

PTCS Air Source Heat Pump Installation Specification

Last updated: June 11th, 2013

1. **Applicability.** This specification outlines the installation requirements for new, air-source heat pumps rated by the Air-Conditioning, Heating, and Refrigeration Institute (AHRI).
2. **Compressor Control.** If a low ambient temperature compressor cutout option is installed, it shall not cutout the compressor at temperatures above 5°F.
3. **Equipment Selection and Sizing.** The heat pump system shall be sized, rounding up or down to the nearest 6000 Btu/hr capacity at AHRI rating conditions, using a balance point of 30°F or less.
 - a. Heating loss and cooling gain calculations shall be made using 70°F indoor design temperature for heating and 75°F for cooling.
 - b. The recommended ASHRAE winter design temperature and cooling design temperature for the nearest weather station representative of the installation shall be used.
 - c. The recommended method and form for calculations is available in the Air Conditioning Contractors of America (ACCA) Manual J. Alternate computer or manual methods of calculating heating and cooling loads may be used if approved in advance by the utility.
 - d. Component U-values and F-values used in the heat loss and heat gain coefficients shall reflect the actual construction of the building and be generally consistent with those found in ACCA Manual J 7th Edition, or later.
 - e. In sizing calculations, an infiltration rate of either 0.5 or 0.8 air changes per hour shall be used for houses built after 1980 or before 1980 respectively, unless a house (de)pressurization test has been performed and an estimate is made using the result. Where available, the results of duct pressurization testing shall be used to estimate the duct system efficiency used in sizing calculations. If a duct pressurization test has not been performed on the house, a default duct system loss of 25% shall be used. Exception: If the air handler and all ductwork are within the thermal envelope of the house, 0% shall be used as the duct system loss in sizing calculations.
4. **Auxiliary Heat Sizing.** Installed auxiliary heat capacity shall not exceed 125% of the heating design load.
5. **Auxiliary Heat Control.** Auxiliary heat shall be controlled in the following manner depending on system type:
 - a. For systems with a single stage of compression and for systems with multiple stages of compression but without supply air temperature sensor control: Auxiliary heat shall 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.
 - b. For systems with multiple stages of compression and supply air temperature sensor control: Auxiliary heat shall be controlled in such a manner that it does not engage when the supply air temperature is above 85°F.
6. **Penetrations.** Refrigerant piping and electrical passing through openings in the unit cabinet or the building structure shall be properly sealed.
7. **Indoor Thermostats.** Thermostats used for both heating and cooling shall have a manual changeover feature or heating/cooling lockout to prevent cross-cycling between heating and cooling.
8. **Compliance with Applicable Codes and Manufacturer Requirements.** Installation must comply with all applicable codes and be installed according to the manufacturer's specifications, including, but not limited to, those for sizing, airflow, protective devices, field wiring, equipment placement, air filter access, condensate drain lines and pumps, refrigerant piping, refrigerant charge, condensate management, and fossil fuel back-up systems.
9. **Refrigerant Charge.** Temperature change across indoor coil after 10 minutes of heating operation shall be at or above the minimum temperature split shown in Table 1. Subcooling and other alternative refrigerant measuring methods, approved by the manufacture, are also acceptable.

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Table 1. R-410A Minimum Expected Temperature Split (Supply Temp. - Return Temp.)

