ENERGY STAR HVAC Verified Installation: Contractor Checklist

[ESVI-C]

[v11.19.2013]

Customer Name: _____ Home Address: _____

City: _____ State: _____ Zip: _____ System Location: _____

System Description: _____

1. Ventilation, Heating & Cooling System Design	Contractor Completed	N/A
1.1 Is there an existing mechanical ventilation system that provides whole building ventilation to the home? ☐ Yes ☐ No	☐	-
1.2 If 1.1 is "Yes", measured rate of mechanical vent. system, as used for heating & cooling system design: _____CFM[1]	☐	☐
1.3 Full load calculations report attached[2]	☐	-
1.4 Heat Loss / Gain Method: ☐ Manual J v8	☐	-
1.5 Equipment Selection Method: ☐ Manual S	☐	-
1.6 Outdoor Design Temperatures: Location: _____ 1%:___ °F 99%: ___°F	☐	-
1.7 Number of occupants: _____	☐	-
1.8 Home orientation: _____	☐	-
1.9 Floor Area Served by Unit: _____ Sq. Ft.	☐	-
1.10 Window Area in the Rooms Served by Unit: _____ Sq. Ft.	☐	-
1.11 Predominant Window Type: ☐ Single Pane ☐ Double Pane ☐ Triple Pane ☐ Double Pane w/ Low-E ☐ Other: _____	☐	-
1.12 Infiltration Rate of Area Served by Unit[3]: ☐ Very Leaky ☐ Leaky ☐ Average ☐ Tight ☐ Very Tight	☐	☐
1.13 Design Latent Heat Gain: _____ BTUh	☐	☐
1.14 Design Sensible Heat Gain: _____ BTUh	☐	☐
1.15 Design Total Heat Gain: _____ BTUh	☐	☐
1.16 Design Total Heat Loss: _____ BTUh	☐	☐
1.17 Design Airflow: _____ CFM	☐	☐
2. Selected Cooling Equipment OR Heat Pump Equipment - *If Applicable*		
2.1 Replacement Equipment is ENERGY STAR Certified (ENERGY STAR Certified equipment is mandatory)	☐	☐
2.2 AHRI Certificate Attached	☐	☐
2.3 AHRI Reference #: _____	☐	☐
2.4 AHRI Listed Efficiency: _____ EER _____SEER _____HSPF	☐	☐
2.5 Nominal Tonnage of Unit Being Replaced: _____	☐	☐
2.6 Nominal Tonnage of Replacement Unit: _____	☐	☐
2.7 Replacement Equipment Listed Sys. Latent Cooling Capacity at Design Cond.: _____BTUh	☐	☐
2.8 Replacement Equipment Listed Sys. Sensible Cooling Capacity at Design Cond.: _____BTUh	☐	☐
2.9 Replacement Equipment Listed Sys. Total Cooling Capacity at Design Cond.: _____ BTUh	☐	☐
2.10 Listed Sys. Total Cooling Capacity (Value 2.9) is 95-115% of Design Total Heat Gain (Value 1.15) or next size[4]	☐	☐
3. Selected Furnace - *If Applicable*		
3.1 Replacement Equipment is ENERGY STAR Certified (ENERGY STAR certified equipment is mandatory)	☐	☐
3.2 Furnace Manufacturer: _____ Model #: _____	☐	☐
3.3 Fuel Type: ☐ Natural Gas ☐ LP Gas ☐ Oil ☐ Electric	☐	☐
3.4 BTU Input of Unit Being Replaced: _____	☐	☐
3.5 BTU Input of Replacement Unit: _____	☐	☐
3.6 Listed Output Heating Capacity of Replacement Unit: _____	☐	☐
3.7 Listed Efficiency of Replacement Unit: _____ AFUE	☐	☐
3.8 Listed Output Heating Capacity (Value 3.6) is 100-140% of Design Total Heat Loss (Value 1.16) or next nominal size[5]	☐	☐
3.9 System Has Dedicated Combustion Air From Outside[6]	☐	☐
4. Duct Leakage		
4.1 Duct Leakage Goal: ☐ ≤ 20% Total (Item 4.3 not required) ☐ 50% Improvement (Item 4.3 required)	☐	☐
4.2 Method to Measure Duct Leakage: ☐ Duct Pressurization or Depressurization Test[7] ☐ Airflow Comparison Method[8] ☐ Hybrid Blower Door / Airflow Measuring Device Subtraction (e.g. Flowhood)[9]	☐	☐
4.3 Total Duct Leakage Pre-Installation[10]: _____%	☐	☐
4.4 Total Duct Leakage Post-Installation[11]: _____%	☐	☐
4.5 Improvement: _____% (calculated as the difference between 4.4 and 4.3 divided by 4.3)	☐	☐

