PCT
Cooling Towers

CTI CERTIFIED

Open Cooling Towers

Product Detail

Evaporative Cooling Products

Evaporative cooling products minimize the energy consumption of the entire system by providing lower operating temperatures than possible with comparably sized air-cooled equipment. Baltimore Aircoil, through extensive research and development, design all of its products to comply with various thermal codes and standards throughout the world. These designs, some patented, form part of the overall thermal integrity of B.A.C. evaporative cooling equipment.

Open Cooling Towers

Open cooling towers are a proven and cost-effective method of cooling condenser water loops and industrial processes. In operation, the condenser water (or process water) flows directly over the heat transfer surface of the open cooling tower. As air is introduced into the tower, a fraction of this water is evaporated, cooling the remaining water.

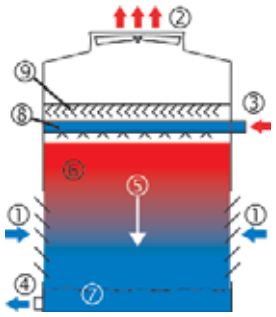
The Value of Standards

ISO 9001 CERTIFIED

B.A.C.'s engineering and manufacturing processes are certified to ISO:9001. This certification confirms our commitment to our customers, ensuring they receive the highest quality evaporative cooling equipment, spare parts and service. Our products are supported exclusively by fully trained and experienced B.A.C. Balticare sales & service offices and appointed representatives.

PCT 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 wet deck (heat transfer surface). Air is pulled through the wet deck, causing a small portion of the water to evaporate. Evaporation removes heat from the remaining water, which is collected in the cold water basin and returned to the system to absorb more heat.

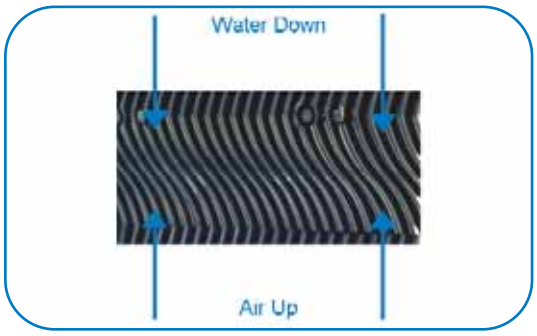


1. Air in
2. Air Out
3. Hot Water In
4. Cool Water Out
5. Direction of Water
6. Wet Deck Surface (Fill)
7. Cold Water Basin
8. Water Distribution System
9. Drift Eliminators

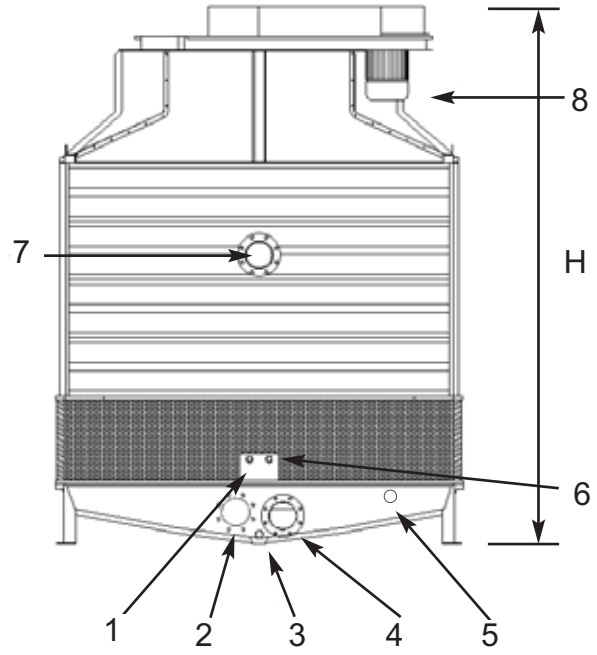
Configuration

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 airflows horizontally across. In counterflow or PCT model cooling towers, the waterflows vertically down the fill as air flows vertically up.

