PTCS Air Source Heat Pump Installation Specification

1. Equipment Selection and Sizing

The new Air-Conditioning, Heating, and Refrigeration Institute (AHRI) rated air source heat pump (ASHP) and variable speed heat pump (VSHP) must meet the minimum efficiency requirements of 9.0 HSPF and 14 SEER for PTCS projects. For Commissioning, Controls, and Sizing ASHP and VSHP projects (I.e. Heat pumps less than 9.0 HSPF), they must meet the federal minimum efficiency standards. The system must be sized using a balance point of 30°F or less. A 70°F indoor design temperature for heating and 75°F for cooling load calculations using ASHRAE winter design temperature and cooling design temperature for the nearest weather station representative of the installation shall be used.

The method for calculating heating and cooling loads shall be consistent with or equivalent to ACCA Manual J 8th edition, or newer. Alternate computer or manual methods of calculating heating and cooling loads may be used if approved in advance by the utility.

2. External Static Pressure

The total external static pressure acting on the system air handler must not exceed 0.8 inches of water (200 Pa).

VSHP Requirement Only – External Static Pressure: Must be as specified in the heat pump manufacturer's documentation.

3. Air Flow

Air flow across the indoor coil must be as specified in the heat pump manufacturer's documentation, or at least 325 to no more than 500 cubic feet per minute (CFM) per 12,000 Btu/hr output at AHRI rating conditions if the manufacturer's documentation is not specific. Approved measurement methods are;

a. TrueFlow plate

b. External static pressure – CFM manufacturer lookup table

c. Duct Blaster pressurization fan matching

VSHP Requirement Only – Air Flow: Must be as specified in the heat pump manufacturer's documentation. Does not need to be measured using methods a, b, or c above.

4. Refrigerant Charge

a. **Heating.** If the outdoor temperature is 65°F or less, test in heating mode after operating the heat pump for a recommended 15 minutes, if not specified by manufacturer, with auxiliary back-up heat off. Temperature change across the air handler indoor coil must be at or above the minimum temperature split shown in the R-410A Temperature Split Table (https://www.bpa.gov/-/media/Aep/energy-efficiency/residential/residential-ptcs-essentials/hp-temp-split-table.pdf).

b. **Cooling.** If the outdoor temperature is greater than 65°F, test in cooling mode after operating the heat pump for a recommended 15 minutes if not specified by manufacturer. The subcooling (liquid saturation temp.. – liquid line temp.) must meet manufacturer's documented requirements. See R-410A Pressure-temperature chart (https://www.bpa.gov/-/media/Aep/energy-efficiency/residential/residential-ptcs-essentials/r-410a-pressure-temperature-chart.pdf) for liquid line pressures and corresponding temperatures.

VSHP Requirement Only – Refrigerant Charge: Must be as specified in the heat pump manufacturer's documentation. Does not need to be measured using methods a or b above.

Other alternative refrigerant measuring methods approved and documented by the manufacturer are also acceptable.

5. Controls

a. **Auxiliary Heat Control.** Auxiliary heat must be controlled in such a manner that it does not engage when the outdoor air temperature is above 35°F, except when supplemental heating is required during a defrost cycle or when emergency heating is required during a refrigeration cycle failure.

PTCS ASHP Installation Best Practices

The program recommends but does not require the following as Air Source Heat Pump installation best practices:

- Check with the local utility about any requirements they may have about sizing auxiliary heat.
- Make sure openings in the unit cabinet or building structure are properly sealed.
- Sizing
    - If a house (de)pressurization test has not been performed, use a default infiltration rate of:
        - 0.8 air changes per hour (ACH) for homes built before 1980,
        - 0.5 ACH for homes built between 1980 – 1990,
        - 0.35 ACH for homes built after 1990,
    - If a duct pressurization test has not been performed, use a default duct system loss of:
        - Up to 25% if ducts are insulated and fully located in the attic and/or crawlspace.
        - Up to 15% if ducts are insulated, sealed, and fully located in the attic and/or crawlspace
        - If the air handler and all ductwork are within the thermal envelope of the house, use 0%.
        - Use a value between 0% - 25% if some ducts are inside conditioned space
    - Use window U-Values provided below if NFRC values are not available:
        - Double-Pane Vinyl: 0.30 – 0.40
        - Double-Pane Wood: 0.35 – 0.55
        - Double-Pane Metal: 0.60 - 0.70
        - Single-Pane Wood: 0.80 – 0.95
    - Include basements as conditioned space in sizing calculations in most cases
- For dual fuel systems (gas backed up heat pumps), a switchover point of 35°F - 40°F should be used.