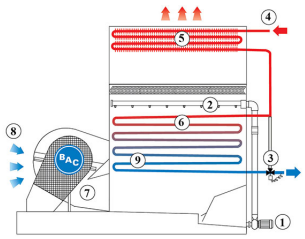
Principle of operation

Closed circuit cooling towers

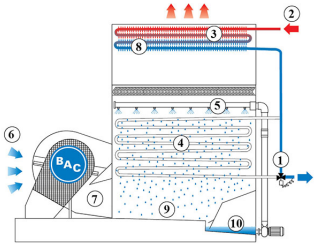
Principle of operation

Dry operation



The spray water **pump (1)** and **spray system (2)** are turned off and the modulating **flow control valve** (3-way valve) **(3)** remains fully open. The warm process **fluid (4)** flows both through the **finned discharge coil (5)** and the **prime surface coil (6)**. A **fan (7)** blows the ambient **air (8)** over the coil and cools the **fluid (9)** inside the coil. In this mode neither water consumption nor plume occurs.

Adiabatic operation



The **flow control valve** (3-way valve) **(1)** lets the warm process **fluid (2)** flow through the **finned discharge coil (3)**, by-passing the **wet prime surface coil (4)**. The prime surface coil is wetted by the **spray water (5)** but there is no water evaporation for heat rejection purposes. Some water will however evaporate, which will humidify the incoming ambient **air (6)** that is blown by a **fan (7)** over the coils. This saturated air has a better cooling capacity to cool down the process **fluid (8)** in the finned coil. The spray water drops into a plenum with sloping **bottom (9)** and drains into the separated wet **sump (10)**. The pump recirculates the water to the spray system. Visible plume and water consumption are greatly reduced while the design fluid outlet temperature is kept.

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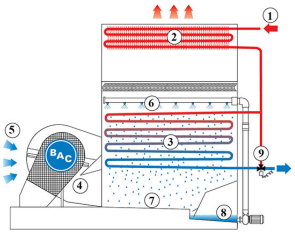
Wet-dry operation



The warm process **fluid (1)** flows both through the **finned discharge coil (2)** and the **prime surface coil (3)**. A **fan (4)** blows the **air (5)** over the coils. At the top where the warm fluid enters the tower, the discharge air is saturated and pre-cools already the fluid. Then a next heat transfer process occurs in the prime surface coil which is wetted by the **spray system (6)**. The spray water drops into a plenum with **sloping bottom (7)** and drains into the separated wet **sump (8)**. The pump recirculates the water to the spray system. When there is less heat load or the ambient temperature drops, the **modulating valve (9)** will control the flow through the prime surface coil in a way that the design fluid outlet temperature is kept. Plume is also minimized because there is less evaporated water and the discharge air is heated with the dry finned coil.

You want to use the HFL hybrid closed cooling tower to cool your process fluid? Contact your local BAC representative for more information.

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