

**From:** [Darrell Lehman](#)  
**To:** ["Passe, Jonathan"; ENERGY STAR Homes & Apartments](#)  
**Cc:** [Richard John; Arlene Stewart; "Rusty Payton \(rpayton@fhba.com\)"; "Joan Sterling Intertek"; "Catherine Sheehy \(Catherine.P.Sheehy@ul.com\)"; "Kevin Harper"](#)  
**Subject:** Feedback on proposed Energy Star Certified Homes requirements  
**Date:** Tuesday, June 25, 2019 8:18:51 AM  
**Attachments:** [image001.png](#)  
[ES ERI Index Target Procedure v3.1 v18 2017-08-25\\_clean Triconic V1.pdf](#)  
[ES NPR 3.1 v14 2018-05-16\\_clean Triconic Edits V1.pdf](#)  
[Rater D v104 2018-07-10\\_clean\\_fillable Triconic Edits v1.pdf](#)  
[Rater F v104 2018-07-10\\_Clean\\_fillable Triconic Redline V1.pdf](#)  
[ES ERI Index Target Procedure v3.1 v18 2017-08-25\\_clean Triconic V1.pdf](#)  
[ES NPR 3.1 v14 2018-05-16\\_clean Triconic Edits V1.pdf](#)  
[Rater D v104 2018-07-10\\_clean\\_fillable Triconic Edits v1.pdf](#)  
[Rater F v104 2018-07-10\\_Clean\\_fillable Triconic Redline V1.pdf](#)  
[VOO Application DRAFT Triconic Edits V2 24 Jun 2019 without Application.docx](#)

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Dear Jonathan Passe,  
Energy Star for Homes  
U.S. Environmental Protection Agency,

Thank you for this opportunity to comment on the proposed Energy Star Certified Homes requirements. Triconic supports the Energy Star Certified Homes program but recommends that EPA consider a certification structure and Verification Oversight Organization (VOO) requirements that correspond to the voluntary third-party conformity assessment process already in use throughout the United States for products and systems. By examples, Triconic attaches the following five redlined documents:

- EPA Recognition of Verification Oversight Organizations (without application section as application section would flow from final requirements, once you settle these)
- National ERI Target Procedure, ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)
- National Rater Design Review Checklist, ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 09)
- National Rater Field Checklist, ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 09)
- National Program Requirements, ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

Triconic is also responding to the EPA WaterSense® Program regarding a similar analysis of programmatic changes to the process for certification of WaterSense® homes. We believe that a useful step would be to seek alignment between the structures of the two programs. The challenges of providing energy efficiency and water conservation involve similar analytical process and attention to technical characteristics of a home, including its appliances, fixtures, and building materials. There is potential synergy between the two EPA programs that could increase market value and adoption of both WaterSense® and Energy Star in residential construction. Maintaining divergent processes will ensure that bundling of these worthy programs will be less likely to occur and less useful to builders.

While EPA has established a proposed timetable for implementation of the draft specifications and changes to requirements for becoming a VOO, the EPA should consider immediate acceptance of willing nationally recognized certifiers as Energy Star certifiers (VOOs). Immediate EPA Energy Star acceptance of both nationally recognized certifiers and Energy Star certification incumbents would

then be on an equal footing as they prepare for meeting any new VOO requirements.

**Darrell Lehman**

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## EPA RECOGNITION OF VERIFICATION OVERSIGHT ORGANIZATIONS

The hallmark of EPA's ~~ENERGY STAR~~ Energy Star Residential New Construction Program (ENERGY STAR) is the requirement for independent, third-party<sup>1</sup> verification certification<sup>2</sup> of the energy efficiency ratings of the energy performance of homes and apartments that earn the ENERGY STAR label requirements. For site-built and modular, single-family and multifamily homes verified through certified to an ENERGY STAR's Energy Ratings Index-based (ERI) approach, this verification is provided by conformity to ENERGY STAR requirements is determined by entities that can be collectively referred to as 'Verifiers.'

**Commented [DL1]:** Title of the "requirements" should be determined and used consistently.

**Commented [DL2]:** Edited to provide clarity of roles and responsibilities, and to align with normative terms.

A Verification Oversight Organization (VOO) is an EPA recognized independent, national organization that is responsible for decisions related to the granting and withdrawal of operating an ENERGY STAR certifications for homes and apartments, and provides for the credentialing, oversight, and quality assurance of businesses and individuals that verify homes and apartments to earn ENERGY STAR certification certification Scheme<sup>3</sup> used by Verifiers. An organization seeking to become an EPA recognized VOO must submit an 'Application for Recognition' to EPA that demonstrates demonstrating that it meets the EPA's ENERGY STAR program's VOO eligibility criteria and can successfully perform all VOO required roles and responsibilities, including oversight of the credentialing, quality control, and technical and administrative processes used by Verifiers in the rating of site-built and modular single family, and multifamily homes.

EPA's recognition of a VOO relates solely and specifically to the ENERGY STAR Residential New

<sup>1</sup> ISO/IEC 17000 *Conformity assessment — Vocabulary and general principles: third-party conformity assessment activity (2.4)*

<sup>2</sup> ISO/IEC 17000 *Conformity assessment — Vocabulary and general principles: certification (5.5)*

<sup>3</sup> ISO/IEC 17067, *Conformity assessment — Fundamentals of product certification and guidelines for product certification schemes: certification scheme (3.2)*

~~Construction programs~~ for site-built single-family homes and multifamily buildings that are ~~verified-certified~~ using ~~Energy Star's ERI approach~~ ~~an Energy Rating Index approach~~; and does not ~~automatically~~ qualify an organization to implement or participate in other ~~EPA aspects of the ENERGY STAR~~ ~~Energy Star program programs~~ (e.g., ~~Energy Star~~ ~~ENERGY STAR~~ certification of multifamily buildings using an ASHRAE-based approach or ~~Energy Star~~ ~~ENERGY STAR~~ certified manufactured homes), ~~nor federal tax credit verification.~~

Activities undertaken by VOOs are not intended ~~to provide as~~ services ~~provided~~ to the federal government. ~~These organizations~~ ~~VOOs are expected to be market based and~~ may not submit claims for compensation to EPA or any other federal agency for their activities related to fulfilling the required roles and responsibilities of ~~EPA ENERGY STAR~~ recognized VOOs. ~~Recognized VOOs may implement participation or certification fee structures, or seek funding from other sources, to support their oversight programs and activities.~~

ELIGIBILITY CRITERIA for VERIFICATION OVERSIGHT ORGANIZATIONS:

1. Demonstration of Impartial Governance

1.

Impartiality is of critical importance for Verification Oversight Organizations. As such, these organizations/VOOs must be organized and operated to safeguard the objectivity of their activities and maintain policies to ensure that potential conflicts of interest issues are identified and avoided. To be eligible for recognition, as a VOO, an organization's VOO's Scheme must include either:

- 501(c)(3) or 501(c)(6) not-for-profit corporation status, with a Board of Directors or Executive Committee with a diverse representation of interests; and/or
- operate pursuant to ISO/IEC 17065 "Conformity Assessment: Requirements for bodies certifying products, processes, and services" an accredited certification covered by an appropriate scope of International Classification for Standards (ICS), such as ISO/IEC 17065 "Conformity Assessment: Requirements for bodies certifying products, processes, and services." Also, the VOO's Scheme must demonstrate ability to show a home's conformance ISO/IEC 17065 "Conformity Assessment: Requirements for bodies certifying products, processes, and services" accreditation to the ENERGY STAR Certification Protocol requirements for Site-Built and Modular Single-Family Homes and Multifamily New Construction Using the ENERGY STAR Energy Rating Index-Based Compliance Path approach. Accreditation of the VOO Scheme shall be received from through an accreditor that is a signatory to the International Accreditation Forum (IAF) Multilateral Recognition Agreement (MLA). The VOO may maintain a not-for-profit, or for-profit corporate form.

In addition to impartiality outlined in ISO/IEC 17065<sup>4</sup>, the VOO must also demonstrate, at a minimum, the following impartial governance practices:

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<sup>4</sup> ISO/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes and Services: Management of impartiality* (4.2)

- The policies and procedures under which the VOO Scheme operates, and the administration of them, shall be non-discriminatory. Procedures shall not be used to impede or inhibit access to ~~the ENERGY STAR~~ evaluation and certification ~~certification program~~ for homes and apartments.
- The VOO shall make its ENERGY STAR certification ~~program~~ Scheme for homes and apartments accessible to all ENERGY STAR builder and developer partners and access to the VOO's certification ~~process~~ Scheme shall not be conditional upon the size of the ENERGY STAR builder or developer partner, nor membership in any association or group.
- The VOO shall take all necessary steps to ensure that ~~certification~~ Scheme activities for ~~the ENERGY STAR~~ program are undertaken impartially, including, but not limited to, establishing an ~~an~~ an

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—organizational conflict of interest policy, and identifying and eliminating risks to impartiality

- that arise from the VOO’s activities and its relationships.

**Commented [DL3]:** Redundant to ISO/IEC 17065 so this could be deleted.

## 2. Demonstration of National Scope of Operations for Verification Oversight

Organizations applying for recognition as a Verification Oversight Organization VOO must demonstrate the ability to provide oversight of verifiers Scheme on a national level<sup>54</sup>.

This must be demonstrated, at a minimum, through the following:

- Maintaining demonstrated experience competence in providing oversight of an Energy Ratings Index scores (ERIs) ERI Verifiers and technical expertise in building science across the U.S.;
- Having Maintaining a sufficient pool of VOO personnel capable of providing oversight of geographically distributed a broad network of V verifiers that are capable of serving geographically distributed ENERGY STAR builder and developer partners across the U.S. to provide services for ENERGY STAR builder and developer partners; and
- Maintaining a quality assurance and oversight mechanism for V verifiers that are distributed across the U.S.

**Commented [DL4]:** An Energy Star certified home is not geographically distributed. Not sure this remains relevant. An accredited Scheme is not geographically dependent. Geographic scope is a business decision and should not (no longer) be a VOO acceptance decision. Even ENERGY STAR is regionalized.

**Commented [DL5]:** These attributes are too subjective. However, should “national scope” be removed here, these attributes could (should?) be further defined (if different than covered in ISO/IEC 17065) and moved into the application.

<sup>5</sup> EPA may consider allowing non-national scope VOO applications from organizations for specific states or regions where unique geographic situations or code structures warrant different oversight models. National scope may also be demonstrated through partnerships and collaborative models.

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~~†EPA may consider allowing non-national scope VOO applications from organizations for specific states or regions where unique geographic situations or code structures warrant different oversight models.~~



**ROLES AND RESPONSIBILITIES for VERIFICATION OVERSIGHT ORGANIZATIONS:**

To be recognized as a ~~Verification Oversight Organization (VOO)~~VOO for the ENERGY STAR-  
~~New Construction programs~~ for single-family homes and multifamily buildings verified  
through an ERI approach, an organization shall agree in writing to the following roles and  
responsibilities, and submit an application for recognition that provides a detailed description  
of the  
organization's proposed approach to each specified area:

1) General Requirements and Responsibilities

- a. Maintain legally enforceable policies and procedures related to, and be responsible  
for, the granting and withdrawal of ~~ENERGY STAR~~ENERGY STAR certifications for  
homes and apartments.
- b. Have publicly available information about the ~~ENERGY STAR~~certification ~~program~~  
~~Scheme~~ online and in hard-copy format for current or prospective certification  
program participants (i.e., ENERGY STAR builder, developer, and  
~~verifier~~Verifier/Verifier partners).
- c. Allow EPA, at its discretion ~~and cost~~, to audit certification and inspection activities.
- d. Notify EPA of any change in its ~~non-profit status or~~ ISO/IEC 17065 accreditation.

2) VOO Responsibilities

~~The VOO applicant shall provide written documentation that it is operating in accordance with  
the following chapters of the Mortgage Industry National Home Energy Rating Standards  
(MINHERS), along with any formally adopted interpretations and exceptions; or if an alternative  
protocol is to be used,~~ a detailed narrative and process description of the following:

- a. Verifier Training/Credentialing and Listing of Approved Verifiers:
  - i. ~~How the applicant d~~Develops, maintains, or recognizes training,  
examination, credentialing, and continuing education program  
~~requirements~~s for ~~V~~verifiers that ~~shall be at least as rigorous as the~~

**Commented [DL6]:** Reference to a proprietary document is inappropriate. Furthermore, reference to MINHERS is not needed. If an organization uses MINHERS to show compliance, then it can state such in its application.

