrees of true south and directly coupled to thermal storage mass that has a heat capacity > 20 btu/ft<sup>3</sup>xoF and provided in a ratio of at least 3 sq. ft per sq. ft. of south facing fenestration. Generally, thermal mass materials will be at least 2" thick. Also, note that the U-Value and SHGC for doors apply to the whole door, not just to the glazing portion.
5. All decorative glass and skylight window areas count toward the total window area to above-grade conditioned floor area (WFA) ratio. For homes using the Prescriptive Path that have a WFA ratio >21%, an improved window U-Value is required and is determined by:

$$\text{Improved U-Value} = [0.21 / \text{WFA}] \times [\text{ENERGY STAR U-Value}]$$

where the ENERGY STAR U-Value is the maximum allowable U-Value in the Northwest ENERGY STAR BOP 1, Exhibit 1. For example, for a home built to the BOP, with a WFA of 24%:

$$\text{Improved U-Value} = [0.21 / 0.24] \times 0.30$$

$$\text{Improved U-Value} = 0.26$$

Conditioned Floor Area for calculation of Window to Floor Area (WFA) shall include conditioned basements. Conditioned basements are defined by Northwest ENERGY STAR Homes as basements with rigid foam insulation or insulation that is installed in a furred out wall assembly and that meet vapor permeability and bulk water protection as defined in the Water Management System Builder Checklist. Attached garages shall not be included in the CFA.

6. Up to 0.75% WFA may be used for decorative glass that does not meet ENERGY STAR requirements. For example, a home with total above-grade conditioned floor area of 2,000 sq. ft. may have up to 15 sq. ft. (0.75% of 2,000) of decorative glass.
7. Certification of a duct system under the Northwest ENERGY STAR Homes program is consistent with the Performance Tested Comfort Systems® (PTCS®) specifications and requires testing of each system. A PTCS certified technician shall complete the testing and certification process and shall provide documentation of the test results showing compliance with Northwest ENERGY STAR Home standards to the Program Verifier. For certification, the measured CFM50 shall not exceed 0.06 x floor area served by the system (in square feet) or 75 CFM50, whichever is greater, and the factory-supplied air handler shall be in place at the time of the test, with the following exceptions:
  1. If both the ducts and equipment are located within the conditioned space, the system is exempted from the duct testing requirement. Up to five percent (5%) of the linear feet of the supply duct system and up to five percent (5%) of the linear feet of the return duct system may be located outside the thermal and/or air barriers of the house or in exterior cavities of the house.
  2. If the air handler is located completely within conditioned space, it is not required to be in place during the test.
  3. If the air handler is located in unconditioned space, it is not required to be in place during the test. However, the leakage limit shall be decreased to 0.04 x floor area served by the system (in square feet) or 50 CFM50, whichever is greater.
8. Commissioning is required when whole-house exhaust fan is used:
  - Using a flow hood or similar method that accurately measures airflow, verify that the minimum airflow required by ASHRAE Std 62.2 is met by the exhaust fan.
  - Verify that the timer on the exhaust fan is set to operate for at least the minimum amount of on time as set forth in ASHRAE Std 62.2.



# Northwest ENERGY STAR Homes Notes

9. Air-to-air H/ERV installations shall:
- Include documentation that units are installed according to manufacturer's instructions
  - Include a fully ducted (both supply and exhaust) ventilation system with both exhaust and supply airflow. A minimum rating of 65% sensible recovery efficiency (SRE) is required with the unit operating in its installed fan speed mode at 32 deg. F. Units shall be third party tested in accordance with C439-06
  - Be sized and set to operate in accordance to ASHRAE Std 62.2
  - A minimum fan efficacy of 1.33 cfm/W measured at the most typical operational flow rate
  - Supply air to at least one central location in the home. For maximum effectiveness, system should supply air to individual bedrooms as well as other general living spaces
  - Have an easily accessible filter. When such filter is not integral to the H/ERV, filters should be installed on the upstream side of the heat exchanger in the intake airstream
  - Provide protection against ice buildup that does not disable the unit during freezing weather
- Connections to the H/ERV shall be made with flexible connectors to reduce vibration. Ductwork shall be located within the conditioned envelope to the maximum extent possible. All ductwork located outside the conditioned building envelope, or between the outside wall and the H/ERV, shall also be fully insulated to R-8 minimum. All ducting should be adequately sealed and supported.
10. All exhaust fans shall be ENERGY STAR qualified, except in half bathrooms. A half-bathroom is any bathroom that does not contain a bathtub, shower, spa or similar source of moisture.
11. This requirement applies to RESNET-defined Qualifying Light Fixture Locations. Also note that the ENERGY STAR Advanced Lighting Package (ALP), which requires a minimum of 80% ENERGY STAR qualified hard-wired fixtures and 100% ENERGY STAR qualified ceiling fans, where installed, may also be used to comply with the lighting requirements.
12. When the Watts per square foot strategy is used, please use the Watts per Square Foot Tool (found here: <http://www.northwestenergystar.com/partners/home-verifiers?tid=36&=Apply>) to determine the home's lighting power density. The following guidelines must also be met:
- Every room in the home must have at least one hardwired light fixture
  - A wattage assumption of 64 must be used for all incandescent lamps
  - There are no wattage assumptions for LED or Xenon lights. Actual wattages must be used
  - Total home square footage includes the garage square footage
  - The Watts per Square Foot Tool must be submitted at time of verification
13. When a heat pump water heater is installed to meet this requirement, please refer to the Northern Climate Specification guidelines at: <http://neea.org/ourwork/documents/HPWHNorthernTierSpecFinal.pdf>, and NEEA's Heat Pump Water Heater (HPWH) Best Practices Installation Guide at: [http://www.smartwaterheat.org/HWH\\_BestPractices.pdf](http://www.smartwaterheat.org/HWH_BestPractices.pdf).
14. The term "Verifier" refers to the person completing the third-party inspections required for qualification. This party may be a certified Home Energy Rater, BOP Inspector or an equivalent designation that has been qualified by the State Certifying Organization.
15. A completed and signed Indoor airPLUS Verification Checklist may be submitted in lieu of the Water Management System checklist. Indoor airPLUS is a complimentary EPA label recognizing new homes equipped with a comprehensive set of Indoor Air Quality (IAQ) features. Indoor airPLUS verification can be completed by a Rater during the ENERGY STAR verification process. For more information, see [www.epa.gov/indoorairplus](http://www.epa.gov/indoorairplus).