



PORTLAND CLEAN ENERGY COMMUNITY BENEFITS FUND

Installation Checklist

HVAC Ducted Heat Pumps

This guide does not replace the manufacturer's specifications. Follow the manufacturer's installation instructions and local building code requirements.

BEFORE YOU BEGIN

- Discuss your plan with the occupant and property owner.
- Choose inverter-driven, variable-speed heat pumps that are sized with a heat load calculation for the area to be served.
- Perform and document a load calculation. Match the system capacity to the calculation as closely as possible.
 - The load calculation shall show that the heat pump will meet the load of the house served by the ducted unit at 23-degree outdoor temperature in heating with an interior temperature of 68-degrees and a 100-degree outdoor temperature in cooling with an interior temperature of 78-degrees.
 - Heat load calculation provided to PCEF is to reflect actual home surface areas and proposed insulation levels.
 - Establishing how much heating and cooling the space needs at design conditions is essential to maximizing the performance, comfort, and longevity of a heat pump system.
 - HVAC Sizing Tool www.hvac/betterbuiltNW.com
- Plan to install system on a dedicated electrical circuit.
- Plan to install power disconnect and service outlet to code.
- Where a new thermostat location is provided, it shall be located on an interior wall away from heating or cooling registers, appliances, lighting fixtures, exterior doors, skylights, windows, and areas that receive direct sunlight or drafts.
- A room-to-room pressurization test is recommended. If a room pressure exceeds 3Pa or more, remediation measures such as a door undercut, transfer grille or dedicated return should be made.
- Improve the envelope: To ensure that the customer can receive utility cost savings when changing from a gas system to a heat pump, it is important to capture all opportunities to improve the air and thermal boundary of the home.

DUCTS

- All exposed ducts (e.g., attic and crawlspace) shall be inspected; all damaged or disconnected ducts shall be repaired or replaced, and all visible leaks shall be sealed with mastic (UL 181 tape may be used at the air handler only) and insulated to current code; R-11 secured batts or R-8 flex.
- All flexible duct connections to rigid ducts shall be tightly fastened at both inner and outer lining using a compression (Panduit or equivalent) strap tightened with a manufacturer approved tensioning tool.
- If a major duct replacement or modification is being made, a room-by-room load calculation shall be performed to be consistent with or equivalent to the Air-Conditioning Contractors of America [ACCA] Manual J. Pressure pan testing is also recommended.

- Use flanged duct connections for return air ducts
- Do not use sheet metal screws longer than .75" in length

RETURN PLENUMS & FILTERS

- The air filter shall be replaced with a MERV 11 or higher 4" filter selected for appropriate air flow across the coil.
- If the air filter is installed in a filter media box attached to the air handler, the access panel for the filter should be fitted with a flexible, air-tight gasket to prevent air leakage.
- Refer to manufacturer's specifications on acceptable return air location, layout and airflow.
- Best practices recommend flow plate testing of the air flow across the coil shall be completed following procedures approved by ANSI/ACCA Standard 5 QI-2015 to verify it is within the CFM range specified by the equipment manufacturer. If it is not, adjustments shall be made as required.

INSTALLATION

OUTDOOR UNIT (COMPRESSOR)

- Set the unit on a permanent pad on a stable, level surface.
- Use risers to prevent debris and snow buildup and allow better drainage.
- Secure outdoor unit to the pad, risers and/or resting surface using bolts and/or adhesive.
- Allow clearance around unit for airflow and maintenance.
- Install service outlet and shut off to code.
- Installation of anti-vibration pads is recommended to mitigate potential noise complaints.
- The outdoor unit may be wall-mounted using appropriate hardware and installed per the manufacturer's instructions. Sound dampening is highly recommended.

INDOOR UNIT

- Indoor unit securely mounted, level and plum, and installed per manufacturer specs to a permanent surface.
- Primary indoor unit, or largest capacity unit, installed in main living area.
- Follow manufacturer's specifications on required clearances and ensure adequate spacing of the indoor unit to allow for routine maintenance and cleaning.

