



® for LIFE

eco-Hybrid Coolers

The NEW Family of Closed Circuit Coolers



NEW!

ARID -fin Pak™

eco-ATWB-H

Sage®

CONTROL SYSTEM

Environmentally Conscious Operation Hybrid
Providing Maximum Water Savings & Higher Dry Switchover Temperatures





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

- Industrial Refrigeration
- Commercial HVAC
- Industrial Process
- Power

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

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

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

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



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

Design and Construction Features

The **NEW** eco-ATWB-H Hybrid line of closed circuit coolers was designed with the purpose of providing maximum water savings, higher dry bulb switch over temperatures, while achieving plume abatement or elimination by utilizing evaporative (latent) and dry (sensible) modes of cooling, simultaneously!

The eco-ATWB-H is provided with EVAPCO's new **ARID-fin Pak™** dry coil. Utilizing copper tubes and aluminum magnesium fins, the **ARID-fin Pak™** maximizes the total surface area available for sensible heat transfer, which results in maximum water savings and higher dry bulb switchover temperatures. Since it is located in the discharge airstream, the **ARID-fin Pak™** heats the saturated discharge air, abating or eliminating the plume. Since a significant portion of the heat load is dissipated through the dry cooling coil, the eco-ATWB-H saves water whenever it is in operation!

The eco-ATWB-H is the ideal solution for: Maximized Water Savings, Highest Dry Bulb Switchovers, Plume Reduction or Plume Abatement. This new closed circuit cooler product line is designed with IBC Compliant construction.

Water Saver Drift Eliminators

- New patented design reduces drift rate to < 0.001%
- Saves water and reduces water treatment cost
- Greater structural integrity vs. old style blade-type
- Made from corrosion resistant PVC for long life (US Patent: 6,315,804)

PVC Spray Distribution Header with ZM II™ Nozzles



- Large orifice nozzles prevent clogging (no moving parts)
- Threaded nozzles eliminate troublesome grommets
- Fixed position nozzles require zero maintenance
- Threaded end caps for ease of cleaning
- Guaranteed for life

"Clean Pan" Basin Design

- Access from all four sides
- Large open area simplifies maintenance
- Basin may be inspected with pumps running
- Sloped basin design prevents sediment buildup, biological film and standing water

Sage² Control System

Water and Energy Conservation Control System

The eco-Hybrid closed circuit cooler is provided with the EVAPCO Sage² Control System. This system operates the unit in a manner which will maximize water or energy savings. Control is accomplished by operating each cell of the eco-Hybrid in the **Evaporative Mode** or **Dry Mode** based on water or energy savings priority.

Advanced Design Smooth Flow Fans

- Totally Enclosed Fan Motors assures long life
- Power-Band Belts for Better Lateral Rigidity
- Advanced Design Aluminum Fan Blades
- Non-corroding Cast Aluminum Sheaves
- Heavy-Duty Fan Shaft Bearings with L-10 life of 75,000 - 135,000 hrs
- All Other Components Corrosion Resistant Materials

CTI Certified
Refer to page 16

IBC Compliant Design
Refer to page 15

CTI
CERTIFIED



Low Sound Options available Refer to page 11



Super Low Sound Fan (optional)

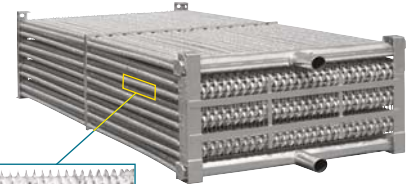
- Extremely wide sloped fan blades for sound sensitive applications
- One piece molded heavy duty construction
- 9-15 dB(A) sound reduction

Ellipti-fin®

Featuring Elliptical Spiral Fin Coil Technology

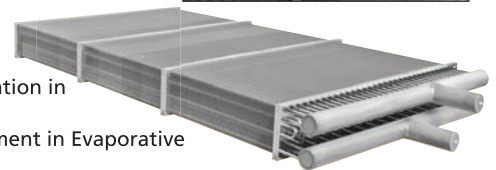
Introducing the Most Efficient Closed Circuit Cooler Coil in the HVAC industry! The **Ellipti-fin®** provides:

- All coil rows feature patent pending finned Thermal-Pak elliptical tube design
- Lower airflow resistance than typical finned round tubes
- Increased Evaporative and Dry Cooling efficiency



ARID-fin Pak™

- Maximizes Water Efficiency
- Higher Dry Switchover Temperatures
- Plume Elimination in Dry Mode
- Plume Abatement in Evaporative Mode
- Increases Evaporative and Dry Cooling Efficiency



Louver Access Door

- Hinged access panel with quick release mechanism
- Allows easy access to perform routine maintenance and inspection of the makeup assembly, strainer screen and basin
- Louver access door is standard on models with 1.5m and 1.8m tall louver



Easy Field Assembly

- A new field assembly seam design which ensures easier assembly and reduced potential for field seam leaks
- Self-guided channels guide the fan casing section into position improving the quality of the field seam
- Eliminates up to 66% of fasteners (Patent Pending)



NEW & Improved!

Stainless Steel Strainers

- Resists corrosion better than other materials

Totally Enclosed Pump Motors

- Help assure long, trouble-free operation

WST II Air Inlet Louvers (Water and Sight Tight)

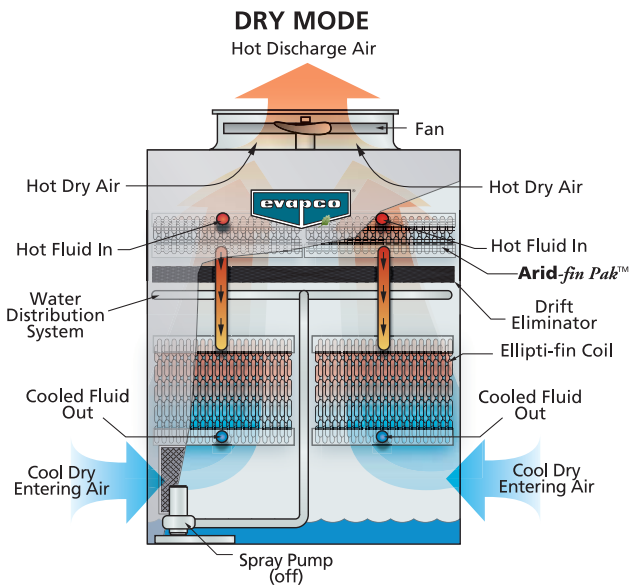
- Easily removable for access
- Improved design to keep sunlight out-preventing biological growth
- Keeps water in while keeping dirt and debris out (Patent Pending)



† Mark owned by the Cooling Technology Institute

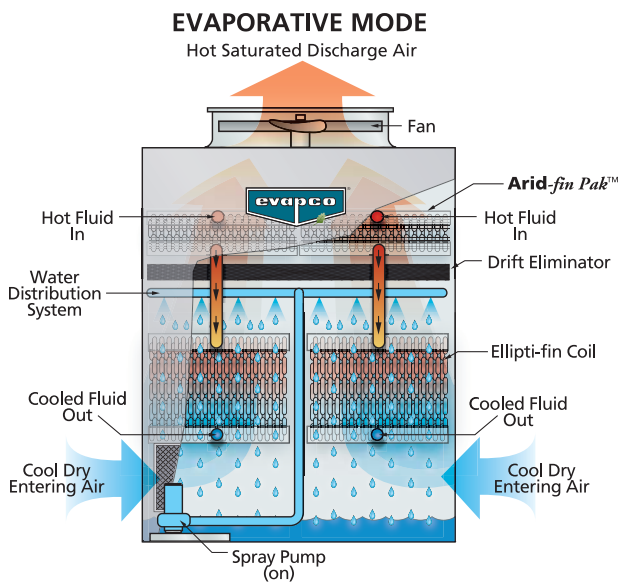
eco-ATWB-H

PRINCIPLE OF OPERATION



Dry Mode (Sensible Heat Transfer)

In the dry mode, the process fluid enters the **ARID-fin Pak™** coil through the top coil connections. The fan motor is energized, while the spray pump is de-energized. The axial fan draws air upward through the louvers and across the coils. As the air passes over the **ARID-fin Pak™** coil, a portion of the load is dissipated to the atmosphere through the tube walls and fins using sensible heat transfer. The warm process fluid exits the **ARID-fin Pak™** coil, then enters the **Ellipti-fin®** coil through the factory installed piping. The remaining load is dissipated through the tube and extended surface fins of the **Ellipti-fin®** coil utilizing sensible heat transfer. The unit will remain in the dry mode of operation until the temperature set point can no longer be met. In this mode, **NO** water is used and plume is eliminated.



