

ENERGY STAR[®]

Residential New Construction Programs

Historical Document

This document is provided for reference because it has been superseded by a more recent Version or Revision. Please find current program documents on the [Program Requirements](#) webpage.

Use of older Versions and Revisions, such as this document, are typically limited to homes and buildings with a permit date (or, for manufactured homes, a production date) prior to a specified date. Consult the [Implementation Timeline](#) table to assess whether a home or apartment is still eligible to be certified using this document.

For questions or more information, contact us at energystarhome@energystar.gov.

ENERGY STAR® New Construction Manufactured Homes

Version 1 Program Requirements Archive

Prior to implementation of Version 2 of the ENERGY STAR Manufactured Homes Program Requirements, all program information was publicly available as web pages. Those original web pages have been archived in the following document. For the most current program requirements, visit www.energystar.gov/manufacturedhomes. Contact energystarhomes@energystar.gov if you have any questions.

June 2019



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Manufactured Homes Plants

To be certified to produce manufactured homes that, upon completion of the site inspection process, earn the ENERGY STAR label, a plant must undergo certification and periodic review processes under the oversight of an EPA-approved [Quality Assurance Provider \(QAP\)](#). The plant certification process includes utilizing home designs that meet ENERGY STAR design guidelines. Once certified, a plant must follow the QAP's guidelines for ongoing production, installation, and certification of homes to maintain its plant certification. The plant certification process described in the pages below is administered by the [Systems Building Research Alliance \(SBRA\)](#) an EPA-approved national QAP.

Guidelines to become certified to produce ENERGY STAR certified manufactured homes:

1. [Certifying the Plant](#)
2. [Designing ENERGY STAR Certified Homes](#)
3. [Producing and Installing ENERGY STAR Certified Homes](#)

Not a Partner? Join today!

The power and credibility of being an ENERGY STAR Partner gives your customers an understanding of the standards you maintain and the credibility of your energy-efficient homes. Manufactured homes plants are eligible to become ENERGY STAR partners within the "Builders & Developers" category." [Learn more about the benefits of becoming an ENERGY STAR Partner.](#)

Certifying the Plant

Plant certification must be performed by a third-party consultant called a Plant Certifier who has been accepted by an EPA-approved Quality Assurance Provider to have met established requirements for training and credentials. This process is done once and usually requires a few weeks to complete, concluding with submission of the [ENERGY STAR Partnership Agreement to EPA](#).

Successful completion of the following eight requirements certifies that the plant can manufacture ENERGY STAR certified homes and establishes the plant as an ENERGY STAR partner:

Requirement 1: Hire a Certifier for the Plant

The Plant Representative is responsible for hiring a Certifier. The Certifier is an independent, third-party consultant certified by an EPA-approved Quality Assurance Provider. An organization may apply to the Quality Assurance Provider to be approved as a manufactured housing Certifier for ENERGY STAR.

The Certifier will certify that the plant meets the ENERGY STAR guidelines for producing ENERGY STAR certified homes. The Certifier will also ensure that the plant's ENERGY STAR certified home designs meet ENERGY STAR guidelines, and will verify the in-plant and in-field performance of at least three homes produced by the plant. The Certifier also inspects a sample of each plant's ENERGY STAR certified homes on a regular basis. More information on field inspections is provided under [Producing ENERGY STAR Certified Manufactured Homes](#).

Quality Assurance Providers maintain a list of plant Certifiers. Contact [Systems Building Research Alliance \(SBRA\)](#) for their list of Certifiers. Contact the [Northwest Energy Efficient Manufactured Housing Program \(NEEM\)](#) for information about plant certifiers in Washington, Oregon, Idaho and Montana.

Requirement 2: Design Homes To Meet ENERGY STAR Requirements

The Plant Design/Engineering Staff, and Manufactured Housing Certifier ensures that the plant creates home designs that meet ENERGY STAR guidelines as well as ensuring that the designs and the methods used to create them are certified to be ENERGY STAR compliant by the Certifier. The Certifier must review and approve each of the qualifying home configurations and designs.

Because a duct leakage value is needed as part of the design process, EPA recommends that the ducts be tested during this step to determine their level of leakage and their potential for improvement. The duct leakage measured in the plant can be used to estimate whether the ducts will meet required leakage levels when homes are set up in the field. Field tests will be valuable aids in verifying this estimate. For guidance on constructing efficient duct systems for manufactured homes visit [SBRA's web site](#).

[Learn more about designing ENERGY STAR certified homes including ENERGY STAR's design packages for manufactured homes.](#)

Requirement 3: Incorporate ENERGY STAR Design Features into Quality Control and Inspection Procedures

The Plant Engineering/Quality Control Staff ensure that the ENERGY STAR features in the new home designs must now be incorporated into the Design Approval Primary Inspection Agency (DAPIA)-approved packages, the plant Quality Control Manual, and the Manufacturers' Installation Manual.

Requirement 4: Ensure Duct Tightness

Plant Production/Engineering Staff and the Manufactured Housing Certifier ensure that the homes produced maintain duct tightness standards. As part of the certification process, a plant must manufacture a minimum of three consecutive homes that meet ENERGY STAR duct system guidelines. As these homes are manufactured, their ducts are tested to determine the level of leakage. The Certifier verifies that the ducts do not exceed allowable leakage levels. If one of the qualification homes fails the duct test, three additional homes are tested until three consecutive homes pass the duct leakage test. Even if the ducts are tightened to the point where they meet the ENERGY STAR target, a home that initially fails the duct test cannot be counted as one of the three qualifying in-plant test homes.

“Three consecutive homes” are defined as three homes coming through the production line that are built using the revised duct system design that is designated for the plant’s ENERGY STAR production. This is only a test of the duct system. These three consecutive homes do not need to meet all of the other requirements (e.g. insulation) to be certified as ENERGY STAR. The Certifier will determine whether the qualification homes are of like or unlike “type,” and whether more than one set of three homes (one set for each home “type”) must be tested. Homes are of different “types” with respect to ENERGY STAR if their design differences have the potential to impact their energy performance significantly. For example, homes with ducts located in the attic and homes with ducts located in the floor would be different “types,” as would single- and double-section homes.

Requirement 5: Develop Site Installation Checklist

The Plant Engineering Staff and the Manufactured Housing Certifier ensure that every ENERGY STAR certified home that leaves a manufacturing plant has a [Site Installation Checklist \(see Appendix B\)](#) identifying items that are part of the ENERGY STAR Design Package, but installed and verified at the time of home installation.

