Heating & Cooling System Design

Builders, raters, and installers use the ENERGY STAR Certified Homes (Version 3.0, Revision 07) HVAC System Quality Installation Contractor Checklist (HVAC/C) to document the sizing and testing of HVAC equipment. The requirements from the checklist do not involve the actual installation of specific measures. Rather, these checklist steps verify that a particular procedure was followed or that appropriate information was used in selecting or sizing equipment. This page provides the full language for the selected checklist requirement and shows the applicable footnotes describing how to comply; however, a full measure guide showing installation information is not needed. For information on installing HVAC equipment, see the HVAC System Quality Installation Rater Checklist [1].

ENERGY STAR Certified Homes, Version 3 (Rev. 07)
HVAC System Quality Installation Contractor Checklist

Footnotes:

The footnotes for this measure are listed below. The numbering corresponds to the original checklist document so some numbers may appear out of sequence.

1. This 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, 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.

This Checklist applies to ventilation systems; to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65,000 Btu / h with forced-air distribution systems (i.e., ducts) and to furnaces up to 225,000 Btu / h with forced-air distribution systems (i.e., ducts). All other permutations of equipment (e.g., boilers, mini-split / multi-split systems) and distribution systems are exempt. If the ventilation system is the only applicable system installed in the home, then only Section 1 shall be completed.

One Checklist shall be completed for each system and provided to the Rater.

4. The person responsible for the heating, cooling, & ventilation design shall be responsible for completing Sections 1 and 2 of this HVAC System Quality Installation Contractor Checklist.

5. For Sections 1 through 5, the “Builder Verified” column shall be used to indicate items verified by the builder (or a firm or
HERS Rater hired by the builder). If any Items have been marked “Builder Verified,” then the builder is responsible for these Items and must sign this Checklist. Note that builders are not permitted to verify any Items in Sections 6-12.

6. For Sections 1 through 5, the “Cont. Verified” column shall be used to indicate Items verified by the credentialed contractor (or a firm or HERS Rater hired by the contractor). In contrast, for Sections 6 through 12, the “Cont. Verified” column shall only be used to indicate Items verified by the credentialed contractor (i.e., neither a builder, nor a firm, nor a HERS Rater are permitted to verify Sections 6 - 12). The credentialed contractor is responsible for these Items and shall sign this HVAC System Quality Installation Contractor Checklist.

8. Heating and cooling loads shall be calculated, equipment shall be selected, and duct systems shall be sized according to the latest editions of ACCA Manuals J, S, & D, respectively, 2009 ASHRAE Handbook of Fundamentals, or other methodology approved by the Authority Having Jurisdiction. The HVAC system design shall be completed for the specific configuration (e.g., plan, elevation, option, and orientation) of the home to be built except as permitted herein.

For each house plan with multiple configurations (e.g., orientations, elevations, options), the loads shall be calculated for each potential configuration. If the loads across all configurations vary by > 25%, then the largest load shall be permitted to be used for equipment selection for all configurations, subject to the over-sizing limits of ACCA Manual S. Otherwise, the contractor shall group the load for each configuration into a set with > 25% variation and equipment selection shall be completed for each set of loads.

For each house plan with multiple configurations, the room-level design airflows shall be calculated for each potential configuration. If the design airflows for each room vary across all configurations by > 25% or 25 CFM, then the average room-level design airflow shall be permitted to be used when designing the duct system. Otherwise, the contractor shall group the room-level design airflow for each configuration into a set with > 25% or 25 CFM variation and the duct design shall be completed for the average airflow of that set.

9. 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.

10. 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 square feet 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 square feet 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 square feet; AND
   - have a minimum net clear opening height of 24 inches; AND
   - have a minimum net clear opening width of 20 inches; AND
   - be operational from the inside of the room without the use of keys, tools or special knowledge.

11. “Predominant” is defined as the SHGC value used in the greatest amount of window area in the home.

12. 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.

13. 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.

14. Design duct static pressure shall account for the installation of a MERV 6 or higher filter.

15. The load calculation for the home shall be provided, documenting all design elements and all resulting loads, including but not limited to the values listed in Items 2.1 through 2.17.
More Info.

Access to some references may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our webmaster if you find broken links.

References and Resources*

1. [ENERGY STAR Certified Homes, Version 3 (Rev. 07) Inspection Checklists for National Program Requirements](#)
   
   **Author(s):** U.S. Environmental Protection Agency  
   **Organization(s):** EPA  
   **Publication Date:** June, 2013  
   
   *Standard document containing the rater checklists and national program requirements for ENERGY STAR Certified Homes, Version 3 (Rev. 7).*

*Publication dates are shown for formal documents. Dates are not shown for non-dated media. Access dates for referenced, non-dated media, such as web sites, are shown in the measure guide text.

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