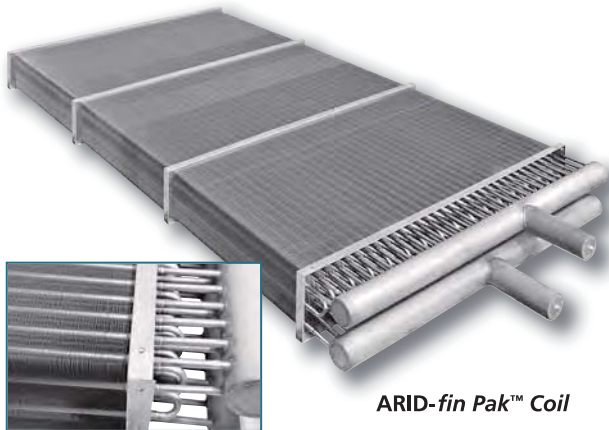
Evaporative mode (Latent and Sensible Heat Transfer)

Once the temperature set point can no longer be met, the unit will switch to the Evaporative mode. This mode of operation in the eco-Hybrid utilizes evaporative and dry cooling simultaneously.

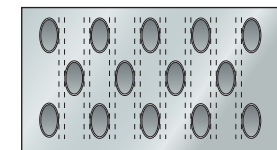
First, the process fluid enters the **ARID-fin Pak™** coil through the top coil connections. The fan and pump motors are energized. A portion of the heat load is transferred through the tube walls and fins to the air passing over the **ARID-fin Pak™** coil. No water is evaporated during this process. The warm process fluid exits the **ARID-fin Pak™** coil, then enters the **Ellipti-fin®** coil through the factory installed piping. The spray system cascades water over the tubes of the **Ellipti-fin®** coil while heat is absorbed by the water. Air is drawn upward and over the coils by the axial fan. A small amount of the recirculating water is evaporated due to latent heat transfer through the tube and fin walls of the **Ellipti-fin®** coil. In this mode, water usage is reduced and plume is abated as the saturated discharge air is heated as it passes over the **ARID-fin Pak™** coil.

DESIGN BENEFITS

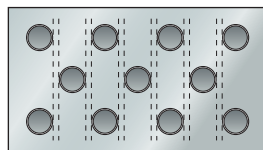
eco-ATWB-H



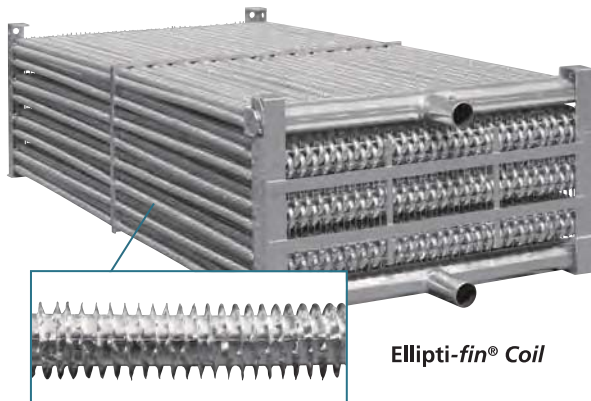
ARID-*fin Pak*™ Coil



Thermal-Pak® Coil by EVAPCO



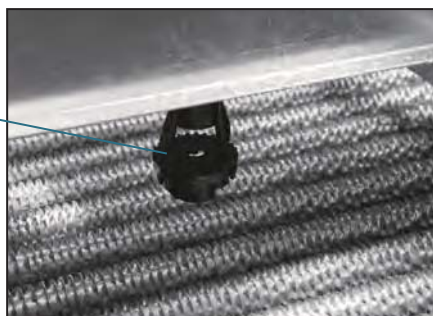
Round Tube Coil by Others



Ellipti-*fin*® Coil



ZMII® Nozzle



ARID-*fin Pak*™ Dry Cooling Coil

The new eco-ATWB-H Closed Circuit Cooler utilizes the **ARID-*fin Pak*™** Dry Cooling Coil. Installed in the air discharge of the cooler the **ARID-*fin Pak*™** dry cooling coil is piped in series with the evaporative cooling coil. The **ARID-*fin Pak*™** dry cooling coil is constructed of copper tubes and tubular copper header with carbon steel coil connections for easy field piping. The fins have fully drawn collars to maintain consistent fin spacing and continuous surface contact over the entire tube to maximize heat transfer. The fins are constructed of Aluminum/Manganese alloy for superior corrosion resistance.

Ellipti-*fin*® Cooling Coil

The new eco-ATWB-H Closed Circuit Cooler utilizes EVAPCO's **Ellipti-*fin*®** coil design which assures even greater operating efficiency. The elliptical tube design allows for closer tube spacing, resulting in greater surface area per unit plan area than round-tube coil designs. In addition, the revolutionary **Ellipti-*fin*®** design utilizes elliptical spiral fin coil technology which has an inherent air side pressure drop lower than finned round tube designs. This permits greater water loading, making the new **Ellipti-*fin*®** coil the most effective design available.

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 2.69 kPa 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 in molten zinc (hot-dip galvanized) at a temperature of approximately 427°C.

Maintenance Free ZMII® Spray Nozzle Water Distribution System

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

The heavy duty nylon ZMII® Spray nozzles have a 32mm diameter opening and a 32mm splash plate clearance. Furthermore, the fixed position ZMII® 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, making it the industry's best performing non-corrosive, maintenance-free water distribution system.

eco-ATWB-H MAINTENANCE ADVANTAGES



Patent #: 6,315,804

Efficient Drift Eliminators

The eco-ATWB-H is equipped 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.

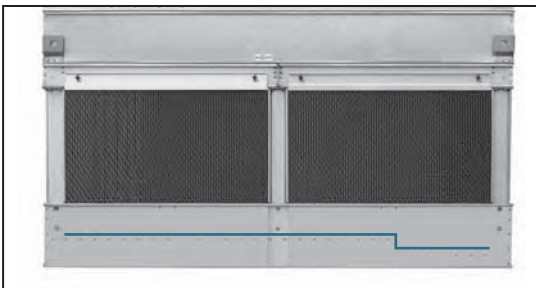
The eliminators are constructed of non-corrosive PVC with a multi-pass design for maximum drift reduction. They are assembled in modular sections for easy removal and access to the water distribution system.

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



Easy Access

The cold water basin is easily accessible from ground level. The basin is provided with removable framed louvers which are designed to protect the basin water from direct exposure to sunlight and debris. The louvers are light-weight and easy to remove. With the louvers removed, a service mechanic has complete access to the basin floor, float assembly and pump strainer. A louver access door is also provided for quick and easy inspection of the basin.



Clean Pan

The basin of the closed circuit cooler is sloped toward the 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 the unit for complete cleaning.



Stainless Steel Strainers

The EVAPCO standard for many years, the 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.

Easy Maintenance Drive System

The EVAPCO POWER-BAND drive system utilized on the eco-ATWB-H 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 to 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. The most significant benefits and features of EVAPCO's drive system are detailed below.

Models with Motors Mounted Externally

2.5m and 5.2m Wide Models

The fan motor and drive assembly are designed for easy service and adjustment from the unit's exterior. The Totally Enclosed, Fan Cooled (TEFC) fan motor is mounted external to the unit with a protective cover which swings aside for maintenance. A large access door adjacent to the fan motor swings open enabling easy access to the fan drive system. The belt tension can be checked and adjusted easily from the outside of the unit. The fan shaft bearings also have their lubrication lines extended to the access door for added convenience. Note, these motors are shipped loose for field installment. Contact your Evapco sales representative for factory mounting options.



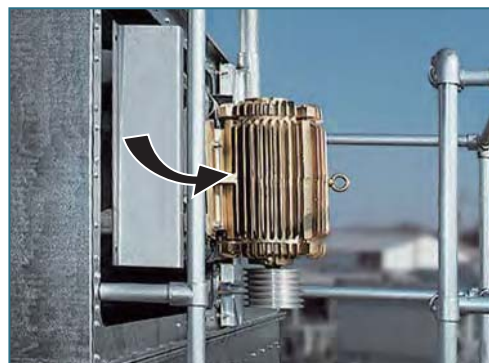
Models with Swing-Out Motors

3m, 3.6m, 6.1m and 7.3m Wide Models

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.

Sloped access ladders, working platforms and motor davits are available as options to make maintenance even easier. See page 10, Optional Equipment, for details.

eco-ATWB-H DRIVE SYSTEM

POWER-BAND Drive System Design

The eco-ATWB-H Closed Circuit Cooler features the highly successful POWER-BAND Belt Drive System. The POWER-BAND Drive System has performed consistently with trouble-free operation in the most severe conditions of closed circuit cooler applications. The reliability of the drive system is backed-up by a Five (5) Year complete drive system warranty.



POWER-BAND Belt



TEFC Fan Motor



TEAO 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
- 5 year drive system warranty

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 20 years of field 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 (T.E.F.C. or T.E.A.O.) designed specifically for evaporative cooling applications. The fan motors which are compatible with variable frequency drive (VFD) systems, come **standard** on all eco-ATWB-H models.

Alternative fan motor options are available as follows:

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

Five Year Drive Warranty

EVAPCO provides a standard 5 year motor and drive warranty on all POWER-BAND drive systems. This warranty provides end users with complete protection against fan motor or drive component failure. The comprehensive warranty includes the fan, fan motor, fan shaft, belts, sheaves, and fan bearings.



