

# CLOSED CIRCUIT COOLERS

## LSWE/LRWB

Forced Draft Closed Circuit Coolers



LSWE



LRWB



\*Mark owned by the Cooling Technology Institute





## Get to Know EVAPCO

- The global innovator in heat transfer solutions
- Serving the commercial HVAC, Industrial Refrigeration, Power Generation, and Industrial Processing markets
- Founded in 1976
- Employee-owned
- 26 manufacturing facilities in 10 countries
- More than 170 sales offices worldwide

## Learn More Now

Visit [www.evapcoasia.com](http://www.evapcoasia.com) to download product catalogs, view complete product specifications, and more.

## EVAPCO is more than a name.

It is a pledge to make everyday life easier, more comfortable, more reliable, and more sustainable for people everywhere. How do we fulfill that promise? It's simple.

### **We never stop innovating.**

At EVAPCO, we do not just talk about innovation, it is ingrained in our workflow. Guided by our annually developed R&D plans, we set out to find groundbreaking solutions that transform the way the world works for the better. It is why we have more than 28 patents worldwide in the last 10 years alone.

### **We craft exceptionally built solutions.**

As an employee-owned company, we take pride in our work. We are proud to be one of the most experienced teams of engineers and craftsmen in the industry. This translates into solutions that are always exceptionally built. EVAPCO has an unwavering commitment to provide "best in class" heat transfer solutions and services.

### **We guarantee performance.**

Every EVAPCO solution is put through rigorous research and testing to ensure maximum efficiency and reliability. But we do not stop there. EVAPCO is an industry leader in independent, third-party performance certifications. These certifications guarantee our performance metrics—so that you can plan your projects with complete peace of mind.

### **We protect the environment.**

Innovation and environmental sustainability go hand-in-hand at EVAPCO. EVAPCO's industrial heat transfer equipment not only conserves natural resources and helps reduce noise pollution, they also feature recycled steel content in their construction. Our stainless steel units are constructed of panels that contain up to 75% recycled content; over 80% in galvanized units construction. From sound reduction to water conservation to chemical elimination, we are constantly developing new technologies that deliver the ultimate operating advantages for our clients— and protect the planet for every generation that comes after us.



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# LSWE and LRWB Principle of Operation

## Low Sound and Low Rise Forced Draft Closed Circuit Coolers

EVAPCO's LSWE/LRWB Closed Circuit Coolers utilize Evapco's Thermal-Pak® coil design now featuring the revolutionary **CROSSCOOL** Internal Tube Enhancement. The **CROSSCOOL** Internal Tube Enhancement increases the internal heat transfer coefficient of the coil and thus increases the cooling capacity of the unit. This new and improved series of coolers is the ideal solution for indoor application, confined layouts, low sound requirements and direct replacements to name a few. Both models are designed for easy maintenance and long, trouble free operation.



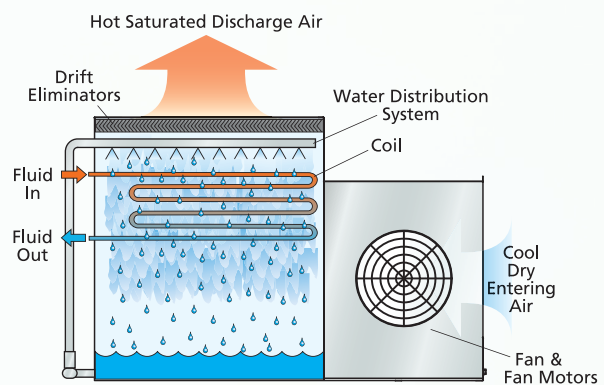
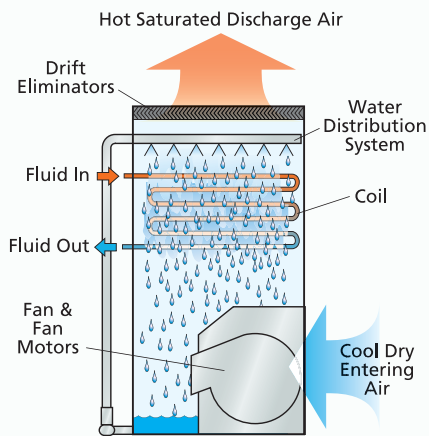
**LSWE**

The standard for forced draft centrifugal fan designs,  
Now more efficient than ever.



**LRWB**

With the fan section located beside the heat transfer casing, this unit satisfies even the strictest of height requirements in a unitary, compact design.



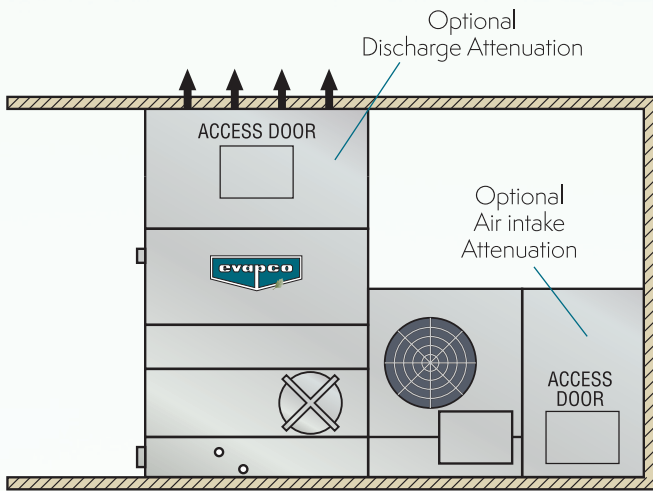
### Principle of Operation

The process fluid is circulated through the coil of the closed circuit cooler. Heat from the process fluid is dissipated through the coil tubes to the water cascading downward over the tubes. Simultaneously air is blown through the unit by the fans and travels upward over the coil opposite the water flow. A small portion of the water is evaporated which removes the heat. The warm moist air is forced to the top of the closed circuit cooler by the fan and is discharged to the atmosphere. The remaining water falls to the sump at the bottom of the cooler where it is recirculated by the pump up through the water distribution system and back down over the coils.



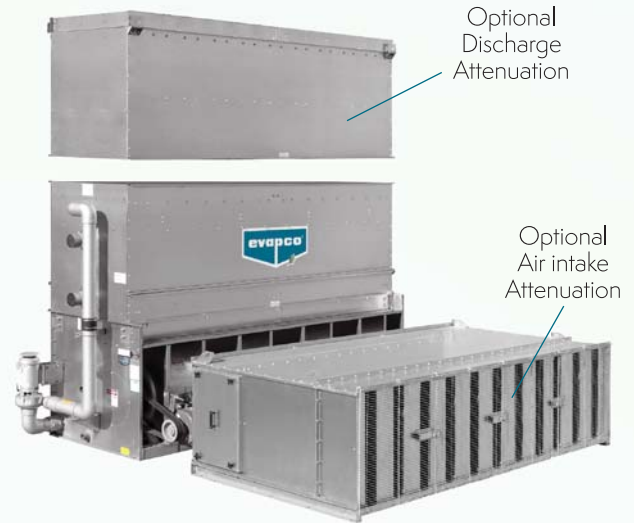
# Application Versatility

Centrifugal units are recommended for a wide range of installations. They are quiet, can easily be hidden, and are an excellent solution for installations where sound is sensitive, and when the unit must handle external static pressure.



**LRWB**

Note: LRWB Shown Ducted on Both Inlet and Discharge



**LSWE**

## Very Quiet Operation

Centrifugal fan units operate at low sound levels which make this design preferred for installations with external static pressure where noise is a concern. Additionally, since the sound from the fans is directional, single sided air entry models can be turned away from critical areas avoiding a sound problem. When even quieter operation is necessary, centrifugal fan models can be equipped with optional sound attenuation packages. See the Sound Reducing Options section of this catalog for details.

In addition, the LRWB features a specially engineered fan enclosure and drive system that is designed to offer very quiet operation without the high cost of external attenuation packages. The LRWB fan system was developed through hundreds of hours of laboratory tests resulting in the lowest standardized sound levels available in the industry. In fact, the sound level of the LRWB on average is 2 dBA quieter than competitors' similar models.

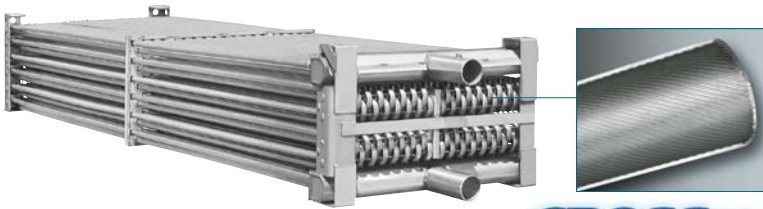
## Indoor Installation

All LSWE and LRWB closed circuit coolers can be installed indoors where they normally require ductwork to and from the unit. The design of the ductwork should be symmetrical to provide even air distribution across both intake and discharge openings. Guidelines for ducted applications:

- 1) The static pressure loss imposed by the ductwork must not exceed 125Pa. The fan motor size must be increased for ESP up to 125Pa.
- 2) For ducted installations, the solid bottom panel option must be ordered. On the LRWB, blank off plates will also be provided in lieu of the side air inlet screens with this option.
- 3) **NOTE: Access doors must be located in the ductwork (by others) for service to the fan drive components and water distribution system.**

Drawings are available showing recommended ductwork connections. See EVAPCO's layout guidelines for additional information.

