



North Carolina Affordable Housing Equivalent Program Instructions for Use



This program represents a prescriptive method for labeling new homes ENERGY STAR, equivalent to the performance of the ENERGY STAR Nation Builder Option Package. This program specifies levels and limitations for the thermal envelope (insulation and windows), HVAC and water heating equipment efficiencies for a specific climate zone. Requirements include a third-party verification, including testing the leakage of the envelope and duct system, to ensure the requirements have been met. Follow these steps to build an ENERGY STAR qualified home:

1. For homes that use a natural gas furnace, choose the climate zone appropriate Gas Heating Package. For homes that use an electric heatpump, choose the climate zone appropriate Heatpump Heating Package.
2. Select the desired package and build the home, following all of the equivalent program requirements. For clarification on certain items please read the attached "Footnotes" section.
3. Contact a Home Energy Rating System (HERS) or BOP Provider to get your home inspected and labeled ENERGY STAR. Providers can be located on the Partner Locator of the ENERGY STAR Web site at www.energystar.gov/homes.
4. The Provider will send a HERS Rater or BOP Inspector to verify the home meets or exceeds all requirements listed. Verification of the home typically includes testing the air leakage of the envelope and duct system, inspecting the insulation installation quality, and determining compliance with the Thermal Bypass Checklist. If the home complies with the requirements, the Rater or Inspector will sign and date the included sheet. This sheet is then filed with the HERS or BOP Provider for their records.
5. For home buyers interested in an energy efficient mortgage or ENERGY STAR mortgage, Fannie Mae requires estimated monthly energy cost savings. For this equivalent program, these estimates are determined using the monthly cost savings table below. To use this table:
 - Select the number of stories and home size that most closely fits the home being built and locate the estimated monthly savings, based on the appropriate heating fuel type.
 - Insert the estimated monthly cost savings in the appropriate line at the bottom of the program requirements sheet. Note that these estimated savings should NOT be used as basis for guaranteeing utility bills. This should only be done on a case by case basis with a qualified energy modeling tool.
 - Submit a copy of the signed program requirements sheet, which includes the estimated monthly cost savings, with your loan request forms.

| Estimated Monthly Cost Savings and Energy Savings Values Table for Energy Efficient Mortgages for North Carolina Affordable Housing Equivalent Program | | | | | | | | | | | | | | | | | | | |
|---|---------------|---------|---------|----------|---------|---------|------------|---------|---------|---------------|---------|---------|----------|---------|---------|------------|---------|---------|--|
| Number of Stories Above Grade: Foundation Type: | One Story | | | | | | | | | Two Story | | | | | | | | | |
| | Slab-on-grade | | | Basement | | | Crawlspace | | | Slab-on-grade | | | Basement | | | Crawlspace | | | |
| Total Conditioned Floor Area: | 1,000 | 2,000 | 2,500 | 1,000 | 2,000 | 2,500 | 1,000 | 2,000 | 2,500 | 1,500 | 2,500 | 3,500 | 1,500 | 2,500 | 3,500 | 1,500 | 2,500 | 3,500 | |
| Estimated Monthly Energy Savings For | | | | | | | | | | | | | | | | | | | |
| Gas Heating Packages: | \$10 | \$10 | \$15 | \$10 | \$15 | \$20 | \$10 | \$20 | \$20 | \$20 | \$30 | \$40 | \$20 | \$30 | \$40 | \$20 | \$35 | \$45 | |
| Electric Heatpump Heating Packages: | \$5 | \$5 | \$10 | \$5 | \$10 | \$10 | \$5 | \$10 | \$10 | \$10 | \$15 | \$20 | \$10 | \$15 | \$20 | \$10 | \$15 | \$25 | |
| Estimated Energy Savings Values For | | | | | | | | | | | | | | | | | | | |
| Gas Heating Packages: | \$1,450 | \$1,450 | \$2,150 | \$1,450 | \$2,150 | \$2,900 | \$1,450 | \$2,900 | \$2,900 | \$2,900 | \$4,350 | \$5,800 | \$2,900 | \$4,350 | \$5,800 | \$2,900 | \$5,050 | \$6,500 | |
| Electric Heatpump Heating Packages: | \$700 | \$700 | \$1,450 | \$700 | \$1,450 | \$1,450 | \$700 | \$1,450 | \$1,450 | \$1,450 | \$2,150 | \$2,900 | \$1,450 | \$2,150 | \$2,900 | \$1,450 | \$2,150 | \$3,600 | |



Climate Zone 3 North Carolina Affordable Housing Equivalent Program^{1,2} ENERGY STAR Requirements