EVAPCOAT Corrosion Protection System

EVAPCO, long known for using premium materials of construction, has developed the ultimate system for corrosion protection in galvanized steel construction – the EVAPCOAT Corrosion Protection System. Marrying corrosion free materials with heavy gauge mill hot-dip galvanized steel construction to provide the longest life product with the best value.

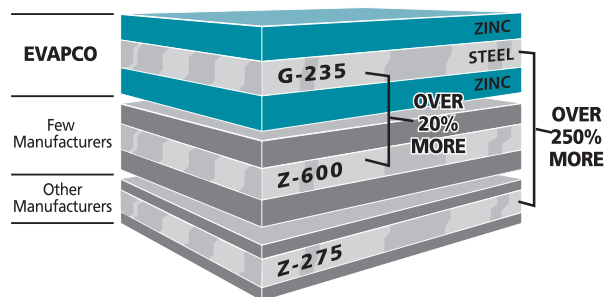
The Evapcoat Corrosion Protection System consist of:

- **G-235 Mill Hot-Dip Galvanized Steel Construction**

Mill hot-dip galvanized steel has been successfully used for many years for the protection of evaporative coolers against corrosion. There are various grades of mill galvanized steel each with differing amounts of zinc protection. EVAPCO has been a leader in the industry in developing heavier galvanizing, and was the first to standardize on G-235 mill hot-dip galvanized steel. G-235 designation means there is a minimum of 2.35 ounces of zinc per square foot (approximately 725 gram of zinc per square meter) of surface area present on the steel.

G-235 is the heaviest level of galvanizing available for manufacturing evaporative coolers and has over 2.5 times more zinc protection than competitive designs using Z-275 steel. With G-235 mill hot-dip galvanized steel construction, EVAPCO provides galvanized steel panels with corrosion protection that approaches the level of the hot-dip galvanized heat exchanger coils.

During fabrication, all panel edges are coated with a 95% pure zinc-rich compound for extended corrosion resistance.



- **Type 304 Stainless Steel Strainers**

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

- **PVC Air Inlet Louvers**

The innovative design uses corrosion free materials while effectively eliminating splash out and reducing the potential for algae formation inside the cooler.

- **PVC Drift Eliminators**

The final elements in the upper part of the cooler are moisture eliminators which strip the entrained water droplets from the leaving air stream.

EVAPCO eliminators are constructed entirely of inert, corrosion-free PVC. This PVC material has been specially treated to resist damaging ultraviolet light. The eliminators are assembled in easily handled sections to facilitate removal thereby exposing the upper portion of the unit and water distribution system for periodic inspection.

- **PVC Water Distribution System, ZM II™ Spray Nozzle**

The fixed position ZM II™ Spray Nozzles are mounted in corrosion-free PVC water distribution pipes that have threaded end caps. Together, these elements combine to provide unequalled coil coverage, scale prevention and make the industries best performing non-corrosive, maintenance-free water distribution system.

- **Totally Enclosed Motors**

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

- **Alternate Materials of Construction**

EVAPCO induced draft coolers have a modular design which allows for specific areas to be enhanced for increased corrosion protection. For particularly corrosive environments, EVAPCO coolers are available with Stainless Steel construction for the basin, casing and/or coil.

- **Stainless Steel Basin**

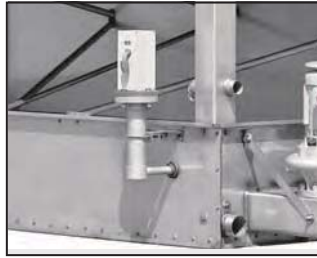
The basin area of a cooler is often subjected to high concentrations of impurities and silt. In addition to the EVAPCOAT Corrosion Protection System, EVAPCO offers optional stainless steel construction for superior corrosion resistance. This option provides Type 304 or Type 316 stainless steel for the entire basin section - including the support columns and air inlet louver frames.

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.

eco-Hybrid 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.



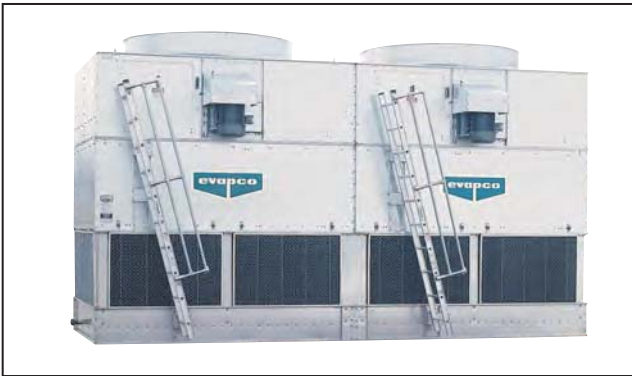
Stainless Steel Basin

EVAPCO coolers have a modular design which allows specific areas to be enhanced for increased corrosion protection. The basin area of the cooler experiences turbulent mixing of air and water, in addition to silt build-up. In conjunction with the EVAPCO Corrosion Protection System, EVAPCO offers an optional Stainless Steel Basin. This option provides Type 304 or 316 stainless steel for the entire basin area including the support columns of the cooler and the louver frames.



Sloped Maintenance Ladders

The EVAPCO designed maintenance ladder features a sloped "ships type" ladder which provides visual inspection of the water distribution system and drive components. All standard drive system maintenance can be performed from the ladder. A handrail is attached to the sloped ladder for safe and easy ascent and descent. There is no need for safety cages with this design. The ladder will ship loose and must be field mounted. The design is OSHA compliant.



Working Platform & Ladder with Davit

Eco-Hybrid closed circuit coolers are available with a self-supported external working platform and ladder. Two separate platforms will allow easy access to the motor and drive system, water distribution system as well as the **ARID-fin Pak™** coil. The working platforms are constructed of the heavy duty galvanized steel. The OSHA compliant working platform option uses a straight ladder as standard and ships in sections for easy installation.



The optional davit eliminates crane rentals and facilitates the removal of motors and fans. The davit is constructed of aluminum for ease of use. When the davit is ordered, the galvanized steel bracket is mounted on the side of the unit. The Davit ships loose and is installed in the field.



OPTIONAL EQUIPMENT **eco-Hybrid**

Solutions for Sound Sensitive Applications

NOTE: These low sound options may impact the overall installed dimensions of the eco-ATWB-H Closed Circuit Cooler selected.

Super Low Sound Fan

9–15 dB(A) Reduction!



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 one-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 **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 **4 dB(A) to 7dB(A)**, depending on specific

unit selection and measurement location. The fans are high efficiency axial propeller type.

Fan Discharge Sound Attenuation

Up to 10 dB(A) Reduction!

The eco-ATWB-H Fan Discharge Attenuator offered by EVAPCO is an additional option available to further reduce the sound level of the unit. The attenuator can be used with the standard eco-Hybrid fan or in combination with the 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 **5 dB(A) to 10 dB(A)**, depending on specific unit selection and



measurement location. 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 is acoustically 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.

The discharge attenuator has minimal impact on unit thermal performance (0%-2% derate depending on specific unit selection).

Water Silencer

Up to 7 dB(A) Reduction!

The water silencer option is available for all eco-Hybrid models and is located in the falling water area of the cold water basin. The water silencer reduces the high frequency noise associated with the falling water and is capable of reducing overall sound levels **4 dB(A) to 7 dB(A)** measured at 1.5m from the side or end of the unit.



The water silencers reduce overall sound levels 9 dB(A) to 12 dB(A) (depending on water loading and louver height) measured 1.5m from the side or end of the unit when water is circulated with fans off.

The water silencers are constructed of lightweight PVC sections and can be easily removed for access to the basin area.

Consult EVAPCO's **Advanced Technology Low Sound Solutions** Bulletin No. 650-US for detailed product and specification information.

Offset Sound Attenuation Walls

Offset Sound Attenuation Walls are EVAPCO's newest attenuation option for even greater levels of sound reduction when used in combination with the Super Low Sound Fan and Water Silencer options. The addition of Offset Sound Attenuation Walls will reduce the 15m free field sound level



by an additional **3 dB(A)**. The walls are constructed of G-235 galvanized steel (stainless steel construction also available) lined with acoustical padding on the inside of the walls. This option requires external support by others.

EVAPCO's Sage[®] ... Water and Energy



The eco-Hybrid closed circuit cooler is provided with the EVAPCO Sage²[®] Control System. This system operates the unit in a manner which will maximize water or energy savings. Control is accomplished by operating each cell of the eco-Hybrid in the **Evaporative Mode** or **Dry Mode** based on **water** or **energy savings priority**.

The Sage²[®] control system contains a Programmable Logic Controller (PLC) with adaptive logic, which allows the operator to select either a priority for maximizing water or energy efficiency. Real time load and weather data are measured and recorded by the PLC and sensors. This data is then analyzed and used to switch the unit between the various modes of operation in order to maximize water or energy savings. If the panel is set to operate in the **water savings priority**, the Sage Panel will vary the unit between the Dry and Evaporative modes of operation, limiting the time spent in the evaporative mode to maximize water savings. If the panel is set to operate in the **energy savings priority**, the Sage Panel will switch the unit between the Dry & Wet modes of operation, controlling the fan speed and pump operation in an effort to maximize energy savings.

