



# ESWA™

## CLOSED CIRCUIT COOLER



**NOW  
FEATURING**

**CROSSCOOL™**  
INTERNALLY ENHANCED  
COIL TECHNOLOGY





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 in 21 locations in 10 countries around the world and supplied through a sales network consisting of over 170 offices.

### Super Low Sound Fan

The ESWA is available with Low Sound Solutions to reduce the overall sound generated from the top of the already quiet ESWA 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!
- Capacity certified by CTI with both Low Sound and Super Low Sound Fans.

### Easy to Maintain Drive System

(12' Wide Units)



- 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.

### Easy Field Assembly

- A new field assembly seam design which ensures easier assembly and fewer field seam leaks.
- Self-guiding channels guide the fill section into position improving the quality of the field seam.
- Eliminates up to 66% of fasteners. (Patent Pending)



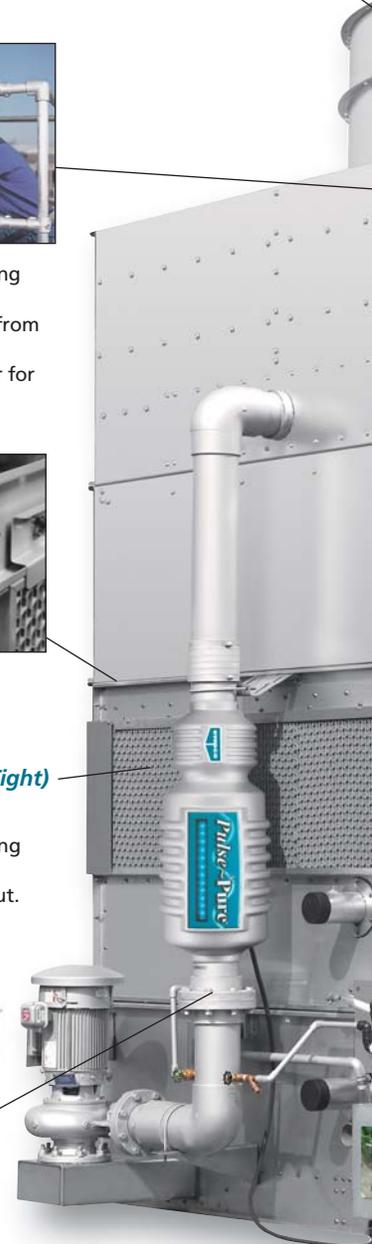
### WST Air Inlet Louvers (Water and Sight Tight)

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



### Optional Factory Mounted Chemical or Non-Chemical Water Treatment Systems

The ESWA is available with either a **Pulse~Pure**® non-chemical or a **Smart Shield**® solid chemical water treatment system. The **Pulse~Pure**® and **Smart Shield**® are environmentally sensitive alternatives for treating water in evaporative cooled equipment. The **Pulse~Pure**® and **Smart Shield**® systems include all components required for an effective water treatment system; factory mounted and wired.



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

† Mark owned by the Cooling Technology Institute

# ESWA DESIGN AND CONSTRUCTION FEATURES

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

The ESWA's Cooling Technology Institute **CTI**† certified performance, new owner oriented features and independent certification of the International Building Code (IBC) compliance reinforce the ESWA's position as a premier cooler in the HVAC Industry.

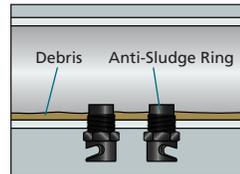


### CTI Certified Units



### Water Distribution System

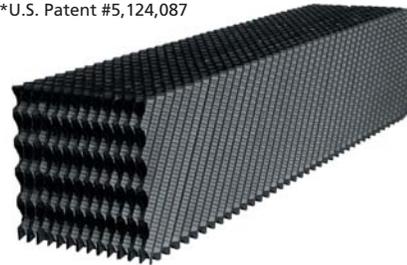
- Non-corrosive PVC construction.
- System branches have threaded end caps to assist with debris removal.



### Patented 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 5 per ASTM E84-81a.
- Can be used as an internal working platform.

\*U.S. Patent #5,124,087



### Galvanized Steel Coil

#### Elliptical Sensi-Coil® XT Construction Featuring CROSSCOOL™ Internal Tube Enhancement Technology

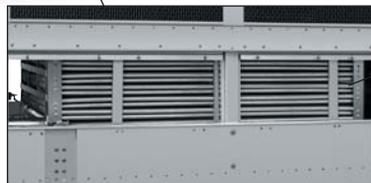
- Internal Tube Enhancement increases fluid turbulence providing **additional evaporative capacity**.
- Elliptical return bends allows for more circuits per coil bundle increasing maximum capacity per footprint.
- Coil located out of airstream eliminating water evaporation on the coil, reducing scale buildup potential.



**CROSSCOOL**™  
INTERNAL TUBE ENHANCEMENT

### Most Accessible Basin and Coil

- Convenient side access.
- Large open area simplifies maintenance.
- Basin may be inspected with pumps running.



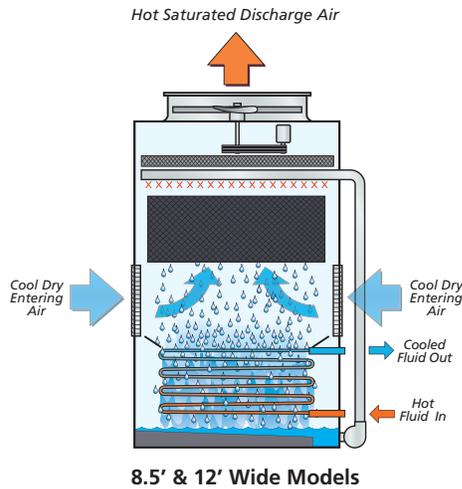


# ESWA DESIGN BENEFITS

## Principle of Operation

Evapco was the first to develop a closed circuit cooler with Patented Optimized Technology\*. The warm process fluid enters the coil of the closed circuit cooler. Through both sensible and latent heat transfer, the heat from the process fluid in the coil is transferred to the cold spray water that floods over the tubes. Having gained heat from the coil, the spray water is then collected in the cold water basin and circulated up to the water distribution system by the spray pump. The warmed spray water is then distributed 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 air is then discharged from the unit as a warm and saturated stream with a final dissipation of heat to the atmosphere. The spray water exits the fill section as a cooled fluid where it is focused on the coil at a high flow rate, and floods across in a repeat cycle.

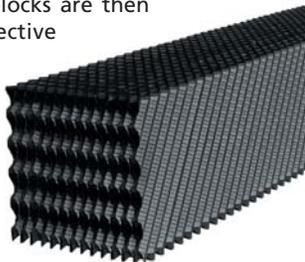
\*US Patent #6,598,862



## Patented EVAPAK Fill

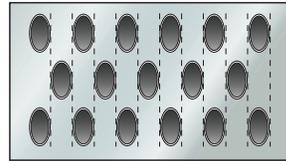
The patented EVAPAK fill is specially designed to induce highly turbulent mixing of the air and water for superior heat transfer. The fill section is constructed of polyvinyl chloride (PVC) sheets which are thermally formed into a cross flute design. The individual fill sheets are bonded together to 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 5 per ASTM Standard E84-81a.

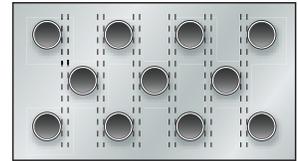


## Cooling Coil

The ESWA Closed Circuit Cooler Utilizes EVAPCO's **Sensi-Coil**®, featuring **CROSSCOOL**™ internal tube enhancement, provides the maximum amount of Thermal-Pak® elliptical tubes packed closely together in a coil arrangement designed with additional coil surface area.

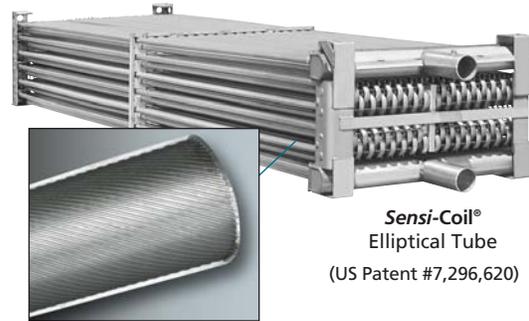


Sensi-Coil®



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  
(US 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. Finally, the assembled coil is pneumatically tested at 400 psig 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 800°F.

**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.**

# ENERGY EFFICIENT LOW SOUND

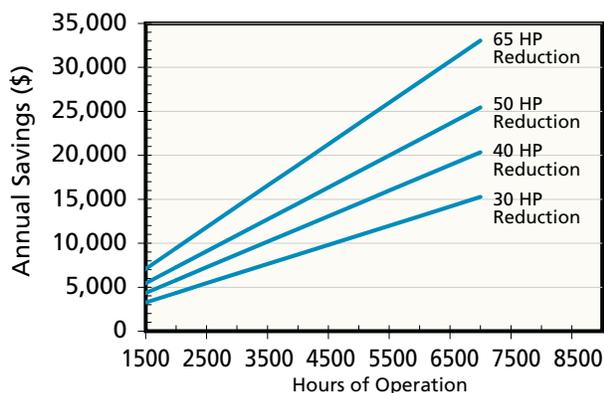
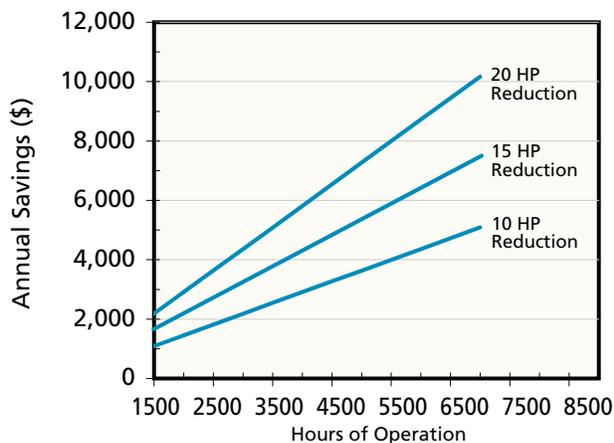
# ESWA

## Low Energy As Standard

The ESWA stands apart as being the most energy efficient closed circuit cooler on the market today. This efficiency, in terms of lower fan horsepower, translates directly to lower operating costs...*significantly lower operating costs*. With the ESWA installed, customers can realize immediate energy savings which continue each and every year for the life of the equipment.

