



# ESWA<sup>TM</sup>

## CLOSED CIRCUIT COOLER

**NEW!**

**CTI**  
CERTIFIED



FEATURING THE NEW  
*Sensi-COIL*<sup>TM</sup>  
TECHNOLOGY

CERTIFIED EN ISO 9001



# ESWA™



Since its founding in 1976, EVAPCO, Inc. has become a world-wide leader in supplying quality cooling equipment for thousands of customers in both the commercial and industrial markets.

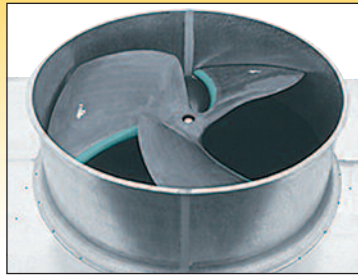
EVAPCO's success has been the result of a continual commitment to product improvement, quality workmanship and a dedication to providing unparalleled service.



Our emphasis on research and development has led to many product innovations – a hallmark of EVAPCO through the years.

The ongoing R & D Program enables EVAPCO to provide the most advanced products in the industry – technology for the future, available today.

With 17 facilities in eight countries and over 170 sales offices in 42 countries world-wide, EVAPCO is ready to assist in all your equipment needs.



### Low Sound Solutions

The New 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.



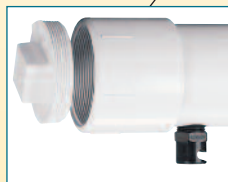
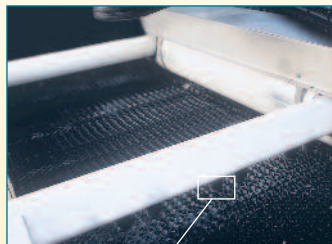
**CTI Certified**  
Refer to page 15 for details

### Low Sound Options available

Refer to page 11 for details

### Efficient Drift Eliminators

- Advanced design removes mist from leaving airstream.
- Corrosion resistant PVC for long life.



### PVC Spray Distribution Header with ABS Nozzles

- Nozzles are threaded to assure proper orientation.
- Large orifice nozzles prevent clogging.
- Threaded end caps for ease of cleaning.

### Totally Enclosed Pump Motors

- Helps assure long, trouble-free operation.

### Z-725 Heavy Gauge Mill-Dip Galvanized Steel Construction

See page 4 for additional informations  
(Stainless steel available as an affordable option)



**IBC Compliant Design**  
Refer to page 13 for details



† Mark owned by the Cooling Technology Institute

# ESWA™

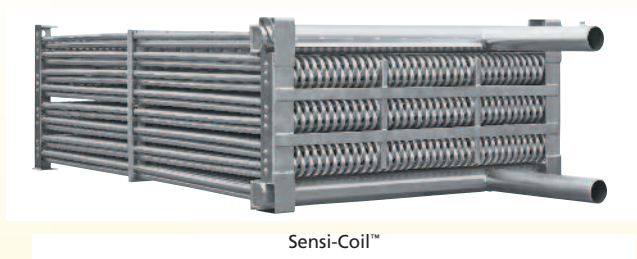
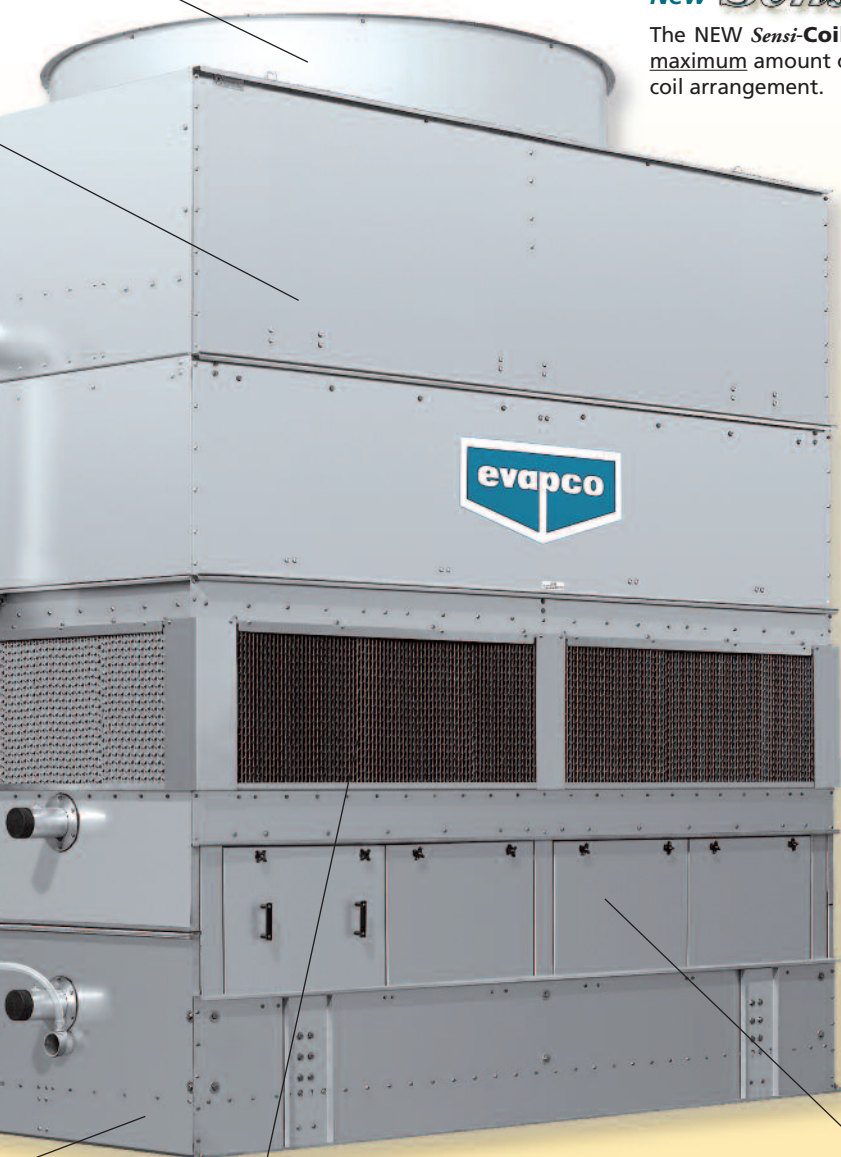
## DESIGN AND CONSTRUCTION FEATURES

The new ESWA closed circuit cooler is another exciting product from EVAPCO. The ESWA is a new high performance version of the original ESW with greater capacity, more models and increased energy savings! The new ESWA is able to provide higher performance as a result of our new **Sensi-Coil™ Technology**, a new coil design that provides significant performance improvements on every ESWA model.

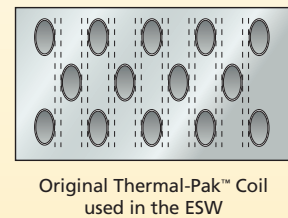
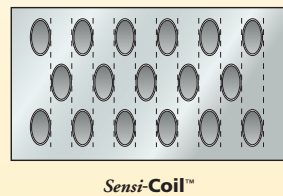
**Sensi-Coil™ Technology** features over 20% more Thermal-Pak® elliptical tubes packed densely together into the same coil plan area as the original ESW. This design also has **50% more water loading** than the previous ESW line. **More surface area plus more water equals higher capacity resulting in more performance with the ESWA in a smaller footprint with less energy.**

### New Sensi-COIL™ Technology

The NEW **Sensi-Coil™**, exclusive on the new ESWA closed circuit cooler, features the maximum amount of Thermal-Pak™ elliptical tubes **packed densely** together in a new coil arrangement.



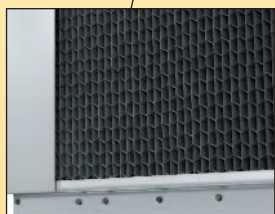
The new **Sensi-Coil™** transfers heat through its tube walls in a sensible exchange - No air travels through the tube bundle, therefore tighter tube spacing is possible. Look at the side by side tube spacing comparison below.



#### The Sensi-Coil™ Features:

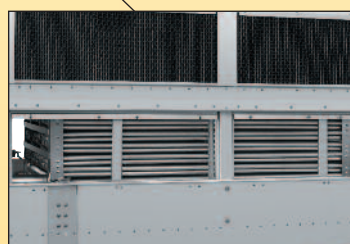
- More Thermal-Pak® elliptical tubes densely packed together into the same plan area used on the original ESW.
- Over 20% more coil surface area than the original ESW coil.
- Higher water loading capability for more heat rejection, increasing from 8 l/s per m<sup>2</sup> to 12 l/s per m<sup>2</sup>, a 50% increase!
- More surface area and more water equals higher capacity and increased energy efficiency.

This innovative tight tube spacing is designed specifically to maximize sensible heat transfer, and is exclusive on the ESWA product line.



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

- Easily removable for access.
- Designed to keep sunlight out-preventing biological growth.
- Keeps water in while keeping dirt and debris out.



#### Most Accessible Basin and Coil

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

SPECIFICATIONS

ENGINEERING

CTI

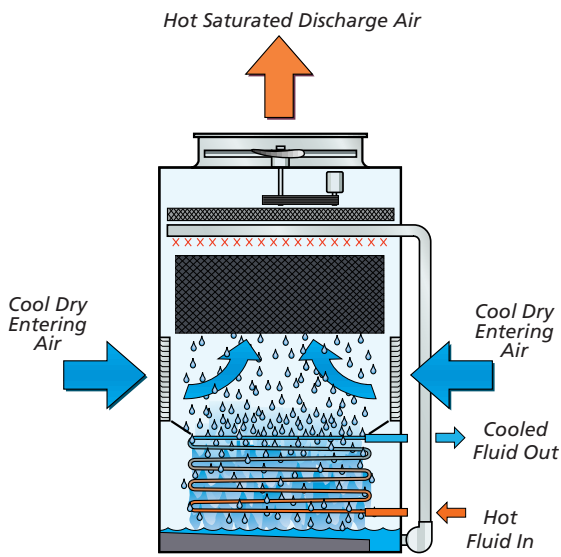
IBC

SOUND

OPTIONS

MAINTENANCE

DESIGN



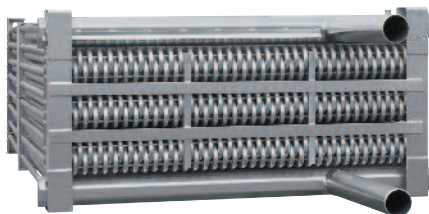
**Principle of Operation**

## Principle of Operation

The warm process fluid circulates from the heat source to the coil of the closed circuit cooler. The fluid in the coil transfers its heat through the coil tube walls in a sensible exchange to the spray water that floods over the tubes. Having gained heat from the coil, the spray water then falls to the sump where it is circulated by the spray pump up through distribution piping to the spray nozzles. The warmed spray water is then distributed as a thin film over the fill section 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 evaporation process provides a latent exchange of heat from the spray water to the air passing through the unit. 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 floods across the coil in a repeat cycle.

