CLOSED CIRCUIT COOLERS

ESW4

New 8.5′ (2.5m), 12′ (3.6m) & 14′ (4.2m) Wide Unit

FEATURING

CROSScool™

INTERNALLY ENHANCED COIL TECHNOLOGY

evapco® for LIFE

FM APPROVED

CTI† CERTIFIED

ISO 9001

ISO 14001

IBC COMPLIANT DESIGNS

† Mark owned by the Cooling Technology Institute

About EVAPCO

EVAPCO for LIFE

EVAPCO is more than a name. We are the global innovator in heat transfer solutions for the commercial HVAC, industrial refrigeration, power and industrial process markets. We pledge to make everyday life easier, more comfortable, more reliable and more sustainable for people everywhere.

OUR COMMITMENT

We never stop innovating. We set out to find groundbreaking solutions that transform the way the world works for the better. It's why we have more than 50 active U.S. Patents and nearly 200 foreign counterparts. We also guarantee performance and put every solution through rigorous research and testing to ensure maximum efficiency and reliability.

PROTECTING THE ENVIRONMENT

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

Full Spectrum Global Solutions

EVAPCO provides a full spectrum of global product solutions for the Commercial HVAC, Process Cooling, Industrial Refrigeration and Power Generation markets.

From the smallest factory assembled cooling tower to the largest field erected air-cooled steam condenser, we offer heat transfer products designed to meet the water and energy requirements for any project. We are committed to providing solutions that are energy efficient and conserve water.

Our latest heat transfer solutions are the eco-Air™ Series Dry Coolers, eco-Air Series Air Cooled Condensers, and eco-Air Series Adiabatic Coolers and Condensers. The eco-Air Series completes our successful eco-family of closed circuit coolers and condensers with water-saving dry and hybrid technology.

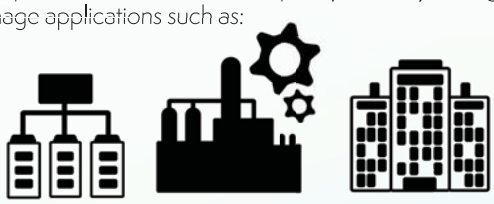
As an industry leader in independent, third-party performance certifications, our fully-rated products enable you to operate your cooling systems efficiently and with complete peace of mind.

The ESW4 series of closed circuit coolers offers unparalleled flexibility in a wide range of capacities, fan motor powers and coil options.

The new 14' x 22' (4.2m x 6.7m) ESW4 was designed to **maximize** capacity and **optimize** energy efficiency in EVAPCO's single largest closed-circuit cooler cell available.

Utilizing EVAPCO's CROSSCOOL™ internal tube enhancement and patented elliptical tube design, the 14' x 22' (4.2m x 6.7m) ESW4 provides the maximum evaporative capacity in a single factory-assembled cooler, **up to 40% more** than previous models.

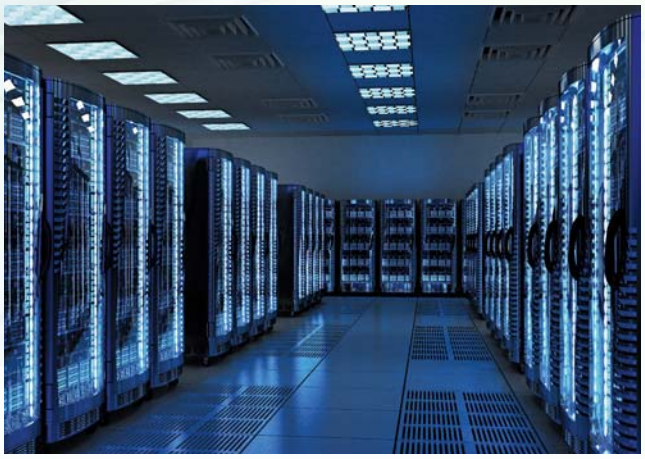
The optimized ESW4 was developed *specifically* for high tonnage applications such as:



Data Centers | Industrial Plants | Large HVAC Applications

where the end user requires the lowest energy consumption in the fewest amount of units, connections and fans.

ESW4 Applications



DATA CENTERS

INDUSTRIAL PROCESS

LARGE HVAC APPLICATIONS

To benefit these and other applications, the ESW4 is highly engineered with quality components and manufactured to exacting standards. The durable materials of construction ensure the longevity expected of EVAPCO products. The closed circuit coolers are designed in large factory-assembled sections for ease of installation and to reduce required field assembly. With the coil located outside of the air stream, heat transfer is achieved via sensible cooling, which eliminates water evaporation on the coil. This design **greatly reduces scale** build-up on the coil and, subsequently, the required downtime for maintenance. The ESW4 stands alone as being the **most energy efficient** axial fan closed circuit cooler on the market.

Features

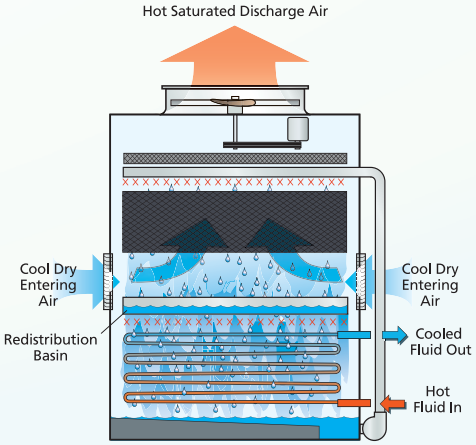
ENERGY - EFFICIENT, LOW SOUND, and CUSTOMIZABLE ESW Cooler

- OVER 1000 CTI Certified models with a wide range of tonnages (33 – 670 nominal tons) providing unmatched versatility to meet the requirements of any application.
- 8.5' (2.5m) wide models utilize an optimized coil to maximize capacity with a lower operating weight/pump powers than previous ESW models.
- 12' (3.6m) wide models are customizable with multiple pump and coil configurations, providing the optimal solution for low erengy, low weight, and footprint restrictive applications.
- Highest IBC ratings in the industry, available with upgraded construction and 1.5 Importance Factor for critical facilities.
- Available with FM Appraved Construction.
- Wide array of fan motor kW options (2.2 kW to 75 kW).
- Available with **factory-mounted** Water Treatment.
- New "Stainless Steel Cold Water Basin" option. This option provides Stainless Steel for just the cold water basin and redistribution basin.
- Now available with water silencers in the redistribution basin for the lowest sound levels.

Principle of Operation

EVAPCO was the first to develop a closed circuit cooler with Patented Optimized Technology*. The pump is energized, and water is circulated up to the water distribution system. This starts with the large orifice EvapJet™ nozzles evenly distributing water as a thin film over the extended fill surface for maximum cooling efficiency. The fan system operates simultaneously, moving large volumes of air through the unit in a direction opposite the falling water. The air and water contact directly across the fill surface whereupon a small portion of the spray water is evaporated. The warm and saturated air is then discharged from the unit dissipating heat to the atmosphere. The spray water exits the fill section as a cooled fluid where it is collected by the redistribution basin for even soaking of the coil. The hot process fluid enters the coil through the bottom coil connection(s). The heat load is rejected to the circulating water that cascades over the coil surface by means of sensible heat transfer.