# LSWE Design & Construction Features



**CROSSCOOL™**  
INTERNAL TUBE ENHANCEMENT

## Galvanized Steel Coil Elliptical Thermal-Pak® COIL Construction Featuring **CROSSCOOL™ Internal Tube Enhancement Technology**

- Internal tube enhancement increases fluid turbulence providing **additional evaporative capacity**
- Elliptical return bends allows for more circuits per coil bundle increasing maximum capacity per footprint
- Coil located in the airstream increasing dry bulb switchover temperature



## Optional Factory Mounted Solid Chemical Water Treatment Systems

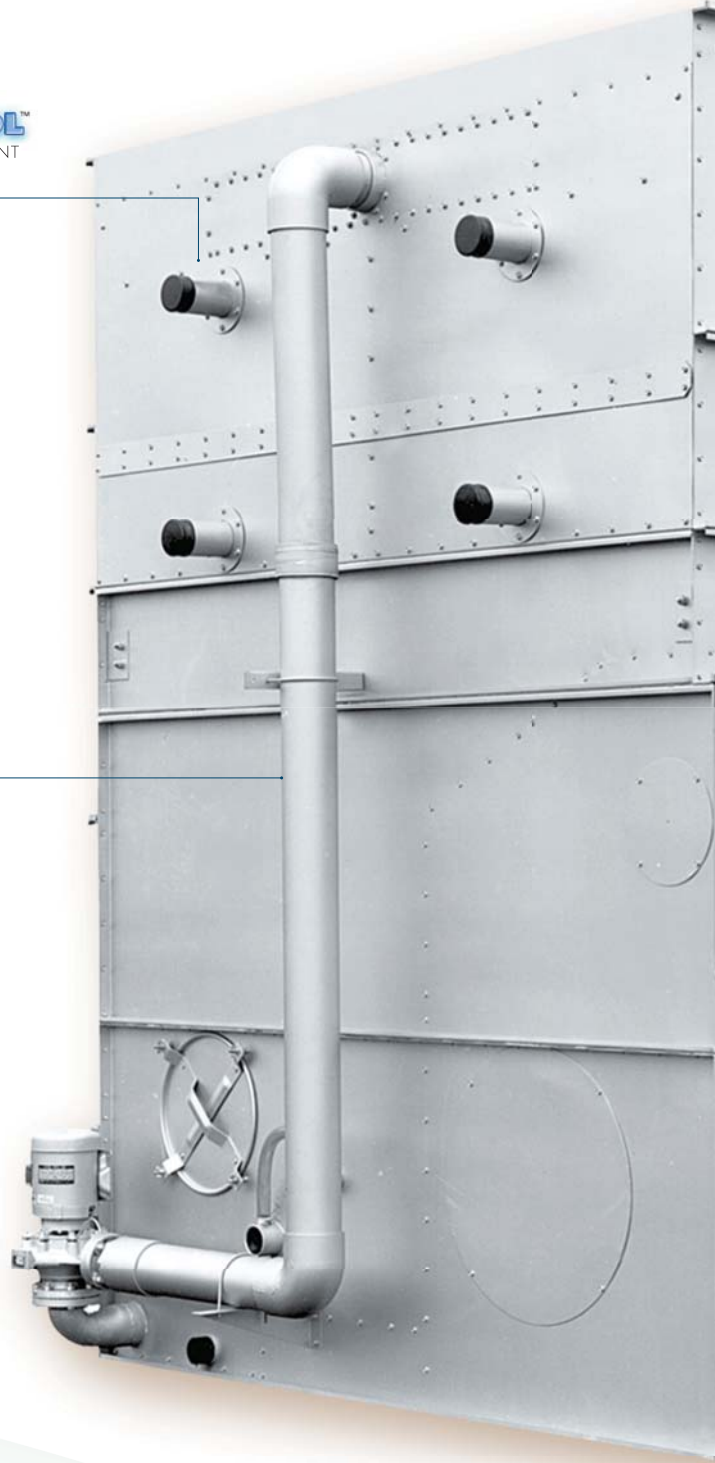
The LSWE is available with a **Smart Shield®** (not shown) solid chemical water treatment system. The **Smart Shield®** is environmentally sensitive alternatives for treating water in evaporative cooled equipment. The **Smart Shield®** systems include all components required for an effective water treatment system; factory mounted and wired.



## The EVAPCO Performance Guarantee

Every LSWE product is rigorously thermal performance tested by EVAPCO and then independently certified by the Cooling Technology Institute (CTI) so you know you're getting a solution that's guaranteed to get the job done.

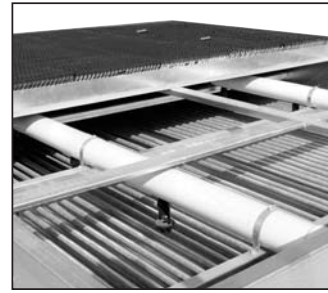
\*Mark owned by the Cooling Technology Institute





### Zero Maintenance PVC Spray Distribution Header with ZM®II Nozzles

- Fixed position nozzles require zero maintenance
- Large orifice nozzles prevent clogging



### Easy Field Assembly

- Ensures easy assembly and fewer fasteners
- Incorporates self-guiding channels to guide the coil casing section into position improving the quality of the field seam

### Clean Pan Design

- Sloped design allows water to drain completely from cold water basin
- Easier removal of dirt and debris

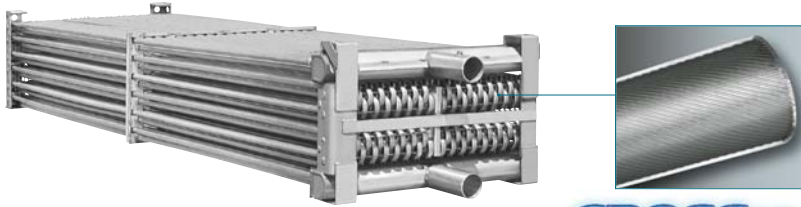


### Totally Enclosed Fan Motors

- Assures long life
- All normal maintenance can be performed quickly from outside the unit
- If required, motor may be easily removed
- Motors are now located outboard on multi-motor units for even easier drive system access



# LRWB Design and Construction Features



**CROSSCOOL™**  
INTERNAL TUBE ENHANCEMENT

## Galvanized Steel Coil

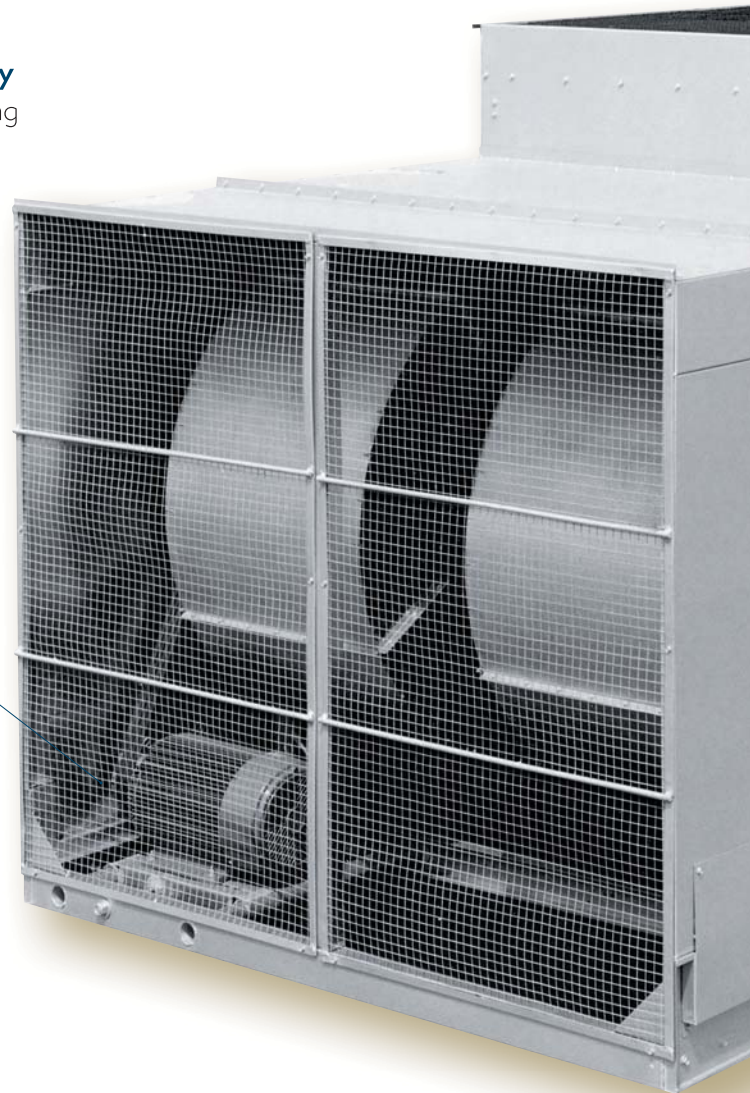
### Elliptical Thermal-Pak® COIL Construction Featuring **CROSSCOOL™** Internal Tube Enhancement Technology

- Internal tube enhancement increases fluid turbulence providing **additional evaporative capacity**
- Elliptical return bends allows for more circuits per coil bundle increasing maximum capacity per footprint
- Coil located in the airstream increasing dry bulb switchover temperature



## Easy to Service Motor & Drive System

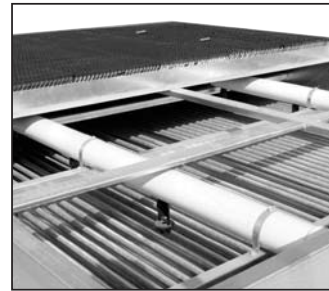
- Belt tensioning and bearing lubrication can be performed from outside the unit
- Locking mechanism can also be used as a wrench to adjust the belts
- Motor is fully accessible by removing one inlet screen
- Split fan housings allow removal of all mechanical equipment through the end of the unit





### Zero Maintenance PVC Spray Distribution Header with ZM®II Nozzles

- Fixed position nozzles require zero maintenance
- Large orifice nozzles prevent clogging



### Optional Factory Mounted Solid Chemical Water Treatment Systems

The LRWB is available with a **Smart Shield®** (*not shown*) solid chemical water treatment system. The **Smart Shield®** is environmentally sensitive alternatives for treating water in evaporative cooled equipment. The **Smart Shield®** systems include all components required for an effective water treatment system; factory mounted and wired.



### The EVAPCO Performance Guarantee

Every LRWB product is rigorously thermal performance tested by EVAPCO and then independently certified by the Cooling Technology Institute (CTI) so you know you're getting a solution that's guaranteed to get the job done.

