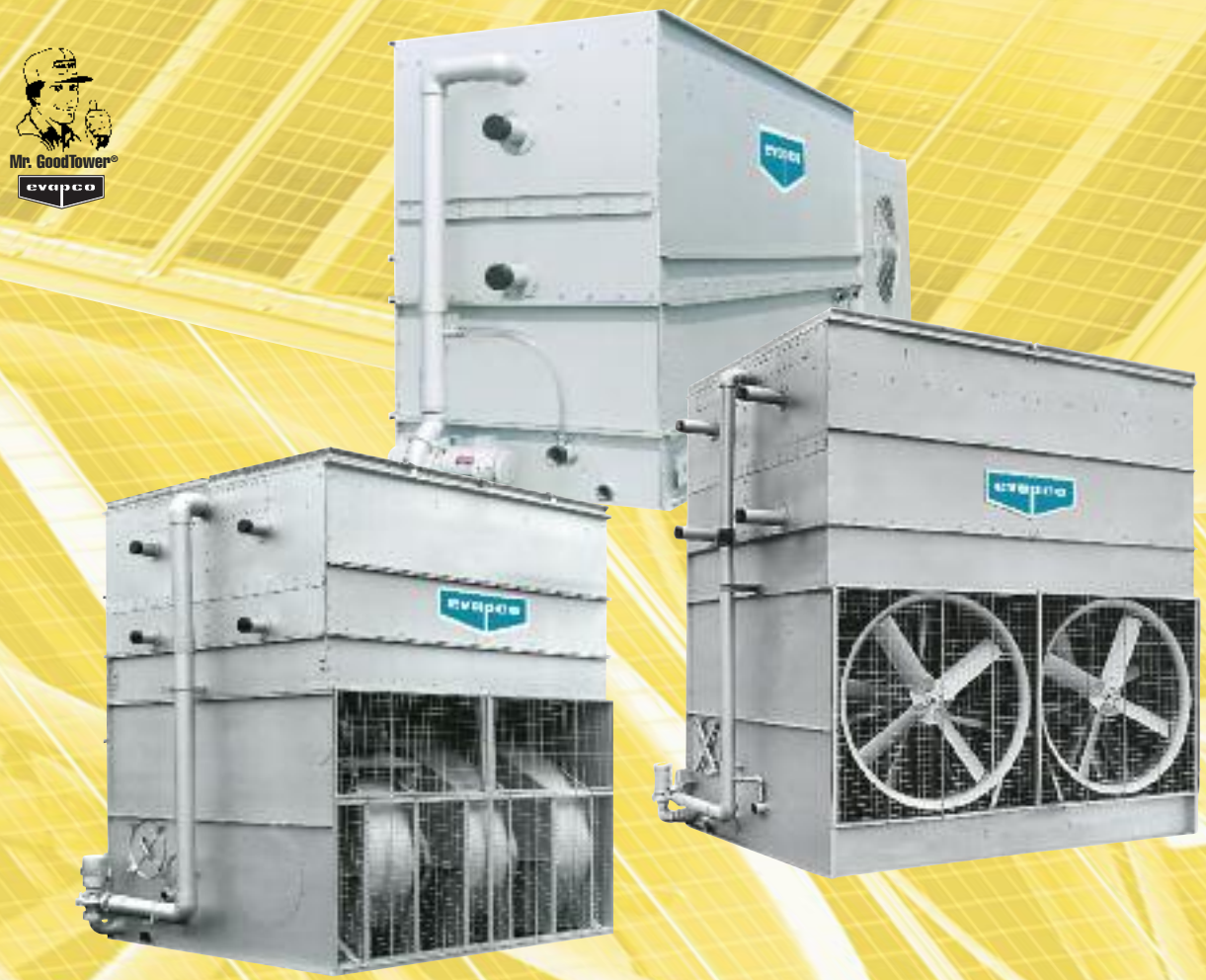
evapco® for LIFE

Bulletin 204-E Metric

LSWA/LRW/PMWA

Closed Circuit Coolers

Advanced Technology for the Future, Available Today



Mr. GoodTower®

Exclusive Thermal-Pak® Coil
Z-725 Galvanized Steel Construction
Totally Enclosed Fan and Pump Motors

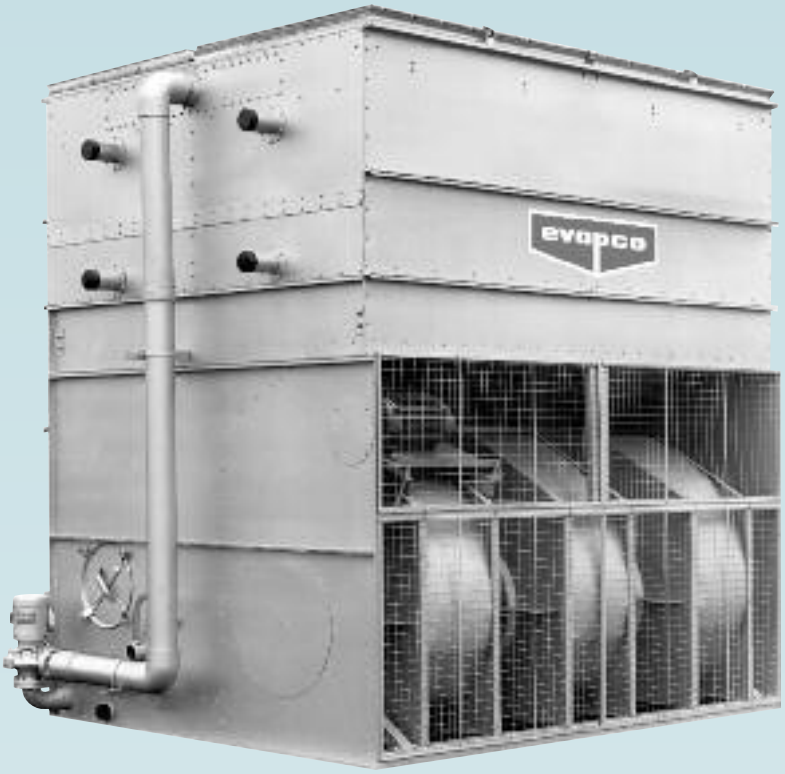
CERTIFIED EN ISO 9001

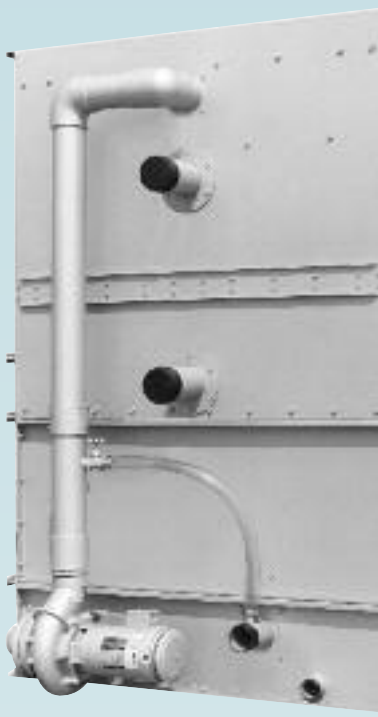
EVAPCO offers a variety of closed circuit coolers designs in

Each unit is a reflection of Evapco's commitment to excellence in engineering and manufacturing. An emphasis on research and development has resulted in many cooler innovations.

All Evapco coolers have the following features as standard:

- Patented* Thermal-Pak® Coil resulting in the maximum thermal performance available per plan area.
- Heavy Gauge Hot Dip Galvanized Steel construction assuring long operating life.
- Totally Enclosed Fan and Pump Motors.