*US Patent #6,598,862



Features

The ESW family stands apart as being the most energy efficient and the quietest axial fan closed circuit coolers on the market today. The ESW4 is able to provide superior performance as a result of its optimized Sensi-Coil® Technology**. The Sensi-Coil® features CROSSCOOL™ Internal Tube Enhancement that increases the internal heat transfer coefficient of the coil and thus increases the cooling capacity of the unit.

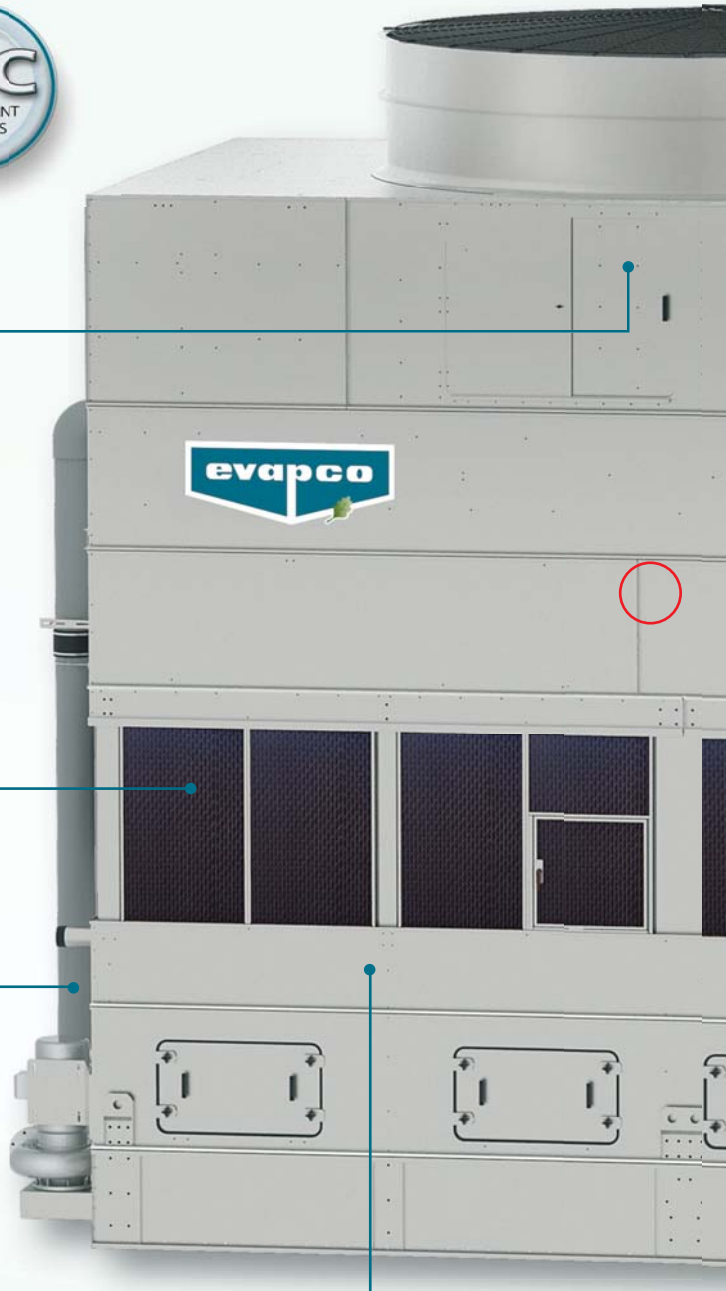
The ESW4's owner-oriented features and independent certification of the International Building Code (IBC) compliance reinforce the ESW4's position as a premier cooler in the HVAC industry.

CTI Certified Units

CTI CERTIFIED †

FM APPROVED

IBC COMPLIANT DESIGNS



Easy to Maintain Drive System

- Adjustable motor base enables the motor to swing outside the unit for easy access
- Belt tension can be easily checked and adjusted from outside the access door
- Lubrication lines are extended to the access door for added convenience

Framed WST Air Inlet Louvers (Water and Sight Tight)

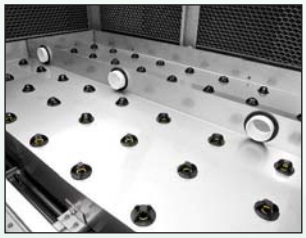
- Hardware-free louver design
- One-step removal for easy access
- Improved design to keep sunlight out – preventing biological growth
- Keeps water in while keeping dirt and debris out

U.S. Patent #7,927,196

evapco SMART SHIELD

Optional Factory Mounted Chemical Water Treatment Systems (Not Shown)

The ESW4 is available with a **Smart Shield**® solid chemical water treatment system. The **Smart Shield**® is an environmentally sensitive alternative for treating water in evaporative cooled equipment. The **Smart Shield**® system includes all components required for an effective water treatment system; factory mounted and wired. Please see "Water Treatment Solution" on page 14.



Redistribution Basin Section

- The redistribution basin ensures even water loading of the optimized ***Sensi*-Coil**®
- Large orifice nozzles prevent clogging
- Easily accessible for routine inspection

