



STANDARDS + SPECIFICATIONS: HVAC INSTALL

SUCCESS WITH AFFORDABLE HOUSING

SystemVision

Below are our standards in the realm of the HVAC contractor. Make sure your HVAC contractor has a copy of this document, as well as the other standards before bidding.

These standards must be met in order for Advanced Energy to guarantee the heating and cooling bills. Below each standard is some further explanation we think might be useful to you and your HVAC contractors in preparing bids.

On-site training is provided for the HVAC contractor free of charge. When the duct system for the first participating home is completed, Advanced Energy will test the system, give immediate feedback and answer any questions about the program that may have arisen.

If you find that the contractors you contact are unsure what some of this means, please don't hesitate to contact the SystemVision team (919.857.9000).

Equipment Sizing and Selection

- Heat pumps and air conditioners, if used, must be sized according to ACCA Manual J and be installed within a 1/2 ton of that size.

A room-by-room Manual J load calculation must be completed for each floor plan (not for each house). Please indicate on the Plan Review Input Form (PRIF) who will be responsible for the load calculation - either the HVAC contractor or Advanced Energy. HVAC contractors should refer to the Load Calculation Input Form in this section and the appendices for a list of required reports and inputs. If you elect for Advanced Energy to complete this load calculation, the fee is \$0.15 per square foot.

- Heat pumps and air conditioners shall have a minimum seasonal energy efficiency ratio (SEER) rating of 14 and a heating season performance factor (HSPF) of at least 8.2.
- Furnaces shall be 90 percent efficient and their cooling systems shall have a minimum SEER rating of 13.

Air Distribution

- All joints in the air distribution system shall be sealed with bucket duct mastic and fiberglass mesh or an Advanced Energy approved equivalent.
- Total duct leakage measured in CFM at 25 Pascals (with reference to the outside) shall be less than 3 percent of the conditioned floor area (i.e., if the house has 1,000 sq. ft. of conditioned space, there shall be no more than 30 CFM of duct leakage when tested).
- Tested airflow must be within +/- 10 percent of the designed airflow in each room. The HVAC contractor is responsible for balancing the system at start-up.

Mechanical Equipment Installation

- Heat pumps must include an outdoor thermostat connected to lock out the heat strips above the unit's balance point.
- Inert gas (nitrogen) shall be used during any brazing and soldering of refrigerant lines.
- Condensation drain shall be installed to meet local codes and manufacturer's specifications.
- Airflow volume across the indoor coil and heat exchanger shall meet manufacturer's specifications.
- Indoor and outdoor units must be matched according to the ARI Directory or the manufacturer's listing.
- Correct charge must be installed per manufacturer's specifications.



Ventilation and Moisture Management

- Bathroom: Each bathroom must have an exhaust fan that exhausts a minimum of 50 CFM directly to the outside. This is the measured flow as installed, not the rated flow.

Typically the 70 CFM models will be adequate to move 50 CFM installed. Both Broan and Panasonic make excellent, quiet bath fans. Four sources carrying Panasonic that we consider dependable are Green-R (Ron Pariseau 828.680.9615), Positive Energy (800.488.4340), Energy Federation, Inc. (www.efi.org) and Shelter Supply (www.sheltersupply.com). We require insulated metal or flex ducts for all exhaust fans. Flexible vinyl ductwork is not acceptable. Mastic must be used to seal all connections. All exhaust fans must be ducted to the outside and attached to a proper termination. Refer to the Critical Detail: Bath Fan sheet in this section for additional information and trouble shooting.

- Kitchen: Each kitchen must have a range hood or exhaust fan that exhausts a minimum of 100 CFM directly to outside. This is the measured flow as installed, not the rated flow.
- The kitchen exhaust must be hard ducted to the outside with a back-draft damper installed. Recirculating range hoods are not acceptable. Typically the 150-200 CFM models will be adequate to provide 100 CFM of flow. The quieter the hood, the better; homeowners will often not use them if they are too noisy.
- Outside Air: There must be a mechanical fresh air ventilation system that brings the following amount of fresh air into the home when installed:

$(7.5 \text{ CFM})(\text{number of bedrooms} + 1) + (.01 \text{ CFM})(\text{sq. ft. of conditioned space})$

Example: A three-bedroom, 2,000 sq. ft. house needs mechanical ventilation equal to 50 CFM.

- The outside air ventilation system must include a damper and filter. Filters must be accessible from the conditioned space. See the “Outdoor Air Intake” guide later in this section for additional information.
- Outside air intakes must be installed at least 18 in. above finished grade or 12 in. above the roof deck. They must also be at least 10 ft. from plumbing vents, chimneys, combustion appliance vents, dryer vent terminations and exhaust fan terminations.
- Solid metal, flexible metal or lined, insulated flexible duct may be used.
- All ventilation ducts in unconditioned spaces must be insulated.

One cost-effective approach is to use a 6-8 in. duct with an adjustable damper to bring outside air into the return box whenever the air handler is running.