LSWA Series

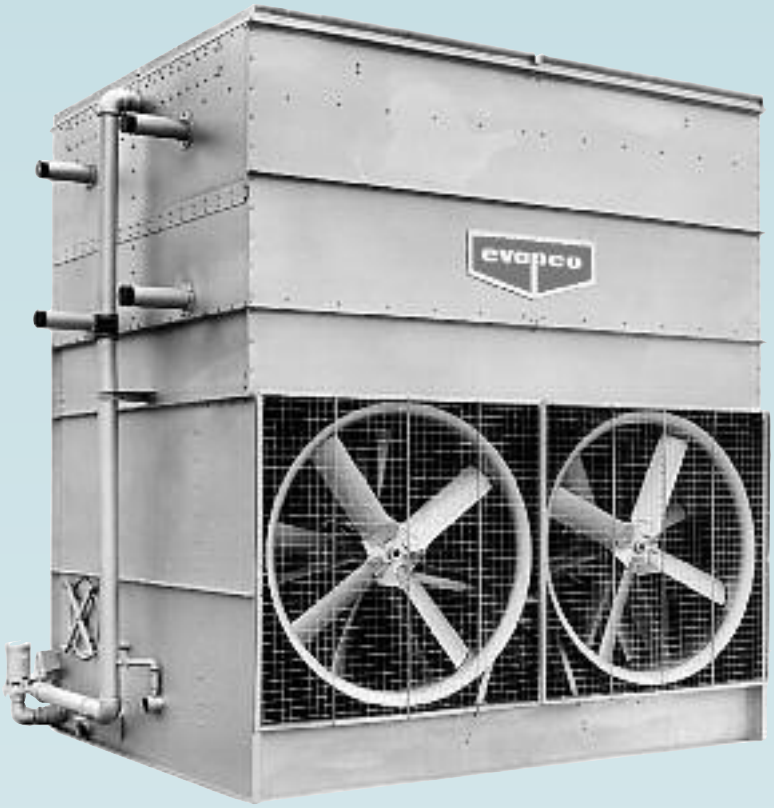
LSWA centrifugal fan forced draft coolers are recommended for a wide range of applications. LSWA models are very quiet and ideal for applications where noise is a concern. In addition, sound attenuation packages are available to further reduce the sound levels.
The centrifugal fans can also operate against the static pressure loss of ductwork and are suitable for indoor installations, or those with inlet or outlet ductwork. Very quiet operation.

LRW Series

LRW coolers are forced draft, centrifugal fan models designed specifically for applications requiring low height. Their compact, yet user-friendly design makes them ideal for smaller applications.

numerous sizes to accommodate almost any application.

- Stainless Steel Suction Strainers easily removed for periodic cleaning.
- Proven Performance, Industrial Design and Quality Construction for years of Dependable Service.
- Evapco's Commitment to 100% Customer Satisfaction.



LRW Design features include:

- Low Silhouette
- Low Maintenance
- Low Rigging Costs
- Low Sound

PMWA Series

PMWA Models are forced draft, with axial flow fans.
The effective axial flow fans can reduce power requirements by up to 50% over centrifugal fan models of similar capacity.
Low energy consumption.

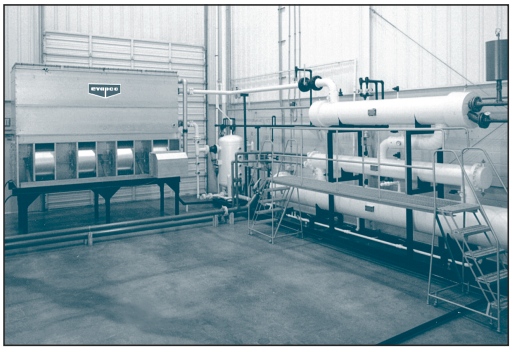
For other EVAPCO Cooler Models See:

ATW Series Induced Draft Counterflow Design

Owner Advantages

Since its founding in 1976, EVAPCO Inc. has become a world-wide leader in supplying quality equipment to the Industrial Refrigeration HVAC and Process Cooling Industries.

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



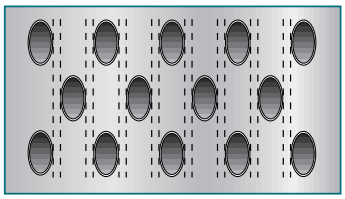
An emphasis on research and development has lead to many product innovations – a hallmark of EVAPCO through the years.

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

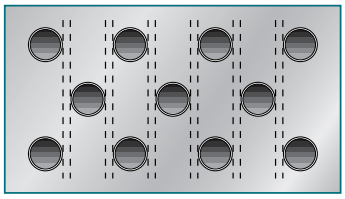
With 16 facilities in seven countries and over 160 sales offices in 42 countries world-wide, EVAPCO is ready to assist in all your evaporative cooling needs.

Patented Thermal-Pak® Coil

EVAPCO's patented Thermal-Pak® cooling coils feature a design which assures maximum cooling capacity. The airflow thru the coil is counterflow to the fluid flow, providing the most efficient heat transfer. This special coil design is utilized to reduce the air pressure drop through the unit while maximizing tube surface area and increasing its heat transfer capabilities. The uniquely shaped tubes of the coil are staggered in the direction of air flow to obtain a high film coefficient. In addition, all tubes are pitched in the direction of fluid flow to give good liquid drainage.



Thermal-Pak® Coil by EVAPCO



Round Tube Coil by Others

The coils are manufactured from high quality steel tubing following the most stringent quality control procedures. Each circuit is inspected to assure the material quality and then tested before being assemble into a coil. Finally, the assembled coil is air pressure tested under water in accordance with the "Pressure Equipment Directive" (PED) 97/23/EC.

To protect the coil against corrosion, it is placed in a heavy-duty steel frame and the entire assembly is dipped in molten zinc (hot dip galvanized) at a temperature of approximately 430°C).

Thermal-Pak® Coil

EVAPCOAT Corrosion Protection System: The Standard for Closed Circuit Coolers

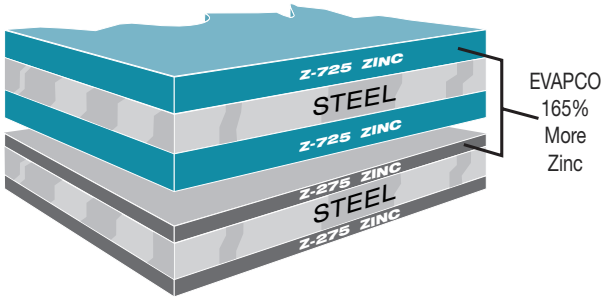
EVAPCO, long known for using premium materials of construction, has developed the ultimate system for corrosion protection in galvanized steel construction – the EVAPCOAT Corrosion Protection System. Marrying corrosion free materials with heavy gauge mill hot-dip galvanized steel construction to provide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

Z-725 Mill Hot-Dip Galvanized Steel Construction

Mill hot-dip galvanized steel has been successfully used for over 25 years for the protection of closed circuit cooler against corrosion. There are various grades of mill galvanized steel each with differing amounts of zinc protection. EVAPCO has been a leader in the industry in developing heavier galvanizing, and was the first to standardize on Z-725 mill hot-dip galvanized steel.

Z-725 designation means there is a minimum of 725 g of zinc per sqm of surface area as measured in a triple spot test. Z-725 is the heaviest level of galvanizing available for manufacturing closed circuit cooler and has a minimum of 165% more zinc protection than competitive designs using Z-275 steel.

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



Type 304 Stainless Steel Strainers

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

PVC Drift Eliminators

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

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

PVC Water Distribution System

Another important part of an closed circuit cooler is the water distribution system. In order to give the maximum heat transfer and minimize scaling, the coil must be drenched with water at all times. The EVAPCO system does this by circulating approximately 4 l/s over every square meter of coil surface area.

