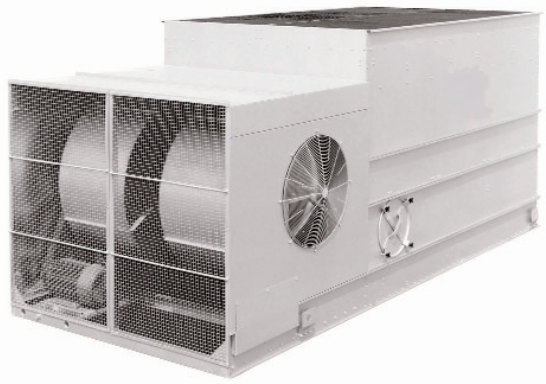
Cooling water

Evaporative cooling tower

Evaporative cooling water towers are used in process cooling systems when the temperature of the water is required to be 3°C to 4°C above wet bulb ambient temperature (generally 6°C to 7°C below the dry bulb ambient temperature).

Closed Circuit Cooling Tower

Process water is circulated through the tower via a multiple circuit serpentine coil. Independent secondary cooling water is sprayed over this coil via a small pump. Air is forced through the coil coming into contact with this secondary cooling water, evaporating some of it. This is then discharged into the atmosphere carrying with it latent heat of evaporation used to cause the change in state of the water from a liquid to a gas. The remaining water, having had this heat extraced from it, is used to cool the process water circulating in the serpentine coil. It then returns to the sump of the cooling tower for re-circulation and to be sprayed again onto the coil. The cooled process water leaves the cooling tower and is pumped to the process to remove further heat in a continuous operation. The process water system is totally closed and sealed from atmospheric contamination.



Open Cooling Tower

The process water is sprayed in a thin film over an extended surface fill pack. Air is forced through the pack evaporating some of the water. This is then discharged into the atmosphere carrying with it the latent heat of evaporation used to cause the change in state of the water from a liquid to a gas. The remaining water, having had this heat extracted from it, returns to the sump of the cooling tower for re-circulating to the process to remove further heat.

- Most efficient method of cooling water with low power consumption.
- Cools water to lower temperature than dry air coolers.
- Small footprint relative to the cooling duty.
- Process water is uncontaminated by atmospheric impurities (closed cooling tower only)
- Low noise versions can be supplied.

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DELIMON Cooling

Evaporative cooling tower

Technical data

Performance

The heat extraction capability of an evaporative cooling water tower is theoretically limiless. In practice, towers are normally used to remove from 50kW to 1000kW of heat from cooling water systems. More than 1000kW necessitates multiple cooling units.

Supply water temperature

These units can supply cooling water at temperatures down to 3°C to 4°C above the wet bulb ambient temperature. This is normally 6°C to 7°C below dry bulb ambient.

Design

As described overleaf, there are two main designs of evaporative cooling tower:-

- closed circuit where the process water is sprayed over coils containing this process water to remove its latent heat of evaporation via air being by forced across a serpentine coil.
- open circut where the process water is allowed to fall through a PVC tower fill pack, which is specially designed to induce highly turbulent mixing of this water and air either forced or induced through the fill pack. In this design, a portion of this process water evaporating and being carried away via the flow of air, removes the heat.

A third option is available utilising a plate type heat exchanger, and an open circuit tower to ensure the process water is contained in a closed circuit.

The advantages of the closed circuit is that the formation of scaling, corrosion, sludge and micro-organisms is confined to within the cooler where it can be controlled by regular treatment and maintenance. Water supplied to the process is clean, essential for many industrial applications.

Open circuit towers have lower capital costs and produce more efficient cooling operations.

Construction

The cooler's casing and tank are normally constructed of heavy guage galvanised steel. All stainless steel units can be supplied for corrosive environments. On closed circuit towers, fans force air upward through the multiple circuit serpentine coils. On open circuit towers, there are two designs. Forced draft towers have fans at the base blowing air upward through the falling process water in the tower fill. Induced draft towers have axial fans mounted at the top of the tower drawing air upward across the tower fill. The second design provides a smaller footprint. Alternative low silhouette models can be supplied for use in architecturally sensitive areas.

Fans

Fans are either vane-axial or centrifugal, which are used where lower sound levels are a major consideration. The fan drive can be direct from an electric motor or via a V-belt. The electric motor can be supplied as a two-speed unit to provide a tower giving close temperature control while reducing energy consumption and sound levels.

Mist control

The final elements in the upper part of a cooling tower are the moisture eliminators which stop the entrained water droplets from leaving in the air stream into the atmosphere. The air discharge area of a cooling tower is the most corrosive and these eliminators are made from especially treated inert PVC which are ultra violet light stable and lightweight for ease of removal for inspection and maintenance.

Serviceability

These towers are designed for ease of access for cleaning and servicing.

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