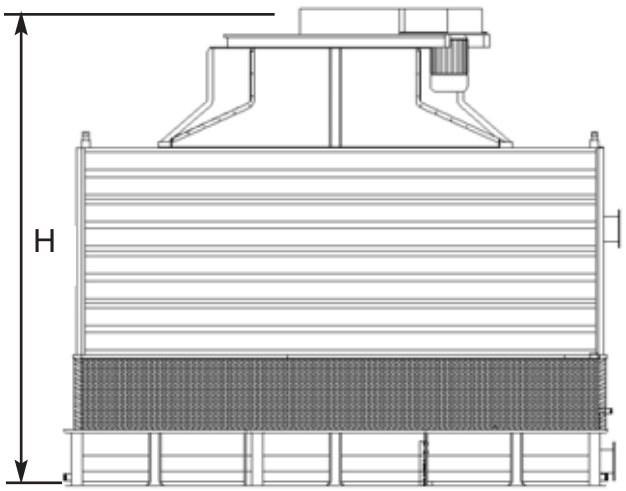
Counterflow Configuration



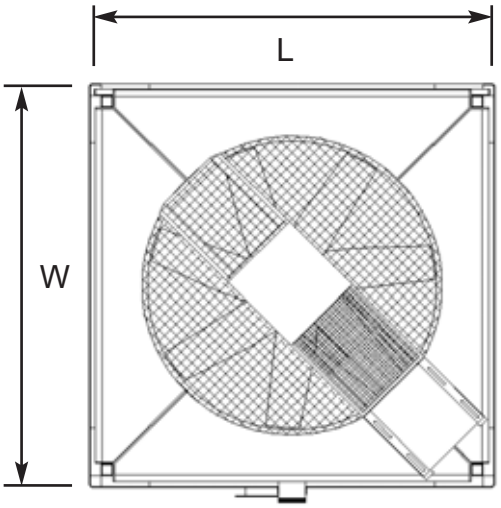
End View (Typical)



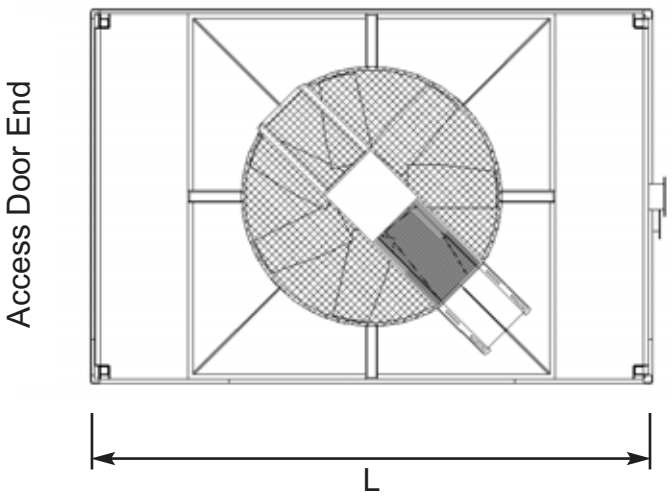
Side View (Rectangular Box Sizes)



Plan View (Square Box Sizes)



Plan View (Rectangular Box Sizes)



1. Make-up
2. Balance Line Connection (optional, see notes)
3. Drain
4. Outlet
5. Overflow
6. Quick-fill
7. Inlet
8. Motor (direct drive units for 5'x5', 6'x6' & 7'x7' not shown)

Notes: Access door is always opposite to inlet connection end.
Alternative inlet/outlet and tower configurations are available. Consult your local B.A.C. representative.
All data correct at the time of publication. Do not use for construction. Refer to factory certified drawing.
Consult your local B.A.C. representative for balance line connection details.
Nominal outlet connection size provided. Actual outlet sized to match flow.