Outdoor Temp.	CFM/TON															
	300	310	320	330	340	350	360	370	380	390	400	410	420	430	440	450
5	13.0	12.6	12.2	11.8	11.4	11.0	10.8	10.6	10.4	10.2	10.0	9.8	9.6	9.4	9.2	9.0
7	13.8	13.4	13.0	12.6	12.2	11.8	11.6	11.3	11.1	10.8	10.6	10.4	10.1	9.9	9.6	9.4
9	14.6	14.2	13.8	13.4	13.0	12.6	12.3	12.0	11.8	11.5	11.2	10.9	10.6	10.4	10.1	9.8
11	15.4	15.0	14.6	14.2	13.8	13.4	13.1	12.8	12.4	12.1	11.8	11.5	11.2	10.8	10.5	10.2
13	16.2	15.8	15.4	15.0	14.6	14.2	13.8	13.5	13.1	12.8	12.4	12.0	11.7	11.3	11.0	10.6
15	17.0	16.6	16.2	15.8	15.4	15.0	14.6	14.2	13.8	13.4	13.0	12.6	12.2	11.8	11.4	11.0
17	17.6	17.2	16.8	16.4	16.0	15.6	15.2	14.8	14.4	14.0	13.6	13.2	12.8	12.4	12.0	11.6
19	18.2	17.8	17.4	17.0	16.6	16.2	15.8	15.4	15.0	14.6	14.2	13.8	13.4	13.0	12.6	12.2
21	18.8	18.4	18.0	17.6	17.2	16.8	16.4	16.0	15.6	15.2	14.8	14.4	14.0	13.6	13.2	12.8
23	19.4	19.0	18.6	18.2	17.8	17.4	17.0	16.6	16.2	15.8	15.4	15.0	14.6	14.2	13.8	13.4
25	20.0	19.6	19.2	18.8	18.4	18.0	17.6	17.2	16.8	16.4	16.0	15.6	15.2	14.8	14.4	14.0
27	20.6	20.2	19.8	19.4	19.0	18.6	18.2	17.7	17.3	16.8	16.4	16.0	15.6	15.2	14.8	14.4
29	21.2	20.8	20.4	20.0	19.6	19.2	18.7	18.2	17.8	17.3	16.8	16.4	16.0	15.6	15.2	14.8
31	21.8	21.4	21.0	20.6	20.2	19.8	19.3	18.8	18.2	17.7	17.2	16.8	16.4	16.0	15.6	15.2
33	22.4	22.0	21.6	21.2	20.8	20.4	19.8	19.3	18.7	18.2	17.6	17.2	16.8	16.4	16.0	15.6
35	23.0	22.6	22.2	21.8	21.4	21.0	20.4	19.8	19.2	18.6	18.0	17.6	17.2	16.8	16.4	16.0
37	24.0	23.6	23.1	22.7	22.2	21.8	21.2	20.6	20.0	19.4	18.8	18.4	18.0	17.6	17.2	16.8
39	25.0	24.5	24.0	23.6	23.1	22.6	22.0	21.4	20.8	20.2	19.6	19.2	18.8	18.4	18.0	17.6
41	26.0	25.5	25.0	24.4	23.9	23.4	22.8	22.2	21.6	21.0	20.4	20.0	19.6	19.2	18.8	18.4
43	27.0	26.4	25.9	25.3	24.8	24.2	23.6	23.0	22.4	21.8	21.2	20.8	20.4	20.0	19.6	19.2
45	28.0	27.4	26.8	26.2	25.6	25.0	24.4	23.8	23.2	22.6	22.0	21.6	21.2	20.8	20.4	20.0
47	29.2	28.5	27.8	27.2	26.5	25.8	25.2	24.6	24.0	23.4	22.8	22.4	21.9	21.5	21.0	20.6
49	30.4	29.6	28.9	28.1	27.4	26.6	26.0	25.4	24.8	24.2	23.6	23.1	22.6	22.2	21.7	21.2
51	31.6	30.8	29.9	29.1	28.2	27.4	26.8	26.2	25.6	25.0	24.4	23.9	23.4	22.8	22.3	21.8
53	32.8	31.9	31.0	30.0	29.1	28.2	27.6	27.0	26.4	25.8	25.2	24.6	24.1	23.5	23.0	22.4
55	34.0	33.0	32.0	31.0	30.0	29.0	28.4	27.8	27.2	26.6	26.0	25.4	24.8	24.2	23.6	23.0
57	34.8	33.8	32.8	31.8	30.8	29.8	29.2	28.5	27.9	27.2	26.6	26.0	25.4	24.8	24.2	23.6
59	35.6	34.6	33.6	32.6	31.6	30.6	29.9	29.2	28.6	27.9	27.2	26.6	26.0	25.4	24.8	24.2
61	36.4	35.4	34.4	33.4	32.4	31.4	30.7	30.0	29.2	28.5	27.8	27.2	26.6	26.0	25.4	24.8
63	37.2	36.2	35.2	34.2	33.2	32.2	31.4	30.7	29.9	29.2	28.4	27.8	27.2	26.6	26.0	25.4
65	38.0	37.0	36.0	35.0	34.0	33.0	32.2	31.4	30.6	29.8	29.0	28.4	27.8	27.2	26.6	26.0

10. **Air Flow.** Air flow across the indoor coil shall be as specified in the heat pump manufacturer’s literature, or at least 325 cubic feet per minute (CFM) per 12,000 Btu/hr output at AHRI rating conditions if the manufacturer’s literature is not specific. Approved measurement methods include using a TrueFlow plate or using the duct pressurization fan matching method per plate or fan manufacturer’s instructions.

11. **External Static Pressure.** The total external static pressure acting on the system air handler shall not exceed 0.8 inches of water (200 Pa).