Bulletin 167 - CT

evapco®

CONTAINERIZED

AT Cooling Towers

Engineered to Deliver the

Maximum Capacity and

Highest Quality to the

Worldwide Market - with the

Lowest Shipping Costs!

U.S. Green Building Council Member

Green Mechanical Council Helios Member

MCAA Supplier Partner Manufacturer/Supplier Council
Member MCAA
Mechanical Contractors Association of America

evapco

CERTIFIED ISO 9001:2008 & ISO 14001:2004

Since its founding in 1976, EVAPCO, Incorporated has become an industry leader in the engineering and manufacturing of quality heat transfer products around the world. EVAPCO's mission is to provide first class service and quality products for the following markets:

- Industrial Refrigeration
- Commercial HVAC
- Industrial Process
- Power
- District Energy

EVAPCO's powerful combination of financial strength and technical expertise has established the company as a recognized manufacturer of market-leading products on a worldwide basis. EVAPCO is also recognized for the superior technology of their environmentally friendly product innovations in sound reduction and water management.

EVAPCO is an employee owned company with a strong emphasis on research & development and modern manufacturing plants. EVAPCO has earned a reputation for technological innovation and superior product quality by featuring products that are designed to offer these operating advantages:

- Higher System Efficiency
- Environmentally Friendly
- Lower Annual Operating Costs
- Reliable, Simple Operation and Maintenance

With an ongoing commitment to Research & Development programs, EVAPCO provides the most advanced products in the industry–***Technology for the Future, Available Today!***

EVAPCO products are manufactured on five continents around the world and distributed through hundreds of factory - anthorized sales representatives.

Advanced Technology Cooling Towers for a Worldwide Market

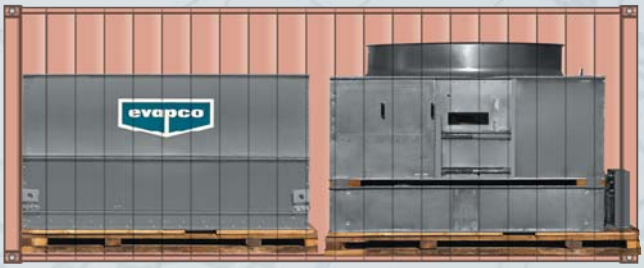
The Containerized line of Cooling Towers has been custom-engineered to ship in standard shipping containers. This feature greatly reduces the transportation costs associated with shipping. Customers around the world will benefit from the Advanced Technology features which are standard on the Containerized design:

- Low-Energy Consumption
- Induced-Draft Operation
- EVAPAK® Fill
- EvapJet™ Nozzle
- PVC Water Distribution System
- WST Air Inlet Louvers
- Simple Operation and Maintenance

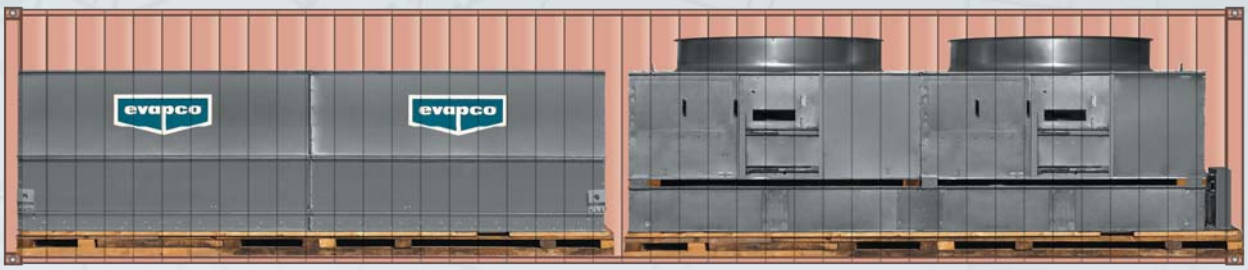
The Containerized Towers have been designed for simplified field assembly and rigging, while delivering the quality and reliability of a factory-built unit. These units provide the maximum capacity with the lowest ocean shipping cost!

