Open Cooling Towers

Open cooling towers provide evaporative cooling for many types of systems. The specific application will largely determine which BAC Cooling Tower is best suited for a project. The table on pages D5 and D6 is intended as a general guide. Specific application assistance is available through your local BAC Representative.

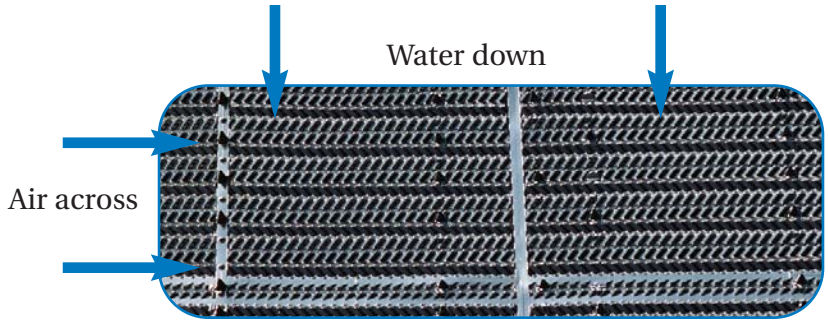
Principle of Operation

Open cooling towers reject heat from water-cooled systems to the atmosphere. Hot water from the system enters the cooling tower and is distributed over the fill (heat transfer surface). Air is induced or forced through the fill, causing a small portion of the water to evaporate. This evaporation removes heat from the remaining water, which is collected in the cold water basin and returned to the system to absorb more heat.

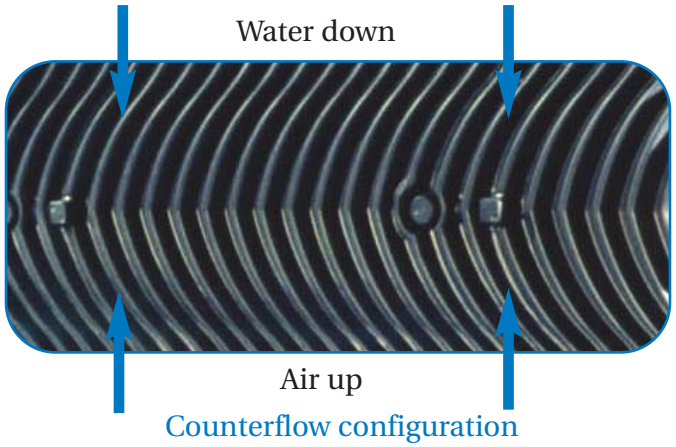
Each open cooling tower line, although operating under the same basic principle of operation, is arranged a little differently. See the schematics on pages D5 and D6 for product specific details.

Configuration

There are two main configurations of factory assembled open cooling towers: crossflow and counterflow. In crossflow cooling towers, the water flows vertically down the fill as air flows horizontally across.
In counterflow cooling towers, the water flows vertically down the fill as air flows vertically up.