Requirement 6: Install, Inspect, and Test a Minimum of Three Qualification Homes in the Field

The Installer, Plant Representative, and Manufactured Housing Certifier ensure that three ENERGY STAR certified homes are installed, inspected, and tested in the field. These homes do not have to be the same homes tested in the plant in Requirement 4. EPA does not require manufacturers to test three homes of each type in the field, however, the homes selected should be representative of the types of homes the plant intends to build and label as ENERGY STAR. The homes are then tested in the field by the Certifier for duct and whole-house air leakage.

The Certifier verifies that duct and whole-house leakage levels are equal to or lower than the ENERGY STAR guidelines. If a home fails either test, modifications must be implemented and the home re-tested until it passes. Any design or installation changes resulting from these tests must be recorded and used to update the ENERGY STAR specifications contained in the third party-approved design package and the site installation checklist.

To expedite and streamline a plant’s certification process, EPA permits setting up and testing certification homes at the plant or a retailer’s lot as long as the marriage line is sealed and crossover ducts connected as they would be on a homeowner’s site. However, when the home is permanently sited, a new Site Installation Checklist must be completed and signed by the manufacturer’s plant representative in order to be an ENERGY STAR certified home.

Requirement 7: Incorporate ENERGY STAR Practices into Routine Operations

Once the required number of certification homes have been installed successfully, the plant must take steps to transfer the lessons learned from the process into its routine production of ENERGY STAR certified homes. The Plant Management, Engineering Staff, and Installer all ensure that lessons learned are considered and become a part of routine production of ENERGY STAR certified homes including:

- Instruct key plant personnel on the critical processes and procedures for designing and manufacturing new ENERGY STAR certified homes, including any corrective actions undertaken during the installation of the three qualification homes.
- Review the unique features contained in the ENERGY STAR third-party-approved design packages with the plant's third-party approval and inspection agencies.
- Instruct set-up crews on how to correctly install and inspect ENERGY STAR certified homes in the field and the need to provide the completed [Site Installation Checklist](#) to the plant.

Plant management is also responsible for submitting information about their ENERGY STAR certified manufactured homes to their Quality Assurance Provider (QAP). The QAP is responsible for submitting ENERGY STAR production data to EPA on behalf of the plant each calendar quarter.

Requirement 8: Submit the ENERGY STAR Partnership Agreement

The Plant Representative submits an [ENERGY STAR Partnership Agreement to EPA](#). Each plant must submit its own Partnership Agreement following the instructions provided on the Partnership Agreement form. The plant representative will receive information from EPA regarding the partnership via e-mail, including access to ENERGY STAR logos and other [marketing resources](#). Partners' names and contact information are displayed on the [Partner Locator](#).

Designing ENERGY STAR Certified Manufactured Homes

To qualify as ENERGY STAR, a manufactured home is required to be substantially more energy efficient than a comparable standard code home. This includes not only the thermal envelope, but also the estimate of total energy use for space heating, space cooling, and water heating.

A home designed to qualify for the ENERGY STAR label may achieve this level of performance in one of two ways:

- **Incorporating Pre-Approved ENERGY STAR Design Packages**
- **Use Computer Analysis to Create Other ENERGY STAR Designs**

The Certifier shall review the manufacturer's documentation to verify that each design meets or exceeds ENERGY STAR guidelines. The goal is to ensure that every home that leaves the plant with an ENERGY STAR label has been designed to meet or exceed EPA's guidelines.

Each design is a unique combination of building elements, including building thermal envelope, specific duct arrangement (overhead or under floor) and maximum leakage level, space heating and cooling equipment efficiency, and hot water heater efficiency. These elements taken together will produce predictable energy use characteristics for which the manufacturer develops an ENERGY STAR-specific third-party-approved design package.

Incorporating Pre-Approved ENERGY STAR Design Packages

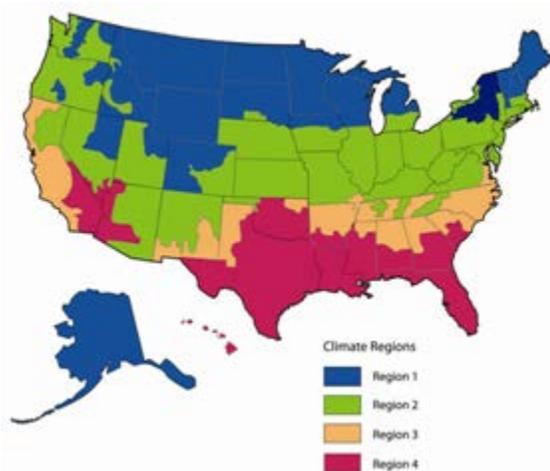
Normally, estimating total energy use requires performing a computer analysis of each home design. However, to simplify the process, we have developed [pre-approved design packages of energy features](#) that meet or exceed the ENERGY STAR requirements.

For each climate region, pre-approved ENERGY STAR design packages are provided. The variety of packages gives the plant fairly wide latitude in deciding how to design an ENERGY STAR certified home.

A package contains requirements for several features that must be used together to qualify as an ENERGY STAR certified manufactured home. All the packages are roughly equivalent in energy terms. That is, applied to the same home, all packages will result in approximately the same total energy use. Therefore, saving energy in one area (e.g., by using tighter ducts or installing a programmable thermostat) will result in offsets elsewhere (e.g., by allowing a higher Uo-value).

The design packages are divided into four sub-tables, one for each climate region. Each sub-table is divided into two or three sections according to expected maximum duct loss percentages (e.g., 3%, 5%, or 7%). Each of these sections is further divided into two or three parts, one for each heating system type: gas/oil, heat pump, and electric resistance, if applicable.

Finding the right package of energy measures is a four-step process:



These regions are NOT the same as the thermal zones contained in the HUD Standards for manufactured homes, nor do the ENERGY STAR region boundaries coincide with state boundaries. A state may include more than one ENERGY STAR climate region.

First: Identify the Climate Region & Basic Requirements

In cases where a state has more than one climate region, the state-by-state climate region tables provide the "primary" climate region and lists counties in the other regions as "exceptions." Where the destination of a home is not known prior to manufacture, and the plant's typical shipping radius covers more than one region, it is advisable to select an ENERGY STAR package from the region

with the more stringent thermal envelope requirements (Climate Region 1 is the most stringent, Climate Region 4 the least).

[See Appendix A for the Climate Region tables and Design Package Tables](#)

Once you have printed the tables, select the climate region where the ENERGY STAR certified home(s) will be sited. Once you have identified your correct region, select the ENERGY STAR design package for that region following the steps described below.

