

## What Architects Need to Know About

### Heat Pump Units

#### Overview

Heat pumps have now been widely used as an economic and efficient choice to heat and cool your home or office. A “heat pump” serves as both a central air-conditioning and a central heating system. There are two types of heat pump systems. They are “packaged heat pumps” and “split-system heat pumps”.

A packaged heat pump is a self-contained unit and consists of a refrigeration compressor, heat exchangers, fans, filters and controls, all pre-wired in a single housing. The unit is shipped to the project, ready to go, in a single package. Supply and return air ductwork is connected and extended to air outlets in the building, where the hot or cold air cools the space. These units are generally “single zone”, which means they can only be controlled by a single thermostat. If additional zone controls are required, then additional heat pumps must be used.



Packaged Heat Pump Unit

Split system heat pumps consist of an indoor fan with cooling/heating coil and exterior mounted condensing unit. They are then connected by copper refrigerant liquid and suction lines. These units are typically used for smaller applications in homes or commercial spaces up to about 4000 square feet.

#### Energy Efficiency

Heat pump unit efficiencies can reach SEER 19 or higher. These units are becoming more efficient with each new code cycle. The California Energy Code, Title 24, sets the minimum efficiency requirements for these units. Marketplace competition is driving the efficiencies even higher.

These high available efficiencies can increase the over-all energy performance of the building, since air conditioning systems in California can consume up to 50% of the over-all energy use of the building.



Split System Heat Pump with Outdoor Condenser and Indoor Fan Coil Unit

## Aesthetics

Packaged rooftop heat pump units can be visually unappealing. Equipment sight lines should be considered to avoid an eyesore in an otherwise aesthetically pleasing building elevation. Strategically locating the units can avoid this issue in many cases. Equipment screening can also be employed to hide the units from critical site lines. Painting of the units to match the adjacent walls may be an option in some cases.



Packaged Heat Pump Unit on Roof

## Specific Architectural Issues

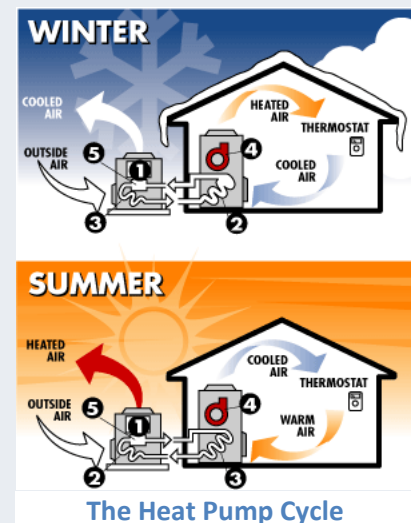
There are a number of architectural considerations for packaged heat pump systems, well as split system heat pumps, as which should be discussed with your engineers.

### Pros:

1. Low installation cost
2. No gas or propane system required for heating
3. Simplicity of operation and maintenance
4. Packaged rooftop heat pump systems have a minimal impact on building interiors as no mechanical room space is required in the building.

### Cons:

1. The life expectancy of these units is 10 to 15 years. This means the owner will have expensive replacement costs in the near future. The long term life cycle costs of these units is quite high due to this fact.
2. Vibration and noise from these units can be a concern in light, wood frame buildings. Make sure you review noise and vibration concerns with your engineer for you particular application.
3. Aesthetically unpleasing appearance which can be a consideration in certain applications such as residential areas or where adjacent properties are higher than the equipment locations.
4. The units present relatively heavy structural point loads so exact locations need to be carefully coordinated with your structural engineer.
5. In some cases units are ducted horizontally on the roof. If this is the case, make sure you review duct and piping support details with your engineer to ensure they are coordinated with the projects roofing details.
6. A heat pump unit is typically a "single zone" unit controlled by a single room thermostat. Make sure your engineer has provided enough separate zones to meet your clients expectations for individual room/area temperature controls.



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