The water distribution system is greatly simplified in EVAPCO units, with the largest non-clog ZM water diffusers available for closed circuit coolers. The ZM diffusers are threaded into the water distribution header to ensure correct positioning. Also, a collar on the diffuser extends into the header and acts as an anti-sludge ring to reduce the need for maintenance. Excellent flooding of the coil is maintained at all times without numerous small orifice nozzles. For corrosion protection the ZM diffusers are made of heavy-duty, glass reinforced nylon for long life and 100% corrosion resistance. Distributor pipes are non-corrosive Polyvinyl Chloride (PVC).

ZM Spray Nozzle

Totally Enclosed Motors

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

Alternate Materials of Construction

For particularly corrosive environments, EVAPCO coolers are available with Type 304 Stainless Steel construction for basins and/or casings. Model LRW coolers are provided with type 304 stainless steel basins as standard equipment. Contact the factory for details on available options.

LSWA & LRW Design and Construction Features

The LSWA and LRW units are a result of EVAPCO's extensive experience in forced draft centrifugal fan designs. Both models are designed for easy maintenance and long, trouble free operation.

Efficient Drift Eliminators

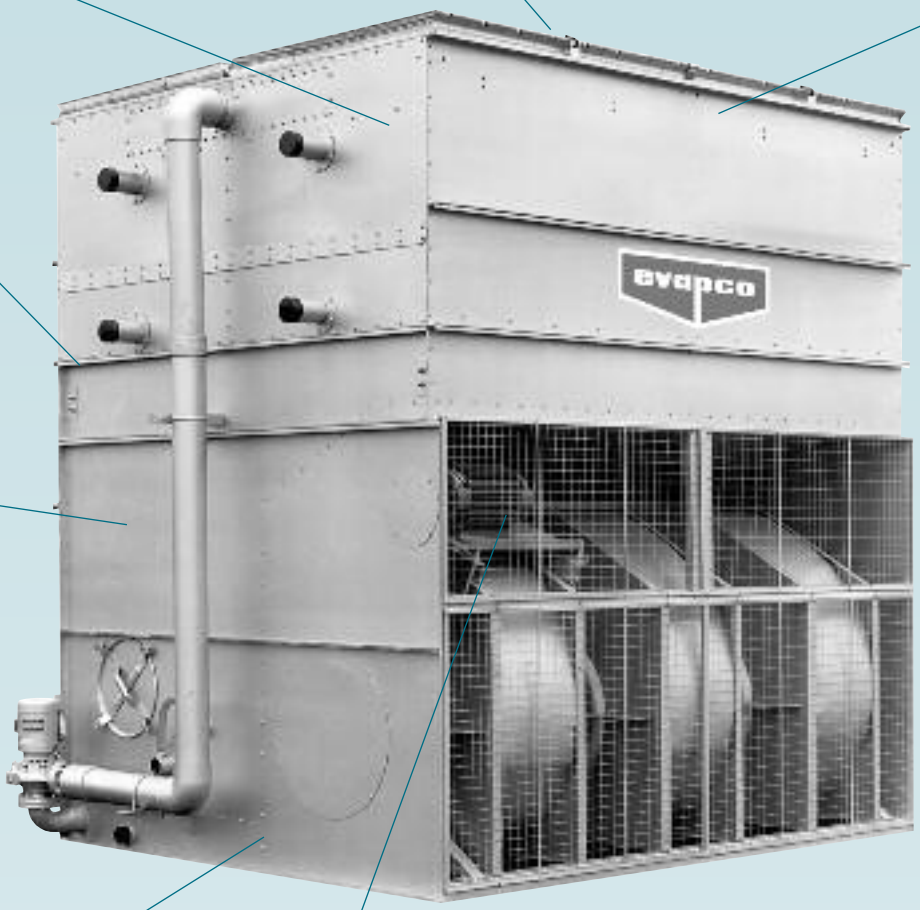
- Advanced design removes mist from leaving airstream.
- Corrosion resistant PVC for long life.

Exclusive Thermal-Pak® Coil

- Providing Maximum Efficiency per Plan Area

Double-Brake Flange Joints

- Stronger than single-brake designs by others.
- Minimizes water leaks at field joints.
- Greater structural integrity.

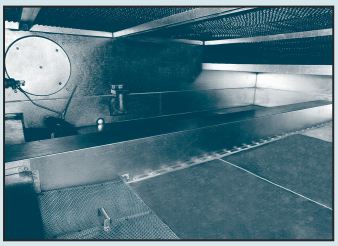


Z-725 Heavy Mill-Dip Galvanized Steel Construction

- (Stainless steel available as affordable option)

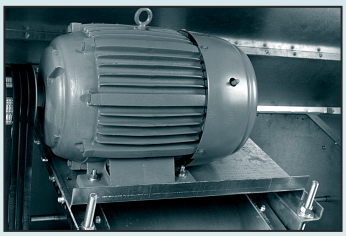
Totally Enclosed Pump Motors

- Long, trouble-free operation.



Stainless Steel Strainers

- Resists corrosion better than other materials.

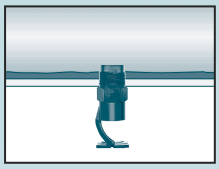


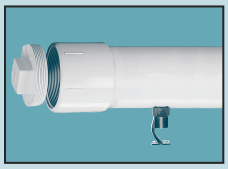
Totally Enclosed Fan Motors

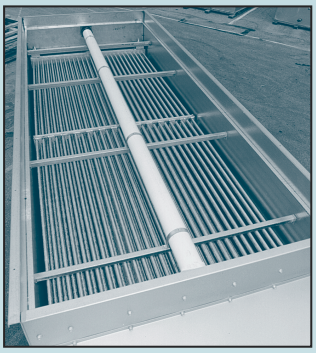
- Assures long life
- All normal maintenance can be performed quickly from outside the unit.
- If required, motor may be easily removed.

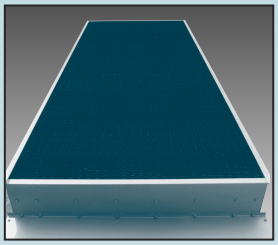
The superior design offers:

• Low Rigging Costs • Low Installed Costs
• Low Silhouette • Low Maintenance • Low Sound







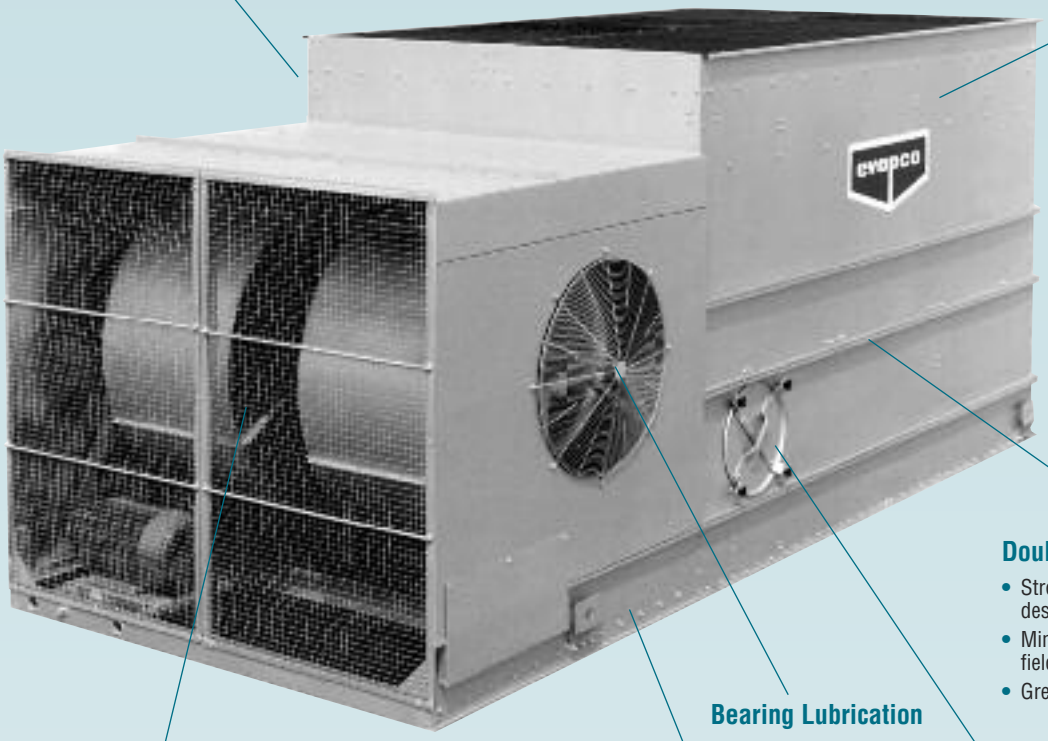


Efficient Drift Eliminators

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

PVC Spray Distribution Header with ZM Nozzles

- Nozzles are threaded to assure proper orientation.
- "Anti-Sludge Ring" reduces maintenance.
- Large orifice nozzles prevent clogging.
- Threaded end caps for ease of cleaning.