Designed Lower Transportation and Installation Costs while Delivering Advanced Technology, Superior Performance, Ease of Maintenance and Long, Trouble-Free Operation.

A complete 2.24M x 2.73M (7.33 ft. x 9 ft.) **unit will fit in a 20' Shipping Container!**



A complete 2.24M x 5.48M (7.33 ft. x 18 ft.) **unit will fit in a 40' Shipping Container!**

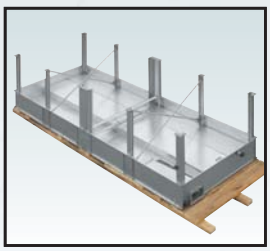


Easy Field Assembly

(See rigging and assembly instructions for fully detailed procedure.)

Unload Unit from Container

Mount Fan Section to Fill Section



Install Vertical Posts in Basin Section

Mount Fill/Fan to Basin Section

Mount Fan Motor

Optional Accessories Ship Inside the Container

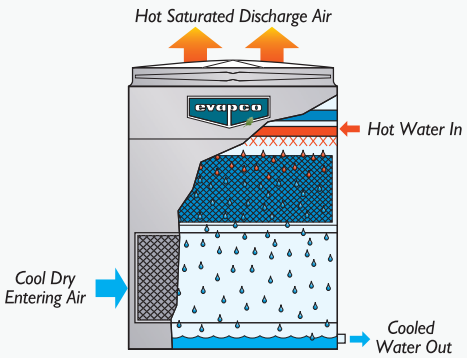
- **Sloped Ladder**
- **Motor Davit**
- **Vibration Cut-Out Switch**
- **Basin Heater Package**
- **Electric Water Level Control**
- **Specialty Motors**

cAT Designand Construction Features

The cAT line of cooling towers reflects EVAPCO's continuing commitment to research and development. Their advanced design provides owners with many operational and performance advantages.

Principle of Operation

Warm water from the heat source is pumped to the water distribution system at the top of the tower. The water is distributed over the wet deck fill by means of large orifice nozzles. Simultaneously, air is drawn in through the air inlet louvers at the base of the tower and travels upward through the wet deck fill opposite the water flow. A small portion of the water is evaporated which removes the heat from the remaining water. The warm moist air is drawn to the top of the cooling tower by the fan and discharged to the atmosphere. The cooled water drains to the basin at the bottom of the tower and is returned to the heat source.



Principle of Operation

For particularly corrosive environments EVAPCO cAT cooling towers are available with type 304 or 316 stainless steel construction. Consult the factory for details on available options.

Fan Drive System

The fan motor and drive assembly is designed to allow easy servicing of the motor and adjustment of the belt tension from the exterior of the unit. The totally enclosed fan cooled (T.E.F.C.) fan motor is mounted on the outside for easy access. A protective cover swings away to allow servicing and belt adjustment.

A large, hinged access door with a "quick release" latch provides access to the fan section for maintenance.

External Motor Mount (Optional Ladder Shown)

Power-Band Drive Belt

The Power-Band is a solid-back, multigroove belt system that has high lateral rigidity. The belt is constructed of neoprene with polyester cords. The drive belt is designed for 150 percent of the motor nameplate horsepower for long life and durability.

Fan Shaft Bearings

The fan shaft bearings in cAT units are specially selected for long, trouble-free life. They are rated for an L-10 life of 75,000 to 135,000 hours and are the heaviest pillow block bearings available.

Aluminum Alloy Pulleys

Fan pulleys located in the air stream are constructed of corrosion free aluminum for long life. The aluminum also helps belts last longer.

WST Air Inlet Louvers

Water and Sight Tight air inlet louvers are designed to effectively eliminate splash-out and sunlight, greatly reducing the potential for algae formation inside the cooling tower. They are manufactured of corrosion-free PVC and mounted in light-weight frames to allow for easy removal and convenient access to the basin section.

Type 304 Stainless Steel Strainers

Subjected to excessive wear and corrosion, the sump strainer is critical to the successful operation of the cooling tower. EVAPCO uses only stainless steel for this very important component.