Panel Hardware and Features

- MODBUS 485 Port
- UL Approval
- Programmable Logic Control
- Variable Frequency Drive(s)
- Recirculating Pump Motor Starter(s)
- Fluid Inlet/Outlet Temperature Sensors with High and Low Alarm Set Points
- Basin Temperature Sensor(s)
- Ambient Dry Bulb Sensor
- Main Disconnect Circuit Breaker
- Main Hand/Off/Auto Switch (HOA)
- DC Power Supply for the PLC and Instruments
- Control Power Transformer
- Heater Contactor with Overload Protection and Temperature Set Points with Fusing
- 5-Probe Electronic Water Level Control Package
- High/Low Water Level Alarm Contacts
- Fan Motor: Space Heater Control(s)
- Relays for all PLC Digital Outputs
- Terminal Blocks for each PLC input/output
- Ethernet Connection between VFD(s), PLC and Operator Interface



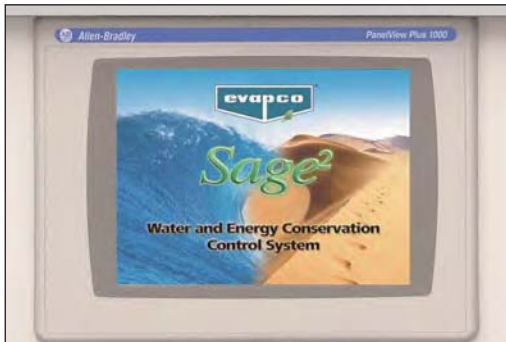
Control Features

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> • Manual Operation of Pumps and Fans • Ability to Enable or Disable Make-Up Valve • Power Failure Recovery Timer • Ability to Perform Bump Test | <ul style="list-style-type: none"> • Visual Status Display of All Unit Components and Accessories • Contacts and Counter To Record Water Usage • Contacts and Analog Signal for (Customer Supplied) Conductivity Meter | <ul style="list-style-type: none"> • Backup with User Settings and Factory Settings • Pump Run Time Recorder • Fan Motor Run Time Recorder |
|--|---|---|

Conservation Control System

HMI Panel Display

All Sage²® Control Panels are provided with a 10" touch screen operator interface with a color display. This allows for easy viewing and control at the panel.

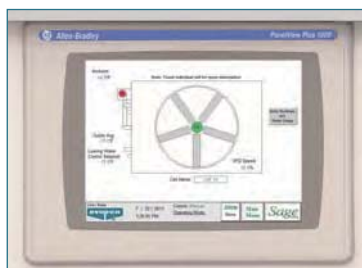


Easy-to-use Touch Screen Navigation

The panel boasts an easy to navigate menu which will allow the user to control each cell independently from other units and gather useful run time information at the unit.



Alarm Setpoints Screen



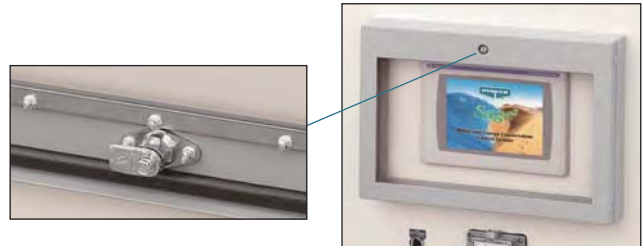
Plan View Screen



End View Screen

Window Enclosure

The display screen is encased by a window enclosure. This enclosure protects the HMI display from the elements.



Electric Water Level Control Package

When a Sage Panel is provided, a 5-probe Electronic Water Level Controller is standard. In addition to controlling the make-up valve, this controller contains two probes that can be utilized as High/Low water alarms. This controller will also be used as a safety device, shutting off the pump and heaters if the water level becomes too low.

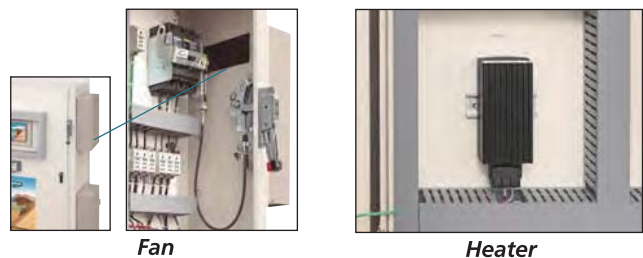
Temperature Sensors (Field Installed)

Four separate temperature data points are monitored with this package.

- Inlet Temperature Sensor: 0°C – 100°C range
- Outlet Temperature Sensor: 0°C – 100°C range
- Dry Bulb Temperature Sensor: -34.4°C – 54.4°C range
- Basin Temperature Sensor: 0°C – 100°C range

Enclosure Temperature Control

The panel enclosure includes an intake and an exhaust ventilation fan or air conditioner dependant on project location. When the enclosure temperature rises to a predetermined set point, the exhaust fans are activated. The enclosure also contains a heater. The heater eliminates the drastic temperature changes which could create condensation inside of the enclosure.



Fan

Heater

**Optional Communication Protocol May Be Available. Please Contact Your Local Sales Representative.*

SMART SHIELD® Solid Chemical Water Treatment System

The eco-ATWB-H 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 eco-ATWB-H 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:

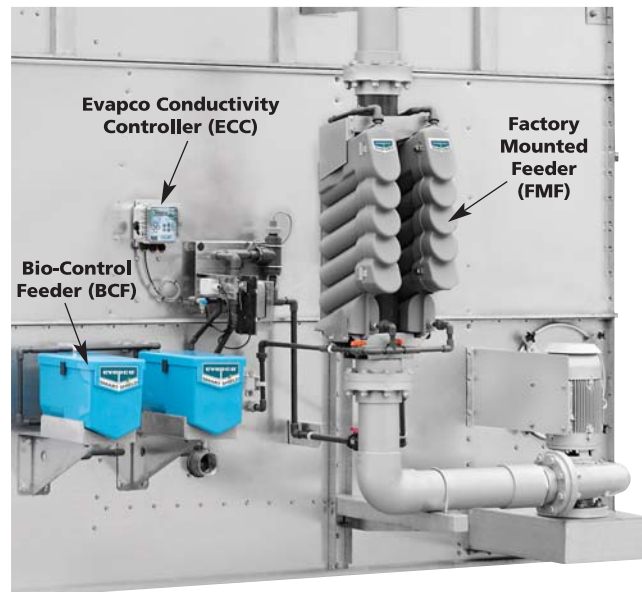
- **SAVES MONEY** by simplifying commission:
 - Single power connection is the only field installation requirement
- **Factory Mounting** your water treatment system ensures that it is installed to factory specifications.
- **Patented self-draining piping** eliminates the need for line insulation and 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.



In its continuing commitment to be the leaders in evaporative cooling equipment design and services, EVAPCO eco-ATWB-H Hybrid Closed Circuit Coolers are now **Independently Certified** to withstand Seismic and Wind Loads in accordance with IBC.

What is IBC?

International Building Code

The International Building Code (IBC) is a comprehensive set of regulations addressing both the structural design and the installation requirements for building systems – including HVAC and industrial refrigeration equipment. Compared to previous building codes that considered only the building structure and component anchorage, the requirements contained within the IBC address anchorage, structural integrity, and the operational capability of a component following either a seismic or wind load event. **Simply stated, the IBC code provisions require that evaporative cooling equipment, and all other components permanently installed on a structure, must be designed to meet the same seismic or wind load forces as the building to which they are attached.**

How Does IBC Apply to Closed Circuit Coolers?

Based on site design factors, calculations are made to determine the equivalent seismic “g force” and wind load on the unit. The closed circuit cooler must be designed to withstand the greater of either the seismic or wind load.

The New eco-ATWB-H is offered with a choice of TWO structural design packages:

- **Standard Structural Design** – For projects with $\leq 1.0g$ seismic or 6.94 kPa wind loads
- **Upgraded Structural Design** – Required for projects with $> 1.0g$ seismic or 6.94 kPa max wind loads

All locations with design criteria resulting in a seismic design force of up to 1.0g or a wind load of 6.94 kPa or below will be provided with the standard eco-ATWB-H structural design. An upgraded structural design is available for installations with design criteria resulting in “g forces” greater than 1.0g. The highest “g force” location in North America is 5.12g. The highest wind load is approximately equal to 6.94 kPa velocity pressure. **Therefore, the upgraded structural design package option for the new eco-ATWB-H is designed for 5.12 g and 6.94 kPa.**

Design Implementation

EVAPCO applies the seismic design and wind load information provided for the project to determine the equipment design necessary to meet IBC requirements. This process ensures that the mechanical equipment and its components are compliant per the provisions of the IBC as given in the plans and specifications for the project.

Independent Certification

Although the IBC references and is based on the structural building code ASCE 7, many chapters and paragraphs of ASCE 7 are superseded by the IBC, independent certification and methods of analysis are such paragraphs. Per the most recent edition of the code, the EVAPCO compliance process included an exhaustive analysis by an independent approval agency. As required by the International Building Code, EVAPCO supplies a certificate of compliance as part of its submittal documents. The certificate of compliance demonstrates that the equipment has been independently tested and analyzed in accordance with the IBC seismic and wind load requirements. EVAPCO has worked closely with the independent approval agency, The VMC Group, to complete the independent equipment testing and analysis.