- **Replace inefficient units:**

The potential for energy savings alone is often enough to justify replacing inefficient fluid coolers with high efficiency models. As an example, a 250 ton centrifugal fan fluid cooler with 80 HP worth of fan motors can be replaced by an ESWA model with a fan motor size of only 15HP. This tremendous reduction in fan motor size offers annual savings of \$16,530 per year based on 3,500 hours of operation and an electric rate of \$0.09/kWh.



Annual savings based on fan motor efficiency = 0.924 and energy cost of \$0.09/kWh

- **New Product Comparison:**

When comparing the cost of new equipment, energy efficiency and consumption are important factors for determining the total product cost. Units having a lower first cost but higher energy requirement are more expensive to operate and normally end up costing the customer more over the life of the equipment.

- **Smaller Footprint, Lower Horsepower:**

As an example, a typical induced-draft 200 ton\*\* cooler can require a 12' x 12' footprint, 20 HP fan motor, and 5 HP pump. The same load can be accomplished in an ESWA with an 8.5' x 12' footprint, 7.5 HP fan motor, and 7.5 HP pump.

\*\*Calculated using 3 GPM of Water at 100°F/90°F/78°F per ton.

## Low Sound As Standard

In addition to being the most energy efficient axial fan fluid cooler, the ESWA is also the quietest. At a distance of five feet above the fan, the ESWA 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 to develop the patented *Optimized Technology* that was used in the ESW closed circuit cooler. Optimized Technology combines "latent" heat transfer over the fill and "sensible" heat transfer over the coil to maximum heat transfer while minimizing scale buildup on the coil.

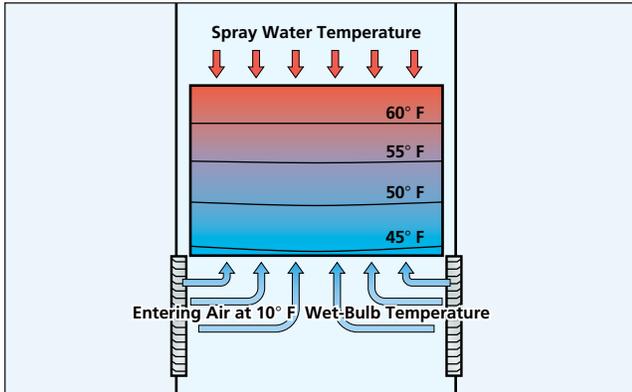
The ESWA closed circuit cooler was developed to take Optimized Technology to the next level. The ESWA features more capacity than ever before, 12-24% more capacity per footprint on average. This is done by using Evapco's new higher-density *Sensi-Coil™ Technology*. By using this new coil design (US Patent # 7,296,620), and higher water loadings over the coil, Evapco has achieved significant performance gains over other closed circuit coolers. 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.



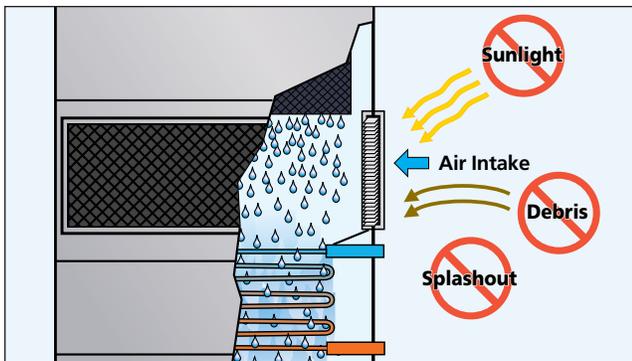
# ESWA DESIGN BENEFITS



## Counterflow... Optimum Design for Freezing Climates

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

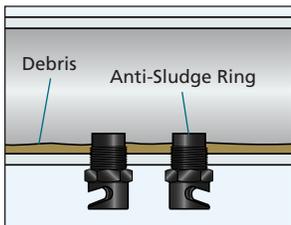
Evapco's counterflow design solves the problem of fill collapse due to ice formation.



## 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.



ABS Water Diffusers



## 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 which 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 and durable ABS plastic water diffusers.

The spray branch piping is easily removed and designed with threaded end-caps for easy cleaning. The water diffusers have wide openings with anti-sludge rings to prevent clogging from sediment and debris.

Evapco's design avoids the problems of biological growth and clogging that can occur due to a water distribution system that is open with direct exposure to the surroundings.



## Efficient Drift Eliminators\*\*

The New ESWA 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 which protect the spray system from sunlight and debris.

\*Patent Pending  
\*\*U.S. Patent #6,315,804

## Easy Maintenance Basin Design

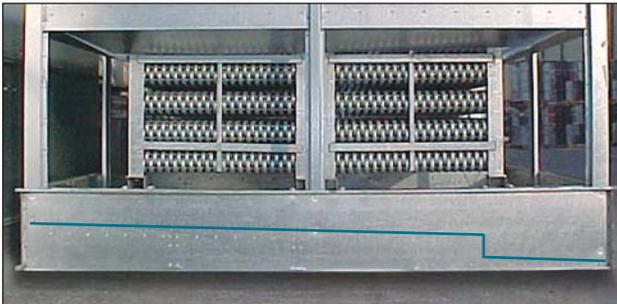
The cold water basin is perhaps the most important area for maintenance in an evaporative cooler. Service mechanics who work on this equipment know that dirt, debris and silt all settle out in the basin. Because basin maintenance is important and should be performed regularly, Evapco designed the basin 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:



### Easy Access

The cold water basin section is easily accessible from ground level. The basin is provided with solid access panels which 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 ESWA 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 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.



# ESWA MAINTENANCE ADVANTAGES

## Easy Maintenance Drive System

The Evapco POWER-BAND drive system utilized on the ESWA 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

#### Models ESWA-77, 102 and 153

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 typically installed in the field to reduce shipping costs. Contact your Evapco sales representative for factory mounting options.



### Models with Swing-Out Motors

#### Models ESWA-144, 216

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 a breeze. See page 20, Optional Equipment, for details.*

## POWER-BAND Drive System Design

The ESWA 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 20 years of successful 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. Premium efficient fan motors which are compatible with variable frequency drive (VFD) systems, come standard on all ESWA models. Alternative fan motor options are available as follows:

- Two speed single winding
- Two speed two winding
- Mill and chemical duty
- Explosion proof

### Five Year Drive Warranty

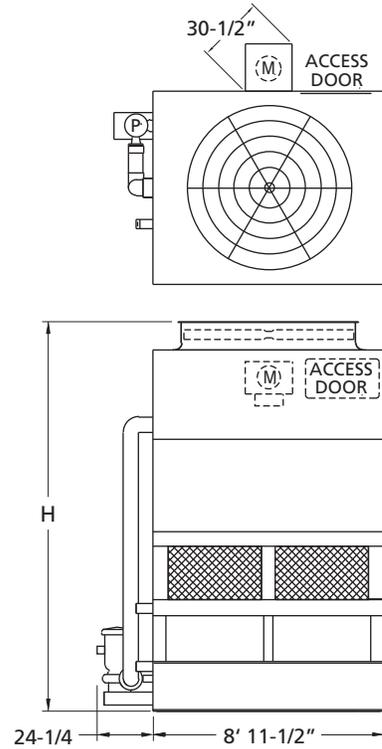
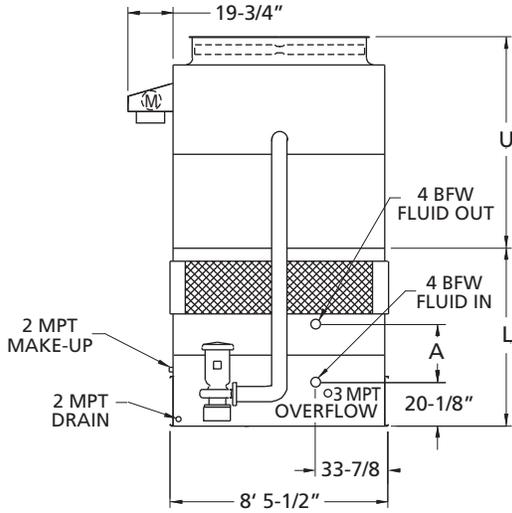
Evapco provides a standard 5 year motor and drive warranty on all POWER-BAND drive systems. This warranty provides end users with complete protection against fan motor or drive component failure. The comprehensive warranty includes the fan, fan motor, fan shaft, belts, sheaves, and fan bearings.



# ESWA Engineering Data & Dimensions

## ESWA Models 77-24H to 77-34K

**Note:** The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm. This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump <sup>4</sup>			Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	HP	CFM	HP	GPM		Gallons Required <sup>3</sup>	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 77-24H	8,420	5,570	11,990	7.5	40,200	5	650	141	250	8"	10,590	6' 10-7/8"	7' 2-1/8"	27"	14' 1"
ESWA 77-24I	8,430	5,570	12,000	10	44,200	5	650	141	250	8"	10,600	6' 10-7/8"	7' 2-1/8"	27"	14' 1"
ESWA 77-24J	8,560	5,570	12,130	15	50,500	5	650	141	250	8"	10,730	6' 10-7/8"	7' 2-1/8"	27"	14' 1"
ESWA 77-25H	9,220	6,370	13,060	7.5	40,200	5	650	174	250	8"	11,650	7' 6-3/8"	7' 2-1/8"	34-1/2"	14' 8-1/2"
ESWA 77-25I	9,230	6,370	13,070	10	44,200	5	650	174	250	8"	11,660	7' 6-3/8"	7' 2-1/8"	34-1/2"	14' 8-1/2"
ESWA 77-25J	9,360	6,370	13,200	15	50,500	5	650	174	250	8"	11,790	7' 6-3/8"	7' 2-1/8"	34-1/2"	14' 8-1/2"
ESWA 77-26H	10,000	7,150	14,110	7.5	40,200	5	650	206	250	8"	12,700	8' 1-7/8"	7' 2-1/8"	42"	15' 4"
ESWA 77-26I	10,010	7,150	14,120	10	44,200	5	650	206	250	8"	12,710	8' 1-7/8"	7' 2-1/8"	42"	15' 4"
ESWA 77-26J	10,140	7,150	14,250	15	50,500	5	650	206	250	8"	12,840	8' 1-7/8"	7' 2-1/8"	42"	15' 4"
ESWA 77-34H	8,710	5,580	12,280	7.5	39,500	5	650	141	250	8"	10,870	6' 10-7/8"	8' 2-1/8"	27"	15' 1"
ESWA 77-34I	8,720	5,580	12,290	10	43,400	5	650	141	250	8"	10,880	6' 10-7/8"	8' 2-1/8"	27"	15' 1"
ESWA 77-34J	8,850	5,580	12,420	15	49,600	5	650	141	250	8"	11,010	6' 10-7/8"	8' 2-1/8"	27"	15' 1"
ESWA 77-34K	8,910	5,580	12,480	20	54,800	5	650	141	250	8"	11,070	6' 10-7/8"	8' 2-1/8"	27"	15' 1"

1 Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require factory internal crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.