- For horizontal installations install an auxiliary drain pan.

REFRIGERANT TUBING

- If the system uses flared connections, create new flares using appropriate R410A flaring tool and measurement gauge. Do not reuse manufacturer provided tubing flares or fittings. Only use flare fittings once. Cut refrigerant line and build a new flare fitting whenever the fitting is opened for service.
- Apply refrigerant oil to the end of each flare and use a torque wrench to tighten to the manufacturer's torque specifications.
- Connect tubing with R410A nuts (supplied with your outdoor unit) and tighten to manufacturer's specifications.

CONDENSATE DRAIN

- Ensure the condensate drain is sloped down and away from the building and runs to a suitable termination point, away from crawl spaces and walkways.
- Install a condensate pump when appropriate.

REFRIGERANT CHARGE

- Adjust refrigerant charge if necessary. On ducted systems, charge to manufacturer's requirements. Many heat pumps do not require adjustments from pre-charge levels for a standard line set. Consult the manufacturer's current installation manual to verify refrigerant charge adjustments as needed. When needed, use a digital scale to weigh in/out refrigerant.
- Document line set length and any changes to refrigerant charge. Best practice is to add this note to the interior service panel door.
- Consult the manufacturer's installation manual to verify refrigerant protocols.

LINE SET INSULATION AND PROTECTION

- Insulation must cover entire line set length to avoid condensation and decreased efficiency. Protect the outdoor line set from insulation damage with rigid line hide and building code-approved line set protection.
- Penetrations through the shell of the home must be sealed and any insulation disturbed must be reinstalled to original (or better) condition.
- Seal the line set cover by using spray foam at any termination points.
- Also protect any exposed line set insulation with UV protection. Electrical tape works well.

COLD WEATHER RECOMMENDATIONS

- Avoid installing outdoor units along pathways; freezing discharge can pose a slip hazard.
- Use a pan heater to prevent defrost discharge from freezing inside the compressor.

COMMISSIONING

- ❑ Start-up commissioning to manufacturer's specifications by installers that have received manufacturer's installation training.
- ❑ If a backup or auxiliary heating system is in place, a lock out temperature is required for the thermostat. The lock out temperature should be set to a max of 23 degrees.
- ❑ The home shall be inspected for the presence of a whole-house ventilation system. If one is present, the actual air flow shall be tested and verified to meet or exceed a target ventilation rate based on house size as follows: 50 cfm for up to 1,500 ft², 70 cfm for 1,501 to 2,500 ft², and 100 cfm over 2,500 ft², per ASHRAE 62.2-2013.
- ❑ Recommendations shall be made to the homeowner for either installing a new whole-house ventilation system compliant with the target rate if one is not present, or repairing an existing system to be compliant with the target rate if airflow is not adequate.

HOMEOWNER EDUCATION

- ❑ Ensure homeowner has a copy of the manufacturer's operation manual; refer to the manual during your unit operation walk-through or training.
- ❑ Guide the homeowner to prioritize using heat pump over backup electric resistance heat or wall/window AC units.
- ❑ Provide guidance on the importance of keeping snow and debris away from the outdoor unit.
- ❑ Instruct homeowners to use "heat" or "cool" settings (rather than "auto"), and generally turn off the unit in seasons where neither is needed. Important: using "auto heat/cool" settings to maintain a specific comfort setting can significantly increase energy use.
- ❑ Instruct homeowners to use "automatic" fan speed setting to allow the fan speed to respond to the compressor speed and allow the fan speed to operate as quietly as possible.
- ❑ Instruct homeowners not to set the thermostat with more than four degrees (4°F) of nighttime setback, as this forces the unit to operate at high power mode in the morning to bring temperature back up. A heat pump provides best efficiency and comfort with a steady temperature setpoint and a small night setback.