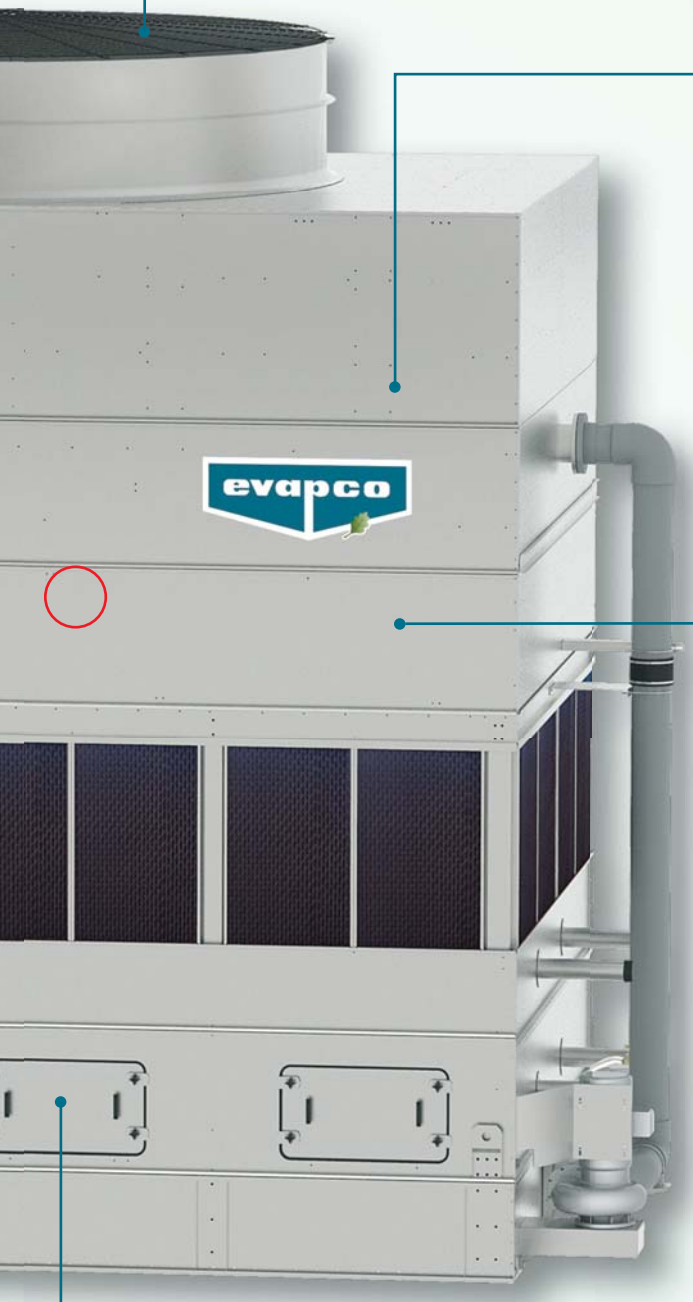
All features available on all ESW4 Models unless specified

† Mark owned by the Cooling Technology Institute

Super Low Sound Fan

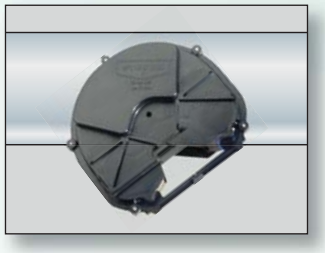
The ESW4 is available with Low Sound Solutions to reduce the overall sound generated from the top of the already quiet ESW4 Closed Circuit Cooler. Each option provides various levels of sound reduction and can be combined to provide the lowest sound level available on a closed circuit cooler.

- Select a Super Low Sound Fan for a 9 to 15 dB(A) reduction
- Select a Low Sound Fan for a 4 to 7 dB(A) reduction



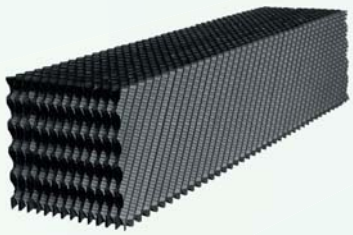
Pressurized Water Distribution System

- EvapJet™ nozzles provide thermal performance gain
- Non-corrosive PVC construction
- Large orifice nozzles prevent clogging and are threaded for easy removal and positive positioning
- Each nozzle provides a large uniform spray pattern



EVAPAK® Fill

- Induces highly turbulent mixing of the air and water for superior heat transfer
- Special drainage tips allow high water loading without excessive pressure drop
- Flame spread rating of less than 25 per ASTM E-84
- Can be used as an internal working platform

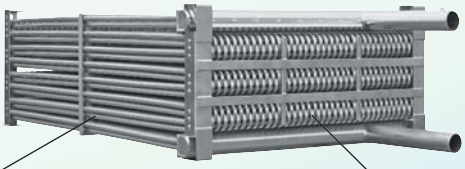


Galvanized Steel Coil

Elliptical Sensi-Coil®** Featuring CROSScool Internal Tube Enhancement Technology

- Internal Tube Enhancement increases fluid turbulence providing additional capacity
- Elliptical return bends allows for more circuits per coil bundle increasing maximum capacity per footprint
- Coil located out of airstream eliminating water evaporation on the coil, reducing scale buildup potential
- Optional Type 304L and 316 Stainless Steel Coil Available

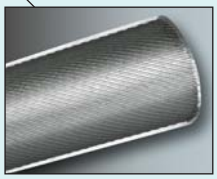
**U.S. Patent #7,296,620



Most Accessible Basin and Coil

- Convenient side access from ground level
- Large open area simplifies maintenance
- Easy access to basin floor, float assembly and pump strainer

CROSScool™ ▶
INTERNAL TUBE ENHANCEMENT



Design Benefits

Low Energy As Standard

The ESW4 product line stands alone as the most energy efficient closed circuit coolers on the market today. This efficiency, in terms of lower fan kW, translates directly to lower operating costs . . . significantly lower operating costs. With the ESW4 installed, customers can realize immediate energy savings that continue each and every year for the life of the equipment.

Low Sound As Standard

In addition to being the most energy efficient axial fan fluid coolers, the ESW4 product line is also the quietest. At a distance of 1.5 meters above the fan, the ESW4 has sound levels that are up to 13dBA less than other axial fan fluid coolers of equal capacity. Additionally, the coil sits just above the basin floor breaking the water fall and reducing water noise to the point where casual conversation is possible at only five feet from the unit … even with the fan running on high speed.

Research and Development

EVAPCO's research and development team considered the basic principles of heat transfer while developing the patented *Optimized* Technology that was used in the original ESWA closed circuit cooler. Optimized Technology combines "latent" heat transfer over the fill and "sensible" heat transfer over the coil to maximize heat transfer.

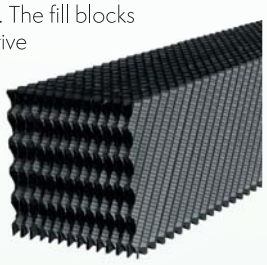
The ESW4 closed circuit cooler was developed to take Optimized Technology to the next level. The ESW4 features more capacity than ever before, up to 40%. This is accomplished by using EVAPCO's optimized **Sensi-Coil®**, featuring CROSSCOOL Internal Tube Enhancement Technology. By optimizing our coil design (US Patent # 7,296,620), and water redistribution over the coil, EVAPCO has achieved significant performance gains over the previous generation ESWB. This means more performance, a smaller footprint and less energy.

Other benefits of this unique counterflow design:

- The coil is easily piped at ground level.
- The coil is easily inspected and accessible at ground level via removable cover panels around the unit.
- Discharge hood with dampers are not required ... the dense coil pack and sheltered enclosure around the coil reduces heat loss and eliminates natural drafts across the coil.

EVAPAK® Fill

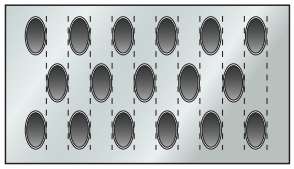
EVAPAK® fill is specially designed to induce highly turbulent mixing of the air and water for superior heat transfer. The fill media is constructed of polyvinyl chloride (PVC) sheets that are thermally formed into a cross flute design. The individual fill sheets are bonded together to form rigid fill blocks. The fill blocks are then stacked within the unit's protective casing. The structural strength of the assembled fill pack enables it to be used as a working platform.