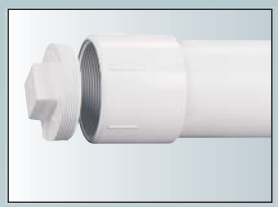
Totally Enclosed Motors

EVAPCO uses totally enclosed motors as standard for all fan motors. These superior motors help to assure longer equipment life without motor failures, which result in costly downtime.

U.S. Patent No. 6315804

PVC Drift Eliminators

The final elements in the upper part of the cooling tower are drift eliminators. They strip the entrained water droplets from the leaving air stream and reduce drift rate to 0.001%. EVAPCO eliminators are constructed entirely of inert, corrosion-free PVC. This patented PVC material has been specially treated to resist damaging ultraviolet light. The eliminators are assembled in easily handled sections to facilitate removal, thereby exposing the upper portion of the unit and water distribution system for periodic inspection.



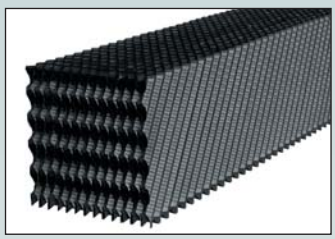
EvapJet™ Nozzle

Water Distribution System

- Non-corrosive PVC construction with new EvapJet™ nozzles.
- Large orifice nozzles prevent clogging and are threaded for easy removal and positive positioning.
- System branches have threaded end caps to assist with debris removal.

EVAPAK® Fill

The EVAPAK® fill design used in the cAT Cooling Tower is specially designed to induce highly turbulent mixing of the air and water for superior heat transfer. Special drainage tips allow high water loadings without excessive pressure drop. The fill is constructed of inert polyvinyl chloride, (PVC), will not rot or decay, and is formulated to with-stand water temperatures of 130˚F (55˚C). Because of the unique way in which the crossfluted sheets are bonded together, and the bottom support of the fill section, the structural integrity of the fill is greatly enhanced, making the fill usable as a working platform.



The fill selected for the cAT Cooling Tower has excellent fire resistant qualities. cAT Cooling Tower fill has a flame spread rating of 5 per ASTM-E84-81a. A higher temperature fill is available for water temperatures exceeding 130˚F (55˚C). Consult your EVAPCO representative for further details.

Quick Connect Piping System

- All inlet and outlet piping connections are beveled for welding and grooved to accept a mechanical coupling device as standard.
- Facilitates easy pipe connections for quick installation.
- Flanged connections are available as an option.

Design

EVAPCO units are of heavy-duty construction and designed for long trouble-free operation. Proper equipment selection, installation and maintenance is, however, necessary to ensure full unit performance.

Some of the major considerations in the application of a tower is presented below. For additional information, contact the factory.

Air Circulation

It is important that proper air circulation be provided. The best location is on an unobstructed roof top or on ground level away from walls and other barriers. Those cooling towers located in wells, enclosures or adjacent to high walls must be properly located to avoid the problems associated with recirculation.

Recirculation raises the wet bulb temperature of the entering air causing the water temperature to rise above the design. For these cases, the discharge of the fan should be located at a height even with the adjacent wall, thereby reducing the chance of recirculation. For additional information, see the EVAPCO Equipment Layout Manual.

Piping

Tower piping should be designed and installed in accordance with generally accepted engineering practices. The piping layout should be symmetrical on multiple unit systems, and sized for a reasonably low water velocity and pressure drop.

Each cell of the cAT Cooling Tower is furnished with one inlet and one outlet piping connection. This design reduces the amount of external piping and thereby lowers the installed cost of the cooling tower. The water distribution system is pressurized and self-balancing. Since field balancing is not required on the cAT, the need for flow balancing valves is eliminated, further reducing the cost of tower installation. The wide orifice nozzles with anti-sludge ring used in the cAT water distribution system helps prevent clogging, reducing the maintenance costs of the water distribution system.

All piping should be securely anchored by properly designed hangers and supports.

