Space Heating Heat Pump Technical Requirements: Split Systems

General

The Technical Requirements shall be followed for all HPD projects utilizing heat pump split systems. These are in addition to all requirements outlined in NYC codes, zoning, NYS Clean Heat program requirements (and the associated requirements of participating utilities) and the HPD Design Guidelines. In some cases, these Technical Requirements are more stringent than required by codes or by the Clean Heat requirements, and in those cases, these requirements shall be followed.

These requirements are specific to air-to-air split systems. Requirements included here shall be reflected in the drawings and/or specifications of the construction documents. For simplicity and clarity, these requirements may be copied and pasted onto drawings on relevant pages and details. A Word version of this document can be made available for this purpose.
See endnotes for summary of items that have been revised or added.

Split System General Requirements

- Equipment shall be listed on the Northeast Energy Efficiency Partnership (NEEP) Cold Climate Air Source Heat Pump Product List and meet or exceed NYS Clean Heat requirements and be sized to meet the design requirements listed below.
- Minimum 10-year parts warranty, 1-year warranty on labor.
- Heat pumps shall have variable speed compressors.
- Locate outdoor and indoor units to minimize total required refrigerant charge (based on piping lengths and sizes).

Sizing Requirements

- Size the heat pump to the heating load, per requirements in this document. System shall be designed to meet Clean Heat "Full Load" requirements.
- Heat pumps shall be used for all habitable spaces, with limited exceptions in select areas (e.g. bathrooms, spaces that require only freeze protection). Full heating is discouraged in spaces with limited duration of occupancy (e.g. corridors, stairwells, basements).
- Size systems to an indoor design heating temperature of 72 degrees, as allowed by the Energy Code. Note that NYC requires that systems be capable of ensuring that the indoor temperature is at least 68 degrees.

- Size systems to a design outdoor temperature of 13 degrees. Note that Clean Heat Program Manual uses the 99% threshold while HPD requires sizing to the 99.6% heat load threshold.
- VRF heat pumps (non-heat recovery) shall be zoned with similar thermal exposures, typically vertical zones by apartment line.

Supplemental Heat

- Electric resistance backup shall not be used for heat pumps (e.g. in the same space).Non–heat pump electric space heating (e.g., electric resistance or radiant) may be used with HPD pre-approval in spaces such as common stairwells, utility rooms, basements, vestibules, and other smaller non-occupiable spaces where heat pumps may not be appropriate. For larger spaces requiring greater than 3.5 KW space heating, use heat pumps.
- Heaters located in bathrooms, if used, shall have timer controls; all other heaters shall have automatic controls with a maximum setpoint of 50°F.
- Electric resistance space heating is not permitted in garages or plenums (unless required to prevent pipes freezing or other similar impacts), or for snow or ice melting.
- Electric resistance heating is permitted in infrequent-use, high-volume applications such as laundry make-up air, but not for ventilation air.
- Electric resistance heaters that are used for freeze protection (e.g. common area spaces with water piping, gas meter rooms, etc.) shall have temperature limits set at 50 degrees maximum or shall be set at 50 degrees and placed under a locking cover

Wiring and Condensate Piping

- Provide a condensate management strategy that addresses collection, drainage, and freeze protection, as applicable.
- Condensate tubing shall be minimum ¾" PEX, PVC, CPVC. Vinyl tubing and corrugated tubing shall not be used. Note that code-approved materials (Mechanical Code 307.2.2) for condensate disposal does not include plain steel, and so abandoned steam piping can generally not be used for condensate disposal on its own. Ensure that drainage is located such that it does not cause condensate to land on balconies or other appurtenances below. Condensate discharge to building drainage shall be through indirect waste connection by means of an air gap.
- Drawings shall show the length of each refrigerant pipe (typically on the riser diagram).

- A 7-day programmable thermostat is required, per NYC Energy Conservation Code (NYCECC), installed and programmed to the requirements described in this document.
- For central VRF systems, the following items are required:
  - VRF systems with heat recovery (i.e., capable of simultaneous heating and cooling) shall be thermally zoned to maximize heat recovery potential.
  - VRF systems without heat recovery shall only be permitted where the project demonstrates that thermal zoning is based on similar heating and cooling load profiles, taking into account occupancy patterns, space type, exterior wall exposure, internal heat gains, and other relevant design factors.
  - Document the control strategy used to switch between heating and cooling modes (e.g., manual switchover, outdoor air temperature-based control, thermostat mode selection, or equivalent)[ii].
  - Provide BACnet-compliant controls that enable remote monitoring of apartment temperatures and temperature setpoints and support centralized system oversight.