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# Innovative Design Features

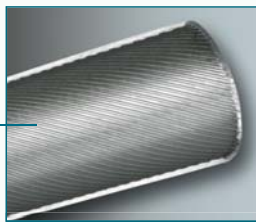
## Elliptical Thermal-Pak® Heat Transfer Coil



Featuring



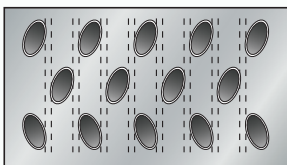
THERMAL-PAK® ELLIPTICAL TUBE



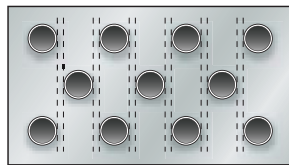
**CROSSCOOL™**  
INTERNAL TUBE ENHANCEMENT

## Galvanized steel elliptical Thermal-Pak® coil featuring **CROSSCOOL™** Internal Tube Enhancement Technology

- Internal Tube Enhancement provides additional evaporative capacity
- Elliptical tube design allows for more circuits per coil bundle increasing maximum capacity per footprint
- Elliptical tube design results in lower airflow resistance than typical round tube designs



EVAPCO's Thermal-Pak®  
Elliptical Tube



Competitors  
Round Tube Coil

The LSWE and LRWB closed circuit coolers utilize EVAPCO's Thermal-Pak® coil design. The elliptical tube design allows for closer tube spacing, resulting in greater surface area per plan area than round-tube coil designs.

In addition, the Thermal-Pak® design has lower resistance to airflow and also permits greater water loading making the Thermal-Pak® coil the most efficient design available.

The Thermal-Pak® coil design also features EVAPCO's Internal Tube Enhancement Technology. This increases fluid turbulence through the coil, further increasing the evaporative capacity.

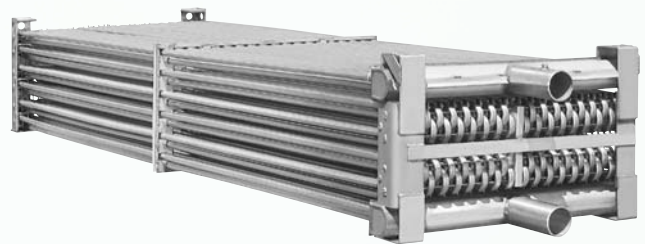
The coils are manufactured from high quality steel tubing following the most stringent quality control procedures. Each circuit is inspected to ensure the material quality and then tested before being assembled into a coil. Finally, the assembled coil is pneumatically tested at 2.69MPa under water to ensure it is leak free.

To protect the coil against corrosion, it is placed in a heavy steel frame and then the entire assembly is dipped into molten zinc (hot-dipped galvanized) at a temperature of approximately 427°C.

**NOTE: Closed circuit coolers should only be used on sealed, pressurized systems. Continual aeration of the water in an open system can cause corrosion inside the tubes of the coil leading to premature failure.**

## Stainless Steel Coil Option

EVAPCO offers the optional TITAN COIL. Constructed with type 304L Stainless Steel, the TITAN COIL is manufactured using EVAPCO's elliptical tube Thermal-Pak® design upgraded to Xtra Tough construction featuring: Xtra Durability, Xtra Corrosion Resistance, and an Xtra long **5 Year Coil Warranty** as standard.



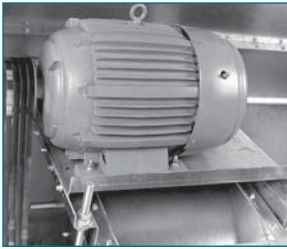
Thermal-Pak® Coil



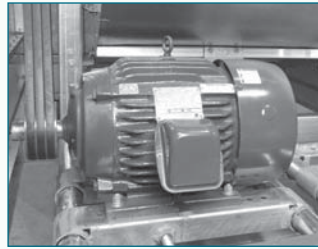
# Innovative Design Features

## Fan Motor Mount

TEFC fan motors are mounted in a convenient open area for ease of belt tensioning, motor lubrication and electrical connection. The motor base is designed for easy adjustment and is locked into position to maintain proper belt tension.



*Example LSWE Fan Motor Mount*



*LRWB Fan Motor Mount*

## Fan Access-Split Housing

Another unique feature of the LRWB closed circuit cooler is the split fan housing. The split fan housing on the LRWB allows quick removal of the fans from the front end of the unit. This feature allows fan removal when units are placed side by side where space is minimal.



## Mechanical Drive System Access

The LSWE and LRWB mechanical drive systems are easy to maintain. Bearing lubrication and belt adjustment can be performed from outside the unit. There is no need to remove fan screens to maintain important drive components. In addition, the locking mechanism used to maintain belt tension can also work as a wrench to adjust the belt.

## Centrifugal Fan Assembly

Fans on LSWE and LRWB closed circuit coolers are of the forward curved centrifugal design with hot-dip galvanized steel construction. All fans are statically and dynamically balanced and are mounted in a hot-dip galvanized steel housing.



## Maintenance Free ZM®II Spray Nozzle Water Distribution System

EVAPCO'S Zero Maintenance ZM®II spray nozzle remains clog-free while providing even and constant water distribution for reliable, scale-free evaporative cooling under all operating conditions.



*ZM®II Nozzle*

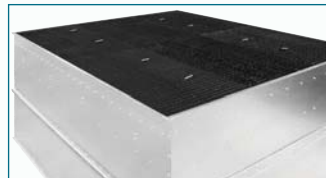
The heavy duty nylon ZM®II spray nozzles have a 33.3mm diameter opening and a 38mm splash plate clearance. Furthermore, the fixed position ZM®II nozzles are mounted in corrosion-free PVC water distribution pipes that have threaded end caps. Together, these elements combine to provide unequalled coil coverage and scale prevention, and make the industry's best performing non-corrosive, maintenance-free water distribution system.

## Efficient Drift Eliminators

The LSWE and LRWB are provided with an efficient drift eliminator system that effectively reduces entrained water droplets from the air discharge to less than 0.001% of the spray water flow rate.

The eliminators are constructed of non-corrosive PVC with a multi-pass design for maximum drift reduction. They are assembled in modular sections for easy removal and access to the water distribution system.

In addition to reducing drift, the eliminators also function as effective debris screens which protect the spray system from sunlight and debris.



*LSWE and LRWB Drift Eliminator*



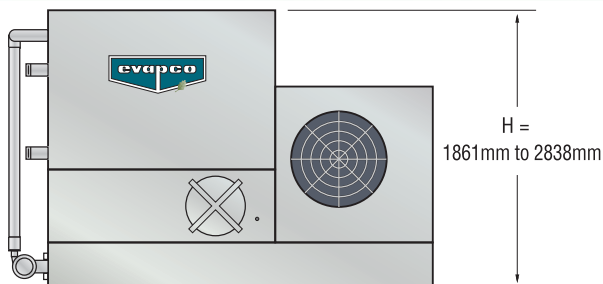
*Drift Eliminators Removed for Coil Inspection*

# Specific Design Features

## LRWB Reduced Height and Maintenance Accessibility

The LRWB has been designed to satisfy installation requirements where height limits must be observed. The lower profile design of the LRWB does not, however, sacrifice maintenance accessibility for reduced height. Its unique casing design allows the water distribution system, cold water basin, fan section and other unit components to be easily maintained.

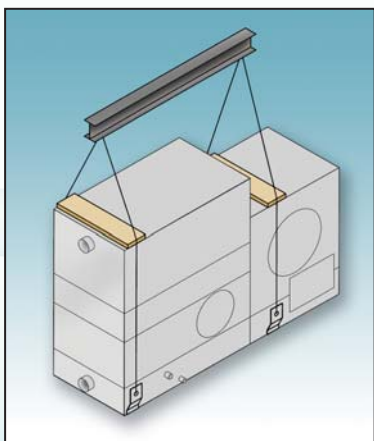
Small, light-weight sections of the drift eliminators can be easily removed to access the water distribution system. A large circular access door is located on the side of the cold water basin to allow adjustment of the float assembly, removal of the stainless steel strainers and cleaning of the basin. The fan motor and drive system are located at one end of the unit and are completely accessible by removing the inlet screens. Routine bearing lubrication and belt tensioning can be performed from the exterior of the unit without removing the inlet screens.



## Low Installed Costs

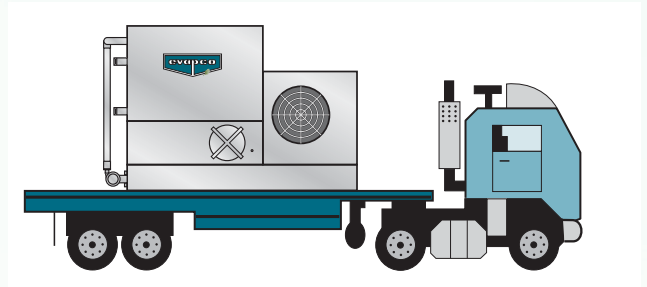
The compact, unitary design of the LRWB closed circuit cooler allows it to be shipped completely assembled. This results in lower transportation costs and no assembly requirements at the job site.

**NOTE: Options such as sound attenuation and discharge hoods will require additional lifts and some minor assembly.**



## Transport of a Pre-Assembled Unit

Since the LRWB ships fully assembled, it is ideal for truck-mounted applications, for remote sites or temporary installations.



## Integral Fan Enclosure for Lower Sound

The LRWB comes standard with an integral fan enclosure that reduces sound levels by 2dB(A). This 3-sided enclosure also protects the fan and drive system for longer equipment life.





## SMART SHIELD® Solid Chemical Water Treatment System



The LSWE/LRWB is available with EVAPCO's **Factory Mounted** water treatment systems. EVAPCO offers a solid chemical solution for water treatment to maintain your heat transfer efficiency and extend the life of the equipment. Each system has been specifically designed for your cooler.

EVAPCO's Water Systems offer LSWE/LRWB owners a single-source of responsibility for equipment, water treatment, and service. Smart Shield® is manufactured and warranted by EVAPCO.