Recirculating Water System

The surest way to protect the recirculating water system from freezing is with a remote sump. The remote sump should be located inside the building and below the unit. All water in the cooling tower basin should drain to the remote sump when the system pump cycles off.

Other freeze protection methods are available when a remote sump is not feasible. Electric pan heaters, steam or hot water coils can be used to keep the pan water from freezing when the unit cycles off. Water lines to and from the unit, and related piping should be heat traced and insulated up to the overflow level in order to protect from freezing.

Water Treatment

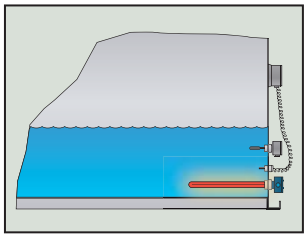
In some cases, the make-up water will have high impurity levels and a normal bleed will not be enough to prevent scale formation. In these cases, the services of an experienced water treatment company should be retained.

The water treatment program prescribed for the given conditions must be compatible with the unit's materials of construction. If an acid is used to control pH, it should be accurately metered in dilute solution such that the spray water is held between a pH of 6.5 and 8.0. Batch feeding of chemicals is not recommended.

Units constructed of galvanized steel operating with circulating water having a pH of 8.0 or higher may require periodic passivation to prevent the formation of white rust. White rust is a corrosion byproduct of the protective zinc barrier and appears on the metal surface as white, waxy formations. If white rust forms and is left untreated, it may flake off and leave the bare metal substrate exposed.

Electric Heaters

Electric immersion heaters for the tower basin are available. They are sized to maintain a +4°C to +5°C (+40°F) pan water temperature with the fans off and an ambient air temperature of -18°C (0°F). They are furnished with a thermostat and low water protection device to cycle the heater on when required and to prevent the heater elements from energizing unless they are completely submerged. All components are in weatherproof enclosures for outdoor use. The heater power contactors and electric wiring are not included as standard.



Heater Sizes

Models	-18°C / 0°F kW	-29°C / -20°F kW	-40°C / -40°F kW
cAT 17-49 to 17-99	7	10	15
cAT 17-511 to 17-911	8	12	15
cAT 17-312 to 17-912	8	14	18
cAT 17-214 to 17-914	10	14	20
cAT 27-518 to 27-918	12	18	24

Control of Biological Contaminants

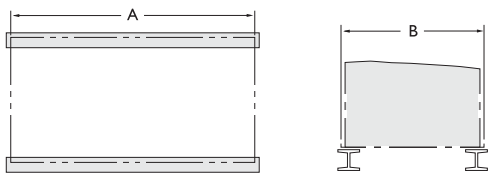
Water quality should be checked regularly for biological contamination. If biological contamination is detected, a more aggressive water treatment and mechanical cleaning program is required. The water treatment program should be performed in conjunction with a qualified water treatment company. It is important that all internal surfaces be kept clean of accumulated dirt or sludge. In addition, the drift eliminators should be kept in good operating condition to minimize water from exiting the evaporative cooling unit in the discharge air.

To minimize the risk of biological contamination, at initial start up or after an extended shut down, it is recommended that the tower be properly treated. Clean all debris such as leaves and dirt from the unit. Completely fill the basin to the overflow level with fresh water. Initiate a biocide water treatment or shock treatment program prior to operating the unit. It is preferable that all such procedures be conducted or supervised by a water treatment specialist.

Steel Support

The recommended support for EVAPCO cooling towers is structural "I" beams located under the outer flanges and running the entire length of the unit. Mounting holes, 19mm (3/4") in diameter are located in the bottom channels of the pan section to provide for bolting to the structural steel. (Refer to certified drawings from the factory for bolt hole locations).

Beams should be level to within 3mm per 2m (1/8" per 6') before setting the unit in place. Do not level the unit by shimming between it and the "I" beams as this will not provide proper longitudinal support.