2 Heaviest section is the lower section.

3 Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).

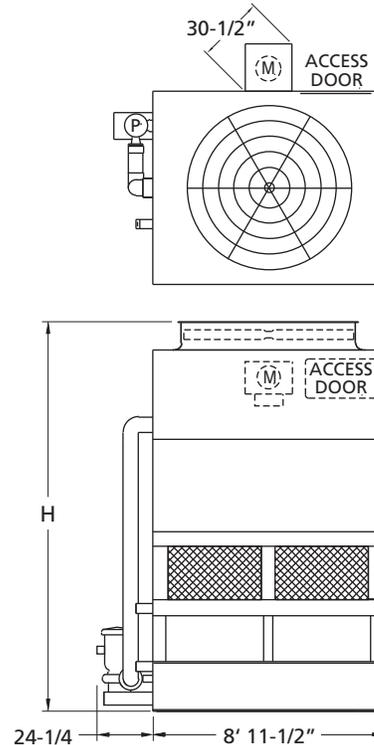
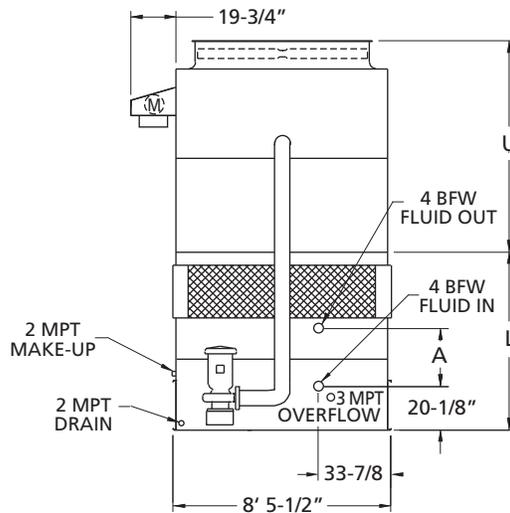
4 When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

5 Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

# ESWA Engineering Data & Dimensions

## ESWA Models 77-35H to 77-46K

**Note:** The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm. This required option is referred to as the High Flow coil configuration.



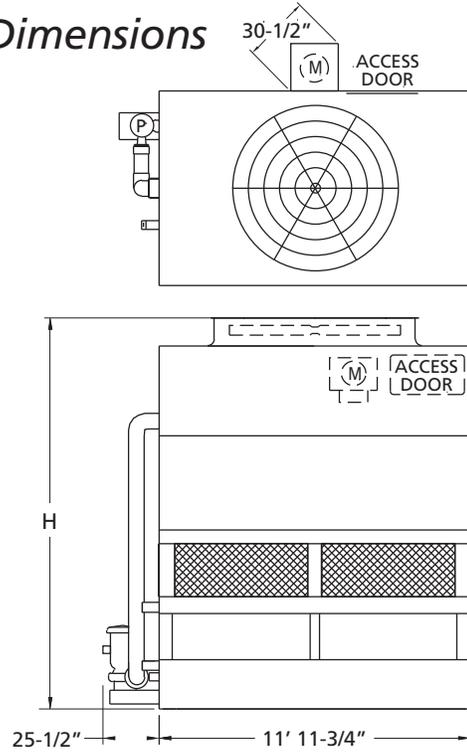
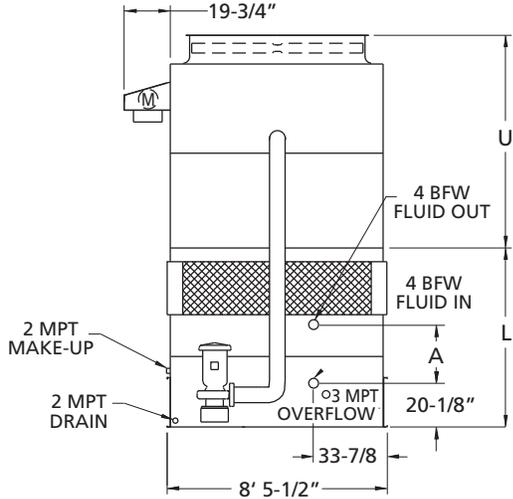
Model Number <sup>1</sup>	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump <sup>4</sup>			Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	HP	CFM	HP	GPM		Gallons Required <sup>3</sup>	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 77-35H	9,500	6,370	13,340	7.5	39,500	5	650	174	250	8"	11,930	7' 6-3/8"	8' 2-1/8"	34-1/2"	15' 8-1/2"
ESWA 77-35I	9,510	6,370	13,350	10	43,400	5	650	174	250	8"	11,940	7' 6-3/8"	8' 2-1/8"	34-1/2"	15' 8-1/2"
ESWA 77-35J	9,640	6,370	13,480	15	49,600	5	650	174	250	8"	12,070	7' 6-3/8"	8' 2-1/8"	34-1/2"	15' 8-1/2"
ESWA 77-35K	9,700	6,370	13,540	20	54,800	5	650	174	250	8"	12,130	7' 6-3/8"	8' 2-1/8"	34-1/2"	15' 8-1/2"
ESWA 77-36H	10,280	7,150	14,390	7.5	39,500	5	650	206	250	8"	12,980	8' 1-7/8"	8' 2-1/8"	42"	16' 4"
ESWA 77-36I	10,290	7,150	14,400	10	43,400	5	650	206	250	8"	12,990	8' 1-7/8"	8' 2-1/8"	42"	16' 4"
ESWA 77-36J	10,420	7,150	14,530	15	49,600	5	650	206	250	8"	13,120	8' 1-7/8"	8' 2-1/8"	42"	16' 4"
ESWA 77-36K	10,480	7,150	14,590	20	54,800	5	650	206	250	8"	13,180	8' 1-7/8"	8' 2-1/8"	42"	16' 4"
ESWA 77-44I	9,040	5,580	12,610	10	42,800	5	650	141	250	8"	11,200	6' 10-7/8"	9' 2-1/8"	27"	16' 1"
ESWA 77-44J	9,170	5,580	12,740	15	48,900	5	650	141	250	8"	11,330	6' 10-7/8"	9' 2-1/8"	27"	16' 1"
ESWA 77-44K	9,230	5,580	12,800	20	53,500	5	650	141	250	8"	11,390	6' 10-7/8"	9' 2-1/8"	27"	16' 1"
ESWA 77-45I	9,830	6,370	13,670	10	42,800	5	650	174	250	8"	12,260	7' 6-3/8"	9' 2-1/8"	34-1/2"	16' 8-1/2"
ESWA 77-45J	9,960	6,370	13,800	15	48,900	5	650	174	250	8"	12,390	7' 6-3/8"	9' 2-1/8"	34-1/2"	16' 8-1/2"
ESWA 77-45K	10,020	6,370	13,860	20	53,500	5	650	174	250	8"	12,450	7' 6-3/8"	9' 2-1/8"	34-1/2"	16' 8-1/2"
ESWA 77-46I	10,620	7,160	14,730	10	42,800	5	650	206	250	8"	13,310	8' 1-7/8"	9' 2-1/8"	42"	17' 4"
ESWA 77-46J	10,750	7,160	14,860	15	48,900	5	650	206	250	8"	13,440	8' 1-7/8"	9' 2-1/8"	42"	17' 4"
ESWA 77-46K	10,810	7,160	14,920	20	53,500	5	650	206	250	8"	13,500	8' 1-7/8"	9' 2-1/8"	42"	17' 4"

- Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require factory internal crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.
- Heaviest section is the lower section.
- Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).
- When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.
- Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

# ESWA Engineering Data & Dimensions

## ESWA Models 102-34H to 102-46K

**Note:** The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm. This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump <sup>4</sup>			Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	HP	CFM	HP	GPM		Gallons Required <sup>3</sup>	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 102-34H	11,190	7,520	16,340	7.5	48,900	7.5	800	209	330	10"	14,500	6' 10-7/8"	8' 2-1/8"	27"	15' 1"
ESWA 102-34I	11,200	7,520	16,350	10	53,800	7.5	800	209	330	10"	14,510	6' 10-7/8"	8' 2-1/8"	27"	15' 1"
ESWA 102-34J	11,330	7,520	16,480	15	61,500	7.5	800	209	330	10"	14,640	6' 10-7/8"	8' 2-1/8"	27"	15' 1"
ESWA 102-34K	11,390	7,520	16,540	20	67,200	7.5	800	209	330	10"	14,700	6' 10-7/8"	8' 2-1/8"	27"	15' 1"
ESWA 102-35H	12,350	8,680	17,910	7.5	48,900	7.5	800	259	330	10"	16,070	7' 6-3/8"	8' 2-1/8"	34-1/2"	15' 8-1/2"
ESWA 102-35I	12,360	8,680	17,920	10	53,800	7.5	800	259	330	10"	16,080	7' 6-3/8"	8' 2-1/8"	34-1/2"	15' 8-1/2"
ESWA 102-35J	12,490	8,680	18,050	15	61,500	7.5	800	259	330	10"	16,210	7' 6-3/8"	8' 2-1/8"	34-1/2"	15' 8-1/2"
ESWA 102-35K	12,550	8,680	18,110	20	67,200	7.5	800	259	330	10"	16,270	7' 6-3/8"	8' 2-1/8"	34-1/2"	15' 8-1/2"
ESWA 102-36I	13,470	9,790	19,440	10	53,800	7.5	800	308	330	10"	17,600	8' 1-7/8"	8' 2-1/8"	42"	16' 4"
ESWA 102-36J	13,600	9,790	19,570	15	61,500	7.5	800	308	330	10"	17,730	8' 1-7/8"	8' 2-1/8"	42"	16' 4"
ESWA 102-36K	13,660	9,790	19,630	20	67,200	7.5	800	308	330	10"	17,790	8' 1-7/8"	8' 2-1/8"	42"	16' 4"
ESWA 102-44I	11,610	7,520	16,760	10	52,900	7.5	800	209	330	10"	14,920	6' 10-7/8"	9' 2-1/8"	27"	16' 1"
ESWA 102-44J	11,740	7,520	16,890	15	60,500	7.5	800	209	330	10"	15,050	6' 10-7/8"	9' 2-1/8"	27"	16' 1"
ESWA 102-44K	11,800	7,520	16,950	20	66,200	7.5	800	209	330	10"	15,110	6' 10-7/8"	9' 2-1/8"	27"	16' 1"
ESWA 102-45I	12,770	8,680	18,330	10	52,900	7.5	800	259	330	10"	16,490	7' 6-3/8"	9' 2-1/8"	34-1/2"	16' 8-1/2"
ESWA 102-45J	12,900	8,680	18,460	15	60,500	7.5	800	259	330	10"	16,620	7' 6-3/8"	9' 2-1/8"	34-1/2"	16' 8-1/2"
ESWA 102-45K	12,960	8,680	18,520	20	66,200	7.5	800	259	330	10"	16,680	7' 6-3/8"	9' 2-1/8"	34-1/2"	16' 8-1/2"
ESWA 102-46I	13,890	9,800	19,860	10	52,900	7.5	800	308	330	10"	18,010	8' 1-7/8"	9' 2-1/8"	42"	17' 4"
ESWA 102-46J	14,020	9,800	19,990	15	60,500	7.5	800	308	330	10"	18,140	8' 1-7/8"	9' 2-1/8"	42"	17' 4"
ESWA 102-46K	14,080	9,800	20,050	20	66,200	7.5	800	308	330	10"	18,200	8' 1-7/8"	9' 2-1/8"	42"	17' 4"

1 Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require factory internal crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.