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~~requirements of Chapter 2 of the Mortgage Industry National Home Energy Rating Standards (MINHERS) and include provisions for the conduct of ERI inspection and rating activities generally, and more specifically, of~~

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- i. ~~both Energy Rating Index and ENERGY STAR~~ specific program requirements and documentation.
  - ii. ~~How the applicant Ensure~~ Ensures that only ~~individuals and organizations that have satisfied~~ Verifiers meeting the training/credentialing requirements of (2)(a)(i) above perform verification of homes/apartments ~~to earn~~ certified to the ENERGY STAR label.
  - iii. Maintain a publicly available online list or database of credentialed ~~V~~ verifiers.
- b. Accredited Software:
- i. ~~How does the applicant E~~ Establish, and maintain, and implement policies ~~requiring that~~ ensure only home energy modeling software programs that are ~~tested and approved for the VOO Applicant's Scheme, including software updates, in accordance with the most current version of RESNET Publication 002 shall be~~ are used by Verifiers in the certification of homes to ENERGY STAR ENERGY STAR ~~certifications for homes and apartments.~~
  - ii. ~~When a new version of home energy software is released, ensure that it shall be used according to the timelines established in section 103.3 of Mortgage Industry National Home Energy Rating Standards (MINHERS).~~
- c. Sampling-based scheme
- i. ~~Describe approved sampling based protocols, if any, When used for homes or /apartments are certified as~~ meeting ENERGY STAR ENERGY STAR ~~through a sampling-based scheme, ensure that the protocol used shall be at least as rigorous as Chapter 6 of Mortgage Industry National Home Energy Rating Standards (MINHERS).~~
- d. ~~Verifier~~ Code of Conduct, Dispute Resolution, and Quality Control/Quality Assurance
- i. ~~Describe the VOO Applicant's~~ Establish and maintain a business code of ethics ~~for verifiers,~~ including a conflict of interest policy, and ethics complaint resolution process that includes procedures for investigation of complaints, ~~verifier suspension or dismissal~~ revocation of Verifiers by the

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~~VOO, and an appeals process that shall be at least as stringent as those specified in Chapter 9 of the Mortgage Industry National Home Energy Rating Standards (MINHERS).~~

- ii. ~~Maintain a dispute resolution process for participating Verifiers that includes procedures for probation, suspension, and revocation; and inform~~

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— EPA when disciplinary action is taken against a Verifier and/or when a

ii. Verifier's status with the VOO has changed<sup>26</sup>.

iii. Provide Verifiers that do not have active formal quality control systems with a process to build quality control systems within the Verifier organization. Such guidance shall provide a pathway and timetable for the Verifier to improve functional quality control, and control and implement internal process and procedure improvements consistent with accredited inspection process.<sup>7</sup>

iv. For Verifiers that are not separately accredited as an inspection agency, such as "ISO/IEC 17020 Conformity Assessment – Requirements for the operation of various types of bodies performing inspection" competent to perform inspection services, the VOO shall provide oversight of those Verifiers consistent with the requirements of ISO/IEC 17065 "Conformity Assessment: Requirements for bodies certifying products, processes, and services" to include ongoing quality assurance and auditing services.

iii.v. Develop, establish and implement quality control/quality assurance systems and procedures for VOO oversight of participating Vverifiers related to the conduct of an Energy Rating Index score and all applicable ENERGY STAR program requirements and documentation, including both file reviews and field inspections at a rate that shall be at least as stringent as those specified in Chapter 9 of the Mortgage Industry National Home Energy Rating Standards (MINHERS) least once every 12 months.

iv.vi. Maintain a web page that allows homeowners to submit inquiries or concerns regarding the ENERGY STAR ENERGY STAR certification of

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**Commented [DL7]:** EPA should just state what they want.

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<sup>6</sup> EPA reserves the right to terminate the ENERGY STAR Partnership Agreement of Vverifiers that violate the terms of their partnership or the Federal ENERGY STAR trademark.

<sup>7</sup> Guidance provided to Verifiers by a VOO should be consistent with and functionally designed for eventual compliance with ISO/IEC 17020: Conformity Assessment – Requirements for the operation of various types of bodies performing inspection.

their home or apartment.

3) Database of ENERGY STAR Certified Homes and Apartments

- a. ~~Maintain a database of homes and apartments that are certified to as ENERGY STAR ENERGY STAR requirements~~, and provide EPA with summary reports, as needed, to allow the Agency to track partners' participation in ~~the ENERGY STAR program~~, as well as obtain general aggregate information about the energy-efficiency features being used in ENERGY STAR certified homes and apartments.

a.           

4) Coordination with EPA

- a. Work collaboratively with EPA to facilitate the comprehensive and coordinated investigation and response to:
  - i. Findings resulting from the routine quality assurance activities conducted by the VOO that may impact ~~the ENERGY STAR ENERGY STAR program~~ certified homes and apartments.

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<sup>2</sup>EPA reserves the right to terminate the ENERGY STAR Partnership Agreement of verifiers that violate the terms of their partnership or the Federal ENERGY STAR trademark.

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**Commented [DL8]:** This requires further discussion. To what detail?

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- ii. Certification discrepancies identified or referred to the VOO by EPA that arise as part of EPA’s administration of ~~the ENERGY STAR-New Construction program.~~
- iii. Certification ~~Review-review Requests-requests~~ and other inquiries from homeowners or renters regarding the ~~ENERGY STAR-ENERGY STAR~~ certification received by the VOO ~~through its website.~~ This will be undertaken in a manner that is consistent with a process defined by EPA.
- iv. Maintain open lines of communication with EPA to address questions and concerns promptly and provide annual reports regarding program administration, quality assurance, and dispute resolution activities (or more frequently, upon request by EPA).
- v. Demonstrate to EPA’s satisfaction adequate availability of personnel and the ability to provide requested information in a timely manner, including participation in meetings related to ~~the ENERGY STAR-New Construction program,~~ as EPA deems necessary.

Commented [DL9]: Requires better defining by EPA

Commented [DL10]: Within reason

Commented [DL11]: Within reason

#### TERMS OF RECOGNITION for VERIFICATION OVERSIGHT ORGANIZATIONS

##### Modifications

EPA reserves the right to modify or amend the eligibility criteria, or roles and responsibilities for ~~Verification Oversight Organizations~~VOOs as needed to ensure the value and integrity of ~~the ENERGY STAR-program.~~ ~~Organizations-VOOs~~ previously recognized by EPA will be given at least 180 days to implement any policies or procedures needed to comply with new EPA requirements.

##### Rejection/Termination

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EPA reserves the right to reject any application that the Agency believes cannot meet the eligibility criteria, including demonstration of a national scope of operations. If, after recognition, EPA determines that a ~~Verification Oversight Organization~~VOO is no longer meeting all of the required eligibility criteria including maintaining a national scope of operations, the required roles or responsibilities, and/or the ~~organization~~VOO has demonstrated a pattern of actions that may negatively impact consumer and industry confidence in, or the integrity of, EPA's ENERGY STAR ~~New Construction programs~~, the Agency will provide the VOO with written notification and allow 30 days to resolve identified issues and provide EPA with a written response summarizing the changes made. If the organization fails to submit a satisfactory response to EPA that addresses the deficiencies identified, EPA reserves the right to suspend or terminate the ~~Verification Oversight Organization's~~VOO's recognition.





# National ERI Target Procedure

## ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

This document provides instructions for determining the ENERGY STAR ERI Target, the highest ERI value that each rated home may achieve to earn the ENERGY STAR. Note that, in addition to meeting the ENERGY STAR ERI Target, homes shall also meet all Mandatory Requirements for All Certified Homes in Exhibit 2 of the National Program Requirements for ENERGY STAR Certified Homes, Version 3.1.

A Home Energy Rating Software program accredited by an EPA-Approved Verification Oversight Organization shall automatically determine (i.e., without relying on a user-configured ENERGY STAR Reference Design) this target for each rated home. This shall be done by configuring the ENERGY STAR Reference Design Home in accordance with Exhibit 1, the Expanded ENERGY STAR Reference Design Definition, and calculating its associated ERI value. This value, rounded to the nearest whole number, shall equal the ENERGY STAR ERI Target.



# National ERI Target Procedure ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

## Exhibit 1: Expanded ENERGY STAR Reference Design Definition

Building Component	Expanded ENERGY STAR Reference Design Definition <sup>1</sup>																																											
Foundations:	Construction Type & Structural Mass: Same as Rated Home, except: <ul style="list-style-type: none"> <li>For masonry floor slabs, modeled with 80% of floor area covered by carpet and 20% of floor directly exposed to room air</li> </ul>																																											
	Conditioning Type: Same as Rated Home, except: <ul style="list-style-type: none"> <li>Crawlspaces shall be modeled as vented with net free vent aperture = 1sq. ft. per 150 sq. ft. of crawlspace floor area</li> </ul>																																											
	Gross Area: Same as Rated Home <sup>2</sup>																																											
	Insulation: <sup>3,4</sup> Choose appropriate insulation level below: <ul style="list-style-type: none"> <li>Basement Wall Assembly U-factor only applies to conditioned bsmt.'s; if applicable, insulation shall be located on interior side of walls</li> <li>Floor assemblies above crawlspace foundations shall be configured to meet the applicable floor assembly U-factor listed in the building component section for Floors Over Unconditioned Spaces</li> <li>Slab floors with a floor surface less than 12" below grade shall be insulated to the Slab Insulation R-value. The insulation shall extend downward from the top of the slab on the outside of the foundation wall and then vertically below-grade to the Slab Insulation Depth</li> </ul>																																											
	<table border="0"> <tr> <td><b>Climate Zone:</b></td> <td><b>CZ 1</b></td> <td><b>CZ 2</b></td> <td><b>CZ 3</b></td> <td><b>CZ 4</b></td> <td><b>CZ 4 C &amp; 5</b></td> <td><b>CZ 6</b></td> <td><b>CZ 7</b></td> <td><b>CZ 8</b></td> </tr> <tr> <td><b>Slab Insulation R-Value:</b></td> <td>0</td> <td>0</td> <td>0</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> </tr> <tr> <td><b>Slab Insulation Depth (ft):</b></td> <td>0</td> <td>0</td> <td>0</td> <td>2</td> <td>2</td> <td>4</td> <td>4</td> <td>4</td> </tr> <tr> <td><b>Basement Wall Assembly U-Factor:</b></td> <td>0.360</td> <td>0.360</td> <td>0.091</td> <td>0.059</td> <td>0.050</td> <td>0.050</td> <td>0.050</td> <td>0.050</td> </tr> </table>									<b>Climate Zone:</b>	<b>CZ 1</b>	<b>CZ 2</b>	<b>CZ 3</b>	<b>CZ 4</b>	<b>CZ 4 C &amp; 5</b>	<b>CZ 6</b>	<b>CZ 7</b>	<b>CZ 8</b>	<b>Slab Insulation R-Value:</b>	0	0	0	10	10	10	10	10	<b>Slab Insulation Depth (ft):</b>	0	0	0	2	2	4	4	4	<b>Basement Wall Assembly U-Factor:</b>	0.360	0.360	0.091	0.059	0.050	0.050	0.050
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<b>Floor Assembly U-Factor:</b>	0.064	0.064	0.047	0.047	0.033	0.033	0.028	0.028																																				
Above-Grade Walls:	Interior and Exterior Construction Type: Wood frame																																											
	Gross Area: Same as Rated Home																																											
	Solar Absorptance = 0.75																																											
	Emittance = 0.90																																											
	<table border="0"> <tr> <td><b>Climate Zone:</b></td> <td><b>CZ 1</b></td> <td><b>CZ 2</b></td> <td><b>CZ 3</b></td> <td><b>CZ 4</b></td> <td><b>CZ 4 C &amp; 5</b></td> <td><b>CZ 6</b></td> <td><b>CZ 7</b></td> <td><b>CZ 8</b></td> </tr> <tr> <td><b>Wall Assembly U-Factor:</b></td> <td>0.082</td> <td>0.082</td> <td>0.057</td> <td>0.057</td> <td>0.057</td> <td>0.048</td> <td>0.048</td> <td>0.048</td> </tr> </table>									<b>Climate Zone:</b>	<b>CZ 1</b>	<b>CZ 2</b>	<b>CZ 3</b>	<b>CZ 4</b>	<b>CZ 4 C &amp; 5</b>	<b>CZ 6</b>	<b>CZ 7</b>	<b>CZ 8</b>	<b>Wall Assembly U-Factor:</b>	0.082	0.082	0.057	0.057	0.057	0.048	0.048	0.048																	
<b>Climate Zone:</b>	<b>CZ 1</b>	<b>CZ 2</b>	<b>CZ 3</b>	<b>CZ 4</b>	<b>CZ 4 C &amp; 5</b>	<b>CZ 6</b>	<b>CZ 7</b>	<b>CZ 8</b>																																				
<b>Wall Assembly U-Factor:</b>	0.082	0.082	0.057	0.057	0.057	0.048	0.048	0.048																																				
Thermally Isolated Sunrooms:	None																																											
Doors:	Area: Same as Rated Home																																											
	Orientation: Same as Rated Home																																											
	U-Values and SHGCs, based on ENERGY STAR doors: <sup>5</sup>																																											
	<table border="0"> <tr> <td><b>Door Type:</b></td> <td><b>Opaque</b></td> <td colspan="3"><b>≤ 1/2-Lite</b></td> <td colspan="2"><b>&gt; 1/2-Lite CZ 1-3</b></td> <td colspan="2"><b>&gt; 1/2-Lite CZ 4-8</b></td> </tr> <tr> <td><b>U-Value:</b></td> <td>0.17</td> <td colspan="3">0.25</td> <td colspan="2">0.30</td> <td colspan="2">0.30</td> </tr> <tr> <td><b>SHGC:</b></td> <td>N/A</td> <td colspan="3">0.25</td> <td colspan="2">0.25</td> <td colspan="2">0.40</td> </tr> </table>									<b>Door Type:</b>	<b>Opaque</b>	<b>≤ 1/2-Lite</b>			<b>&gt; 1/2-Lite CZ 1-3</b>		<b>&gt; 1/2-Lite CZ 4-8</b>		<b>U-Value:</b>	0.17	0.25			0.30		0.30		<b>SHGC:</b>	N/A	0.25			0.25		0.40									
	<b>Door Type:</b>	<b>Opaque</b>	<b>≤ 1/2-Lite</b>			<b>&gt; 1/2-Lite CZ 1-3</b>		<b>&gt; 1/2-Lite CZ 4-8</b>																																				
<b>U-Value:</b>	0.17	0.25			0.30		0.30																																					
<b>SHGC:</b>	N/A	0.25			0.25		0.40																																					
Glazing:	Total Area: (except in homes with conditioned basements and attached homes <sup>6</sup> ) <ul style="list-style-type: none"> <li>Same as Rated Home, where Rated Home glazing area is less than 15% of conditioned floor area; <u>OR</u></li> <li>15% of the conditioned floor area, where the Rated Home glazing area is 15% or more of the conditioned floor area</li> </ul>																																											
	Orientation: Equally distributed to North, East, South, and West																																											
	Interior Shade Coefficient: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301 <sup>7</sup>																																											
	External Shading: None																																											
	U-Values and SHGCs, based on ENERGY STAR Windows: <sup>5</sup>																																											
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	<b>Climate Zone:</b>	<b>CZ 1</b>	<b>CZ 2</b>	<b>CZ 3</b>	<b>CZ 4</b>	<b>CZ 4 C &amp; 5</b>	<b>CZ 6</b>	<b>CZ 7</b>	<b>CZ 8</b>																																			
<b>U-Value:</b>	0.40	0.40	0.30	0.30	0.27	0.27	0.27	0.27																																				
<b>SHGC:</b>	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40																																				
Skylights:	None																																											
Ceilings:	Construction Type: Wood frame																																											
	Gross Area: Same as Rated Home																																											
	Insulation: <sup>3</sup>																																											
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<b>Climate Zone:</b>	<b>CZ 1</b>	<b>CZ 2</b>	<b>CZ 3</b>	<b>CZ 4</b>	<b>CZ 4 C &amp; 5</b>	<b>CZ 6</b>	<b>CZ 7</b>	<b>CZ 8</b>																																				
<b>Ceiling Assembly U-Factor:</b>	0.035	0.030	0.030	0.026	0.026	0.026	0.026	0.026																																				
Attics:	Construction Type: Vented with aperture = 1sq. ft. per 300 sq. ft. ceiling area																																											
	Radiant Barrier: None																																											
Roofs:	Construction Type: Composition shingle on wood sheathing																																											
	Gross Area: Same as Rated Home																																											
	Solar Absorptance = 0.92																																											
	Emittance = 0.90																																											