Installation requirements

- Contractor shall be a Participating Contractor in the NYS Clean Heat program and shall provide proof of design-appropriate heat pump manufacturer training.
- Outdoor units shall be installed at least 12” above grade to avoid snow,
- Outdoor units shall be located to avoid melting condensate from one unit dripping onto another or from other sources of excessive moisture (e.g., melting snow from roof edge)
- Outdoor piping must be insulated to meet NYCECC requirements specific to each installation. Drawings may show the energy code insulation table, but shall also specify the refrigerant temperatures for piping, to allow correct sizing of pipe insulation. Pipe insulation shall be insulated the full length of the piping from outdoor units to indoor units, without gaps in the insulation that would allow condensate to form. Insulation shall be protected from UV exposure per code requirements, typically with a metal or plastic cover (as required for exterior walls, see below), or with UV-resistant paint. Refrigerant pipe insulation should be ½" minimum thickness and should completely cover all refrigerant piping. For certain applications, thicker insulation may be recommended by manufacturer or required by Building Code.
- Fastening of condensate tubing shall be hose clamp (worm drive clamp) or approved crimp rings, for PEX or approved connectors or approved adhesive for PVC or CPVC.
- Pipe and wiring penetrations of walls and roofs shall be sealed on both sides of the penetration. Sealing material used outdoors shall be UV-resistant. Sealing should be around and between all pipes and wires/conduit.

- Piping and wiring indoors shall be concealed unless otherwise approved. “Concealed” means: In chases, in ceiling or floor cavities, in basements or attics, or in drywall-finished soffits, or other approved means of concealment. Avoid enclosing line sets in wall cavities, where they cannot be inspected and where they may be inadvertently punctured. If line sets are enclosed in a wall, there must be a proposed method to protect the line sets from being accidentally punctured.
- Exposed piping and wiring on exterior walls shall be concealed in a cover in a color to match the wall. Cover type and color to be submitted and approved by Owner prior to ordering.
- Refrigerant and condensate piping shall be structurally supported per latest Mechanical Code (Mechanical Code Section 305, Table 305.4, summarized below) requirements. These code requirements shall be spelled out on the drawings:

Piping Support Spacing (Table 305.4, abridged)		
Piping Material	**Maximum Horizontal Spacing**	**Maximum Vertical Spacing**
Copper or copper alloy tubing, 1 ¼ inch diameter and smaller	6 feet	10 feet
Copper or copper alloy tubing, 1 ½ inch diameter and larger	10 feet	10 feet
PEX tubing	32 inches	10 feet
PVC pipe	4 feet	10 feet

- Piping and wiring shall be routed plumb/level and either parallel to or at right angles to buildings lines (wall vertical lines, roof horizontal lines, etc.).
- For REDi projects, contractor shall notify REDi Technical Assistance Provider (TAP) after piping is installed and supported, but before locations such as chases or soffits are sealed, to allow for inspection before these locations are concealed.

Refrigerant Charging and Leak Prevention

Comply with refrigerant charging and leak prevention requirements in HPD Technical Requirement: Refrigerant Leak Protection (Appendix A).

[iii]**Impacts**[iv]

- Systems using A2L refrigerants should be designed and installed in accordance with ASHRAE Standard 15-2022 and Applicable Codes. Refrigerant lines penetrating 2 floors require a 1-hr fire shaft enclosure. A 2-hr rating is needed if over 3 floors (BC 713.4).
    - *Exception*: A shaft is not required if refrigerant concentration limits (RCL) are not exceeded in the smallest occupied room with exposed piping, (ASHRAE 15, Section 9.12.1.5.1)
- ASHRAE 15 General Requirements: Per Section 9.7.8.2, the shaft vent discharge must be 15' above the ground and 20' from wall openings and the shaft must have a makeup air opening per Section 9.12.2.2.
- If shafts use the Natural Ventilation approach, the shafts shall be air sealed and insulated as follows. Shafts shall be air sealed such that they achieve a maximum air leakage rate of 5 cubic feet per minute (CFM) per floor per shaft measured at a pressure of 50 Pascals. Intended openings at the top and bottom of the shaft shall be closed during air leakage testing. Shafts shall be insulated to achieve an effective minimum R-10 insulation, taking into account all framing and thermal bridging. It is recommended that continuous insulation be considered to achieve this requirement.: The bottom of the shaft must have a minimum 4" exhaust pipe pitched down. A makeup air opening is required at the top of the shaft.
- Mechanical Ventilation: Airflow rate must be designed to Table 9-12, with a refrigerant sensor at the bottom of the shaft that activates the fan (R32 & R454b are denser than air).
- All refrigerant systems with >55 lbs of refrigerant (typically >100 ft line length and >5 apts/system) require that the installer file a certificate of pressure testing with the Building Department (MC 1108.4).

