



Tropics Rater Field Checklist

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

Home Address: _____		City: _____	State: _____	Permit Date: _____		
HVAC System ¹ (National HVAC Design Report Item # indicated in parenthesis)				Must Correct	Rater Verified ²	N/A ³
1. Heating & Cooling Equipment						
1.1 HVAC manufacturer & model number on installed equipment matches either of the following (check box): ⁴ <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"/>	<input type="checkbox"/>
1.2 External static pressure measured by Rater at contractor-provided test locations and documented below: ⁵ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure: _____ IWC				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 <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"/>
2. Duct Quality Installation - Applies to Heating, Cooling, Ventilation, Exhaust, & Pressure Balancing Ducts, Unless Noted in Footnote						
2.1 Ductwork installed without kinks, sharp bends, compressions, or excessive coiled flexible ductwork ⁶				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 Bedrooms pressure-balanced (e.g., using transfer grills, jump ducts, dedicated return ducts, undercut doors) to achieve a Rater-measured pressure differential ≥ -3 Pa and $\leq +3$ Pa with respect to the main body of the house when all air handlers are operating. See Footnote 7 for test configuration and an alternative compliance option. ⁷				<input type="checkbox"/>	<input type="checkbox"/>	-
2.3 All supply and return ducts in unconditioned space, including connections to trunk ducts, are insulated to $\geq R-6$ ⁸				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Rater-measured total duct leakage meets one of the following two options. See Footnote 10 for alternative: ^{9, 10, 11}						
2.4.1 <u>Rough-in</u> : The greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 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. ¹²				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4.2 <u>Final</u> : The greater of ≤ 8 CFM25 per 100 sq. ft. of CFA or ≤ 80 CFM25, with the air handler & all ducts, building cavities used as ducts, duct boots, & register grilles atop the finished surface (e.g., drywall, floor) installed ¹³				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Rater-measured duct leakage to outdoors the greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM25 ^{9, 11, 14}				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Whole-House Mechanical Ventilation System						
3.1 Rater-measured ventilation rate is within either ± 15 CFM or $\pm 15\%$ of design value (2.3) ¹⁵				<input type="checkbox"/>	<input type="checkbox"/>	-
3.2 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) ¹⁶				<input type="checkbox"/>	<input type="checkbox"/>	-
3.3 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"/>	-
3.4 System fan rated ≤ 3 sones if intermittent and ≤ 1 sone if continuous, or exempted ¹⁷				<input type="checkbox"/>	<input type="checkbox"/>	-
3.5 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"/>
3.6 Bathroom fans are ENERGY STAR certified if used as part of the whole-house system ¹⁸				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.7 Air inlet location (Complete if ventilation air inlet location was specified (2.12, 2.13); otherwise check "N/A"): ^{19, 20}				-	-	<input type="checkbox"/>
3.7.1 Inlet pulls ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit				<input type="checkbox"/>	<input type="checkbox"/>	-
3.7.2 Inlet is ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. distance from dryer exhausts and sources exiting the roof.				<input type="checkbox"/>	<input type="checkbox"/>	-
3.7.3 Inlet is provided with rodent / insect screen with ≤ 0.5 inch mesh				<input type="checkbox"/>	<input type="checkbox"/>	-
4. 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: ^{15, 21}						
Location		Continuous Rate		Intermittent Rate ²²		
4.1 Kitchen	Airflow	≥ 5 ACH, based on kitchen volume ^{23, 24}		≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume ^{23, 24, 25}		
	Sound	Recommended: ≤ 1 sone		Recommended: ≤ 3 sones		
4.2 Bathroom	Airflow	≥ 20 CFM		≥ 50 CFM		
	Sound	Required: ≤ 1 sone		Recommended: ≤ 3 sones		
5. Filtration						
5.1 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 owner ²⁶				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.2 Filter access panel includes gasket or comparable sealing mechanism and fits snugly against the exposed edge of filter when closed to prevent bypass ²⁷				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.3 All return air and mechanically supplied outdoor air passes through filter prior to conditioning				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Combustion Appliances						
6.1 Furnaces, boilers, and water heaters located within the home's pressure boundary are mechanically drafted or direct-vented. See Footnote 30 for alternatives. ^{28, 29, 30}				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2 Fireplaces located within the home's pressure boundary are mechanically drafted or direct-vented. See Footnote 31 for alternatives. ^{28, 29, 31}				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.3 If unvented combustion appliances other than cooking ranges or ovens are located inside the home's pressure boundary, the Rater has followed Section 802 of RESNET's Standards, encompassing ANSI/ACCA 12 QH-2014, Appendix A, Section A3 (Carbon Monoxide Test), and verified the equipment meets the limits defined within ^{28, 32}				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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7. Thermal Comfort System	Must Correct	Rater Verified ²	N/A ³
7.1 Operable apertures provided that meet the specifications of the Tropics Rater Design Review Checklist as follows:			
7.1.1 Area, placement, & function is as specified in Items 4.1.1 through 4.1.3.	<input type="checkbox"/>	<input type="checkbox"/>	-
7.1.2 Wing walls present if specified in Item 4.1.3.	<input type="checkbox"/>	<input type="checkbox"/>	-
7.1.3 Insect screens provided per specifications in Item 4.1.4.	<input type="checkbox"/>	<input type="checkbox"/>	-
7.1.4 Integral devices capable of holding components open provided per specifications in Item 4.1.5.	<input type="checkbox"/>	<input type="checkbox"/>	-
7.1.5 Mechanically-attached door stop or similar device provided per specifications in Item 4.1.6.	<input type="checkbox"/>	<input type="checkbox"/>	-
7.2 Solar gain through windows reduced per specs. in Item 4.2 of the Tropics Rater Design Review Checklist.	<input type="checkbox"/>	<input type="checkbox"/>	-
7.3 Ceiling fan junction boxes installed per specs. in Item 4.3 of the Tropics Rater Design Review Checklist.	<input type="checkbox"/>	<input type="checkbox"/>	-
Rater Name: _____ Rater Pre-Drywall Inspection Date: _____ Rater Initials: _____			
Rater Name: _____ Rater Final Inspection Date: _____ Rater Initials: _____			