Z-725 Heavy Mill-Dip Galvanized Steel Construction

(Stainless steel available as affordable option)

Double-Brake Flange Joints

- Stronger than single-brake designs by others.
- Minimizes water leaks at field joints.
- Greater structural integrity.

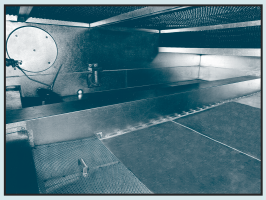
Bearing Lubrication

Easy to Service Motor Mount Design

- All normal maintenance can be performed quickly from outside the unit.
- If required, motor may be easily removed.
- Split fan housings allow removal of all mechanical equipment through the end of the unit.

Stainless Steel Basin

- Standard Construction
- Eliminates the need for unreliable epoxy coatings.



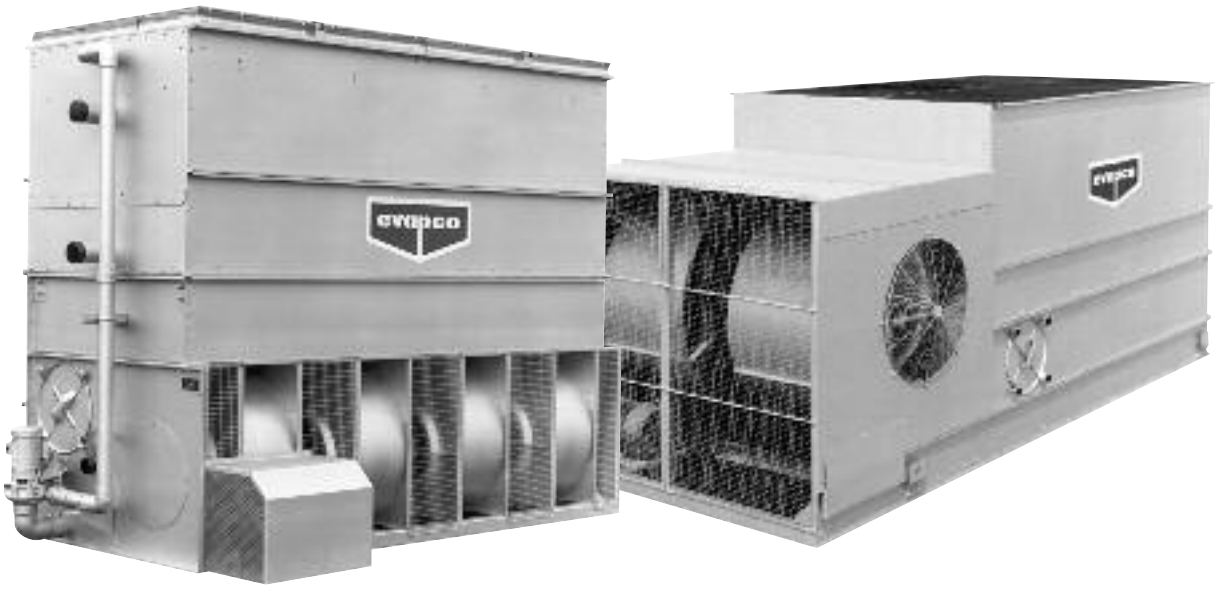
Stainless Steel Strainers

- Resists corrosion better than other materials.

Forced Draft Centrifugal Design Features LSWA & LRW Models

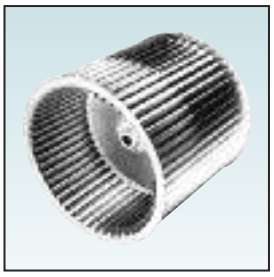
Application versatility

Centrifugal units are recommended for a wide range of installations. They are quiet, can easily be hidden, and the increase in fan motor kW over propeller fan units is generally not significant in the small size range. They are also excellent for larger installations where very quiet operation is a must, such as residential neighborhoods.
In addition, centrifugal fan units can operate against the static pressure loss of ductwork and are therefore ideal for indoor installations.



Centrifugal Fan Assembly

Fans on LSWA & LRW coolers are of the forward curved centrifugal design with hot-dip galvanized steel construction. All fans are statically and dynamically balanced and are mounted in a hot-dip galvanized steel housing designed and manufactured by EVAPCO.



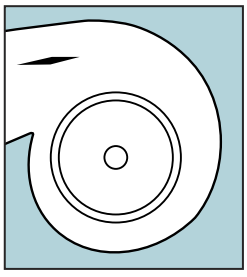
Centrifugal Fan

Very Quiet Operation

Centrifugal fan units operate at lower sound levels which make this design preferred for installations where noise is a concern. The sound they produce is primarily at high frequencies which is easily attenuated by building walls, windows, and natural barriers. Additionally, since the sound from the fans is directional, single sided air entry models can be turned away from critical areas avoiding a sound problem. When even quieter operation is necessary, centrifugal fan models can be equipped with optional sound attenuation packages. Consult the factory for details.

Capacity Control Dampers

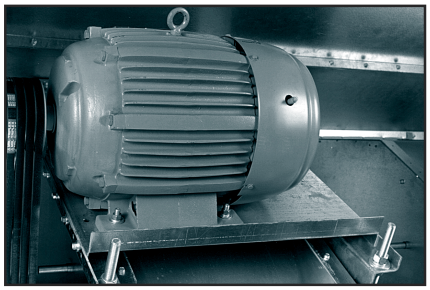
Capacity control dampers are an excellent way to match unit capacity to system requirements. This option consists of dampers mounted in the air stream which modulate the air flow through the unit. They may also be supplied with an electric control package.



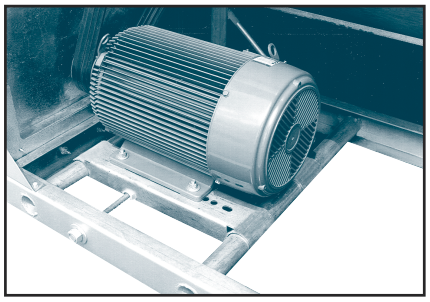
Fan Dampers

Fan Motor Mount

Fan motors are mounted in a convenient open area to make it easy to adjust belt tension, lubricate the motor, electrically connect it, or change the motor if necessary. The fan motor and drive are under a protective cover for safety and to protect them from the elements.



LSWA Fan Motor Mount

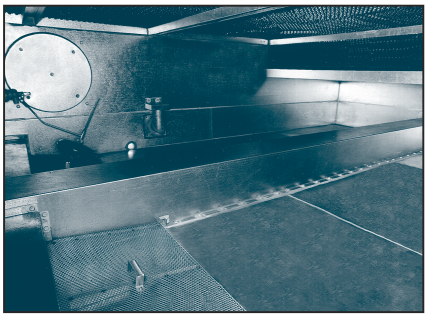


LRW Fan Motor Mount

Accessibility

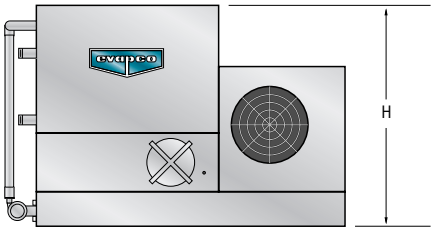
The basin/fan section of a centrifugal fan unit is designed for accessibility and ease of maintenance. Fan and drive components are positioned to allow easy adjustment and cleaning. All grease fittings are in convenient locations for periodic lubrication.

