ENERGY STAR Certified Homes, Version 3.1 (Rev. 01) National Program Requirements

Certifying Homes

The following homes are eligible to earn the ENERGY STAR:

- Detached dwelling units [1] (e.g. single family homes); OR
- Dwelling units [1] in any multifamily building with 4 units or fewer; OR
- Dwelling units [1] in multifamily buildings with 3 stories or fewer above-grade [2,3]; OR
- Dwelling units [1] in multifamily buildings with 4 or 5 stories above-grade [2,3] that have their own heating, cooling, and hot water systems [4], separate from other units, and where dwelling units occupy 80% or more of the occupiable [3] square footage of the building [5]. When evaluating mixed–use buildings for eligibility, exclude commercial / retail space when assessing whether the 80% threshold has been met.

Dwelling units [1] 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.

Homes may earn the ENERGY STAR using the following ENERGY STAR Prescriptive Path or Performance Path in all locations except CA, FL, GU, HI, PR, and the Pacific Northwest, for which regional program requirements have been developed.

Note that compliance with these guidelines is not intended to imply compliance with all local code requirements that may be applicable to the home to be built. [6]

ENERGY STAR Prescriptive Path

The Prescriptive Path provides a single set of measures that can be used to construct an ENERGY STAR Certified Home. Modeling is not required; however, no tradeoffs are allowed. Follow these steps to use the Prescriptive Path:

1. First, assess the eligibility to follow the Prescriptive Path by comparing the conditioned floor area (CFA) of the home to be built to the CFA of the Benchmark Home as specified in Exhibit 3. [7] For the purposes of this step, calculate the number of bedrooms and the CFA of the home to be built using RESNET standards with the following exception: floor area in basements with at least half of the gross surface area of the basement's exterior walls below grade shall not be counted. [8] If the CFA of the home to be built exceeds the CFA of the Benchmark Home, then the Performance Path shall be used.
2. If the home to be built is eligible to follow the Prescriptive Path, build the home using all requirements of the ENERGY STAR Reference Design, Exhibit 1, and the Mandatory Requirements for All Certified Homes, Exhibit 2.
3. Using a Rater, verify that all requirements have been met in accordance with the Mandatory Requirements for All Certified Homes and with RESNET's On-Site Inspection Procedures for Minimum Rated Features. [9]

ENERGY STAR Performance Path

The Performance Path 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. Equivalent performance is assessed through energy modeling. Follow the steps below to use the Performance Path:

1. Use a RESNET-accredited Home Energy Rating software program to determine the ENERGY STAR HERS Index Target, which is the highest numerical HERS Index value that each rated home may achieve to earn the ENERGY STAR. 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 ENERGY STAR HERS Index Target Procedure, Version 3.1, available on EPA's website.
2. Using the same RESNET-accredited Home Energy Rating software program, configure the preferred set of energy measures for the rated home and verify that the resulting HERS Index meets or exceeds the ENERGY STAR HERS Index Target, as determined in Step 1. Note that, regardless of the measures selected, Mandatory Requirements for All Certified Homes in Exhibit 2 are also required and impose certain constraints on the energy measures selected (e.g., insulation levels, insulation installation quality, window performance, duct leakage). [10,11,12,13]

   Furthermore, on-site power generation may only be used to meet the ENERGY STAR HERS Index Target for homes that are larger than the Benchmark Home and only for the incremental change in ENERGY STAR HERS Index Target caused by the Size Adjustment Factor, as outlined in the ENERGY STAR HERS Index Target Procedure, Version 3.1.
3. Construct the home using 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 RESNET's On-Site Inspection Procedures for Minimum Rated Features. [9]

Partnership, Training, and Credentialing Requirements

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

- Builders are required to be ENERGY STAR partners and complete the online Version 3 Builder Orientation. Partnership Agreements and Version 3 Builder Orientation can be found at www.energystar.gov/homesPA.
- HVAC contractors must be credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (H-QUITO). An explanation of this process and links to H-QUITOs can be found at www.energystar.gov/newhomesHVAC.
- Raters and Field Inspectors are required to complete Version 3 Training which can be found at www.energystar.gov/newhomestraining.