# National ERI Target Procedure ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

## Exhibit 1: Expanded ENERGY STAR Reference Design Definition (Continued)

Heating Systems:	Heating capacity shall be selected in accordance with ACCA Manual S based on building heating and cooling loads calculated in accordance with ACCA Manual J, Eighth Edition, ASHRAE Handbook of Fundamentals, or an equivalent computation procedure.																																																																																
	Fuel Type: Same as Rated Home <sup>8</sup>																																																																																
	System Type: Same as Rated Home, except Reference Design shall be configured with air-source heat pump in CZ 1-6 where Rated Home is modeled with ground-source heat pump, electric strip or baseboard heat, and Reference Design shall be configured with ground-source heat pump in CZ 7 & 8 where Rated Home is modeled with air-source or ground-source heat pump, electric strip or baseboard heat; applicable efficiency selected from below <sup>9</sup>																																																																																
	<table border="1"> <thead> <tr> <th>Climate Zone:</th> <th>CZ 1</th> <th>CZ 2</th> <th>CZ 3</th> <th>CZ 4</th> <th>CZ 4 C &amp; 5</th> <th>CZ 6</th> <th>CZ 7</th> <th>CZ 8</th> </tr> </thead> <tbody> <tr> <td>Gas Furn. AFUE:</td> <td>80</td> <td>80</td> <td>80</td> <td>95</td> <td>95</td> <td>95</td> <td>95</td> <td>95</td> </tr> <tr> <td>Oil Furn. AFUE:</td> <td>80</td> <td>80</td> <td>80</td> <td>85</td> <td>85</td> <td>85</td> <td>85</td> <td>85</td> </tr> <tr> <td>Gas Boiler AFUE:</td> <td>80</td> <td>80</td> <td>80</td> <td>90</td> <td>90</td> <td>90</td> <td>90</td> <td>90</td> </tr> <tr> <td>Oil Boiler AFUE:</td> <td>80</td> <td>80</td> <td>80</td> <td>86</td> <td>86</td> <td>86</td> <td>86</td> <td>86</td> </tr> <tr> <td>Air-Source Heat Pump HSPF:</td> <td>8.2</td> <td>8.2</td> <td>8.2</td> <td>8.5</td> <td>9.25</td> <td>9.5</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>Air-Source Heat Pump Backup:</td> <td>Electric</td> <td>Electric</td> <td>Electric</td> <td>Electric</td> <td>Electric</td> <td>Electric</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>Ground-Source Heat Pump COP:</td> <td>n/a</td> <td>n/a</td> <td>n/a</td> <td>n/a</td> <td>n/a</td> <td>n/a</td> <td>3.6</td> <td>3.6</td> </tr> </tbody> </table>									Climate Zone:	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8	Gas Furn. AFUE:	80	80	80	95	95	95	95	95	Oil Furn. AFUE:	80	80	80	85	85	85	85	85	Gas Boiler AFUE:	80	80	80	90	90	90	90	90	Oil Boiler AFUE:	80	80	80	86	86	86	86	86	Air-Source Heat Pump HSPF:	8.2	8.2	8.2	8.5	9.25	9.5	n/a	n/a	Air-Source Heat Pump Backup:	Electric	Electric	Electric	Electric	Electric	Electric	n/a	n/a	Ground-Source Heat Pump COP:	n/a	n/a	n/a	n/a	n/a	n/a	3.6	3.6
	Climate Zone:	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8																																																																								
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	Oil Furn. AFUE:	80	80	80	85	85	85	85	85																																																																								
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Air-Source Heat Pump HSPF:	8.2	8.2	8.2	8.5	9.25	9.5	n/a	n/a																																																																									
Air-Source Heat Pump Backup:	Electric	Electric	Electric	Electric	Electric	Electric	n/a	n/a																																																																									
Ground-Source Heat Pump COP:	n/a	n/a	n/a	n/a	n/a	n/a	3.6	3.6																																																																									
For non-electric warm furnaces and non-electric boilers, the Electric Auxiliary Energy shall be determined in accordance with the methodology for the Energy Rating Reference Home in ANSI / RESNET / ICC Std. 301, using the capacity determined in this Section. <sup>7</sup>																																																																																	
Cooling Systems:	Cooling capacity shall be selected in accordance with ACCA Manual S based on building heating and cooling loads calculated in accordance with ACCA Manual J, Eighth Edition, ASHRAE Handbook of Fundamentals, or an equivalent computation procedure.																																																																																
	Fuel Type: Same as Rated Home <sup>8</sup>																																																																																
	System Type: Same as Rated Home, except Reference Design shall be configured with air-source heat pump in CZ 1-6 where Rated Home is modeled with ground-source heat pump and Reference Design shall be configured with ground-source heat pump in CZ 7 & 8 where Rated Home is modeled with air-source or ground-source heat pump; applicable efficiency selected from below. <sup>10</sup>																																																																																
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Air-Source Heat Pump SEER:	15	15	15	15	15	15	n/a	n/a																																																																									
Ground-Source Heat Pump EER:	n/a	n/a	n/a	n/a	n/a	n/a	17.1	17.1																																																																									
Use (Gallons per Day): Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301, except for reduced usage resulting from the dishwasher specified in the Lighting, Appliances, & Internal Gains Section. <sup>7, 11</sup>																																																																																	
Service Water Heating Systems:	Tank Temperature: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. <sup>7</sup>																																																																																
	Fuel Type: Same as Rated Home <sup>8</sup>																																																																																
	System Type: Conventional storage water heater with tank size equal to that of Rated Home, unless Rated Home uses instantaneous water heater in which case select 50 gallon tank for gas systems and 60 gallon tank for electric systems. Select applicable efficiency from below using tank size of Reference Home.																																																																																
	<table border="1"> <thead> <tr> <th>Gas Storage Tank Capacity:<sup>12</sup></th> <th>30 Gallon</th> <th>40 Gallon</th> <th>50 Gallon</th> <th>60 Gallon</th> <th>70 Gallon</th> <th>80 Gallon</th> </tr> </thead> <tbody> <tr> <td>Gas DHW EF:</td> <td>0.63</td> <td>0.61</td> <td>0.59</td> <td>0.57</td> <td>0.55</td> <td>0.53</td> </tr> <tr> <th>Electric Storage Tank Capacity:<sup>12</sup></th> <th>30 Gallon</th> <th>40 Gallon</th> <th>50 Gallon</th> <th>60 Gallon</th> <th>70 Gallon</th> <th>80 Gallon</th> </tr> <tr> <td>Electric DHW EF:</td> <td>0.94</td> <td>0.93</td> <td>0.92</td> <td>0.91</td> <td>0.90</td> <td>0.89</td> </tr> <tr> <th>Oil Storage Tank Capacity:<sup>12</sup></th> <th>30 Gallon</th> <th>40 Gallon</th> <th>50 Gallon</th> <th>60 Gallon</th> <th>70 Gallon</th> <th>80 Gallon</th> </tr> <tr> <td>Oil DHW EF:</td> <td>0.55</td> <td>0.53</td> <td>0.51</td> <td>0.49</td> <td>0.47</td> <td>0.45</td> </tr> </tbody> </table>									Gas Storage Tank Capacity: <sup>12</sup>	30 Gallon	40 Gallon	50 Gallon	60 Gallon	70 Gallon	80 Gallon	Gas DHW EF:	0.63	0.61	0.59	0.57	0.55	0.53	Electric Storage Tank Capacity: <sup>12</sup>	30 Gallon	40 Gallon	50 Gallon	60 Gallon	70 Gallon	80 Gallon	Electric DHW EF:	0.94	0.93	0.92	0.91	0.90	0.89	Oil Storage Tank Capacity: <sup>12</sup>	30 Gallon	40 Gallon	50 Gallon	60 Gallon	70 Gallon	80 Gallon	Oil DHW EF:	0.55	0.53	0.51	0.49	0.47	0.45																														
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One Story Above Grade:	100% Conditioned	100% Conditioned	100% Conditioned																																																																														
Two Story Above Grade:	100% Conditioned	100% Conditioned	100% Conditioned																																																																														
Thermostat:	Type: Programmable																																																																																
	Temperature Setpoints: Same as Energy Rating Reference Home, but with offsets for a programmable thermostat, as defined by ANSI / RESNET / ICC Std. 301. <sup>7</sup>																																																																																
Infiltration & Mechanical Ventilation:	Infiltration Rates: <table border="1"> <thead> <tr> <th>Climate Zone:</th> <th>CZ 1</th> <th>CZ 2</th> <th>CZ 3</th> <th>CZ 4</th> <th>CZ 4 C &amp; 5</th> <th>CZ 6</th> <th>CZ 7</th> <th>CZ 8</th> </tr> </thead> <tbody> <tr> <td>ACH50:</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </tbody> </table>									Climate Zone:	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8	ACH50:	4	4	3	3	3	3	3	3																																																						
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	ACH50:	4	4	3	3	3	3	3	3																																																																								
	Mechanical ventilation system without heat recovery																																																																																
	Rate: CFM = 0.01 * CFA + 7.5 * (Nbr + 1), where CFA = Conditioned Floor Area and Nbr = Number of Bedrooms; Runtime: 24 Hours / Day																																																																																
Fan Watts: Watts = CFM Rate / 2.8 CFM per Watt, where CFM Rate is determined above																																																																																	
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Ventilation Type:	Supply	Supply	Supply	Supply	Exhaust	Exhaust	Exhaust	Exhaust																																																																									
Lighting, Appliances, & Internal Gains:	Lighting: Fraction of qualifying Tier I fixtures to all fixtures in qualifying light fixture locations 90% for interior; 0% for exterior and garage																																																																																
	Refrigerator: 423 kWh per year																																																																																
	Dishwasher: 0.66 EF, Place Setting Capacity Same as Rated Home																																																																																
	Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Home; otherwise Quantity = 0																																																																																
	Clothes Washer and Dryer: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. <sup>7</sup>																																																																																
Internal Gains: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301, except for adjustments for the lighting, refrigerator, dishwasher, and ceiling fans specified in this Section. <sup>7</sup>																																																																																	
Internal Mass:	Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301. <sup>7</sup>																																																																																
Additional mass specifically designed as a Thermal Storage Element for the Rated Home shall be excluded.																																																																																	



# National ERI Target Procedure

## ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

### Footnotes:

1. Any parameter not specified in this exhibit shall be identical to the value entered for the Rated Home.
2. "Same as Rated Home" indicates that the parameter shall be identical to the value entered for the Rated Home.
3. Slab insulation R-values represent nominal insulation levels; and assembly U-factors for foundations, floors, walls, and ceilings represent the overall assembly, inclusive of sheathing materials, cavity insulation, installation quality, framing, and interior finishes.
4. If software allows the user to specify the thermal boundary location independent of the conditioned space boundary in the basement of the rated home, then the thermal boundary of the ENERGY STAR Reference Design shall be aligned with this boundary. For example, if the thermal boundary is located at the walls, then the wall insulation shall be configured as if it was a conditioned basement. If the thermal boundary is located at the floor above the basement, then the floor insulation shall be configured as if it was a floor over an unconditioned space.
5. All Reference Design window and door U-value and SHGC requirements are based on the ENERGY STAR Program Requirements for Residential Windows, Doors, and Skylights – Version 6.0 as outlined at [www.energystar.gov/windows](http://www.energystar.gov/windows), except that SHGC values have been assumed for CZ 4C & 5-8. Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion.
6. When determining the ENERGY STAR ERI Target for homes with conditioned basements and for attached homes, the following formula shall be used to determine total window area of the ENERGY STAR Reference Design:

$$AG = 0.15 \times CFA \times FA \times F$$

Where:

- AG = Total glazing area
- CFA = Total conditioned floor area
- FA = (Gross above-grade thermal boundary wall area) / (Gross above-grade thermal boundary wall area + 0.5 x Gross below-grade thermal boundary wall area)
- F =  $1 - 0.44 \times (\text{Gross common wall area}) / (\text{Gross above-grade thermal boundary wall area} + \text{Gross common wall area})$

And where:

- Thermal boundary wall is any wall that separates Conditioned Space from Unconditioned Space, outdoor environment, or the surrounding soil;
  - Above-grade thermal boundary wall is any portion of a thermal boundary wall not in contact with soil;
  - Below-grade thermal boundary wall is any portion of a thermal boundary wall in soil contact; and
  - Common wall is the total wall area of walls adjacent to another conditioned living unit, not including foundation walls.
7. The version of ANSI / RESNET / ICC Std. 301 utilized by RESNET for HERS<sub>i</sub> ratings shall be used to configure this parameter.
  8. Fuel type(s) shall be same as Rated Home, including any dual-fuel equipment where applicable. For a Rated Home with multiple heating, cooling, or water heating systems using different fuel types, the applicable system capacities and fuel types shall be weighted in accordance with the loads distribution (as calculated by accepted engineering practice for that equipment and fuel type) of the multiple systems.
  9. For a Rated Home without a heating system, the ENERGY STAR Reference Design Home shall be configured with a 78% AFUE gas furnace system, unless the Rated home has no access to natural gas or fossil fuel delivery. In such cases, the ENERGY STAR Reference Design Home shall be configured with a 7.7 HSPF air-source heat pump.
  10. For a Rated Home without a cooling system, the ENERGY STAR Reference Design Home shall be configured with a 13 SEER electric air conditioner.
  11. That is to say, representative of standard-flow plumbing fixtures, reference clothes washer gallons per day, standard distribution system water use effectiveness, a hot water piping ratio of 1.0, no pipe insulation, and no drainwater heater recovery.
  12. To determine domestic hot water (DHW) EF requirements for additional tank sizes, use the following equations: Gas DHW EF  $\geq 0.69 - (0.002 \times \text{Tank Gallon Capacity})$ ; Electric DHW EF  $\geq 0.97 - (0.001 \times \text{Tank Gallon Capacity})$ ; Oil DHW EF  $\geq 0.61 - (0.002 \times \text{Tank Gallon Capacity})$ .



# National Rater Design Review Checklist

## ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 09)

Home Address: _____ City: _____ State: _____ Permit Date: _____		
<b>1. Partnership Status</b>	<b>Must Correct</b>	<b>Rater <sup>1</sup> Verified</b>
1.1 Rater has verified that builder is an ENERGY STAR partner using <a href="http://energystar.gov/partnerlocator">energystar.gov/partnerlocator</a>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Rater has verified that HVAC contractor holds credential required to complete National HVAC Commissioning Checklist, unless all equipment to be installed in home to be certified is an exempted type, in which case check "N/A" <sup>2</sup> <input type="checkbox"/> N/A HVAC Contractor Company Name: _____	<input type="checkbox"/>	<input type="checkbox"/>
<b>2. High-Performance Fenestration</b>		
2.1 Specified fenestration meets or exceeds 2009 IECC requirements <sup>3</sup>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3. High-Performance Insulation</b>		
3.1 Specified ceiling, wall, floor, and slab insulation levels comply with one of the following options:	<input type="checkbox"/>	<input type="checkbox"/>
3.1.1 Meets or exceeds 2009 IECC levels <sup>4,5,6</sup> <b>OR</b> ;	-	-
3.1.2 Achieves $\leq 133\%$ of the total UA resulting from the U-factors in 2009 IECC Table 402.1.3, per guidance in Footnote 4d, AND specified home infiltration does not exceed the following: <sup>5,6</sup> 3 ACH50 in CZs 1, 2      2.5 ACH50 in CZs 3, 4      2 ACH50 in CZs 5, 6, 7      1.5 ACH50 in CZ 8	-	-
<b>4. Review of National HVAC Design Report <sup>7</sup></b>		
4.1 National HVAC Design Report collected for records, with no items left blank	<input type="checkbox"/>	<input type="checkbox"/>
4.2 National HVAC Design Report reviewed by Rater for the following parameters (National HVAC Design Report Item # in parenthesis):		
4.2.1 Cooling season and heating season outdoor design temperatures used in loads (3.3) are within the limits defined at <a href="http://energystar.gov/hvacdesigntemps">energystar.gov/hvacdesigntemps</a> for the State and County, or US Territory, where the home will be built, or the designer has provided an allowance from EPA to use alternative values <sup>8</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4.2.2 Number of occupants used in loads (3.4) is within $\pm 2$ of the home to be certified <sup>9</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4.2.3 Conditioned floor area used in loads (3.5) is between 100 sq. ft. smaller and 300 sq. ft. larger than the home to be certified	<input type="checkbox"/>	<input type="checkbox"/>
4.2.4 Window area used in loads (3.6) is between 15 sq. ft. smaller and 60 sq. ft. larger than the home to be certified, or, for homes to be certified with > 500 sq. ft. of window area, between 3% smaller and 12% larger	<input type="checkbox"/>	<input type="checkbox"/>
4.2.5 Predominant window SHGC used in loads (3.7) is within 0.1 of predominant value in the home to be certified <sup>10</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4.2.6 Sensible, latent, & total heat gain are documented (3.10 - 3.12) for the orientation of the home to be certified <sup>11</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4.2.7 The variation in total heat gain across orientations (3.13) is $\leq 6$ kBtuh <sup>11</sup>	<input type="checkbox"/>	<input type="checkbox"/>
4.2.8 Cooling sizing % (4.13) is within the cooling sizing limit (4.15) selected by the HVAC designer	<input type="checkbox"/>	<input type="checkbox"/>
Rater Name: _____ Date of Review: _____		
Rater Signature: _____ Rater Company Name: _____		



# National Rater Design Review Checklist

## ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 09)

### Footnotes

1. The term 'Rater' refers to the person completing the third-party inspections required for certification. This person shall: a) be a certified Home Energy Rater, Rating Field Inspector, or an equivalent designation as determined by a Verification Oversight Organization ~~such as RESNET~~; and, b) have attended and successfully completed an EPA-recognized training class. See [energystar.gov/newhomestraining](http://energystar.gov/newhomestraining).
2. HVAC contractors must be credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (H-QUITO) if a split air conditioner, unitary air conditioner, air-source heat pump, or water-source (i.e., geothermal) heat pump up to 65 kBtu/h with a forced-air distribution system (i.e., ducts) or a furnace up to 225 kBtu/h with a forced-air distribution system (i.e., ducts) will be installed in the home to be certified. For all other permutations of equipment (e.g., boilers, mini-split / multi-split systems) and distribution systems, a credential is not required. An explanation of this credentialing process and links to H-QUITOs, which maintain lists of credentialed contractors, can be found at [energystar.gov/newhomeshvac](http://energystar.gov/newhomeshvac).
3. All windows, doors and skylights shall meet or exceed the component U-factor and SHGC requirements specified in 2009 IECC Table 402.1.1. If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the U-factor and SHGC value from Tables 4 and 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. Select the highest U-factor and SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating). Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion. The following exceptions apply:
  - a. An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements;
  - b. An area-weighted average of fenestration products  $\geq 50\%$  glazed shall be permitted to satisfy the SHGC requirements;
  - c. 15 square feet of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above;
  - d. One side-hinged opaque door assembly up to 24 square feet in area shall be exempt from the U-factor requirements and shall be excluded from area-weighted averages calculated using a) and b), above;
  - e. Fenestration utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above. Exempt windows shall be facing within 45 degrees of true South and directly coupled to thermal storage mass that has a heat capacity  $> 20 \text{ btu} / \text{ft}^3 \times ^\circ\text{F}$  and provided in a ratio of at least 3 sq. ft. per sq. ft. of South facing fenestration. Generally, thermal mass materials will be at least 2 in. thick.In PHIUS+ or PHI certified homes, where triple-glazed window assemblies with thermal breaks / spacers between the panes are used, such windows meet the intent of Item 2.1 and shall be excluded when assessing compliance of a) through e), above.
4. Specified levels shall meet or exceed the component insulation levels in 2009 IECC Table 402.1.1. The following exceptions apply:
  - a. Steel-frame ceilings, walls, and floors shall meet the insulation levels of 2009 IECC Table 402.2.5. In CZ 1 and 2, the continuous insulation requirements in this table shall be permitted to be reduced to R-3 for steel-frame wall assemblies with studs spaced at 24 in. on center. This exception shall not apply if the alternative calculations in d) are used;
  - b. For ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves. This exemption shall not apply if the alternative calculations in d) are used;
  - c. For ceilings without attic spaces, R-30 shall satisfy the requirement for any required value above R-30 if the design of the roof / ceiling assembly does not provide sufficient space for the required insulation value. This exemption shall be limited to 500 sq. ft. or 20% of the total insulated ceiling area, whichever is less. This exemption shall not apply if the alternative calculations in d) are used;
  - d. An alternative equivalent U-factor or total UA calculation may also be used to demonstrate compliance, as follows:

An assembly with a U-factor equal or less than specified in 2009 IECC Table 402.1.3 complies.

A total building thermal envelope UA that is less than or equal to the total UA resulting from the U-factors in Table 402.1.3 also complies. The performance of all components (i.e., ceilings, walls, floors, slabs, and fenestration) can be traded off using the UA approach. Note that Items 3.1 through 3.3 of the National Rater Field Checklist shall be met regardless of the UA tradeoffs calculated. The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method.
5. Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 12 inches below grade. Slab insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. Alternatively, the thermal break is permitted to be created using  $\geq R-3$  rigid insulation on top of an existing slab (e.g., in a home undergoing a gut rehabilitation). In such cases, up to 10% of the slab surface is permitted to not be insulated (e.g., for sleepers, for sill plates). Insulation installed on top of slab shall be covered by a durable floor surface (e.g., hardwood, tile, carpet).
6. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the house, slab insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab. Where specific details cannot meet this requirement, partners shall provide the detail to EPA to request an exemption prior to the home's certification. EPA will compile exempted details and work with industry to develop feasible details for use in future revisions to the program. A list of currently exempted details is available at: [energystar.gov/slabeledge](http://energystar.gov/slabeledge).
7. The Rater shall collect one National HVAC Design Report per system design per plan. Regardless of whether the "site-specific design" or "group design" box has been checked in Item 1.6 of the National HVAC Design Report, the system design as documented on the National HVAC Design Report must fall within the tolerances in Item 4.2 for the home to be certified. The report is only required to be collected once per system design, even if multiple homes are built using this design (e.g., in a production environment where the same plan is built multiple times, only one report is required as long as no aspect of the system design changes between homes). The Rater is only responsible for verifying that the designer has not left any items blank on the National HVAC Design Report and for verifying the discrete objective parameters in Item 4.2 of this Checklist, not for verifying the accuracy of every input on the National HVAC Design Report.



# National Rater Design Review Checklist

## ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 09)

8. Visit [energystar.gov/hvacdesigntemps](http://energystar.gov/hvacdesigntemps) for the maximum cooling season design temperature and minimum heating season design temperature permitted for ENERGY STAR certified homes and the process for a designer to obtain an allowance from EPA. The same design report is permitted to be used in other counties, as long as the design temperature limits in those other counties meet or exceed the cooling and heating season temperature limits for the county selected. For example, if Fauquier County, VA, is used for the load calculations, with a 1% cooling temperature limit of 93 F, then the same report could be used in Fairfax County (which has a higher limit of 94 F) but not in Arlington County (which has a lower limit of 92 F).
9. To determine the number of occupants among all HVAC systems in the home, calculate the number of bedrooms, as defined below, and add one. The number of occupants used in loads must be within  $\pm 2$  of the home to be certified, unless Item 1.5 of the National HVAC Design Report indicates that the system is a cooling system for temporary occupant loads.

A bedroom is defined by ANSI / RESNET / ICC Standard 301-2014 as a room or space 70 sq. ft. or greater size, with egress window and closet, used or intended to be used for sleeping. A "den", "library", or "home office" with a closet, egress window, and 70 sq. ft. or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.

An egress window, as defined in 2009 IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:

  - have a sill height of not more than 44 inches above the floor; AND
  - have a minimum net clear opening of 5.7 sq. ft.; AND
  - have a minimum net clear opening height of 24 in.; AND
  - have a minimum net clear opening width of 20 in.; AND
  - be operational from the inside of the room without the use of keys, tools or special knowledge.
10. "Predominant" is defined as the SHGC value used in the greatest amount of window area in the home.
11. Orientation represents the direction that the front door of the house is facing. The designer is only required to document the loads for the orientation(s) that the house might be built in. For example, if a house plan will only be built one time in a specific orientation (e.g., a site-specific design), then the designer only needs to document the loads for this one orientation.