Benefits of adding an EVAPCO water treatment system include:

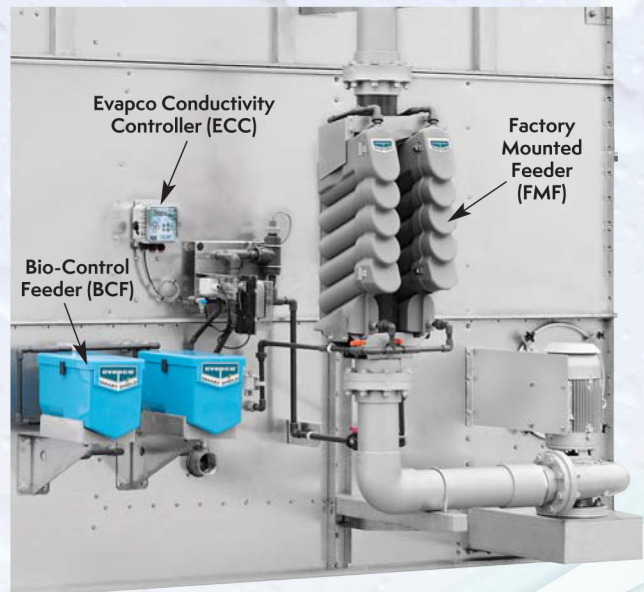
- **SAVES MONEY** by simplifying commission:
  - Single power connection is the only field installation requirement
- **Factory Mounting** your water treatment system ensures that it is installed to factory specifications.
- **Patented self-draining piping** eliminates the need for line insulation and heat tracing above the overflow level.
- **A Factory Authorized Service Partner** provides the first year of water system service and monitoring, to ensure proper operation and ongoing success.
- **Conductivity control package** maximizes water efficiency and features:
  - Low maintenance non-fouling torodial probe
  - USB port for downloadable 60 day audit trail of system operation
  - Motorized blowdown valve that provides the most reliable bleed control with power open / spring return operation.

EVAPCO's **Smart Shield®** system utilizes proven solid chemistry delivered via our revolutionary feed system. Patented controlled release scale and corrosion inhibitor is fed whenever your spray water pump is energized, keeping your system

protected anytime the spray water pump is operating.

**Smart Shield®** is a complete water treatment package that:

- Utilizes 'Bag in Bag' no touch chemical replenishments, making reloads easier and safer.
- Creates reduced packaging, shipping and handling providing a reduced carbon footprint compared to liquid chemicals.
- Eliminates the hazards associated with liquid chemicals, potential for liquid spills and the need for expensive feed pumps making it the easiest and safest chemical water treatment system available today.



US 8,398,850

US 8,518,271

US 9,938,161



# Stainless Steel Material Options

All LSWE and LRWB Series units are constructed with galvanized steel panels as standard. The following pages illustrate the available stainless steel construction material options for this series. Stainless steel options are available in both 304 and 316L stainless steel. Selection of these options only changes the sheet steel; optional accessories such as attenuation, discharge hoods, platforms, etc. are available in stainless steel only by special order. Stainless steel discharge hoods/attenuation have galvanized dampers with a stainless steel linkage. Accessories, coils, and fan shafts **do not** change to stainless steel with these options and are upgraded separately. The strainer in the basin is always 304 stainless steel independent of basin construction.

## LSWE

### Stainless Steel Basin up to Overflow Level Option

Includes Type 304 stainless steel basin panels up to the overflow level. All panels above the overflow, including the fan discharge cowls are G-235 galvanized steel. Centrifugal fan wheels are **not available** in stainless steel.

This is the first stage of stainless steel on the LS Series units 1.5m wide and larger. The "stainless steel basin up to overflow" option is not available on 1.2m wide models.



### Stainless Steel Water Touch Basin

All panels in the pan section in contact with the cooling water including the fan discharge cowls are constructed of Type 304 stainless steel. Remainder of unit constructed of G-235 galvanized steel. All models with this option are furnished with epoxy coated fan wheels and shafts coated with a rust inhibitor. Centrifugal fan wheels are **not available** in stainless steel.



### Stainless Steel Water Touch Unit

All panels in contact with the cooling water including the upper casing panels are constructed of Type 304 stainless steel. All models with this option are furnished with epoxy coated fan wheels and shafts coated with a rust inhibitor. Centrifugal fan wheels are **not available** in stainless steel.

This option designates the entire water section as stainless. Note that the fan housings and supports are still galvanized in this option.



### All Stainless Steel Except Fans Option

All panels including the fan housings and supports are constructed of Type 304 stainless steel. All models with this option are furnished with epoxy coated fan wheels and shafts coated with a rust inhibitor. Centrifugal fan wheels are **not available** in stainless steel.



# Stainless Steel Material Options

## LRWB

### Stainless Steel Cold Water Basin

This option consists of the lowest section of the unit as highlighted in the photograph to the right. On all LRWB units, the fan side inlet screens are PVC coated. Fan Screens are galvanized.



### Stainless Steel Water Touch Basin

All panels in the pan section in contact with the cooling water including the fan discharge cowls are constructed of Type 304 stainless steel. Remainder of unit constructed of G-235 galvanized steel.

All models with this option are furnished with epoxy coated fan wheels and shafts coated with a rust inhibitor. Centrifugal fan wheels are **not available** in stainless steel. Fan Screens are galvanized.

**NOTE: LRWB models have carbon steel coils, which are hot dip galvanized after fabrication as standard.**



### Stainless Steel Water Touch Unit

All panels in contact with the cooling water including the upper casing panels are constructed of Type 304 stainless steel. All models with this option are furnished with epoxy coated fan wheels and shafts coated with a rust inhibitor. Centrifugal fan wheels are **not available** in stainless steel. Fan Screens are galvanized. This option designates the entire water section as stainless.



### All Stainless Steel Option (Excluding Fans/Coils)

All panels including the fan housings and supports are constructed of Type 304 stainless steel. All models with this option are furnished with epoxy coated fan wheels and shafts coated with a rust inhibitor. Centrifugal fan wheels are **not available** in stainless steel. Fan Screens are stainless steel.



# Coil Connection Options



## Beveled For Weld (BFW) Coil Connections

EVAPCO Closed Circuit Coolers are provided with Beveled For Weld (BFW) coil connections as standard. Beveled edges simplify field welding and allow welds to fully penetrate.



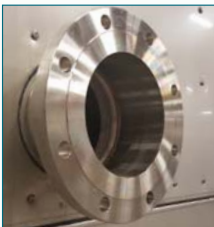
## Optional Factory Mounted Crossover Piping

Some EVAPCO Closed Circuit Coolers are design for "series flow" coil operation where the coils inside of one cell are operated in series. These units are denoted by a "-Z" following the unit model number. These units require "crossover piping" from one coil to the other. As an option, this piping can be installed in the factory for simplified field installation.



## Optional Grooved Coil Connections

Grooved connections can be provided as an optional coil connection. The groove allows for a mechanical coupling allowing for faster and easier field piping.



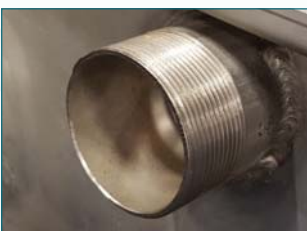
## Optional Flanged Coil Connections

150# (PN20) Raised Faced Flanged connections can be provided as an optional coil connection. The flanged coil connection allows for faster and easier field piping to a mating flanged connection. 300# (PN50) flanged can be provided in some cases. Please see your local sales representative.



## Optional Nitrogen Charged Coils

For projects requiring long term storage or ocean freight, coils can be nitrogen charged at the factory to prevent corrosion inside of the coil circuits.



## Optional Male Pipe Thread (MPT) Coil Connections

Male Pipe Thread (MPT) connections can be provided as an optional connection for mating with Female Pipe Thread (FPT) piping.

**NOTE: All coil connections are constructed from the same material as the coil.**



# Low Sound Solutions

## Sound Attenuation Packages

The centrifugal fan design of the LSWE and LRWB models operate at lower sound levels which make these units preferable for installations where noise is a concern. For sound-sensitive applications, the LSWE and LRWB centrifugal fan models may be supplied with various stages of intake and/or discharge attenuation packages which further reduce sound levels.

Consult the factory for certified sound data for each sound attenuation option.

**NOTE: Sound attenuation packages may require oversized fan motors.**

## Fan Side Inlet Attenuation (LRWB Only)

Reduces sound radiated from the fan side air intakes and has an open side to allow for air entry. **This attenuation package ships loose to be mounted in the field on each side of the closed circuit cooler over the fan intakes.**

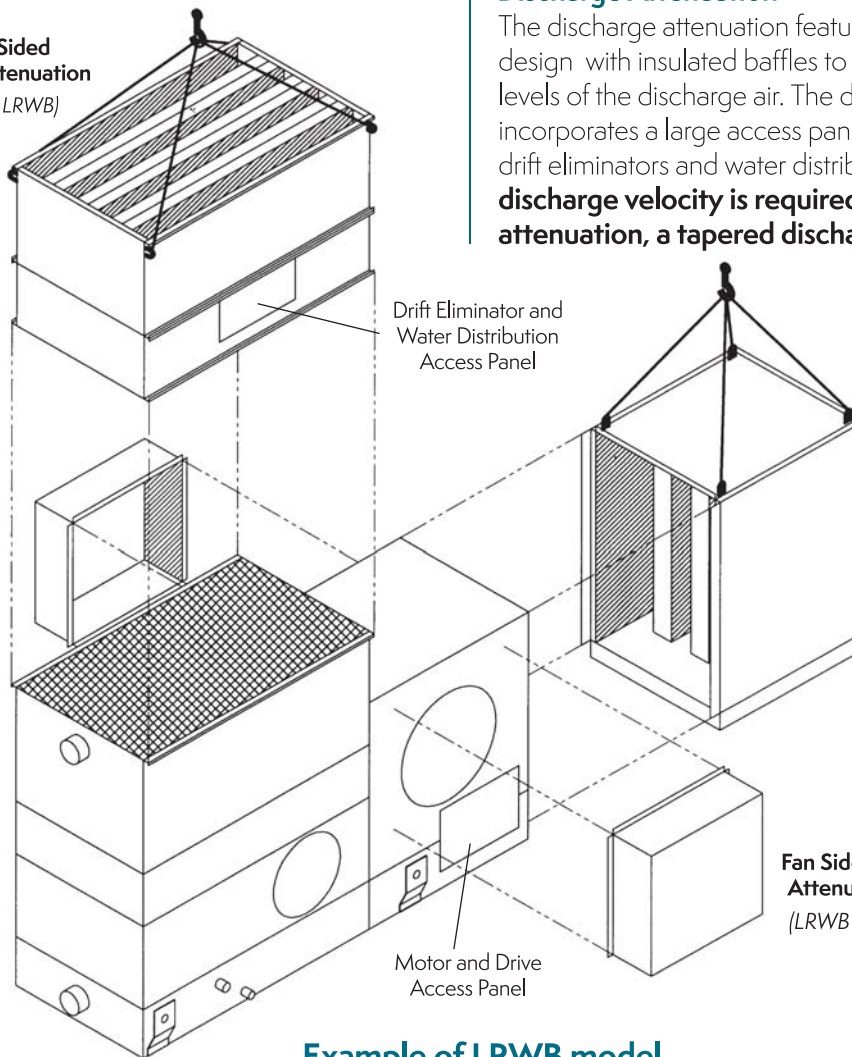
## Fan End Inlet Attenuation

Reduces sound radiated through the end air intakes. It consists of baffled panels that change the path of the air entry and capture the radiated noise thus reducing the overall sound levels generated. In addition, the external belt adjustment mechanism is extended through the inlet attenuator to allow for easy adjustment without having to enter the unit. Solid bottom panels are included with this option to force the inlet air through the attenuator.