2 Heaviest section is the lower section.

3 Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).

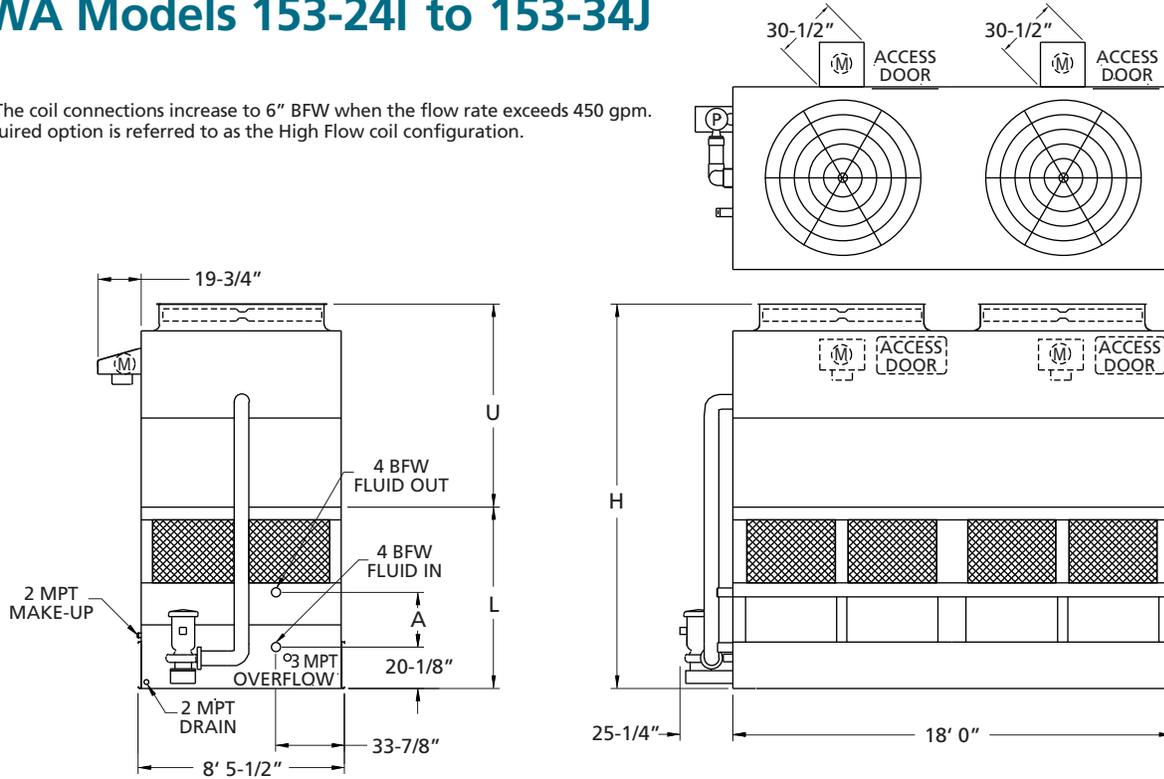
4 When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

5 Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

# ESWA Engineering Data & Dimensions

## ESWA Models 153-24I to 153-34J

**Note:** The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm. This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump <sup>4</sup>			Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	HP	CFM	HP	GPM		Gallons Required <sup>3</sup>	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 153-24I	16,730	11,320	24,540	10	88,800	10	1,030	323	510	12"	21,720	7' 5-3/8"	7' 3-3/4"	27"	14' 9-1/8"
ESWA 153-24J	16,980	11,320	24,790	15	101,500	10	1,030	323	510	12"	21,970	7' 5-3/8"	7' 3-3/4"	27"	14' 9-1/8"
ESWA 153-25H	18,320	12,940	26,780	7.5	80,800	10	1,030	400	510	12"	23,960	8' 7/8"	7' 3-3/4"	34-1/2"	15' 4-5/8"
ESWA 153-25I	18,350	12,940	26,810	10	88,800	10	1,030	400	510	12"	23,990	8' 7/8"	7' 3-3/4"	34-1/2"	15' 4-5/8"
ESWA 153-25J	18,600	12,940	27,060	15	101,500	10	1,030	400	510	12"	24,240	8' 7/8"	7' 3-3/4"	34-1/2"	15' 4-5/8"
ESWA 153-26H	20,070	14,690	29,170	7.5	80,800	10	1,030	478	510	12"	26,350	8' 8-3/8"	7' 3-3/4"	42"	16' 1/8"
ESWA 153-26I	20,100	14,690	29,200	10	88,800	10	1,030	478	510	12"	26,380	8' 8-3/8"	7' 3-3/4"	42"	16' 1/8"
ESWA 153-26J	20,350	14,690	29,450	15	101,500	10	1,030	478	510	12"	26,630	8' 8-3/8"	7' 3-3/4"	42"	16' 1/8"
ESWA 153-34H	17,240	11,320	25,050	7.5	79,500	10	1,030	323	510	12"	22,230	7' 5-3/8"	8' 3-3/4"	27"	15' 9-1/8"
ESWA 153-34I	17,270	11,320	25,080	10	87,400	10	1,030	323	510	12"	22,260	7' 5-3/8"	8' 3-3/4"	27"	15' 9-1/8"
ESWA 153-34J	17,520	11,320	25,330	15	99,900	10	1,030	323	510	12"	22,510	7' 5-3/8"	8' 3-3/4"	27"	15' 9-1/8"

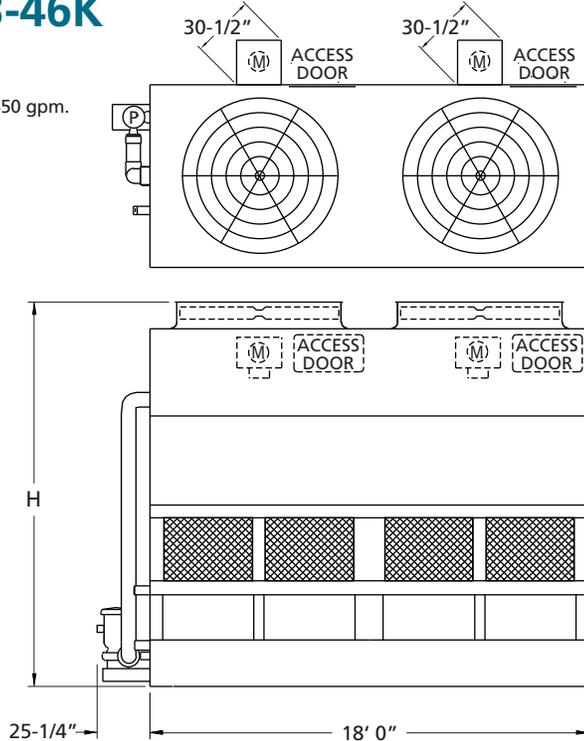
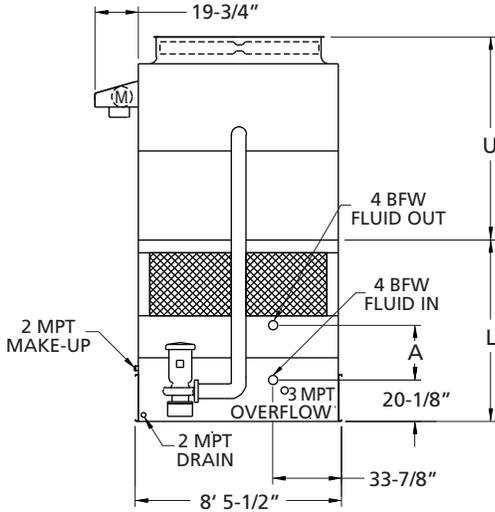
- Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require factory internal crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.
- Heaviest section is the lower section.
- Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).
- When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.
- Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.



# ESWA Engineering Data & Dimensions

## ESWA Models 153-35H to 153-46K

**Note:** The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm. This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump <sup>4</sup>			Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	HP	CFM	HP	GPM		Gallons Required <sup>3</sup>	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 153-35H	18,860	12,940	27,320	7.5	79,500	10	1,030	400	510	12"	24,500	8' 7/8"	8' 3-3/4"	34-1/2"	16' 4-5/8"
ESWA 153-35I	18,890	12,940	27,350	10	87,400	10	1,030	400	510	12"	24,530	8' 7/8"	8' 3-3/4"	34-1/2"	16' 4-5/8"
ESWA 153-35J	19,140	12,940	27,600	15	99,900	10	1,030	400	510	12"	24,780	8' 7/8"	8' 3-3/4"	34-1/2"	16' 4-5/8"
ESWA 153-36H	20,620	14,700	29,720	7.5	79,500	10	1,030	478	510	12"	26,890	8' 8-3/8"	8' 3-3/4"	42"	17' 1/8"
ESWA 153-36I	20,650	14,700	29,750	10	87,400	10	1,030	478	510	12"	26,920	8' 8-3/8"	8' 3-3/4"	42"	17' 1/8"
ESWA 153-36J	20,900	14,700	30,000	15	99,900	10	1,030	478	510	12"	27,170	8' 8-3/8"	8' 3-3/4"	42"	17' 1/8"
ESWA 153-44I	17,870	11,330	25,680	10	85,400	10	1,030	323	510	12"	22,850	7' 5-3/8"	9' 3-3/4"	27"	16' 9-1/8"
ESWA 153-44J	18,120	11,330	25,930	15	97,600	10	1,030	323	510	12"	23,100	7' 5-3/8"	9' 3-3/4"	27"	16' 9-1/8"
ESWA 153-44K	18,240	11,330	26,050	20	107,400	10	1,030	323	510	12"	23,220	7' 5-3/8"	9' 3-3/4"	27"	16' 9-1/8"
ESWA 153-45I	19,490	12,950	27,950	10	85,400	10	1,030	400	510	12"	25,120	8' 7/8"	9' 3-3/4"	34-1/2"	17' 4-5/8"
ESWA 153-45J	19,740	12,950	28,200	15	97,600	10	1,030	400	510	12"	25,370	8' 7/8"	9' 3-3/4"	34-1/2"	17' 4-5/8"
ESWA 153-45K	19,860	12,950	28,320	20	107,400	10	1,030	400	510	12"	25,490	8' 7/8"	9' 3-3/4"	34-1/2"	17' 4-5/8"
ESWA 153-46I	21,240	14,700	30,340	10	85,400	10	1,030	478	510	12"	27,510	8' 8-3/8"	9' 3-3/4"	42"	18' 1/8"
ESWA 153-46J	21,490	14,700	30,590	15	97,600	10	1,030	478	510	12"	27,760	8' 8-3/8"	9' 3-3/4"	42"	18' 1/8"
ESWA 153-46K	21,610	14,700	30,710	20	107,400	10	1,030	478	510	12"	27,880	8' 8-3/8"	9' 3-3/4"	42"	18' 1/8"

1 Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require factory internal crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.