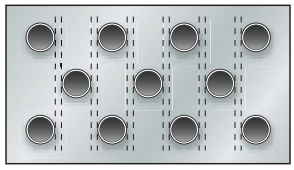
EVAPAK® fill is impervious to rot and decay, and is self-extinguishing with a flame spread rating of less than 25 per ASTM Standard 84.

Cooling Coil

The ESW4 Closed Circuit Cooler utilizes EVAPCO's **Sensi-Coil®**, featuring CROSSCOOL Internal Tube Enhancement. The **Sensi-Coil®** provides the maximum amount of Thermal-Pak® elliptical tubes packed closely together in a coil arrangement designed with over 50% additional coil surface area.

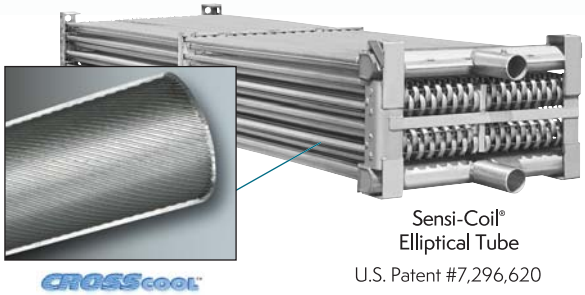


Sensi-Coil®



Round Tube Coil by Others

In addition, the **Sensi-Coil®** design utilizes elliptical return bend, coil technology. This increases the number of circuits per coil assembly, increasing the maximum cooling capacity per unit footprint. This **Sensi-Coil®** design features EVAPCO's CROSSCOOL Internal Tube Enhancement, creating more turbulence to the fluid as it passes through the coil, further increasing the evaporative capacity.



Sensi-Coil®
Elliptical Tube

U.S. Patent #7,296,620

CROSSCOOL
Internal Tube Enhancement

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. The coil shall have design pressure of 2.07 MPa and shall be in compliance with ANSI/ASME B31.5, Refrigeration Piping and Heat Transfer Components. The coil assembly shall be strength tested in accordance with ANSI/ASME B31.5 and subsequently leak tested using air under water.

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

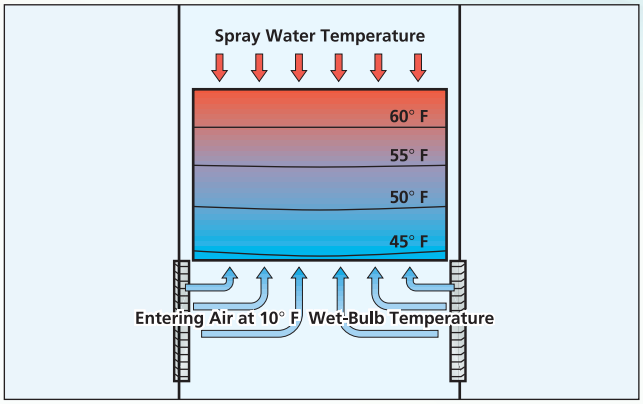
Note: Closed circuit coolers should only be used on sealed, pressurized systems. Continual aeration of the water in an open system can cause corrosion inside the tubes of the cooler leading to premature failure.

Stainless Steel Coil Option

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

Sensi-Coil®

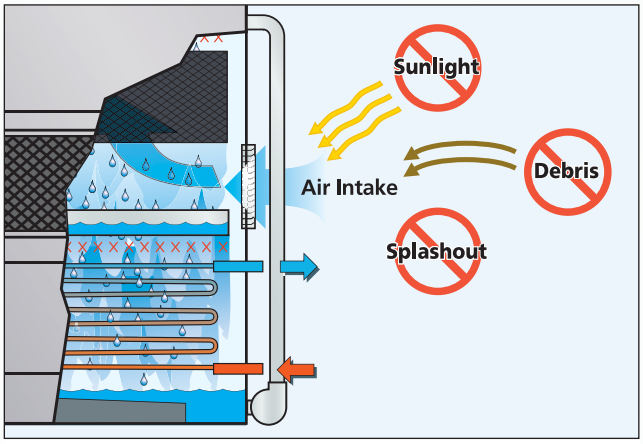
Design Benefits



Counterflow ... Optimum Design for Freezing Climates

The counterflow design of the ESW4 Closed Circuit Cooler is well suited for winter operation. The fill section is totally encased and protected from freezing temperatures, thus inhibiting ice formation on the fill section. The even temperature gradient of the counterflow design further improves winter operability by eliminating cold spots.

EVAPCO's counterflow design solves the problem of fill collapse due to ice formation.

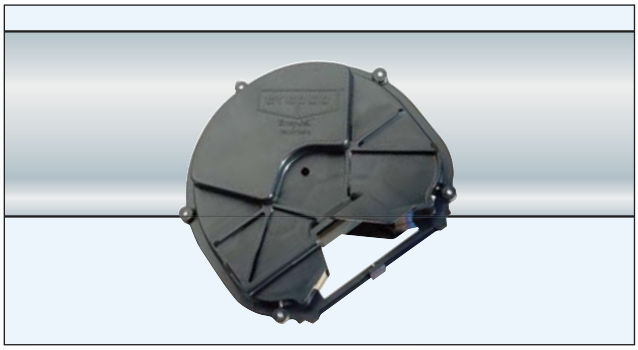


Framed Water Sight Tight Air Inlet Louver*

EVAPCO's innovative air inlet louvers are both water and sight tight to ensure that the water stays in and the sunlight stays out of the cold water basin. Using extensive computational fluid dynamics modeling, EVAPCO engineers developed a louver to improve "splash resistance" while maximizing airflow. The resulting design maximizes thermal performance while minimizing water loss. This sight tight design also inhibits algae growth more effectively than previous designs.

EVAPCO's louver design solves the problem of the circulating water and heat transfer surfaces being directly exposed to external contaminants and the harsh surroundings.

*U.S. Patent #7,927,196



Water Distribution System

The water distribution system is enclosed and completely protected by the casing panels and drift eliminators. The eliminators also function as effective debris screens that block sunlight and prevent debris from entering the spray system.

The water distribution system is made with non-corrosive materials including schedule 40 PVC pipe for its distribution system and EvapJet® nozzles.

EVAPCO's EvapJet® nozzles and water distribution system design eliminates the problems of biological growth and clogging that can occur with a system that is open to direct sunlight and the surroundings.

Redistribution Basin

The redistribution basin ensures even water loading of the optimized Sensi-Coil®. The redistribution basin is enclosed and completely protected by the air inlet louvers. The louvers also function as effective debris screens which block sunlight and prevent debris from entering redistribution system.