Closed Crawl Spaces

- Closed crawl spaces shall have a strategy for humidity control. One approved method is to deliver supply air (1 CFM per 30 sq. ft. of crawl space floor area). The HVAC contractor should coordinate with the builder about the drying strategy.
- When supply air is used as a drying strategy, the supply duct shall have both a backflow damper and a manual damper.

The backflow damper is installed to prevent entry of crawl space air into the supply system when the system is not operating. The manual damper is installed to adjust the amount of airflow into the crawl space.

- For additional information, refer to pages 25 and 41 of the “Closed Crawl Spaces: An Introduction for the Southeast” at www.crawlspaces.org. For examples of supply air delivery and other closed crawl space products, see www.crawlspacesproducts.com.



Pressure Balancing and Return Air Paths

- No pressures with a magnitude greater than 3.0 Pascals with reference to the outside may exist in any zone of a house.
- Some form of pressure relief in addition to 3/4 in. door undercuts is required between each bedroom and the main body of the house. Examples of pressure relief strategies include dedicated returns, jump-over ducts and transfer grilles. See the "Pressure Balancing" guide later in this section for additional information.

This means that the duct design needs to be followed closely and that pressure relief - door undercuts, relief grilles, jumper ducts, etc. - is necessary.

Combustion Safety

- Any gas appliance, other than gas ranges, located inside of the conditioned space must be direct or power vented.
- One hard-wired carbon monoxide (CO) detector shall be installed per 1,000 sq. ft. of living space (minimum 1 per floor) in houses that have any combustion appliance within the conditioned space or an attached garage.

The following are strongly recommended:

- Ducts should not touch any exterior walls.
- All flexible ductwork should not be compressed more than the thickness of the insulation.
- All flexible ductwork should be supported at least every 4 ft. and have no bends greater than 90 degrees.




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Load Calculation Input Form

To the right is an example of the Load Calculation Input Form required for all floor plans. Complete and submit this form with each load calculation. A copy of this form can be found in the appendices or as part of the Plan Review Input Form (PRIF) at www.SystemVision.org.



Office Use: Plan
Review Control Number

Load Calculation Input Form (to be completed by HVAC contractor)

PLEASE SEND TO:
Advanced Energy Corporation, Attention: Krista Egger
909 Capability Drive Suite 2100, Raleigh, NC 27606
PH: 919-857-9000 FX: 919-832-2696 E-Mail: kegger@advancedenergy.org

LOAD CALCULATION REVIEW
Right-sized HVAC equipment is an integral part of the SystemVision program. For each plan submitted, Advanced Energy reviews an ACCA Manual J room-by-room load calculation for compliance with the program standards. Complete and submit this form along with the load calculation. Loads may be sent via e-mail as .pdf files or via fax or mail.

HVAC CONTRACTOR: AAA HVAC CONTACT: John Doe
 PHONE: (123) 456-7890 FAX: (123) 456-7899
 E-MAIL ADDRESS: aaahvac@aaahvac.com
 NON-PROFIT DEVELOPER: Anytown HFH PLAN NAME: "Piedmont"

ATTACHED REPORTS MUST INCLUDE: (for other software, please submit equivalent reports)

<p style="text-align: center; font-size: small;">Wright-Soft</p> <input type="checkbox"/> Load Short Form <input type="checkbox"/> Building Analysis <input type="checkbox"/> Component Constructions <input type="checkbox"/> Project Summary <input type="checkbox"/> Worksheet <input type="checkbox"/> Drawings	<p style="text-align: center; font-size: small;">Elite RHVAC</p> <input type="checkbox"/> Project Report <input type="checkbox"/> Miscellaneous Report w/ Duct Load Factors <input type="checkbox"/> Load Preview Report <input type="checkbox"/> Total Building Summary Loads <input type="checkbox"/> Detailed Room Loads
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DESIGN SELF-REVIEW:

Input	Modeled Value	Standards/ACCA Recommendation
Indoor Design Temperature	70/75	70 Heating/75 Cooling/50% RH
Outdoor Design Temperature	17/91	99% Heating/1% Cooling per MJ8, Table 1A
Window U-Value	.33	≤ .35
Window SHGC	.28	≤ .30
Wall R-Value	R-15	Consult builder
Ceiling R-Value	R-38	Consult builder, ≥ R-38
Floor R-Value	R-10 at crawspace wall	Consult builder
Infiltration	Tight	Tight or equivalent
Appliances	1	1 appliance recommended; maximum of 2
Occupants	5	Total = # of bedrooms + 1
Duct Tightness/Sealing	Extreme	Extreme or equivalent
Duct Location	Crawlspace	Consult builder
Ventilation	42 CFM	Total = (.01 x ft ²) + 7.5 (# of bedrooms + 1)

PLAN REVIEWS WILL BE DELAYED IF ANY INFORMATION IS MISSING.

5 of 5