

Central Plants

Direct Expansion, Chilled Water and VRF Systems

Central Plants are usually large airconditioning plants assembled at the site. These plants are used for big buildings such as hotels, theatres, hospitals, large office complexes and factories. They are designed for accurate control of all the parameters of comfort. As the name implies the Central Plant is housed in a central location, usually in a plant room. This plant room could be in a basement or adjacent to the building to be airconditioned.

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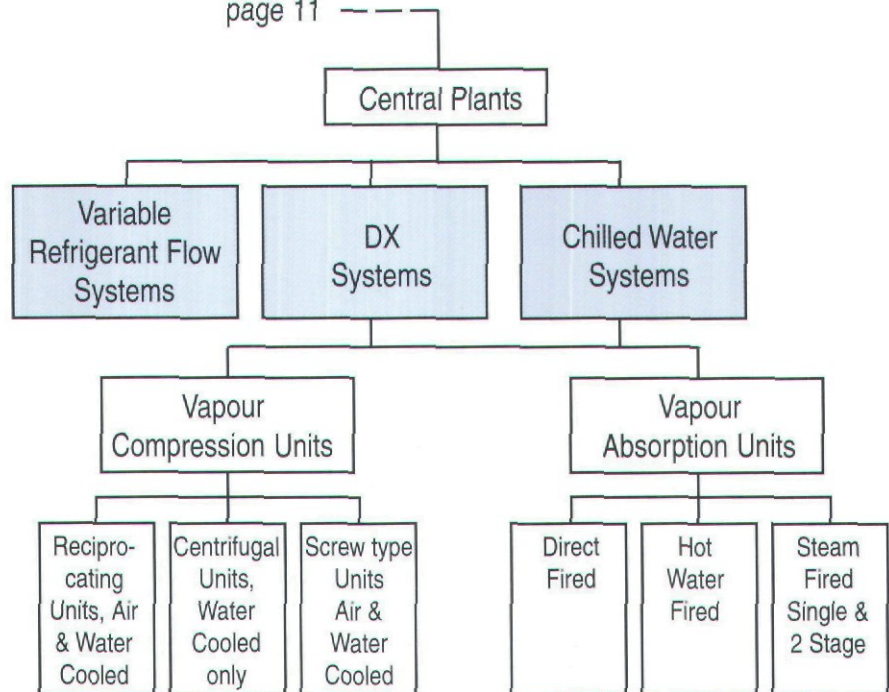


Fig. 23. Types of Central Plants



Though the Central Plant can look quite complex with large compressors, pumps, gauges, miles of piping, ducts and cables, the basic components are the same as smaller plants. Central Plants comprise Compressors, Condensers, Air-Handling Units, Water Chillers and Cooling Towers.

As we see in the tree diagram for Central Plants, the main divisions are those that use **Direct Expansion (DX)** and those that use **Chilled Water. Variable Refrigerant Flow** systems are a third revolutionary category of Central Plants.

Direct Expansion (DX) system: In this system, air is cooled and conditioned in the plant room. This treated air is then pumped to various parts of the building. The air returning from the airconditioned area is sucked through a coil-fin arrangement by a fan. Refrigerant inside the coil picks up heat from this air and evaporates. The cold air is then pumped back to the airconditioned space. In DX plants the place where this heat exchange takes place is called an Air Handling Unit (AHU). This type of system typically uses ducting passing through the structure to various parts of the building to be conditioned.

Chilled Water System: Where refrigerant and water interaction takes place the system is called a Chilled Water System. The refrigerant in the shell (or tube, depending on the design) of a **shell & tube heat exchanger**, evaporates by picking up the heat from the water which is in the other portion of the heat exchanger. This chilled water is then circulated to various water-air heat exchangers called **Fan Coil Units/Air Handling Units**. The system is also preferred where multiple zones are to be cooled like a hotel or hospital.