If the seismic “g force” or wind load kPa(KN/m²) requirements for the project site are known, EVAPCO’s online equipment selection software, **evapSelect™**, will allow you to choose the required structural design package – either standard construction or upgraded construction.

For further questions regarding IBC compliance, please contact your local EVAPCO Representative.



eco-ATWB-H CTI CERTIFICATION

In its continuing commitment to be the leaders in evaporative cooling equipment design and services, EVAPCO eco-ATWB-H Hybrid Closed Circuit Coolers are now **Independently Certified** by **CTI**, to perform thermally in accordance with the published data.

What is CTI?

Cooling Technology Institute

The Cooling Technology Institute is an organization headquartered in the United States with over 400 member companies from around the globe. CTI membership is composed of manufacturers, suppliers, owner operators, and test agencies from over 40 countries. In 2012 CTI certified more than 10000 Evaporative Heat Transfer Systems (EHTS) from 76 product line of 37 participants.

CTI's Mission and Objectives

This can be best explained by the CTI's published Mission statement and Objectives revised in December 2003 and published on their website www.cti.org.

CTI Mission Statement

To advocate and promote the use of environmentally responsible Evaporative Heat Transfer Systems (EHTS) for the benefit of the public by encouraging:

- Education
- Research
- Standards Development and Verification
- Government Relations
- Technical Information Exchange

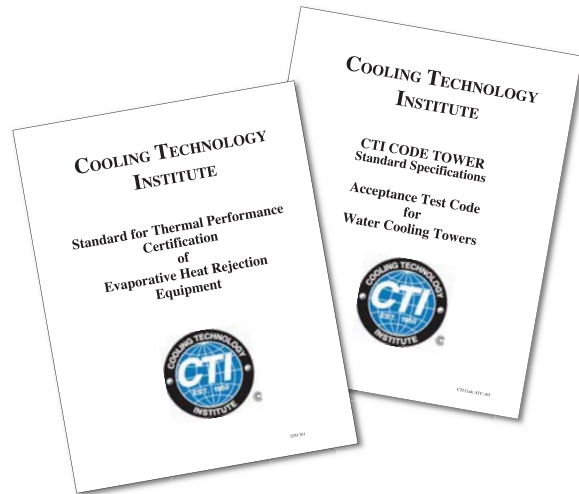
Benefits to the End User

CTI defines an independent testing certification program that is specifiable, enforceable and available to all equipment manufacturer's.

- Ensures customers receive full value for their equipment purchase
- Ensures energy consumption does not exceed expectations
- Ensures all manufacturers compete on a "level playing field"
- Designers routinely specify certified products to reduce their risk and liability

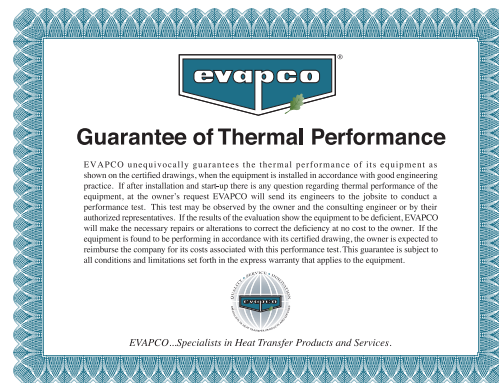
Additionally CTI certification is the first step for the Green Building Concept:

- LEED - Leadership in Energy and Environmental Design
- Green Rating System



Thermal Performance Guarantee

In addition to the CTI Certification, EVAPCO unequivocally guarantees the Thermal Performance of ALL EVAPCO Equipment. Every unit order is confirmed with a submittal package that includes an EVAPCO Thermal Performance Guarantee Certificate.



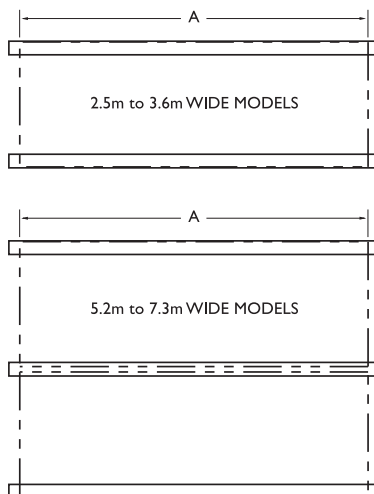
Recommended Steel Support

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.)

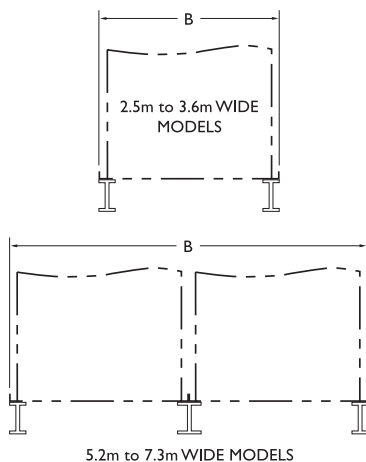
Beams should be level before setting the unit in place. Do not level the unit by shimming between the unit and the structural steel. Dimensions, weights, and data are subject to change without notice. Refer to the factory certified drawings for exact dimensions.

NOTE: Consult IBC for required steel support layout and structural design.

Plan Views



End Elevations



eco-ATWB-H SUPPORTING STEEL DIMENSIONS

2.5m Wide Models	A	B
eco-ATWB-H 9x9	2731	2578
eco-ATWB-H 9x12	3651	2578
eco-ATWB-H 9x14	4261	2578
eco-ATWB-H 9x18	5486	2578
eco-ATWB-H 9x21	6401	2578
3m Wide Models	A	B
eco-ATWB-H 10x12	3651	2991
eco-ATWB-H 10x18	5486	2991
eco-ATWB-H 10x24	7366	2991
eco-ATWB-H 10x36	11036	2991
3.6m Wide Models	A	B
eco-ATWB-H 12x12	3651	3607
eco-ATWB-H 12x14	4261	3607
eco-ATWB-H 12x18	5486	3607
eco-ATWB-H 12x20	6096	3607
eco-ATWB-H 12x24	7366	3607
eco-ATWB-H 12x28	8585	3607
eco-ATWB-H 12x36	11036	3607
eco-ATWB-H 12x40	12256	3607
5.2m Wide Models	A	B
eco-ATWB-H 17x12	3651	5286
eco-ATWB-H 17x14	4261	5286
6.1m Wide Models	A	B
eco-ATWB-H 17x12	3651	6112
eco-ATWB-H 17x14	5486	6112
7.3m Wide Models	A	B
eco-ATWB-H 24x12	3651	7344
eco-ATWB-H 24x14	4261	7344
eco-ATWB-H 24x18	5486	7344
eco-ATWB-H 24x20	6096	7344

eco-Hybrid APPLICATIONS

Design

EVAPCO units are of heavy-duty construction and designed for long trouble-free operation. Proper equipment selection, installation and maintenance is, however, necessary to ensure full unit performance. Some of the major considerations in the application of a 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 fan should be located at a height even with the adjacent wall, thereby reducing the chance of recirculation. For additional information, see the EVAPCO Equipment Layout Manual.

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. 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 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.

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

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.

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

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

Heat Exchanger Coil

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 50°F when the cooler is shut down. Also, a minimum recommended flow rate per unit must be maintained.

Minimum Flows	Standard Flow LPS	Series Flow LPS
2.5m Wide Models		
eco-ATWB-H 9x9 to 9x21	10.1	5.1
3m Wide Models		
eco-ATWB-H 10x12 to 10x18	11.9	6.0
eco-ATWB-H 10x24 to 10x36	23.8	11.9
3.6m Wide Models		
eco-ATWB-H 12x12 to 12x20	14.7	7.4
eco-ATWB-H 12x24 to 12x40	29.3	14.7
5.2m Wide Models		
eco-ATWB-H 17x12 to 17x14	20.2	10.1
6.1m Wide Models		
eco-ATWB-H 20x12 to 20x18	23.8	11.9
7.3m Wide Models		
eco-ATWB-H 24x12 to 24x20	29.3	14.7

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. Insulation may be factory installed on the hood and casing or field installed by an insulation contractor.

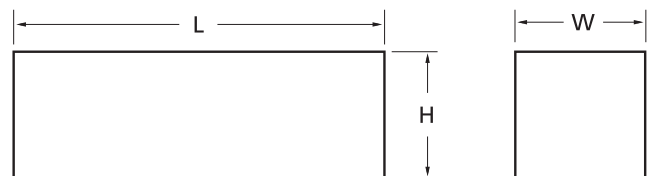
The discharge hood and dampers are constructed of hot-dip galvanized steel. Hoods are equipped with access panels to facilitate maintenance of the eliminators and water distribution system. The dampers, damper actuator and linkage are all factory assembled. Actuator controls and wiring are field supplied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

The system control sequence should allow 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.