Crossflow configuration



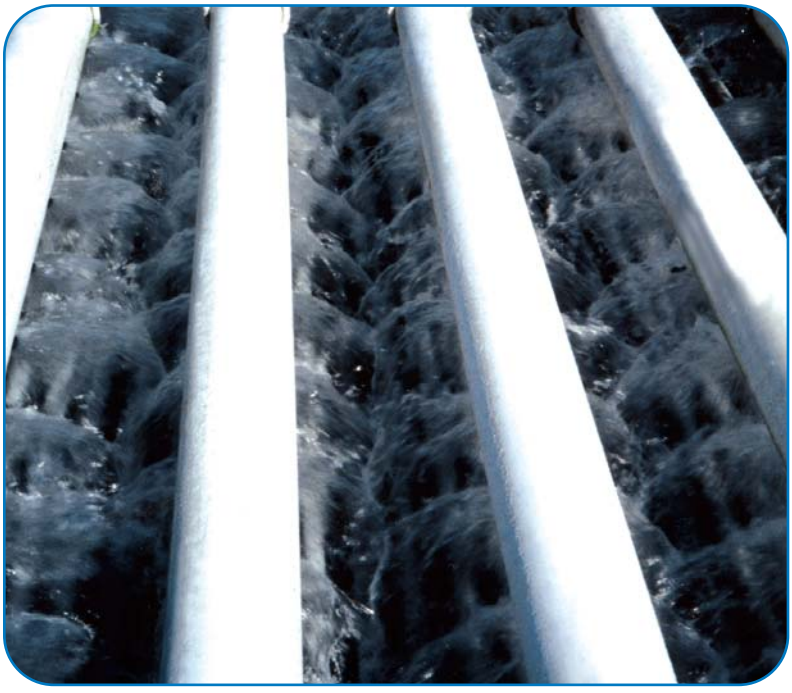
Counterflow configuration

Gravity distribution basin

Water Distribution System

Open cooling towers employ either gravity distribution or pressurized spray systems to distribute water over the fill. Gravity systems, employed on BAC's crossflow cooling towers, feature hot water basins mounted on top of the tower above the fill. A series of metering orifices in each hot water basin distribute the water evenly over the fill. Gravity distribution systems generally require minimal pump head, can be inspected while the unit is in operation and are easy to access for routine maintenance and service.

Spray distribution systems, employed on counterflow cooling towers, feature a series of PVC branches or pipes fitted with spray nozzles mounted inside the tower above the fill. These systems typically require 2 to 7 psi water pressure at the water inlet and require the unit to be out of service for inspection and maintenance.



Spray distribution

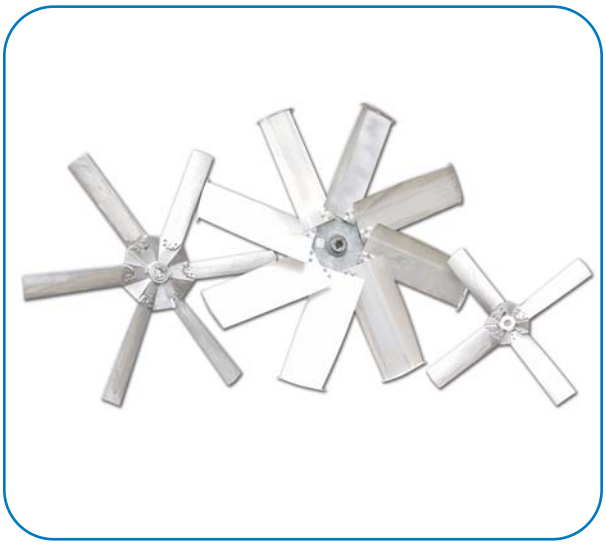
Fan System

The flow of air through most factory assembled cooling towers is provided by one or more mechanically driven fans. The fan(s) may be axial or centrifugal, each type having its own distinct advantages.

Axial fan units require approximately half the fan motor horsepower of comparably sized centrifugal fan units, offering significant lifecycle cost savings.

Centrifugal fan units are capable of overcoming reasonable amounts of external static pressure (≤ 0.5" or 12.7mm of H_2O), making them suitable for both indoor and outdoor installations. Centrifugal fans are also inherently quieter than axial fans, although the difference is minimal and can often be overcome through the application of optional low sound fans and/or sound attenuation on axial fan units.

Centrifugal fan



Axial fan

Induced Draft

The axial fans of induced draft equipment are mounted in the top deck of the unit, minimizing the impact of fan noise on nearby neighbors and providing maximum protection from fan icing with units operating in sub-freezing conditions. The use of corrosion resistant materials ensures long life and minimizes maintenance requirements for the air handling components.

Forced Draft

The fans are located on the air inlet face at the base of forced draft towers, facilitating easy access for routine maintenance and service. Additionally, location of these components in the dry entering air stream extends component life by isolating them from the saturated discharge air.

Capacity Range

On the following pages, product capacities are called out in terms of nominal tons. A nominal cooling tower ton is defined as the capability to cool 3 GPM (0.19 l/s) of water from a 95ºF (35.0ºC) entering water temperature to an 85ºF (29.4ºC) leaving water temperature at a 78ºF (25.6ºC) entering wet-bulb temperature. Nominal conditions are typical of conventional HVAC designs in most parts of the country, but will not apply to all projects. BAC offers selection software to evaluate the performance of a tower at many conditions; see page M18 for details.

All capacities shown are for a single cell! Multiple cell selections can be applied to achieve larger capacities.