The column “High Efficiency WH” indicates requirements for water heater efficiency, and the column “Programmable Thermostat” indicates if a programmable thermostat is required.

[Get explanations of the features of ENERGY STAR’s design packages for manufactured homes.](#)

Second: Select the duct leakage level that the plant expects can be consistently reached and has been identified by testing.

Third: Select the heating source, either the gas/oil heat, heat pump, or the electric resistance section followed by the heating efficiency.

Fourth: Select the rows containing appropriate U_o-value and, for Regions 3 and 4, the solar heat gain coefficient (SHGC) values.

ENERGY STAR Design Package Features

Duct Loss

This refers to the amount of leakage from the air distribution ducts as measured with a "Duct Blaster" or similar diagnostic device. During plant certification, the manufacturer in consultation with the certifier will determine the target leakage rate and steps required to achieve that rate (e.g., duct sealing strategies). The midrange leakage rate of 5% should be readily achievable with currently available duct design and sealing techniques. The duct leakage values in the ENERGY STAR design packages are measurements of air leakage to the outside when the ducts are depressurized to negative 25 pascals. The values are based on air handler airflow rates and correlate approximately to cubic feet per minute of leakage divided by the floor area of the home. When measured in the plant, only total duct leakage can be determined. About 50% of total measured duct leakage will leak to the outside after the home is set.

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Heating Equipment Efficiency

This refers to the rated seasonal efficiency of the equipment used for space heating.

- Heat pump efficiencies are listed by the Air-Conditioning and Refrigeration Institute (ARI) in the ARI Directory of Certified Unitary Products. Heat pumps in the heating mode are rated in terms of Heating Seasonal Performance Factor (HSPF).
- Gas (natural and liquid petroleum) and oil burning furnace efficiencies are listed by the Gas Appliance Manufacturers Association (GAMA) in the Consumers' Directory of Certified Efficiency Ratings for Heating and Water Heating Equipment. Fossil fuel-burning furnaces are rated in terms of Annual Fuel Utilization Efficiency (AFUE).

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Envelope Heat Flow

This refers to the ability of the home's envelope to resist heat flow and is calculated in the same manner as the U_o-value referred to in the HUD standards.

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Window Efficiency

This refers to the ability of the window to block solar heat from entering the home. The higher the SHGC, the more solar heat is transmitted through the window. To meet the requirement, calculate the area-weighted average of the SHGCs for all the windows (multiply each window area by its whole window SHGC, add the results together, and divide by the total window area). ENERGY STAR certified homes do not require the use of ENERGY STAR qualified windows, nor does the use of ENERGY STAR qualified windows make a home qualify as ENERGY STAR.

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Hot Water Equipment Efficiency

This refers to the efficiency rating of the hot water heater (WH). Hot water heaters are rated in terms of Energy Factor (EF). Different EF levels are provided for gas and for electric equipment. In some packages a high efficiency water heater is required. This is indicated by a check mark in the "High Efficiency WH" column in the design packages. The high efficiency WH requirement may be met in either of two ways:

- An EF of at least 0.59 for gas or at least 0.91 for electric water heaters.
- A water heater with a minimum EF of 0.56 for gas heaters and 0.88 for electric heaters heater wrapped with a minimum of R-5 insulation. Check with the water heater manufacturer about restrictions on wrapping a specific water heater.

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- A water heater with a minimum EF of 0.56 for gas heaters and 0.88 for electric heaters heater wrapped with a minimum of R-5 insulation. Check with the water heater manufacturer about restrictions on wrapping a specific water heater.

Programmable Thermostats

Programmable thermostats that can be automatically set back to lower temperatures in the heating season or set up to higher temperatures in the cooling season can generate significant energy savings. Refer to the column labeled Programmable Thermostat to see whether a programmable thermostat is needed for the home.

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Cooling Equipment Efficiency

This refers to the equipment rating as certified by ARI and published in the ARI Directory of Certified Unitary Products. Air conditioners and heat pumps in the cooling mode are rated in terms of Seasonal Energy Efficiency Ratio State Primary(SEER). All ENERGY STAR certified homes must be equipped with cooling equipment rated not less than National Appliance Energy Conservation Act (NAECA) minimum requirements (13 SEER, 7.7 HSPF). While not an ENERGY STAR requirement, [cooling equipment should be correctly sized](#) (PDF, 3.9MB).

Heat Recovery Ventilator

For the electric resistance heating packages for Climate Region 1, a heat recovery ventilator (HRV) must be used to maintain the fresh air ventilation requirements of the HUD Code. A heat recovery ventilator (also called an air-to-air heat exchanger) is a ventilation system that consists of two separate air-handling systems-one collects and exhausts stale indoor air and the other draws in fresh outdoor air and distributes it throughout the home. At the core of an HRV is a heat transfer module. Both the exhaust and fresh air streams pass through this module and the heat from the exhaust air is used to preheat the fresh air stream. Only the heat is transferred; the two air streams remain physically separate. Typically, an HRV is able to recover 70-80% of the heat from the exhaust air and transfer it to the incoming air. This dramatically reduces the energy needed to heat fresh incoming air.

All ENERGY STAR certified homes must also contain the following features:

Minimum Duct Insulation

This refers to the rated insulation value (R-value) of materials used for insulating all ductwork, including the exterior crossover duct. Attic and floor insulation covering ductwork may count towards this requirement.

- Climate Regions 1 and 2: a minimum of R-8 is required
- Climate Regions 3 and 4: a minimum of R-6 is required

Whole-house leakage

All ENERGY STAR certified homes must have whole-house leakage rates, calculated based on blower door measurements, that do not exceed 7.0 ACH50. ("Electric resistance packages in Region 1 require a maximum shell leakage rate of 4.0 ACH50.) Whole-house leakage rates are determined by the ENERGY STAR Certifier during plant certification and as part of random-sample field evaluations.

Basements

All ENERGY STAR certified homes placed over basements must also meet the following requirements:

- **Unconditioned basement:**
Unconditioned basements are separated from the living area and not intentionally heated. The walls of the interior stairwell are insulated to the same levels as the exterior walls of the home. Doors to the basement are insulated and weather-stripped.
- **Semi-conditioned and conditioned basements:**
For heated basements and basements separated from the main living space by uninsulated

stairwells are required to have exterior basement wall insulation with the following nominal (insulation material) R-values:

- Climate Region 1: R-13
- Climate Region 2: R-10
- Climate Region 3: R-10
- Climate Region 4: R-0

Using Computer Analysis to Create Other ENERGY STAR Designs

As an alternative to the packages of energy features, manufacturers have the option of developing designs using software tools and procedures that are approved by their verification oversight organization (VOO). Designs generated through the use of these tools or procedures must be approved by the plant's Certifier.