Model #	Dimensions (mm)			Weights (kg)			Motor Size	Connections (mm)**					
	L	W	H	Shipping incl skid	Oper. @ Oper. Level	Oper. @ Oper. O/Flow Level	kW	Inlet	Outlet	Drain	O/flow	MakeUp	Qk/Fill
PCT0505-P2-F	1674	1674	2905	650	1325	1550	1.5	100		50	50	15	
PCT0505-P2-G							2.2						
PCT0505-P2-I							4						
PCT0505-P3-F							1.5						
PCT0505-P3-G							2.2						
PCT0505-P3-I							4						
PCT0606-P2-I	1979	1979	3062	800	1725	2075	4						
PCT0606-P2-J							5.5						
PCT0606-P3-F							1.5						
PCT0606-P3-H							3						
PCT0606-P3-I							4						
PCT0606-P3-J							5.5						
PCT0707-P2-J	2284	2284	3252	1000	2225	2675	5.5	150				20	
PCT0707-P2-K							7.5						
PCT0707-P3-I							4						
PCT0707-P3-J							5.5						
PCT0707-P3-K							7.5						
PCT0808-P2-J	2589	2589	3326	1250	2800	3375	5.5				80		
PCT0808-P2-K							7.5						
PCT0808-P3-I							4						
PCT0808-P3-J							5.5						
PCT0808-P3-K							7.5						
PCT0808-P3-L							11						
PCT0710-P2-K	3270	2284	3960	1500	3340	4020	7.5					40	
PCT0710-P2-L							11						
PCT0710-P3-J							5.5						
PCT0710-P3-K							7.5						
PCT0710-P3-L							11						
PCT0909-P2-K	2894	2894	3413	1550	3375	4125	7.5	200				20	
PCT0909-P2-L							11						
PCT0909-P3-J							5.5						
PCT0909-P3-K							7.5						
PCT0909-P3-L							11						
PCT0909-P3-M							15						
PCT0812-P2-K	3876	2589	3894	1875	4200	5080	7.5	150				40	
PCT0812-P2-L							11						
PCT0812-P3-K							7.5						
PCT0812-P3-L							11						
PCT0812-P3-M							15						
PCT1010-P2-L	3198	3198	3646	1800	3950	4850	11	200					
PCT1010-P2-M							15						
PCT1010-P3-J							5.5						
PCT1010-P3-K							7.5						
PCT1010-P3-L							11						
PCT1010-P3-M							15						
PCT1010-P3-N							18.5						
PCT1111-P2-M	3499	3499	3810	2100	4575	5700	15						
PCT1111-P2-N							18.5						
PCT1111-P3-L							11						
PCT1111-P3-M							15						
PCT1111-P3-N							18.5						
PCT0913-P2-L	4335	2894	4270	2400	5100	6200	11						
PCT0913-P2-M							15						
PCT0913-P3-L							11						
PCT0913-P3-M							15						
PCT0913-P3-N							18.5						

PCT Cooling Towers can be supported on either steel beams, concrete plinths or piers. All supports are to be level at the top and must be orientated as shown. Please consult your local B.A.C. representative for certified support drawings to suit your project prior to construction.

Specification

1.0 Open Cooling Tower
1.1 General: Furnish and install ____factory assembled, induced draft counterflow, axial fan, open cooling tower(s) with vertical air discharge, conforming in all aspects to the specifications and schedules as shown on the plans. Overall dimensions shall not exceed approximately ____m long x ____m wide x ____m high. The total connected fan horsepower shall not exceed ____kW. The cooling tower(s) shall be Baltimore Aircoil Company Model(s) _____.

1.2 Thermal Capacity: The open cooling tower(s) shall be warranted by the manufacturer to cool each and every duty listed below.
Duty (a) Cool_____l/s of water from ____°C to ____°C at ____°C entering wet-bulb
Duty (b) Cool_____l/s of water from ____°C to ____°C at ____°C entering wet-bulb
Duty (c) Cool_____l/s of water from ____°C to ____°C at ____°C entering wet-bulb

Additionally, the thermal performance shall be certified by the Cooling Technology Institute in accordance with CTI Certification Standard STD-201. Lacking such certification, a field acceptance test shall be conducted within the warranty period in accordance with CTI Acceptance test code ATC-105 by a qualified third party testing agency to determine if the tower can achieve the nearest one of the above conditions. A manufacturer's performance guarantee or performance bond will not be accepted.

1.3 Quality Assurance: The manufacturer shall have a Management System certified by an accredited registrar as complying with the requirements of ISO-9001 to ensure consistent quality of products and services. Manufacturers that are not ISO-9001 certified shall not be acceptable.

2.0 Construction Details
Casing
2.1 Corrosion Resistant Standard Construction: Casing panels and supporting structure shall be constructed of superior strength pultruded composite. All pultruded composite components shall be moulded to exacting standards with UV resistant polyester resins such that the UV protection is afforded throughout the entire embodiment of the components as well as being an externally applied coating. All internal component supports shall be constructed of Type 304 Stainless Steel. All hardware joining steel parts shall be of Type 304 Stainless Steel.

(Alternate 2.1) Corrosion Resistant Type 316 Stainless Steel Construction: Casing panels and supporting structure shall be constructed of superior strength pultruded composite. All pultruded composite components shall be moulded to exacting standards with UV resistant polyester resins such that the UV protection is afforded throughout the entire embodiment of the components as well as being an externally applied coating. All internal component supports shall be constructed of Type 316 Stainless Steel. All hardware joining steel parts shall be of Type 316 Stainless Steel.