Discharge Hood Dimensions

Model	L	H*	W	Weight	Number of Hoods
eco-ATWB-H 9x9	2727	406	2578	445	1
eco-ATWB-H 9x12	3188	406	2578	515	1
eco-ATWB-H 9x14					
eco-ATWB-H 9x18	2731	406	2578	890	2
eco-ATWB-H 9x21	3188	406	2578	1035	2
eco-ATWB-H 17x12	3188	406	2578	960	2
eco-ATWB-H 17x14					
eco-ATWB-H 10x12	3648	356	3105	785	1
eco-ATWB-H 10x18					
eco-ATWB-H 10x24	3648	356	3105	1570	2
eco-ATWB-H 10x36					
eco-ATWB-H 20x12					
eco-ATWB-H 20x18					
eco-ATWB-H 12x12	3651	356	3607	815	1
eco-ATWB-H 12x14					
eco-ATWB-H 12x18					
eco-ATWB-H 12x20					
eco-ATWB-H 12x24	3651	356	3607	1635	2
eco-ATWB-H 12x28					
eco-ATWB-H 12x36					
eco-ATWB-H 12x40					
eco-ATWB-H 24x12	3651	356	3607	1635	2
eco-ATWB-H 24x14					
eco-ATWB-H 24x18					
eco-ATWB-H 24x20					

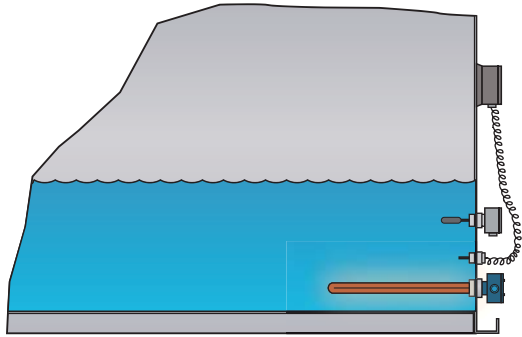
*Overall unit height will be height of the base unit plus the H dimension.



eco-Hybrid APPLICATIONS

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 not included as standard.



eco-ATWB-H Heater Sizes *

Unit No.	-18°C kW	-29°C kW	-40°C kW
eco-ATWB-H 9x9	7	10	15
eco-ATWB-H 9x12	(2) 4	(2) 7	(2) 9
eco-ATWB-H 9x14	(2) 5	(2) 7	(2) 10
eco-ATWB-H 9x18	(2) 6	(2) 9	(2) 12
eco-ATWB-H 9x21	(2) 7	(2) 12	(2) 15
eco-ATWB-H 17x12	(4) 4	(4) 7	(4) 9
eco-ATWB-H 17x14	(4) 5	(4) 7	(4) 10
eco-ATWB-H 10x12	(2) 5	(2) 8	(2) 10
eco-ATWB-H 10x18	(2) 7	(2) 12	(2) 15
eco-ATWB-H 10x24	(4) 5	(4) 8	(4) 10
eco-ATWB-H 10x36	(4) 7	(4) 12	(4) 15
eco-ATWB-H 20x12	(4) 5	(4) 8	(4) 10
eco-ATWB-H 20x18	(4) 7	(4) 12	(4) 15
eco-ATWB-H 12x12	(2) 6	(2) 9	(2) 12
eco-ATWB-H 12x14	(2) 7	(2) 10	(2) 15
eco-ATWB-H 12x18	(2) 9	(2) 15	(2) 18
eco-ATWB-H 12x20	(2) 10	(2) 15	(3) 15
eco-ATWB-H 12x24	(4) 6	(4) 9	(4) 12
eco-ATWB-H 12x28	(4) 7	(4) 10	(4) 15
eco-ATWB-H 12x36	(4) 9	(4) 15	(4) 18
eco-ATWB-H 12x40	(4) 10	(4) 15	(6) 15
eco-ATWB-H 24x12	(4) 6	(4) 9	(4) 12
eco-ATWB-H 24x14	(4) 7	(4) 10	(4) 15
eco-ATWB-H 24x18	(4) 9	(4) 15	(4) 18
eco-ATWB-H 24x20	(4) 10	(4) 15	(4) 20

*Electric heater selection based on ambient air temperature shown.

FACTORY FABRICATED INDUCED DRAFT eco-ATWB-H CLOSED CIRCUIT COOLER

General

Furnish and install factory assembled closed circuit cooler of induced draft counterflow design with a horizontal multiple side air entry and a vertical air discharge. The unit shall be completely factory assembled and conform to the specifications and schedules.

The closed circuit cooler shall be **CTI certified** and have the capacity to cool ___ l/s water / glycol from ___°C to ___°C with a ___°C entering wet bulb temperature and a dry bulb switchover temperature of ___°C.

Optional: (If dry operating conditions are different than the wet operating conditions)

Each unit shall also cool ___ l/s of ___ from ___°C to ___°C with a ___°C entering dry bulb temperature.

The total fan power should not exceed ___ kW.
The total pump power should not exceed ___ kW.

The total overall unit dimensions should not exceed the following:

Length: ___ mm Width: ___ mm Height: ___ mm

The maximum operating weight should not exceed ___ kg.

The unit will be delivered in three parts: the bottom basin - louver section, the coil section and the fan section. The unit sections shall be joined together with elastic sealer and bolted together with corrosion resistant fasteners.

Approved manufacturer **Evapco** – model **eco-ATWB-H** _____

Thermal Performance – Performance Warranty

The tower shall be capable of performing the thermal duties as shown in the schedule and on drawings and its design thermal rating shall be certified by the manufacturer.

Applicable Standards

CTI ATC 128 Test Code for Measurement of Sound from Water Cooling Towers

Submittals

- Shop drawings: submit shop drawings indicating dimensions, weight loadings and required clearances.
- Product data: submit manufacturers technical product data, original selection printouts and clearance requirements.
- Complete noise data sheet for the selected closed circuit cooler(s).
- Maintenance data for the closed circuit cooler(s).
- The manufacturer shall provide factory test run certificates of the fans and fan motor.

Product Delivery – Storage and Handling

- The contractor shall make the provisions for proper storage at site before installation and handle the product per the instructions of the manufacturer.
- Once installed provide the necessary measures to keep units clean and protected from any dust and mechanical damage.

Quality Assurance

- The manufacturer shall have a quality assurance system in place which is certified by an accredited registrar and complying with the requirements of ISO 9001. This is to guarantee a consistent level of product and service quality.
- Manufacturers without ISO 9001 certification are not acceptable.

Warranty

- The products will be warranted for one (1) year from start-up, not to exceed eighteen (18) months from the date of shipment.

PRODUCT

Construction – Corrosion Resistance

- The structure and all steel elements of the pan and casing shall be constructed of G-235 hot dip galvanized steel for long life and durability. Alternatives with lower zinc layer thickness and external paint or coating are not accepted as equal.
- The strainer shall be made of stainless steel type 304.
- During fabrication all panel edges shall be coated with a 95% pure zinc compound.
- Casing materials shall be of non flammable construction only.

OPTIONAL EXECUTION – BASIN IN 304 Stainless Steel (OR 316 SST)

Construction – Corrosion Resistance

- The structure and all steel elements of the Basin and Louver section up to the water level shall be made of 304/316 SST.
- Alternatives with hot dip galvanized steel and epoxy coatings in lieu of the 304/316 SST are not considered to be equal and are not accepted.
- All other steel components of the casing shall be constructed of G-235 hot dip galvanized steel for long life and durability. Alternatives with lower zinc layer thickness and external paint or coating or FRP materials are not accepted as equal.
- The strainer shall be made of 304 SST.
- During fabrication all galvanized steel panel edges shall be coated with a 95% pure zinc compound.
- Casing materials shall be of non flammable construction only.

OPTIONAL EXECUTION – COMPLETE UNIT IN 304 STAINLESS STEEL [except heat exchange coils(s)] (OR 316 SST)

Construction – Corrosion Resistance

- The structure and all steel elements shall be made of 304/316 SST.
- Alternatives with hot dip galvanized steel and epoxy coatings in lieu of the 304/316 SST are not considered to be equal and are not accepted.
- The strainer shall be made of 304 SST.
- Casing materials shall be of non flammable construction only.

Construction – Seismic and wind load resistance

- The structural design must withstand 1g seismic or 6.94 kPa
- Closed Circuit Coolers must be independently certified according to IBC

Basin Section

Closed Circuit Cooler Basin

- Standard basin accessories include: overflow, drain, strainer and brass make up valve with plastic float ball.
- The strainer shall be made of 304 SST.
- The entire pan area shall incorporate a sloped and stepped basin design to prevent sediment built up, biological film and standing water.
- Upper and lower basin bottoms shall be sloped to provide drainage of the complete basin section.
- The basin can be inspected while the unit is in operation with the fan(s) and pump(s) running.

