

Cooling Towers

We learnt that in the water cooled airconditioning system the heat from the room is transferred to the evaporator, from where it is transferred to the condenser, and from the condenser to the **cooling water**, which finally transfers the heat into the atmosphere.

In the **Cooling tower** the water is sprayed through nozzles into the air. The water becomes small droplets and evaporates thereby losing heat and becoming cool. This cool water falls into a sump tank at the bottom of the cooling tower from where it is pumped into the shell & tube condenser and the cycle repeats again. The typical types of Cooling Towers are:

- **Atmospheric or Natural Draft towers.** In these towers (see fig.39) the water is sprayed into the tower and the droplets of water cools in the natural air currents passing through the cooling tower.
- **Forced Draft towers.** These towers use a motor and fan to pull or push a constant volume of air through the tower.

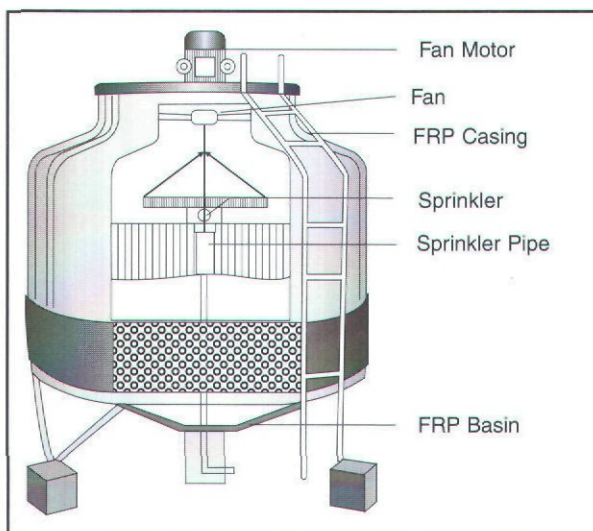


Fig. 41. Forced Draft Cooling Tower

The water is sprayed through nozzles into the draft thereby evaporating rapidly and cooling the rest of the water.



The quality of water is very important for the performance of the airconditioning system. Hard water causes scaling, thereby decreasing the efficiency of heat transfer in the condenser. Some water is required to make up for the water which evaporates and also the portion of the water that is blown away by the wind. This is referred to as 'Make-Up* water'. Water cooled condensers and cooling towers are normally used where water is available in plenty.

Air Handling Units

The **Air Handling Unit (AHU)** is a centrifugal type fan that pumps air. The fan is usually located in the Air Handler/Water Coil Cabinet. Its purpose is to create a pressure differential so that the air from the conditioned space is drawn to the unit. The air is passed through a filter first to remove dust particles and then over the cooling coils or chilled water tubes where the heat is rejected. This cooled and dehumidified air is then drawn into the suction side of the fan and discharged back into the conditioned space. A damper arrangement in the suction side of the AHU is kept a little open to draw in fresh air.

*The normal make-up water requirement for airconditioning applications is 15 litres/hr/ton refrigeration.

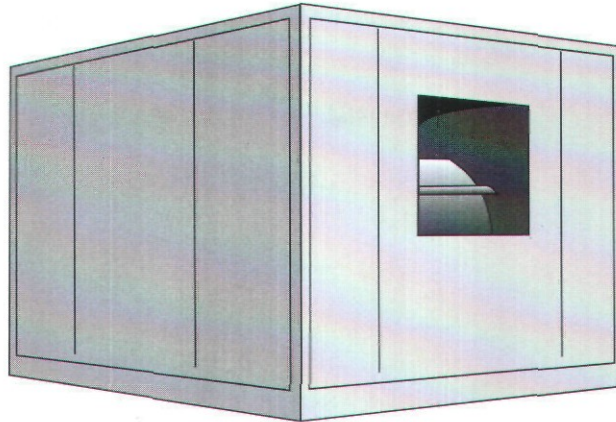


Fig. 42. Air Handling Unit

The typical AHU (above) is a sheet steel cabinet which houses the Cooling Coil and the blower fan. The motor is mounted on the outside of the cabinet and drives the blower by a pulley-belt arrangement. Depending on their application, AHUs vary in size from small/medium sized packaged units to large walk-in models.

There are two types of AHUs, the '**single skin**' and the '**double skin**' type.

- The '**single skin**' AHUs have a single layer cabinet and are usually placed inside an AHU room. It is advisable to insulate the room so that the air in the AHU does not pick up heat from the outside warm air. Keeping the AHU in an insulated room also reduces the sound levels in the conditioned space.



- The 'double skin' type has an inner cabinet and an outer cabinet. A layer of thermal insulation is sandwiched between the two cabinets. Though these AHUs are more expensive than the single skin type they have the following advantages:
 - Because of the insulation, the cool air inside does not gain heat from the surrounding air thereby improving the efficiency of the plant.
 - They are more silent because the thermal insulation also acts like an acoustic insulation.
 - They do not 'sweat' on the outside and can be kept in the non-airconditioned space thereby saving on the cost of a separate plant/AHU room.