# National Rater Field Checklist

## ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 09)

Home Address: _____	City: _____	State: _____	Permit Date: _____			
Thermal Enclosure System			Must Correct	Builder Verified <sup>1</sup>	Rater Verified <sup>2</sup>	N/A <sup>3</sup>
<b>1. High-Performance Fenestration &amp; Insulation</b>						
1.1 Fenestration meets or exceeds specification in Item 2.1 of the National Rater Design Review Checklist			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
1.2 Insulation meets or exceeds specification in Item 3.1 of the National Rater Design Review Checklist			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
1.3 All insulation achieves Grade I install. per ANSI / RESNET / ICC Std. 301. Alternatives in Footnote 4. 4,5			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
<b>2. Fully-Aligned Air Barriers<sup>6</sup></b> At each insulated location below, a complete air barrier is provided that is fully aligned as follows:						
Ceilings: At interior or exterior horizontal surface of ceiling insulation in Climate Zones 1-3; at interior horizontal surface of ceiling insulation in Climate Zones 4-8. Also, at exterior vertical surface of ceiling insulation in all climate zones (e.g., using a wind baffle that extends to the full height of the insulation in every bay or a tabbed baffle in each bay with a soffit vent that prevents wind washing in adjacent bays). <sup>7</sup>						
2.1 Dropped ceilings / soffits below unconditioned attics, and all other ceilings			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walls: At exterior vertical surface of wall insulation in all climate zones; also at interior vertical surface of wall insulation in Climate Zones 4-8 <sup>8</sup>						
2.2 Walls behind showers, tubs, staircases, and fireplaces			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Attic knee walls and skylight shaft walls <sup>9</sup>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Walls adjoining porch roofs or garages			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Double-walls and all other exterior walls			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
Floors: At exterior vertical surface of floor insulation in all climate zones and, if over unconditioned space, also at interior horizontal surface including supports to ensure alignment. Alternatives in Footnotes 11 & 12. 10, 11, 12						
2.6 Floors above garages, floors above unconditioned basements or crawlspaces, and cantilevered floors			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.7 All other floors adjoining unconditioned space (e.g., rim / band joists at exterior wall or at porch roof)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3. Reduced Thermal Bridging</b>						
3.1 For insulated ceilings with attic space above (i.e., non-cathedralized), Grade I insulation extends to the inside face of the exterior wall below and is $\geq R-21$ in CZ 1-5; $\geq R-30$ in CZ 6-8 <sup>13</sup>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2 For slabs on grade in CZ 4-8, 100% of slab edge insulated to $\geq R-5$ at the depth specified by the 2009 IECC and aligned with the thermal boundary of the walls <sup>14, 15</sup>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3 Insulation beneath attic platforms (e.g., HVAC platforms, walkways) $\geq R-21$ in CZ 1-5; $\geq R-30$ in CZ 6-8			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4 At above-grade walls separating conditioned from unconditioned space, one of the following options used (rim / band joists exempted): <sup>16</sup>						
3.4.1 Continuous rigid insulation, insulated siding, or combination of the two is: $\geq R-3$ in CZ 1-4; $\geq R-5$ in CZ 5-8 <sup>17, 18, 19</sup> ; <b>OR</b> ;			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.2 Structural Insulated Panels <b>OR</b> ; Insulated Concrete Forms <b>OR</b> ; Double-wall framing <b>OR</b> ; <sup>17,20</sup>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3 Advanced framing, including all of the Items below: <sup>21</sup>						
3.4.3a Corners insulated $\geq R-6$ to edge <sup>22</sup> ; <b>AND</b> ;			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3b Headers above windows & doors insulated $\geq R-3$ for 2x4 framing or equivalent cavity width, and $\geq R-5$ for all other assemblies (e.g., with 2x6 framing) <sup>23</sup> ; <b>AND</b> ;			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3c Framing limited at all windows & doors to one pair of king studs, plus one pair of jack studs per window opening to support the header and sill, <b>AND</b> ;			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3d Interior / exterior wall intersections insulated to same R-value as rest of exterior wall, <sup>24</sup> <b>AND</b> ;			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3e Minimum stud spacing of 16 in. o.c. for 2x4 framing in all Climate Zones and, in CZ 6-8, 24 in. o.c. for 2x6 framing <sup>25</sup>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4. Air Sealing (Unless otherwise noted below, "sealed" indicates the use of caulk, foam, or equivalent material)</b>						
4.1 Ducts, flues, shafts, plumbing, piping, wiring, exhaust fans, & other penetrations to unconditioned space sealed, with blocking / flashing as needed			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
4.2 Recessed lighting fixtures adjacent to unconditioned space ICAT labeled and gasketed. Also, if in insulated ceiling without attic above, exterior surface of fixture insulated to $\geq R-10$ in CZ 4-8.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3 Above-grade sill plates adjacent to conditioned space sealed to foundation or sub-floor. Gasket also placed beneath above-grade sill plate if resting atop concrete / masonry & adjacent to cond. space <sup>26,27</sup>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4 Continuous top plate or blocking is at top of walls adjoining unconditioned space, and sealed			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.5 Drywall sealed to top plate at all unconditioned attic / wall interfaces using caulk, foam, drywall adhesive (but not other construction adhesives), or equivalent material. Either apply sealant directly between drywall and top plate or to the seam between the two from the attic above.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.6 Rough opening around windows & exterior doors sealed <sup>28</sup>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
4.7 Walls that separate attached garages from occupiable space sealed and, also, an air barrier installed and sealed at floor cavities aligned with these walls			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.8 In multifamily buildings, the gap between the common wall (e.g. the drywall shaft wall) and the structural framing between units sealed at all exterior boundaries			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.9 Doors adjacent to unconditioned space (e.g., attics, garages, basements) or ambient conditions made substantially air-tight with weatherstripping or equivalent gasket.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.10 Attic access panels, drop-down stairs, & whole-house fans equipped with durable $\geq R-10$ cover that is gasketed (i.e., not caulked). Fan covers either installed on house side or mechanically operated. <sup>29</sup>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





# National Rater Field Checklist

## ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 09)

HVAC System <sup>30</sup> (National HVAC Design Report Item # in parenthesis)				Must Correct	Rater Verified <sup>2</sup>	N/A <sup>3</sup>
<b>5. Heating &amp; Cooling Equipment</b>						
5.1 HVAC manufacturer & model number on installed equipment matches either of the following (check box): <sup>31</sup> <input type="checkbox"/> National HVAC Design Report (4.3, 4.4, & 4.17) <input type="checkbox"/> Written approval received from designer				<input type="checkbox"/>	<input type="checkbox"/>	-
5.2 External static pressure measured by Rater at contractor-provided test locations and documented below: <sup>32</sup> Return-Side External Static Pressure: _____ IWC    Supply-Side External Static Pressure: _____ IWC				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.3 <u>Permitted, but not required</u> : National HVAC Commissioning Checklist collected, with no items left blank				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>6. Duct Quality Installation - Applies to Heating, Cooling, Ventilation, Exhaust, &amp; Pressure Balancing Ducts, Unless Noted in Footnote</b>						
6.1 Ductwork installed without kinks, sharp bends, compressions, or excessive coiled flexible ductwork <sup>33</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2 Bedrooms pressure-balanced (e.g., using transfer grilles, jump ducts, dedicated return ducts, undercut doors) to achieve a Rater-measured pressure differential $\geq -3$ Pa and $\leq +3$ Pa with respect to the main body of the house when all air handlers are operating. Test configuration and an alternative compliance option in Footnote 34. <sup>34</sup>				<input type="checkbox"/>	<input type="checkbox"/>	-
6.3 All supply and return ducts in unconditioned space, including connections to trunk ducts, are insulated to $\geq R-6$ <sup>35</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.4 Rater-measured total duct leakage meets one of the following two options. Alternative in Footnote 37: <sup>36, 37, 38</sup>						
6.4.1 <u>Rough-in</u> : The greater of $\leq 4$ CFM25 per 100 sq. ft. of CFA or $\leq 40$ CFM25, with air handler & all ducts, building cavities used as ducts, & duct boots installed. In addition, <u>all</u> duct boots sealed to finished surface, Rater-verified at final. <sup>39</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.4.2 <u>Final</u> : The greater of $\leq 8$ CFM25 per 100 sq. ft. of CFA or $\leq 80$ CFM25, with the air handler & all ducts, bldg. cavities used as ducts, duct boots, & register grilles atop the finished surface (e.g., drywall, floor) installed <sup>40</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.5 Rater-measured duct leakage to outdoors the greater of $\leq 4$ CFM25 per 100 sq. ft. of CFA or $\leq 40$ CFM25 <sup>36, 38, 41</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>7. Whole-House Mechanical Ventilation System</b>						
7.1 Rater-measured ventilation rate is within either $\pm 15$ CFM or $\pm 15\%$ of design value (2.3) <sup>42</sup>				<input type="checkbox"/>	<input type="checkbox"/>	-
7.2 A readily-accessible ventilation override control installed and also labeled if its function is not obvious (e.g., a label is required for a standalone wall switch, but not for a switch that's on the ventilation equipment) <sup>43</sup>				<input type="checkbox"/>	<input type="checkbox"/>	-
7.3 No outdoor air intakes connected to return side of the HVAC system, unless controls are installed to operate intermittently & automatically based on a timer and to restrict intake when not in use (e.g., motorized damper)				<input type="checkbox"/>	<input type="checkbox"/>	-
7.4 System fan rated $\leq 3$ sones if intermittent and $\leq 1$ sone if continuous, or exempted <sup>44</sup>				<input type="checkbox"/>	<input type="checkbox"/>	-
7.5 If system utilizes the HVAC fan, then the specified fan type is ECM / ICM (4.7), or the controls will reduce the standalone ventilation run-time by accounting for hours when the HVAC system is heating or cooling				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.6 Bathroom fans are ENERGY STAR certified if used as part of the whole-house system <sup>45</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.7 Air inlet location (Complete if ventilation air inlet location was specified (2.12, 2.13); otherwise check "N/A"): <sup>46, 47</sup>				-	-	<input type="checkbox"/>
7.7.1 Inlet pulls ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit				<input type="checkbox"/>	<input type="checkbox"/>	-
7.7.2 Inlet is $\geq 2$ ft. above grade or roof deck; $\geq 10$ ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and $\geq 3$ ft. distance from dryer exhausts and sources exiting the roof				<input type="checkbox"/>	<input type="checkbox"/>	-
7.7.3 Inlet is provided with rodent / insect screen with $\leq 0.5$ inch mesh				<input type="checkbox"/>	<input type="checkbox"/>	-
<b>8. Local Mechanical Exhaust - In each kitchen and bathroom, a system is installed that exhausts directly to the outdoors and meets one of the following Rater-measured airflow and manufacturer-rated sound level standards: <sup>42, 48</sup></b>						
<b>Location</b>		<b>Continuous Rate</b>		<b>Intermittent Rate <sup>49</sup></b>		
8.1 Kitchen	Airflow	$\geq 5$ ACH, based on kitchen volume <sup>50, 51</sup>		$\geq 100$ CFM and, if not integrated with range, also $\geq 5$ ACH based on kitchen volume <sup>50, 51, 52</sup>		
	Sound	Recommended: $\leq 1$ sone		Recommended: $\leq 3$ sones		
8.2 Bathroom	Airflow	$\geq 20$ CFM		$\geq 50$ CFM		
	Sound	Required: $\leq 1$ sone		Recommended: $\leq 3$ sones		
<b>9. Filtration</b>						
9.1 At least one MERV 6 or higher filter installed in each ducted mechanical system in a location that facilitates access and regular service by the occupant <sup>53</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.2 Filter access panel includes gasket or comparable sealing mechanism and fits snugly against the exposed edge of filter when closed to prevent bypass <sup>54</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.3 All return air and mechanically supplied outdoor air passes through filter prior to conditioning				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>10. Combustion Appliances</b>						
10.1 Furnaces, boilers, and water heaters located within the home's pressure boundary are mechanically drafted or direct-vented. Alternatives in Footnote 57. <sup>55, 56, 57</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.2 Fireplaces located within the home's pressure boundary are mechanically drafted or direct-vented. Alternatives in Footnote 59. <sup>55, 56, 58</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.3 If unvented combustion appliances other than cooking ranges or ovens are located inside the home's pressure boundary, the Rater has followed <u>Section 802 of RESNET's</u> Standards, encompassing ANSI/ACCA 12 QH-2014, Appendix A, Section A3 (Carbon Monoxide Test), and verified the equipment meets the limits defined within <sup>55, 59</sup>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rater Name: _____		Rater Pre-Drywall Inspection Date: _____		Rater Initials: _____		
Rater Name: _____		Rater Final Inspection Date: _____		Rater Initials: _____		
Builder Employee: _____		Builder Inspection Date: _____		Builder Initials: _____		