Fan Cowl and Mechanical Equipment
2.2 Corrosion Resistant Standard Construction: Fan cowl sections shall be constructed of high performance Fibreglass Reinforced Polyester (FRP) and reinforced in critical areas. Sections shall be fastened together with Type 304 Stainless Steel hardware. All mechanical equipment supporting structure parts shall be constructed of ZAM coated steel. The fan shaft shall be of Type 316 Stainless Steel.

(Alternate 2.2) Corrosion Resistant Type 304 Stainless Steel Construction: Fan cowl sections shall be constructed of high performance Fibreglass Reinforced Polyester (FRP) and reinforced in critical areas. Sections shall be fastened together with Type 304 Stainless Steel hardware. All mechanical equipment supporting structure parts shall be constructed of Type 304 Stainless Steel. The fan shaft shall be of Type 316 Stainless Steel.

(Alternate 2.2) Corrosion Resistant Type 316 Stainless Steel Construction: Fan cowl sections shall be constructed of high performance Fibreglass Reinforced Polyester (FRP) and reinforced in critical areas. Sections shall be fastened together with Type 316 Stainless Steel hardware. All mechanical equipment supporting structure parts shall be constructed of Type 316 Stainless Steel. The fan shaft shall be of Type 316 Stainless Steel.

Cold Water Basin
2.3 Cold Water Basin : The cold water basin shall be constructed of high performance Fibreglass Reinforced Polyester (FRP) and reinforced in critical areas. All connections and other steel parts in the wetted area shall be constructed of Type 304 Stainless Steel. Standard basin accessories shall include: a corrosion resistant make-up valve with large diameter plastic float for easy adjustment of the operating water level, removable anti-vortexing strainer with perforated openings sized smaller than the water distribution system nozzles.

Alternate 2.3) The cold water basin shall be constructed of high performance Fibreglass Reinforced Polyester (FRP) and reinforced in critical areas. All connections and other steel parts in the wetted area shall be constructed of Type 316 Stainless Steel. Standard basin accessories shall include: a corrosion resistant make-up valve with large diameter plastic float for easy adjustment of the operating water level, removable anti-vortexing strainer with perforated openings sized smaller than the water distribution system nozzles.

2.4 Air Inlet Louver Screens: All louvers shall be constructed from PVC. Louver sections shall be individually removable in 48" wide (maximum) sections, allowing for quick and easy access to any part of the cold water basin without the need for tools. Louvers shall prevent debris and sunlight from entering the cold water basin as well as preventing splashout. Louvers which require tools for removal shall not be an acceptable alternative.

2.5 Casing Field Joint: The field joint shall be self aligning and require a minimum number of fasteners.

2.6 Heat Transfer Section: The heat transfer section(s) shall consist of fill, spray water distribution system and drift eliminators arranged for optimal thermal performance with minimal drift.

2.7 Fill: The fill shall be formed from self-extinguishing polyvinyl chloride (PVC) having a flame spread rating of <20 per ASTM E84 and shall be impervious to rot, decay, and fungus or biological attack. The fill shall be performance tested by the cooling tower manufacturer to assure single source responsibility and control of the final product. The fill shall be able to withstand a water temperature of 140°F (60.0º C).

2.8 Water Distribution System: Water shall be distributed evenly over the fill by a water distribution system consisting of a header and spray branches of Schedule 40 PVC pipe with large orifice, non-clog plastic distribution nozzles. The spray nozzles shall be held in place by snap-in rubber grommets and the branches should be removable without tools or removal of branch supports, allowing quick removal of individual nozzles or complete branches for cleaning or flushing. Branches that require tools for removal or removal of branch supports shall not be an acceptable alternative.

2.9 Drift Eliminators: Eliminators shall be constructed PVC and shall be UV resistant and impervious to rot, decay and fungus or biological attacks. They shall consist of high efficiency three pass wave formed blades solvent welded into lightweight, easily removable sections. Drift loss shall be less than 0.002% of the circulated water flow as required by AS3666.

3.0 Mechanical Equipment
3.1 Fan(s): Fan(s) shall be axial flow with glass reinforced polypropylene or glass reinforced polyamide blades selected to provide optimum cooling tower thermal performance with minimal sound levels. Air shall discharge through a fan cylinder designed for streamlined air entry and minimum tip clearance for maximum fan efficiency. The top of the fan cylinder shall be equipped with a non-sagging removable fan guard. The fan(s) and fan drive system, including the fan motor, shall be factory test-mounted and aligned to ensure reliable operation and ease of maintenance.

