ENERGY STAR Qualified Homes
Builder Option Package Notes

2004/2006 IECC Climate Zone [1] – 5	ENERGY STAR Window Zone [2] – North/Central

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

Home Address:_____City:_____State:_____

Building System	Inspection Guidelines		*Rater Verified*	*Must Correct*	*NA*
Cooling Equipment (Where Provided)	Right-sized [2] ≥ 13 SEER A/C; OR		☐	☐	☐
	Right-sized [2] ≥ 14.5 SEER/ 12 EER/ 8.5 HSPF ENERGY STAR qual. HP [3]		☐	☐	☐
Heating Equipment	≥ 90 AFUE gas furnace; OR		☐	☐	☐
	Right-sized [2] ≥ 14.5 SEER/ 12 EER/ 8.5 HSPF ENERGY STAR qual. HP [3]; OR		☐	☐	☐
	≥ 85 AFUE boiler; OR		☐	☐	☐
	≥ 85 AFUE oil furnace		☐	☐	☐
Thermostat [3]	ENERGY STAR qualified thermostat (except in 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	≤ 5 ACH50	Infiltration [6,7]	☐	☐	☐
	≤ Reference UA	UA Alternative Approach [8]; OR	☐	☐	☐
	≥ 38 R-Value	Ceiling Insulation [8]; AND (if applicable)	☐	☐	☐
	≥ 30 R-Value	Cathedral Ceiling Insulation [8]; AND (if app.)	☐	☐	☐
	≥ 19 R-Value	Wood Frame Wall Insulation [8]; OR (if app.)	☐	☐	☐
	≥ 13 + 5 R-Value	Wood Frame Wall Insulation and Sheathing[8]; AND (if app.)	☐	☐	☐
	≥ 30 R-Value	Floor Over Unconditioned Space Insulation [8]; AND (if app.)	☐	☐	☐
	≥ 10 R-Value	Crawlspace Wall Insulation Continuous [8]; OR (if app.)	☐	☐	☐
	≥ 13 R-Value	Crawlspace Wall Insulation Framed [8]; AND (if app.)	☐	☐	☐
	≥ 10 R-Value	Basement Wall Insulation Continuous [8]; OR (if app.)	☐	☐	☐
	≥ 13 R-Value	Basement Wall Insulation Framed [8]; AND (if app.)	☐	☐	☐
	≥ 10 R-Value	Slab Insulation [8]; AND	☐	☐	☐
	Completed Thermal Bypass Inspection Checklist [9]		☐	☐	☐
Windows [10,11,12]	≤ 0.40 U-Value		☐	☐	☐
	≤ 0.55 SHGC		☐	☐	☐
Water Heater [13,14]	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 [15]: Integrated with space heating boiler		☐	☐	☐
Lighting and Appliances [16,17]	Five or more ENERGY STAR qualified appliances, light fixtures, water heaters, ceiling fans equipped with lighting fixtures, and/or ventilation fans		☐	☐	☐

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2004/2006 IECC Climate Zone [1] – 5	ENERGY STAR Window Zone [2] – North/Central

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 air-source and ground-source heat pumps is 15% with the following two exceptions: single-speed air-source and ground-source heat pumps in buildings with heating loads that exceed cooling loads have a limit of 25% and multi-stage heat pumps do not have a strict limit, but should be sized to allow adequate humidity control in the cooling mode. 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.

   The stated efficiency requirements are aligned with the increased requirements for ENERGY STAR labeled central air conditioners and air-source heat pumps that went into effect as of January 1, 2009. Equipment manufactured before January 1 is still eligible to earn the ENERGY STAR based on the old performance level. Therefore, there will be a transition period when labeled equipment is commercially available at both the old and new performance levels. Builders must transition to equipment meeting these new ENERGY STAR requirements as stocks of equipment qualified at the old performance levels are exhausted.
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.

   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. More efficient water heating equipment can represent a significant opportunity for energy savings and a meaningful way to differentiate ENERGY STAR qualified homes from those with standard equipment. Selecting an ENERGY STAR qualified water heater not only satisfies the Water Heater efficiency requirements, but also counts toward the requirement for five or more ENERGY STAR qualified lighting products or appliances as detailed in the Lighting and Appliances guideline.

14. 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).

15. 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.

16. 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.).

17. 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. To learn more about the benefits of increasing the use of efficient fixtures through the installation of the ENERGY STAR Advanced Lighting Package (ALP), refer to www.energystar.gov/alp.