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Exhibit 1: ENERGY STAR Reference Design

Hot Climates (2009 IECC Zones 1,2,3) [15]	**Mixed and Cold Climates** (2009 IECC Zones 4,5,6,7,8) [15]
Cooling Equipment (Where Provided) [16]	
• Cooling equipment shall meet the following applicable efficiency levels:	
• ≥ 15 SEER / 12 EER ENERGY STAR certified AC, **OR;** • Heat pump (See Heating Equipment)	• ≥ 13 SEER AC, **OR**; • Heat pump (See Heating Equipment)
Heating Equipment [16]	
• Heating equipment shall meet the following applicable efficiency levels:	

• Gas furnace, efficiency as follows:
  • *CZ 1 & 2:* ≥ 80 AFUE furnace, **OR;**
  • *CZ 3:* ≥ 90 AFUE furnace, ENERGY STAR certified, **OR;**
• ≥ 80 AFUE oil furnace, **OR;**
• ≥ 80 AFUE boiler, **OR;**
• ≥ 8.2 HSPF / 15 SEER / 12 EER air-source heat pump, ENERGY STAR certified with electric backup or ENERGY STAR certified dual-fuel backup heating, **OR;**
• Ground-source heat pump, any product type, ENERGY STAR certified [18]
	• ≥ 95 AFUE gas furnace, ENERGY STAR certified, **OR;**
	• ≥ 85 AFUE oil furnace, ENERGY STAR certified, **OR;**
	• ≥ 90 AFUE gas boiler, ENERGY STAR certified, **OR;**
	• ≥ 86 AFUE oil boiler, ENERGY STAR certified, **OR;**
	• Air-source heat pump [17], ENERGY STAR certified with efficiency as follows:
	  • *CZ 4:* ≥ 8.5 HSPF / 15 SEER / 12 EER with electric backup, **OR;**
	  • *CZ 5:* ≥ 9.25 HSPF / 15 SEER / 12 EER with electric backup, **OR;**
	  • *CZ 6:* ≥ 9.5 HSPF / 15 SEER / 12 EER with electric backup, **OR;**
	• Air-source heat pump, ENERGY STAR certified, ≥ 8.2 HSPF / 15 SEER / 12 EER with ENERGY STAR certified dual-fuel backup, **OR;**
	• Ground-source heat pump, any product type, ENERGY STAR certified [18]

Envelope, Windows, & Doors

- Insulation levels shall meet or exceed 2012 IECC levels and achieve Grade I installation per RESNET standards. [10,11,12]
- Infiltration rates shall be less than or equal to the following values: [19]

4 ACH50 in CZs 1,2	3 ACH50 in CZs 3,4,5,6,7

- Windows, doors, and skylights shall be ENERGY STAR certified, as illustrated below: [13, 20]

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

Skylight U-Value:	≤ 0.60 in CZs 1,2	≤ 0.53 in CZ 3	≤ 0.53 in CZ 4	≤ 0.50 in CZs 5,6,7,8
Skylight SHGC:	≤ 0.28 in CZs 1,2	≤ 0.28 in CZ 3	≤ 0.35 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

- Homes with total window-to-floor area greater than 15% shall have adjusted U-values or SHGCs as outlined in Footnote 20.

Water Heater

- DHW equipment shall meet the following efficiency requirements: [21]

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

Thermostat & Ductwork

- Programmable thermostat shall be installed unless thermostat controls a zone with electric radiant heat, for which manual thermostat is allowed.[22]
- Total duct leakage shall be ≤ 4 CFM25 per 100 sq. ft. of conditioned floor area at rough-in. [23]
- All ducts and air handlers shall be located within conditioned space.

Lighting & Appliances

- Where refrigerators, dishwashers, ceiling fans, or exhaust fans [24] are installed, products shall be ENERGY STAR certified.
- ENERGY STAR certified light bulbs or fixtures shall be installed in ≥ 90% of RESNET-defined Qualifying Light Fixture Locations.

Exhibit 2: Mandatory Requirements for All Certified Homes

Area of Improvement	Mandatory Requirements
1. Thermal Enclosure System	• Completed Thermal Enclosure System Rater Checklist, Version 3
2. Heating, Ventilation, & Air Conditioning (HVAC) System	• Completed HVAC System Quality Installation Contractor Checklist, Version 3 • Completed HVAC System Quality Installation Rater Checklist, Version 3
3. Water Management System	• Completed Water Management System Builder Checklist, Version 3

Exhibit 3: Benchmark Home [7]

Bedrooms in Home to be Built	0	1	2	3	4	5	6	7	8
Conditioned Floor Area Benchmark Home	1,000	1,000	1,600	2,200	2,800	3,400	4,000	4,600	5,200

Effective Date

EPA intends to implement the Version 3.1 program requirements for homes permitted starting one year after state-level implementation of the 2012 IECC or an equivalent code. However, EPA will make a final determination of the implementation timeline on a state-by-state basis. Exhibit 4 defines the Version 3.1 implementation timeline for states where EPA has made this determination. Homes permitted prior to the implementation timeline are eligible to earn the ENERGY STAR under Version 3 of the program requirements.

Note that regional program requirements and associated implementation schedules have been developed for homes in CA, FL, GU, HI, PR, and the Pacific Northwest.