## Discharge Attenuation

The discharge attenuation features a straight-sided design with insulated baffles to reduce the overall sound levels of the discharge air. The discharge attenuation incorporates a large access panel to allow entry to the drift eliminators and water distribution system. **If a higher discharge velocity is required with minimal sound attenuation, a tapered discharge hood is available.**

**Straight Sided Discharge Attenuation**  
(LSWE and LRWB)



**Example of LRWB model**

# LSWE Discharge & Intake Attenuation

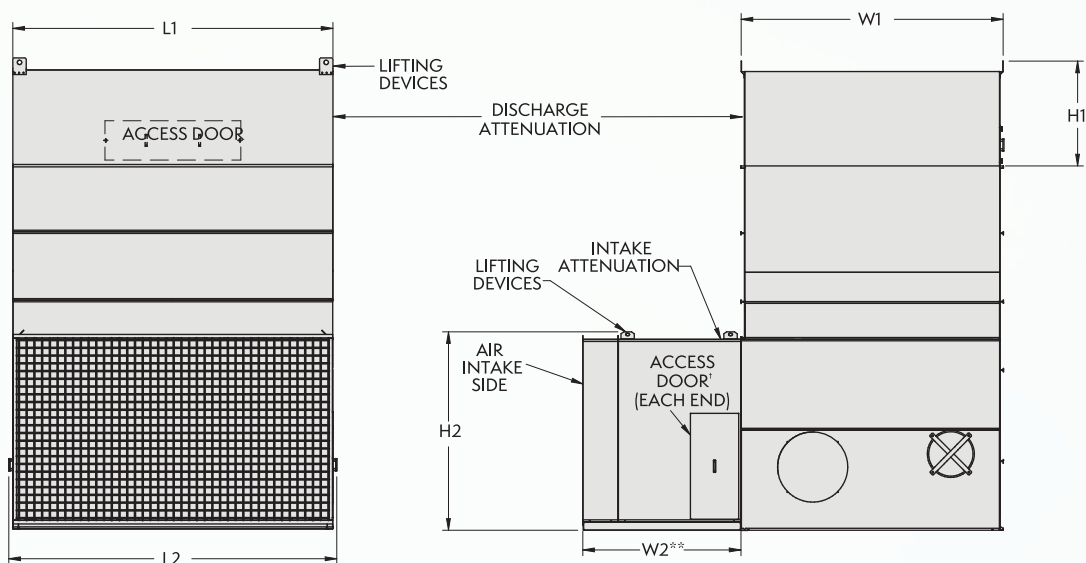
## LSWE Discharge Attenuation Dimensions\*

Model No.	H1 (mm)	L1 (mm)	W1 (mm)	Weight per Attenuator (kg)	Number of Attenuator
LSWE 4 x 6	1194	1826	1156	255	1
LSWE 4 x 9	1194	2724	1156	340	1
LSWE 4 x 12	1194	3645	1156	455	1
LSWE 4 x 18	1194	5486	1156	620	1
LSWE 5 x 12	1194	3645	1572	550	1
LSWE 5 x 18	1194	5486	1572	755	1
LSWE 8P x 12	1813	3651	2343	1040	1
LSWE 8P x 18	1813	5486	2343	1415	1
LSWE 8P x 24	1813	3651	2343	1040	2
LSWE 8P x 36	1813	5486	2343	1415	2
LSWE 10 x 12	1813	3645	3023	1230	1
LSWE 10 x 18	1813	5486	3023	1670	1
LSWE 10 x 24	1813	3645	3023	1230	2
LSWE 10 x 36	1813	5486	3023	1670	2

## LSWE Intake Attenuation Dimensions\*

Model No.	H2 (mm)	L2 (mm)	Weight Per Compact (kg)	Weight Per Basic (kg)	Weight Per Extended (kg)	Number of Attenuator
LSWE 4 x 6	1010	1895	275	345	445	1
LSWE 4 x 9	1010	2819	395	485	610	1
LSWE 4 x 12	1010	3740	510	615	775	1
LSWE 4 x 18	1010	5582	795	935	1145	1
LSWE 5 x 12	1175	3740	625	710	840	1
LSWE 5 x 18	1175	5582	965	1075	1235	1
LSWE 8P x 12	2070	3743	825	965	1175	1
LSWE 8P x 18	2070	5582	1255	1440	1715	1
LSWE 8P x 24	2070	3693	825	960	1160	2
LSWE 8P x 36	2070	5534	1270	1440	1695	2
LSWE 10 x 12	2261	3747	915	1055	1260	1
LSWE 10 x 18	2261	5588	1245	1485	1835	1
LSWE 10 x 24	2261	3696	920	1050	1245	2
LSWE 10 x 36	2261	5540	1425	1585	1820	2

\* Attenuation dimensions may vary slightly from catalog. See factory certified prints for exact dimensions.



LSWE Attenuation

\*\* Measurements for W2 will vary based on selected attenuation (Compact, Basic, or Extended).

† Please note the Compact option has NO access door.

W2 Variations (mm)	
Compact	1143
Basic	1410
Extended	1813

**NOTE:** Intake sound attenuation must be fully supported. If the recommended steel support is being used a third I-beam is required for the intake attenuation. Refer to page 22.

**NOTE:** Sound attenuation packages may require oversized fan motors.

# LRWB Discharge & Intake Attenuation

## LRWB Discharge Attenuation Dimensions\*

Model No.	H1 (mm)	L1 (mm)	W1 (mm)	Weight per Attenuator (kg)	Number of Attenuator
LRWB 3 x 6	1102	1822	1029	305	1
LRWB 5 x 6	1102	1822	1540	385	1
LRWB 5 x 9	1102	2724	1540	530	1
LRWB 5 x 12	1102	3648	1540	905	1
LRWB 8 x 9	1102	2724	2388	710	1
LRWB 8 x 12	1102	3648	2388	920	1

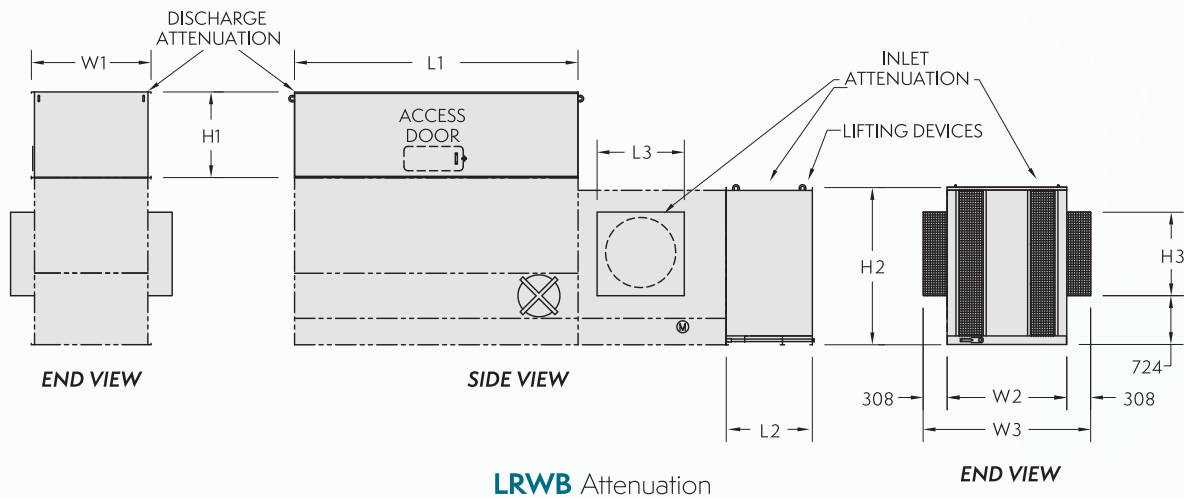
## LRWB Fan End Attenuation Dimensions\*

Model No.	H2 (mm)	L2 (mm)	W2 (mm)	Weight per Attenuator (kg)	Number of Attenuator
LRWB 3 x 6	1622	1029	1108	365	1
LRWB 5 x 6	2022	1540	1105	580	1
LRWB 5 x 9	2022	1540	1105	580	1
LRWB 5 x 12	2022	1540	1105	580	1
LRWB 8 x 9	2022	2394	1108	695	1
LRWB 8 x 12	2022	2394	1108	695	1

## LRWB Fan Side Attenuation Dimensions\*

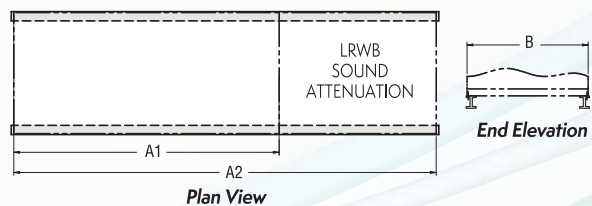
Model No.	H3 (mm)	L3 (mm)	W3 (mm)	Weight per Attenuator (kg)	Number of Attenuator
LRWB 3 x 6	854	1645	883	27	2
LRWB 5 x 6	937	2156	1372	27	2
LRWB 5 x 9	937	2156	1372	27	2
LRWB 5 x 12	937	2156	1372	27	2
LRWB 8 x 9	1076	3010	1121	27	2
LRWB 8 x 12	1076	3010	1121	27	2

\* Attenuation dimensions may vary slightly from catalog. See factory certified prints for exact dimensions.