2 Heaviest section is the lower section.

3 Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).

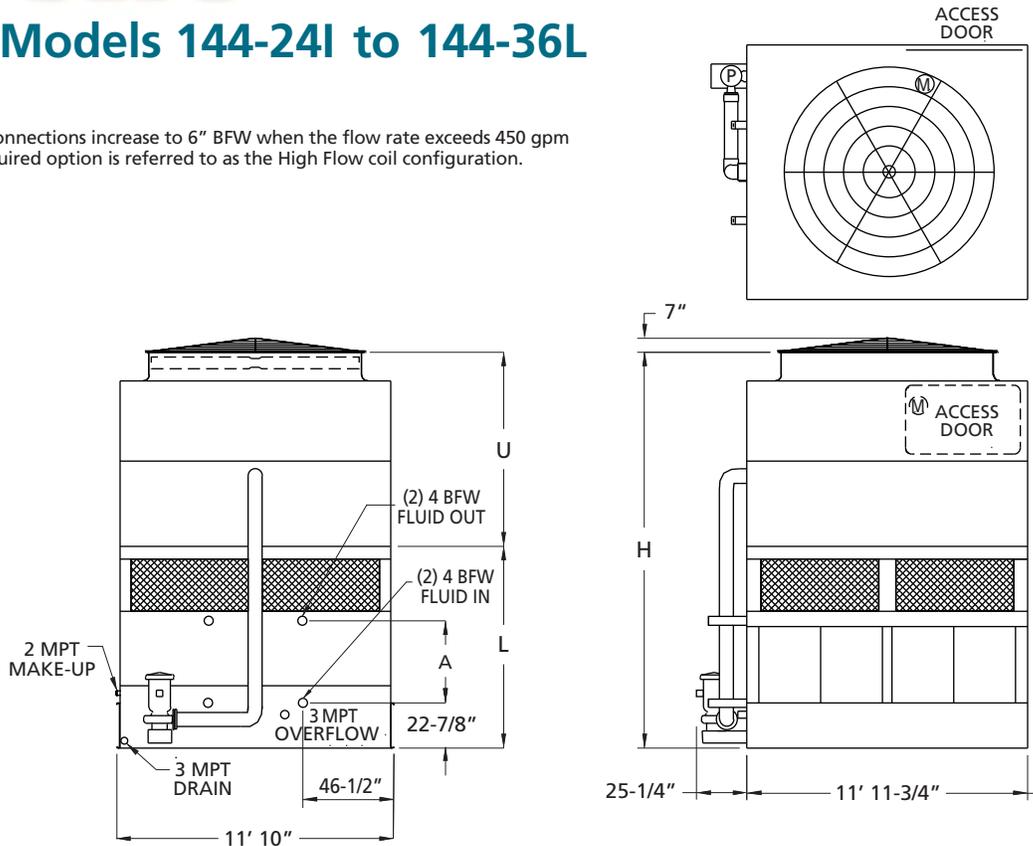
4 When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

5 Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

# ESWA Engineering Data & Dimensions

## ESWA Models 144-24I to 144-36L

**Note:** The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm per coil. This required option is referred to as the High Flow coil configuration.



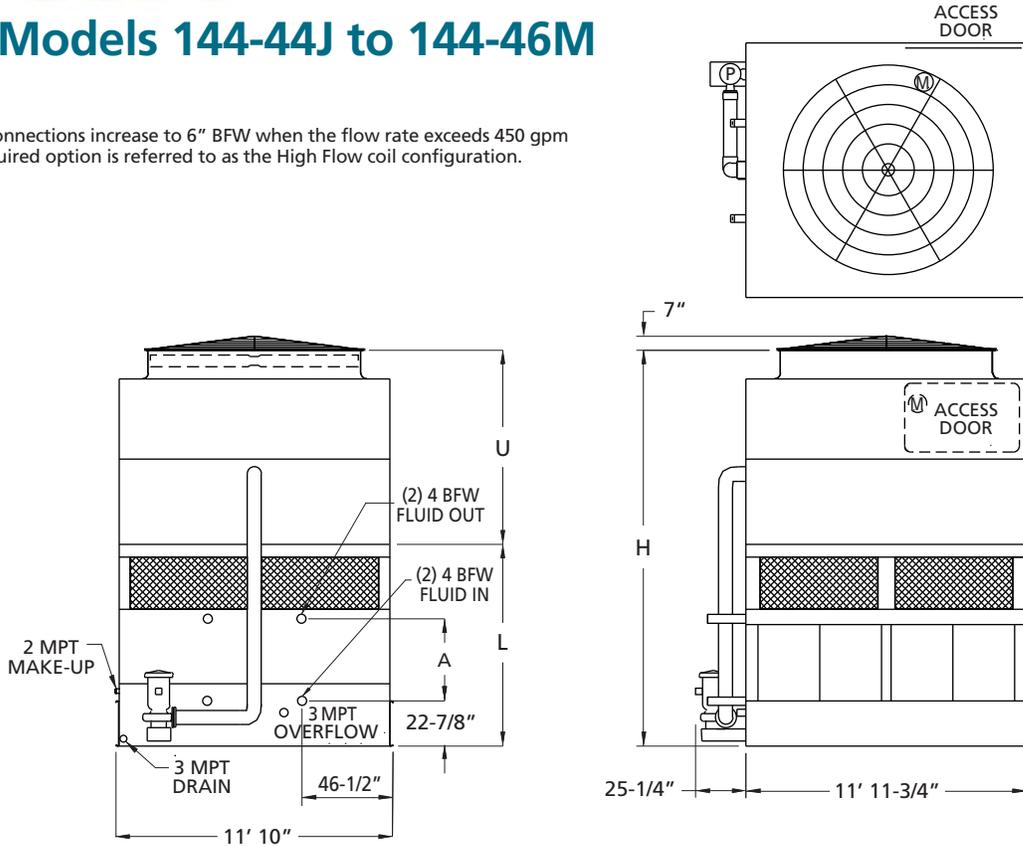
Model Number <sup>1</sup>	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump <sup>4</sup>			Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	HP	CFM	HP	GPM		Gallons Required <sup>3</sup>	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 144-24I	15,910	10,670	24,110	10	69,700	10	1,030	293	490	12"	19,930	7' 4-1/2"	8' 4"	27"	15' 8-1/2"
ESWA 144-24J	16,040	10,670	24,240	15	79,700	10	1,030	293	490	12"	20,060	7' 4-1/2"	8' 4"	27"	15' 8-1/2"
ESWA 144-24K	16,100	10,670	24,300	20	87,600	10	1,030	293	490	12"	20,120	7' 4-1/2"	8' 4"	27"	15' 8-1/2"
ESWA 144-25J	17,680	12,310	26,460	15	79,700	10	1,030	362	490	12"	22,280	8' 0"	8' 4"	34 1/2"	16' 4"
ESWA 144-25K	17,740	12,310	26,520	20	87,600	10	1,030	362	490	12"	22,340	8' 0"	8' 4"	34 1/2"	16' 4"
ESWA 144-26K	19,310	13,880	28,660	20	87,600	10	1,030	431	490	12"	24,470	8' 7-1/2"	8' 4"	42"	16' 11-1/2"
ESWA 144-34I	16,460	10,670	24,660	10	68,200	10	1,030	293	490	12"	20,480	7' 4-1/2"	9' 4"	27"	16' 8-1/2"
ESWA 144-34J	16,590	10,670	24,790	15	78,000	10	1,030	293	490	12"	20,610	7' 4-1/2"	9' 4"	27"	16' 8-1/2"
ESWA 144-34K	16,650	10,670	24,850	20	85,700	10	1,030	293	490	12"	20,670	7' 4-1/2"	9' 4"	27"	16' 8-1/2"
ESWA 144-34L	16,680	10,670	24,880	25	92,300	10	1,030	293	490	12"	20,700	7' 4-1/2"	9' 4"	27"	16' 8-1/2"
ESWA 144-35I	18,110	12,320	26,890	10	68,200	10	1,030	362	490	12"	22,700	8' 0"	9' 4"	34 1/2"	17' 4"
ESWA 144-35J	18,240	12,320	27,020	15	78,000	10	1,030	362	490	12"	22,830	8' 0"	9' 4"	34 1/2"	17' 4"
ESWA 144-35K	18,300	12,320	27,080	20	85,700	10	1,030	362	490	12"	22,890	8' 0"	9' 4"	34 1/2"	17' 4"
ESWA 144-35L	18,330	12,320	27,110	25	92,300	10	1,030	362	490	12"	22,920	8' 0"	9' 4"	34 1/2"	17' 4"
ESWA 144-36J	19,800	13,880	29,150	15	78,000	10	1,030	431	490	12"	24,960	8' 7-1/2"	9' 4"	42"	17' 11-1/2"
ESWA 144-36K	19,860	13,880	29,210	20	85,700	10	1,030	431	490	12"	25,020	8' 7-1/2"	9' 4"	42"	17' 11-1/2"
ESWA 144-36L	19,890	13,880	29,240	25	92,300	10	1,030	431	490	12"	25,050	8' 7-1/2"	9' 4"	42"	17' 11-1/2"

- Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.
- Heaviest section is the lower section.
- Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).
- When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.
- Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

# ESWA Engineering Data & Dimensions

## ESWA Models 144-44J to 144-46M

**Note:** The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm per coil. This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump <sup>4</sup>			Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	HP	CFM	HP	GPM		Gallons Required <sup>3</sup>	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 144-44J	17,100	10,680	25,300	15	76,800	10	1,030	293	490	12"	21,110	7' 4-1/2"	10' 4"	27"	17' 8-1/2"
ESWA 144-44K	17,160	10,680	25,360	20	84,400	10	1,030	293	490	12"	21,170	7' 4-1/2"	10' 4"	27"	17' 8-1/2"
ESWA 144-44L	17,190	10,680	25,390	25	90,900	10	1,030	293	490	12"	21,200	7' 4-1/2"	10' 4"	27"	17' 8-1/2"
ESWA 144-44M	17,240	10,680	25,440	30	95,400	10	1,030	293	490	12"	21,250	7' 4-1/2"	10' 4"	27"	17' 8-1/2"
ESWA 144-45J	18,740	12,320	27,520	15	76,800	10	1,030	362	490	12"	23,330	8' 0"	10' 4"	34-1/2"	18' 4"
ESWA 144-45K	18,800	12,320	27,580	20	84,400	10	1,030	362	490	12"	23,390	8' 0"	10' 4"	34-1/2"	18' 4"
ESWA 144-45L	18,830	12,320	27,610	25	90,900	10	1,030	362	490	12"	23,420	8' 0"	10' 4"	34-1/2"	18' 4"
ESWA 144-45M	18,880	12,320	27,660	30	95,400	10	1,030	362	490	12"	23,470	8' 0"	10' 4"	34-1/2"	18' 4"
ESWA 144-46J	20,300	13,880	29,650	15	76,800	10	1,030	431	490	12"	25,460	8' 7-1/2"	10' 4"	42"	18' 11-1/2"
ESWA 144-46K	20,360	13,880	29,710	20	84,400	10	1,030	431	490	12"	25,520	8' 7-1/2"	10' 4"	42"	18' 11-1/2"
ESWA 144-46L	20,390	13,880	29,740	25	90,900	10	1,030	431	490	12"	25,550	8' 7-1/2"	10' 4"	42"	18' 11-1/2"
ESWA 144-46M	20,440	13,880	29,790	30	95,400	10	1,030	431	490	12"	25,600	8' 7-1/2"	10' 4"	42"	18' 11-1/2"

1 Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.

2 Heaviest section is the lower section.

3 Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).

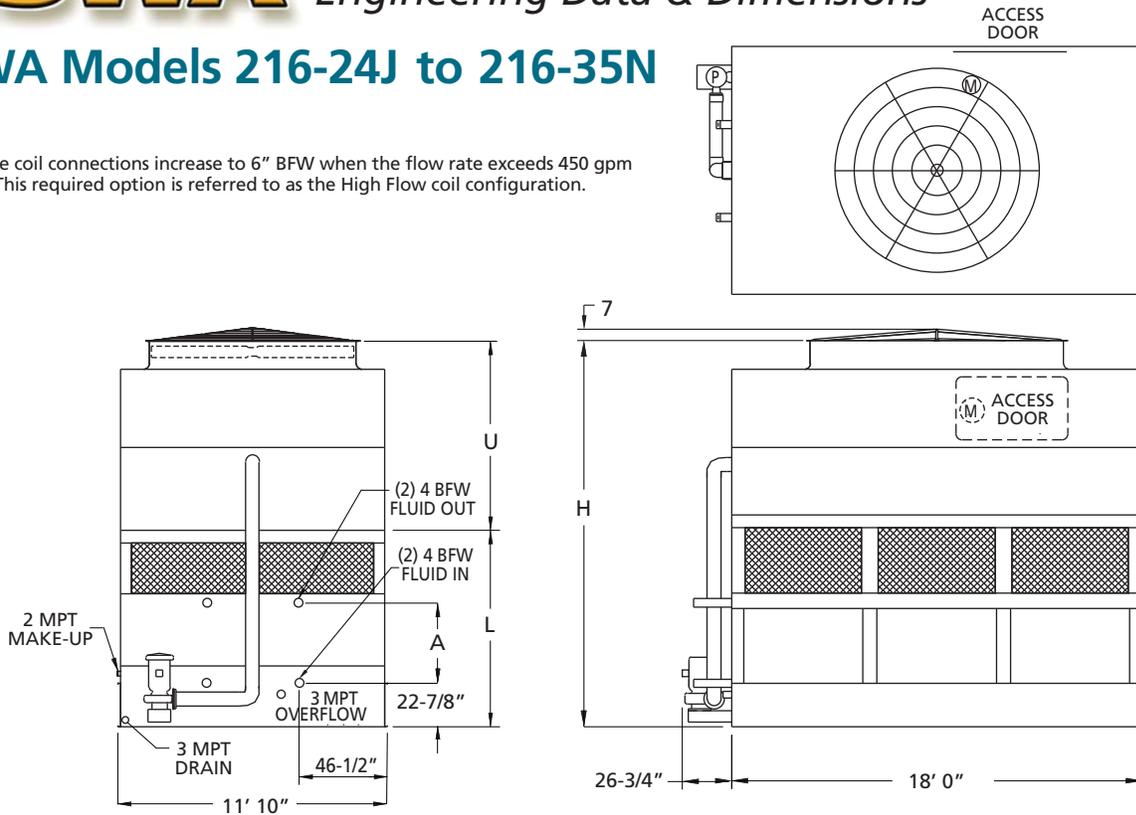
4 When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

5 Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

# ESWA Engineering Data & Dimensions

## ESWA Models 216-24J to 216-35N

**Note:** The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm per coil. This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump <sup>4</sup>			Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	HP	CFM	HP	GPM		Gallons Required <sup>3</sup>	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 216-24J	22,360	15,370	34,980	15	106,700	15	1,250	452	720	12"	28,870	8' 1/2"	8' 4"	27"	16' 4-1/2"
ESWA 216-24K	22,420	15,370	35,040	20	117,300	15	1,250	452	720	12"	28,930	8' 1/2"	8' 4"	27"	16' 4-1/2"
ESWA 216-24L	22,450	15,370	35,070	25	126,300	15	1,250	452	720	12"	28,960	8' 1/2"	8' 4"	27"	16' 4-1/2"
ESWA 216-24M	22,500	15,370	35,120	30	134,100	15	1,250	452	720	12"	29,010	8' 1/2"	8' 4"	27"	16' 4-1/2"
ESWA 216-25J	24,720	17,730	38,240	15	106,700	15	1,250	560	720	12"	32,130	8' 8"	8' 4"	34-1/2"	17' 0"
ESWA 216-25K	24,780	17,730	38,300	20	117,300	15	1,250	560	720	12"	32,190	8' 8"	8' 4"	34-1/2"	17' 0"
ESWA 216-25L	24,810	17,730	38,330	25	126,300	15	1,250	560	720	12"	32,220	8' 8"	8' 4"	34-1/2"	17' 0"
ESWA 216-25M	24,860	17,730	38,380	30	134,100	15	1,250	560	720	12"	32,270	8' 8"	8' 4"	34-1/2"	17' 0"
ESWA 216-26J	27,190	20,200	41,610	15	106,700	15	1,250	668	720	12"	35,490	9' 3-1/2"	8' 4"	42"	17' 7-1/2"
ESWA 216-26K	27,250	20,200	41,670	20	117,300	15	1,250	668	720	12"	35,550	9' 3-1/2"	8' 4"	42"	17' 7-1/2"
ESWA 216-26L	27,280	20,200	41,700	25	126,300	15	1,250	668	720	12"	35,580	9' 3-1/2"	8' 4"	42"	17' 7-1/2"
ESWA 216-26M	27,330	20,200	41,750	30	134,100	15	1,250	668	720	12"	35,630	9' 3-1/2"	8' 4"	42"	17' 7-1/2"
ESWA 216-34K	23,200	15,370	35,820	20	116,000	15	1,250	452	720	12"	29,710	8' 1/2"	9' 4"	27"	17' 4-1/2"
ESWA 216-34L	23,230	15,370	35,850	25	125,000	15	1,250	452	720	12"	29,740	8' 1/2"	9' 4"	27"	17' 4-1/2"
ESWA 216-34M	23,280	15,370	35,900	30	132,300	15	1,250	452	720	12"	29,790	8' 1/2"	9' 4"	27"	17' 4-1/2"
ESWA 216-34N	23,440	15,370	36,060	40	144,800	15	1,250	452	720	12"	29,950	8' 1/2"	9' 4"	27"	17' 4-1/2"
ESWA 216-35K	25,570	17,740	39,090	20	116,000	15	1,250	560	720	12"	32,970	8' 8"	9' 4"	34-1/2"	18' 0"
ESWA 216-35L	25,600	17,740	39,120	25	125,000	15	1,250	560	720	12"	33,000	8' 8"	9' 4"	34-1/2"	18' 0"
ESWA 216-35M	25,650	17,740	39,170	30	132,300	15	1,250	560	720	12"	33,050	8' 8"	9' 4"	34-1/2"	18' 0"
ESWA 216-35N	25,810	17,740	39,330	40	144,800	15	1,250	560	720	12"	33,210	8' 8"	9' 4"	34-1/2"	18' 0"