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Footnotes

1. 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.
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.
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. 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.
5. 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.
6. 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.
7. Item 2.2 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 ± 3 Pa limit, a Rater-measured pressure differential ≥ -5 Pa and $\leq +5$ Pa is permitted to be used for bedrooms with a design airflow ≥ 150 CFM. The Rater-measured pressure shall be rounded to the nearest whole number to assess compliance.
8. Item 2.3 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 2 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
9. Items 2.4 and 2.5 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.
10. For a duct system with three or more returns, the total Rater-measured duct leakage is permitted to be the greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM25 at 'rough-in' or the greater of ≤ 12 CFM25 per 100 sq. ft. of CFA or ≤ 120 CFM25 at 'final'.
11. 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® Duct Sealing Certification Form is permitted to be collected by the Home Energy Rater.
12. 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 ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM25, with air handler & all ducts, building cavities used as ductwork, & duct boots installed.
13. 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.
14. 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 ≤ 4 CFM25 per 100 sq. ft. of conditioned floor area or 40 CFM25, whichever is larger.
15. 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.
16. 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.
17. 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 ≥ 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 ≥ 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.
18. Bathroom fans with a rated flow rate ≥ 500 CFM are exempted from the requirement to be ENERGY STAR certified.
19. Ventilation air inlets that are only visible via rooftop access are exempted from Item 3.7 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.



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20. 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 owner.
21. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the airflow rate in Item 4.2. 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 4.1 and 4.2. 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.
22. 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.
23. 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 ≥ 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.
24. 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, ≥ 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. As an alternative to Item 4.1, 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 ≤ 0.05 CFM50 per sq. ft. of Enclosure Area, and a Rater-verified dwelling unit compartmentalization rate ≤ 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.
25. 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 ≥ 5 ACH, based on the kitchen volume.
26. 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 ≤ 12 ft.
27. 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.
28. 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.
29. 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.
30. 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.
31. 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 ≤ 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 17 for the definition of "habitable spaces".
32. 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.