**NOTE:** Intake sound attenuation must be fully supported. If the recommended steel support is being used, extended I-beams are required for the intake attenuation. Refer to page 22.

**NOTE:** Sound attenuation packages may require oversized fan motors.





# Freeze Protection and Heat Loss

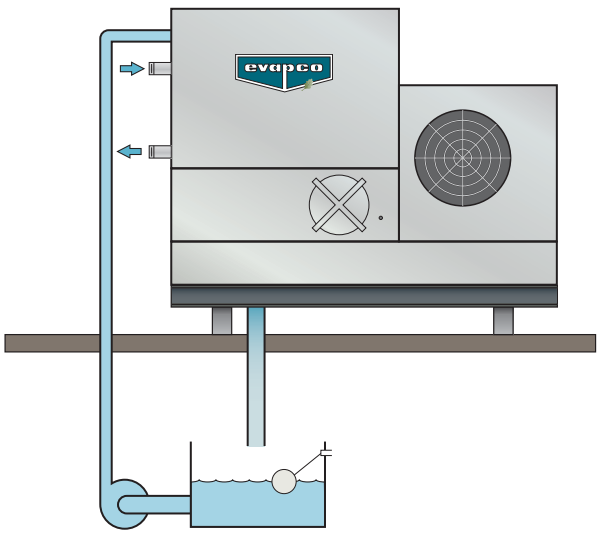
## Freeze Protection

If the units are installed in a cold climate and operated year-round, freeze protection must be provided for the heat exchanger coil in the unit as well as for the recirculating water system.

## Recirculating Water System Freeze Protection Options

### Remote Sump Configuration

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. **When a remote sump arrangement is selected, the spray pump is provided by others and installed at the remote sump.** All water in the closed circuit cooler basin should drain to the remote sump when the spray pump cycles off.



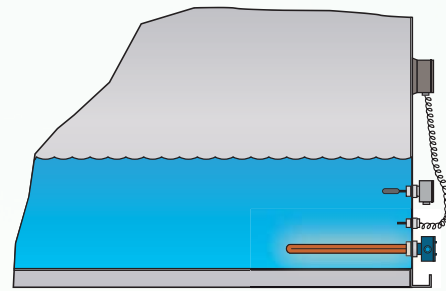
### Steam/Hot Water Coils

Steam or hot water coils are available as an alternative to using electric basin heaters or a remote sump. Constructed of galvanized pipe, the coils are installed in the closed circuit cooler basin, and are ready for piping to an external hot water source. **Controls for steam/hot water coils are provided by others and should be interlocked with the water circulating pump to prevent their operation when the pump is energized.**

## Basin Heater Package

If a remote sump configuration is not practical, electric basin heater packages are available to keep the pan water from freezing when the unit cycles off. Water lines to and from the unit, spray pump and related piping should be heat traced and insulated up to the overflow level to protect from freezing. **Basin heaters should be interlocked with the water circulating pump to prevent their operation when the pump is energized.**

This unit should not be operated dry (fans on, pump off) unless the basin is completely drained or the heaters have been oversized and the unit has been designed for dry operation. Consult the factory when dry operation is a requirement.



## LSWE Basin Heater Sizing

Model No.	kW (-18°C)	kW (-28°C)	kW (-40°C)
LSWE 4 x 6	(1) 2	(1) 3	(1) 4
LSWE 4 x 9	(1) 3	(1) 4	(1) 5
LSWE 4 x 12	(1) 3	(1) 5	(1) 7
LSWE 4 x 18	(1) 5	(1) 7	(1) 9
LSWE 5 x 12	(1) 4	(1) 6	(1) 8
LSWE 5 x 18	(2) 3	(2) 4	(1) 12
LSWE 8P x 12	(1) 5	(1) 8	(1) 10
LSWE 8P x 18	(2) 4	(2) 6	(2) 7
LSWE 8P x 24	(2) 5	(2) 7	(2) 10
LSWE 8P x 36	(2) 7	(2) 12	(2) 15
LSWE 10 x 12	(1) 7	(1) 10	(1) 15
LSWE 10 x 18	(2) 5	(2) 7	(2) 10
LSWE 10 x 24	(2) 7	(2) 10	(2) 15
LSWE 10 x 36	(2) 10	(4) 7	(4) 9

## LRWB Basin Heater Sizing

Model No.	kW (-18°C)	kW (-28°C)	kW (-40°C)
LRWB 3 x 6	(1) 2	(1) 3	(1) 4
LRWB 5 x 6	(1) 3	(1) 5	(1) 6
LRWB 5 x 9	(1) 4	(1) 6	(1) 8
LRWB 5 x 12	(1) 6	(1) 8	(1) 12
LRWB 8 x 9	(1) 7	(1) 9	(1) 12
LRWB 8 x 12	(1) 9	(1) 12	(1) 16

# Freeze Protection and Heat Loss

## Heat Exchanger Coil Freeze Protection Options

The simplest and most foolproof method of protecting the heat exchanger coil from freeze-up is to use a glycol solution. If this is not possible, an auxiliary heat load must be maintained on the coil at all times so that the water temperature does not drop below 10°C when the cooler is shut down and, a minimum recommended flow rate per unit as shown in the table below must be maintained. Refer to Heat Loss Data Table on page 21 for heat loss data.

### LSWE Minimum Flows for Freeze Protection

Model No.	Minimum Flow for Freeze (l/s)	
	Standard Unit	Series Flow Unit (-Z)
LSWE 4 x 6	4.2	2.1
LSWE 4 x 9	4.2	2.1
LSWE 4 x 12	4.2	2.1
LSWE 4 x 18	4.2	2.1
LSWE 5 x 12	5.9	3.0
LSWE 5 x 18	5.9	3.0
LSWE 8P x 12	9.3	4.7
LSWE 8P x 18	9.3	4.7
LSWE 8P x 24	18.7	9.3
LSWE 8P x 36	18.7	9.3
LSWE 10 x 12	11.9	5.9
LSWE 10 x 18	11.9	5.9
LSWE 10 x 24	23.7	11.9
LSWE 10 x 36	23.7	11.9

### LRWB Minimum Flows for Freeze Protection

Model No.	Minimum Flow for Freeze (l/s)	
	Standard Unit	Series Flow Unit (-Z)
LRWB 3 x 6	3.8	1.9
LRWB 5 x 6	5.9	3.0
LRWB 5 x 9	5.9	3.0
LRWB 5 x 12	5.9	3.0
LRWB 8 x 9	9.3	4.7
LRWB 8 x 12	9.3	4.7

If an anti-freeze solution is not used, the coil must be drained immediately whenever the pump is shut down or flow stops. Care must be taken to ensure that the piping is sized to allow the water to flow quickly from the coil. This method of freeze control should only be used in an emergency situation. Coils should not be drained for an extended period of time. Leaving the coil drained and open to the atmosphere can cause corrosion inside the tubes which may lead to premature coil failure.

The amount of glycol required for a system will depend upon the total volume of water in the closed loop and the winter ambient conditions for the installation. The engineering data tables presented on pages 24-41 provide the water volume contained inside the cooler coils to assist in this calculation.

## Discharge Hoods with Positive Closure Dampers

When a closed circuit cooler is used in a water-to-air heat pump system or in certain process cooling applications, a method of reducing the heat loss during idle periods of wintertime operation may be required. **For these cases, an optional discharge hood with positive closure dampers and damper actuator is available.**

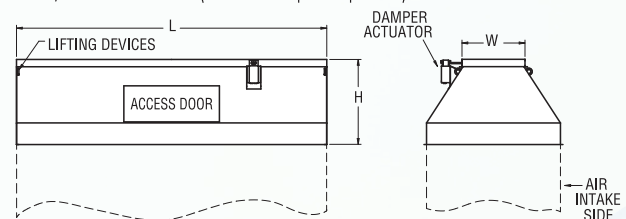
The discharge hood with dampers is designed to minimize the heat loss from convective airflow through an idle cooler. Further reductions in heat loss may be obtained with the addition of insulation to the hood and casing, minimizing conductive heat losses. **Optional insulation may be factory-installed on the hood and casing or field-installed by an insulation contractor.**

The discharge hood and dampers are constructed of hot-dip galvanized steel as standard. Hoods are equipped with access panels to facilitate maintenance on the eliminators and water distribution system. The dampers, damper actuator and linkage are all factory-assembled. **Actuator controls and wiring are field-supplied by others. Damper actuators require 120 volt power supply. Stainless steel discharge hoods with galvanized positive closure dampers are available as an optional accessory.**

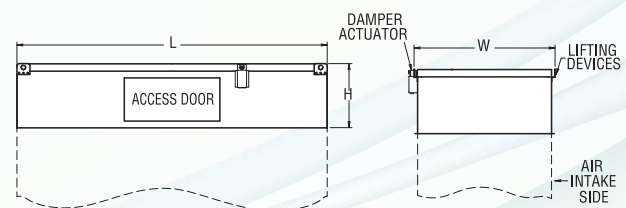
The system control sequence should provide for dampers to be fully open before the fans are running and closed when the fans are off; the damper actuator must be interlocked with the temperature control system for this purpose.

**When a tapered discharge hood is specified, the next larger size fan motor must be used to overcome the additional static pressure.**

Heat loss data is provided for standard units without hoods, with hoods and with hoods and insulation. Table ratings are based on 10°C water in the coil, -23°C ambient and 72km/hour winds (fan and pump off).