VOO-Approved Rating Software Tools:

- [RESNET Approved Software](#)

The major advantage of the computer analysis option is the ability to tailor the design to a specific location and design considerations. For example, lower equipment efficiencies can be combined with a lower home Uo-value using this approach. The principal disadvantage of this alternative is the cost and time associated with conducting the analysis.

Producing and Installing ENERGY STAR Certified Manufactured Homes

Once a plant has been certified, it can proceed to produce and install ENERGY STAR certified homes based on the designs approved during the certification process. This is a simple, four-step process that builds directly on the knowledge and expertise developed during the plant certification process.

Requirement 1: Manufacture and Inspect Homes in the Plant

The Plant Production Staff ensure that the plant manufactures ENERGY STAR certified homes in accordance with the designs created during the plant certification process. The homes are inspected by the plant’s third-party inspection agency. Plant quality control (QC) personnel use the new information in the plant’s quality control manual to check all ENERGY STAR QC issues, particularly duct systems.

Requirement 2: Install and Inspect Homes in the Field

The Plant Representative (e.g., the factory field representative or retailer) uses the [Site Installation Checklist](#) developed during the plant certification process to monitor set-up. Non-compliance items are fixed on site. Following installation, the representative reviews and verifies the items on the site installation checklist, signs it, and returns a copy to the plant. The plant must maintain copies of all signed installation checklists. The site installation checklist must be completed, signed by the plant representative and returned to the plant in order for the home to be an ENERGY STAR certified home. For more information on proper installation of ENERGY STAR certified manufactured homes visit the [Systems Building Research Alliance \(SBRA\)](#) Web site containing a guide for retailers with instructions for installers and HVAC contractors.

Requirement 3: Affix the ENERGY STAR Label and the Quality Assured Label*

The Plant Representative or Plant Field Representative ensures that both an EPA-issued ENERGY STAR label and a Quality Assurance Provider (QAP)-issued label are affixed and used appropriately on the home. Both labels should be placed adjacent to the HUD Data Plate or inside the electric panel cover of the home. The EPA label functions as a certification mark for compliance with EPA’s ENERGY STAR energy efficiency guidelines. The QAP label certifies that the home was built and installed under an EPA-approved QAP’s quality assurance program. The EPA label can be obtained from EPA or from the plant’s QAP.

The plant has two options for affixing these labels to the home. In all cases, it is the plant’s responsibility to ensure that all homes receiving these labels meet ENERGY STAR guidelines when installed in their final location.





If the plant has a commitment from its retailer or installer to properly install ENERGY STAR certified homes, then the plant may affix the labels in the factory after Requirement 1 (Manufacture and Inspect Homes in the Plant). The plant may provide the labels to their field representative who completes the site installation checklist and affixes the labels to the home.

In either case, once the site installation checklist is completed, the field representative signs and dates the quality assured label and returns the completed and signed checklist to the manufacturer.

* Plants in the Pacific Northwest will use a QAP label provided by the Northwest Energy Efficiency Alliance (NEEA).

Requirement 4: Conduct Periodic Field Evaluations to Verify Performance

The Manufactured Housing Certifier ensures that the homes are performing as designed. A plant must at all times retain an accredited Certifier responsible for conducting field evaluations on no less than 2 percent (2%) of its ENERGY STAR certified homes sold and installed on a homeowner's site or a minimum of one home each calendar year, whichever is greater. The plant's Certifier is responsible for coordinating the quality control testing.

If the plant fails to conduct this field verification it may be de-certified under ENERGY STAR's policy for plant de-certification. The plant's Certifier or the Quality Assurance Provider may rescind a plant's ENERGY STAR certification if they determine that the plant is not in conformance with the rules, or is compromising the integrity, of the ENERGY STAR label.

Change in Plant Status

After a plant becomes certified to produce ENERGY STAR certified homes, it is listed on EPA's [Partner Locator](#) as an active partner. To maintain its active status, partner plants must label at least one home within any consecutive 12-month period starting with the date the Partnership Agreement is submitted to EPA. If 12 months elapse without the plant labeling its next ENERGY STAR certified home, the partner's status is changed to "inactive." Active status and re-listing on the EPA web site is automatically restored when the plant resumes production and reporting of ENERGY STAR certified homes. Plants should report their ENERGY STAR production data to their QAP. The QAP is responsible for submitting the plant's ENERGY STAR production data to EPA.

Qualifications and Capabilities of Quality Assurance Providers (QAP)

To be successful transforming the housing market to increased energy efficiency, ENERGY STAR depends on a self-sustaining, independent, industry-based verification process for assuring that factory-built homes (manufactured homes) meet ENERGY STAR guidelines. To that end, EPA is making it a matter of policy to designate one or more organizations to serve as a Quality Assurance Provider (QAP)^{i,ii} to provide independent, third-party quality control/quality assurance oversight of the verification process for factory-built homes earning the ENERGY STAR. QAPs are authorized to provide ENERGY STAR labels for certified factory-built homes. As such, QAPs are responsible for the oversight and enforcement of all quality assurance requirements related to designing, producing and installing these homes. QAPs are also responsible for reporting to EPA all homes qualifying for the ENERGY STAR label under the verification guidelines developed by the QAP and approved by EPA as well as any issues of non-compliance. QAPs must document its procedures for in-plant and on-site quality control oversight of ENERGY STAR certified homes and submit them to EPA for review and approval.

To be a QAP, an organization must demonstrate to EPA's satisfaction that they possess the qualifications and capabilities listed below:

Develop and administer all aspects of a national quality assurance/quality control program for the design, production, and construction of ENERGY STAR certified factory-built homes that includes the following four elements: (1) ENERGY STAR labeled home requirements; (2) plant certification; (3) builder qualification; and (4) compliance verification:

- Develop a comprehensive program guide that details the in-plant and on-site construction, inspection and verification procedures, including protocols for addressing non-compliance in the plant and at the site. This program guide must also establish qualifications and eligibility criteria for third-party consultants, plants, and builders.
- Establish a mechanism for reporting program activity including but not limited to certified plants, certified homes, non-compliance issues, approved third-party consultants and other program data to EPA on a regular basis.