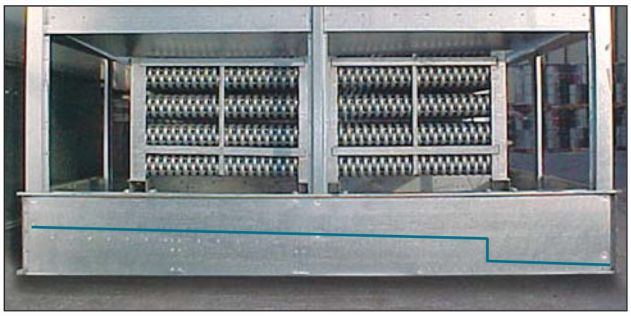
The redistribution basin is easily inspected with the removal of the framed air inlet louvers.

Maintenance Advantages

Easy Maintenance Design

The cold water basin is perhaps the most important area for maintenance in an evaporative cooler. Service mechanics who work on this equipment know that dirt, debris and silt all settle out in the basin. Because basin maintenance is important and should be performed regularly, EVAPCO designed the basin to make inspection, cleaning and flushing as easy as possible.

EVAPCO's basin is designed for quick and easy access with the following valuable features:



Efficient Drift Eliminators

The New ESW4 is 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 that protect the spray system from sunlight and debris.

Easy Access

The cold water basin section is easily accessible from ground level. The basin is provided with solid access panels that are designed to protect the basin water and heat transfer coil from direct exposure to sunlight and debris. The access panels are light-weight and easy to remove. With the access panels removed, a service mechanic has complete access to the basin floor, heat transfer coil, float assembly and pump strainer.

Clean Pan Basin Design

The basin of the ESW4 is sloped toward a depressed area where the drain is located. With the Clean Pan design, it is easy for a service mechanic to flush the pan without getting wet feet. Other fluid cooler designs may necessitate getting inside of the unit for complete cleaning.

Stainless Steel Strainers

The EVAPCO standard for many years, the 304 stainless steel strainer, is one component that is subject to excessive wear and corrosion. With stainless steel construction, this component will last the life of the unit.

Maintenance Advantages

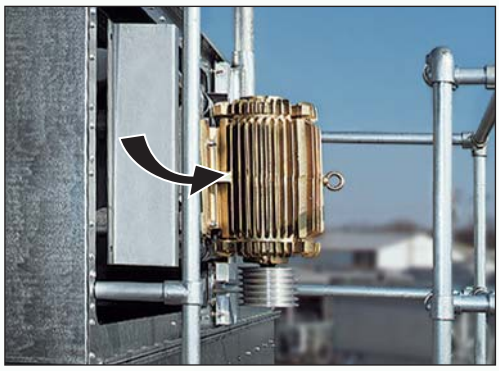
Easy Maintenance Drive System

The EVAPCO POWER-BAND drive system utilized on the ESW4 Closed Circuit Cooler is the easiest belt drive system to maintain in the industry. Unlike other designs, there is no need to enter the cold water basin and climb up the plenum for access to motors, bearings or belts. All routine and periodic maintenance on the drive system can be safely performed from the exterior of the unit.

Models with Swing-Out Motors

The fan motor is Totally Enclosed, Air Over (TEAO) and specifically designed for evaporative cooling applications. The motor is mounted inside of the unit on an adjustable base that enables the motor to swing outside the unit for easy access. The belt tension is easily checked and adjusted from outside the access door. EVAPCO provides a special tool for belt adjustment which also functions as a locking mechanism for the motor base adjustment. Lubrication lines for the fan shaft bearings are also extended to the access door for added convenience.

Internal motor ...



... with swing-out base

Internally mounted fan motor can swing outside the unit for easy access.

With all periodic and routine maintenance for the drive system performed from the side of the unit, EVAPCO drive systems are the most serviceable in the industry.

Ladders, working platforms and motor davits are available as options to make maintenance a breeze. See page 15, Optional Equipment, for details.

Drive System

POWER-BAND Drive System Design

The ESW4 Closed Circuit Cooler features the highly efficient POWER-BAND Belt Drive System. The POWER-BAND Drive System consistently performs with trouble-free operation in the most severe conditions.

POWER-BAND Belt

TEAO Fan Motor

TEFC Fan Motor

POWER-BAND Drive System Includes:

- Solid back POWER-BAND drive belt
- Totally enclosed fan motors
- Aluminum sheaves
- Fan shaft bearings with minimum 75,000 hrs. L-10 life

POWER-BAND Belt Drive

The POWER-BAND drive is a solid-backed multigroove belt designed for closed circuit cooler service. The drive belt is sized for 150 percent of the motor nameplate horsepower and constructed of neoprene with polyester chords. Band belts are field-proven with over 30 years of operation.

Drive System Sheaves

Drive system sheaves are constructed of an aluminum alloy for corrosion resistance in the humid closed circuit cooler environment.

Fan Shaft Bearings

The fan shaft bearings are specially selected to provide long life, minimizing costly downtime. They are rated for an L- 10 life of 75,000 to 135,000 hours, making them the heaviest duty pillow block bearings in the industry.

Fan Motors

All EVAPCO closed circuit coolers utilize totally enclosed fan motors (TEFC or TEAO) designed specifically for evaporative cooling applications. **The fan motors, which are compatible with variable frequency drive (VFD) systems, come standard on all ESW4 models. Alternative fan motor options are available as follows:**

- Premium efficient
- Two speed single winding
- Two speed two winding
- Explosion proof

Applications & Water Quality

Design

EVAPCO equipment is constructed of the highest quality materials and designed to provide years of reliable service when properly installed and maintained. The following sections present items that must be considered prior to the selection and installation of equipment.

Equipment Layout Planning

Proper equipment layout is essential to ensure that the fluid cooler operates at its rated capacity. Since evaporative cooling equipment requires large quantities of fresh air for cooling, it is important that the unit be located where the air supply is fresh and unobstructed.

The unit should also be located so that recirculation of the moist discharge air is minimized. Recirculation, also known as short-cycling, occurs when some of the warm, moist air discharge flows back to the unit's air inlet. The recirculation effect results in higher wet bulbs to the unit, which has a negative impact on the unit's field performance.

Engineering Bulletin No. 311 presents the Layout Guidelines for EVAPCO cooling towers, fluid coolers and evaporative condensers. Download it at evapcoasia.com.

The closed circuit cooler should be located away from fresh air intakes, operable windows, kitchen exhaust and prevailing winds directed toward public areas.

Closed Circuit Applications

Closed Circuit Coolers are designed to be used on closed loop systems where the cooling loop is sealed and pressurized. These units are not intended for use in "Open Systems" where the cooling fluid has atmospheric contact.

If applied in open systems, the coil may corrode from the inside with rust deposition throughout the cooling loop.

The cooling fluid must be compatible with the coil material; standard coils are fabricated from black steel with the outer surface hot dip galvanized.

Piping

Supply and return piping for fluid coolers should be designed and installed in accordance with generally accepted engineering practice. The piping layout should be symmetrical for systems with multiple units, and should be sized for a low water velocity and pressure drop.

