

EQUIPMENT RIGHT-SIZING GUIDELINES

Properly sizing a heat pump is essential for comfort, energy efficiency, and system longevity. An incorrectly sized unit - whether oversized or undersized - can lead to significant performance issues, higher operating costs, and reduced lifespan. This document outlines the items that HPD typically reviews upon receipt of load calculations and equipment sizing when submitted. HPD may perform additional review or request written justification when projects select non-default or otherwise unusual values for load calculations and system sizing. Applicants may send an example load calc for a single unit for feedback prior to completing all unit types.

To ensure right sizing, perform heating and cooling load calculations in accordance with ACCA Manual J (8th Edition) or the most recent ASHRAE Handbook Fundamentals available at time of specification, and select and size space conditioning equipment in accordance with ACCA Manual S. Calculations shall be performed using an [ACCA-approved software](#) or another HPD-approved methodology. All calculation inputs and outputs shall be clearly documented and legible.

Refrain from using 'rules of thumbs' and/or safety factors during any stage of the load calculation and equipment selection process. When replacing equipment, do not use the existing equipment size as the criteria for the size of the replacement equipment.

In the Equipment Selection Report, identify whether the basis of design for the selected heat pump capacity is primarily governed by the cooling load, heating load, or a balanced combination of both.

LOAD CALCULATION

General

- Any space that has a direct heating/cooling source (radiator, PTHP, etc.) must be calculated as a room. Auxiliary rooms, such as closets, should be included with adjacent rooms. Kitchens and hallways that are not separated from the living room by full-height partitions shall be considered part of the living room.
- All unit types must be calculated; floorplans with the same number of bedrooms, same number of bathrooms, same conditioned floor area, and enclosure area ($\pm 10\%$) can be considered the same type.
- Units or rooms with different orientations (north vs. south) and exposures (top of building vs. bottom) must be calculated separately.

Occupancy

- Total number of occupants for the whole apartment cannot exceed the number of bedrooms plus one.

Envelope

- Thermal performance of exterior assemblies (including walls, roofs/ceilings, floors, windows, and doors) shall be consistent with the approved construction documents and design assumptions.
- Where a building is designed to meet or exceed a Passive House or other high-performance building standard, the load calculations shall reflect the enhanced envelope performance associated with that standard.

- Fenestration assumptions shall account for reduced solar heat gain resulting from permanent exterior shading devices, overhangs, fins, or other shading strategies incorporated into the building design.
- Adiabatic surfaces (surfaces for which there is no heat transfer, such as party walls within the building or between buildings, floors or ceilings between two conditioned spaces, shall not be included in the load calculations.
- For buildings undergoing rehabilitation, where the thermal performance of exterior assemblies is unknown and/or not accessible for inspection, the following defaults shall be used. The following shall not be applied for New Construction buildings.

Building Vintage	Exterior Wall R-value	Roof R-Value	Window U-value
Prewar (uninsulated brick facade)	4	11	0.93
Postwar (1940-1979)	7	11	0.93
Post-1980 through 2006	11	19	0.68
2007-present (attic insulation)	19	38	0.55
2007-present (continuous roof insulation)	19	20	0.55

Design Temperature

- Heating and cooling load calculations shall use indoor design temperatures no greater than 72°F (22°C) for heating and no less than 75°F (24°C) for cooling.
- Outdoor Design Temperatures shall be based on the 99.6% dry-bulb heating design temperature and 1% dry-bulb cooling design temperature. For NYC, these typically correspond to ~13°F for heating and ~89°F for cooling.
- Do not design for record breaking, or news making, weather conditions.

Infiltration

- Refer to Table 5A Infiltration Air Change Values of the Manual J to establish Air Changes per Hour in Heating and Cooling Mode according to the construction types below.
- For new construction, where buildings are inspected and tested to ensure air-tightness, infiltration setting should be “tight” (or equivalent ACH).
- For a substantial or gut rehab, where air-sealing work is assumed, the infiltration setting should be “average”.
- For a moderate rehab, where no air-sealing work is assumed, the infiltration setting should be “loose”.

Ventilation

- Ventilation provided (CFMs of outdoor air) shall match the design specifications or existing conditions.
- Where mechanical ventilation is provided through an exhaust-only system (e.g. bathroom and/or kitchen exhaust), only the greater of the infiltration rate (as described in the section above) or the mechanical ventilation rate shall be included in the calculation.

- Intermittent bathroom and kitchen exhaust fans operated by wall switches, short-term delay timers, humidity sensors, or similar “on demand” controls shall not be included in load calculations unless they are part of a dedicated, continuously operating fresh air ventilation system.
- Ventilation loads shall account for heat recovery by subtracting the recovered energy from the total ventilation load.

Internal gains

- Internal gains assumptions such as equipment and lighting should follow Table 6A in Manual J or internal gains equations in the ASHRAE Handbook of Fundamentals.
- Btu/hr in excess of Table 6A numbers will need an explanation (excess of ~3,000 Btu/hr will be scrutinized).

Safety Factors

- Multiplicative or additive safety factors with no defined source shall NOT be included in load calculations.

EQUIPMENT SELECTION

- Equipment shall be selected in accordance with ACCA Manual S such that heating and cooling capacities closely match the calculated loads from Manual J at NYC design conditions.
- Cooling capacity shall not exceed 130% of the design cooling load and shall meet latent load requirements and shall not be less than 90% of the design cooling load.
- Heating capacity shall meet or exceed 100% of the design heating load at design temperature.
- Equipment selection shall be based on manufacturer performance data at design conditions, not nominal ratings using published performance data at NYC design conditions, including capacity derating at low ambient temperatures for heat pumps.
- Oversizing beyond Manual S limits is not permitted unless justified.