Exhibit 4: ENERGY STAR Certified Homes Version 3.1 Implementation Timeline

State	Applicable to Homes with the Following Permit Date
MA	On or after 01/01/2015
IL, MD, RI	On or after 04/01/2015
IA	On or after 06/01/2015

Notes (Unless specified otherwise, notes shall apply to both the Prescriptive Path and Performance Path):

1. 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.
2. 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.
3. 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.
4. Central systems for domestic hot water are allowed if solar energy provides at least 50% of the domestic hot water needs for the residential units.
5. Units in multifamily buildings with 4 or 5 stories above-grade, including mixed–use buildings, that have their own heating, cooling, and hot water systems, separate from other units, *but where dwelling units occupy less than 80%* of the residential (i.e., excluding commercial / retail space for mixed-use buildings) occupiable square footage of the building may earn the ENERGY STAR through either the Certified Homes Program or the Multifamily High Rise Program if permitted prior to July 1, 2012. Units in buildings of this type that are permitted after this date shall only be eligible to earn the ENERGY STAR through the Multifamily High Rise (MFHR) Program.
6. 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. In cases where the overlapping requirements exceed the ENERGY STAR guidelines, these overlapping requirements shall be met;
    b. In cases where overlapping requirements conflict with a requirement of these ENERGY STAR guidelines (e.g., slab insulation is prohibited to allow visual access for termite inspections), then the conflicting requirement within these guidelines 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 of these ENERGY STAR guidelines (e.g., switching from exterior to interior slab edge insulation). Note that, under the Performance Path, a home must still meet its ENERGY

STAR HERS Index Target. Therefore, other efficiency measures may be needed to compensate for the omission of the conflicting requirement.

7. The average-size home with a specific number of bedrooms is termed the "Benchmark Home". The conditioned floor area of a Benchmark Home (CFA Benchmark Home) is determined by selecting the appropriate value from Exhibit 3. For homes with more than 8 bedrooms, the CFA Benchmark Home shall be determined by multiplying 600 sq. ft. by the total number of bedrooms and adding 400 sq. ft.

   Example: CFA Benchmark Home for a 10 bedroom home = (600 sq. ft. x 10) + 400 sq. ft. = 6,400 sq. ft.

   A bedroom is defined by RESNET 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 2012 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 in. 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.

8. To determine whether at least half of the basement wall area is below grade, use the gross surface area of the walls that are in contact with either the ground or ambient outdoor air, measured from the basement floor to the bottom of the basement ceiling framing (e.g., the bottom of the joists for the floor above). Note that the exception regarding the floor area in basements is only for the purpose of determining a home's Benchmark Home Size, Size Adjustment Factor, and eligibility to use the Prescriptive Path. The full conditioned floor area, per RESNET's standards, should be used when rating the home (e.g., determining compliance with duct leakage requirements).

9. 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, BOP 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 www.energystar.gov/newhomestraining. Raters who operate under a Sampling Provider are permitted to verify the Minimum Rated Features of the home using the RESNET-approved sampling protocol.

10. *For Prescriptive Path:* Insulation levels in a home shall meet or exceed the component insulation requirements in the 2012 IECC - Table R402.1.1. The following exceptions apply:

    a. Steel-frame ceilings, walls, and floors shall meet the insulation requirements of the 2012 IECC – Table R402.2.6. 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 square 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 2012 IECC Table R402.1.3 complies.

       A total building thermal envelope UA that is less than or equal to the total UA resulting from the U-factors in Table R402.1.3 also complies. The performance of all components (i.e., ceilings, walls, floors, slabs, and fenestration) can be traded off using the UA approach under both the Prescriptive and the Performance Path. Note that while ceiling and slab insulation and fenestration can be included in trade-off calculations, Items 4.1 through 4.3 of the Thermal Enclosure System Rater 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.

11. Consistent with the 2012 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.

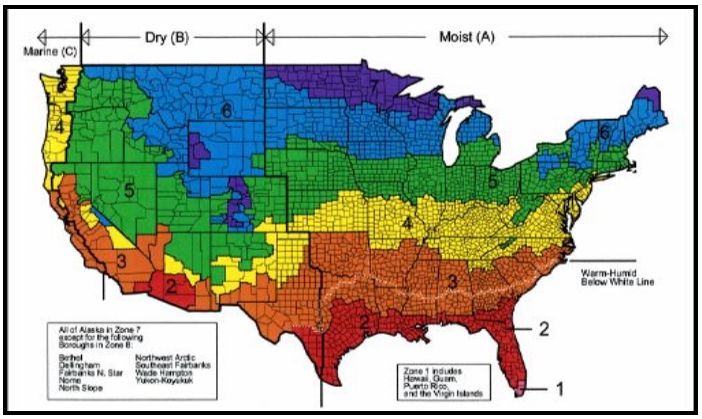
12. Insulation shall be verified by a Rater to achieve Grade I installation as defined in the RESNET Standards, except for ceiling, wall, and floor assemblies with continuous rigid insulation. For such homes, Grade II installation is acceptable for the cavity insulation only if the continuous rigid insulation meets or exceeds the following levels: R-3 in Climate Zones 1 to 4; R-5 in Zones 5 to 8.