Accredit and track third-party consultants who certify a plant's readiness to consistently produce ENERGY STAR certified homes and spot-check field installation of homes produced by certified plants:

- Provide and enforce a nationwide accreditation process that verifies the training, skills and knowledge of third-party consultants. This includes the use of detailed application forms, mandatory training, and on-going education and collaboration meetings required to maintain accreditation.
- Maintain a database of accredited third-party consultants who can assist plants with improving the energy efficiency of factory-built homes such that they meet ENERGY STAR

guidelines, certify the plants as proficient in producing ENERGY STAR certified homes, and inspect field installations of these homes.

Develop and manage a national labeling process that ensures ENERGY STAR certified homes are produced in certified plants and visually inspected and labeled onsite by a third-party consultant:

- Provide and enforce a nationwide process that verifies the training, skills and knowledge of third-party consultants.
- Develop, produce, and distribute labels signifying that ENERGY STAR certified homes were built in plants certified by accredited third-party consultants.
- Demonstrate expertise in the processes required to upgrade factory-built housing plants to produce ENERGY STAR certified homes.

Oversee and enforce all in-plant and on-site quality control processes involved in building ENERGY STAR certified homes and be responsible for necessary corrective actions:

- Monitor field inspections of installed ENERGY STAR certified homes conducted by accredited third-party consultants, investigate failures impacting the energy performance of these homes as identified during field inspections, and facilitate corrective actions with third-party consultants, plant representatives, and builder representatives. Share information about non-compliance with ENERGY STAR program requirements with EPA in a timely manner for further action. This includes:
 - When homes are found to have been improperly labeled as ENERGY STAR and confirmed by the QAP:
 - EPA will be notified of the plant certifier, plant, builder, rater, and address(s) of the affected home(s).
 - The QAP will provide a signed affidavit and sufficient documentation that the home(s) do not meet ENERGY STAR program minimum requirements.
 - EPA will inform the plant and builder partners of the QAP's findings and provide the plant and builder 90 days to apply corrective action to the affected home(s) that results in compliance with the relevant standard.
 - A plant certifier and rater not associated with the original labeling of the home(s) must confirm compliance to relevant standard in order for corrective action to be accepted.
 - If the home(s) are not brought to program standards within 90 days, EPA will inform the affected homeowner(s), the plant, the builder, the plant certifier, and the rater. The partnership status of the plant and/or builder will be terminated and EPA will remove the affected home(s) from ENERGY STAR's database.
 - In the event that EPA staff or its contractors conduct formal or informal reviews of ENERGY STAR certified homes and files, these reviews will also supplement the QAP's QA process. Discrepancies discovered by EPA staff or contractors will be forwarded to the QAP and will trigger an independent inquiry into the discrepancies in question.
 - When ENERGY STAR program sponsors undertake quality assurance reviews of ENERGY STAR certified homes, the reviews will serve to supplement the QAP's QA

process. In the event the program sponsor informs either EPA or the QAP of any significant discrepancies found, then that party receiving the information from the sponsor will notify the other party. An independent inquiry will be conducted by the QAP into the discrepancies in question.

- Collect, maintain, and distribute information about ENERGY STAR certified homes nationwide. This includes contact information on accredited third-party consultants, manufacturing plants that have been certified to produce ENERGY STAR certified homes, the number of ENERGY STAR certified homes produced by each certified manufacturing plant, and the remediation problems of homes found not to meet energy efficiency specifications during field spot checks.
- Review all third-party consultants' records for homes that have been field inspected to ensure compliance with ENERGY STAR energy efficiency guidelines, adherence to field testing procedures, and proper remediation of identified problems.
- Based on tracking data and spot-checking of third-party consultant records, provide random quality control inspections of field verified homes by third-party consultants.

Communicate important developments within the industry:

- Demonstrate leadership researching and analyzing factory-built housing issues related to energy efficiency for all climate zones.
- Demonstrate proven experience facilitating energy-efficiency programs and initiatives with factory-built industry stakeholders across the nation including manufacturing plants, retailers, HUD inspection agents, and industry associations.
- Serve as liaison between factory-built housing industry stakeholders (plants, builders, retailers/dealers, HUD inspection agents, industry associations) to assure an effective and timely interchange of information as it relates to the development, implementation, marketing, and maintenance of energy efficiency programs, initiatives, and innovations.
- Coordinate national/regional training and educational programs among factory-built housing plants, communities, builders, and retailers regarding building and selling ENERGY STAR certified homes. This includes maintaining a web site, publishing reports and brochures, conducting seminars, providing presentations, and supporting conferences/workshops related to ENERGY STAR certified homes.

ⁱ EPA reserves the right to modify these qualifications and capabilities at any time without prior notice.

ⁱⁱ The Systems Building Research Alliance (SBRA) has been approved by EPA as a national Quality Assurance Provider (QAP) for ENERGY STAR certified manufactured homes. For information about SBRA's QA procedures and requirements for ENERGY STAR certified manufactured homes go to www.research-alliance.org. The [Northwest Energy Efficient Manufactured Homes Program \(NEEM\)](#) has been approved by EPA to serve in this capacity for states in the Pacific Northwest.

Table A-1 State-by-State Climate Region Index

State	Primary Region	Exception	Counties				
Alabama	3	Region 4:	Baldwin Barbour Bullock Butler Choctaw Clarke	Coffee Conecuh Covington Crenshaw Dale Dallas	Escambia Geneva Greene Hale Henry Houston	Lowndes Macon Marengo Mobile Monroe Montgomery	Perry Pike Russell Sumter Washington Wilcox
Alaska	1	None					
Arizona	4	Region 2:	Apache Cochise	Coconino Gila	Graham Greenlee	Navajo Pima	Santa Cruz Yavapai
Arkansas	3	Region 4:	Ashley Bradley Calhoun Chicot Clark	Cleveland Columbia Dallas Desha Drew	Hempstead Howard Jefferson Lafayette Lincoln	Little River Miller Montgomery Nevada Ouachita	Pike Sevier Union
California	3	Region 2: Region 4:	Alpine Butte Colusa Glenn	Lake Lassen Modoc Mono	Nevada Placer Plumas Shasta	Sierra Solano Sutter Tehama	Yolo Yuba
Colorado	1	Region 2:	Baca Bent Chaffee Cheyenne Crowley	Custer El Paso Fremont Huerfano Kiowa	Kit Carson Lake Las Animas Lincoln Otero	Phillips Prowers Pueblo Sedgwick Teller	Washington Yuma
Connecticut	2	None					
Delaware	2	None					
Florida	4	None					
Georgia	4	Region 3:	Banks Barrow Bartow Carroll Catoosa Chattahoochee Chattooga Cherokee Clarke Clayton Cobb Coweta Dade	Dawson DeKalb Douglas Elbert Fannin Fayette Floyd Forsyth Franklin Fulton Gilmer Gordon Gwinnett	Habersham Hall Haralson Harris Hart Heard Henry Jackson Lamar Lincoln Lumpkin Macon Madison	Marion Meriwether Murray Muscogee Oconee Oglethorpe Paulding Pickens Pike Polk Rabun Schley Spalding	Stephens Talbot Taylor Towns Troup Union Upson Walker Walton White Whitfield Wilkes
Hawaii	4	None					
Idaho	1	Region 2:	Ada Canyon Gem	Gooding Jerome	Lemhi Lincoln	Minidoka Nez Perce	Payette Washington
Illinois	2	None					