3.2 Bearings (belt driven units): Fan(s) and shaft(s) shall be supported by heavy-duty, self-aligning, grease packed ball bearings with moisture proof seals and integral slinger collars, designed for L- 10 Life. Extended bearing lube lines shall be fitted for ease of maintenance.

3.3 Fan Drive: The fan shall be either direct driven or belt driven. Where belts are used they shall be standard “A” or “B” section belts for ease of availability and be designed for 150% of the motor nameplate horsepower.

3.4 Fan Motor (direct drive units): Fan motor(s) shall be MEPS2 2006 compliant and be totally enclosed air over (TEAO), reversible, squirrel cage, ball bearing type, epoxy coated and be to IP66 protection rating. The motor(s) shall be mounted above the fan, protruding the top of the fan cowl for ease of access for lubrication and maintenance.

(Alternate 3.4) Fan Motor (belt drive units): Fan motor(s) shall be MEPS2 2006 compliant and be totally enclosed fan cooled (TEFC), reversible, squirrel cage, ball bearing type and be to IP55 protection rating. A removable protective cover shall protect the motor from the elements. Motor adjustments shall be made from the exterior of the unit; internally mounted motors shall not be an acceptable alternative.

4.0 Access
4.1 Tower Access: One full side of the casing shall be removable to provide full and open access to all internal tower components for inspection, maintenance and cleaning. The access panel shall be retained by four easily removable knobs and when removed shall not compromise structural integrity of the tower.

5.0 Sound
5.1 Sound Level: To maintain the quality of the local environment, the maximum sound pressure levels (dB) measured 50 ft from the cooling tower operating at full fan speed shall not exceed the sound levels detailed below.

Location	63	125	250	500	1000	2000	4000	8000	dB(A)
Discharge									
Air Inlet									
Motor Side									

6.0 Accessories
6.1 Basin Heater(s): The cooling tower cold water basin shall be provided with electric heater(s) to prevent freezing in low ambient conditions. The heater(s) shall be _____kW _____V/____phase/___Hz electric and shall be provided with a thermostat.

6.2 Basin Water Level Control: The cooling tower manufacturer shall provide an electric water level control (EWLC) system. The system shall consist of an electric float switch with stainless steel stilling chamber and a brass body solenoid valve in quantities and locations as indicated on the drawings. The system shall be capable of handling water pressures ranging from 0.3 – 10 bar and accept 240V/1PH/50Hz power supply. Electrical enclosures shall be of IP65 protection and the float switch shall be of single pole single throw type. The valve shall have female BSP threaded connections and shall be slow closing and of a water hammer damped type.

(Alternative 6.2) Basin Water Level Control: A liquid level control device shall be fitted externally to the cooling tower basin to maintain adequate water level through a pilot operated valve. The device shall consist of an externally mounted stilling chamber with float mechanism and controller valve, and a pilot operated make up valve fitted to the cooling tower make up connection.

6.3 Vibration Cutout Switch: A mechanical local reset vibration switch shall be fitted to the mechanical assembly of the cooling tower. It shall be designed to trip at a point so as not to cause damage to the cooling tower. The switch time delay and trip point shall be preset to typical values. Adjustment for these settings shall be available.

6.4 Basin Sweeper Piping: The cold water basin of the cooling tower shall be equipped with PVC basin sweeper piping for a filter or separator (supplied by BAC or others).

6.5 Extended Fan Cowl: The unit shall be equipped with a ZAM cylinder fitted to the top of the fan cowl suitable for connecting ductwork.

6.6 External Access – Roof deck Access Pod: Provide an external ZAM access pod at the roof deck level of the unit(s) to allow access to the drive system. A hot dip galvanized ladder from unit footing height to the pod at 15 deg to vertical shall be included. Field installation is by others. The installation shall comply with AS 1657-1992.

7.0 Equipment Controls
7.1 Variable Frequency Drive(s): A variable frequency drive (VFD) shall be provided for each fan motor. It shall be factory mounted externally to the unit and be pre-wired and set to the required duty. The supplier of the VFD shall be the manufacturer of the evaporative cooling equipment. The VFD shall have 98% basic energy efficiency, sleep mode, automatic energy optimization, flow compensation, and have a removable control panel. The drive shall be to IP66 protection rating and be capable of running at full load at temperatures up to 50°C.