

Commercial HVAC Systems Explained

A Package A/C Unit is a self-contained unit with the air handler, condenser and compressor in a single package, usually in a large metal box. It is very popular and is most commonly used in low-rise office and retail buildings. The unit can be A/C only, heat pump or gas pack. Normally, it is located on the roof. The unit displayed in the Energy Efficiency Center-Irwindale (EEC-I) is a high-efficiency gas pack with variable speed fan and variable capacity compressor.



Package A/C Unit on display at the EEC-Irwindale

A **Chilled Water Air Handling Unit (AHU)** is used to provide conditioned and fresh air as part of an HVAC system. It is usually a large insulated metal enclosure containing one or more variable speed blowers (fans), chilled water coils, filter racks, sound attenuators, air mixing box and dampers. Hot water coils can be installed upstream of the chilled water coils in the coil section for preheating of the outside air.

The air handling unit usually connects to ductwork that distributes the conditioned air throughout the building, and returns it to the AHU. A chilled water AHU is typically located in a mechanical room or on the roof of the building and serves multiple zones via variable air volume (VAV) boxes (with optional reheat). An AHU system with VAV boxes operates more efficiently than multiple package units. It is easier to maintain due to reduced number of components. An AHU typically has an economizer to bring in 100% outside air when outside conditions allow. The AHU displayed in the EEC-I has a heat pipe heat recovery system.

An **Air-Cooled Chiller** is a refrigeration machine that provides 45° F water and is ideal for large office buildings, commercial and industrial facilities. It is designed for outdoor installation in ambient temperature from 0 to 125° F. It uses the flow of outside air across the condenser to remove or reject heat from the chiller. It is installed on the roof or ground for comfort or process cooling applications. It is equipped with compressors, condenser, fans, evaporator and controls. Capacities range from 20 to 390 tons.



TurboCor-Compressor on display at the EEC-Irwindale

Chilled water is circulated through an AHU to cool air. The air-cooled chiller outside the EEC-I comes with a variable speed, frictionless, oil-free TurboCor compressor. Performance at part load has been as low as 0.5 kW/ton.

A **Water-Cooled Chiller** is a refrigeration machine that provides 45° F water and is ideal for large office buildings, commercial and industrial facilities. Capacities range from 100 to 4000 tons. It uses water to remove the heat from the condenser. A water-cooled chiller is typically more efficient than an air-cooled chiller and lasts longer. The condenser water is kept cool by circulating through a cooling tower. A water-cooled chiller will typically have the condenser and evaporator inside a facility while the cooling tower is located outside. The efficiency of a new water-cooled chiller can now be less 0.5 kW/ton.



Water-Cooled Chiller on display at the EEC-Irwindale

A **Cooling Tower** is a heat rejection device, which extracts waste heat to the atmosphere through the cooling of the condenser water to a lower temperature. The type of heat rejection in a cooling tower is termed "evaporative" in that it allows a small portion of the water being cooled to evaporate into a moving air stream to provide significant cooling to the rest of that water stream. The heat from the water stream transferred to the air stream raises the air temperature and its relative humidity to 100%, and this air is discharged to the atmosphere. Evaporative heat rejection devices such as cooling towers are commonly used to provide significantly lower water temperatures than achievable with "air cooled" units, thereby achieving more cost-effective and energy efficient operation.

Incentives

SCE offers cash incentives for certain qualifying high-efficiency air conditioning retrofits or new construction installations. For more information about SCE cash incentives, go to <https://www.sce.com/wps/portal/home/business/savings-incentives>

SCE Energy Centers

To learn more about HVAC, and other energy efficiency technologies attend an Energy Center seminar or workshop today! Visit www.sce.com/energycenters to view the quarterly calendar and register online. You can also call (800) 336-2822 (Irwindale) or (800) 772-4822 (Tulare) for assistance.