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### Footnotes

1. At the discretion of the Rater, the builder may verify up to eight items in Sections 1-4 of this Checklist. When exercised, the builder's responsibility will be formally acknowledged by the builder signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.
2. The term 'Rater' refers to the person completing the third-party inspections required for certification. This person shall: a) be a certified Home Energy Rater, Rating Field Inspector, or an equivalent designation as determined by a Verification Oversight Organization such as RESNET; and, b) have attended and successfully completed an EPA-recognized training class. See [energystar.gov/newhomestraining](http://energystar.gov/newhomestraining).
3. The column titled "N/A," which denotes items that are "not applicable," should be used when the checklist Item is not present in the home or conflicts with local requirements.
4. Two alternatives are provided: a) Grade II cavity insulation is permitted to be used for assemblies that contain a layer of continuous, air impermeable insulation  $\geq R-3$  in Climate Zones 1 to 4,  $\geq R-5$  in Climate Zones 5 to 8; b) Grade II batts are permitted to be used in floors if they fill the full depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving Grade I is the compression caused by the excess insulation.
5. Ensure compliance with this requirement using the version of ANSI / RESNET / ICC Std. 301 utilized by RESNET for HERS ratings.
6. For purposes of this Checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. EPA recommends, but does not require, rigid air barriers.  
Open-cell or closed-cell foam shall have a finished thickness  $\geq 5.5$  in. or 1.5 in., respectively, to qualify as an air barrier unless the manufacturer indicates otherwise.  
If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads  $\geq 1$  in. diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be  $\geq 6$  mil.
7. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings.
8. All insulated vertical surfaces are considered walls (e.g., above and below grade exterior walls, knee walls) and must meet the air barrier requirements for walls. The following exceptions apply: air barriers recommended, but not required, in adiabatic walls in multifamily dwellings; and, in Climate Zones 4 through 8, an air barrier at the interior vertical surface of insulation is recommended but not required in basement walls or crawlspace walls. For the purpose of these exceptions, a basement or crawlspace is a space for which  $\geq 40\%$  of the total gross wall area is below-grade.
9. Exterior air barriers are not required for attic knee walls that are  $\leq 24$  in. in height if an interior air barrier is provided and insulation extends in all directions from the top of this interior air barrier into unconditioned space at the following levels: CZ 1-5:  $\geq R-21$ ; CZ 6-8:  $\geq R-30$ .
10. EPA highly recommends, but does not require, an air barrier at the interior vertical surface of floor insulation in Climate Zones 4-8.
11. Examples of supports necessary for permanent contact include staves for batt insulation or netting for blown-in insulation. Alternatively, supports are not required if batts fill the full depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving the required installation grade is the compression caused by the excess insulation.
12. Alternatively, an air barrier is permitted to be installed at the exterior horizontal surface of the floor insulation if the insulation is installed in contact with this air barrier, the exterior vertical surfaces of the floor cavity are also insulated, and air barriers are included at the exterior vertical surfaces of this insulation.
13. The minimum designated R-values must be achieved regardless of the trade-offs determined using an equivalent U-factor or UA alternative calculation, with the following exception:  
For homes permitted through 12/31/2012: CZ 1-5: For spaces that provide less than 5.5 in. of clearance, R-15 Grade I insulation is permitted. CZ 6-8: For spaces that provide less than 7.0 in. of clearance, R-21 Grade I insulation is permitted.  
For homes permitted on or after 01/01/2013: Homes shall achieve Item 3.1 without exception.  
Note that if the minimum designated values are used, then higher insulation values may be needed elsewhere to meet Item 1.2. Also, note that these requirements can be met by using any available strategy, such as a raised-heel truss, alternate framing that provides adequate space, and / or high-density insulation.
14. Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 12 inches below grade. Slab insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. Alternatively, the thermal break is permitted to be created using  $\geq R-3$  rigid insulation on top of an existing slab (e.g., in a home undergoing a gut rehabilitation). In such cases, up to 10% of the slab surface is permitted to not be insulated (e.g., for sleepers, for sill plates). Insulation installed on top of slab shall be covered by a durable floor surface (e.g., hardwood, tile, carpet).
15. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the house, slab insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab. Where specific details cannot meet this requirement, partners shall provide the detail to EPA to request an exemption prior to the home's certification. EPA will compile exempted details and work with industry to develop feasible details for use in future revisions to the program. A list of currently exempted details is available at: [energystar.gov/slabeledge](http://energystar.gov/slabeledge).
16. Mass walls utilized as the thermal mass component of a passive solar design (e.g., a Trombe wall) are exempt from this Item. To be eligible for this exemption, the passive solar design shall be comprised of the following five components: an aperture or collector, an absorber, thermal mass, a distribution system, and a control system. For more information, see: [energy.gov/sites/prod/files/guide\\_to\\_passive\\_solar\\_home\\_design.pdf](http://energy.gov/sites/prod/files/guide_to_passive_solar_home_design.pdf).



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Mass walls that are not part of a passive solar design (e.g., CMU block or log home enclosure) shall either utilize the strategies outlined in Item 3.4 or the pathway in the assembly with the least thermal resistance, as determined using a method consistent with the 2013 ASHRAE Handbook of Fundamentals, shall provide  $\geq 50\%$  of the applicable assembly resistance, defined as the reciprocal of the mass wall equivalent U-factor in the 2009 IECC Table 402.1.3. Documentation identifying the pathway with the least thermal resistance and its resistance value shall be collected by the Rater and any Builder Verified or Rater Verified box under Item 3.4 shall be checked.

17. Up to 10% of the total exterior wall surface area is exempted from the reduced thermal bridging requirements to accommodate intentional designed details (e.g., architectural details such as thermal fins, wing walls, or masonry fireplaces; structural details, such as steel columns). It shall be apparent to the Rater that the exempted areas are intentional designed details or the exempted area shall be documented in a plan provided by the builder, architect, or engineer. The Rater need not evaluate the necessity of the designed detail to certify the home.
18. If used, insulated siding shall be attached directly over a water-resistive barrier and sheathing. In addition, it shall provide the required R-value as demonstrated through either testing in accordance with ASTM C 1363 or by attaining the required R-value at its minimum thickness. Insulated sheathing rated for water protection can be used as a water resistant barrier if all seams are taped and sealed. If non-insulated structural sheathing is used at corners, the advanced framing details listed in Item 3.4.3 shall be met for those wall sections.
19. Steel framing shall meet the reduced thermal bridging requirements by complying with Item 3.4.1 of the Checklist.
20. Double-wall framing is defined as any framing method that ensures a continuous layer of insulation covering the studs to at least the R-value required in Item 3.4.1 of the Checklist, such as offset double-stud walls, aligned double-stud walls with continuous insulation between the adjacent stud faces, or single-stud walls with 2x2 or 2x3 cross-framing. In all cases, insulation shall fill the entire wall cavity from the interior to exterior sheathing except at windows, doors and other penetrations.
21. All advanced framing details shall be met except where the builder, architect, or engineer provides a framing plan that encompasses the details in question, indicating that structural members are required at these locations and including the rationale for these members (e.g., full-depth solid framing is required at wall corners or interior / exterior wall intersections for shear strength, a full-depth solid header is required above a window to transfer load to jacks studs, additional jack studs are required to support transferred loads, additional cripple studs are required to maintain on-center spacing, or stud spacing must be reduced to support multiple stories in a multifamily building). The Rater shall retain a copy of the detail and rationale for their records, but need not evaluate the rationale to certify the home.
22. All exterior corners shall be constructed to allow access for the installation of  $\geq R-6$  insulation that extends to the exterior wall sheathing. Examples of compliance options include standard-density insulation with alternative framing techniques, such as using three studs per corner, or high-density insulation (e.g., spray foam) with standard framing techniques.
23. Compliance options include continuous rigid insulation sheathing, SIP headers, other prefabricated insulated headers, single-member or two-member headers with insulation either in between or on one side, or an equivalent assembly. R-value requirement refers to manufacturer's nominal insulation value.
24. Insulation shall run behind interior / exterior wall intersections using ladder blocking, full length 2x6 or 1x6 furring behind the first partition stud, drywall clips, or other equivalent alternative.
25. In Climate Zones 6 - 8, a minimum stud spacing of 16 in. o.c. is permitted to be used with 2x6 framing if  $\geq R-20.0$  wall cavity insulation is achieved. However, all 2x6 framing with stud spacing of 16 in. o.c. in Climate Zones 6 - 8 shall have  $\geq R-20.0$  wall cavity insulation installed regardless of any framing plan or alternative equivalent total UA calculation.
26. Existing sill plates (e.g., in a home undergoing a gut rehabilitation) on the interior side of structural masonry or monolithic walls are exempt from this Item. In addition, other existing sill plates resting atop concrete or masonry and adjacent to conditioned space are permitted, in lieu of using a gasket, to be sealed with caulk, foam, or equivalent material at both the interior seam between the sill plate and the subfloor and the seam between the top of the sill plate and the sheathing.
27. In Climate Zones 1 through 3, a continuous stucco cladding system adjacent to sill and bottom plates is permitted to be used in lieu of sealing plates to foundation or sub-floor with caulk, foam, or equivalent material.
28. In Climate Zones 1 through 3, a continuous stucco cladding system sealed to windows and doors is permitted to be used in lieu of sealing rough openings with caulk or foam.
29. Examples of durable covers include, but are not limited to, pre-fabricated covers with integral insulation, rigid foam adhered to cover with adhesive, or batt insulation mechanically fastened to the cover (e.g., using bolts, metal wire, or metal strapping).
30. This Checklist is designed to meet the requirements of ASHRAE 62.2-2010 / 2013 / 2016, and ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems, (e.g., those caused by a lack of maintenance by occupants). Therefore, this Checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
31. If installed equipment does not match the National HVAC Design Report, then prior to certification the Rater shall obtain written approval from the designer (e.g., email, updated National HVAC Design Report) confirming that the installed equipment meets the requirements of the National HVAC Design Report. In cases where the condenser unit is installed after the time of inspection by the Rater, the HVAC manufacturer and model numbers on installed equipment can be documented through the use of photographs provided by the HVAC Contractor after installation is complete.
32. The Rater shall measure and record the external static pressure in the return-side and supply-side of the system using the contractor-provided test locations. However, at this time, the Rater need not assess whether these values are within a specific range to certify the home.
33. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
34. Item 6.2 does not apply to ventilation or exhaust ducts. For an HVAC system with a multi-speed fan, the highest design fan speed shall be used when verifying this requirement. When verifying this requirement, doors separating bedrooms from the main body of the house (e.g., a door between a bedroom and a hallway) shall be closed and doors to rooms that can only be entered from the bedroom (e.g., a closet, a bathroom) shall be open. As an alternative to the  $\pm 3$  Pa limit, a Rater-measured pressure differential  $\geq -5$  Pa and  $\leq +5$  Pa is permitted to be used for bedrooms with a design airflow  $\geq 150$  CFM. The Rater-measured pressure shall be rounded to the nearest whole number to assess compliance



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35. Item 6.3 does not apply to ducts that are a part of local mechanical exhaust and exhaust-only whole-house ventilation systems. EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
36. Items 6.4 and 6.5 only apply to heating, cooling, and balanced ventilation ducts. Duct leakage shall be determined and documented by a Rater using the same version of ANSI / RESNET / ICC Std. 380 that is utilized by ~~RESNET~~ for HERS ratings. Leakage limits shall be assessed on a per-system, rather than per-home, basis. For balanced ventilation ducts that are not connected to space heating or cooling systems, a Rater is permitted to visually verify, in lieu of duct leakage testing, that all seams and connections are sealed with mastic or metal tape and all duct boots are sealed to floor, wall, or ceiling using caulk, foam, or mastic tape.
37. For a duct system with three or more returns, the total Rater-measured duct leakage is permitted to be the greater of  $\leq 6$  CFM25 per 100 sq. ft. of CFA or  $\leq 60$  CFM25 at 'rough-in' or the greater of  $\leq 12$  CFM25 per 100 sq. ft. of CFA or  $\leq 120$  CFM25 at 'final'.
38. For a home certified in the State of ID, MT, OR, or WA that is permitted before 01/01/2016, as an alternate to Rater-verified duct leakage, a PTCS<sup>®</sup> Duct Sealing Certification Form is permitted to be collected by the Home Energy Rater.
39. Cabinets (e.g., kitchen, bath, multimedia) or ducts that connect duct boots to toe-kick registers are not required to be in place during the 'rough-in' test. For homes permitted through 12/31/2013: Homes are permitted to be certified if rough-in leakage is  $\leq 6$  CFM25 per 100 sq. ft. of CFA or  $\leq 60$  CFM25, with air handler & all ducts, building cavities used as ductwork, & duct boots installed.
40. Registers atop carpets are permitted to be removed and the face of the duct boot temporarily sealed during testing. In such cases, the Rater shall visually verify that the boot has been durably sealed to the subfloor (e.g., using duct mastic or caulk) to prevent leakage during normal operation.
41. Testing of duct leakage to the outside can be waived if all ducts & air handling equipment are located within the home's air and thermal barriers AND infiltration does not exceed the following: CZ 1-2: 3 ACH50; CZ 3-4: 2.5 ACH50; CZ 5-7: 2 ACH50; CZ 8: 1.5 ACH50. Alternatively, testing of duct leakage to the outside can be waived if total duct leakage is  $\leq 4$  CFM25 per 100 sq. ft. of conditioned floor area or 40 CFM25, whichever is larger.
42. The whole-house ventilation air flow and local exhaust air flows shall be determined and documented by a Rater using the same version of ANSI / RESNET / ICC Std. 380 that is utilized by ~~RESNET~~ for HERS ratings.
43. In a multi-family dwelling unit, the override control is not required to be readily accessible to the occupant. However, in such cases, EPA recommends but does not require that the control be readily accessible to others (e.g., building maintenance staff) in lieu of the occupant.
44. Whole-house mechanical ventilation fans shall be rated for sound at no less than the airflow rate in Item 2.3 of the National HVAC Design Report. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated  $\geq 400$  CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be  $\geq 4$  ft. ductwork between the fan and intake grill. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
45. Bathroom fans with a rated flow rate  $\geq 500$  CFM are exempted from the requirement to be ENERGY STAR certified.
46. Ventilation air inlets that are only visible via rooftop access are exempted from Item 7.7 and the Rater shall mark "n/a". The outlet and inlet of balanced ventilation systems shall meet these spacing requirements unless manufacturer instructions indicate that a smaller distance may be used. However, if this occurs the manufacturer's instructions shall be collected for documentation purposes.
47. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the occupant.
48. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the airflow rate in Item 8.2. Intermittent bathroom and both intermittent and continuous kitchen local mechanical exhaust fans are recommended, but not required, to be rated for sound at no less than the airflow rate in Items 8.1 and 8.2. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope (e.g., bath exhaust fans, range hoods, clothes dryers). Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
49. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.
50. Kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, peninsulas, ranges / ovens, and the kitchen exhaust fan, and multiplying by the average ceiling height for this area. In addition, the continuous kitchen exhaust rate shall be  $\geq 25$  CFM, per 2009 IRC Table M1507.3, regardless of the rate calculated using the kitchen volume. Cabinet volume shall be included in the kitchen volume.
51. For homes permitted through 01/01/2014: Homes are permitted to be certified without enforcement of this Item to provide partners with additional time to integrate this feature into their homes.  
For homes permitted on or after 01/01/2014: Homes shall meet this Item. Alternatively, the prescriptive duct sizing requirements in Table 5.3 of ASHRAE 62.2-2010 / 2013 / 2016 are permitted to be used for kitchen exhaust fans based upon the rated airflow of the fan at 0.25 IWC. If the rated airflow is unknown,  $\geq 6$  in. smooth duct shall be used, with a rectangular to round duct transition as needed. Guidance to assist partners with these alternatives is available at [energystar.gov/newhomesresources](http://energystar.gov/newhomesresources). As an alternative to Item 8.1, homes are permitted to use a continuous kitchen exhaust rate of 25 CFM per 2009 IRC Table M1507.3, if they are either a) PHIUS+ or PHI certified, or b) provide both whole-house ventilation and local mechanical kitchen exhaust using a balanced system, and have a Rater-verified whole-building infiltration rate  $\leq 0.05$  CFM50 per sq. ft. of Enclosure Area, and a Rater-verified dwelling unit compartmentalization rate  $\leq 0.30$  CFM50 per sq. ft. of Enclosure Area if multiple dwelling units are present in the building. 'Enclosure Area' is defined as the area of the surfaces that bound the volume being pressurized / depressurized during the test.
52. All intermittent kitchen exhaust fans must be capable of exhausting at least 100 CFM. In addition, if the fan is not part of a vented range hood or appliance-range hood combination (i.e., if the fan is not integrated with the range), then it must also be capable of exhausting  $\geq 5$  ACH, based on the kitchen volume.