Plan View *End Elevation*

cAT Supporting Steel Dimensions

Models	S.I. Units (mm)		English Units	
	A	B	A	B
cAT 17-49 to 17-99	2731	2240	8' 11-1/2"	7' 4-3/16"
cAT 17-511 to 17-911	3188	2240	10' 5-1/2"	7' 4-3/16"
cAT 17-312 to 17-912	3651	2240	11' 11-3/4"	7' 4-3/16"
cAT 17-214 to 17-914	4261	2240	13' 11-3/4"	7' 4-3/16"
cAT 27-518 to 27-918	5486	2240	18' 0"	7' 4-3/16"

cAT Cooling Tower Mechanical Specifications

Furnish and install as shown on the plans an EVAPCO Model _____ induced draft counterflow cooling tower. Each unit shall have the capacity to cool _____ GPM (lps) of water from _____ ˚F (˚C) to _____ ˚F (˚C) with a _____ ˚F (˚C) entering wet bulb temperature.

Pan
The pan shall be constructed if G-235 hot-dip galvanized steel for long life and durability. G-235 hot-dip galvanized steel designates an average coating thickness of approximately 725g of zinc per square meter on the steel. Standard pan accessories shall include overflow, drain, antivortexing hood, Type 304 Stainless Steel strainers, and brass make-up valve with plastic float. The entire pan area shall incorporate a stepped configuration for reduced water volume, lower operating weight and easier pan maintenance. The upper and lower pan bottoms shall be sloped to provide positive drainage of the complete basin section. Depressed side outlet sumps which are not an integral part of the basin shall not be acceptable.

Casing
The casing shall be constructed of G-235 hot-dip galvanized steel. The casing panels shall totally encase the sides of the fill section to protect the surface from direct atmospheric contact.

Fan Motor(s)
_____ HP (kW) totally enclosed fan cooled **(T.E.F.C.)** ball bearing fan motor(s) shall be furnished suitable for cooling tower service on _____ volts, _____ hertz, and _____ phase. Motor(s) shall be mounted on an adjustable base which is mounted on the side of the unit for service. A hinged protective cover shall shield the motor and sheave from the weather.

Drive
The fan drive shall be a multigroove, solid back V-belt type with taper lock sheaves designed for 1.5 service factor of the motor nameplate horsepower (kW). The belt material shall be neoprene reinforced with polyester cord and specifically designed for cooling tower service. A hinged protective cover shall shield the motor and sheave from the weather. Belt adjustment shall be accomplished from the exterior of the unit. Bearing lube lines shall be extended to the exterior of the unit for easy maintenance. All sheaves located in the airstream shall be constructed of aluminum alloy, vented guards shall not be acceptable. If internal belt adjustment is necessary, an internal working platform and ladder is required to access the drive system.

Axial Propeller Fans
Fans shall be heavy duty axial propeller type statically balanced. The fans shall be fabricated by the cooling tower manufacturer for single source responsibility and reliability. The fans shall be constructed of extruded aluminum alloy blades, installed in a closely fitted cowl with venturi air inlet for maximum fan efficiency. Each fan blade shall be individually adjustable. Fan cowl shall be covered with a heavy gauge hot dip galvanized wire fan guard.

Fan Shaft Bearings
Fan shaft bearings shall be heavy duty self-aligning ball type with self locking collars and grease fittings extended to the outside of the unit. Bearings shall be designed for a minimum L-10 life of 75,000 hours.

Fan Drive Warranty
Cooling tower fan drive components shall be covered by a five year manufacturer's plan. Drive components protected by this warranty shall include the fans, bearings, fan shafts, belts, drive sheaves and fan motors.

Fill
The cooling tower fill shall be PVC (Polyvinyl Chloride) of crossfluted design for optimum heat transfer efficiency. The crossfluted sheets shall be bonded together for strength and durability. The fill shall be fabricated, formed and installed by the cooling tower manufacturer and shall be elevated a minimum of 3 feet (914 mm) above the floor of the cold water basin to facilitate cleaning. *The fill shall be suitable for use as a working platform.* The PVC fill shall be self-extinguishing for fire resistance with a flame spread rating of 5 per ASTM E84-81a. It shall also be resistant to rot, decay and biological attack. The fill shall be able to withstand a water temperature of 130°F (55°C).