Since these units are intended for closed loop applications, the loop piping should include an expansion tank to allow for fluid expansion and to purge excess air from the system.

The piping system should include air vents and drain valves at the coil piping so that the coil can be drained if the need arises.

All piping external to the unit should be secured and anchored by properly designed hangers and supports. No external loads should be placed upon the coil connections nor should any pipe supports be anchored to the unit.

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.

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. 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 your site specific water treatment protocol includes a passivation procedure that 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.

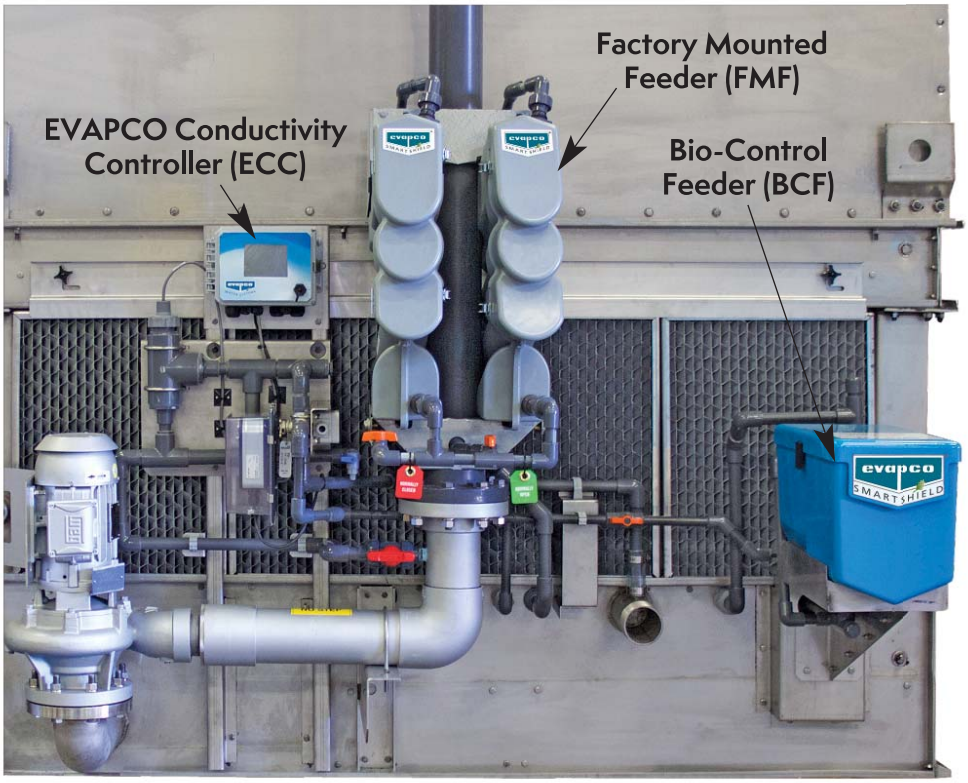
Control of Biological Contaminants

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.

EVAPCO Water Systems

Smart Shield® Solid Chemical Water Treatment System



EVAPCO's **Smart Shield®** system utilizes proven soild chemistry delivered via our revolutionary feed system. Patented controlled a 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

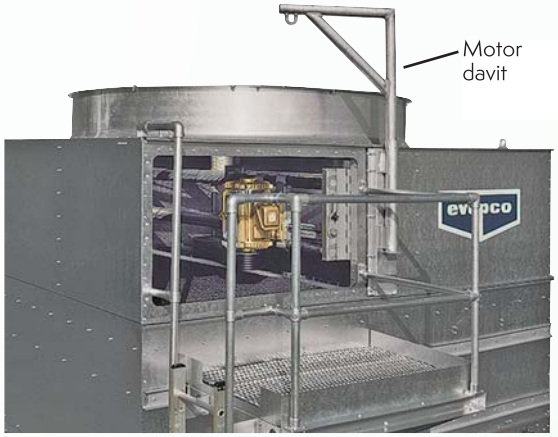
Watch a short product video at: **evapco.com**, **evapcoasia.com**

US 8,398,850
US 8,518,271
US 9,938,161

Optional Equipment

External Platforms, Ladders & Motor Davits

External platforms provide a sturdy base for access to the drive components, water distribution and drift eliminators. Constructed from heavy gauge galvanized steel, the platform mounts easily to the unit and requires no external support. The platform option includes a vertical aluminum ladder and meets all applicable OSHA requirements. A safety cage for the ladder is also available if required for the installation.

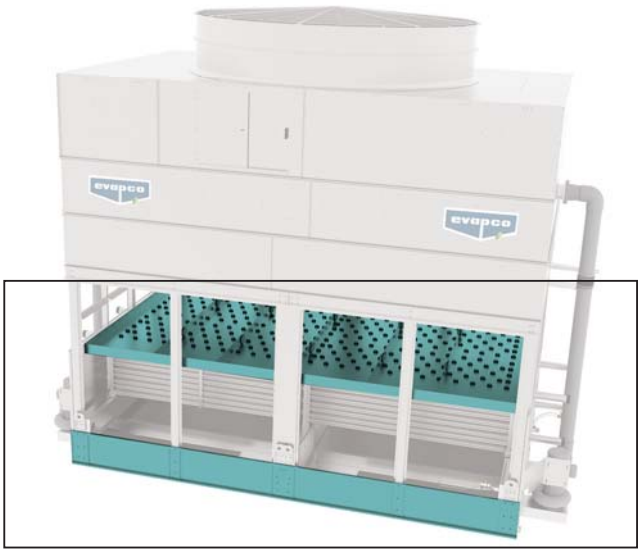


The economical motor davit option eliminates the need for a crane in the event that a fan or motor needs to be removed. The service mechanic only needs a chain-fall or come-along for easy removal of these items. The motor davit is constructed for easy mounting to the unit in the field.

Stainless Steel Water Touch Basin

The modular design of EVAPCO coolers allow specific areas to be targeted for increased corrosion protection. The basin area of the cooler will experience silt build-up and turbulent mixing of air and water making it the part of the unit that is most prone to corrosion. This section also serves as the foundation of the unit providing critical support to the upper sections. EVAPCO recognizes the need for corrosion protection in this area and offers a Stainless Steel Water Touch Basin as an affordable option. This option provides Type 304 or 316 stainless steel for the entire basin area including the support columns and louver frames.

Stainless Steel Cold Water Basins



EVAPCO is excited to announce the new Stainless Steel Cold Water Basins upgrade. This option provides Type 304 or Type 316 stainless steel for the cold water basins, both the intermediate redistribution basin above the coil AND the bottom cold water basin.