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5. Air Flow Tests		
5.1 Measurement Method: ☐ Total External Static Pressure/Blower Table ☐ Traversing Anemometer ☐ Flow Grid Measurement ☐ Pressure Drop Across Unrestricted/Clean Coil ☐ Pressure Matching Method ☐ Temperature Rise (heating only)	☐	☐
5.2 Air volume at dry evaporator in cooling mode: _____ CFM	☐	☐
5.3 Return Side Static Pressure: _____ IWC	☐	☐
5.4 Marked Return Test Hole Location: _____	☐	☐
5.5 Supply Side Static Pressure: _____ IWC	☐	☐
5.6 Marked Supply Test Hole Location: _____	☐	☐
5.7 Total External Static Pressure: _____ IWC 5.8 OEM Maximum Allowable Total External Static Pressure: _____ IWC	☐	☐
5.9 Airflow volume (Value 5.2), at fan design speed, is within ± 15% of the airflow required per system design (Value 1.17)	☐	☐
6. Refrigerant Tests – *Run system for 10 minutes before testing*		

For systems with Thermal Expansion Valve (TXV) only: *Complete 6.1a – 6.5a below*[12]	For systems with Fixed Orifice only: *Complete items 6.1b – 6.5b below*		
6.1a Outdoor ambient temperature at condenser: ____ °F DB	6.1b Outdoor ambient temperature at evaporator: ____ °F DB	☐	☐
6.2a Condenser saturation temperature: ____ °F DB[13]	6.2b Evaporator saturation temperature: ____ °F DB[14]	☐	☐
6.3a Subcooling value: _____ °F DB[15]	6.3b Superheat value: _____ °F DB[16]	☐	☐
6.4a OEM subcooling goal: _____ °F DB	6.4b OEM superheat goal: _____ °F DB	☐	☐
6.5a Subcooling deviation: _____ °F DB[17]	6.5b Superheat deviation: _____ °F DB[18]	☐	☐

6.6 Liquid line pressure: _____ psig	☐	☐
6.7 Liquid line temperature: _____°F DB	☐	☐
6.8 Value 6.5a is ± 3°F OR Value 6.5b is ± 5°F		
6.9 If OEM test procedure has been used in place of sub-cooling, documentation has been attached that defines this procedure and documents the refrigerant test's compliance with the procedure	☐	☐
7. Electrical Measurements – *Taken at electrical disconnect while component is in operation*		
7.1 Evaporator or furnace air handler fan: ____ amperage _____line voltage	☐	☐
7.2 Outdoor unit: ____ amperage _____line voltage	☐	☐
7.3 Electrical measurements within OEM-specified tolerance of nameplate value	☐	☐
8. Combustion Performance – *If furnace installed*		
8.1 Combustion Test: Altitude Derating Factor: _____ Manifold Pressure: _____ IWC Orifice Size (for gas appliances): _____ Nozzle gallons per hour (for oil appliances) _____ gph Nameplate Temp. Rise Range: _____ °F DB Measured Temp. Rise: _____°F DB	☐	☐
8.2 Combustion Analyzer[19]: CO *(undiluted)*: ____PPM Stack Temperature: _____ °F Efficiency: _____ % Draft Pressure: _____ Pa Notation explaining why certain tests were not performed: _____	☐	☐
9. Combustion Safety – *When CAZ is in home's pressure boundary and any changes may affect operation of any combustion appliance*		
9.1 Pass of Combustion Appliance Zone Test[20] (includes ambient CO test)	☐	☐
9.2 All New and Existing Combustion Appliances Pass Flue Tests[21] (spillage, draft and undiluted CO)	☐	☐
10. Other		
10.1 Operating and safety controls meet OEM requirements	☐	☐
10.2 Filter located and installed so as to facilitate access and regular service by the owner		
10.3 Filter access panel includes gasket or comparable sealing mechanism and fits snugly against the exposed edge of filter when closed to prevent bypass.	☐	☐
10.4 Corrosion-resistant drain pan, properly sloped to drainage system, included with each HVAC component that produces condensate and overflow switch or sensor is installed and operational	☐	☐

HVAC Company Name:_____

System Designer Name: _____ Crew Leader Name: _____

Crew Leader Signature:_____ Date Signed:_____

Name of Credentialing or Oversight Organization: _____

To which organization that this Contractor Checklist will be submitted in order to obtain the ENERGY STAR Certification for the HVAC System being Verified

[1] The whole-house ventilation air flow and local exhaust air flows shall be measured by the Contractor using a flow hood, flow grid, anemometer (in accordance with AABC, NEBB or ASHRAE procedures), or substantially equivalent method.