## New Sensi-Coil™ Technology

The NEW *Sensi-Coil™*, exclusive on the new ESWA closed circuit cooler, features the **maximum** amount of Thermal-Pak™ elliptical tubes **packed densely** together in a new coil arrangement designed with over 20% more surface area.



*Sensi-Coil™*

Evapco's coils are manufactured within the most stringent of quality control procedures. Each circuit consists of high quality steel tubing formed into a continuous serpentine circuit. Each circuit is then inspected and tested prior to being welded into a framed coil assembly. Finally, the assembled coil is air pressure tested under water in accordance with the "Pressure Equipment Directive" (PED) 97/23/EC. The entire coil assembly is then hot-dip galvanized for industrial strength corrosion protection.

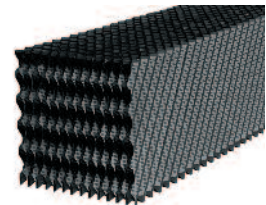
**Note:** Closed circuit coolers should only be used on sealed, pressurized systems. Continual aeration of the water in an open system can cause corrosion inside the tubes of the cooler leading to premature failure.

## 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.

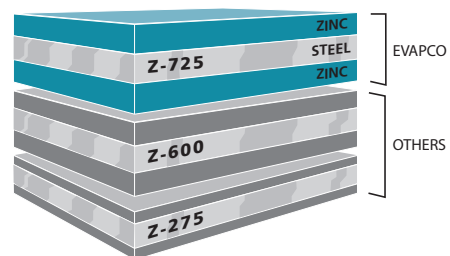
EVAPAK® fill is impervious to rot and decay.



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

## EVAPCOAT Corrosion Protection System

The Z-725 Mill Hot-Dip Galvanized Steel Construction is the heaviest level of galvanizing available for manufacturing closed circuit coolers and has more zinc protection than competitive designs using Z-275 and Z-600 steel.



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 Z-725 mill hot-dip galvanized steel. Z-725 designation means there is a minimum of 725 g/m<sup>2</sup> of surface area as measured in a triple spot test. During fabrication, all panel edges are coated with a 95% pure zinc-rich compound for extended corrosion resistance.

# ENERGY EFFICIENT LOW SOUND

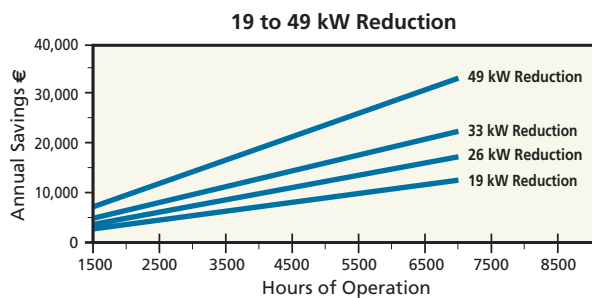
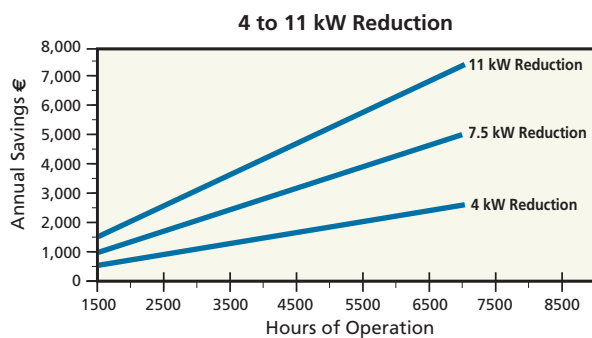
# ESWA

The new Evapco ESWA represents another leap forward in coil technology. Evapco has taken the already energy efficient, low sound, ESW and made it even more efficient and added additional capacity through the new **Sensi-Coil™** Technology Design. The ESWA is yet another example of Evapco's continuous commitment to developing innovative products which surpass industry standards and expectations.

## Low Energy As Standard

The New ESWA again stands apart as being the most energy efficient closed circuit cooler ever. 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 44 kW worth of fan motors can be replaced by an ESWA model with a fan motor size of only 11 kW. This tremendous reduction in fan motor size offers annual savings of 10.400 € per year based on 3.500 hours of operation and an electric rate 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 requirements are more expensive to operate and normally end up costing the customer more over the life of the equipment.



Annual savings based on fan motor efficiency = 0.924 and energy cost of 0,09 €/kWh

## Low Sound As Standard

In addition to being the most energy efficient, the ESWA is also the quietest axial fan fluid cooler. The removable access panels around the base of the unit block 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. And 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.

## 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 new 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 on average. This is done by using Evapco's new higher-density **Sensi-Coil™** Technology. By using this new coil design (patent pending), and higher water loadings over the coil, Evapco has achieved significant performance gains. This means more performance, a smaller footprint, and less energy.

## Patented Optimized Technology\*

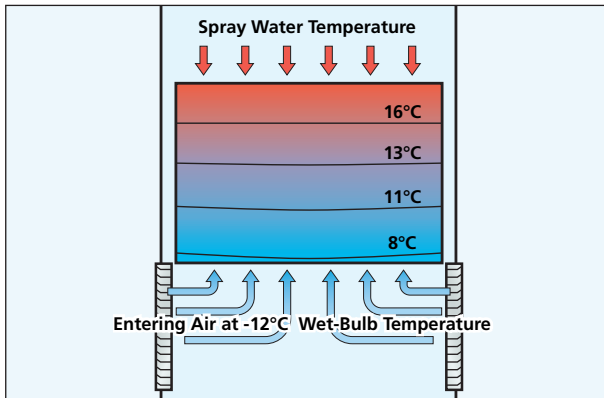
Evapco is the first manufacturer to develop a closed circuit cooler with Patented Optimized Technology®. The performance of the fill section in the original ESW was optimized with counterflow heat transfer and a flow rate of 4 l/s per square meter. The new ESWA is now optimized at 6 l/s per square meter for increased cooling through the fill section.

After leaving the fill section, the water focuses on the coil at a rate of approximately 12 l/s per square meter, depending on the boxsize – this continues to be the highest flow over a coil in the industry! This is an increase of 4 l/s per square meter from the original ESW. Now at 12 l/s per square meter, more heat is being stripped from the coil by sensible heat transfer.

### 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 sheltered enclosure around the coil reduces heat loss and eliminates natural drafts across the coil.

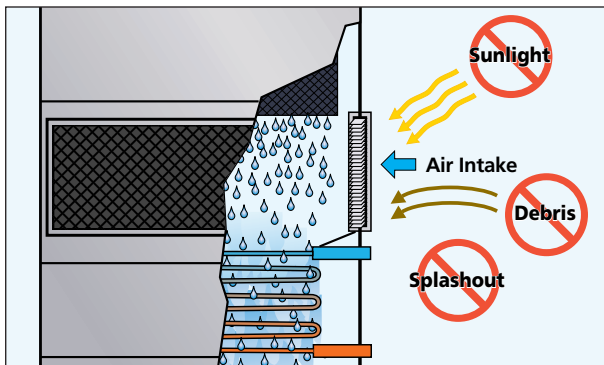
\*U.S. Patent #6,598,862



### Counterflow... Optimum Design for Freezing Climates

The counterflow design of the New 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.

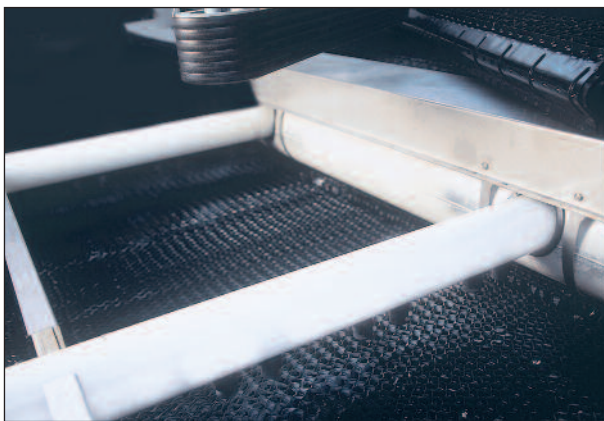
Evapco's counterflow design solves the problem of fill collapse due to ice formation. This is a problem of crossflow designs.



### 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.



### 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.

\*U.S. Patent #6,923,250  
\*\*U.S. Patent #6,315,804

# MAINTENANCE ADVANTAGES

# ESWA

## The Advanced Technology Easy Maintenance Basin Design

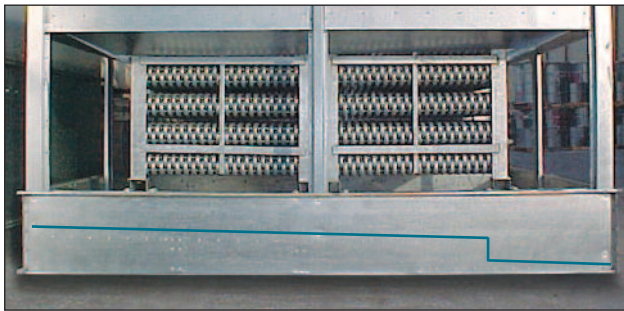
The cold water basin is perhaps the most important area for maintenance in an evaporative cooler. Service mechanics who work on this equipment know that dirt, debris and silt all settle out in the basin. Because basin maintenance is important and should be performed regularly, Evapco designed the basin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

## The Advanced Technology Easy Maintenance Drive System

The EVAPCO POWER-BAND drive system utilized on the New 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-72, 96 and 142

The fan motor and drive assembly are designed for easy service and adjustment from the unit's exterior. The Totally Enclosed 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.



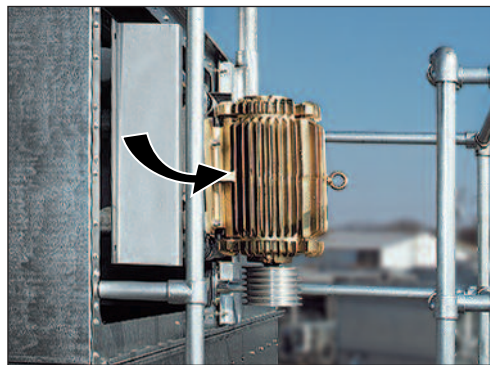
### Models with Swing-Out Motors

#### Models ESWA-144 and 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."*



## DRIVE SYSTEM

### The Advanced Technology POWER-BAND Drive System Design

The New 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.