Air Inlet Louvers

- The air inlet louvers shall be constructed of UV inhibited polyvinyl chloride (PVC), mounted in easily removable frames for easy access to the basin.
- The louvers shall be at four sides to provide easy access to the basin interior.
- The louvers shall have a minimum of two changes in air direction to prevent splash out and block direct sunlight from entering the basin.
- The louvers will have a 19 mm opening to prevent debris from entering the basin.

eco-ATWB-H SPECIFICATIONS

Water Circulation Pump(s)

- a) The pump(s) shall be a close coupled, centrifugal type with mechanical seal, installed vertically at the factory to allow free drainage on shut down.
- b) A ____ kW totally enclosed motor(s) suitable for outdoor service shall be furnished.
- c) The motor shall be suitable for the following power supply: ____volts, ____hertz and ____ phase and ____ kW.

Electric Heaters

- a) The closed circuit cooler cold water basin shall be provided with an electric heater package to prevent freezing of the water in the cold water basin, while the pump is shut down.
- b) The electric heater package includes: electric heater element(s), thermostat and low water level cutoff.
- c) The heaters shall be selected to maintain 4°C basin water temperature at ____°C ambient
- d) The heater(s) shall be ____V / ____ phase / ____ Hz electric power supply.

Five Probe Electric Water Level Control Package

- a) The closed circuit cooler manufacturer shall provide an electric water level control package instead of the mechanical float valve arrangement.
- b) The package consist of the following elements :
 - Multiple heavy duty stainless steel 316 static sensors mounted in a stilling chamber outside the unit. Electrodes or sensors mounted inside the unit are not accepted as their operation will be disturbed by the moving water in the basin.
 - An ABS, IP 56 case contains all the contactors for the different level probes and will provide an output signal of a relay for automatic filling and one relay for alarm level.
 - The power supply to the control package is 24 Vac / 230 Vac - ____ Hz .
 - A weather protected solenoid valve (PN16) for the water make up ready for piping to a water supply with pressure between 35 kPa and 700 kPa.

Heat Transfer Coil Section

Evaporative Coil (Wet Coil)

- a) The closed circuit cooler shall use heat exchange coils of an elliptical tube design to obtain lower air flow resistance and allow higher water loadings around the tubes. Each row of the heat exchanger coil shall be provided with elliptical spiral fins to increase the evaporative and dry thermal performance of the unit.
- b) The heat transfer coil(s) shall be made of all prime surface, encased in a steel framework and hot dip galvanized after fabrication as a complete assembly.
- c) The tubes shall be arranged in a self spacing, staggered pattern in the direction of air flow for maximum heat transfer efficiency and minimum pressure drop.
- d) The heat exchange coils shall be tested to 2.69MPa air pressure under water.
- e) Coil shall meet strength requirements of ASME/ANSI B31.5.
- f) The manufacturer shall be responsible for the manufacturing and performance testing of the entire heat transfer coil. This is to assure single source responsibility.
- g) The casing shall totally encase the complete coil section to protect the complete coil from direct atmospheric contact.
- h) The pressure drop of the process fluid through the coil shall not exceed ____kPa.

Sensible Heat Transfer Coil (Dry Coil)

- a) The sensible heat transfer coil is installed in the air discharge of the closed circuit cooler and will be piped in series with the wet coil.
- b) The sensible heat transfer coil shall be constructed of copper tubes and tubular copper headers with carbon steel coil connections for easy field piping.
- c) To maximize heat transfer, tubes shall be arranged in a staggered design and be equipped with fins.
- d) The fins should have fully drawn collars to maintain con-

sistent fin spacing and continuous surface contact over the entire tube.

- e) The fins should be made of Aluminum Magnesium of at least 0.7% to have good corrosion resistance and the distance between the fins should be 2.5 mm to avoid clogging.
- f) The coils should be placed in a heavy-duty galvanized G-235 frame. The frame should have full collars to support the coil correctly and avoid damaging the tubes.
- g) The dry coil shall be pneumatically tested under water at 1.6MPa.

Fan Section

Water Distribution

- a) The water distribution system shall be completely enclosed and protected from sunlight exposure, environmental elements and debris. Water distribution systems with direct exposure to the environment are not allowed.
- b) The spray header and branches shall be constructed of Schedule 40, Polyvinyl Chloride (PVC) pipe for corrosion resistance.
- c) All spray branches shall have threaded end caps and are easily removable for cleaning purposes.
- d) The water shall be distributed over the coil by precision molded spray nozzles with large minimum orifice openings and integral sludge ring to eliminate clogging.
- e) The nozzles shall be threaded into the water distribution piping to assure positive positioning and easy removal for maintenance. Snap in or strapped on nozzles are not accepted.

Drift Eliminators

- a) The drift eliminators shall be constructed of entirely inert polyvinyl (PVC) that has been specially treated to resist ultra violet light.
- b) Assembled in easily handled sections, the eliminator shall incorporate three changes in air direction to assure efficient removal of entrained moisture from the discharge air stream.
- c) The maximum drift rate shall not exceed 0.001 % of the circulating water rate.

Access Door

- a) A large hinged access door shall provide access to the fan section for maintenance.
- b) A second access door shall provide access to the evaporative coil section.

Mechanical Equipment

Axial Propeller Fan(s) (Standard)

- a) Fan shall be heavy duty wide chord axial propeller type, statically balanced and constructed of extruded aluminum alloy blades.
- b) Fans shall be installed in a closely fitted cowl with venturi air inlet for maximum fan efficiency.
- c) The fans shall utilize a soft connect blade to hub design, compatible with variable speed drives, to avoid transmission of vertical forces to the unit structure.
- d) Each fan blade shall be individually adjustable.
- e) The fan cowl shall be covered with a heavy gauge hot dip galvanized steel wire fan guard.
- f) The fan – drive system (fan – drive – motor) shall be factory mounted, adjusted and undergo a trial run in the factory before shipment.

Axial Propeller Fan(s) - Low Sound Fan (Alternative)

- a) Fan shall be heavy duty wide chord axial propeller type, statically balanced and constructed of extruded aluminum alloy blades.
- b) Fans shall be installed in a closely fitted cowl with venturi air inlet for maximum fan efficiency.
- c) The fans shall utilize a soft connect blade to hub design, compatible with variable speed drives, to avoid transmission of vertical forces to the unit structure.

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- d) Each fan blade shall be individually adjustable.
- e) The fan cowl shall be covered with a heavy gauge hot dip galvanized steel wire fan guard.
- f) The fan – drive system (fan – drive – motor) shall be factory mounted, adjusted and undergo a trial run in the factory before shipment.

Axial Propeller Fan(s) - Super Low Sound Fan (Alternative)

- a) Fan shall be extremely wide chord axial, one piece heavy duty propeller type, statically balanced and made of FRP.
- b) Fans will be installed in a closely fitted cowl with venturi air inlet for maximum fan efficiency.
- c) The fan cowl shall be covered with a heavy gauge hot dip galvanized steel wire fan guard.
- d) The fan – drive system (fan – drive – motor) shall be factory mounted, adjusted and undergo a trial run in the factory before shipment.
- e) The fans are high efficiency and operate with no loss of thermal performance

Bearings and Drive

- a) The fan shaft (s) shall be supported by heavy duty, self aligning ball type bearings with cast iron housings and lubrication fittings for maintenance.
- b) The bearings shall be rated for an L-10 life of 75000 to 135000 hours.
- c) The fan drive sheaves shall be aluminum alloy.
- d) The belt shall be a multigroove belt system, constructed of neoprene with polyester cords and designed for 150% of the motor nameplate horsepower.
- e) The grease fittings shall be extended to a location just inside the access door.

Motor (2.5 and 5.2 meter wide Models)

- a) The fan motor shall be Totally Enclosed Fan Cooled (TEFC), squirrel cage, ball bearing type motor.
- b) The motor shall be specially designed for cooling tower use with moisture protection on the winding, shaft and bearings.
- c) The motor shall be minimum IP 55 degree of protection, Class F insulation, Service Factor 1.0 and selected for the appropriate cooling tower duty and the correct ambient temperature but minimum 40°C.
- d) Motors bearings shall be double sealed non-relubricable or external grease nipples shall be provided.
- e) The motor shall be mounted on an adjustable heavy duty steel motor base.
- f) A hinged protective cover shall shield the motor and sheave from the weather.
- g) The motor power supply shall be ___ volts, ___ hertz and ___ phase.

Motor (3, 3.6, 6.1 and 7.3 meter wide Models)

- a) The fan motor shall be Totally Enclosed Air Over (TEAO), squirrel cage, ball bearing type motor.
- b) The motor shall be specially designed for cooling tower use with moisture protection on the windings, shaft and bearings.
- c) The motor shall be minimum IP 55 degree of protection, Class F insulation, Service Factor 1.0 and selected for the appropriate cooling tower duty and the correct ambient temperature but minimum 40°C.
- d) Motor bearings shall be double sealed non-relubricable or external grease nipples shall be provided.
- e) The motor shall be mounted on an adjustable heavy duty steel motor base.
- f) The motor base shall be able to swing to the outside of the unit for repair or removal.
- g) The motor power supply shall be ___ volts, ___ hertz and ___ phase.