Non-Corrosive Water Distribution System
Each cell of the cooling tower shall have one (1) hot water return inlet connected to a main spray header. The spray header and branches shall be constructed of Schedule 40 polyvinyl chloride (PVC) pipe for corrosion resistance and shall have a steel connection which is beveled for weld/grooved for a mechanical coupling to attach the external piping. The spray header and branches shall be removable for cleaning purposes and have threaded end caps to allow debris to be removed. The water shall be distributed over the fill by precision molded ABS spray nozzles with large orifice openings to eliminate clogging. The nozzles shall be threaded into the water distribution piping to assure positive positioning. Nozzles shall use fluidic technology to evenly distribute the water over the fill media without any moving parts.

Eliminators
The eliminators shall be constructed entirely of inert polyvinyl chloride (PVC) in easily handled sections and be completely separate from the fill section for maximum efficiency. The eliminator design shall incorporate three changes in air direction to assure removal of all entrained moisture from the discharge air stream. Maximum drift rate shall be less than .001% of the circulating water rate.

Air Inlet Louver Screens
The louvers screens shall be constructed of polyvinyl chloride (PVC) and mounted in easily removable frames on all four sides of the cooling tower for access to the entire basin area for maintenance. The louvers shall have a minimum of two changes in air direction to prevent splashout, block direct sunlight from entering the basin, and have a 3/4" (19 mm) opening to prevent debris from entering the basin.

Finish
All pan and casing material shall be constructed of G-235 heavy gauge mill hot-dip galvanized steel for maximum protection against corrosion. During fabrication, all panel edges shall be coated with a 95% pure zinc-rich compound.

Innovation, Performance, Experience

EVAPCO, Inc. — World Headquarters & Research / Development Center

P.O. Box 1300 • Westminster, MD 21158 USA
410-756-2600 p • 410-756-6450 f • marketing@evapco.com

North America

EVAPCO, Inc.
World Headquarters
P.O. Box 1300
Westminster, MD 21158 USA
410-756-2600 p | 410-756-6450 f
marketing@evapco.com

EVAPCO East
5151 Allendale Lane
Taneytown, MD 21787 USA
410-756-2600 p | 410-756-6450 f
marketing@evapco.com

EVAPCO Midwest
1723 York Road
Greenup, IL 62428 USA
217-923-3431 p | 217-923-3300 f
evapcomw@evapcomw.com

EVAPCO West
1900 West Almond Avenue
Madera, CA 93637 USA
559-673-2207 p | 559-673-2378 f
contact@evapcowest.com

EVAPCO Iowa
925 Quality Drive
Lake View, IA 51450 USA
712-657-3223 p | 712-657-3226 f

EVAPCO Iowa
Sales & Engineering
215 1st Street, NE
P.O. Box 88
Medford, MN 55049 USA
507-446-8005 p | 507-446-8239 f
evapcomn@evapcomn.com

EVAPCO Newton
701 East Jourdan Street
Newton, IL 62448 USA
618-783-3433 p | 618-783-3499 f
evapcomw@evapcomw.com

EVAPCOLD
521 Evapco Drive
Greenup, IL 62428 USA
217-923-3431 p
evapcomw@evapcomw.com

EVAPCO-Dry Cooling, Inc.
1011 U.S. Highway 22 West
Bridgewater, NJ 08807 USA
1-908-379-2665 p
info@evapco-blct.com

Refrigeration Valves &
Systems Corporation
A wholly owned subsidiary of EVAPCO, Inc.
1520 Crosswind Drive
Bryan, TX 77808 USA
979-778-0095 p | 979-778-0030 f
rvs@rvscorp.com

EVAPCO Northwest
5775 SW Jean Road, Suite 210
Lake Oswego, OR 97035 USA
503-639-2137 p | 503-639-1800 f

