ENERGY STAR Qualified Homes, Version 3 (Rev. 02)
HVAC System Quality Installation Contractor Checklist[1]

Home Address: _____ City: _____ State: _____

System Description[2] _____ Cooling system for temporary occupant load?[3] Yes ☐ No ☐

1. Whole-Building Mechanical Ventilation Design[4]	Cont./Tech. Verified[5]	Rater Verified	N/A
1.1 Ventilation system designed to meet ASHRAE 62.2-2010 requirements [6].	☐	☐	-
1.2 Ventilation system does not utilize an intake duct to the return side of the HVAC system unless the system is designed to operate intermittently and automatically based on a timer and to restrict outdoor air intake when not in use (e.g., motorized damper).	☐	☐	-
1.3 Documentation is attached with ventilation system type, location, design rate, and frequency and duration of each ventilation cycle.	☐	☐	-
1.4 If present, continuously-operating vent. & exhaust fans designed to operate during all occupiable hours.	☐	☐	☐
1.5 If present, intermittently-operating whole-house ventilation system designed to automatically operate at least once per day and at least 10% of every 24 hours.	☐	☐	☐
2. Heating & Cooling System Design[4,7] - *Parameters used in the design calculations shall reflect home to be built, specifically, outdoor design temperatures, home orientation, number of bedrooms, conditioned floor area, window area, predominant window performance and insulation levels, infiltration rate, mechanical ventilation rate, presence of MERV6 or better filter, and indoor temperature setpoints = 70°F for heating; 75°F for cooling*			
2.1 Heat Loss / Gain Method: ☐ Manual J v8 ☐ ASHRAE 2009 ☐ Other: _____	☐	☐	-
2.2 Duct Design Method: ☐ Manual D ☐ Other: _____	☐	☐	☐
2.3 Equipment Selection Method: ☐ Manual S ☐ OEM Rec. ☐ Other: _____	☐	☐	-
2.4 Outdoor Design Temperatures:[8] Location:_____ 1%:_____°F 99%:_____°F	☐	☐	-
2.5 Orientation of Rated Home (e.g., North, South): _____	☐	☐	-
2.6 Number of Occupants Served by System:[9] _____	☐	☐	-
2.7 Conditioned Floor Area in Rated Home: _____Sq. Ft.	☐	☐	-
2.8 Window Area in Rated Home: _____Sq. Ft.	☐	☐	-
2.9 Predominant Window SHGC in Rated Home:[10] _____	☐	☐	-
2.10 Infiltration Rate in Rated Home:[11] Summer:_____ Winter:_____	☐	☐	-
2.11 Mechanical Ventilation Rate in Rated Home: _____CFM	☐	☐	-
2.12 Design Latent Heat Gain: _____BTUh	☐	☐	-
2.13 Design Sensible Heat Gain: _____BTUh	☐	☐	-
2.14 Design Total Heat Gain: _____BTUh	☐	☐	-
2.15 Design Total Heat Loss: _____BTUh	☐	☐	-
2.16 Design Airflow: [12] _____CFM	☐	☐	-
2.17 Design Duct Static Pressure:[13] _____ Inches Water Column (IWC)	☐	☐	☐
2.18 Full Load Calculations Report Attached	☐	☐	-
3. Selected Cooling Equipment, If Cooling Equipment to be Installed			
3.1 Condenser Manufacturer & Model: _____	☐	☐	☐
3.2 Condenser Serial #: _____	☐	☐	☐
3.3 Evaporator / Fan Coil Manufacturer & Model: _____	☐	☐	☐
3.4 Evaporator / Fan Coil Serial #: _____	☐	☐	☐
3.5 AHRI Reference #:[14] _____	☐	☐	☐
3.6 Listed Efficiency: _____EER _____SEER	☐	☐	☐
3.7 Metering Device Type: ☐ TXV ☐ Fixed orifice ☐ Other: _____	☐	☐	☐
3.8 Refrigerant Type: ☐ R-410a ☐ Other: _____	☐	☐	☐
3.9 Fan Speed Type: [15] ☐ Fixed ☐ Variable (ECM/ICM) ☐ Other: _____	☐	☐	☐
3.10 Listed Sys. Latent Capacity at Design Cond.[16]: _____BTUh	☐	☐	☐
3.11 Listed Sys. Sensible Capacity at Design Cond.[16]: _____BTUh	☐	☐	☐
3.12 Listed Sys. Total Capacity at Design Cond.[16]: _____BTUh	☐	☐	☐
3.13 If Listed Sys. Latent Capacity (Value 3.10) ≤ Design Latent Heat Gain (Value 2.12), ENERGY STAR qualified dehumidifier installed	☐	☐	☐
3.14 Listed Total Cap. (Value 3.12) is 95-115% of Design Total Heat Gain (Value 2.14) or next nom. Size[17,18]	☐	☐	☐
3.15 AHRI Certificate Attached [14]	☐	☐	☐
4. Selected Heat Pump Equipment, If Heatpump to be Installed			
4.1 AHRI Listed Efficiency: _____ HSPF	☐	☐	☐
4.2 Performance at 17°F: Capacity _____ BTUh Efficiency: _____COP	☐	☐	☐
4.3 Performance at 47°F: Capacity _____ BTUh Efficiency: _____ COP	☐	☐	☐