Large circular access doors are provided on each section to allow entry into the basin. All float valve and strainer assemblies are located near the door for easy adjustment and cleaning. The basin sump is designed to catch the dirt accumulated and can be flushed out simply with a hose. The basin strainers may be easily removed for periodic cleaning.



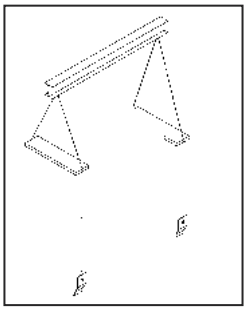
Reduced Height and Improved Maintenance Accessibilty

The LRW unit has been designed to satisfy installation requirements where height limits must be observed. The lower profile design of the LRW does not, however, sacrifice maintenance accessibilty for reduced height. Its unique casing design allows the water distribution system, cold water basin, fan section and other unit components to be easily maintained.
Small, light weight sections of the drift eliminators can be easily removed to access the water distribution system. Large circular access doors are located on both sides of the cold water basin to allow adjustment of the float assembly, removal of the stainless steel strainers and cleaning of the basin. The fan motor and drive system are located at one end of the unit and are completely accessible by removing the inlet screens. Although, routine maintenance can be performed from the exterior of the unit without removing the inlet screens



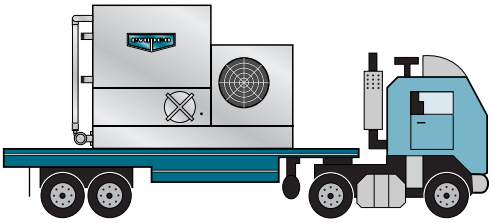
Low Installed Costs

The compact, unitary design of the LRW units allows them to be shipped completely assembled. This results in lower transportation costs and no assembly requirments at the job site. Note: Options such as sound attenuation and discharge hoods will require additional lifts and some minor assembly.



Transport of a Pre-Assembled Unit

The LRW ships fully assembled. This means lower transport costs and no further expenses at the job site for assembly. LRW units are ideal for truck-mounted applications for remote sites or temporary installations.



Forced Draft Axial Fan Design Features - PMWA Models

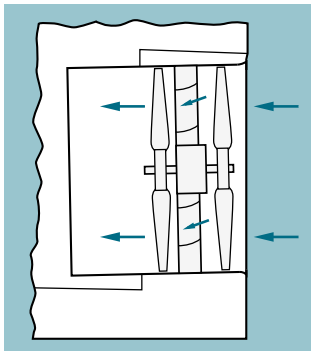
Energy Efficient for Lowest Operating Cost

Cut Operating kW up to 50%

The Power-Mizer models use effective axial flow fans which can reduce power requirements by up to 50%. This results in significant energy savings.

Vane Axial Fan Assembly

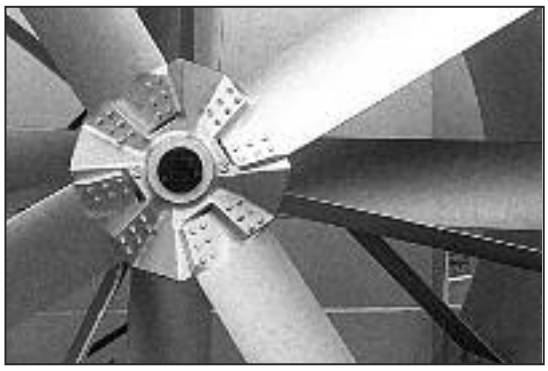
The PMWA models utilize two stage vane-axial fans for highly efficient operation. The fans are installed in a closely fitted cowl with a venturi inlet and advanced design guide vanes between stages, which help direct the flow and increase efficiency.



Two Stage Fan

Cast Aluminum Alloy Fans

The fans are heavy-duty cast aluminum alloy that are virtually corrosion free.



Vane-Axial Fan

PMWA Fan Motor Mount

EVAPCO's tandem TEFC motor mount assembly allows for two fans to be operated with one motor for semplicity. Routine maintenance is easily performed. If redundancy is a concern, individual fan motor drives are available as an option on PMWA models.

Tandem Fan Drive Motor Mount

Accessibility

The fan section is completely open and accessible at waist level where each part may be carefully checked by simply removing the safety screens.

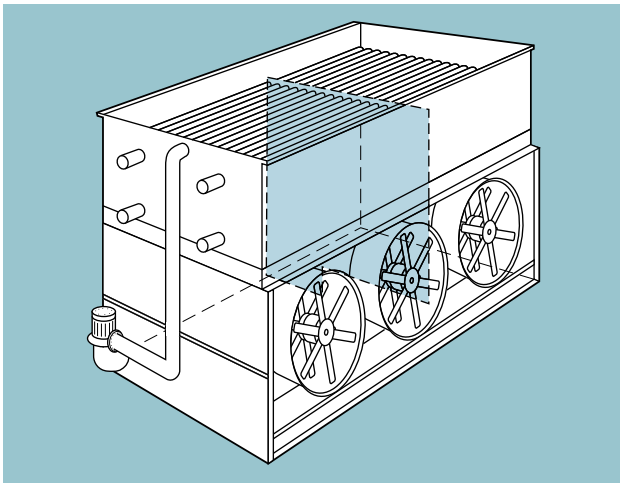
Bearing grease fittings are extended to the outside of the unit to ease of lubrication.

The basin is also open and easy to access for inspection or cleaning. There is a depressed sump area to catch the dirt accumulated and it may be easily flushed out with a hose through the access door on either end.

Vane-Axial Fan

Internal Baffles

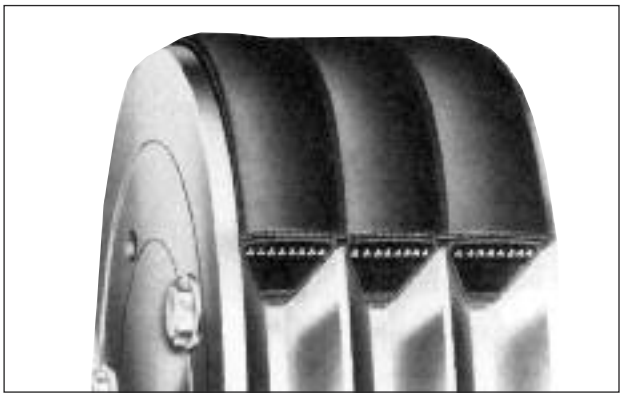
As a standard feature, all EVAPCO coolers with multiple motors are provided with an internal baffle system which extends from the pan bottom vertically through the coil bundle. This allows the user to cycle fan motors indipendently to match system load without the harmful effects of air by-pass.



Internal Baffles

Power-Band Drive

The Power-Band drive is a solid backed belt system that has a high lateral rigidity. This eliminates the problem of mismatched belts and prevents belts from jumping pulleys, a common problem with other designs.



Power-Band

Optional Equipment for Closed Circuit Coolers

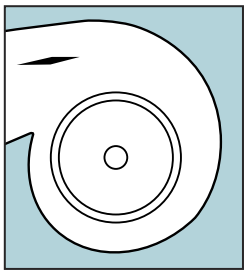
Two Speed Motors

Two speed fan motors can provide an excellent means of capacity control. In periods of lightened loads or reduced wet bulb temperatures, the fans can operate at low speed, which will provide about 60% of full speed capacity, yet consume only about 15% of the power compared with high speed. In addition to the energy savings, the sound levels of the units will be greatly reduced at low speed.