State	Primary Region	Exception Counties
Indiana	2	None
Iowa	2	Region 1: Allamakee Cherokee Emmet Kossuth Pocahontas Black Hawk Chickasaw Fayette Lyon Sioux Bremer Clay Floyd Mitchell Winnebago Buchanan Clayton Franklin O'Brien Winneshiek Buena Vista Delaware Hancock Osceola Worth Butler Dickinson Howard Palo Alto Wright Cerro Gordo Dubuque Humboldt Plymouth
Kansas	2	None
Kentucky	2	None
Louisiana	4	None
Maine	1	None
Maryland	2	None
Massachusetts	2	Region 1: Berkshire Franklin Hampden Hampshire
Michigan	2	Region 1: Alcona Clare Iosco Mason Ontonagon Alger Crawford Iron Mecosta Osceola Alpena Delta Isabella Menominee Oscoda Antrim Dickinson Kalkaska Midland Otsego Arenac Emmet Keweenaw Missaukee Presque Isle Baraga Gladwin Lake Montcalm Roscommon Bay Gogebic Leelanau Montmorency Saginaw Benzie Grand Taverse Luce Muskegon Sanilac Charlevoix Gratiot Mackinac Newaygo Schoolcraft Cheboygan Houghton Manistee Oceana Tuscola Chippewa Huron Marquette Ogemaw Wexford
Minnesota	1	None
Mississippi	4	Region 3: Alcorn Grenada Marshall Prentiss Tishomingo Benton Itawamba Panola Tate Union Calhoun Lafayette Pontotoc Tippah Yalobusha DeSoto Lee
Missouri	2	Region 3: Butler Mississippi Pemiscot Scott Stoddard Duncan New Madrid
Montana	1	None
Nebraska	2	None
Nevada	4	Region 1: Elko Eureka Lander White Pine Region 2: Carson City Esmeralda Lyon Nye Storey Churchill Humboldt Mineral Pershing Washoe Douglas Lincoln
New Hampshire	1	None
New Jersey	2	None
New Mexico	2	Region 3: Chaves Dona Ana Guadalupe Lea Otero DeBaca Eddy Hidalgo Luna

Designing ENERGY STAR Qualified Homes

State	Primary Region	Exception Counties					
New York	2	Region 1:	Allegany Broome Cattaraugus Cayuga Chemung Chenango Clinton	Cortland Delaware Essex Franklin Fulton Hamilton Herkimer	Lewis Livingston Madison Montgomery Oneida Onondaga Ontario	Otsego Schoharie Schuyler Seneca St. Lawrence Steuben Sullivan	Tioga Tompkins Warren Wyoming Yates
North Carolina	3	Region 2:	Alleghany Ashe Avery Buncombe Burke	Caldwell Cherokee Clay Graham Haywood	Henderson Jackson McDowell Macon Madison	Mitchell Polk Rutherford Surry Swain	Transylvania Watauga Wilkes Yadkin Yancey
North Dakota	1	None					
Ohio	2	None					
Oklahoma	4	Region 2: Region 3:	Beaver Craig Delaware Mayes	Cimarron Nowata Osage	Ellis Ottawa Pawnee	Harper Rogers Tulsa	Texas Wagoner Washington
Oregon	2	Region 1:	Baker	Klamath	Union	Wallowa	
Pennsylvania	2	Region 1:	Bradford	Sullivan	Susquehanna	Tioga	Wyoming
Rhode Island	2	None					
South Carolina	3	Region 4:	Allendale Bamberg Barnwell Beaufort	Berkeley Calhoun Charleston Clarendon	Colleton Dorchester Hampton	Jasper Lee Lexington	Orangeburg Richland Sumter
South Dakota	1	Region 2:	Gregory	Mellette	Todd	Tripp	
Tennessee	3	Region 2:	Bledsoe Coffee Cumberland Fentress	Franklin Grundy Marion	Morgan Overton Pickett	Putnum Scott Sequatchie	Van Buren Warren White
Texas	4	Region 3:	Andrews Armstrong Bailey Briscoe Carson Castro Cochran Crosby	Dallam Dawson Deaf Smith Floyd Gaines Glasscock Gray Hale	Hansford Hartley Hemphill Hockley Howard Hutchinson Lamb Lipscomb	Lubbock Lynn Martin Midland Moore Ochiltree Oldham Parmer	Potter Randall Roberts Sherman Swisher Terry Yoakum
Utah	2	Region 1: Region 4:	Cache Carbon Washington	Daggett Duchesne	Morgan Rich	Summit Uintah	Wasatch
Vermont	1	None					
Virginia	2	Region 3:	Accomack Charles City Essex Gloucester Greensville	Isle of Wight James City King and Queen King George King William	Lancaster Mathews Middlesex New Kent Northampton	Northumberland Prince George Richmond Southampton Stafford	Surry Sussex Westmoreland York

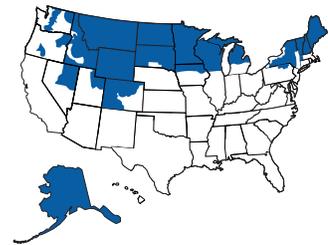
State	Primary Region	Exception Counties
Washington	2	Region 1: Chelan Ferry Kittitas Okanogan Pend Orielle Skamania Spokane Stevens Yakima
West Virginia	2	None
Wisconsin	1	None
Wyoming	1	None

Table A-2 ENERGY STAR Design Packages

CLIMATE REGION 1

Basic Requirements:

- Maximum shell leakage: 7.0 ACH₅₀
- Window SHGC: any
- Minimum duct insulation: R-8



