ENERGY STAR Qualified Homes
Builder Option Package Notes

2004/2006 IECC Climate Zone[1] – 3	ENERGY STAR Window Zone[10] – South/Central

The requirements for the ENERGY STAR Builder Option Package (BOP) are specified in the table below.

To qualify as ENERGY STAR using this BOP, a home must meet the requirements specified, be verified and field-tested in accordance with the HERS Standards by a RESNET-accredited Provider, and meet all applicable codes.

Cooling Equipment (Where Provided)	Right-sized[2] ≥14 SEER/ 11.5 EER ENERGY STAR qualified A/C; OR Right-sized[2] ≥14 SEER/ 11.5 EER/ 8.2 HSPF ENERGY STAR qualified heat pump [3]	
Heating Equipment	≥80 AFUE gas furnace; OR ≥14 SEER/ 11.5 EER/ 8.2 HSPF ENERGY STAR qualified heat pump [2, 3] ; OR ≥80 AFUE boiler; OR ≥80 AFUE oil furnace	
Thermostat [3]	ENERGY STAR qualified thermostat (except for zones with mass radiant heat)	
Ductwork	Leakage [4] : ≤ 4 cfm to outdoors / 100 sq. ft.; AND Insulation [5] : ≥ R-6 insulation on ducts in unconditioned spaces	
Envelope	≤ 6 ACH50	Infiltration [6,7]
	≤ Reference UA ≥ 30 R-Value ≥ 30 R-Value ≥ 13 R-Value ≥ 19 R-Value ≥ 5 R-Value ≥ 13 R-Value None required None required None required	UA Alternative Approach [8]; OR Ceiling Insulation [8]; AND (if applicable) Cathedral Ceiling Insulation [8]; AND (if applicable) Wood Frame Wall Insulation [8]; AND (if applicable) Floor Over Unconditioned Space Insulation [8]; AND (if applicable) Crawlspace Wall Insulation Continuous [8]; OR (if applicable) Crawlspace Wall Insulation Framed [8]; AND (if applicable) Basement Wall Insulation Continuous [8]; OR (if applicable) Basement Wall Insulation Framed [8]; AND (if applicable) Slab Insulation [8]; AND
	Completed Thermal Bypass Inspection Checklist [9]	
Windows [10,11,12]	≤ 0.40 U-Value ≤ 0.40 SHGC	
Water Heater [13]	Gas (EF): 40 Gal = 0.61 | 60 Gal = 0.57 | 80 Gal = 0.53 Electric (EF): 40 Gal = 0.93 | 50 Gal = 0.92 | 80 Gal = 0.89 Oil or Gas [14]: Integrated with space heating boiler	
Lighting and Appliances [15,16]	Five or more ENERGY STAR qualified appliances, light fixtures, ceiling fans equipped with lighting fixtures, and/or ventilation fans	

Energy Savings Values and associated average monthly savings are provided at the end of this document for the purpose of applying for an energy efficient mortgage. [17]

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1. The appropriate climate zone shall be determined by the 2004 International Residential Code (IRC), Figure N1101.2.
2. Cooling equipment shall be sized according to the latest editions of ACCA Manuals J and S, ASHRAE 2001 Handbook of Fundamentals, or an equivalent procedure. Maximum oversizing limit for air conditioners and heat pumps is 15% (with the exception of heat pumps in Climate Zones 5 - 8, where the maximum oversizing limit is 25%). The following operating conditions shall be used in the sizing calculations and verified where reviewed by the rater:

   Outdoor temperatures shall be the 99.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the home's location or most representative city for which design temperature data are available. Note that a higher outdoor air design temperature may be used if it represents prevailing local practice by the HVAC industry and reflects extreme climate conditions that can be documented with recorded weather data; Indoor temperatures shall be 75 F for cooling; Infiltration rate shall be selected as "tight", or the equivalent term.