LSWA & LRW Models

Capacity Control Dampers & Pony Motors

In addition to two speed fan motors, variable frequency drives (VFD's) or cycling fan motor on multiple motor units, centrifugal fan coolers have two other types of capacity control options available to them: Pony motors and capacity control fan dampers.



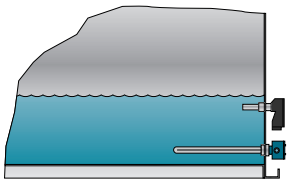
Fan Dampers

Pony motors utilize a smaller fan motor in conjunction with the primary motor for use in times of reduced loading. This pony motor is typically 1/4 the kW of the primary motor, and can significantly reduce energy requirements.

A feature of the centrifugal fan unit is the availability of capacity control dampers. These dampers are located directly in the fan housings and control water temperature over a modulating range of 3°C. When the dampers approach their closed position, an end switch shuts off the fan motor. Dampers are recommended where it is necessary to control temperature closely and there is a rapidly fluctuating load.

Basin Heater Package

If a remote sump configuration is not practical, electric basin heater packages are available to help prevent freeze-up of the basin water. The packages include electric heater elements with thermostat and low water cutoff. (See page 21 for heater size and application)



Electric Water Level Control

EVAPCO closed circuit coolers are available with an optional electric water level control system in place of the standard mechanical makeup valve and float assembly. This package provides very accurate control of the pan water level and does not require field adjustment, even under widely variable operating conditions.

The control was designed by EVAPCO and consists of multiple heavy duty stainless steel electrodes. These electrodes are mounted external to the unit.

The weather protected slow closing solenoid valve for the makeup water connection is factory supplied and is ready for piping to a water supply with a pressure between 140 kPa (minimum) and 340 kPa (maximum).

Extended Surface Coil

Closed Circuit Coolers can be provided with spiral fins on the heat exchanger coil to increase the dry performance of the unit. Dry performance is accomplished by rejecting heat to the atmosphere without the use of the spray pump and the cooling process. Dry operation can be practical in cold climates and/or when reduced winter loads exist. The number of fins per inch and and quantity of rows finned can be varied to obtain different dry performances. Dry operation often requires the next larger size fan motor. Consult the factory for sizing.

Solid Bottom Panels for Ductwork

When centrifugal fan units are installed indoors and intake air is ducted to the unit, a solid bottom panel is required to completely enclose the fan section and prevent the unit from drawing room air into the fan intakes. When this is ordered, air inlet screens are omitted and the fan bearings are provided with extended lubrication fittings to facilitate maintenance from outside the duct.

Access Ladders

Access ladders are available to provide access for water distribution system inspection and maintanance.

Stainless Steel Basin *(Option)*

LSWA and PMWA coolers are available with an inexpensive all stainless steel basin section. This provides superior corrosion resistance over other materials of construction. (Standard on all LRW models)

Optional Equipment for Sound Reduction

LSWA & LRW Models

Sound Attenuation Packages

The centrifugal fan design of the LSWA and LRW models operate at lower sound level which make these units preferred for installations where noise is a concern. The sound they produce is primarily at high frequencies which is easily attenuated by building walls, windows and natural barriers. For extremely noise sensitive applications, the LSWA and LRWcentrifugal fan models may be supplied with various stages of intake and/or discharge attenuation packages which greatly reduce sound levels.
The sound attenuation options can be provided in stages to provide varying degrees of attenuation while economically matching the project sound requirements.
Oversize fan motors are required for many of these options in order to overcome the additional static pressure. Consult the factory for Certified Sound Data for each sound attenuation option.

Fan Side Inlet Attenuation *(LRW only)*

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

Fan End Inlet Attenuation *(LSWA and LRW)*

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

Discharge Attenuation *(LSWA and LRW)*

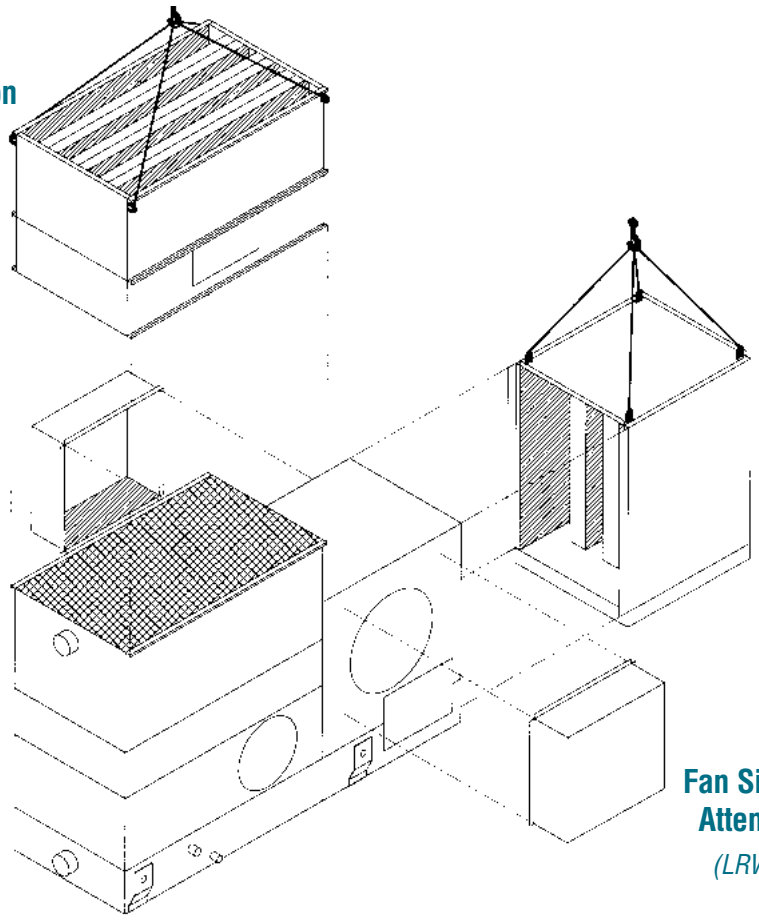
The discharge attenuation hood features a straight sided design with insulated baffles to reduce the overall sound levels of the discharge air. The discharge attenuation incorporates a large access panel to allow entry to the drift eliminators and water distribution system. If a higher discharge velocity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

PMWA Models

Wide Blade Fans

Wide blade fans are available for PMWA forced draft units. The cast aluminum fans operate at lower tip speeds to significantly reduce sound levels.

Discharge Attenuation
(LSWA and LRW)

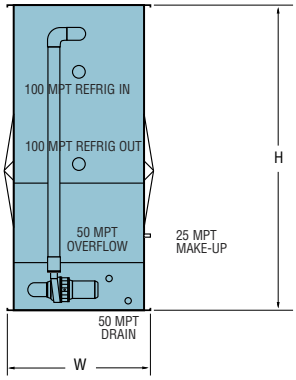


Fan End Inlet Attenuation
(LSWA and LRW)

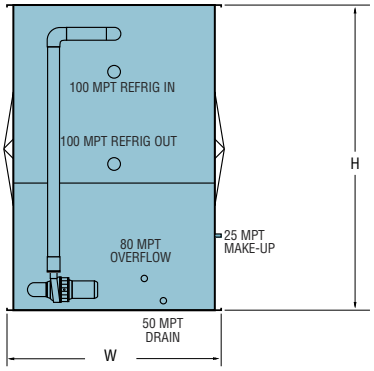
Fan Side Inlet Attenuation
(LRW only)

Engineering Dimensions & Data

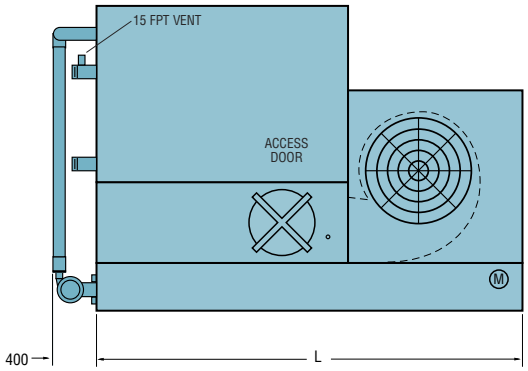
Low Silhouette Evaporative Closed Circuit Cooler



LRW 18



LRW 30 thru 60



LRW 18 thru 60

NOTE: All piping connections are nominal bore sizes in mm.
The number of coil connections doubles when the flow rate exceeds 28 l/s on Models LRW 18 thru LRW 60.