Required Systems Testing

- Program room heat pump temperature controls to 70°F heating and 78°F cooling (occupied mode), unless provided written instructions otherwise.
- Space conditioning controls shall be set to limit setpoints in dwelling unit and common areas to a maximum of 76 F for heating.
- Ensure that filters on indoor units are clean and free of construction dust.
- For outdoor temperatures above 60 F, force heat pump into cooling at maximum compressor speed (for example, by calling for cooling in all zones), and then record outdoor air temperature in the shade, total heat pump electric current (amps), and, for one zone or fan coil unit only, return air temperature and relative humidity (%) and supply air temperature.
- For outdoor temperatures below 60 F, force heat pump into heating at maximum compressor speed (for example, by calling for heat in all zones), and then record outdoor air temperature

in the shade, total system electric current (amps), and, for one zone only, return air temperature and supply air temperature.

- Buildings with central VRF-based systems shall provide system error and fault logs demonstrating at least one continuous week of normal occupied operation during one heating season and one cooling season. Logs shall clearly identify each indoor unit by apartment number and shall confirm stable system operation under normal loads[v].

Temperature and Operational Controls

- A 7-day programmable thermostat is required, per the energy code. Controls shall be fixed, wall-mounted types that are simple and easy to read.
- Mount controls on the heat pump or on an interior wall, 60" above the finished floor, unless a lower height is required for accessibility (ADA).
- Provide easy-to-read instructions to residents outlining thermostat settings, thermostat use, basic functions including overrides, "away" mode, information about energy savings, etc.
- Provide hands-on training to residents to ensure full understanding of operations and options

Best Practices

In addition to Technical Requirements, consider best practices as outlined by HPD, including:

- FAQ: Roof Considerations for Heat Pumps
- FAQ: Heat Pump System Design
- FAQ: Energy Apportionment

These can be found at the following web site: HPD's REDi webpage

Removal of Fossil Fuel Equipment

Where existing fossil fuel equipment is being removed, comply with the following requirements:

- Permanently seal the bottom and top of chimneys/vents and outdoor air combustion intake openings, and air-seal and insulate these penetrations per energy code. Permanently seal, ridged as with plywood or masonry, air sealed, waterproofed, insulated, and with a vapor barrier. If a chimney is being reused, for example for a smaller hot water flue, the sealing should occur around new flue at top and bottom.
- Permanently cap abandoned gas piping. Do not simply close shutoff valves.
- Remove oil tanks and oil piping and accessories.
- For the removal of existing oil tank(s), GC to submit all DEP and FDNY decommissioning documents of the oil tank(s) to HPD. Removal of tanks 1100 gallons or larger must also comply with NYC DEC removal and documentation requirements.

Required Submittals[vi]

Submittals For Design Approval:

- Complete design calculations demonstrating compliance with the design temperature and performance requirements included in this Technical Requirements document.
- Drawings and Specifications conforming to all requirements herein.
- A comprehensive maintenance and service plan for the heat pump system, including all interior and exterior components and sub-systems. Plan shall comply with HPD-NYSERDA VRF and Split System Maintenance Plan and Maintenance Service Contract Checklist. (required for REDi projects only, optional but recommended for all other projects)

Submittals prior to Construction:

- Commissioning (Cx) Plan: Narrative description of commissioning activities and timeline, including personnel intended to accomplish the activities, a list of equipment and systems to be tested, functions to be tested, and required testing conditions.
- Functional Testing Plan: Narrative of blank form indicated planned testing procedures, protocols, and acceptance criteria. Functional test plan shall include all functional test requirements described later in this Technical Requirements section.
- Refrigerant Testing Plan conforming to the requirements of Technical Requirements: Refrigerant Charging and Leak Prevention (Appendix A)

Submittals During Construction:

- To assist with requisition reimbursements, submit construction photos of each major step of construction and a brief summary of work completed as systems are installed and tested, along with applicable payment applications.

Prior to Completion or Final Payment:

- Functional Performance Testing Reports: Testing reports with any issues and resolution actions. List all errors, diagnostic faults, and other issues observed as well as corrective actions and issue resolution.
- Startup tests procedure, time and dates of testing, testing firm and technicians, results, and corrective actions as applicable.
- Final Cx Report: Final report as accepted by ownership that includes results of all functional performance tests, deficiencies found during testing and corrective measures taken, and functional performance test procedures. Report shall also document the following:

- Final refrigerant charge (pounds, ounces).
- System tag

- If refrigerant piping is part of the installation, refer to HPD's "Refrigerant Charging and Leak Prevention (Appendix A) Technical Requirements" and provide as-built shop drawings of refrigerant lines and testing reports as detailed in that document.
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[i] Newly clarified requirement for May 2026
[ii] New requirement for May 2026

[iv] New section created for clarity, May 2026
[v] New requirement for May 2026
[vi] New section created for clarity, May 2026