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

#### 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 kW 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 on the ESWA closed circuit cooler 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

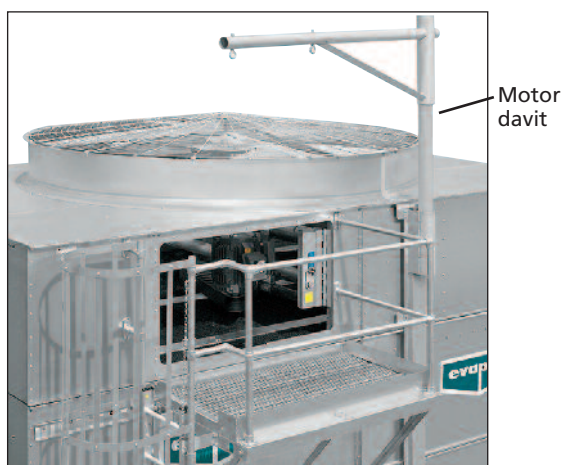
All ESWA Closed Circuit Coolers utilize Totally Enclosed fan motors (T.E.F.C. or T.E.A.O.) designed specifically for evaporative cooling application. In addition to the standard efficiency motors, the following motor options are available:

- Premium efficiency motors
- Two speed single winding
- Two speed two winding
- Mill and chemical duty
- Inverter-duty motors for VFD applications
- Explosion proof

### External Platforms & Motor Davits



External platforms provide a sturdy base for access to the drive components, water distribution and drift eliminators. The platform mounts easily to the unit and requires no external support. The platform option includes a vertical aluminum ladder. A safety cage for the ladder is also available if required for the installation.



Motor davit

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 needs only to have a chain-fall or come-along for easy removal of these heavy items. The motor davit is constructed from heavy duty galvanized steel with easy mounting to the unit in the field.

### Electric Heaters

Electric immersion heaters are available to protect the basin water from freezing. Basin heaters are sized to maintain a 4,5°C pan water temperature at -18°C ambient with the fans off\*. 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.

Additional heater options are also available including contactors, transformers and disconnects.

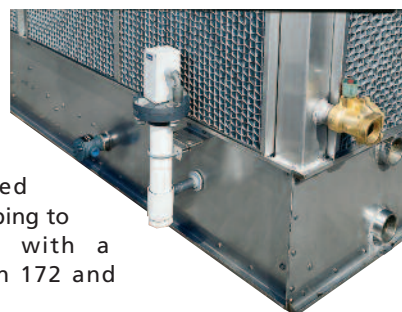
\* Electric heater selection based on -18°C ambient temperature. Lower design ambient heaters are available in accordance with Table 3 on page 17.

### 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.

These electrodes are 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 solenoid valve(s) for the makeup water connection is factory supplied and is ready for piping to a water supply with a pressure between 172 and 345 kPa.



### Other Options

- Heater Control Packages
- Vibration Isolators
- Vibration Switches
- Remote Sump Connections
- Motors—Energy Efficient / Inverter Duty
  - 2 speed / 1winding and
  - 2 speed / 2 windings
- Sloped Ladders



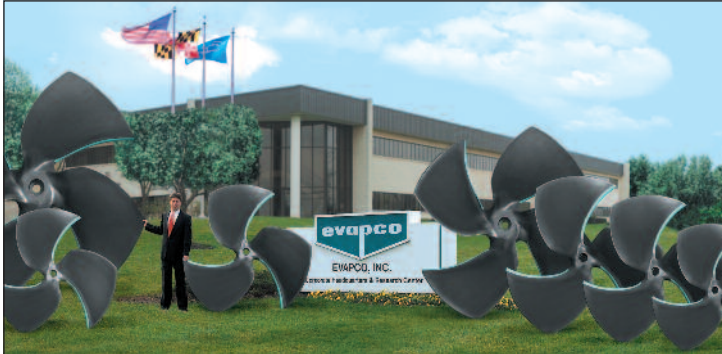
## Ultra Quiet Closed Circuit Cooler

The ESWA Closed Circuit Cooler is now available with two (2) equipment options to reduce the overall sound generated from the side or top of the ESWA Closed Circuit Cooler. Each option provides various levels of sound reduction and can be used in combination to provide the lowest sound level.



**Ultra Quiet operation  
for induced draft  
counterflow  
Closed Circuit Coolers**

### Super Low Sound Solution for Sound Sensitive Applications



Family of Super Low Sound Fans

### The Super Low Sound Fan Reduced Sound Levels versus Model ESWA Standard Fan

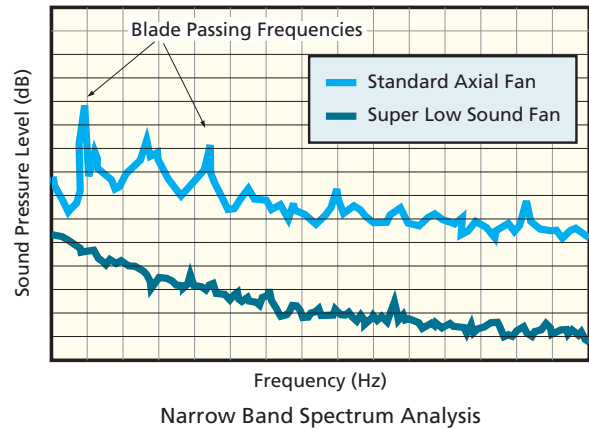
EVAPCO's Super Low Sound Fan on the **ESWA** closed circuit cooler utilizes an extremely wide chord blade design applied for sound sensitive applications where the lowest sound levels are desired. The fan is one piece molded heavy duty FRP construction utilizing a forward swept blade design. The Super Low Sound Fan reduces sound levels 9 to 15 dB(A) compared to standard fans.

### Improved Sound Quality versus Standard Fan

The **SUPER** Low Sound Fan on the **ESWA** closed circuit cooler reduces sound levels 9-15 dB(A) and eliminates audible blade passing frequencies indicative of straight bladed axial type fans.

Refer to the Narrow Band Spectrum graph which shows how straight bladed axial fans produce blade passing frequencies – the same phenomena that produce the signature pulsating helicopter noise.

The blade passing frequencies are audible spikes in sound pressure levels, but are not apparent in the octave band sound spectrum.



*The Super Low Sound Fan on the **ESWA** Closed Circuit Cooler reduces sound levels and better the sound quality!*

### Additional Solutions for Sound Sensitive Applications



#### Low Sound Fan 4 – 7 dB(A) Reduction!

The Low Sound Fan offered by EVAPCO is a wide chord blade design for sound sensitive applications where low sound levels are desired. The Low Sound Fan shall utilize a unique soft-connect blade-to-hub design that is compatible with Variable Speed Drives.

The Low Sound Fan is capable of reducing the unit sound pressure levels **4 dB(A) to 7 dB(A)**, depending upon specific unit selection and measurement location. The fans are high efficiency axial propeller type and are on the ESWA Closed Circuit Coolers.

*The Low Sound Fan is available on all 2.4 m wide and larger ESWA Closed Circuit Coolers.*

**NOTE:** These low sound options may impact the overall installed dimensions of the ESWA Closed Circuit Cooler selected.

Consult EVAPCO's *iES* selection software for unit sound levels. If a detailed analysis or full octave band data sheet is required for your application, please consult your EVAPCO Sales Representative.



The International Building Code (IBC) is a comprehensive set of regulations addressing the structural design and installation requirements for building systems – including HVAC and industrial refrigeration equipment.

With the advent of the IBC, EVAPCO is proud to introduce the new and improved line of ESWA Closed Circuit Coolers with IBC 2006 compliance standard.



## Wind, Rain, Earthquake and Hurricane

*EVAPCO Closed Circuit Coolers... designed to withstand seismic or wind load forces.*

In its continuing commitment to be the leaders in evaporative cooling equipment design and services, EVAPCO ESWA Closed Circuit Coolers are now **Independently Certified** to withstand Seismic and Wind Loads in accordance with IBC 2006.

## 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 2006 Apply to Closed Circuit Cooler?

Based on site design factors, calculations are made to determine the equivalent seismic “g force” and wind load (kilo-Newton per square meter, kN/m<sup>2</sup>) on the unit. The cooling tower must be designed to withstand the greater of either the seismic or wind load.

All locations with design criteria resulting in a seismic design force of up to 1.0g or a wind load of 2,87 kN/m<sup>2</sup> or below will be provided with the standard ESWA 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 shown on the maps is 273 km/h, which is approximately equal to 6,94 kN/m<sup>2</sup> velocity pressure. **Therefore, the upgraded structural design package option for the New ESWA is designed for 5.12 g and 6,94 kN/m<sup>2</sup> making it applicable to most building locations all over the World.**

### 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 requirements for the project site are known, EVAPCO’s online equipment selection software, *iES*, 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.





## CTI Certification Purpose (STD-201)

This standard sets forth a program whereby the Cooling Technology Institute will certify that all models of a line of evaporative heat rejection equipment offered for sale by a specific manufacturer will perform thermally in accordance with the manufacturer's published ratings...



## CTI Validation Number 06-13-05

† Mark owned by the Cooling Technology Institute

In its continuing commitment to be the leaders in evaporative cooling equipment design and services, EVAPCO ESWA 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 2008 CTI certified more than 5000 Evaporative Heat Transfer Systems (EHTS) from 49 product line of 24 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](http://www.cti.org).

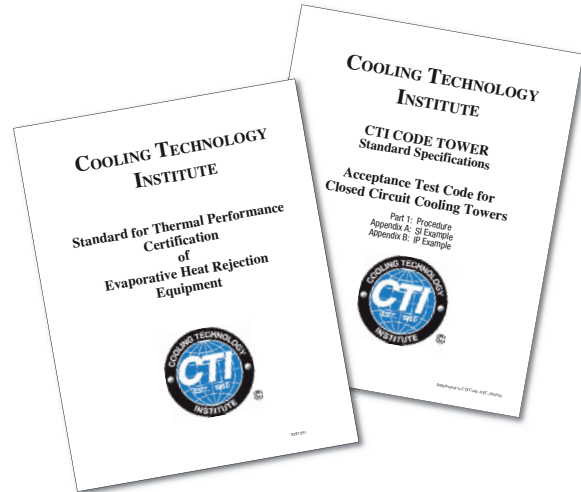
#### CTI Mission Statement

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

#### CTI Objectives

- Maintain and expand a broad base membership of individuals and organizations interested in Evaporative Heat Transfer Systems (EHTS).
- Identify and address emerging and evolving issues concerning EHTS.
- Encourage and support educational programs in various formats to enhance the capabilities and competence of the industry to realize the maximum benefit of EHTS.
- Encourage and support cooperative research to improve EHTS technology and efficiency for the long-term benefit of the environment.
- Assure acceptable minimum quality levels and performance of EHTS and their components by establishing standard specifications, guidelines, and certification programs.
- Establish standard testing and performance analysis systems and procedures for EHTS.
- Communicate with and influence governmental entities regarding the environmentally responsible technologies, benefits, and issues associated with EHTS.
- Encourage and support forums and methods for exchanging technical information on EHTS.



### Benefits to the End User

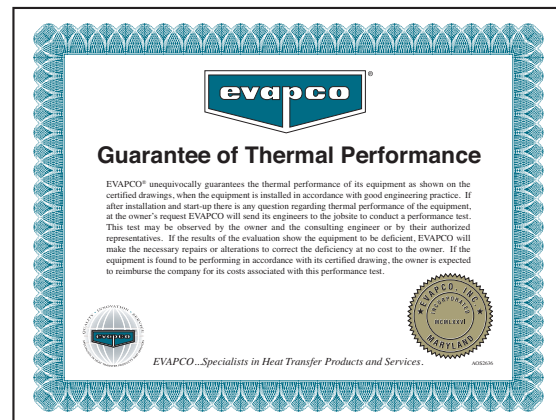
CTI defines an independent testing certification program that is specifiable, enforceable and available to all equipment manufacturer's. End users that purchase CTI certified products are assured that those products will perform thermally as specified.