TABLE 1 Engineering Data

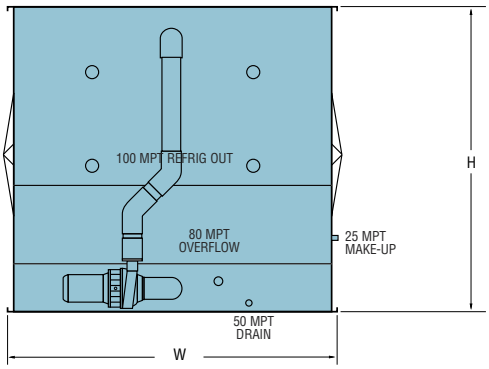
UNIT NO.		WEIGHTS (kg)		FANS			SPRAY PUMP		REMOTE SUMP		Coil Volume Liters	DIMENSIONS (mm)		
		Shipping	Operating	No	kW*	m3/s	kW	l/s	Liters Req'd**	Conn. Size		Height H	Length L	Widht W
LRW	18-2E	1050	1615	1	1,5	3,9	0,37	6,3	303	100	125	2026	3083	1029
	18-2F	1050	1620	1	2,2	4,5	0,37	6,3	303	100	125	2026	3083	1029
	18-2G	1060	1625	1	4	5,3	0,37	6,3	303	100	125	2026	3083	1029
	18-3F	1205	1825	1	2,2	4,4	0,37	6,3	303	100	186	2026	3083	1029
	18-3G	1210	1830	1	4	5,2	0,37	6,3	303	100	186	2026	3083	1029
	18-4F	1365	2030	1	2,2	4,3	0,37	6,3	303	100	246	2216	3083	1029
	18-4G	1370	2030	1	4	5,1	0,37	6,3	303	100	246	2216	3083	1029
	18-5G	1540	2260	1	4	5	0,37	6,3	303	100	307	2407	3083	1029
	18-5H	1565	2275	1	5,5	5,8	0,37	6,3	303	100	307	2407	3083	1029
LRW	30-2G	1605	2590	1	4	7,7	0,75	10	455	150	197	2026	3731	1540
	30-2H	1625	2610	1	5,5	8,8	0,75	10	455	150	197	2026	3731	1540
	30-3G	1835	2895	1	4	7,6	0,75	10	455	150	295	2026	3731	1540
	30-3H	1875	2930	1	5,5	8,7	0,75	10	455	150	295	2026	3731	1540
	30-4H	2095	3235	1	5,5	8,5	0,75	10	455	150	394	2216	3731	1540
	30-5H	2365	3585	1	5,5	8,3	0,75	10	455	150	492	2407	3731	1540
LRW	45-3I	2400	3975	1	7,5	11,7	1,1	16	643	150	443	2026	4636	1540
	45-3J	2450	4025	1	11	13,3	1,1	16	643	150	443	2026	4636	1540
	45-4J	2820	4520	1	11	13,1	1,1	16	643	150	591	2216	4636	1540
	45-5J	3215	5035	1	11	12,8	1,1	16	643	150	738	2407	4636	1540
	45-6J	3555	5500	1	11	12,6	1,1	16	643	150	886	2597	4636	1540
LRW	60-3K	2960	5095	1	15	16,5	1,5	21,8	908	200	594	2051	5553	1540
	60-3L	2965	5100	1	18,5	17,7	1,5	21,8	908	200	594	2051	5553	1540
	60-4K	3465	5770	1	15	16,2	1,5	21,8	908	200	791	2242	5553	1540
	60-4L	3470	5775	1	18,5	17,4	1,5	21,8	908	200	791	2242	5553	1540
	60-5L	3965	6430	1	18,5	17	1,5	21,8	908	200	988	2432	5553	1540
	60-5M	3975	6440	1	22	17,1	1,5	21,8	908	200	988	2432	5553	1540
	60-6M	4430	7070	1	22	17,7	1,5	21,8	908	200	1185	2623	5553	1540

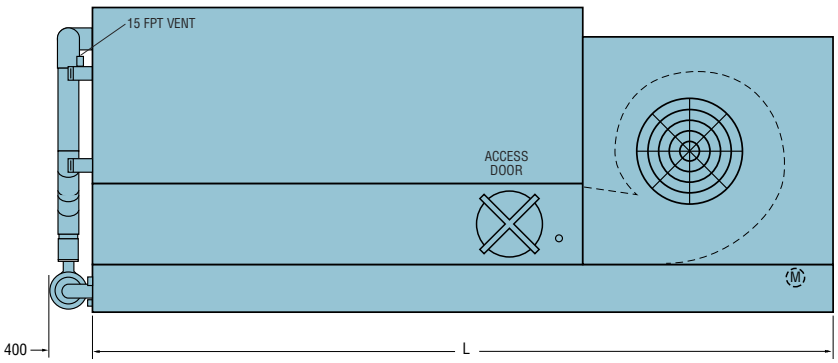
* For dry operation or for external static pressure up to 125 Pa., use next larger size fan motor.
** Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300 mm would normally be sufficient).
Dimensions are subject to change. Do not use for pre-fabrication.

Unit Selections
Selections for all Closed Circuit Coolers can be made by using EVAPCO's IES computer selection software. IES provides quick and accurate selections at the click of a button. In addition to selections, the program displays unit drawings, coil pressure drop and dimensional and shipping information.
Please contact your local sales representative or visit the EVAPCO Europe web site.

Engineering Dimensions & Data

Low Silhouette Evaporative Closed Circuit Cooler





LRW 72 thru 96

LRW 72 thru 96

NOTE: All piping connections are nominal bore sizes in mm.
The number of coil connections doubles when the flow rate exceeds 56 l/s on Models LRW 72 thru LRW 96.

TABLE 2 Engineering Data

UNIT NO.		WEIGHTS (kg)		FANS			SPRAY PUMP		REMOTE SUMP		Coil Volume Liters	DIMENSIONS (mm)		
		Shipping	Operating	No	kW*	m3/s	kW	l/s	Liters Req'd**	Conn. Size		Height H	Length L	Widht W
LRW	72-3K	3680	6240	2	15	19,7	1,5	25,6	946	200	621	2121	4629	2388
	72-3L	3685	6245	2	18,5	21,2	1,5	25,6	946	200	621	2121	4629	2388
	72-4K	4230	6965	2	15	19,3	1,5	25,6	946	200	810	2311	4629	2388
	72-4L	4235	7170	2	18,5	20,8	1,5	25,6	946	200	810	2311	4629	2388
	72-5L	4925	8050	2	18,5	20,4	1,5	25,6	946	200	1007	2502	4629	2388
LRW	96-4L	5110	8850	2	18,5	24,3	2,2	34,4	1363	250	1083	2311	5553	2388
	96-4M	5125	8860	2	22	25,9	2,2	34,4	1363	250	1083	2311	5553	2388
	96-4N	5265	9000	2	30	28,5	2,2	34,4	1363	250	1083	2311	5553	2388
	96-5M	5875	9855	2	22	25,3	2,2	34,4	1363	250	1340	2502	5553	2388
	96-5N	6010	9990	2	30	27,9	2,2	34,4	1363	250	1340	2502	5553	2388
	96-6N	6715	10945	2	30	27,3	2,2	34,4	1363	250	1605	2692	5553	2388

* For dry operation or for external static pressure up to 125 Pa., use next larger size fan motor.
** 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 (300 mm would normally be sufficient).
Dimensions are subject to change. Do not use for pre-fabrication.