   In specifying equipment, the next available size may be used. In addition, indoor and outdoor coils shall be matched in accordance with ARI standards.
3. Homes with heat pumps in Climate Zones 4 and 5 must have an HSPF ≥ 8.5, which exceeds the ENERGY STAR minimum of 8.2 HSPF. Homes with heat pumps in Climate Zones 6, 7, and 8 cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements. In homes with heat pumps that have programmable thermostats, the thermostat must have "Adaptive Recovery" technology to prevent the excessive use of electric back-up heating.
4. Ducts must be sealed and tested to be ≤ 4 cfm to outdoors / 100 sq. ft. of conditioned floor area, as determined and documented by a RESNET-certified rater using a RESNET-approved testing protocol. If *total* duct leakage is ≤ 4 cfm to outdoors / 100 sq.ft. of conditioned floor area, then leakage to outdoors does not need to be tested. Duct leakage testing can be waived if all ducts and air handling equipment are located in conditioned space (i.e., within the home's air and thermal barriers) AND the envelope leakage has been tested to be ≤ 3 ACH50 OR ≤ 0.25 CFM 50 per sq. ft. of the building envelope. Note that mechanical ventilation will be required in this situation.
5. EPA recommends, but does not require, locating ducts within conditioned space (i.e., inside the air and thermal barriers), and using a minimum of R-4 insulation for ducts inside conditioned space to prevent condensation.
6. Envelope leakage must be determined by a RESNET-certified rater using a RESNET-approved testing protocol.
7. To ensure consistent exchange of indoor air, whole-house mechanical ventilation is recommended, but not required.
8. Insulation levels of a home must meet or exceed Sections N1102.1 and N1102.2 of the 2004 IRC. These sections allow for compliance to be determined by meeting prescriptive insulation requirements, by using U-factor alternatives, or by using a total UA alternative. These sections also provide guidance and exceptions that may be used. However, note that the U-factor for steel-frame envelope assemblies addressed in Section N1102.2.4 shall be calculated using the ASHRAE zone method, or a method providing equivalent results, and not a series-parallel path calculation method as is stated in the code. Additionally, Section N1102.2.2, which allows for the reduction of ceiling insulation in space constrained roof/ceiling assemblies, shall be limited to 500 sq. ft. or 20% of ceiling area, whichever is less. In all cases, insulation shall be inspected to Grade I installation as defined in the RESNET Standards by a RESNET-certified rater, with the following exceptions:
   i. Rim/Band Joists - the interior sheathing/enclosure material is optional in all climate zones, provided insulation is adequately supported and meets all other requirements.
   ii. Wall Insulation - the interior sheathing/enclosure material is optional in climate zones 1-3, provided insulation is adequately supported and meets all other requirements.
   iii. Sealed, Unvented Attic/Roof Assemblies - the interior sheathing/enclosure material is optional in climate zones 1-3, provided insulation is adequately supported and meets all other requirements, including full contact with the exterior (roof) sheathing.
   iv. Floor insulation over unconditioned basements or enclosed crawlspaces, either vented or unvented, need not be enclosed (though floor insulation over ambient conditions does).

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.Note that the fenestration requirements of the 2004 IRC do not apply to the fenestration requirements of the National Builder Option Package. Therefore, if UA calculations are performed, they must use the IRC requirements (with the exception of fenestration) plus the fenestration requirements contained in the national BOP. For more information, refer to the "Codes and Standards Information" document.

9. The Thermal Bypass Inspection Checklist must be completed for homes to earn the ENERGY STAR label. The Checklist requires visual inspection of framing areas where air barriers are commonly missed and inspection of insulation to ensure proper alignment with air barriers, thus serving as an extra check that the air and thermal barriers are continuous and complete.
10. All windows and skylights must be ENERGY STAR qualified or meet all specifications for ENERGY STAR qualified windows. Windows in Climate Zones 2 and 4 must exceed ENERGY STAR specifications (CZ 2: U-value $\leq$ 0.55 and SHGC $\leq$ 0.35; CZ 4: U-value ≤ 0.40 and SHGC $\leq$ 0.45). Visit www.energystar.gov/windows for more information on ENERGY STAR qualified windows.
11. All decorative glass and skylight window area counts toward the total window area to above-grade conditioned floor area (WFA) ratio. For homes with a WFA ratio >18%, the following additional requirements apply:
    a. In IRC Climate Zones 1, 2, and 3, an improved window SHGC is required, and is determined by:

       Required SHGC = [0.18 / WFA] x [ENERGY STAR SHGC]

       Where the ENERGY STAR SHGC is the minimum required SHGC of the climate-appropriate window specified in this BOP.

    b. In IRC Climate Zones 4, 5, 6, 7, and 8, an improved window U-Value is required, and is determined by:

       Required U-Value = [0.18 / WFA] x [ENERGY STAR U-Value]

       Where the ENERGY STAR U-Value is the minimum required U-Value of the climate-appropriate window specified in this BOP.
12. 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.
13. To determine domestic hot water (DHW) EF requirements for additional tank sizes, use the following equations:

    Gas DHW EF ≥ 0.69 - (0.002 x Tank Gallon Capacity); Electric DHW EF ≥ 0.97 - (0.001 x Tank Gallon Capacity).
14. In homes with gas or oil hydronic space heating, water heating systems must have an efficiency ≥ 0.78 EF. This may be met through the use of an instantaneous water heating system or an indirect storage system with a boiler that has a system efficiency ≥ 85 AFUE. Homes with tankless coil hot water heating systems cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements.
15. Any combination of ENERGY STAR qualified products listed may be installed to meet this requirement. ENERGY STAR qualified ventilation fans include range hood, bathroom, and inline fans. ENERGY STAR qualified lighting fixtures installed in the following locations shall not be counted: storage rooms (e.g., closets, pantries, sheds), or garages. Eligible appliances include ENERGY STAR qualified refrigerators, dish washers, and washing machines. Further efficiency and savings can be achieved by installing ENERGY STAR qualified products, in addition to those required (e.g., additional lighting, appliances, etc.).
16. Efficient lighting fixtures represent a significant opportunity for persistent energy savings and a meaningful way to differentiate ENERGY STAR qualified homes from those meeting minimum code requirements. In 2008, EPA intends to propose and solicit industry comments on adding the ENERGY STAR Advanced Lighting Package (ALP) as an additional requirement for ENERGY STAR qualified homes in 2009. To learn more about the ALP, refer to www.energystar.gov/homes.