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

- LEED - Leadership in Energy and Environmental Design
- Best Available Practice
- Green Building 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.





# CTI CERTIFICATION

## CTI Certification Program

### CTI Certification Process

- Submit Application for Certification
- CTI completes a technical review of the product line submitted
- CTI performs an initial qualification test in a laboratory on a specified model number
- CTI issues an Approval Letter with Validation Number if test is passed. Letter is also distributed to all members of CTI to inform everyone that a successful certification has been completed. The Certification Validation Number assigned should be fixed to each tower sold and displayed in all catalogs and other literature
- Product Line must undergo an Annual Reverification Test - Different model number is selected every year
- More details can be found on the CTI website [www.cti.org](http://www.cti.org)

### CTI Certification Test Parameters

- Entering Wet Bulb temperature - 12.8°C to 32.2°C
- Cooling Range - Minimum of 2.2°C
- Cooling Approach - Minimum of 2.8°C
- Process Fluid Temperature - Maximum of 51.7°C
- Barometric Pressure - 91.4 to 105 kPa
- More details can be found on the CTI website [www.cti.org](http://www.cti.org)

### CTI Certification Limitations

- Specific manufacturer's product line name and model numbers
- Applicable only to product lines and model numbers submitted
- Multiple cell model numbers are allowed if the airflow is not affected or the configuration impact is included in the unit rating
- Optional accessories are allowed if the airflow is not affected or the accessory impact is accounted for in the rating
- More details can be found on the CTI website [www.cti.org](http://www.cti.org)

### Evapco Europe CTI Certified ESWA Product Line

#### ESWA Line of CTI Certified Closed Circuit Coolers

- CTI Certification Validation Number 06-13-05
- Includes the use of optional remote sump
- Includes optional Super Low Sound Fan (SLSF) and Low Sound Fan (LSF)
- Includes high flow header connections and series flow coil configuration
- Includes optional external service platform and ladders for access
- iES Technical data sheet will state "CTI Certified Selection" if the selection falls within the CTI Certification Test Parameters
- Unit will receive a CTI Certified Shield located near the nameplate
- Certification applies only to units with water as process fluid

#### Note

All CTI Certified Product Lines of all manufacturers with CTI certified products can be found on the website: <http://www.cti.org/certification.shtml>



† Mark owned by the Cooling Technology Institute



# ESWA

Notes:

A large, empty rectangular box with a thin black border, intended for handwritten notes.



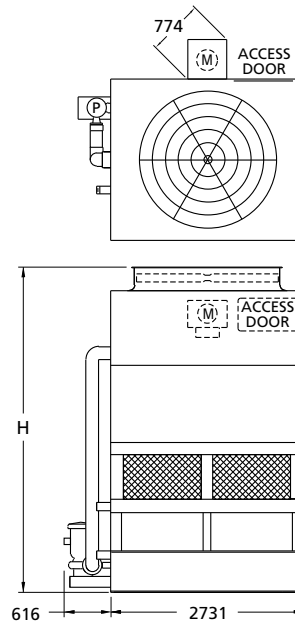
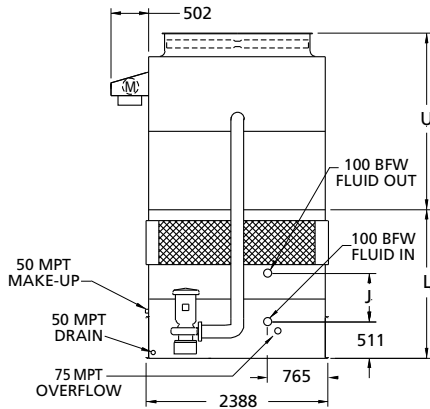
## Engineering Data



## Dimensions

### ESWA MODELS 72-23H TO 72-46K

**Note:** The coil connections increase to DN 150 BFW when the flow rate exceeds 28,3 l/s. This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump <sup>4</sup>			Unit Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	kW	m <sup>3</sup> /s	kW	l/s		Liters Required <sup>3</sup>	Conn. Size	Operating Weight (kg)	H	L	U	J
ESWA 72-23H	3305	2195	4910	5,5	18,1	4	33,4	412	909	200	4220	4103	1915	2188	495
ESWA 72-23I	3320	2195	4925	7,5	20,0	4	33,4	412	909	200	4230	4103	1915	2188	495
ESWA 72-23J	3350	2195	4960	11	22,7	4	33,4	412	909	200	4265	4103	1915	2188	495
ESWA 72-24J	3685	2530	5415	11	22,7	4	33,4	536	909	200	4720	4293	2105	2188	686
ESWA 72-25J	4040	2885	5890	11	22,7	4	33,4	658	909	200	5195	4484	2296	2188	876
ESWA 72-26J	4400	3245	6375	11	22,7	4	33,4	781	909	200	5680	4674	2486	2188	1067
ESWA 72-33H	3425	2195	5035	5,5	17,8	4	33,4	413	909	200	4340	4407	1915	2492	495
ESWA 72-33I	3440	2195	5045	7,5	19,7	4	33,4	413	909	200	4350	4407	1915	2492	495
ESWA 72-33J	3470	2195	5080	11	22,4	4	33,4	413	909	200	4385	4407	1915	2492	495
ESWA 72-33K	3495	2195	5100	15	24,2	4	33,4	413	909	200	4405	4407	1915	2492	495
ESWA 72-34H	3760	2530	5490	5,5	17,8	4	33,4	536	909	200	4795	4597	2105	2492	686
ESWA 72-34I	3775	2530	5500	7,5	19,7	4	33,4	536	909	200	4810	4597	2105	2492	686
ESWA 72-34J	3805	2530	5535	11	22,4	4	33,4	536	909	200	4840	4597	2105	2492	686
ESWA 72-34K	3830	2530	5555	15	24,2	4	33,4	536	909	200	4865	4597	2105	2492	686
ESWA 72-35H	4115	2885	5965	5,5	17,8	4	33,4	658	909	200	5270	4788	2296	2492	876
ESWA 72-35I	4130	2885	5980	7,5	19,7	4	33,4	658	909	200	5285	4788	2296	2492	876
ESWA 72-35J	4160	2885	6010	11	22,4	4	33,4	658	909	200	5315	4788	2296	2492	876
ESWA 72-35K	4180	2885	6035	15	24,2	4	33,4	658	909	200	5340	4788	2296	2492	876
ESWA 72-36H	4475	3245	6450	5,5	17,8	4	33,4	781	909	200	5755	4978	2486	2492	1067
ESWA 72-36I	4490	3245	6460	7,5	19,7	4	33,4	781	909	200	5765	4978	2486	2492	1067
ESWA 72-36J	4520	3245	6495	11	22,4	4	33,4	781	909	200	5800	4978	2486	2492	1067
ESWA 72-36K	4545	3245	6515	15	24,2	4	33,4	781	909	200	5820	4978	2486	2492	1067
ESWA 72-43I	3575	2195	5180	7,5	19,2	4	33,4	413	909	200	4485	4712	1915	2797	495
ESWA 72-43J	3605	2195	5210	11	21,7	4	33,4	413	909	200	4520	4712	1915	2797	495
ESWA 72-43K	3630	2195	5235	15	23,7	4	33,4	413	909	200	4540	4712	1915	2797	495
ESWA 72-44I	3910	2530	5635	7,5	19,2	4	33,4	536	909	200	4940	4902	2105	2797	686
ESWA 72-44J	3940	2530	5670	11	21,7	4	33,4	536	909	200	4975	4902	2105	2797	686
ESWA 72-44K	3960	2530	5690	15	23,7	4	33,4	536	909	200	4995	4902	2105	2797	686
ESWA 72-45I	4260	2885	6110	7,5	19,2	4	33,4	658	909	200	5420	5093	2296	2797	876
ESWA 72-45J	4295	2885	6145	11	21,7	4	33,4	658	909	200	5450	5093	2296	2797	876
ESWA 72-45K	4315	2885	6165	15	23,7	4	33,4	658	909	200	5475	5093	2296	2797	876
ESWA 72-46I	4620	3245	6595	7,5	19,2	4	33,4	781	909	200	5900	5283	2486	2797	1067
ESWA 72-46J	4655	3245	6625	11	21,7	4	33,4	781	909	200	5935	5283	2486	2797	1067
ESWA 72-46K	4675	3245	6650	15	23,7	4	33,4	781	909	200	5955	5283	2486	2797	1067

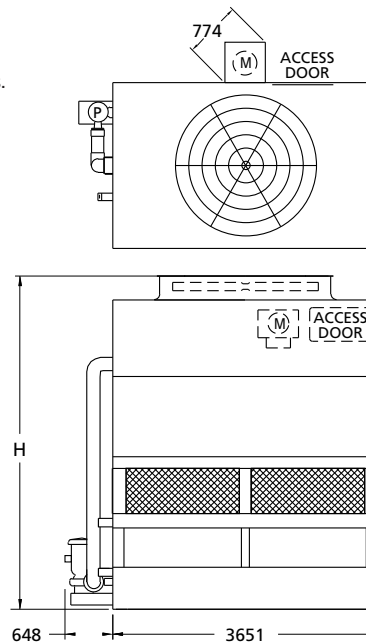
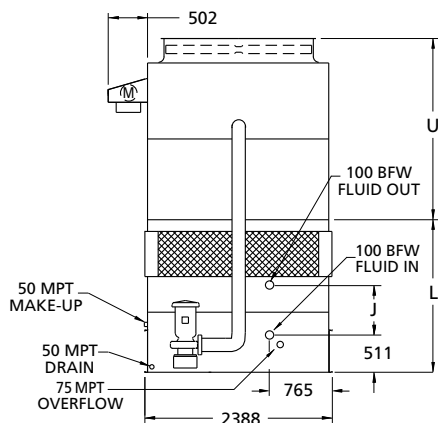
1 Model Number will end in "-2" for units with Series Flow piping configuration. Series Flow will require factory mounted internal crossover piping.  
 2 Heaviest section is the lower section.  
 3 Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm 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 100 mm beveled for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

# ENGINEERING DATA & DIMENSIONS

# ESWA

## ESWA MODELS 96-23H TO 96-46K

**Note:** The coil connections increase to DN 150 BFW when the flow rate exceeds 28,3 l/s. This required option is referred to as the High Flow coil configuration.