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5. Selected Furnace, If Furnace to be Installed	Cont./Tech. Verified[5]	Rater Verified	N/A
5.1 Furnace Manufacturer & Model: _____	☐	☐	☐
5.2 Furnace Serial #: _____	☐	☐	☐
5.3 Listed Efficiency: _____ AFUE	☐	☐	☐
5.4 Listed Output Heating Capacity: _____ BTUh	☐	☐	☐
5.5 Listed Output Heat. Cap. (Value 5.4) is 100-140% of Design Total Heat Loss (Value 2.15) or next nom. Size[18,19]	☐	☐	☐
6. Refrigerant Tests - *Run system for 15 minutes before testing* Note: If cold weather makes it impossible to verify proper refrigerant charge, system must include a TXV[20]			
6.1 Outdoor ambient temperature at condenser: _____ °F DB	☐	☐	☐
6.2 Return-side air temperature inside duct near evaporator, during cooling mode: _____ °F WB	☐	☐	☐
6.3 Liquid line pressure: _____ psig	☐	☐	☐
6.4 Liquid line temperature: _____ °F DB	☐	☐	☐
6.5 Suction line pressure: _____ psig	☐	☐	☐
6.6 Suction line temperature: _____ °F DB	☐	☐	☐
7. Refrigerant Calculations			
For System with Thermal Expansion Valve (TXV):			
7.1 Condenser saturation temperature: _____ °F DB (Using Value 6.3)	☐	☐	☐
7.2 Subcooling value: _____ °F DB (Value 7.1 - Value 6.4)	☐	☐	☐
7.3 OEM subcooling goal: _____ °F DB	☐	☐	☐
7.4 Subcooling deviation: _____ °F DB (Value 7.2 – Value 7.3)	☐	☐	☐
For System with Fixed Orifice:			
7.5 Evaporator saturation temperature: _____ °F DB (Using Value 6.5)	☐	☐	☐
7.6 Superheat value: _____ °F DB (Value 6.6 – Value 7.5)	☐	☐	☐
7.7 OEM superheat goal: _____ °F DB (Using superheat tables and Values 6.1 & 6.2)	☐	☐	☐
7.8 Superheat deviation: _____ °F DB (Value 7.6 – Value 7.7)	☐	☐	☐
7.9 Value 7.4 is ±3°F or Value 7.8 is ±5°F	☐	☐	☐
7.10 An OEM test procedure has been used in place of sub-cooling or super-heat process and documentation has been attached that defines this procedure	☐	☐	☐
8. Electrical Measurements			
8.1 Evaporator/air handler fan: ____ amps _____volts _____ watts	☐	☐	☐
8.2 Condenser fan: ____ amps _____volts _____ watts	☐	☐	☐
8.3 Compressor: ____ amps _____volts _____ watts	☐	☐	☐
8.4 Electrical measurements within OEM specified tolerance of nameplate value	☐	☐	☐
9. Air Flow Tests			
9.1 Air volume at evaporator: _____ CFM	☐	☐	☐
9.2 Test performed in which mode? ☐ Heating ☐ Cooing	☐	☐	☐
9.3 Return duct static pressure: _____ IWC Test Hole Location[21]: _____	☐	☐	☐
9.4 Supply duct static pressure: _____ IWC Test Hole Location[21] : _____	☐	☐	☐
9.5 Test hole locations are well-marked and accessible[21]	☐	☐	☐
9.6 Measurement method used: ☐ Anemometer ☐ Pressure matching[22] ☐ Flow grid ☐ Fan curve ☐ Other: _____	☐	☐	☐
9.7 Airflow volume at evaporator (Value 9.1), at fan design speed and full operating load, +/- 15% of the airflow required per system design (Value 2.16) or within range recommended by OEM	☐	☐	☐
10. Air Balance			
10.1 Individual room airflows within the greater of ±20% or 25 CFM of the design / application requirements for the supply and return ducts[23]	☐	☐	☐
10.2 Balancing report indicating quantity of supply and return terminals per room attached	☐	☐	☐
11. System Controls			
11.1 Operating and safety controls meet OEM requirements	☐	☐	☐
12. Drain pan			
12.1 Corrosion-resistant drain pan, properly sloped to drainage system, included[24]	☐	☐	☐