13. *For Prescriptive Path:* All windows, doors, and skylights shall meet or exceed ENERGY STAR Program Requirements for Residential Windows, Doors, and Skylights – Version 6.0 as outlined at www.energystar.gov/windows. *For Performance Path:* All

windows, doors and skylights shall meet or exceed the component U-factor and SHGC requirements specified in the 2012 IECC – Table R402.1.1. 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 14, respectively, in 2005 ASHRAE Fundamentals, Chapter 31. 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 more than 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 btu / $ft^3 x^o F$ 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.

14. To ensure that the most current program requirements are in use, this Revision shall be used for homes permitted starting 60 days after the 'Revised' date. 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. The following map is shown to depict Climate Zone boundaries. It is for illustrative purposes only and is based on 2012 IECC Figure R301.1.



16. *For Prescriptive Path:* Where ENERGY STAR certified heating or cooling systems are required, all installed equipment of that system type must be ENERGY STAR certified.
17. *For Prescriptive Path:* The required efficiency for air source heat pumps in Climate Zones 4, 5, and 6 exceed the ENERGY STAR minimum of 8.2 HSPF. Air source heat pumps with electric resistance backup heating cannot be used in homes certified in Climate Zones 7 and 8 using the Prescriptive Path.
18. *For Prescriptive Path:* The following efficiency levels shall be used based on ground-source heat pump product type:
    - *Closed Loop Water-to-Air*: ≥ 3.6 COP / 17.1 EER
    - Open Loop Water-to-Air: ≥ 4.1 COP / 21.1 EER
    - Direct Geo-Exchange (DGX): ≥ 3.6 COP / 16 EER
    - Closed Loop Water-to-Water: ≥ 3.1 COP / 16.1 EER
    - Open Loop Water-to-Water: ≥ 3.5 COP / 20.1 EER
19. Envelope leakage shall be determined by a Rater using a RESNET-approved testing protocol.
20. *For Prescriptive Path:* All decorative glass and skylight window areas count toward the total window area to above-grade conditioned floor area (WFA) ratio. For homes using the Prescriptive Path that have a WFA ratio > 15%, the following additional requirements apply:
    a. In Climate Zones 1, 2, and 3, an improved window SHGC is required and is determined by:

       Improved SHGC = [0.15 / WFA] x [ENERGY STAR SHGC]

       Where the ENERGY STAR SHGC is the maximum allowable SHGC in Exhibit 1, ENERGY STAR Reference Design, for the Climate Zone where the home will be built.
    b. In Climate Zones 4, 5, 6, 7, and 8, an improved window U-Value is required and is determined by:

       Improved U-Value = [0.15 / WFA] x [ENERGY STAR U-Value]

Where the ENERGY STAR U-Value is the maximum allowable U-Value in Exhibit 1, ENERGY STAR Reference Design, for the Climate Zone where the home will be built.

21. *For Prescriptive Path:* To determine domestic hot water (DHW) EF requirements for additional tank sizes, use the following equations: Gas DHW EF ≥ 0.69 - (0.002 x Tank Gallon Capacity); Electric DHW EF ≥ 0.97 - (0.001 x Tank Gallon Capacity); Oil DHW EF ≥ 0.61 - (0.002 x Tank Gallon Capacity). The minimum efficiency for instantaneous water heaters shall be determined using the above equations and assuming a 1 gallon capacity.

    Domestic hot water systems that are integrated with the space-heating system are permitted to be used in the following two scenarios: either the space-heating system (e.g., furnace or boiler) shall heat and circulate a fluid through an indirect storage tank, or a single integrated/combined product intended for both space heating and domestic hot water shall be used. A 'tankless coil water heater', where domestic water flows through a coil installed in the space-heating system, is not permitted.
22. For homes with heat pumps that contain an electric resistance heating element used to supplement the capacity of the heat pump, the thermostat shall have 'Adaptive Recovery' technology to prevent excessive use of the heating element.
23. Duct leakage shall be determined by a Rater using a RESNET-approved testing protocol. Leakage limits shall be assessed on a per-system, rather than per-home, basis.
24. *For Prescriptive Path:* All exhaust fans shall be ENERGY STAR certified, except in half bathrooms. A half bathroom is any bathroom that does not contain a bathtub, shower, spa, or similar source of moisture.