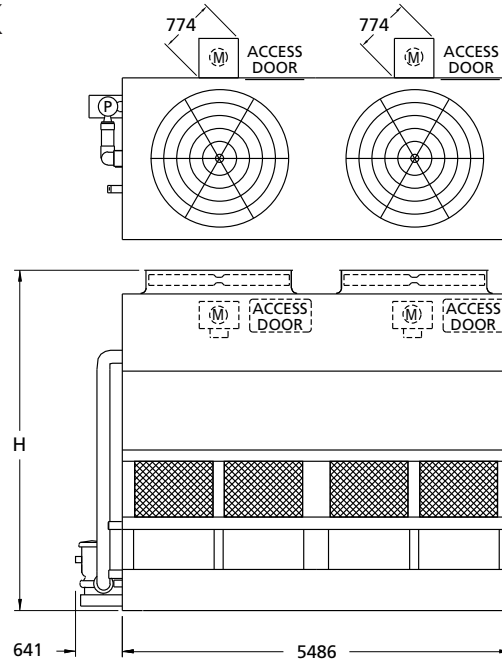
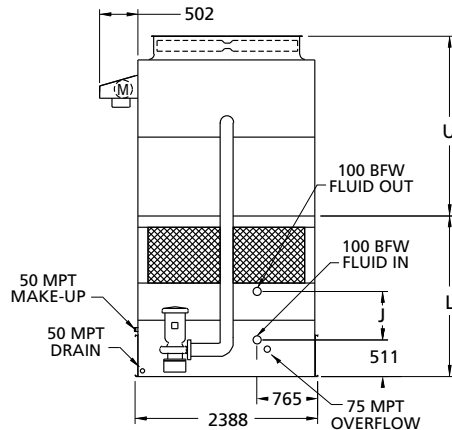
ENGINEERING

Model Number <sup>1</sup>	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump <sup>4</sup>			Unit Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	kW	m <sup>3</sup> /s	kW	l/s		Liters Required <sup>3</sup>	Conn. Size	Operating Weight (kg)	H	L	U	J
ESWA 96-23H	4235	2910	6495	5,5	22,6	5,5	46,7	606	1211	250	5590	4103	1915	2188	495
ESWA 96-23I	4250	2910	6510	7,5	25,0	5,5	46,7	606	1211	250	5600	4103	1915	2188	495
ESWA 96-33H	4390	2910	6650	5,5	22,2	5,5	46,7	606	1211	250	5740	4407	1915	2492	495
ESWA 96-33I	4405	2910	6665	7,5	24,6	5,5	46,7	606	1211	250	5755	4407	1915	2492	495
ESWA 96-33J	4435	2910	6695	11	27,9	5,5	46,7	606	1211	250	5790	4407	1915	2492	495
ESWA 96-33K	4460	2910	6720	15	30,4	5,5	46,7	606	1211	250	5810	4407	1915	2492	495
ESWA 96-34H	4895	3410	7345	5,5	22,2	5,5	46,7	791	1211	250	6435	4597	2105	2492	686
ESWA 96-34I	4910	3410	7355	7,5	24,6	5,5	46,7	791	1211	250	6450	4597	2105	2492	686
ESWA 96-34J	4940	3410	7390	11	27,9	5,5	46,7	791	1211	250	6480	4597	2105	2492	686
ESWA 96-34K	4960	3410	7410	15	30,4	5,5	46,7	791	1211	250	6505	4597	2105	2492	686
ESWA 96-35H	5420	3935	8055	5,5	22,2	5,5	46,7	980	1211	250	7145	4788	2296	2492	876
ESWA 96-35I	5430	3935	8065	7,5	24,6	5,5	46,7	980	1211	250	7160	4788	2296	2492	876
ESWA 96-35J	5465	3935	8100	11	27,9	5,5	46,7	980	1211	250	7190	4788	2296	2492	876
ESWA 96-35K	5485	3935	8120	15	30,4	5,5	46,7	980	1211	250	7215	4788	2296	2492	876
ESWA 96-36H	5920	4435	8740	5,5	22,2	5,5	46,7	1166	1211	250	7835	4978	2486	2492	1067
ESWA 96-36I	5935	4435	8755	7,5	24,6	5,5	46,7	1166	1211	250	7845	4978	2486	2492	1067
ESWA 96-36J	5965	4435	8785	11	27,9	5,5	46,7	1166	1211	250	7880	4978	2486	2492	1067
ESWA 96-36K	5985	4435	8810	15	30,4	5,5	46,7	1166	1211	250	7900	4978	2486	2492	1067
ESWA 96-43I	4575	2910	6835	7,5	24,0	5,5	46,7	606	1211	250	5925	4712	1915	2797	495
ESWA 96-43J	4605	2910	6865	11	27,3	5,5	46,7	606	1211	250	5960	4712	1915	2797	495
ESWA 96-43K	4630	2910	6890	15	29,9	5,5	46,7	606	1211	250	5980	4712	1915	2797	495
ESWA 96-44I	5080	3410	7525	7,5	24,0	5,5	46,7	791	1211	250	6620	4902	2105	2797	686
ESWA 96-44J	5110	3410	7560	11	27,3	5,5	46,7	791	1211	250	6650	4902	2105	2797	686
ESWA 96-44K	5130	3410	7580	15	29,9	5,5	46,7	791	1211	250	6675	4902	2105	2797	686
ESWA 96-45I	5600	3935	8235	7,5	24,0	5,5	46,7	980	1211	250	7330	5093	2296	2797	876
ESWA 96-45J	5635	3935	8270	11	27,3	5,5	46,7	980	1211	250	7360	5093	2296	2797	876
ESWA 96-45K	5655	3935	8290	15	29,9	5,5	46,7	980	1211	250	7385	5093	2296	2797	876
ESWA 96-46I	6105	4435	8925	7,5	24,0	5,5	46,7	1166	1211	250	8015	5283	2486	2797	1067
ESWA 96-46J	6135	4435	8955	11	27,3	5,5	46,7	1166	1211	250	8050	5283	2486	2797	1067
ESWA 96-46K	6160	4435	8980	15	29,9	5,5	46,7	1166	1211	250	8070	5283	2486	2797	1067

1 Model Number will end in "-2" for units with Series Flow piping configuration. Series Flow will require factory mounted internal crossover piping.  
 2 Heaviest section is the lower section.  
 3 Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm 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 100 mm beveled for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

### ESWA Models 142-23H to 142-46K

**Note:** The coil connections increase to DN 150 BFW when the flow rate exceeds 28,3 l/s. This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump <sup>4</sup>			Unit Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	kW	m <sup>3</sup> /s	kW	l/s		Liters Required <sup>3</sup>	Conn. Size	Operating Weight (kg)	H	L	U	J
ESWA 142-23H	6420	4295	9855	(2) 5,5	35,6	7,5	61,2	927	1817	300	8510	4309	2080	2229	495
ESWA 142-23I	6445	4295	9885	(2) 7,5	39,4	7,5	61,2	927	1817	300	8535	4309	2080	2229	495
ESWA 142-23J	6510	4295	9945	(2) 11	44,7	7,5	61,2	927	1817	300	8600	4309	2080	2229	495
ESWA 142-33H	6650	4295	10090	(2) 5,5	35,1	7,5	61,2	927	1817	300	8740	4614	2080	2534	495
ESWA 142-33I	6675	4295	10115	(2) 7,5	38,8	7,5	61,2	927	1817	300	8770	4614	2080	2534	495
ESWA 142-33J	6740	4295	10180	(2) 11	44,1	7,5	61,2	927	1817	300	8830	4614	2080	2534	495
ESWA 142-33K	6785	4295	10225	(2) 15	48,6	7,5	61,2	927	1817	300	8875	4614	2080	2534	495
ESWA 142-34H	7445	5090	11175	(2) 5,5	35,1	7,5	61,2	1223	1817	300	9825	4804	2270	2534	686
ESWA 142-34I	7475	5090	11200	(2) 7,5	38,8	7,5	61,2	1223	1817	300	9855	4804	2270	2534	686
ESWA 142-34J	7535	5090	11265	(2) 11	44,1	7,5	61,2	1223	1817	300	9920	4804	2270	2534	686
ESWA 142-34K	7580	5090	11310	(2) 15	48,6	7,5	61,2	1223	1817	300	9965	4804	2270	2534	686
ESWA 142-35H	8180	5820	12200	(2) 5,5	35,1	7,5	61,2	1514	1817	300	10855	4995	2461	2534	876
ESWA 142-35I	8205	5820	12230	(2) 7,5	38,8	7,5	61,2	1514	1817	300	10880	4995	2461	2534	876
ESWA 142-35J	8270	5820	12290	(2) 11	44,1	7,5	61,2	1514	1817	300	10945	4995	2461	2534	876
ESWA 142-35K	8315	5820	12340	(2) 15	48,6	7,5	61,2	1514	1817	300	10990	4995	2461	2534	876
ESWA 142-36H	8970	6615	13290	(2) 5,5	35,1	7,5	61,2	1809	1817	300	11945	5185	2651	2534	1067
ESWA 142-36I	9000	6615	13315	(2) 7,5	38,8	7,5	61,2	1809	1817	300	11970	5185	2651	2534	1067
ESWA 142-36J	9065	6615	13380	(2) 11	44,1	7,5	61,2	1809	1817	300	12035	5185	2651	2534	1067
ESWA 142-36K	9110	6615	13425	(2) 15	48,6	7,5	61,2	1809	1817	300	12080	5185	2651	2534	1067
ESWA 142-43I	6930	4295	10365	(2) 7,5	37,7	7,5	61,2	927	1817	300	9020	4918	2080	2838	495
ESWA 142-43J	6990	4295	10430	(2) 11	42,8	7,5	61,2	927	1817	300	9085	4918	2080	2838	495
ESWA 142-43K	7035	4295	10475	(2) 15	47,4	7,5	61,2	927	1817	300	9130	4918	2080	2838	495
ESWA 142-44I	7725	5090	11455	(2) 7,5	37,7	7,5	61,2	1223	1817	300	10105	5108	2270	2838	686
ESWA 142-44J	7790	5090	11515	(2) 11	42,8	7,5	61,2	1223	1817	300	10170	5108	2270	2838	686
ESWA 142-44K	7835	5090	11560	(2) 15	47,4	7,5	61,2	1223	1817	300	10215	5108	2270	2838	686
ESWA 142-45I	8455	5820	12480	(2) 7,5	37,7	7,5	61,2	1514	1817	300	11135	5299	2461	2838	876
ESWA 142-45J	8520	5820	12545	(2) 11	42,8	7,5	61,2	1514	1817	300	11195	5299	2461	2838	876
ESWA 142-45K	8565	5820	12590	(2) 15	47,4	7,5	61,2	1514	1817	300	11240	5299	2461	2838	876
ESWA 142-46I	9250	6615	13570	(2) 7,5	37,7	7,5	61,2	1809	1817	300	12220	5489	2651	2838	1067
ESWA 142-46J	9315	6615	13635	(2) 11	42,8	7,5	61,2	1809	1817	300	12285	5489	2651	2838	1067
ESWA 142-46K	9360	6615	13680	(2) 15	47,4	7,5	61,2	1809	1817	300	12330	5489	2651	2838	1067