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53. Based upon ASHRAE 62.2-2010, ducted mechanical systems are those that supply air to an occupiable space with a total amount of supply ductwork exceeding 10 ft. in length and through a thermal conditioning component, except for evaporative coolers. Systems that do not meet this definition are exempt from this requirement. While filters are recommended for mini-split systems, HRV's and ERV's, these systems, ducted or not, typically do not have MERV-rated filters available for use and are, therefore, also exempted under this version of the requirements. HVAC filters located in the attic shall be considered accessible to the occupant if either 1) drop-down stairs provide access to attic and a permanently installed walkway has been provided between the attic access location and the filter or 2) the filter location enables arm-length access from a portable ladder without the need to step into the attic and the ceiling height where access is provided is  $\leq 12$  ft.
54. The filter media box (i.e., the component in the HVAC system that houses the filter) may be either site-fabricated by the installer or pre-fabricated by the manufacturer to meet this requirement. These requirements only apply when the filter is installed in a filter media box located in the HVAC system, not when the filter is installed flush with the return grill.
55. The pressure boundary is the primary enclosure boundary separating indoor and outdoor air. For example, a volume that has more leakage to outside than to conditioned space would be outside the pressure boundary.
56. Per the 2009 International Mechanical Code, a direct-vent appliance is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.
57. Naturally drafted equipment is allowed within the home's pressure boundary in Climate Zones 1-3 if the Rater has followed ~~Section 802 of RESNET's~~ Standards, encompassing ANSI / ACCA 12 QH-2014, Appendix A, Sections A3 (Carbon Monoxide Test) and A4 (Depressurization Test for the Combustion Appliance Zone), and verified that the equipment meets the limits defined within.
58. Naturally drafted fireplaces are allowed within the home's pressure boundary if the Rater has verified that the total net rated exhaust flow of the two largest exhaust fans (excluding summer cooling fans) is  $\leq 15$  CFM per 100 sq. ft. of occupiable space when at full capacity. If the net exhaust flow exceeds the allowable limit, it shall be reduced or compensating outdoor airflow provided. Per ASHRAE 62.2-2010, the term "net rated exhaust flow" is defined as flow through an exhaust fan minus the compensating outdoor airflow through any supply fan that is interlocked to the exhaust fan. Per ASHRAE 62.2-2010, the term "occupiable space" is defined as any enclosed space inside the pressure boundary and intended for human activities, including, but not limited to, all habitable spaces, toilets, closets, halls, storage and utility areas, and laundry areas. See Footnote 44 for the definition of "habitable spaces".
59. The minimum volume of combustion air required for safe operation by the manufacturer and / or code shall be met or exceeded. Also, in accordance with the National Fuel Gas Code, ANSI Z223.1 / NFPA54, unvented room heaters shall not be installed in bathrooms or bedrooms.



# National Program Requirements

## ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

### Eligibility Requirements

The following site-built or modular <sup>1</sup> homes are eligible to earn the ENERGY STAR:

- Detached dwelling units <sup>2</sup> (e.g. single family homes); OR
- Dwelling units <sup>2</sup> in any multifamily building with 4 units or fewer; OR
- Dwelling units <sup>2</sup> in multifamily buildings with 3 stories or fewer above-grade <sup>3,4</sup>; OR
- Dwelling units <sup>2</sup> in multifamily buildings with 4 or 5 stories above-grade <sup>3,4</sup> where dwelling units occupy 80% or more of the occupiable <sup>4</sup> square footage of the building <sup>5,6</sup>. When evaluating mixed-use buildings for eligibility, exclude commercial / retail space when assessing whether the 80% threshold has been met.

Dwelling units <sup>2</sup> in multifamily buildings that are not eligible to earn the ENERGY STAR through the Certified Homes Program may be eligible through the Multifamily High Rise Program. For more information, visit: [www.energystar.gov/mfhr/eligibility](http://www.energystar.gov/mfhr/eligibility)

Note that compliance with these requirements is not intended to imply compliance with all local code requirements that may be applicable to the home to be built. <sup>7</sup>

### Partnership, Training, and Credentialing Requirements

Builders, Raters, and HVAC contractors must meet the following requirements prior to certifying homes:

- Builders are required to sign an ENERGY STAR Partnership Agreement and complete the online Version 3 Builder Orientation, which can be found at [www.energystar.gov/homesPA](http://www.energystar.gov/homesPA).
- HVAC installing contractors are required to be credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (H-QUITO). An explanation of this process can be found at [www.energystar.gov/newhomesHVAC](http://www.energystar.gov/newhomesHVAC).
- Raters and Field Inspectors are required to complete training, which can be found at [www.energystar.gov/newhomestraining](http://www.energystar.gov/newhomestraining).

### ENERGY STAR Certification Process <sup>8</sup>

1. The certification process provides flexibility to select a custom combination of measures for each home that is equivalent in performance to the minimum requirements of the ENERGY STAR Reference Design Home, Exhibit 1, as assessed through energy modeling. Use a Home Energy Rating Software program accredited by an EPA-Approved Verification Oversight Organization (VOO) to determine the ENERGY STAR ERI Target, which is the highest ERI value that each rated home may achieve to earn the ENERGY STAR. <sup>9</sup>

2. Using the same software program, configure the preferred set of efficiency measures for the home to be certified and verify that the resulting ERI meets or exceeds the ENERGY STAR ERI Target, as determined in Step 1.

Note that, regardless of the measures selected, the Mandatory Requirements for All Certified Homes in Exhibit 2 are also required and impose certain constraints on the efficiency measures selected (e.g., insulation levels, insulation installation quality, window performance, duct leakage). Furthermore, on-site power generation may not be used to meet the ENERGY STAR ERI Target.

3. Construct the home using the measures selected in Step 2 and the Mandatory Requirements for All Certified Homes, Exhibit 2.

4. Using a Rater, verify that all requirements have been met in accordance with the Mandatory Requirements for All Certified Homes and with the on-site inspection procedures for minimum rated features of an EPA-Approved VOO.<sup>10</sup> For modular homes, a Rater must verify any requirement in the plant not able to be verified on-site because a feature will be concealed prior to shipment. ~~Finally, register the rated home with the same EPA-Approved VOO.~~ The Rater is required to keep electronic or hard copies of the completed and signed National Rater checklists and the National HVAC Design Report.

The Rater must review all items on the National Rater checklists. Raters are expected to use their experience and discretion to verify that the overall intent of each inspection checklist item has been met (i.e., identifying major defects that undermine the intent of the checklist item versus identifying minor defects that the Rater may deem acceptable).

In the event that a Rater finds an item that is inconsistent with the intent of the checklists, the home cannot earn the ENERGY STAR until the item is corrected. If correction of the item is not possible, the home cannot earn the ENERGY STAR. In the event that an item on a National Rater checklist cannot be inspected by the Rater, the home also cannot earn the ENERGY STAR. The only exceptions to this rule are in the Thermal Enclosure System Section of the National Rater Field Checklist, where the builder may assume responsibility for verifying a maximum of eight items. This option shall only be used at the discretion of the Rater. When exercised, the builder's responsibility will be formally acknowledged by the builder signing the checklist for the item(s) that they verified.

In the event that a Rater is not able to determine whether an item is consistent with the intent (e.g., an alternative method of meeting a checklist requirement has been proposed), then the Rater shall consult their ~~Provider~~. If the ~~Provider~~ also cannot make this determination, then the Rater or ~~Provider~~ shall report the issue to EPA prior to project completion at: [energystarhomes@energystar.gov](mailto:energystarhomes@energystar.gov) and will typically receive an initial response within 5 business days. If EPA believes the current program requirements are sufficiently clear to determine whether the intent has been met, then this guidance will be provided to the partner and enforced beginning with the house in question. In contrast, if EPA believes the program requirements require revisions to make the intent clear, then this guidance will be provided to the partner but only enforced for homes permitted after a specified transition period after the release of the revised program requirements, typically 60 days in length.

This process will allow EPA to make formal policy decisions as partner questions arise and to disseminate these policy decisions through the periodic release of revised program documents to ensure consistent application of the program requirements.



# National Program Requirements ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

## Exhibit 1: ENERGY STAR Reference Design Home <sup>11</sup>

The ENERGY STAR Reference Design Home is the set of efficiency features modeled to determine the ENERGY STAR ERI Target for each home pursuing certification. Therefore, while the features below are not mandatory, if they are not used then other measures will be needed to achieve the ENERGY STAR ERI Target. In addition, note that the Mandatory Requirements for All Certified Homes, Exhibit 2, contain additional requirements such as total duct leakage limits, minimum allowed insulation levels, and minimum allowed fenestration performance. Therefore, EPA recommends that partners review the documents in Exhibit 2 prior to selecting measures.