Packages for homes with maximum 3% duct losses

Heating Type	Minimum Heating Efficiency	Maximum Envelope Heat Resistance U _o -value	High Efficiency WH ¹¹	Programmable Thermostat	Package Number
Gas/Oil Furnace	0.80 AFUE	0.054			1-1
		0.056		✓	1-2
		0.058	✓		1-3
	0.90 AFUE	0.060		✓	1-4
		0.063	✓	✓	1-5
Heat Pump	7.7 HSPF	0.052		✓	1-6
		0.053	✓	✓	1-7
Electric Resistance (Forced Air) ¹²	1.0 EF	0.048		✓ ¹³	1-8
		0.050	✓	✓ ¹³	1-9

Packages for homes with maximum 5% duct losses

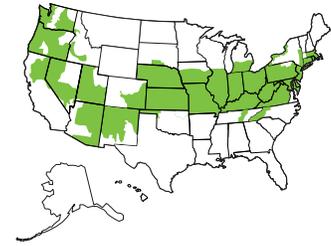
Heating Type	Minimum Heating Efficiency	Maximum U _o -value	High Efficiency WH ¹¹	Programmable Thermostat	Package Number
Gas/Oil Furnace	0.80 AFUE	0.052			1-10
		0.054		✓	1-11
		0.056	✓	✓	1-12
	0.90 AFUE	0.058		✓	1-13
		0.061	✓	✓	1-14
Heat Pump	7.7 HSPF	0.050		✓	1-15
		0.051	✓	✓	1-16
	8.0 HSPF	0.052		✓	1-17
		0.053	✓	✓	1-18

¹¹ The high efficiency WH requirement may be met by using a 0.59 EF gas WH or a 0.91 EF electric WH or by wrapping a lower-rated WH with a minimum of R-5 insulation.

¹² Electric resistance packages in Climate Region 1 require a maximum shell leakage rate of 4.0 ACH₅₀ and a 70% efficient heat recovery ventilator to ensure that total ventilation rate is maintained at 0.35 ACH at all times.

¹³ A programmable thermostat is required for a forced air all-electric heating system. Zone controls are required for baseboard electric resistance heating systems.

CLIMATE REGION 2



Basic Requirements:

- Maximum shell leakage: 7.0 ACH₅₀
- Maximum window SHGC: 0.55
- Minimum duct insulation: R-8

Packages for homes with maximum 3% duct losses

Heating Type	Minimum Heating Efficiency	Maximum U _o -value	High Efficiency WH ¹⁴	Programmable Thermostat	Package Number
Gas/Oil Furnace	0.80 AFUE	0.061			2-1
		0.065		✓	2-2
		0.067	✓	✓	2-3
Heat Pump	7.7 HSPF	0.061		✓	2-6
		0.063	✓	✓	2-7

Packages for homes with maximum 5% duct losses

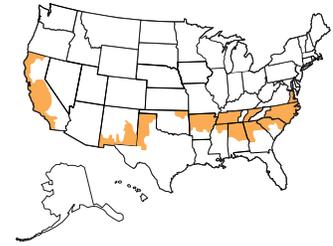
Heating Type	Minimum Heating Efficiency	Maximum U _o -value	High Efficiency WH ¹⁴	Programmable Thermostat	Package Number	
Gas/Oil Furnace	0.80 AFUE	0.057			2-8	
		0.061		✓	2-9	
		0.063	✓	✓	2-10	
	0.90 AFUE	0.063		✓	✓	2-11
		0.065	✓	✓	✓	2-12
Heat Pump	7.7 HSPF	0.058			2-13	
		0.059		✓	2-16	
		0.062	✓	✓	2-17	
	8.0 HSPF	0.062		✓	✓	2-18
		0.064	✓	✓	✓	2-19

Packages for homes with maximum 7% duct losses

Heating Type	Minimum Heating Efficiency	Maximum U _o -value	High Efficiency WH ¹⁴	Programmable Thermostat	Package Number	
Gas/Oil Furnace	0.80 AFUE	0.056			2-20	
		0.060		✓	2-21	
		0.062	✓	✓	2-22	
	0.90 AFUE	0.062		✓	✓	2-23
		0.064	✓	✓	✓	2-24
Heat Pump	7.7 HSPF	0.054			2-25	
		0.055		✓	2-26	
		0.059	✓	✓	2-27	

¹⁴ The high efficiency WH requirement may be met by using a 0.59 EF gas WH or a 0.91 EF electric WH or by wrapping a lower-rated WH with a minimum of R-5 insulation.

CLIMATE REGION 3



Basic Requirements:

- Maximum shell leakage: 7.0 ACH₅₀
- Minimum duct insulation: R-6

Packages for homes with maximum 3% duct losses

Heating Type	Minimum Heating Efficiency	Maximum U _o -value	Maximum Window SHGC	High Efficiency WH ¹⁵	Programmable Thermostat	Package Number
Gas/Oil Furnace	0.80 AFUE	0.075	0.50			3-1
		0.082	0.50		✓	3-2
		0.084	0.50	✓	✓	3-3
		0.084	0.40		✓	3-4
		0.086	0.40	✓	✓	3-5
Heat Pump	7.7 HSPF	0.074	0.50			3-6
		0.075	0.50		✓	3-7
		0.076	0.50	✓	✓	3-8
		0.076	0.40		✓	3-9
		0.077	0.40	✓	✓	3-10

Packages for homes with maximum 5% duct losses

Heating Type	Minimum Heating Efficiency	Maximum U _o -value	Maximum Window SHGC	High Efficiency WH ¹⁵	Programmable Thermostat	Package Number
Gas/Oil Furnace	0.80 AFUE	0.073	0.50			3-11
		0.080	0.50		✓	3-12
		0.082	0.50	✓	✓	3-13
		0.082	0.40		✓	3-14
		0.084	0.40	✓	✓	3-15
Heat Pump	7.7 HSPF	0.073	0.50			3-16
		0.074	0.50		✓	3-21
		0.075	0.50	✓	✓	3-22
		0.076	0.40	✓	✓	3-23
	8.0 HSPF	0.077	0.50		✓	3-24
		0.078	0.50	✓	✓	3-25
		0.079	0.40	✓	✓	3-26

Packages for homes with maximum 7% duct losses

Heating Type	Minimum Heating Efficiency	Maximum U _o -value	Maximum Window SHGC	High Efficiency WH ¹⁵	Programmable Thermostat	Package Number
Gas/Oil Furnace	0.80 AFUE	0.068	0.50			3-27
		0.075	0.50		✓	3-28
		0.077	0.50	✓	✓	3-29
		0.078	0.40		✓	3-30
		0.080	0.40	✓	✓	3-31
Heat Pump	7.7 HSPF	0.066	0.50			3-32
		0.067	0.50		✓	3-33
		0.068	0.50	✓	✓	3-34
		0.070	0.40		✓	3-35
		0.071	0.40	✓	✓	3-36

¹⁵ The high efficiency WH requirement may be met by using a 0.59 EF gas WH or a 0.91 EF electric WH or by wrapping a lower-rated WH with a minimum of R-5 insulation.