Only detached homes in the following counties can use the North Carolina Affordable Housing Equivalent Program –
Anson, Beaufort, Bladen, Cabarrus, Camden, Carteret, Chowan, Columbus, Craven, Cumberland, Currituck, Dare, Davidson, Duplin, Edgecombe,
Gaston, Greene, Hoke, Hyde, Johnston, Jones, Lenoir, Martin, Mecklenburg, Montgomery, Moore, New Hanover, Pamlico, Pasquotank, Pender,
Perquimans, Pitt, Randolph, Richmond, Robeson, Rowan, Sampson, Scotland, Stanly, Tyrrell, Union, Washington, Wilson

| Package Number | Exterior Wall Framing Type | Window Requirements | | | Minimum Insulation Requirements ^{3,4} | | | | | | | | Minimum Equipment Requirements ⁵ | | | | | | |
|----------------------------------|----------------------------|------------------------------|----------------|--------------------------|--|--------------------------------|--------------------------------------|-------------------------------|------|------------|---------------|--|---|---|-------------------------|---|---|---|--------------------------|
| | | Max Window Area ⁶ | Window U-value | Window SHGC ⁷ | Attic | Cathedral Ceiling ⁸ | Max % Cathedral Ceiling ⁹ | Exterior Wall ^{8,13} | Slab | Bsmt. Wall | Crawlsp. Wall | Floor Over Unconditioned or Exterior Space | Furnace Heating (AFUE or HSPF) | DHW ¹⁰ (Elec EF or Fuel EF for 40g tank) | Electric Cooling (SEER) | Infiltration ^{11,12} (ACH50, blower door tested) | Duct Leakage ¹³ [CFM of system flow to the outside at 25 Pa] / [100 square feet of conditioned floor space] Field Verified | Number of Compact Fluorescent Lighting Fixtures | ENERGY STAR Refrigerator |
| Gas Heating Package | | | | | | | | | | | | | | | | | | | |
| 1 | 2x4 | 15% | <= 0.35 | <= 0.38 | R- 38 | R- 30 | 10% | R- 15 | R- 0 | R- 15 | R- 7 | R- 19 | 90% | 0.61 | 13 | 6 | 3.0 | 2 | 1 |
| Heat Pump Heating Package | | | | | | | | | | | | | | | | | | | |
| 2 | 2x4 | 15% | <= 0.35 | <= 0.38 | R- 38 | R- 30 | 10% | R- 15 | R- 0 | R- 15 | R- 7 | R- 19 | 8.2 | 0.93 | 14 | 6 | 3.0 | 2 | 1 |

BOP or HERS Provider Company's Name: _____
 BOP or HERS Provider Phone number: _____
 BOP or HERS Inspector's Name: _____
 Inspection Date: _____

BOP or HERS Provider's Address: _____
 BOP or HERS Inspector's Company Name: _____
 Estimated Monthly Cost Savings¹²: _____



Climate Zone 4 North Carolina Affordable Housing Equivalent Program^{1,2} ENERGY STAR Requirements

Only detached homes in the following counties can use the North Carolina Affordable Housing Equivalent Program –
Alamance, Alexander, Bertie, Buncombe, Burke, Caldwell, Caswell, Catawba, Chatham, Cherokee, Clay, Cleveland, Davie, Durham, Forsyth, Franklin,
Gates, Graham, Granville, Guilford, Halifax, Harnett, Haywood, Henderson, Hertford, Iredell, Jackson, Lee, Lincoln, Macon, Madison, McDowell, Nash,
Northampton, Orange, Person, Polk, Rockingham, Rutherford, Stokes, Surry, Swain, Vance, Wake, Warren, Wilkes, Yadkin

| Package Number | Exterior Wall Framing Type | Window Requirements | | | Minimum Insulation Requirements ^{3,4} | | | | | | | Minimum Equipment Requirements ⁵ | | | | | | | |
|----------------------------------|----------------------------|------------------------------|----------------|--------------------------|--|--------------------------------|--------------------------------------|-------------------------------|------|------------|---------------|---|--------------------------------|---|-------------------------|---|---|---|--------------------------|
| | | Max Window Area ⁶ | Window U-value | Window SHGC ⁷ | Attic | Cathedral Ceiling ⁸ | Max % Cathedral Ceiling ⁹ | Exterior Wall ^{8,13} | Slab | Bsmt. Wall | Crawlsp. Wall | Floor Over Unconditioned or Exterior Space | Furnace Heating (AFUE or HSPF) | DHW ¹⁰ (Elec EF or Fuel EF for 40g tank) | Electric Cooling (SEER) | Infiltration ^{11,12} (ACH50, blower door tested) | Duct Leakage ¹³ [CFM of system flow to the outside at 25 Pa] / [100 square feet of conditioned floor space] Field Verified | Number of Compact Fluorescent Lighting Fixtures | ENERGY STAR Refrigerator |
| Gas Heating Package | | | | | | | | | | | | | | | | | | | |
| 3 | 2x4 | 15% | <= 0.35 | <= 0.38 | R- 38 | R- 30 | 10% | R- 13 | R- 7 | R- 15 | R- 7 | R- 19 | 90% | 0.61 | 13 | 6 | 3.0 | 2 | 1 |
| Heat Pump Heating Package | | | | | | | | | | | | | | | | | | | |
| 4 | 2x4 | 15% | <= 0.35 | <= 0.38 | R- 38 | R- 30 | 10% | R- 15 | R- 7 | R- 15 | R- 7 | R- 19 | 8.2 | 0.93 | 14 | 6 | 3.0 | 2 | 1 |