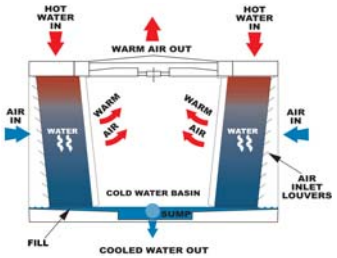
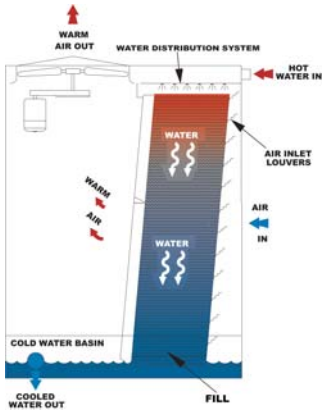
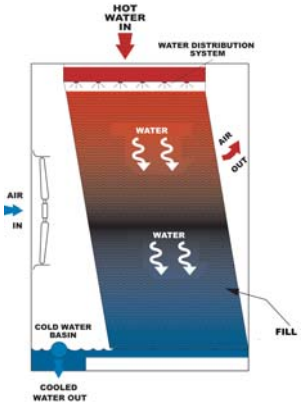
Maximum Entering Water Temperature

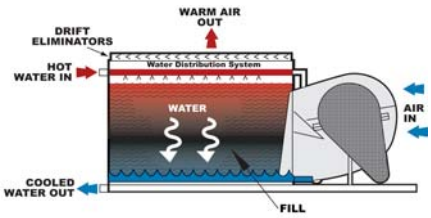
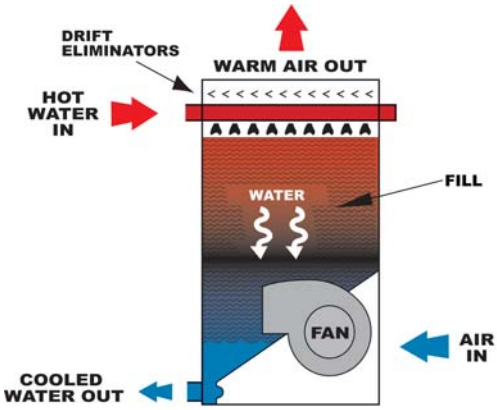
As previously stated, typical HVAC conditions call for an entering water temperature of approximately 95ºF (35.0˚C). All BAC Cooling Towers are capable of withstanding temperatures of at least 120ºF (48.9˚C) with standard fill materials. For applications where the entering water temperature exceeds 120ºF (48.9˚C), check the following table to determine whether alternate fill materials are required for your project.

Typical Applications

A list of typical applications is provided on pages D5 and D6 for your reference.

Open Circuit Cooling Towers
Product Lines

	Series 3000	Series 1500	FXT
Principle of Operation			
Configuration	Crossflow	Crossflow	Crossflow
Water distribution	Gravity	Gravity	Gravity
Fan system	Axial fan, induced draft	Axial fan, induced draft	Axial fan, forced draft
Capacity range (Single cell)	220 - 1,350 Nominal Tons 660 - 4,050 GPM at 95˚F/85˚F/78˚F	128 - 428 Nominal Tons 384 - 1,284 GPM at 95˚F/85˚F/78˚F	6 - 268 Nominal Tons 18 - 804 GPM at 95˚F/85˚F/78˚F
Maximum entering water temperature	130˚F (54.4˚C) Standard Fill; 140˚F (60.0˚C) with alternative fill material	120˚F (48.9˚C) Standard Fill; 135˚F (57.2˚C) with alternative fill material	125˚F (51.7˚C) Standard Fill; 140˚F (60.0˚F) with alternative fill material
Typical applications	Medium to large HVAC & industrial applications Replacement of field erected towers w/basinless units	Medium HVAC & industrial applications Counterflow unit replacements Crossflow unit replacements Tight enclosures & installations requiring a single air inlet	Small HVAC & industrial applications

Series V		
VTL	**VT0**	**VT1**
		
Counterflow	Counterflow	Counterflow
Pressurized	Pressurized	Pressurized
Centrifugal fan, forced draft	Centrifugal fan, forced draft	Centrifugal fan, forced draft
16 - 272 Nominal Tons 48 - 816 GPM at 95˚F/85˚F/78˚F	12 -176 Nominal Tons 36 - 528 GPM at 95˚F/85˚F/78˚F	134 - 1,335 Nominal Tons 402 - 4,005 GPM at 95˚F/85˚F/78˚F
130˚F (54.4˚C) Standard Fill; 170˚F (76.7˚C) with alternative fill material	130˚F (54.4˚C) Standard Fill; 170˚F (76.7˚C) with alternative fill material	130˚F (54.4˚C) Std Fill; 170˚F (76.7˚C) with alternative fill material
Small to medium HVAC & industrial applications Installations with extremely low height requirements Indoor installations High temperature industrial applications Tight enclosures & installations requiring a single air inlet	Small HVAC & industrial applications Indoor installations High temperature industrial applications Tight enclosures & installations requiring a single air inlet	Medium HVAC & industrial applications Indoor applications High temperature industrial applications Tight enclosures & installations requiring a single air inlet