Technician Name[25] _____ Equipment Installation Date: _____
Technician Signature[25] _____ Company: _____
Designer Name[25] _____ System Design Date: _____
Designer Signature[25] _____ Company: _____

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1. The HVAC System Quality Installation Contractor Checklist is designed to align with the requirements of ASHRAE 62.2-2010 and published addenda and ANSI / ACCA's 5 QI-2007 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, or 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.

   This checklist applies to ventilation systems, split air conditioners, unitary air conditioners, air-source/water-source (i.e., geothermal) heat pumps up to 65,000 Btu/h and furnaces up to 225,000 Btu/h. All other equipment, including boilers, is exempt.

   This checklist shall be provided by the Rater to the HVAC contractor who shall complete one checklist for each system. Upon completion, the HVAC contractor shall return the checklist(s) to the Rater. Alternatively, at the discretion of the contractor and Rater, the Rater may verify any item on this checklist in place of the contractor. When this occurs, the Rater shall check the box of the verified items in the Rater Verified column. The Rater is only responsible for ensuring that the Contractor has completed the Contractor checklist in its entirety and for the items that are checked in the Rater Verified column (if any). The Rater is not responsible for assessing the accuracy of the items in this checklist that are not checked in the Rater Verified column. Instead, it is the contractor's exclusive responsibility to ensure the design and installation comply with the Contractor checklist.

   This checklist with supporting documents may also be used to demonstrate compliance with Indoor airPLUS specifications 4.1, 4.2, 4.5, 4.6, and 7.1.

2. Description of HVAC system location or area served (e.g., "whole-house", "upper level", "lower-level", or "supplemental for excess loads.").

3. Check "Yes" if this system is to handle temporary occupant loads. Such a system may be required to accommodate a significant number of guests on a regular or sporadic basis and shall be handled by a supplemental cooling system (e.g., a small, single-package unit or split-coil unit) or by a system that can shift capacity from zone to zone (e.g., a variable volume system).

4. The person responsible for the heating, cooling, and ventilation design, whether it be the HVAC technician or other qualified HVAC design professional, shall be responsible for completing sections 1 and 2 of this checklist.

5. The 'Cont. / Tech. Verified' column shall be used to indicate items verified by the HVAC Contractor or Technician. The 'Rater Verified' column shall only be used to indicate items verified by the Rater, for homes in which the Rater has agreed to verify and accept responsibility for one or more requirements.

6. For proper procedures, exceptions, and selection methods see ASHRAE 62.2-2010 and published addenda. All components shall be designed and installed per local codes, manufacturers' installation instructions, engineering documents, and regional ENERGY STAR program requirements.

   The system shall have at least one supply or exhaust fan with associated ducts and controls. Local exhaust fans are allowed to be part of an exhaust ventilation system. Outdoor air ducts connected to the return side of an air handler are allowed to be part of a supply ventilation system if manufacturers' requirements for return air temperature are met.

7. Heating and cooling loads shall be calculated, equipment capacity shall be selected, and duct systems shall be sized according to the latest editions of ACCA Manuals J, S, & D, respectively, ASHRAE 2009 Handbook of Fundamentals, or a substantively equivalent procedure.