[2] Full load calculations vary by software. Full load calculations often include: load short form / load preview report, total building summary loads, building analysis, component constructions, project summary/project report, worksheet(s), and drawing(s). Room-by-room load calculations are not a requirement. Mechanical ventilation (if present) should be accounted for in the load calculations.

[3] Method to determine infiltration rate to be consistent with Manual J v8 protocols and guidance

[4] Or Manual S equivalent measure. For heat pumps, 95% to 125% of total cooling requirements (for heat pumps with heating dominated requirement).

[5] Or Manual S equivalent measure.

[6] Exception allowed for ENERGY STAR Certified oil furnaces that are atmospherically vented

[7] Duct leakage is measured using a duct pressurization test through a calibrated fan or orifice. Duct registers are sealed, a fan is attached to one opening, the ducts are pressurized, and the amount of air flowing through the fan is quantified. A commonly known system is Duct Blaster®; there are several others as well (ACCA Standard 5, section 5.1.2, footnote 13).

[8] Total room supply CFMs and return CFMs compared with blower capability (e.g., airflow measuring device method: Commonly referred to as a Flow Hood™, Shortridge or Balometer™, Alnor), as per procedures specificed by ACCA, AABC, ASHRAE, NEBB and TABB (ACCA Standard 5, section 5.1.2, footnote 14).

[9] A calibrated fan measures whole-building positive or negative pressure on the building, then duct leakage is measured by placing an airflow capture hood over the grilles and registers (ACCA Standard 5, section 5.1.2, footnote 15).

[10] Calculated by measured total duct leakage pre-installation divided by Item 5.2 (Air volume at dry evaporator in cooling mode).

[11] Calculated by measured total duct leakage post-installation divided by Item 5.2 (Air volume at dry evaporator in cooling mode).

[12] If outdoor ambient air temperatures are below a manufacturer's specification when performing cold weather charging procedures, Contractor shall fill out section 6.1 (a) or 6.1 (b) and mark "N/A" for items 6.2 through 6.9

[13] Use Value 6.6.

[14] Using value of item 6.6.

[15] Value of item 6.2a - value of item 6.6.

[16] Value of item 6.2b – value of item 6.6.

[17] Value of item 6.3a – value of item 6.4a.

[18] Value of item 6.3b – value of item 6.4b.

[19] Testing procedures need to be compliant with local code and manufacturers' specifications. Drilling of PVC or metal flue piping may or may not be permitted, and testing of the flue's termination point may not be safely accessible (e.g., on a rooftop). In situations where testing procedures cannot be performed, Contractor may note "N/A"

[20] CAZ Testing may be performed using BPI Technical Standards for the Building Analyst Professional v1/4/12, Worst Case Depressurization Protocols as outlined in the RESNET Standards Chapter 8 Section 807 "Worst Case Depressurization Test", ASTM E1998 – 02(2007), or ANSI/ACCA QH-12 – 2011 (Existing Home Performance Evaluation and Improvement). Unless required by H-QUITO, program, or other AHJ, Verifier should follow the same CAZ Testing protocol used by Contractor.

[21] Spillage Testing may be performed using BPI Technical Standards for the Building Analyst Professional v1/4/12, ASTM-E1998 – 02(2007), or Spillage protocols in Section 807.12, 807.13, and 807.14 in the Worst Case Depressurization Protocols as outlined in the RESNET Standards Chapter 8 Section 807 "Worst Case Depressurization Test". Unless required by H-QUITO, program, or other AHJ, Verifier should follow the same Spillage Testing protocol used by Contractor. Flue Testing may be performed using BPI Technical Standards for the Building Analyst Professional v1/4/12 or ASTM-E1998 – 02(2007). Unless required by H-QUITO, program, or other AHJ, Verifier should follow the same Flue Testing protocol used by Contractor.