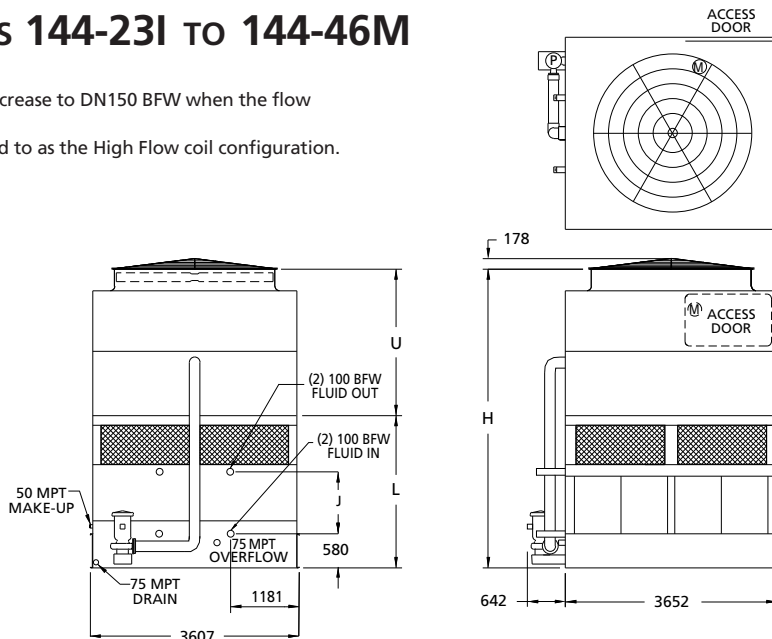
1 Model Number will end in "-2" for units with Series Flow piping configuration. Series Flow will require factory mounted internal crossover piping.  
 2 Heaviest section is the lower section.  
 3 Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm 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 100 mm beveled for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

# ENGINEERING DATA & DIMENSIONS

# ESWA

## ESWA MODELS 144-23I TO 144-46M

**Note:** The coil connections increase to DN150 BFW when the flow rate exceeds 28,3 l/s per coil.  
This required option is referred to as the High Flow coil configuration.



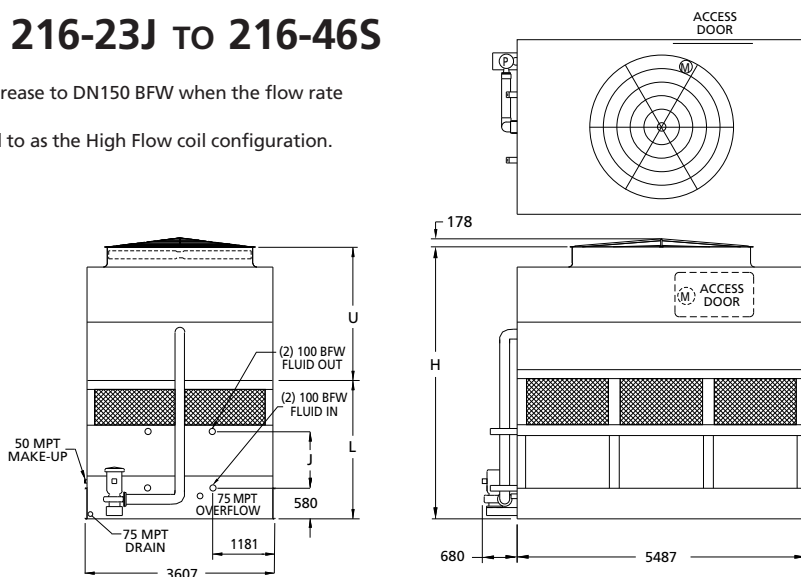
Model Number <sup>1</sup>	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump <sup>4</sup>			Unit Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	kW	m <sup>3</sup> /s	kW	l/s		Liters Required <sup>3</sup>	Conn. Size	Operating Weight (kg)	H	L	U	J
ESWA 144-23I	6485	4215	10030	7,5	32,9	7,5	65,0	852	1855	300	8080	4597	2057	2540	495
ESWA 144-23J	6505	4215	10055	11	37,6	7,5	65,0	852	1855	300	8105	4597	2057	2540	495
ESWA 144-23K	6530	4215	10075	15	41,3	7,5	65,0	852	1855	300	8125	4597	2057	2540	495
ESWA 144-24I	7200	4930	11000	7,5	32,9	7,5	65,0	1109	1855	300	9050	4788	2248	2540	686
ESWA 144-24J	7220	4930	11020	11	37,6	7,5	65,0	1109	1855	300	9070	4788	2248	2540	686
ESWA 144-24K	7245	4930	11045	15	41,3	7,5	65,0	1109	1855	300	9095	4788	2248	2540	686
ESWA 144-25I	7940	5670	12005	7,5	32,9	7,5	65,0	1370	1855	300	10055	4978	2438	2540	876
ESWA 144-33I	6735	4215	10285	7,5	32,2	7,5	65,0	852	1855	300	8330	4902	2057	2845	495
ESWA 144-33J	6760	4215	10305	11	36,8	7,5	65,0	852	1855	300	8355	4902	2057	2845	495
ESWA 144-33K	6780	4215	10330	15	40,4	7,5	65,0	852	1855	300	8380	4902	2057	2845	495
ESWA 144-34I	7450	4930	11250	7,5	32,2	7,5	65,0	1109	1855	300	9300	5093	2248	2845	686
ESWA 144-34J	7475	4930	11275	11	36,8	7,5	65,0	1109	1855	300	9325	5093	2248	2845	686
ESWA 144-34K	7495	4930	11295	15	40,4	7,5	65,0	1109	1855	300	9345	5093	2248	2845	686
ESWA 144-34L	7520	4930	11320	18,5	43,6	7,5	65,0	1109	1855	300	9370	5093	2248	2845	686
ESWA 144-35I	8190	5670	12255	7,5	32,2	7,5	65,0	1370	1855	300	10305	5283	2438	2845	876
ESWA 144-35J	8215	5670	12280	11	36,8	7,5	65,0	1370	1855	300	10330	5283	2438	2845	876
ESWA 144-35K	8235	5670	12300	15	40,4	7,5	65,0	1370	1855	300	10350	5283	2438	2845	876
ESWA 144-35L	8260	5670	12325	18,5	43,6	7,5	65,0	1370	1855	300	10375	5283	2438	2845	876
ESWA 144-36I	8900	6380	13225	7,5	32,2	7,5	65,0	1632	1855	300	11275	5474	2629	2845	1067
ESWA 144-36J	8920	6380	13250	11	36,8	7,5	65,0	1632	1855	300	11300	5474	2629	2845	1067
ESWA 144-36K	8945	6380	13270	15	40,4	7,5	65,0	1632	1855	300	11320	5474	2629	2845	1067
ESWA 144-36L	8970	6380	13295	18,5	43,6	7,5	65,0	1632	1855	300	11345	5474	2629	2845	1067
ESWA 144-43J	6985	4215	10530	11	36,2	7,5	65,0	852	1855	300	8580	5207	2057	3150	495
ESWA 144-43K	7005	4215	10555	15	39,8	7,5	65,0	852	1855	300	8600	5207	2057	3150	495
ESWA 144-44J	7695	4930	11500	11	36,2	7,5	65,0	1109	1855	300	9550	5398	2248	3150	686
ESWA 144-44K	7720	4930	11520	15	39,8	7,5	65,0	1109	1855	300	9570	5398	2248	3150	686
ESWA 144-44L	7745	4930	11545	18,5	42,9	7,5	65,0	1109	1855	300	9595	5398	2248	3150	686
ESWA 144-44M	7790	4930	11590	22	45,0	7,5	65,0	1109	1855	300	9640	5398	2248	3150	686
ESWA 144-45J	8440	5670	12505	11	36,2	7,5	65,0	1370	1855	300	10555	5588	2438	3150	876
ESWA 144-45K	8460	5670	12525	15	39,8	7,5	65,0	1370	1855	300	10575	5588	2438	3150	876
ESWA 144-45L	8485	5670	12550	18,5	42,9	7,5	65,0	1370	1855	300	10600	5588	2438	3150	876
ESWA 144-45M	8530	5670	12595	22	45,0	7,5	65,0	1370	1855	300	10645	5588	2438	3150	876
ESWA 144-46J	9145	6380	13475	11	36,2	7,5	65,0	1632	1855	300	11525	5779	2629	3150	1067
ESWA 144-46K	9170	6380	13495	15	39,8	7,5	65,0	1632	1855	300	11545	5779	2629	3150	1067
ESWA 144-46L	9190	6380	13520	18,5	42,9	7,5	65,0	1632	1855	300	11570	5779	2629	3150	1067
ESWA 144-46M	9235	6380	13565	22	45,0	7,5	65,0	1632	1855	300	11615	5779	2629	3150	1067

1 Model Number will end in "-2" for units with Series Flow piping configuration. Series Flow units will require crossover piping.  
2 Heaviest section is the lower section.  
3 Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm 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 100 mm beveled for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

### ESWA MODELS 216-23J TO 216-46S

**Note:** The coil connections increase to DN150 BFW when the flow rate exceeds 28,3 l/s per coil.

This required option is referred to as the High Flow coil configuration.