Control panel

The unit(s) shall be provided with a control panel which operates by measuring and analyzing water inlet and outlet temperature simultaneous with ambient dry bulb monitoring in order to minimize the evaporative cooling mode of operation and to

save system water. The control panel can also be programmed to operate with a water savings or energy savings priority.

The system will include:

- A MODBUS 485* Port for the Building Automation System
- Programmable Logic Control
- Fluid Inlet Temperature Sensor(s)
- Fluid Outlet Temperature Sensor(s)
- Basin Temperature Sensor(s)
- Ambient Dry Bulb Sensor(s)
- Variable frequency drive(s) For Fan Motor(s)
- Recirculating Pump Motor Starter(s).
- Main Disconnect
- Manual Bypass
- DC power supply for the PLC and instrumentation.
- Heater Package Controls w/Contactor with Overload Protection
- Control Power Transformer
- Electronic Water Level Control Package
- Preprogrammed software to ensure optimized water and energy savings priority
- Ethernet Connection between VFD's, PMC and Operator Interface
- Relays for all PLC Digital Outputs
- Fan Motor: Space Heater Control
- Manual Operation of Pump(s) and Fan(s)
- Visual Status Display of All Components.

Sound Levels

Sound Level

The maximum sound pressure levels (dB) measured 1.5 m 45° from the top of the closed circuit cooler operating at full fan speed shall not exceed the sound levels detailed below.

Center Freq.	63	125	250	500	1000	2000	4000	8000
	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz
dB(A)								

ACCESSORIES (Optional)

Vibration Switch

- a) A vibration limit switch shall be installed on the mechanical equipment support and wired into the control panel. The purpose of this switch is to interrupt power to the motor in the event of excessive vibration.
- b) The switch shall be adjustable for sensitivity and shall require manual reset.

Vertical Access Ladders

- a) A vertical ladder with safety cage which provide easy access to the water distribution system and drive components shall be provided with the closed circuit cooler(s).
- b) The ladder will be completed with a safety cage for safety purposes.
- c) Ladder safety cage shall meet OSHA 29 CFR 1910.27 requirements.

Service Platforms

- a) The closed circuit cooler shall be supplied with a double external service platform.
- b) The external service platforms will be self supporting and include access ladders to the platforms.
- c) The external service platforms will be installed in front of the access doors.
- d) The platform shall meet OSHA 29 CFR 1910.27 requirements.

Motor Davit

- a) The closed circuit cooler shall be supplied with a motor davit to facilitate the removal of fan motor(s) and fan(s).
- b) The davit is constructed of aluminum, the bracket is constructed of galvanized steel and is mounted on the side of the unit.
- c) The fan motor davit ships loose with the unit and is installed in the field.

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Water Silencer

- a) The water silencers are located in the falling water area of the cold water basin.
- b) The water silencers will reduce the overall sound levels 4 dB (A) to 7 dB (A) measured at 1.5 m from the side or end of the unit, when the fans are running, and 9 dB (A) to 12 dB (A) when fans are off.
- c) The water silencers are constructed of lightweight PVC sections and can be easily removed for access to the basin area.
- d) The water silencers will have no impact on the unit's thermal performance.

APPLICATIONS

eco-Hybrid

NOTES





World Headquarters/
Research and
Development Center

EVAPCO Facilities

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

EVAPCO, Inc. • P.O. Box 1300 • Westminster, MD 21158 USA
PHONE: 410-756-2600 • FAX: 410-756-6450 • E-MAIL: marketing@evapco.com

EVAPCO North America

**EVAPCO, Inc.
World Headquarters**

P.O. Box 1300
Westminster, MD 21158 USA
Phone: 410-756-2600
Fax: 410-756-6450
E-mail:

EVAPCO East

5151 Allendale Lane
Taneytown, MD 21787 USA
Phone: 410-756-2600
Fax: 410-756-6450
E-mail: marketing@evapco.com

EVAPCO Midwest

1723 York Road
Greenup, IL 62428 USA
Phone: 217-923-3431
Fax: 217-923-3300
E-mail: evapcomw@evapcomw.com

EVAPCO West

1900 West Almond Avenue
Madera, CA 93637 USA
Phone: 559-673-2207
Fax: 559-673-2378
E-mail: contact@evapcwest.com

EVAPCO Iowa

925 Quality Drive
Lake View, IA 51450 USA
Phone: 712-657-3223
Fax: 712-657-3226

**EVAPCO Iowa
Sales & Engineering**

1234 Brady Boulevard
Owatonna, MN 55060 USA
Phone: 507-446-8005
Fax: 507-446-8239
E-mail: evapcomn@evapcomn.com

**Refrigeration Valves &
Systems Corporation**

A wholly owned subsidiary of EVAPCO, Inc.
1520 Crosswind Dr.
Bryan, TX 77808 USA
Phone: 979-778-0095
Fax: 979-778-0030
E-mail: rvs@rvscorp.com

McCormack Coil Company, Inc.

A wholly owned subsidiary of EVAPCO, Inc.
P.O. Box 1727
6333 S.W. Lakeview Boulevard
Lake Oswego, OR 97035 USA
Phone: 503-639-2137
Fax: 503-639-1800
E-mail: mail@mmccoil.com

EvapTech, Inc.

A wholly owned subsidiary of EVAPCO, Inc.
8331 Nieman Road
Lenexa, KS 66214 USA
Phone: 913-322-5165
Fax: 913-322-5166
E-mail: marketing@evaptech.com

Tower Components, Inc.

A wholly owned subsidiary of EVAPCO, Inc.
5960 US HWY 64E
Ramseur, NC 27316
Phone: 336-824-2102
Fax: 336-824-2190
E-mail: mail@towercomponentsinc.com

EVAPCO Newton

701 East Jourdan Street
Newton, IL 62448 USA
Phone: 618-783-3433
Fax: 618-783-3499
E-mail: evapcomw@evapcomw.com

EVAPCO Europe

**EVAPCO Europe, N.V.
European Headquarters**

Industrieterrein Oost 4010
3700 Tongeren, Belgium
Phone: (32) 12-395029
Fax: (32) 12-238527
E-mail: evapco.europe@evapco.be

EVAPCO Europe, S.r.l.

Via Ciro Menotti 10
I-20017 Passirana di Rho
Milan, Italy
Phone: (39) 02-939-9041
Fax: (39) 02-935-00840
E-mail: evapcoeuropa@evapco.it

EVAPCO Europe, S.r.l.

Via Dosso 2
23020 Piateda Sondrio, Italy

EVAPCO Europe, GmbH

Bovert 22
D-40670 Meerbusch, Germany
Phone: (49) 2159-69560
Fax: (49) 2159-695611
E-mail: info@evapco.de

Flex coil a/s

A wholly owned subsidiary of EVAPCO, Inc.
Knøsgårdvej 115
DK-9440 Aabybro Denmark
Phone: (45) 9824 4999
Fax: (45) 9824 4990
E-mail: info@flexcoil.dk

EVAPCO S.A. (Pty.) Ltd.

A licensed manufacturer of EVAPCO, Inc.
18 Quality Road
Isando 1600
Republic of South Africa
Phone: (27) 11-392-6630
Fax: (27) 11-392-6615
E-mail: evapco@evapco.co.za

Evap Egypt Engineering Industries Co.

A licensed manufacturer of EVAPCO, Inc.
5 El Nasr Road
Nasr City, Cairo, Egypt
Phone: 2 02 24022866 / 2 02 24044997
Fax: 2 02 24044667 / 2 02 24044668
E-mail: Primacool@link.net / Shady@primacool.net

EVAPCO Asia/Pacific

EVAPCO Asia/Pacific Headquarters

1159 Luoning Rd. Baoshan Industrial Zone
Shanghai, P. R. China, Postal Code: 200949
Phone: (86) 21-6687-7786
Fax: (86) 21-6687-7008
E-mail: marketing@evapcochina.com

**Evapco (Shanghai) Refrigeration
Equipment Co., Ltd.**

1159 Louning Rd., Baoshan Industrial Zone
Shanghai, P.R. China, Postal Code: 200949
Phone: (86) 21-6687-7786
Fax: (86) 21-6687-7008
E-mail: sales@evapco.com.au

**Beijing EVAPCO Refrigeration
Equipment Co., Ltd.**

No.66 Yan Xi Avenue,
Yanqi Development Zone, Huai Rou County
Beijing, P.R. China, Postal Code: 101407
Phone: (86) 10 6166-7238
Fax: (86) 10 6166-7395
E-mail: evapcoobj@evapcochina.com

Evapco Australia (Pty.) Ltd.

34-42 Melbourne Road
P.O. Box 436
Riverstone, N.S.W. Australia 2765
Phone: (61) 2 9627-3322
Fax: (61) 2 9627-1715
E-mail: sales@evapco.com.au

EvapTech Asia Pacific Sdn. Bhd

A wholly owned subsidiary of EvapTech, Inc.
101 Business Park, 2/F Unit 20
Persiaran Puchong Jaya Selatan
Bandar Puchong Jaya,
47170 Puchong, Selangor, Malaysia
Phone: (60-3) 8070 7255
Fax: (60-3) 8070 5731
E-mail: marketing-ap@evaptech.com

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