**Tapered Discharge Hood** (See page 21 for dimensions)



**Straight-Sided Discharge Hood** (See page 21 for dimensions)

# Heat Loss & Discharge Hood Dimensions

## LSWE Heat Loss Data

LSWE Model	Standard Unit (kW)	Unit with Hood (kW)	With Hood & Insulation (kW)
4-2x6	10.8	8.5	5.6
4-3x6	14.7	9.7	6.2
4-4x6	17.9	10.5	6.7
4-5x6	19.9	11.4	7.3
4-3x9	22.3	12.9	8.2
4-4x9	27.0	14.1	9.1
4-5x9	30.5	15.2	9.7
4-3x12	30.2	15.8	10.3
4-4x12	36.3	17.6	11.1
4-5x12	41.0	19.0	12.3
4-3x18	45.4	22.3	14.4
4-4x18	55.1	24.6	15.8
4-5x18	61.8	26.7	17.0
5-3x12	43.1	20.5	13.2
5-4x12	52.2	22.6	14.4
5-5x12	58.6	24.3	15.5
5-6x12	62.4	26.4	16.7
5-7x12	67.7	28.7	18.2
5-3x18	65.3	28.1	18.2
5-4x18	78.8	30.8	19.6
5-5x18	88.8	33.4	21.4
5-6x18	94.3	36.0	23.1
5-7x18	102.3	39.3	25.2
8-3x12	66.5	28.7	18.5
8-4x12	80.9	30.8	19.6
8-5x12	90.5	32.8	21.1
8-6x12	96.4	34.9	22.3
8-3x18	91.1	38.7	24.9
8-4x18	110.2	41.3	26.4
8-5x18	137.1	44.0	28.1
8-6x18	146.2	46.6	29.9
8-7x18	158.5	50.7	32.5

LSWE Model	Standard Unit (kW)	Unit with Hood (kW)	With Hood & Insulation (kW)
8-3x24	133.0	57.4	36.9
8-4x24	161.7	61.5	39.3
8-5x24	181.1	65.6	42.2
8-6x24	192.8	69.7	44.5
8-7x24	208.9	75.6	48.3
8-3x36	201.6	77.4	49.8
8-4x36	244.4	82.6	52.7
8-5x36	274.2	87.9	56.3
8-6x36	292.4	93.2	59.8
8-7x36	317.0	101.1	64.8
10-3x12	86.1	31.9	20.2
10-4x12	104.3	34.3	22.0
10-5x12	117.2	36.6	23.4
10-6x12	124.8	39.3	25.2
10-7x12	135.4	42.8	27.5
10-3x18	130.4	41.9	26.7
10-4x18	157.9	44.8	28.7
10-5x18	177.3	48.1	30.8
10-6x18	188.7	51.3	32.8
10-7x18	204.5	55.7	35.7
10-3x24	172.3	63.6	40.7
10-4x24	208.6	68.6	44.0
10-5x24	234.1	73.5	46.9
10-6x24	249.3	78.2	50.1
10-7x24	270.1	85.0	54.5
10-3x36	254.9	83.5	53.3
10-4x36	315.9	90.0	57.4
10-5x36	354.5	96.1	61.5
10-6x36	377.7	102.3	65.3
10-7x36	409.3	111.0	70.9

## LRWB Heat Loss Data

LRWB Model	Standard Unit (kW)	Unit with Hood (kW)	With Hood & Insulation (kW)
3-2x6	9.7	8.5	6.4
3-3x6	13.5	10.5	6.7
3-4x6	15.8	11.4	7.3
3-5x6	18.2	12.3	7.9
5-2x6	15.2	12.9	8.5
5-3x6	21.1	13.2	8.8
5-4x6	25.5	14.4	9.1
5-5x6	28.7	15.5	10.0
5-3x9	32.2	17.3	11.1
5-4x9	39.0	18.8	12.0
5-5x9	43.7	20.2	12.9
5-6x9	46.6	21.4	13.8
5-7x9	47.5	25.2	16.1
5-3x12	43.1	21.7	13.8
5-4x12	52.2	23.4	14.9
5-5x12	58.6	24.9	16.1
5-6x12	62.4	26.7	17.3
5-7x12	63.6	31.4	19.9
8-3x9	49.8	22.6	14.4
8-4x9	60.1	24.3	15.5
8-5x9	67.7	26.1	16.7
8-6x9	72.1	27.5	17.9
8-7x9	73.3	32.2	20.8
8-3x12	66.8	27.5	17.6
8-4x12	80.9	29.6	18.8
8-5x12	90.8	31.4	20.2
8-6x12	96.7	33.4	21.4
8-7x12	98.4	39.0	24.9

## Discharge Hood Dimensions

### LSWE Tapered Discharge Hood Dimensions

Model No.	H (mm)	L (mm)	W (mm)	Weight per Hood (kg)	Number of Hoods
LSWE 4 x 6	838	1826	537	95	1
LSWE 4 x 9	838	2724	537	125	1
LSWE 4 x 12	838	3645	537	160	1
LSWE 4 x 18	838	5486	537	220	1
LSWE 5 x 12	1003	3645	740	205	1
LSWE 5 x 18	1003	5486	740	280	1
LSWE 8P x 12	1083	3651	1159	280	1
LSWE 8P x 18	1083	5486	1159	380	1
LSWE 8P x 24	1083	3651	1159	280	2
LSWE 8P x 36	1083	5486	1159	380	2
LSWE 10 x 12	1280	3648	1476	350	1
LSWE 10 x 18	1280	5486	1476	480	1
LSWE 10 x 24	1280	3648	1476	350	2
LSWE 10 x 36	1280	5486	1476	480	2

### LSWE Straight-Sided Discharge Hood Dimensions

Model No.	H (mm)	L (mm)	W (mm)	Weight per Hood (kg)	Number of Hoods
LSWE 4 x 6	762	1826	1156	80	1
LSWE 4 x 9	762	2724	1156	115	1
LSWE 4 x 12	762	3645	1156	135	1
LSWE 4 x 18	762	5486	1156	180	1
LSWE 5 x 12	762	3645	1575	150	1
LSWE 5 x 18	762	5486	1575	225	1
LSWE 8P x 12	762	3651	2426	205	1
LSWE 8P x 18	762	5486	2426	280	1
LSWE 8P x 24	762	3651	2426	205	2
LSWE 8P x 36	762	5486	2426	280	2
LSWE 10 x 12	762	3648	3026	285	1
LSWE 10 x 18	762	5493	3026	390	1
LSWE 10 x 24	762	3648	3026	285	2
LSWE 10 x 36	762	5493	3026	390	2

### LRWB Tapered Discharge Hood Dimensions

Model No.	H (mm)	L (mm)	W (mm)	Weight per Hood (kg)	Number of Hoods
LRWB 3 x 6	622	1826	483	105	1
LRWB 5 x 6	997	1826	737	175	1
LRWB 5 x 9	997	2724	737	235	1
LRWB 5 x 12	997	3648	737	310	1
LRWB 8 x 9	1080	2724	1080	355	1
LRWB 8 x 12	1080	3648	1080	440	1

### LRWB Straight-Sided Discharge Hood Dimensions

Model No.	H (mm)	L (mm)	W (mm)	Weight per Hood (kg)	Number of Hoods
LRWB 3 x 6	749	1826	1029	170	1
LRWB 5 x 6	749	1826	1540	215	1
LRWB 5 x 9	749	2724	1540	310	1
LRWB 5 x 12	749	3648	1540	390	1
LRWB 8 x 9	749	2724	2388	445	1
LRWB 8 x 12	749	3648	2388	565	1



# Steel Support

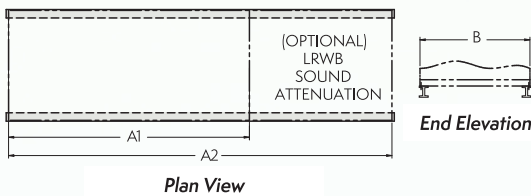
## Steel Support

The recommended support for EVAPCO Closed Circuit Coolers is structural I-beams located under the outer flanges and running the entire length of the unit. Mounting holes 19mm 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 1/360 of unit length, not to exceed 13mm 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.

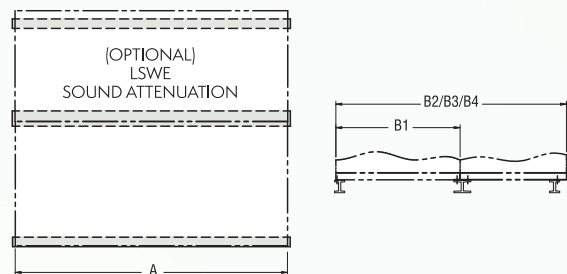
## LRWB Dimensions

Model No.	A1 (mm) (Unit Only)	A2 (mm) (Unit with Intake Atten.)	B (mm)
LRWB 3 x 6	3096	4207	1029
LRWB 5 x 6	3731	4842	1540
LRWB 5 x 9	4629	5740	1540
LRWB 5 x 12	5553	6664	1540
LRWB 8 x 9	4629	5740	2388
LRWB 8 x 12	5553	6664	2388



## LSWE Dimensions

Model No.	B1 (mm) (Unit Only)	B2 (mm) (Compact Option)	B3 (mm) (Basic Option)	B4 (mm) (Extended Option)	A (mm)
LSWE 4 x 6	1235	2378	2648	3048	1826
LSWE 4 x 9	1235	2378	2648	3048	2724
LSWE 4 x 12	1235	2378	2648	3048	3645
LSWE 4 x 18	1235	2378	2648	3048	5486
LSWE 5 x 12	1651	2794	3064	3453	3645
LSWE 5 x 18	1651	2794	3064	3453	5483
LSWE 8P x 12	2388	3531	3800	4188	3651
LSWE 8P x 18	2388	3531	3800	4188	5486
LSWE 8P x 24	2388	3531	3800	4188	7341
LSWE 8P x 36	2388	3531	3800	4188	11011
LSWE 10 x 12	2991	4134	4404	4791	3651
LSWE 10 x 18	2991	4134	4404	4791	5493
LSWE 10 x 24	2991	4134	4404	4791	7344
LSWE 10 x 36	2991	4134	4404	4791	11027



## Optional Equipment

### Electric Water Level Control

Closed Circuit Coolers may be ordered with an electric water level control in lieu of the standard mechanical float and make-up assembly. This package provides accurate control of water levels and does not require field adjustment.



### Bottom Screens

Protective inlet screens are provided on the sides and/or end of the unit's air intake. Screens are not provided below the fan section since most units are mounted on the roof or at ground level. It is recommended that bottom screens be added to the unit when it will be elevated. These screens can be provided by the factory at an additional cost or added by the installing contractor.