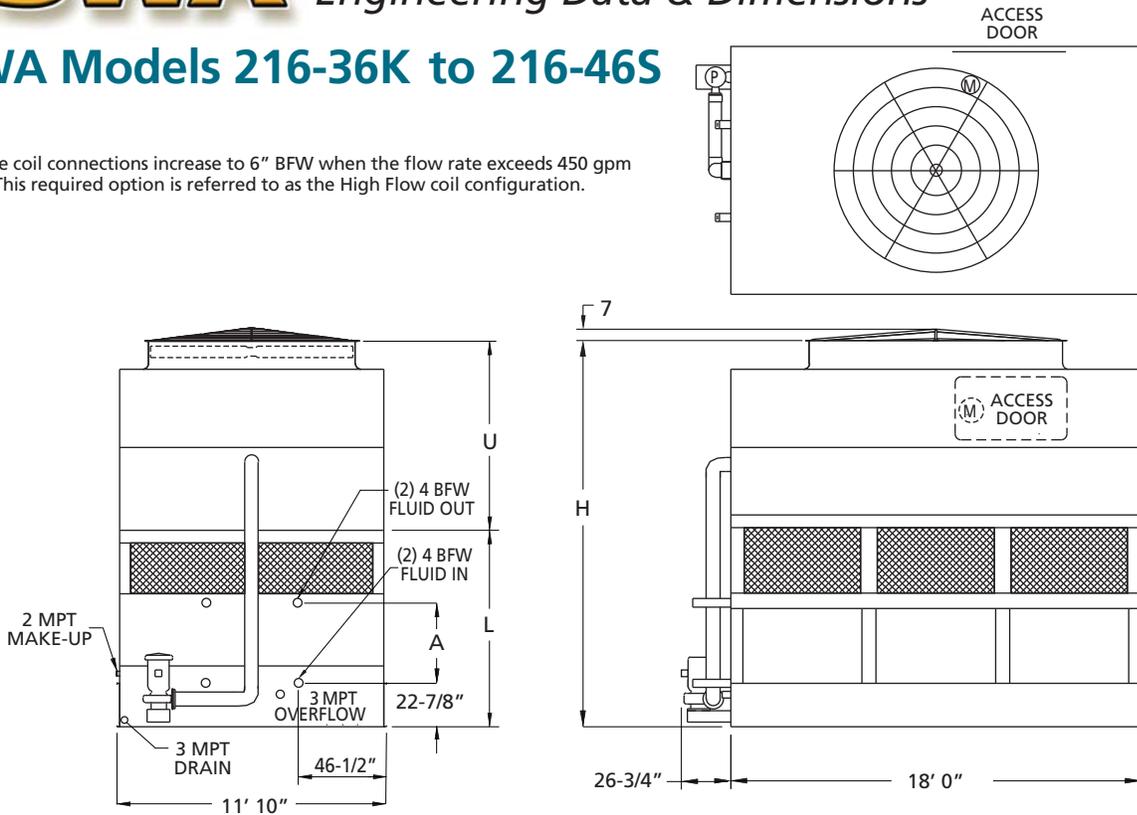
1 Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.  
 2 Heaviest section is the lower section.  
 3 Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).  
 4 When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.  
 5 Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.



# ESWA Engineering Data & Dimensions

## ESWA Models 216-36K to 216-46S

**Note:** The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm per coil. This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump <sup>4</sup>			Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	HP	CFM	HP	GPM		Gallons Required <sup>3</sup>	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 216-36K	28,030	20,200	42,450	20	116,000	15	1,250	668	720	12"	36,330	9' 3 1/2"	9' 4"	42"	18' 7-1/2"
ESWA 216-36L	28,060	20,200	42,480	25	125,000	15	1,250	668	720	12"	36,360	9' 3-1/2"	9' 4"	42"	18' 7-1/2"
ESWA 216-36M	28,110	20,200	42,530	30	132,300	15	1,250	668	720	12"	36,410	9' 3-1/2"	9' 4"	42"	18' 7-1/2"
ESWA 216-36N	28,270	20,200	42,690	40	144,800	15	1,250	668	720	12"	36,570	9' 3-1/2"	9' 4"	42"	18' 7-1/2"
ESWA 216-44K	23,940	15,380	36,560	20	113,800	15	1,250	452	720	12"	30,440	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-44L	23,970	15,380	36,590	25	122,500	15	1,250	452	720	12"	30,470	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-44M	24,020	15,380	36,640	30	130,100	15	1,250	452	720	12"	30,520	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-44N	24,180	15,380	36,800	40	143,000	15	1,250	452	720	12"	30,680	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-44O	24,190	15,380	36,810	50	152,500	15	1,250	452	720	12"	30,690	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-45K	26,300	17,740	39,820	20	113,800	15	1,250	560	720	12"	33,700	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-45L	26,330	17,740	39,850	25	122,500	15	1,250	560	720	12"	33,730	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-45M	26,380	17,740	39,900	30	130,100	15	1,250	560	720	12"	33,780	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-45N	26,540	17,740	40,060	40	143,000	15	1,250	560	720	12"	33,940	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-45O	26,550	17,740	40,070	50	152,500	15	1,250	560	720	12"	33,950	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-46K	28,760	20,200	43,180	20	113,800	15	1,250	668	720	12"	37,060	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46L	28,790	20,200	43,210	25	122,500	15	1,250	668	720	12"	37,090	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46M	28,840	20,200	43,260	30	130,100	15	1,250	668	720	12"	37,140	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46N	29,000	20,200	43,420	40	143,000	15	1,250	668	720	12"	37,300	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46O	29,010	20,200	43,430	50	152,500	15	1,250	668	720	12"	37,310	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46P	29,210	20,200	43,630	60	161,500	15	1,250	668	720	12"	37,510	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46S	29,210	20,200	43,630	60	161,500	15	1,250	668	720	12"	37,510	9' 3-1/2"	10' 4"	42"	19' 7-1/2"

1 Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.

2 Heaviest section is the lower section.

3 Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).

4 When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

5 Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.





## EVAPCO Water Systems

The ESWA is available with EVAPCO's Factory Mounted water treatment systems. EVAPCO offers both a solid chemical and a non-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 eco-cooler.

EVAPCO's Water Systems offer ESWA owners a single-source of responsibility for equipment, water treatment, and service. Both **Smart Shield®** and **Pulse~Pure®** are manufactured and warranted by EVAPCO.

Benefits of adding an EVAPCO water treatment system include:

- **SAVE 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 Water Systems



Smart Shield® Solid Chemical Water Treatment System



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.



Watch a short product video at: [www.smartshield.evapco.com](http://www.smartshield.evapco.com)



Pulse~Pure® Non-Chemical Water Treatment System



EVAPCO's **Pulse~Pure®** water treatment system utilizes pulsed electric field technology to provide an environmentally responsible alternative for the treatment of water in evaporative cooled equipment. The **Pulse~Pure®** system delivers short, high-frequency bursts of low energy electromagnetic fields to the recirculating water in the ESWA.

- EVAPCO guarantees that total bacterial counts will not exceed 10,000 CFU/ml in the cooling water.
- Controls scale, corrosion, and microbiological growth with absolutely no chemicals required.
- Compact design with no moving parts and low energy consumption.



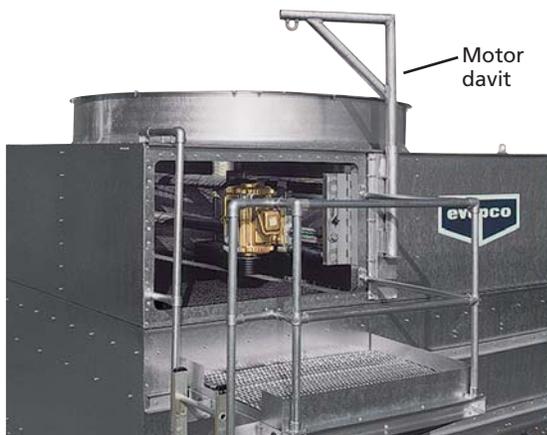
Learn More about **Pulse~Pure®** online at: [www.evapco.com](http://www.evapco.com)

# ESWA OPTIONAL EQUIPMENT

## External Platforms & 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 motor davit option is an economical option which eliminates the need for a crane in the event that a fan motor has to be removed. The service mechanic only needs a chain-fall or come-along for easy removal of these heavy items. The motor davit is constructed from heavy duty aluminum with easy mounting to the unit in the field.

## Electric Water Level Control

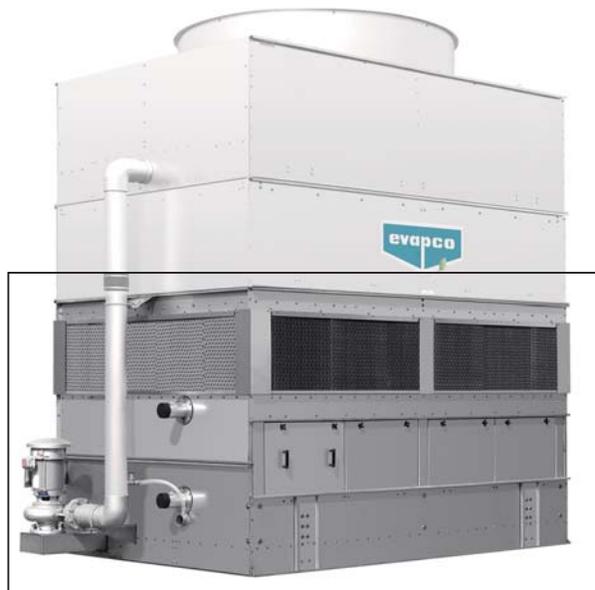
An electric water level control package is available as an alternative to the standard mechanical makeup valve and float ball. This package provides accurate control for the basin water level and does not require field adjustment, even under varying operating conditions.

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.



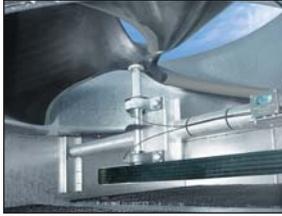
## Stainless Steel Basin

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 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.



## 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 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 by **9 dB(A) to 15 dB(A)**, depending on specific unit selection and measurement location with no impact to thermal performance. 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!

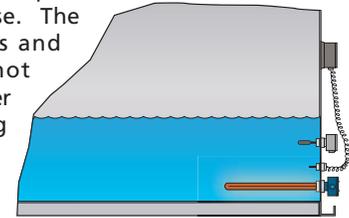
The ESWA Fan Discharge Attenuator offered by EVAPCO is an additional option available to further reduce the sound level of the unit. The attenuator can be used with the standard ESWA fan or in combination with the Low Sound Fan option.

The discharge attenuator is a factory-assembled straight-sided discharge hood designed to reduce overall discharge sound levels at full fan speed 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 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.



## Electric Basin Heaters

Electric immersion heaters are available factory-installed in the basin of the cooler. Standard Heaters are sized to maintain a +40°F pan water temperature with the fans and pumps off and an ambient air temperature of 0°F. 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. Refer to the Basin Heater Sizing table below for heater sizing at various freeze design temperatures.



BASIN HEATER SIZING			
Unit No.	0°F kW	-20°F kW	-40°F kW
ESWA 77	7	10	15
ESWA 102	(2) 4	(2) 7	(2) 9
ESWA 153	(2) 6	(2) 9	(2) 12
ESWA 144	(2) 6	(2) 9	(2) 12
ESWA 216	(2) 9	(2) 15	(2) 18

## Capacity Control

All ESWA models come standard with premium efficient, 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.