Model Number <sup>1</sup>	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump <sup>4</sup>			Unit Dimensions <sup>5</sup>			
	Shipping	Heaviest Section <sup>2</sup>	Operating	kW	m <sup>3</sup> /s	kW	l/s		Liters Required <sup>3</sup>	Conn. Size	Operating Weight (kg)	H	L	U	J
ESWA 216-23J	9005	5965	14390	11	50,4	11	78,9	1302	2725	300	11560	4801	2261	2540	495
ESWA 216-23K	9025	5965	14415	15	55,4	11	78,9	1302	2725	300	11585	4801	2261	2540	495
ESWA 216-23L	9050	5965	14440	18,5	59,6	11	78,9	1302	2725	300	11605	4801	2261	2540	495
ESWA 216-23M	9100	5965	14490	22	63,3	11	78,9	1302	2725	300	11655	4801	2261	2540	495
ESWA 216-24J	10120	7085	15930	11	50,4	11	78,9	1711	2725	300	13095	4991	2451	2540	686
ESWA 216-24K	10145	7085	15950	15	55,4	11	78,9	1711	2725	300	13120	4991	2451	2540	686
ESWA 216-24L	10165	7085	15975	18,5	59,6	11	78,9	1711	2725	300	13145	4991	2451	2540	686
ESWA 216-24M	10215	7085	16025	22	63,3	11	78,9	1711	2725	300	13195	4991	2451	2540	686
ESWA 216-25J	11195	8160	17410	11	50,4	11	78,9	2120	2725	300	14580	5182	2642	2540	876
ESWA 216-25K	11220	8160	17435	15	55,4	11	78,9	2120	2725	300	14605	5182	2642	2540	876
ESWA 216-25L	11240	8160	17455	18,5	59,6	11	78,9	2120	2725	300	14625	5182	2642	2540	876
ESWA 216-25M	11290	8160	17505	22	63,3	11	78,9	2120	2725	300	14675	5182	2642	2540	876
ESWA 216-26J	12310	9270	18935	11	50,4	11	78,9	2529	2725	300	16105	5372	2832	2540	1067
ESWA 216-33K	9385	5965	14770	15	54,7	11	78,9	1302	2725	300	11940	5106	2261	2845	495
ESWA 216-33L	9405	5965	14795	18,5	59,0	11	78,9	1302	2725	300	11965	5106	2261	2845	495
ESWA 216-33M	9455	5965	14845	22	62,4	11	78,9	1302	2725	300	12015	5106	2261	2845	495
ESWA 216-34K	10500	7085	16305	15	54,7	11	78,9	1711	2725	300	13475	5296	2451	2845	686
ESWA 216-34L	10525	7085	16330	18,5	59,0	11	78,9	1711	2725	300	13500	5296	2451	2845	686
ESWA 216-34M	10575	7085	16380	22	62,4	11	78,9	1711	2725	300	13550	5296	2451	2845	686
ESWA 216-34N	10690	7085	16495	30	68,3	11	78,9	1711	2725	300	13665	5296	2451	2845	686
ESWA 216-35K	11575	8160	17790	15	54,7	11	78,9	2120	2725	300	14960	5487	2642	2845	876
ESWA 216-35L	11600	8160	17815	18,5	59,0	11	78,9	2120	2725	300	14980	5487	2642	2845	876
ESWA 216-35M	11650	8160	17860	22	62,4	11	78,9	2120	2725	300	15030	5487	2642	2845	876
ESWA 216-35N	11765	8160	17980	30	68,3	11	78,9	2120	2725	300	15150	5487	2642	2845	876
ESWA 216-36K	12690	9270	19310	15	54,7	11	78,9	2529	2725	300	16480	5677	2832	2845	1067
ESWA 216-36L	12710	9270	19335	18,5	59,0	11	78,9	2529	2725	300	16505	5677	2832	2845	1067
ESWA 216-36M	12760	9270	19385	22	62,4	11	78,9	2529	2725	300	16555	5677	2832	2845	1067
ESWA 216-36N	12880	9270	19500	30	68,3	11	78,9	2529	2725	300	16670	5677	2832	2845	1067
ESWA 216-43K	9715	5965	15100	15	53,7	11	78,9	1302	2725	300	12270	5411	2261	3150	495
ESWA 216-43L	9735	5965	15125	18,5	57,8	11	78,9	1302	2725	300	12295	5411	2261	3150	495
ESWA 216-43M	9785	5965	15175	22	61,4	11	78,9	1302	2725	300	12345	5411	2261	3150	495
ESWA 216-44K	10830	7085	16640	15	53,7	11	78,9	1711	2725	300	13805	5601	2451	3150	686
ESWA 216-44L	10855	7085	16660	18,5	57,8	11	78,9	1711	2725	300	13830	5601	2451	3150	686
ESWA 216-44M	10905	7085	16710	22	61,4	11	78,9	1711	2725	300	13880	5601	2451	3150	686
ESWA 216-44N	11020	7085	16830	30	67,5	11	78,9	1711	2725	300	14000	5601	2451	3150	686
ESWA 216-44O	11050	7085	16855	37	72,0	11	78,9	1711	2725	300	14025	5601	2451	3150	686
ESWA 216-45K	11905	8160	18120	15	53,7	11	78,9	2120	2725	300	15290	5792	2642	3150	876
ESWA 216-45L	11930	8160	18145	18,5	57,8	11	78,9	2120	2725	300	15315	5792	2642	3150	876
ESWA 216-45M	11980	8160	18195	22	61,4	11	78,9	2120	2725	300	15365	5792	2642	3150	876
ESWA 216-45N	12095	8160	18310	30	67,5	11	78,9	2120	2725	300	15480	5792	2642	3150	876
ESWA 216-45O	12125	8160	18340	37	72,0	11	78,9	2120	2725	300	15510	5792	2642	3150	876
ESWA 216-46K	13020	9270	19645	15	53,7	11	78,9	2529	2725	300	16810	5982	2832	3150	1067
ESWA 216-46L	13045	9270	19665	18,5	57,8	11	78,9	2529	2725	300	16835	5982	2832	3150	1067
ESWA 216-46M	13095	9270	19715	22	61,4	11	78,9	2529	2725	300	16885	5982	2832	3150	1067
ESWA 216-46N	13210	9270	19835	30	67,5	11	78,9	2529	2725	300	17005	5982	2832	3150	1067
ESWA 216-46O	13240	9270	19860	37	72,0	11	78,9	2529	2725	300	17030	5982	2832	3150	1067
ESWA 216-46P	13240	9270	19860	45	76,2	11	78,9	2529	2725	300	17030	5982	2832	3150	1067
ESWA 216-46S	13700	9730	20445	45	76,2	11	78,9	2529	2725	300	17665	5982	2832	3150	1067

1 Model Number will end in "-2" for units with Series Flow piping configuration. Series Flow units will require crossover piping.  
 2 Heaviest section is the lower section.  
 3 Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm 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 100 mm beveled for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

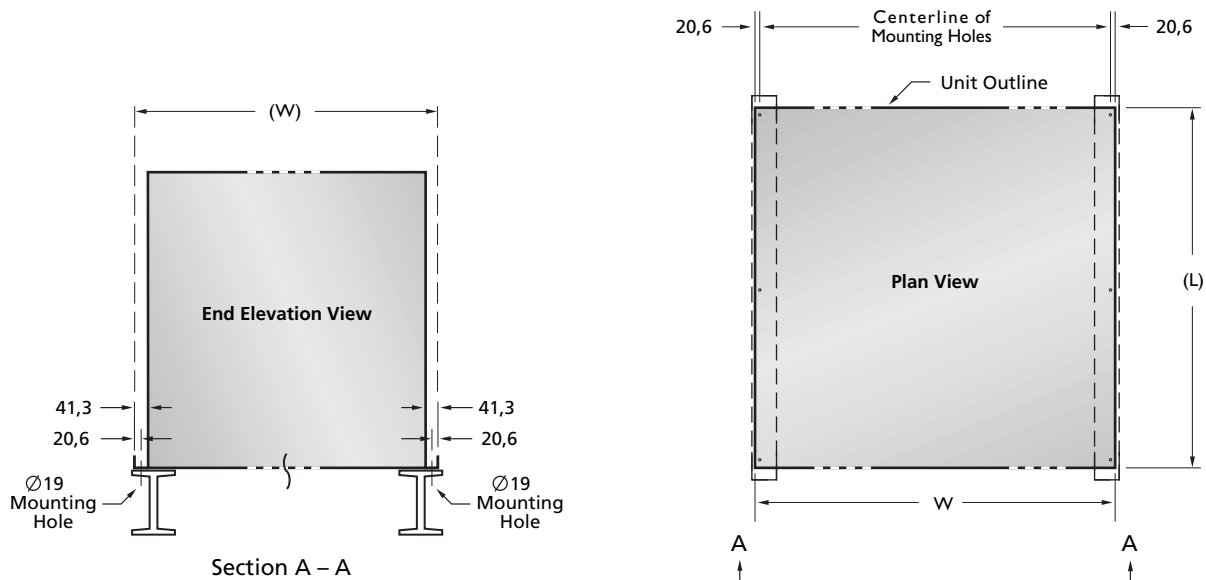


# STRUCTURAL STEEL SUPPORT

# ESWA

## SUGGESTED TWO "I" BEAM ARRANGEMENT

Dimensions are in mm.



Model	Unit Width (W)	Unit Length (L)	Centerline of mounting holes	Number of mounting holes
ESWA-72	2388	2731	2347	6
ESWA-96	2388	3372	2347	6
ESWA-142	2388	5486	2347	12
ESWA-144	3607	3651	3566	6
ESWA-216	3607	5486	3566	12

**Notes:**

1. These are suggested arrangements for preliminary layout purposes. Consult your EVAPCO representative or the EVAPCO website ([www.evapco.eu](http://www.evapco.eu)) for certified steel support drawings.
2. The recommended support is structural "I" beams under the entire lengths of the unit. The unit should be elevated for access underneath the unit and the supporting base. Mounting holes are 19mm diameter.
3. Beams should be sized in accordance with accepted structural practices. Maximum deflection of beam under unit to be 1/360 of the unit length, not to exceed 13 mm.
4. Deflection may be calculated by using 55% of the operating weight as a uniform load on each beam. Refer to unit certified print for the operating weight.
5. Beams should be level before setting the unit in place. Do not level the unit by shimming between the unit and the support beam.
6. Support beams and anchor bolts are to be supplied and installed by others.
7. Dimensions, weights and data are subject to change without notice. Refer to the factory certified drawings for exact dimensions.
8. If point isolation is to be used, the isolators must be installed under the supports beams, not between the unit and support beam.
9. Consult your Evapco representative for alternate support beam layouts.

## Freeze Protection

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

### Freeze Protection of Closed Circuit Cooler Coils

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 the following conditions must be met:

- 1) Maintain sufficient process heat load through the coil such that the coil temperature is kept above 10°C. If the process load cannot support 10°C fluid, an auxiliary heat load should be applied when freezing conditions exist. Refer to Table 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.
- 3) If the coil is not protected with an antifreeze/glycol solution, automatic drain valves and air vents should be installed in the coil supply and return piping. The drain valves and piping should be heat traced and sized for quick drainage of the coil. The drain valves and air vents should be signaled to drain the coil if the fluid flow stops or drops below 4°C in freezing conditions.

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

**Table 1 Heat Loss Data**

Model	kW	Model	kW
ESWA 72-23	32,5	ESWA 142-36	95,2
ESWA 72-24	38,9	ESWA 142-43	65,9
ESWA 72-25	44,2	ESWA 142-44	79,1
ESWA 72-26	46,8	ESWA 142-45	89,3
ESWA 72-33	32,5	ESWA 142-46	95,2
ESWA 72-34	38,9	ESWA 144-24	73,8
ESWA 72-35	44,2	ESWA 144-25	83,2
ESWA 72-36	46,8	ESWA 144-26	88,7
ESWA 72-43	32,5	ESWA 144-33	61,2
ESWA 72-44	38,9	ESWA 144-34	73,8
ESWA 72-45	44,2	ESWA 144-35	83,2
ESWA 72-46	46,8	ESWA 144-36	88,7
ESWA 96-23	43,3	ESWA 144-43	61,2
ESWA 96-33	43,3	ESWA 144-44	73,8
ESWA 96-34	52,4	ESWA 144-45	83,2
ESWA 96-35	58,9	ESWA 144-46	88,7
ESWA 96-36	62,9	ESWA 216-23	92,2
ESWA 96-43	43,3	ESWA 216-24	111,3
ESWA 96-44	52,4	ESWA 216-25	125,6
ESWA 96-45	58,9	ESWA 216-26	133,8
ESWA 96-46	62,9	ESWA 216-33	92,2
ESWA 142-23	65,9	ESWA 216-34	111,3
ESWA 142-24	79,1	ESWA 216-35	125,6
ESWA 142-25	89,3	ESWA 216-36	133,8
ESWA 142-26	95,2	ESWA 216-43	92,2
ESWA 142-33	65,9	ESWA 216-44	111,3
ESWA 142-34	79,1	ESWA 216-45	125,6
ESWA 142-35	89,3	ESWA 216-46	133,8

Heat loss ratings are based on 10°C water in the coil with -23,3°C ambient and 72km/h winds. Fan and pump off.