### Solid Bottom Panels for Ducted Installations

When centrifugal fan units are installed indoors and intake air is ducted to the unit, a solid bottom panel is required to completely enclose the fan section and prevent the unit from drawing air from the room into the fan intakes. When this option is ordered, air inlet screens are omitted and the next larger size fan motor must be used to overcome the additional static pressure.

# General Information

## Design

EVAPCO closed circuit coolers 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 cooler are 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 closed circuit coolers 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 unit 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.

Good engineering practice dictates that the closed circuit cooler discharge air not be directed or located close to or in the vicinity of building air intakes.

## Piping

Cooler 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.

The standard closed circuit cooler is recommended only on a closed, pressurized system. The piping system should include an expansion tank to allow for fluid expansion and purging air from the system.

**NOTE: Closed circuit coolers should never be used on an open type system. An open type system with a cooler may result in premature coil failure.**

The piping system should be designed to permit complete drainage of the heat exchanger coil. This will require a vacuum breaker or air vent to be installed at the high point and a drain valve installed at the low point of the piping system. Both must be adequately sized.

All piping should be securely anchored by properly designed hangers and supports. No external loads should be placed upon the cooler connections, nor should any of the pipe supports be anchored to the cooler framework.

## Recirculating Water Quality

Proper water treatment is an essential part of the maintenance required for evaporative cooling equipment. A well designed and consistently implemented water treatment program will help to ensure efficient system operation while maximizing the equipment's service life. **If EVAPCO factory mounted water systems are not utilized**, a qualified water treatment company should design a site specific water treatment protocol based on equipment (including all metallurgies in the cooling system), location, makeup water quality, and usage.

## Bleed off

Evaporative cooling equipment requires a bleed or blowdown line, located on the discharge side of the recirculating pump, to remove concentrated (cycled up) water from the system. EVAPCO recommends an automated conductivity controller to maximize the water efficiency of your system. **If EVAPCO factory mounted water systems are not utilized**, based on recommendations from your water treatment company, the conductivity controller should open and close a motorized ball or solenoid valve to maintain the conductivity of the recirculating water. If a manual valve is used to control the rate of bleed it should be set to maintain the conductivity of the recirculating water during periods of peak load at the maximum level recommended by your water treatment company.

## Water Treatment

The water treatment program prescribed for the given conditions must be compatible with the unit's materials of construction, including any galvanized components. The initial commissioning and passivation period is a critical time for maximizing the service life of galvanized equipment. EVAPCO recommends that the site specific water treatment protocol includes a passivation procedure which details water chemistry, any necessary chemical addition, and visual inspections during the first six (6) to twelve (12) weeks of operation. During this passivation period, recirculating water pH should be maintained above 7.0 and below 8.0 at all times. Batch feeding of chemicals is not recommended.

## Control of Biological Contaminants

Evaporative cooling equipment should be inspected regularly to ensure good microbiological control. Inspections should include both monitoring of microbial populations via culturing techniques and visual inspections for evidence of biofouling.

Poor microbiological control can result in loss of heat transfer efficiency, increase corrosion potential, and increase the risk of pathogens such as those that cause Legionnaires' disease. Your site specific water treatment protocol should include procedures for routine operation, startup after a shut-down period, and system lay-up, if applicable. **If excessive microbiological contamination is detected**, a more aggressive mechanical cleaning and/or water treatment program should be undertaken.







# WORLDWIDE MANUFACTURING FACILITIES



★ World Headquarters/  
Research and  
Development Center

■ EVAPCO Facilities



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

P.O. Box 1300 • Westminster, MD 21158 USA  
410.756.2600 • [marketing@evapco.com](mailto:marketing@evapco.com) • [evapco.com](http://evapco.com)

### North America

#### EVAPCO, Inc. World Headquarters

Westminster, MD USA  
410.756.2600  
[marketing@evapco.com](mailto:marketing@evapco.com)

#### EVAPCO East

Taneytown, MD USA  
410.756.2600  
[marketing@evapco.com](mailto:marketing@evapco.com)

#### EVAPCO East

Key Building  
Taneytown, MD USA  
410.756.2600  
[marketing@evapco.com](mailto:marketing@evapco.com)

#### EVAPCO Midwest

Greenup, IL USA  
217.923.3431  
[evapcomw@evapcomw.com](mailto:evapcomw@evapcomw.com)

#### EVAPCO West

Madera, CA USA  
559.673.2207  
[contact@evapcowest.com](mailto:contact@evapcowest.com)

#### EVAPCO Iowa

Lake View, IA USA  
712.657.3223

#### EVAPCO Iowa

Sales & Engineering  
Medford, MN USA  
507.446.8005  
[evapcomn@evapcomn.com](mailto:evapcomn@evapcomn.com)

#### EVAPCO Newton

Newton, IL USA  
618.783.3433  
[evapcomw@evapcomw.com](mailto:evapcomw@evapcomw.com)

#### Evapcold Manufacturing

Greenup, IL USA  
217.923.3431  
[evapcomw@evapcomw.com](mailto:evapcomw@evapcomw.com)

#### EVAPCO Dry Cooling, Inc.

Littleton, CO USA  
908.895.3236  
[info@evapcodc.com](mailto:info@evapcodc.com)  
Spare Parts: 908.895.3236  
Spare Parts: [spares@evapcodc.com](mailto:spares@evapcodc.com)

#### EVAPCO Dry Cooling, Inc.

Bridgewater, NJ USA  
908.379.2665  
[info@evapcodc.com](mailto:info@evapcodc.com)

#### EVAPCO Power México S. de R.L. de C.V.

Mexico City, Mexico  
(52) 55.8421.9260  
[info@evapcodc.com](mailto:info@evapcodc.com)

#### Refrigeration Vessels & Systems Corporation

*A wholly owned subsidiary of EVAPCO, Inc.*  
Bryan, TX USA  
979.778.0095  
[rsvs@rsvscorp.com](mailto:rsvs@rsvscorp.com)

#### EvapTech, Inc.

*A wholly owned subsidiary of EVAPCO, Inc.*  
Edwardsville, KS USA  
913.322.5165  
[marketing@evaptech.com](mailto:marketing@evaptech.com)

#### Tower Components, Inc.

*A wholly owned subsidiary of EVAPCO, Inc.*  
Ramseur, NC USA  
336.824.2102  
[mail@towercomponentsinc.com](mailto:mail@towercomponentsinc.com)

#### EVAPCO Alcoil, Inc.

*A wholly owned subsidiary of EVAPCO, Inc.*  
York, PA USA  
717.347.7500  
[info@evapco-alcoil.com](mailto:info@evapco-alcoil.com)

### Europe

#### EVAPCO Europe BVBA European Headquarters

Tongeren, Belgium  
(32) 12.39.50.29  
[evapco.europe@evapco.be](mailto:evapco.europe@evapco.be)

#### EVAPCO Europe, S.r.l.

Milan, Italy  
(39) 02.939.9041  
[evapcoeuropa@evapco.it](mailto:evapcoeuropa@evapco.it)

#### EVAPCO Europe, S.r.l.

Sondrio, Italy

#### EVAPCO Europe GmbH

Meerbusch, Germany  
(49) 2159.69560  
[info@evapco.de](mailto:info@evapco.de)

#### EVAPCO Air Solutions

*A wholly owned subsidiary of EVAPCO, Inc.*  
Aabybro, Denmark  
(45) 9824.4999  
[info@evapco.dk](mailto:info@evapco.dk)

#### EVAPCO Air Solutions GmbH

Garbsen, Germany  
(49) 5137.938750  
[info@evapcoas.de](mailto:info@evapcoas.de)

#### Evap Egypt Engineering Industries Co.

*A licensed manufacturer of EVAPCO, Inc.*  
Nasr City, Cairo, Egypt  
(202) 24044997 / (202) 24044998  
[mmanz@tiba-group.com](mailto:mmanz@tiba-group.com) /  
[hany@tiba-group.com](mailto:hany@tiba-group.com)

#### EVAPCO Middle East DMCC

Dubai, United Arab Emirates  
(971) 4.448.7242  
[info@evapco.ae](mailto:info@evapco.ae)

#### EVAPCO S.A. (Pty.) Ltd.

*A licensed manufacturer of EVAPCO, Inc.*  
Isando, South Africa  
(27) 11.392.6630  
[evapco@evapco.co.za](mailto:evapco@evapco.co.za)

### Asia Pacific

#### EVAPCO Asia Pacific Headquarters

Baoshan Industrial Zone  
Shanghai, P.R. China  
(86) 21.6687.7786  
[marketing@evapcochina.com](mailto:marketing@evapcochina.com)

#### EVAPCO (Shanghai) Refrigeration Equipment Co., Ltd.

Baoshan Industrial Zone, Shanghai, P.R. China  
(86) 21.6687.7786  
[marketing@evapcochina.com](mailto:marketing@evapcochina.com)

#### EVAPCO (Beijing) Refrigeration Equipment Co., Ltd.

Huairou District, Beijing, P.R. China  
(86) 10.6166.7238  
[marketing@evapcochina.com](mailto:marketing@evapcochina.com)

#### EVAPCO Air Cooling Systems (Jiaxing) Company, Ltd.

Jiaxing, Zhejiang, P.R. China  
(86) 573.8311.9379  
[info@evapcochina.com](mailto:info@evapcochina.com)

#### EVAPCO Australia (Pty.) Ltd.

Riverstone, NSW, Australia  
(61) 02.9627.3322  
[sales@evapco.com.au](mailto:sales@evapco.com.au)

#### EvapTech Asia Pacific Sdn. Bhd

*A wholly owned subsidiary of EvapTech, Inc.*  
Puchong, Selangor, Malaysia  
(60) 3.8070.7255  
[marketing-ap@evaptech.com](mailto:marketing-ap@evaptech.com)

### South America

#### EVAPCO Brasil

*Equipamentos Industriais Ltda.*  
Indaiatuba, São Paulo, Brazil  
(55) 11.5681.2000  
[vendas@evapco.com.br](mailto:vendas@evapco.com.br)

#### FanTR Technology Resources

Indaiatuba, São Paulo, Brazil  
(55) 11.4025.1670  
[fantr@fantr.com](mailto:fantr@fantr.com)