Optional Equipment

Super Low Sound Fan

9–15 dB(A) Reduction versus Standard Fan

The Super Low Sound Fan offered by EVAPCO uses an extremely wide chord blade design for very sound sensitive applications where the lowest sound levels are required. The fan is multi-piece molded heavy duty FRP construction utilizing a forward swept blade design. The Super Low Sound fan is capable of reducing the unit sound pressure levels by **9 dB(A) to 15 dB(A)**, depending on specific unit selection and measurement location. The fans are high efficiency axial propeller type.

Low Sound Fan

4–7 dB(A) Reduction

The Low Sound Fan offered by EVAPCO uses a wide chord blade design for sound sensitive applications where low sound levels are desired. Low Sound Fan construction uses aluminum blades and a steel fan hub. The Low Sound Fan is capable of reducing the unit sound pressure levels by **4 dB(A) to 7dB(A)**, depending on specific unit selection and measurement location with a minimal impact to thermal performance. The fans are high efficiency axial propeller type.

Fan Discharge Sound Attenuation

Up to 10 dB(A) Reduction

The ESW4 Fan Discharge Attenuator offered by EVAPCO allows for further sound reduction of the unit. The attenuator can be used with the standard ESW4 fan or in combination with the Low Sound or Super Low Sound Fan option.

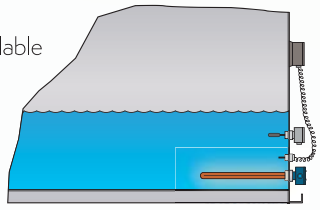
The discharge attenuator is a factory-assembled straight-sided discharge hood designed to reduce overall discharge sound levels at full fan speed by **5 dB(A) to 10 dB(A)**, depending on specific unit selection and measurement location with a minimal impact to thermal performance. It is constructed of G-235 galvanized steel as standard (options available for Type 304 stainless steel) and includes insulated walls and a low pressure drop baffling system that isacoustically lined with high density fiberglass. The discharge attenuator is self-supported by the unit and is shipped loose for field mounting. A heavy-gauge, hot-dip galvanized steel fan guard covers the discharge attenuator to prevent debris from entering the attenuator.

Electric Water Level Control

An electric water level control package is available as an alternative to the standard mechanical makeup valve and float ball. This package provides accurate control for the basin water level and does not require field adjustment, even under varying operating conditions.

The control was designed by EVAPCO and is manufactured exclusively for EVAPCO. It consists of multiple heavy duty stainless steel electrodes mounted external to the unit in a vertical stand pipe. For winter operation, the stand pipe must be wrapped with electric heating cable and insulated to protect it from freezing. The weather protected slow closing solenoid valve(s) for the makeup water connection is factory supplied and is ready for piping to a water supply.

Electric Basin Heaters



Electric immersion heaters are available factory-installed in the basin of the cooler. Standard Heaters are sized to maintain a 4.5˚C pan water temperature with the fans and pumps off and an ambient air temperature of -18˚C. The heater option includes a thermostat and low-water protection device to control the heater and to prevent it from energizing unless they are completely submerged. All components are in weather proof enclosures for outdoor use. The heater power contactors and electric wiring are additional. Refer to the Basin Heater Sizing table below for heater sizing at various freeze design temperatures.

Table 1 Basin Heater Sizing

BASIN HEATER SIZING			
Box Size	**-18˚C kW**	**-29˚C kW**	**-40˚C kW**
8.5' x 6' (2.5m x 1.8m)	5	7	9
8.5' x 9' (2.5m x 2.7m)	7	10	15
8.5' x 12' (2.5m x 3.6m)	(2) 5	(2) 7	(2) 9
8.5' x 18' (2.5m x 5.4m)	(2) 6	(2) 10	(2) 15
12' x 12' (3.6m x 3.6m)	(2) 6	(2) 9	(2) 12
12' x 18' (3.6m x 5.4m)	(2) 9	(2) 15	(2) 18
14' x 22' (4.2m x 6.7m)	(2) 12	(2) 18	(3) 18

Capacity Control

All ESW4 models come standard with inverter capable fan motors that can be used with variable frequency drive (VFD) systems for precise capacity control. VFD systems can control the speed of a fan motor by modulating the voltage and frequency of the input electrical signal. When connected to a building automation system a VFD can receive signals telling it to slow down the fan motor as the capacity of the closed circuit cooler exceeds the cooling demand and speed it back up when demand increases. This popular method of capacity control can yield significant energy savings.

EVAPCO offers two-speed fan motors as an option for alternative capacity control. In periods of lightened loads or reduced wet bulb temperatures the fans can operate at low speed providing about 60% of full speed capacity yet consuming only about 15% of full speed power. In addition to the energy savings, the sound levels of the unit can be greatly reduced by operating at low speed. These motors do not require the use of VFD systems however they can only operate at two speeds: full or low.

Steel Support/Freeze Protection

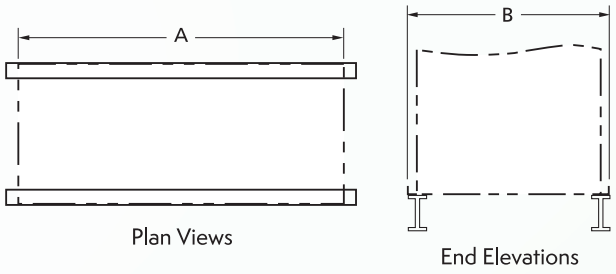
Recommended Steel Support

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. The unit should be elevated to allow access underneath the unit and to the roof below. Mounting holes 19mm in diameter are located in the bottom flanges 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 before setting the unit in place. Do not level the unit by shimming between the unit and the structural steel. Dimensions, weights, and data are subject to change without notice. Refer to the factory certified drawings for exact dimensions.

Table 2 ESW4 Supporting Steel Dimensions

ESW4 SUPPORTING STEEL DIMENSIONS		
Unit Footprint	A (mm)	B (mm)
8.5' x 6' (2.5m x 1.8m)	2579	1826
8.5' x 9' (2.5m x 2.7m)	2731	2579
8.5' x 12' (2.5m x 3.6m)	3652	2579
8.5' x 18' (2.5m x 5.4m)	5487	2579
12' x 12' (3.6m x 3.6m)	3652	3607
12' x 18' (3.6m x 5.4m)	5487	3607
14' x 22' (4.2m x 6.7m)	6699	4248



Plan Views

End Elevations

Freeze Protection for the Heat Exchanger Coil

Units installed in climates subject to freezing conditions must be adequately protected against freezing of the heat exchanger coil and pan water.

The simplest and most effective way of protecting the heat exchanger coil from freezing is to use an inhibited ethylene or propylene glycol solution.

If a glycol solution cannot be used both of the following conditions must be met:

1. Maintain sufficient process heat load through the coil such that the coil temperature is kept above 10°C. If the process load cannot support 10°C fluid, an auxiliary heat load should be applied when freezing conditions exist. Refer to Table 3 for coil heat loss data.