8. If the design conditions are dictated by a code or regulation, then the requirements of the lawful or controlling authority supersedes the Manual J or ASHRAE default design values. Otherwise, the default values shall be used. The values for the geographically closest location shall be selected or a justification provided for the selected location.

9. The number of occupants among all HVAC systems in the home must be equal to the number of bedrooms, as defined below, plus one. Occupants listed for systems that are indicated in the header as a cooling system for temporary occupant loads, as described in footnote 3, shall be permitted to exceed this limit.

   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 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. Infiltration rate shall reflect value used in confirmed or projected HERS rating for rated home. Alternatively, use "Average" or "Semi-loose" values for the cooling season infiltration rates and "Semi-tight" or "Average" values for the heating season infiltration rates, as defined by ACCA Manual J, Eighth Edition, Version Two.
12. Design airflow is the design value(s) for the blower in CFM, as determined by using the manufacturer's expanded performance data to select equipment, per ACCA Manual S procedures.
13. Design duct static pressure shall account for the installation of a MERV6 or higher filter.
14. All evaporators and condensing units shall be properly matched as demonstrated by an attached AHRI certificate. If an AHRI certificate is not available, a copy of OEM-provided catalog data indicating acceptable combination selection and performance data shall be attached.
15. If whole-house ventilation system utilizes the HVAC air handler, then the fan speed type shall be ECM/ICM, variable speed, and run at a reduced speed during ventilation, or include a controller (e.g., smart cycler) that reduces the ventilation run time by accounting for hours when HVAC system is heating or cooling the home.
16. Listed system capacity at design conditions is to be obtained from the OEM expanded performance data.
17. For cooling systems, the next largest nominal piece of equipment may be used that is available to satisfy the latent and sensible requirements. Single-speed systems generally have OEM nominal size increments of ½ ton. Multi-speed or multi-stage equipment may have OEM nominal size increments of one ton. Therefore, the use of these advanced system types can provide extra flexibility to meet the equipment sizing requirements.
18. Contractors shall perform a load calculation for the specific house plan and orientation of the home to be qualified or, for plans with multiple options or that may be built in more than one orientation, for every option and orientation. If the loads are calculated for multiple orientations and the loads across all orientations vary by $\leq$ 25%, then the largest load shall be permitted to be used for equipment selection for all orientations, subject to the over-sizing limits of ACCA Manual S. Otherwise, the contractor shall group the load for each orientation into a set with $\leq$ 25% variation and equipment selection shall be completed for each set of loads. All other aspects of system design (e.g., duct static pressure, design airflow) shall be completed for the specific orientation and configuration of the home. Note that room-level design airflows determined using Manual J and Manual S may be different than the design values used for a standardized Manual D duct design for each option and orientation. Duct balancing shall be performed to meet the design airflows for each orientation and option.
19. For warm air heating systems, the output capacity must be between 100% and 140% of calculated system load unless a larger size is dictated by the cooling equipment selection.
20. Either factory-installed or field-installed TXV's may be used. For field-installed TXV's, ensure that sensing bulbs are insulated and tightly clamped to the vapor line with good linear thermal contact at the recommended orientation, usually 4 or 8 o'clock.
21. Examples of return or supply duct static pressure measurement locations are: plenum, cabinet, trunk duct, as well as front, back, left or right side. Test hole locations shall be well marked and accessible.
22. The pressure matching method uses a calibrated fan to match the supply plenum pressure produced when the HVAC air handler fan is in operation. The airflow through the calibrated fan that produces the same pressure is assumed to match the HVAC air handler fan airflow.
23. Ducts shall not include coiled or looped ductwork except to the extent needed for acoustical control. Balancing dampers or proper duct sizing shall be used instead of loops to limit flow to diffusers. When balancing dampers are used, they shall be located at the trunk to limit noise unless the trunk will not be accessible when the balancing process is conducted. In such cases, opposable blade dampers or dampers located in the duct boot are permitted.
24. Condensate pan shall be made of corrosion-resistant materials, to include galvanized steel and plastic. Drain pan shall drain condensate to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drainage system; and shall be equipped with a backflow prevention valve when drained to a shared drainage system, such as a storm water management system.
25. HVAC technician signature required prior to submittal to Rater. If the HVAC system design (Sec. 1 & 2) was not completed by the HVAC technician, then the designer shall sign in addition to HVAC technician.