

Roof considerations for heat pumps

Siting for heat pump systems is an important consideration for design teams. Structural design decisions for any system siting are always building-specific and will benefit from the expertise of a structural engineer. Here are some answers to questions that will support your team as you determine the best design for your heat pump system.

Q What is the approximate weight of the outdoor unit?

The weights of outdoor units range from about 125 pounds for the smallest systems to as much as 700-800 pounds for large commercial outdoor units. The most common weight is approximately 250 pounds, barely more than the weight of a person, for a nominal 3-ton system that might serve a typical apartment.



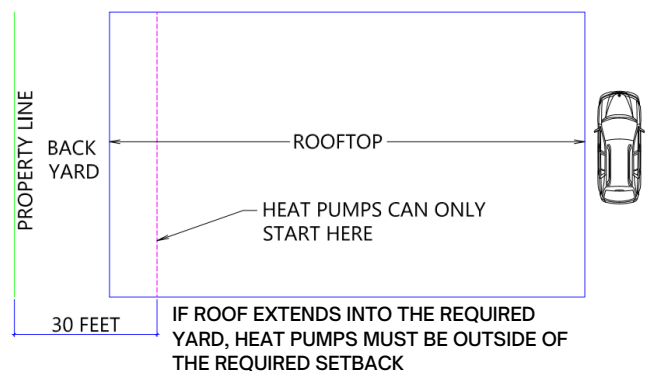
Q Where should the units be located if they are on the roof?

Preferably, locate the units at the end of rafters and spread the weight out over multiple rafters. It is also possible to mount units on parapet walls with mounting brackets or bulkhead walls so long as the walls are properly supported. During re-roofing, an outdoor unit can have its weight distributed between a parapet wall bracket and sleepers on the roof. In the future, if the building needs to be re-roofed, the sleepers can simply be removed during re-roofing, avoiding the need to relocate the outdoor unit during re-roofing.

Other considerations include required FDNY access (section FC 504.4), placement of solar, and - within Landmarked Districts - equipment should not be visible from a public right of way.

Q Can outdoor units be placed in rear yards or exterior walls?

Per NYC zoning requirements, units can be placed in yards/courts or exterior yards - but not within the required setbacks. This includes areas on non-compliant roofs that extend into the required yard. See the example to the right where we use 30 feet (typical for rear yards) as the required setback.



Q How will I know the rafter size in an older building?

For old buildings the rafter size shown on old drawings may or may not match what is in the field. For greater confidence, field measurements are recommended.

Q Will we need to use structural steel on the roof to accommodate the system?

Structural steel above the roof is not a given or a necessity. Sleepers or other means of distributing the load may be sufficient. Your design professional should ensure that the design is adequate to support the proposed equipment.

Q Will wind become an issue when the unit is raised?

The design should also account for wind. The widest face of the pump has the most wind forces hitting it. This is particularly true because of the thin rectangular shape of many heat pump outdoor units. Wind design should take into the account height of the unit.

Q Will the weight of the unit damage any roof insulation or existing roof assembly?

Structural design will need to take into account the roof assembly (eg. rafters, sheathing, insulation, EPDM, etc.). There is a chance that the weight of the unit could compress the roof assembly, if the weight is not adequately distributed.

Q How high does the unit need to be to prevent snow drift?

The height of the outdoor units above the roof, to prevent snow from blocking the heat exchanger should preferably be 18" in NYC (Fig 1).



Figure 1 - Raised units

Q Are we able to stack the outdoor units?

Some manufacturers allow outdoor units to be stacked two high (Fig 2).

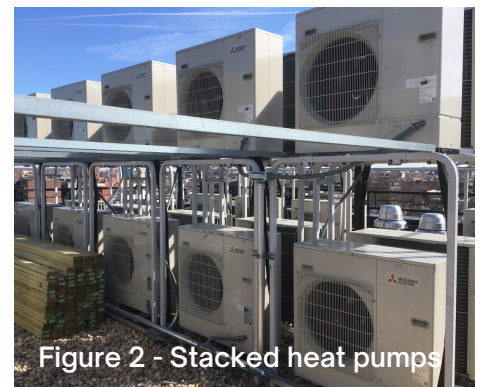


Figure 2 - Stacked heat pumps

Q Are supports required for piping that is on the roof?

Supports are typically required every 6 feet horizontally and 10 feet vertically. Refer to Section 305.4 of the mechanical code.

Q Does pipe insulation need to be protected?

Yes. Per code, pipe insulation needs to be protected from deterioration by UV radiation with covers or with UV-resistant paint.

Q How should piping be placed?

For some applications, the building code does not allow piping to directly penetrate down through the roof. In this case, it must go horizontally into a wall or into a box or gooseneck and then turn down (Figure 3). This is likely a best practice anyway to minimize the risk of roof leaks or voiding roof warranties.

Piping needs to be well-sealed where it penetrates the building envelope preferably BOTH where the piping enters the building outdoors AND where the piping enters the heated space through the interior wall.

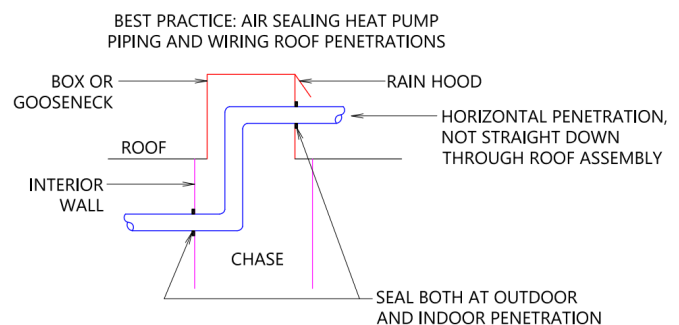


Figure 3 - Piping into gooseneck

Q Do large VRF heat pumps take up less space on roofs?

Not necessarily, because they require more space around and between them and cannot be stacked.

Please note, this FAQ is not to be substituted for professional design.

All installations must meet NYC codes and zoning.

Link to: [Design Professional Requirements](#)

If you want to learn more, contact electrificationpilot@hpd.nyc.gov