Table 3 Heat Loss Data

Box Size	Coil Rows	kW
8.5' x 6' (2.5m x 1.8m)	4	18
	6	20
	8	22
	10	24
	12	26
8.5' x 9' (2.5m x 2.7m)	4	24
	6	26
	8	29
	10	31
	12	33
8.5' x 12' (2.5m x 3.6m)	4	29
	6	32
	8	35
	10	38
	12	41
8.5' x 18' (2.5m x 5.4m)	4	40
	6	44
	8	48
	10	51
	12	55
12' x 12' (3.6m x 3.6m)	4	37
	6	41
	8	44
	10	47
	12	50
12' x 18' (3.6m x 5.4m)	4	50
	6	55
	8	59
	10	63
	12	67
14' x 22' (4.2m x 6.7m)	4	67
	6	72
	8	77
	10	82
	12	87

2. Design flow should be maintained through the coil whenever possible. If this is not possible, refer to Table 4 for minimum recommended flow rates.

If the coil is not protected with an antifreeze/glycol solution, automatic drain valves and air vents should be installed in the coil supply and return piping. The drain valves and piping should be heat traced and sized for quick drainage of the coil. The drain valves and air vents should be signaled to drain the coil if the fluid flow stops or drops below 4.5°C in freezing conditions.

Draining the coil as an emergency method of freeze protection is acceptable, however it is not recommended as standard practice. Frequent draining of the coil exposes the inner tube surface to oxygen which results in corrosion. If the coil is drained for emergency freeze protection, it should not be left empty for extended periods of time.

Table 4 Minimum Flow Chart

Unit No.	Standard Unit (l/s)	Series Flow Unit (l/s)
8.5' x 6' (2.5m x 1.8m)	6.6	3.3
8.5' x 9' (2.5m x 2.7m)	11	5.5
8.5' x 12' (2.5m x 3.6m)	11	5.5
8.5' x 18' (2.5m x 5.4m)	16.4	8.2
12' x 12' (3.6m x 3.6m) Optimized Coil	11.1	5.6
12' x 12' (3.6m x 3.6m) Large Coil	16.4	8.2
12' x 18' (3.6m x 5.4m) Optimized Coil	22.1	11.1
12' x 18' (3.6m x 5.4m) Large Coil	32.8	16.4
14' x 22' (4.2m x 6.7m)	30.6	15.5

WORLDWIDE MANUFACTURING LOCATIONS

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

P.O. Box 1300 • Westminster, MD 21158 USA
410.756.2600 • marketing@evapco.com • **evapco.com**

North America

EVAPCO, Inc.
World Headquarters
Westminster, MD USA
410.756.2600
marketing@evapco.com

EVAPCO East
Taneytown, MD USA

EVAPCO East
Key Building
Taneytown, MD USA

EVAPCO Midwest
Greenup, IL USA
217.923.3431
evapcomw@evapcomw.com

Evapcold Manufacturing
Greenup, IL USA

EVAPCO Newton
Newton, IL USA
618.783.3433
evapcomw@evapcomw.com

EVAPCO West
Madera, CA USA
559.673.2207
contact@evapcowest.com

EVAPCO Alcoil, Inc.
York, PA USA
717.347.7500
info@evapco-alcoil.com

EVAPCO Iowa
Lake View, IA USA

EVAPCO Iowa
Sales & Engineering
Medford, MN USA
507.446.8005
evapcomn@evapcomn.com

EVAPCO LMP ULC
Laval, Quebec, Canada
450.629.9864
info@evapcolmp.ca

EVAPCO Select Technologies, Inc.
Belmont, MI USA
844.785.9506
emarketing@evapcoselect.com

Refrigeration Vessels & Systems Corporation
Bryan, TX USA
979.778.0095
rvs@rvscorp.com

Tower Components, Inc.
Ramseur, NC USA
336.824.2102
mail@towercomponentsinc.com

EvapTech, Inc.
Edwardsville, KS USA
913.322.5165
marketing@evaptech.com

EVAPCO Dry Cooling, Inc.
Bridgewater, NJ USA
908.379.2665
info@evapcodc.com

EVAPCO Dry Cooling, Inc.
Littleton, CO USA
908.895.3236
info@evapcodc.com

EVAPCO Power México S. de R.L. de C.V.
Mexico City, Mexico
(52) 55.8421.9260
info@evapcodc.com

Asia Pacific

EVAPCO Asia Pacific Headquarters
Baoshan Industrial Zone Shanghai, P.R. China
(86) 21.6687.7786
marketing@evapcochina.com

EVAPCO (Shanghai) Refrigeration Equipment Co., Ltd.
Baoshan Industrial Zone, Shanghai, P.R. China

EVAPCO (Beijing) Refrigeration Equipment Co., Ltd.
Huairou District, Beijing, P.R. China
(86) 10.6166.7238
marketing@evapcochina.com

EVAPCO Air Cooling Systems (Jiaxing) Company, Ltd.
Jiaxing, Zhejiang,P.R. China
(86) 573.8311.9379
info@evapcochina.com

EVAPCO Australia (Pty.) Ltd.
Riverstone, NSW, Australia
(61) 02.9627.3322
sales@evapco.com.au

EvapTech (Shanghai) Cooling Tower Co., Ltd
Baoshan District, Shanghai, P.R. China.
Tel: (86) 21.6478.0265

EvapTech Asia Pacific Sdn. Bhd.
Puchong, Selangor, Malaysia
(60) 3.8070.7255
marketing-ap@evaptech.com

Europe | Middle East | Africa

EVAPCO Europe
EMENA Headquarters
Tongeren, Belgium
(32) 12.39.50.29
evapco.europe@evapco.be

EVAPCO Europe BVBA
Tongeren, Belgium

EVAPCO Europe, S.r.l.
Milan, Italy
(39) 02.939.9041
evapcoeurope@evapco.it

EVAPCO Europe, S.r.l.
Sondrio, Italy

EVAPCO Europe A/S
Aabybro, Denmark
(45) 9824.4999
info@evapco.dk

EVAPCO Europe GmbH
Meerbusch, Germany
(49) 2159.69560
info@evapco.de

EVAPCO Middle East DMCC
Dubai, United Arab Emirates
(971) 4.448.7242
info@evapco.ae

Evap Egypt Engineering Industries Co.
A licensed manufacturer of EVAPCO, Inc.
Nasr City, Cairo, Egypt
(202) 24044997
mmanz@tiba-group.com

EVAPCO S.A. (Pty.) Ltd.
A licensed manufacturer of EVAPCO, Inc.
Isando, South Africa
(27) 11.392.6630
evapco@evapco.co.za

South America

EVAPCO Brasil
Equipamentos Industriais Ltda.
Indaiatuba, São Paulo, Brazil
(55) 11.5681.2000
vendas@evapco.com.br

FanTR Tecnology Resources
Itu, São Paulo, Brazil
(55) 11.4025.1670
fantr@fantr.com

Bulletin ESW422MRKT - Metric
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