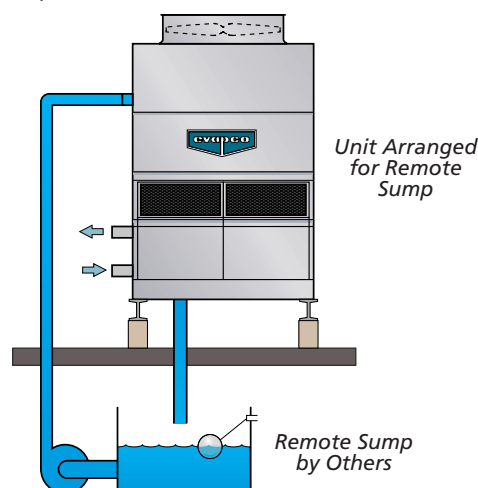
**Table 2 Minimum Flow Chart**

Unit No.	Minimum Flow (l/s)
ESWA 72	15,1
ESWA 96	15,1
ESWA 142	15,1
ESWA 144	20,8
ESWA 216	20,8

## Recirculating Water System

There are several effective methods for protecting the pan water from freezing.

Remote sumps are commonly used where extreme freezing conditions are expected. For these applications the unit can be provided with an oversized bottom outlet to allow the pan water to drain from the unit to an indoor sump. Units arranged for remote sump applications are provided without a spray pump. The spray pump in these cases is provided by others and installed by the contractor alongside an indoor sump.



Electric pan heaters, hot water coils, steam coils and steam injectors are also frequently used for protecting the pan water from freezing when the unit is idle. Contact EVAPCO or consult iES for heater sizing at various freeze design temperatures.

All water lines to and from the unit should be heat traced. Additionally, the spray pump, standpipes and exterior piping should be heat traced and insulated up to the units' overflow level.

# APPLICATIONS AND WATER QUALITY

## Design

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

## Structural Steel Support

The recommended method of support for Evapco coolers is two structural "I" beams located under the outer flanges and running the entire length of the unit. Mounting holes 19mm in diameter, are located in the bottom channels of the pan section to provide for bolting to the structural steel; refer to certified drawings from the factory for bolt hole locations.

Beams should be level before setting the unit in place. Do not level the unit by shimming between it and the "I" beams as this will not provide proper longitudinal support. Consult Evapco or Evapco's iES program for steel support drawings.

## 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 affect 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.eu](http://www.evapco.eu)

**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

It is recommended that Evapco or another qualified water treatment company be contacted to design a water treatment protocol specifically for equipment and location.

Closed circuit coolers reject heat by evaporating a portion of the water spray and discharging it as hot, saturated air. As the spray water evaporates, it leaves behind the mineral content and impurities of the supply water. If left untreated, these residuals become concentrated and lead to a buildup of scale, corrosion, and biological fouling.

### Bleed off

To avoid this build-up of residuals, closed circuit coolers are provided with a bleed valve which allows for a portion of the spray water to be continually drained from the unit. The bleed valve, which is located on the pump discharge, should be set to the "fully open" position so as to ensure a sufficient bleed rate. Another method to remove residuals is to use a conductivity controlled blowdown device. This method should also be considered for water savings. If the bleed is reduced, the unit should be checked periodically to ensure the chemistry of the spray water is within the recommended guidelines as noted in Evapco's Operation and Maintenance Instructions.

### Water Treatment

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

Whatever chemical treatment program is prescribed for the given conditions, it must be compatible with the unit's materials of construction, including the galvanized coil. If an acid is used to control pH, it should be accurately metered in dilute solution such that the spray water is held between a pH of 6,5 and 8,0. Batch feeding of chemicals is not recommended.

Units constructed of galvanized steel operating with circulating water having a pH of 8,3 or higher may require periodic passivation to prevent the formation of white rust. White rust is a corrosion byproduct of the protective zinc barrier and appears on the metal surface as white, waxy formations. If white rust forms and is left untreated, it may flake off and leave the bare metal substrate exposed.

### Control of Biological Contaminants

In addition to the above considerations, the water treatment program should include a biocide treatment to control contaminants such as algae, slime and legionella.

At initial start-up or after an extended shut down, the unit should be drained and thoroughly cleaned. The unit should then be refilled with fresh water and provided an initial shock-treatment of biocide. A regular biocide monitoring and treatment schedule should be maintained thereafter.

It is preferable that water treatment programs be implemented, monitored and maintained by an outfit experienced in the water treatment for cooling tower systems.



# ESWA

Notes:

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# SPECIFICATIONS

## FACTORY FABRICATED INDUCED DRAFT 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 have the capacity to cool \_\_\_\_\_ l/sec water / glycol from \_\_\_\_\_ °C to \_\_\_\_\_ °C with a \_\_\_\_\_ °C entering wet 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 two parts: the bottom basin section and the top section. The unit (top and bottom section) shall be joined together with elastic sealer and bolted together with corrosion resistant fasteners.

Approved manufacturer Evapco – model ESWA \_\_\_\_\_

### 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 Cooling Technology Institute (CTI).

Only models with performance certified by CTI will be approved.

Manufacturers performance guarantee without CTI certification for the proposed model or an independent field performance test shall not be accepted.

### Applicable Standards

CTI ATC 128 Test Code for Measurements of Sound from Water Cooling Towers  
CTI STD 201 Standard for Thermal Performance Certification of Evaporative Heat Rejection Equipment

### 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.

### ESWA Closed Circuit Cooler

#### Material of construction and corrosion resistance

- The structure and all steel elements of the pan and casing shall be constructed of Z 725 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 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.

#### Optional execution basin in SST 304 – Corrosion Resistance

- The structure and all steel elements of the Basin and Louver section up to the water level shall be made of SST 304.
- Alternatives with hot dip galvanized steel and epoxy coatings in lieu of the SST 304 are not considered to be equal and are not accepted.

- All other steel components of the casing shall be constructed of Z 725 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 stainless steel type 304.
- During fabrication all galvanized steel panel edges shall be coated with a 95 % pure zinc compound.
- Casing materials shall be of non flammable construction.

#### Optional execution - Complete unit in SST 304 – (except heat transfer coil)

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

### 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 SST 304.
- The entire pan area shall incorporate a sloped basin design to prevent sediment built up, biological film and standing water.
- The entire pan area shall be enclosed and protected from exposure to environmental elements by solid panels.
- The minimum distance between the heat exchange coil and the basin floor shall be 200 mm to allow easy cleaning.
- The basin bottoms shall be sloped and stepped to provide drainage of the complete basin section.
- The basin can be inspected, cleaned and completely flushed without the need to enter the unit.

### Air Inlet Louvers

- The air inlet louvers shall be constructed of UV inhibited polyvinyl chloride (PVC) and incorporate an interlocking design.
- The louvers shall have a minimum of two changes in air direction to prevent splash out and block direct sunlight to the circulating water and heat transfer system.
- The louvers will have a 19 mm opening to prevent debris to enter the basin.

### Heat Transfer Coil

- The closed circuit cooler shall use heat exchange coils of a tightly spaced elliptical tube design.
- The heat exchange coils shall be made of all prime surface, encased in a steel framework and hot dip galvanized after fabrication as a complete assembly.
- The heat exchange coils shall be air pressure tested under water.
- The design and manufacturing process shall be approved and in accordance with the "Pressure Equipment Directive " – PED 97 / 23 EC.
- The manufacturer shall be responsible for the manufacturing and performance testing of the entire heat exchange coil, this to assure single source responsibility.
- The coil assembly shall be totally enclosed and completely protected from sunlight exposure, environmental elements and debris.
- The sheltered enclosure shall eliminate natural drafts across the coil. Closed circuit coolers where the heat exchange coils can be subject to natural draft shall be equipped with discharge dampers.
- The heat exchanger shall use complete sensible cooling for minimum potential for scale build up.
- The pressure drop of the process fluid through the coil shall not exceed \_\_\_\_\_ kPa.

**Water Circulation Pump**

- 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.

**CLOSED CIRCUIT COOLER TOP SECTION**

**Heat Exchange Fill**

- a) The cooling tower fill shall be PVC (Polyvinyl Chloride) of cross fluted design for optimum heat transfer and efficiency.
- b) The cross fluted sheets shall be bonded together for maximum strength and durability. Fill packs which are not bonded are not allowed. The fill sheets will be bonded together in such a way that the structural integrity of the fill makes the fill useable as an internal working platform.
- c) The PVC fill shall be self extinguishing for fire resistance with a flame spread rating of 5 per ASTM E 84 - 81a.
- d) The fill shall be resistant to rot, decay or biological attack.
- e) The cooling tower manufacturer shall be responsible for the manufacturing and performance testing of the fill. This is to assure single source responsibility.
- f) The casing shall totally encase the complete fill section to protect the complete fill from direct atmosphere contact.
- g) The construction of the unit shall allow removal of the fill bundles for maintenance purposes.
- h) The fill shall be elevated a minimum of 600 mm above the coil to facilitate inspection.

**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 easily removable for cleaning purposes.
- d) The water shall be distributed by precision molded ABS spray nozzles with large 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 type 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 blades shall be spaced on 1 inch centers and 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.

**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 venture 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.

**Low Sound Axial Propeller Fan(s) (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.
- 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.

**Super Low Sound Axial 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.
- b) The bearings shall be rated for an L-10 life of 75000 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.

**(Models ESWA 72 , 96 and 142)**

- 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 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) A hinged protective cover shall shield the motor and sheave from the weather.
- g) The motor power supply shall be \_\_\_\_ Volts, \_\_\_\_Hertz and \_\_\_\_ phase.
- h) The maximum installed fan motor kW is \_\_\_\_

**Motor (Models ESWA 144 and 216)**

- 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 winding, shaft and

# SPECIFICATIONS

# ESWA

- bearings.
- c) The motor shall be minimum IP 55 degree of protection, Class F insulation, Service Factor 1 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) The motor base shall be able to swing to the outside of the unit for repair or removal.
- g) If the motor cannot be serviced externally, the manufacturer must include basin level platforms and elevated internal platforms for a safe access to the drive system.
- h) The motor power supply shall be \_\_\_\_ Volts, \_\_\_\_ Hertz and \_\_\_\_ phase.
- i) The maximum installed fan motor kW is \_\_\_\_

### 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.

Location	63	125	250	500	1000	2000	4000	8000	dB(A)
Fan discharge									
Air inlet /end									

### ACCESSORIES (Optional)

#### 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, when 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.

#### Three 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.
- i) The package consist of the following elements :
  - Multiple heavy duty stainless steel static sensors mounted in a stilling chamber outside the unit. Electrodes or sensors mounted inside the unit are not accepted as there 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 140 kPa and 340 kPa.

#### 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.

#### Service Platform

- a) The closed circuit cooler shall be supplied with an external service platform.
- b) The external service platform will be self supporting and include access ladders to the platform.
- c) The external service platform will be installed in front of the fan access doors.

#### 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 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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