EvapTech, Inc.
A wholly owned subsidiary of EVAPCO, Inc.
8331 Nieman Road
Lenexa, KS 66214 USA
913-322-5165 p | 913-322-5166 f
marketing@evaptech.com

Tower Components, Inc.
A wholly owned subsidiary of EVAPCO, Inc.
5960 US Highway 64 East
Ramseur, NC 27316 USA
336-824-2102 p | 336-824-2190 f
mail@towercomponentsinc.com

South America

EVAPCO SEMCO
Equipamentos de Refrigeracao Ltda.
Rua Alexandre Dumas, 1601
Conj. 13, 14, 15 - Edificio Stelvio Mazza
04717-004 Sao Paulo - SP, Brazil
(55+19) 5681-2000 p

Europe

EVAPCO Europe BVBA
European Headquarters
Heersterveldweg 19
Industrieterrein Oost
3700 Tongeren, Belgium
(32) 12-395029 p | (32) 12-238527 f
evapco.europe@evapco.be

EVAPCO Europe, S.r.l.
Via Ciro Menotti, 10
I-20017 Passirana di Rho
Milan, Italy
(39) 02-939-9041 p | (39) 02-935-00840 f
evapcoeurope@evapco.it

EVAPCO Europe, S.r.l.
Via Dosso 2
23020 Piateda
Sondrio, Italy

EVAPCO Europe GmbH
Meerbuscher Straße 64-78
Haus 5
40670 Meerbusch, Germany
(49) 2159-69560 p | (49) 2159-695611 f
info@evapco.de

Flex coil a/s
A wholly owned subsidiary of EVAPCO, Inc.
Knøsgårdvej 115
DK-9440 Aabybro, Denmark
(45) 9824 4999 p | (45) 9824 4990 f
info@flexcoil.dk

EVAPCO S.A. (Pty.) Ltd.
A licensed manufacturer of EVAPCO, Inc.
18 Quality Road
Isando 1600
Republic of South Africa
(27) 11-392-6630 p | (27) 11-392-6615 f
evapco@evapco.co.za

Evap Egypt Engineering Industries Co.
A licensed manufacturer of EVAPCO, Inc.
5 El Nasr Road
Nasr City, Cairo, Egypt
2 02 24022866 / 2 02 24044997 p
2 02 24044667 / 2 02 24044668 f
primacool@link.net / shady@primacool.net

Asia/Pacific

EVAPCO Asia/Pacific Headquarters
1159 Luoning Road, Baoshan Industrial Zone
Shanghai 200949, P.R. China
(86) 21-6687-7786 p | (86) 21-6687-7008 f
marketing@evapcochina.com

EVAPCO (Shanghai) Refrigeration
Equipment Co., Ltd.
1159 Luoning Rd., Baoshan Industrial Zone
Shanghai, P.R. China, Postal Code: 200949
(86) 21-6687-7786 p | (86) 21-6687-7008 f
marketing@evapcochina.com

Beijing EVAPCO Refrigeration
Equipment Co., Ltd.
No. 66 the 4th Block, Yanxi Economic
Development Zone
Huairou District
Beijing, P.R. China Postcode: 101407
010-6166-7238 p | 010-6166-7295 f
evapcobj@evapcochina.com

EVAPCO Australia (Pty.) Ltd.
34-42 Melbourne Road
P.O. Box 436
Riverstone NSW 2765, Australia
(61) 2 9627-3322 p | (61) 2 9627-1715 f
sales@evapco.com.au

EVAPCO Composites Sdn. Bhd
No. 70 (Lot 1289) Jalan Industri 2/3
Rawang Integrated Industrial Park
48000 Rawang, Selangor, Malaysia
60 3 6092-2209 p | 60 3 6092-2210 f

EvapTech Asia Pacific Sdn. Bhd
A wholly owned subsidiary of EvapTech, Inc.
B-61, IOI Boulevard
Jalan Kenari 5, Bandar Puchong Jaya
47170 Puchong, Selangor, Malaysia
(60-3) 8070-7255 p | (60-3) 8070-5731 f
marketing-ap@evaptech.com

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