Hot Climates (2009 IECC Zones 1,2,3) <sup>12</sup>	Mixed and Cold Climates (2009 IECC Zones 4,5,6,7,8) <sup>12</sup>																							
<b>Cooling Equipment (Where Provided)</b>																								
<ul style="list-style-type: none"> <li>Cooling equipment modeled at the applicable efficiency levels below:</li> </ul>																								
<ul style="list-style-type: none"> <li>15 SEER / 12 EER AC,</li> <li>Heat pump (See Heating Equipment)</li> </ul>	<ul style="list-style-type: none"> <li>13 SEER AC,</li> <li>Heat pump (See Heating Equipment)</li> </ul>																							
<b>Heating Equipment</b>																								
<ul style="list-style-type: none"> <li>Heating equipment modeled at the applicable efficiency levels below, dependent on fuel and system type:</li> </ul>																								
<ul style="list-style-type: none"> <li>80 AFUE gas furnace,</li> <li>80 AFUE oil furnace,</li> <li>80 AFUE boiler,</li> <li>8.2 HSPF / 15 SEER / 12 EER air-source heat pump with electric or dual-fuel backup</li> </ul>	<ul style="list-style-type: none"> <li>95 AFUE ENERGY STAR gas furnace,</li> <li>85 AFUE ENERGY STAR oil furnace,</li> <li>90 AFUE ENERGY STAR gas boiler,</li> <li>86 AFUE ENERGY STAR oil boiler,</li> <li>Heat pump, with efficiency as follows:               <ul style="list-style-type: none"> <li>CZ 4: 8.5 HSPF / 15 SEER / 12 EER air-source w/ electric or dual-fuel backup,</li> <li>CZ 5: 9.25 HSPF / 15 SEER / 12 EER air-source w/ electric or dual-fuel backup,</li> <li>CZ 6: 9.5 HSPF / 15 SEER / 12 EER air-source w/ electric or dual-fuel backup,</li> <li>CZ 7-8: 3.6 COP / 17.1 EER ground-source w/ electric or dual-fuel backup</li> </ul> </li> </ul>																							
<b>Envelope, Windows, &amp; Doors</b>																								
<ul style="list-style-type: none"> <li>Insulation levels modeled to 2012 IECC levels and Grade I installation per ANSI / RESNET / ICC Standard 301.<sup>13</sup></li> <li>Infiltration rates modeled as follows:               <table border="1" style="margin-left: 40px;"> <tr> <td style="text-align: center;">4 ACH50 in CZs 1,2</td> <td style="text-align: center;">3 ACH50 in CZs 3,4,5,6,7,8</td> </tr> </table> </li> <li>ENERGY STAR windows and doors modeled, as illustrated below:               <table border="1" style="margin-left: 40px;"> <tr> <td>Window U-Value:</td> <td>0.40 in CZs 1,2</td> <td>0.30 in CZ 3</td> <td>0.30 in CZ 4</td> <td>0.27 in CZs 5,6,7,8</td> </tr> <tr> <td>Window SHGC:</td> <td>0.25 in CZs 1,2</td> <td>0.25 in CZ 3</td> <td>0.40 in CZ 4</td> <td>Any in CZs 5,6,7,8</td> </tr> </table> <table border="1" style="margin-left: 40px;"> <tr> <td>Door U-Value:</td> <td>Opaque: 0.17</td> <td>≤½ lite: 0.25</td> <td>&gt;½ lite: 0.30</td> </tr> <tr> <td>Door SHGC:</td> <td>Opaque: Any</td> <td>≤½ lite: 0.25</td> <td>&gt;½ lite: 0.25 in CZs 1,2,3; 0.40 in CZs 4,5,6,7,8</td> </tr> </table> </li> </ul>				4 ACH50 in CZs 1,2	3 ACH50 in CZs 3,4,5,6,7,8	Window U-Value:	0.40 in CZs 1,2	0.30 in CZ 3	0.30 in CZ 4	0.27 in CZs 5,6,7,8	Window SHGC:	0.25 in CZs 1,2	0.25 in CZ 3	0.40 in CZ 4	Any in CZs 5,6,7,8	Door U-Value:	Opaque: 0.17	≤½ lite: 0.25	>½ lite: 0.30	Door SHGC:	Opaque: Any	≤½ lite: 0.25	>½ lite: 0.25 in CZs 1,2,3; 0.40 in CZs 4,5,6,7,8	
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Door SHGC:	Opaque: Any	≤½ lite: 0.25	>½ lite: 0.25 in CZs 1,2,3; 0.40 in CZs 4,5,6,7,8																					
<b>Water Heater</b>																								
<ul style="list-style-type: none"> <li>DHW equipment modeled with the following efficiency levels as applicable:</li> </ul> <table border="1" style="margin-left: 40px;"> <tr> <td>Gas:</td> <td>30 Gal = 0.63 EF</td> <td>40 Gal = 0.61 EF</td> <td>50 Gal = 0.59 EF</td> <td>60 Gal = 0.57 EF</td> <td>70 Gal = 0.55 EF</td> <td>80 Gal = 0.53 EF</td> </tr> <tr> <td>Electric:</td> <td>30 Gal = 0.94 EF</td> <td>40 Gal = 0.93 EF</td> <td>50 Gal = 0.92 EF</td> <td>60 Gal = 0.91 EF</td> <td>70 Gal = 0.90 EF</td> <td>80 Gal = 0.89 EF</td> </tr> <tr> <td>Oil:</td> <td>30 Gal = 0.55 EF</td> <td>40 Gal = 0.53 EF</td> <td>50 Gal = 0.51 EF</td> <td>60 Gal = 0.49 EF</td> <td>70 Gal = 0.47 EF</td> <td>80 Gal = 0.45 EF</td> </tr> </table>				Gas:	30 Gal = 0.63 EF	40 Gal = 0.61 EF	50 Gal = 0.59 EF	60 Gal = 0.57 EF	70 Gal = 0.55 EF	80 Gal = 0.53 EF	Electric:	30 Gal = 0.94 EF	40 Gal = 0.93 EF	50 Gal = 0.92 EF	60 Gal = 0.91 EF	70 Gal = 0.90 EF	80 Gal = 0.89 EF	Oil:	30 Gal = 0.55 EF	40 Gal = 0.53 EF	50 Gal = 0.51 EF	60 Gal = 0.49 EF	70 Gal = 0.47 EF	80 Gal = 0.45 EF
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<b>Thermostat &amp; Ductwork</b>																								
<ul style="list-style-type: none"> <li>Programmable thermostat modeled.</li> <li>All ducts and air handlers modeled within conditioned space.</li> </ul>																								
<b>Lighting &amp; Appliances</b>																								
<ul style="list-style-type: none"> <li>ENERGY STAR refrigerators, dishwashers, and ceiling fans modeled.</li> <li>ENERGY STAR light bulbs modeled in 90% of ANSI / RESNET / ICC Standard 301-defined Qualifying Light Fixture Locations. <sup>13</sup></li> </ul>																								



# National Program Requirements ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

## Exhibit 2: Mandatory Requirements for All Certified Homes

Party Responsible	Mandatory Requirements
<b>Rater</b>	<ul style="list-style-type: none"> <li>• Completion of National Rater Design Review Checklist</li> <li>• Completion of National Rater Field Checklist</li> </ul>
<b>HVAC System Designer</b>	<ul style="list-style-type: none"> <li>• Completion of National HVAC Design Report</li> </ul>
<b>HVAC Installing Contractor</b>	<ul style="list-style-type: none"> <li>• Completion of National HVAC Commissioning Checklist</li> </ul>
<b>Builder</b>	<ul style="list-style-type: none"> <li>• Completion of National Water Management System Builder Requirements</li> </ul>

### Effective Date

To determine the program Version and Revision that a home is required to be certified under, look up the location and permit date of the home in Exhibit 3. Note that the National Version 3 program requirements are being implemented in states that have not adopted the 2012, 2015, or 2018 IECC, or an equivalent code. Note, as well, that regional program requirements, and associated implementation timelines, have been developed for homes in CA, FL, GU, HI, the Northern Mariana Islands, OR, PR, and WA. The National Version 3 and regional program requirements can be found at [www.energystar.gov/newhomesrequirements](http://www.energystar.gov/newhomesrequirements).

This Exhibit contains all implementation timelines applicable on or after September 1, 2016. Implementation timelines applicable prior to this date can be obtained by contacting [energystarhomes@energystar.gov](mailto:energystarhomes@energystar.gov).

## Exhibit 3: ENERGY STAR Certified Homes Implementation Timeline

State / Territory	Homes Permitted <sup>14</sup> On or After This Date Must Meet the Adjacent Version & Revision	Version	Revision <sup>15</sup>
AL, AK, AZ, AR, CO, GA, IN, ID, KS, KY, LA, ME, MS, MO, NE, NH, NM, NC, ND, OH, OK, PA, SC, SD, TN, UT, VA, WV, WI, WY	07-01-2016	National v3	Rev. 08
	01-01-2019	National v3	Rev. 09
DC, DE, IA, IL, MA, MD, MN, MT, RI, VT	07-01-2016	National v3.1	Rev. 08
	01-01-2019	National v3.1	Rev. 09
NV	07-01-2016	National v3	Rev. 08
	10-01-2016	National v3.1	Rev. 08
	01-01-2019	National v3.1	Rev. 09
MI, NJ	07-01-2016	National v3	Rev. 08
	04-01-2017	National v3.1	Rev. 08
	01-01-2019	National v3.1	Rev. 09
CT, NY	07-01-2016	National v3	Rev. 08
	10-01-2017	National v3.1	Rev. 08
	01-01-2019	National v3.1	Rev. 09
TX	07-01-2016	National v3	Rev. 08
	07-01-2018	National v3.1	Rev. 08
	01-01-2019	National v3.1	Rev. 09
WA	07-01-2016	National v3.1	Rev. 08
	07-01-2018	Oregon and Washington v3.2	Rev. 08
	01-01-2019	Oregon and Washington v3.2	Rev. 09
OR	07-01-2016	National v3.1	Rev. 08
	01-01-2019	National v3.1	Rev. 09
	04-01-2019	Oregon and Washington v3.2	Rev. 09



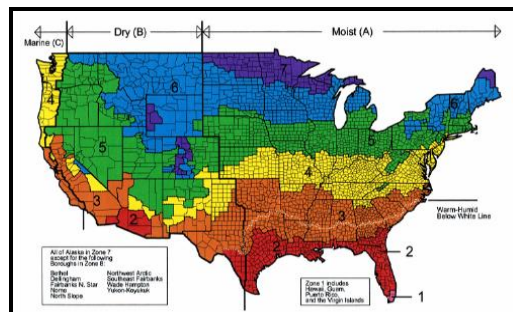


# National Program Requirements

## ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

### Footnotes:

1. A modular home is a prefabricated home that is made of multiple modules or sections that are manufactured and substantially assembled in a manufacturing plant. These pre-built sections are transported to the building site and constructed by a builder to meet all applicable building codes for site-built homes.
2. A dwelling unit, as defined by the 2012 IECC, is a single unit that provides complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.
3. Any above-grade story with 20% or more occupiable space, including commercial space, shall be counted towards the total number of stories for the purpose of determining eligibility to participate in the program. The definition of an 'above-grade story' is one for which more than half of the gross surface area of the exterior walls is above-grade. All below-grade stories, regardless of type, shall not be included when evaluating eligibility.
4. Per ASHRAE 62.2-2010, occupiable space is any enclosed space inside the pressure boundary and intended for human activities or continual human occupancy, including, but not limited to, areas used for living, sleeping, dining, and cooking, toilets, closets, halls, storage and utility areas, and laundry areas.
5. These units may earn the ENERGY STAR through either the Certified Homes Program or the Multifamily High Rise (MFHR) Program. If participating in the Certified Homes program and the dwelling unit is served by a central heating, cooling, or hot water system, use of the ~~RESNET Guidelines for Multifamily Ratings~~ for modeling the specified central system(s) is recommended.
6. If permitted prior to July 1, 2012, units in multifamily buildings with 4 or 5 stories above-grade may earn the ENERGY STAR through either the Certified Homes Program or the Multifamily High Rise (MFHR) Program, without assessing whether the 80% threshold has been met.
7. Where requirements of the local codes, manufacturers' installation instructions, engineering documents, or regional ENERGY STAR programs overlap with the requirements of these guidelines, EPA offers the following guidance:
  - a. Where the overlapping requirements exceed the ENERGY STAR guidelines, these overlapping requirements shall be met;
  - b. Where overlapping requirements conflict with a requirement of the ENERGY STAR program (e.g., slab insulation is prohibited to allow visual access for termite inspections), then the conflicting requirement within these program requirements shall not be met. Certification shall only be allowed if the Rater has determined that no equivalent option is available that could meet the intent of the conflicting requirement (e.g., switching from exterior to interior slab edge insulation). Note that a home must still meet its ENERGY STAR ERI Target. Therefore, other efficiency measures may be needed to compensate for the omission of the conflicting requirement.
8. Prior to Rev. 06, homes were permitted to be certified using either a Prescriptive Path or a Performance Path. Homes with a permit date on or after 09/01/2015 shall only use the Performance Path, which has been renamed the ENERGY STAR Certification Process. To minimize disruption to projects that are in process, homes with a permit date before 09/01/2015 are permitted to use a modified version of the Prescriptive Path in lieu of the Performance Path. For more information about this compliance option, visit: [www.energystar.gov/v31prescriptivepath](http://www.energystar.gov/v31prescriptivepath).
9. The software program shall automatically determine (i.e., without relying on a user-configured ENERGY STAR Reference Design) this target for each rated home by following the National ERI Target Procedure, Version 3.1 (Rev. 09), available on EPA's website.
10. The term 'Rater' refers to the person completing the third-party inspections required for certification. This person shall: a) be a certified Home Energy Rater, Rating Field Inspector, or an equivalent designation as determined by a VOO, ~~such as RESNET~~; and, b) have attended and successfully completed an EPA-recognized training class. See [www.energystar.gov/newhomestraining](http://www.energystar.gov/newhomestraining). Raters who operate under a ~~Sampling Provider~~ are permitted to verify the Minimum Rated Features of the home and to verify any Checklist Item designated "Rater Verified" using the VOO-approved sampling protocol for homes outside California, and the CEC-approved sampling protocol for homes in CA. No parties other than Raters are permitted to use sampling. All other items shall be verified for each certified home. For example, no items on the National HVAC Commissioning Checklist are permitted to be verified using a sampling protocol.
11. Note that the efficiency levels of ENERGY STAR certified products aligned with these product specifications when this Version was first released. These efficiency features form the basis of the ENERGY STAR ERI target, regardless of any subsequent revisions to ENERGY STAR certified product specifications. EPA recommends, but does not require, that current ENERGY STAR products be included in ENERGY STAR homes. For current ENERGY STAR products, visit [www.energystar.gov/products](http://www.energystar.gov/products).
12. The following map illustrates the Climate Zone boundaries as defined by the 2012 IECC Figure R301.1.



13. The version of ANSI / RESNET / ICC Std. 301 utilized by RESNET for HERS ratings is used to model this parameter.



# National Program Requirements

## ENERGY STAR Certified Homes, Version 3.1 (Rev. 09)

14. The Rater may define the 'permit date' as either the date that the permit was issued or the date of the contract on the home. In cases where permit or contract dates are not available, Providers have discretion to estimate permit dates based on other construction schedule factors. These assumptions should be both defensible and documented.
15. Homes certified under Rev. 09 of the program requirements are permitted to use either Rev. 08 or 09 National HVAC Design Report.