# ESWA STEEL SUPPORT/FREEZE PROTECTION

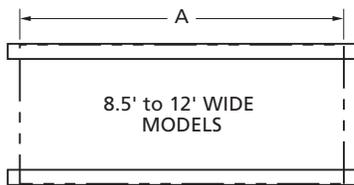
## Recommended Steel Support

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 3/4" 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).

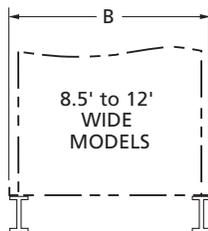
Beams should be level before setting the unit in place. Do not level the unit by shimming between the unit and the structural steel. Dimensions, weights, and data are subject to change without notice. Refer to the factory certified drawings for exact dimensions.

**NOTE: Consult IBC 2012 for required steel support layout and structural design.**

ESWA SUPPORTING STEEL DIMENSIONS		
Unit Footprint	A	B
8.5' x 9'	8' 11-1/2"	8' 5-1/2"
8.5' x 12'	11' 11-3/4"	8' 5-1/2"
8.5' x 18'	18' 0"	8' 5-1/2"
12' x 12'	11' 11-3/4"	11' 10"
12' x 18'	18' 0"	11' 10"



Plan Views



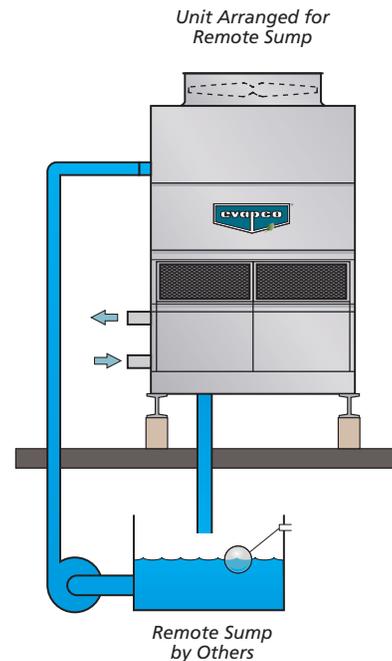
End Elevations

## Freeze Protection for the Recirculating Water System

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

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.



# FREEZE PROTECTION/HEAT LOSS



## 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 50°F. If the process load cannot support 50°F fluid, an auxiliary heat load should be applied when freezing conditions exist. Refer to Table 1 for coil heat loss data.

- 2) Design flow should be maintained through the coil whenever possible. If this is not possible, refer to Table 2 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 40°F 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 1 Heat Loss Data**

Model	Btu/hr	Model	Btu/hr	Model	Btu/hr	Model	Btu/hr
ESWA 77-24	133,000	ESWA 102-36	215,000	ESWA 153-45	305,000	ESWA 216-24	380,000
ESWA 77-25	151,000	ESWA 102-44	179,000	ESWA 153-46	325,000	ESWA 216-25	429,000
ESWA 77-26	160,000	ESWA 102-45	201,000	ESWA 144-24	252,000	ESWA 216-26	457,000
ESWA 77-34	133,000	ESWA 102-46	215,000	ESWA 144-25	284,000	ESWA 216-34	380,000
ESWA 77-35	151,000	ESWA 153-24	270,000	ESWA 144-26	303,000	ESWA 216-35	429,000
ESWA 77-36	160,000	ESWA 153-25	305,000	ESWA 144-34	252,000	ESWA 216-36	457,000
ESWA 77-44	133,000	ESWA 153-26	325,000	ESWA 144-35	284,000	ESWA 216-44	380,000
ESWA 77-45	151,000	ESWA 153-34	270,000	ESWA 144-36	303,000	ESWA 216-45	429,000
ESWA 77-46	160,000	ESWA 153-35	305,000	ESWA 144-44	252,000	ESWA 216-46	457,000
ESWA 102-34	179,000	ESWA 153-36	325,000	ESWA 144-45	284,000		
ESWA 102-35	201,000	ESWA 153-44	270,000	ESWA 144-46	303,000		

**Table 2 Minimum Flow Chart**

Unit No.	Standard Unit (gpm)	Series Flow Unit (gpm)
ESWA 77	240	120
ESWA 102	240	120
ESWA 153	240	120
ESWA 144	330	165
ESWA 216	330	165

### 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 which 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. This bulletin is available from your local representative, or it can be downloaded from [www.evapco.com](http://www.evapco.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 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.

## SECTION 23 65 00 – FACTORY-FABRICATED COOLING TOWERS

**PART 1 – GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

## 1.2 SUMMARY:

- A. This Section includes factory assembled and tested, closed circuit, induced draft counterflow cooling tower (also known as a closed circuit cooler).

## 1.3 SUBMITTALS

- A. General. Submit the following:
  1. Certified drawings of the closed circuit cooler, sound data, recommended steel support indicating weight loadings, wiring diagrams, installation instructions, operation and maintenance instructions, and thermal performance guarantee by the manufacturer.

## 1.4 QUALITY ASSURANCE

- A. Verification of Performance:
  1. Test and certify cooling tower thermal performance according to CTI Standard 201.
  2. Test and certify cooling tower sound performance according to CTI ATC-128.
- B. Meet or Exceed energy efficiency per ASHRAE 90.1.

## 1.5 WARRANTY

- A. Motor/Drive System: Five (5) year comprehensive warranty against materials and workmanship including motor, fan, bearings, mechanical support, sheaves, bushings and belt.
- B. Unit: One (1) year from start-up, not to exceed eighteen (18) months from shipment on the unit.

**PART 2 - PRODUCTS**

## 2.1 MANUFACTURERS

- A. Manufactures: Subject to compliance with requirements, provide cooling towers manufactured by one of the following:
  1. EVAPCO, Inc.
  2. Approved Substitute

## 2.2 MATERIALS

- A. Galvanized Sheet Steel complying with ASTM A 653/A 653M and having G-235 designation.
- B. Optional Type 304 and/or 316 Stainless Steel as specified.

## 2.3 INDUCED-DRAFT, COUNTERFLOW CLOSED CIRCUIT COOLERS

- A. Description: Factory assembled and tested, induced draft counterflow closed circuit cooler complete with coil, fill, fan, louvers, accessories, and rigging supports.
- B. Closed Circuit Cooler Characteristics and Capacities: Refer to the Closed Circuit Cooler schedule.
- C. Fan(s):
  1. Type and Material: Axial propeller, individually adjustable wide chord blade extruded aluminum installed in a closely fitted cowl with venturi air inlet for maximum efficiency, covered with a heavy gauge hot dipped Galvanized Steel fan guard.
  2. Maximum sound pressure level of \_\_\_\_\_ dB(A) measured at 5 feet above the fan discharge during full speed operation in accordance with CTI Standard ATC-128.
- D. Water Distribution System: Non-corrosive materials.
  1. Evenly distribute of water over fill material with pressurized spray tree.
    - a. Pipes: Schedule 40 PVC, Non-corrosive Materials
    - b. Nozzles: Non-clogging, ABS Plastic, threaded into branch piping.
  2. Maximum pressure at inlet shall be \_\_\_\_\_ psig.
- E. IBC Compliance: The unit structure shall be designed, analyzed, and constructed in accordance with the latest edition of the International Building Code (IBC) Regulations for seismic loads up to \_\_\_\_\_ g and wind loads up to \_\_\_\_\_ psf.

- F. Collection Basin Material: Galvanized Steel. Type 304 Stainless Steel Optional:

1. Removable stainless-steel strainer with openings smaller than nozzle orifices.
2. Joints: Bolted and sealed watertight or welded.
3. Overflow, makeup and side drain connections
4. Flume plate between cells (for multiple-cell units) or Equalizer connection (for multiple- closed circuit cooler system).

- G. Heat Transfer Coil: Heavy Gauge G-235 Galvanized Steel encased in a steel framework, assembly hot-dip galvanized after construction. Type 304 Stainless Steel Optional. Coil assembly completely enclosed and protected from sunlight exposure, environmental elements and debris. Tubes sloped for free drainage of the coil and designed for low pressure drop. Coil assembly pneumatically tested at 400 psig under water. Coil connections beveled for weld, flanged (optional) or grooved (optional).

- H. Casing: Galvanized Steel. Type 304 Stainless Steel Optional:
  1. Casing panels shall totally encase the fill media to protect the fill from damage due to direct atmospheric contact.
  2. Fasteners: Corrosion resistance equal to or better than materials being fastened.
  3. Joints: Sealed watertight.
  4. Welded Connections: Continuous and watertight

- I. Fill Media: PVC; resistant to rot, decay and biological attack; formed, crossfluted bonded together for strength and durability in block format for easy removal and replacement; suitable for use as a working surface; self extinguishing with flame spread rating of 5 per ASTM E84-81a; able to withstand continuous operating temperature of 130°F; and fabricated, formed and installed by the manufacturer to ensure water breaks up into droplets.

- J. Drift Eliminators: Same material as Fill. 0.001% drift rate.
- K. Air Inlet Louvers: Formed PVC; designed "Sight Tight" to completely block direct sunlight from entering and water from splashing out of the closed circuit cooler.
- L. Water Level Control: Brass mechanical makeup water valve and plastic float with an adjustable linkage.

## 2.4 MOTORS AND DRIVES

- A. General requirements for motors are specified in Division 15 Section "Motors".
- B. Enclosure Type: TEAO or TEFC
- C. Motor Speed: Premium Efficient VFD Duty (Option: 2-speed)
- D. Drive: Power Band Belt designed for 150% of the motor nameplate HP.
  1. Belt: Mutli-groove, solid back V-belt type neoprene reinforced with polyester cord.
  2. Sheaves: Aluminum alloy if located inside the airstream.
  3. Bearings: Heavy duty, self-aligning pillow block bearings with lubrication lines extended to side access door. Minimum L10 life for bearings shall be 75,000 hours. Provide extended grease lines and fittings.
  4. Vibration Cutout Switch: Mechanical switch to de-energize fan motors if excessive vibration in NEMA 4 enclosure.

## 2.5 MAINTENANCE ACCESS

- A. Internal Working / Service Platforms: Provide a complete internal working platform and ladder system for service of all drive components. A suitable working platform may be constructed of the fill media for counterflow closed circuit coolers. If a crossflow cooler is used, provide an internal walkway with ladder and elevated working platform to allow for service and maintenance to motor and drive assembly.
- B. Handrails/Grabrails: Galvanized steel pipe complying with 29 CFR 1910.23. If access to fan deck is required, supply a perimeter handrail with ladder from grade to fan deck.
- C. Ladders: Aluminum, sloped "ships type" with grabrail or vertical complying with 29 CFR 1910.27.



EVAPCO PRODUCTS ARE MANUFACTURED WORLDWIDE



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