BOP or HERS Provider Company's Name: _____
 BOP or HERS Provider Phone number: _____
 BOP or HERS Inspector's Name: _____
 Inspection Date: _____

BOP or HERS Provider's Address: _____
 BOP or HERS Inspector's Company Name: _____
 Estimated Monthly Cost Savings¹²: _____

North Carolina Affordable Housing Equivalent Program - Additional Requirements

| Envelope | Equipment | | | Design Limitations | |
|----------|------------|---|--------------------------------|----------------------------|---|
| Door | Thermostat | Duct Insulation ¹³ | Ventilation | Above Grade Area per Floor | Window Orientation |
| >/= R-3 | Manual | Insulate ducts in unconditioned spaces to R-6 | Active Ventilation Recommended | </= 2500 S.F. | </= 62.5% of allowable Maximum Window Area can be located on the south & west |

Footnotes:

- 1) The appropriate climate zone shall be determined by the 2004 International Residential Code (IRC), Figure N1101.2.
- 2) Meeting all the requirements in equivalent program qualifies an individual home as ENERGY STAR compliant. ENERGY STAR labeled homes are designed to use at least 15% less energy than code in heating, cooling, and domestic water heating, lighting, and appliances. Homes that do not meet the requirements in this equivalent program should be certified by a local HERS rater. Homes built to these specifications must be verified by a RESNET-approved HERS or BOP Provider, in accordance with the EPA/RESNET Agreement on BOPs (see www.natresnet.org/bop/agreement.htm). Additional efficiency and savings can be achieved by selecting other ENERGY STAR labeled products throughout the house (e.g., lighting, appliances). For more information, visit www.energystar.gov. Regardless of these specifications, all local codes must be followed.
- 3) In all cases, insulation shall be inspected to Grade I installation as defined in the RESNET Standards by a RESNET-certified rater.
- 4) 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.
- 5) 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% and 1.0% 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; Indoor temperatures shall be 75 F for cooling and 70 F for heating; 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.
- 6) Maximum window area is a ratio of total window rough opening area to total above-grade conditioned floor area (WFA). For example, a house with total above-grade conditioned floor area of 2,000 square feet and total window area of 400 square feet has a WFA of 400/2,000 = 20%. All decorative glass and skylight window area counts toward the total window area to above-grade conditioned floor area (WFA) ratio. 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) Window solar screens may be used to meet SHGC requirements. The overall SHGC for a window unit with solar screen is determined by the following equation: [(window SHGC) x (solar screen SHGC) x (percent of area covered)] + [window SHGC x percent of area not covered]. For example, a window with a SHGC of 0.5, using a solar screen that provides 70% shading (the equivalent of 0.3 solar heat gain coefficient) and covers 60% of the window has an overall solar heat gain coefficient of [0.5 x 0.3 x 0.6] + [0.5 x 0.4] = 0.09 + 0.20 = 0.29.
- 8) Any space in which R-38 insulation is installed can be considered an attic space, rather than a cathedral ceiling.
- 9) The percentage of cathedral ceiling should be calculated by dividing the surface area of the cathedral ceiling by the total surface area of the thermal barrier between the attic and conditioned space.
- 10) 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).
- 11) Envelope leakage must be determined by a RESNET-certified rater using a RESNET-approved testing protocol.
- 12) To ensure acceptable indoor air quality, it is recommended that homes be built in compliance with ASHRAE Standard 62.2-2003. This Standard requires that a mechanical exhaust system, supply system, or combination thereof be installed for each dwelling unit to provide whole-building ventilation with outdoor air at a minimum specified rate. For a typical home (1500-3000 ft² of conditioned space and 2-3 bedrooms), this required level is 45-60 cfm (approximately 0.15-0.30 natural ACH).
- 13) Ducts must be sealed and tested to be ≤ 3 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. 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. A minimum of R-4 duct insulation is recommended for ducts in conditioned space to prevent condensation.
- 12) See the attached "Estimated Monthly Cost Savings Table" to determine estimated monthly utility savings. Homes that are qualified using an ENERGY STAR package should reference the ENERGY STAR savings estimates of the table.
- 13) Insulate rim joists to the same R-value as the exterior wall.