CLIMATE REGION 4

Basic Requirements:

- Maximum shell leakage: 7.0 ACH₅₀
- Minimum duct insulation: R-6



Packages for homes with maximum 3% duct losses

Heating Type	Minimum Heating Efficiency	Maximum Uo-value	Maximum Window SHGC	High Efficiency WH ¹⁷	Programmable Thermostat	Package Number
Gas/Oil Furnace	0.80 AFUE	0.111	0.50			4-1
Heat Pump	7.7 HSPF	0.097	0.50			4-2
		0.104	0.50		✓	4-3
		0.108	0.50	✓	✓	4-4
Electric Resistance ¹⁶	1.0 EF	0.074	0.40		✓ ¹⁸	4-5
		0.075	0.40	✓	✓ ¹⁸	4-6
Electric Resistance (Florida Only)	1.0 EF	0.111	0.40		✓ ¹⁸	4-7
		0.114	0.40	✓	✓ ¹⁸	4-8

Packages for homes with maximum 5% duct losses

Heating Type	Minimum Heating Efficiency	Maximum Uo-value	Maximum Window SHGC	High Efficiency WH ¹⁷	Programmable Thermostat	Package Number
Gas/Oil Furnace	0.80 AFUE	0.102	0.50			4-9
		0.116	0.50		✓	4-10
Heat Pump	7.7 HSPF	0.095	0.50			4-11
		0.102	0.50		✓	4-14
		0.106	0.50	✓	✓	4-15
	8.0 HSPF	0.104	0.50		✓	4-16
		0.108	0.50	✓	✓	4-17
Electric Resistance ¹⁶	1.0 EF	0.070	0.40		✓ ¹⁸	4-18
		0.071	0.40	✓	✓ ¹⁸	4-19
Electric Resistance (Florida Only)	1.0 EF	0.116	0.40		✓ ¹⁸	4-20

Packages for homes with maximum 7% duct losses

Heating Type	Minimum Heating Efficiency	Maximum Uo-value	Maximum Window SHGC	High Efficiency WH ¹⁷	Programmable Thermostat	Package Number
Gas/Oil Furnace	0.80 AFUE	0.092	0.50			4-21
		0.106	0.50		✓	4-22
		0.109	0.40		✓	4-23
		0.111	0.50	✓	✓	4-24
		0.115	0.40	✓	✓	4-25
Heat Pump	7.7 HSPF	0.086	0.50			4-26
		0.093	0.50		✓	4-27
		0.095	0.40		✓	4-28
		0.099	0.50	✓	✓	4-29
		0.101	0.40	✓	✓	4-30

¹⁶ Electric resistance packages are not available for homes placed in HUD Thermal Zone 3.

¹⁷ The high efficiency WH requirement may be met by using a 0.59 EF gas WH, a 0.91 EF electric WH or by wrapping a lower-rated WH with a minimum of R-5 insulation.

¹⁸ A programmable thermostat is required for a forced air all-electric heating system. Zone controls are required for baseboard electric resistance heating systems.

SAMPLE SITE INSTALLATION CHECKLIST FOR ENERGY STAR QUALIFIED MANUFACTURED HOMES

Note: This form can be automatically custom-generated for each home by the MHRA ENERGY STAR Information Manager

HOME MANUFACTURER

Company	Contact	Home serial number	
Address	City	State	Telephone

Instructions for manufacturer's field representative:

1. Fill in retailer and homeowner contact information.
2. Verify that all **ENERGY STAR CONSTRUCTION REQUIREMENTS** listed below have been successfully completed.
3. Confirm that the EPA ENERGY STAR and MHRA Quality Assured labels are affixed to the home (near the HUD data plate or the main electrical panel).
4. When all ENERGY STAR construction requirements have been successfully completed:
 - Sign and date this form.
 - Sign and date the MHRA Quality Assured™ label.
 - Promptly return this completed form to the manufacturer.

If there are any discrepancies, contact the manufacturer immediately.

RETAILER*

Company	Contact	Telephone	
Address	City	State	

HOMEOWNER*

Name	Telephone		
Address	City	State	County

ENERGY STAR CONSTRUCTION REQUIREMENTS

A. Marriage Line Seal

The marriage line areas must be filled with a continuous non-porous insulating gasket creating a permanent air barrier at joints in the ceiling, walls and floor. Acceptable gaskets can be one or two-part systems, including proprietary gaskets, foams, insulation wrapped in poly, and insulation covered by butyl or other long-life tape on one side. In addition, there must be no visible signs of gaps or tears.

B. Tears in Bottom Board Material Repaired

All tears in the bottom board material must be covered and sealed with a durable, permanent patch to prevent air leakage. (Foam sealant can be used on lag bolt and other small holes.)

C. Exterior (Including Crossover) Duct Installation

For multi-section homes, the exterior ducts must be sealed with a permanent connection per the Manufacturer's Installation Manual. Identify that the following items are completed:

- All exterior ducts have been installed and wrapped with insulation.
- Crossover collar is secured to the trunk with at least three screws and cannot rotate or move.
- All exterior duct insulation is a minimum of R-_____.
- Nylon or metal straps and saddles are used to support the exterior duct; duct does not touch the ground.
- Three or more screws are placed below the straps through the flexible duct and into the crossover collar.
- Exterior duct insulation is pushed into the floor cavity and sealed with tape or foam sealant at all bottom board penetrations.

D. Field Installed Heat Pump

- Heating equipment efficiency meets or exceeds the following specification: HSPF-_____.

E. For Homes Installed Over Basements (One of the following must be checked)

- This home has an UNHEATED BASEMENT. All interior stairwells from the heated space into the basement are constructed in the same manner as an exterior wall with full insulation and a weather-stripped, insulated exterior door.
- This home has a HEATED BASEMENT. The basement wall insulation level is a minimum of: R-_____.

Signature (Manufacturer's Representative)

Print Name

Date

Fax this completed form to _____ or mail to the home manufacturer at the address above.
Fax Number

A copy of the Sample Site Installation Checklist for ENERGY STAR Manufactured Home is available on the web at: <http://www.mhrahomes.org>. This is a model checklist. Manufacturers may have their own.

* The retailer and/or homeowner may be contacted as part of the ENERGY STAR for Homes quality assurance program.