Engineering Dimensions & Data

Centrifugal Fan Models LSWA 20AA to 20C, LSWA 30A to 30C, LSWA 41A to 41C, LSWA 58A to 58D, LSWA 87A to 87D

▲ NOTE: Coil connection(s) and other unit dimensions may vary to match application requirements and/or shipping regulations. Consult the EVAPCO plant or certified drawings for detailed information.

* LSWA 20AA thru 30C = 384
LSWA 41A thru 41C = 486

NOTE: All piping connections are nominal bore sizes in mm.
The number of coil connections double when flow rate exceeds 28 l/s

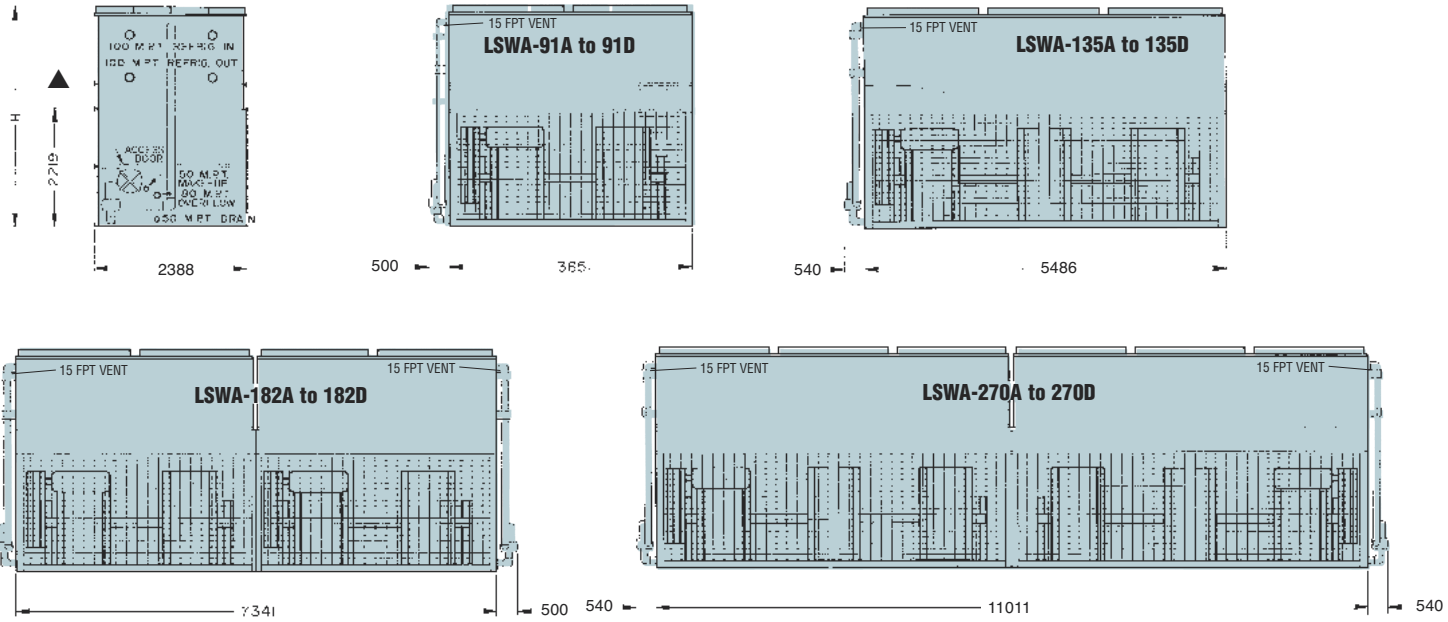
TABLE 3 Engineering Data

UNIT N°	WEIGHTS (kg)			FANS		SPRAY PUMP		REMOTE SUMP		Coil Volume Liters	DIMENSIONS (mm)	
	Shipping	Operating	Heaviest section†	kW*	m³/s	kW	l/s	Liters Req'd**	Conn. Size		Height	Length
LSWA- 20AA	1020	1500	1020††	4,0	5,7	0,55	7,6	303	100	155	2048	1826
20A	1210	1740	1210††	4,0	5,6	0,55	7,6	303	100	223	2238	1826
20B	1375	1955	925	4,0	5,5	0,55	7,6	303	100	291	2429	1826
20C	1575	2210	1100	5,5	6,2	0,55	7,6	303	100	360	2619	1826
LSWA- 30A	1745	2545	1745††	5,5	8,4	0,75	11,4	454	150	314	2238	2724
30B	2020	2895	1360	7,5	9,1	0,75	11,4	454	150	413	2429	2724
30C	2290	3250	1630	7,5	8,9	0,75	11,4	454	150	511	2619	2724
LSWA- 41A	2230	3345	2230††	7,5	11,2	1,1	15,5	643	150	416	2238	3645
41B	2615	3835	1795	11,0	12,3	1,1	15,5	643	150	556	2429	3645
41C	2970	4300	2155	11,0	12,4	1,1	15,5	643	150	696	2619	3645
LSWA- 58A	3105	4540	1980	11,0	18,3	1,5	21,8	870	200	594	2763	3645
58B	3610	5205	2480	11,0	17,9	1,5	21,8	870	200	791	2979	3645
58C	4130	5875	2985	15,0	17,5	1,5	21,8	870	200	988	3194	3645
58D	4630	6535	3495	15,0	17,1	1,5	21,8	870	200	1185	3410	3645
LSWA- 87A	4750	6695	3035	15,0	24,8	2,2	32,5	1285	200	886	2763	5490
87B	5335	7005	3780	18,5	26,2	2,2	32,5	1285	200	1181	2979	5490
87C	6290	8700	4530	18,5	25,4	2,2	32,5	1285	200	1476	3194	5490
87D	7070	9715	5290	22,0	24,9	2,2	32,5	1285	200	1771	3410	5490

† Heaviest section is the coil section.
†† Model normally ships in one piece.
* For external static pressure up to 125 Pa., use next larger size fan motor.
** 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 (300 mm would normally be sufficient).
Dimensions are subject to change. Do not use for pre-fabrication.

Engineering Dimensions & Data

Centrifugal Fan Models
LSWA 91A to 91D, LSWA 135A to 135D,
LSWA 182A to 182D, LSWA 270A to 270D



▲ NOTE: Coil connection(s) and other unit dimensions may vary to match application requirements and/or shipping regulations. Consult the EVAPCO plant or certified drawings for detailed information.

NOTE: All piping connections are nominal bore sizes in mm. The number of coil connections doubles when flow rate exceeds 56 l/s on Models 91A thru 135D and 112 l/s on Models 182A thru 270D.

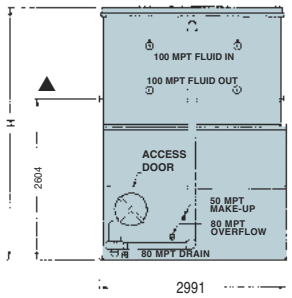
TABLE 4 Engineering Data

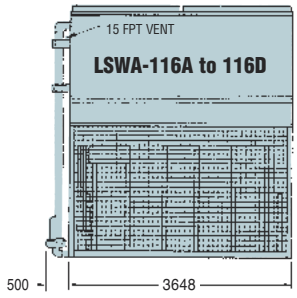
UNIT N°	WEIGHTS (kg)			FANS		SPRAY PUMP		REMOTE SUMP		Coil Volume Liters	DIMENSIONS (mm)	
	Shipping	Operating	Heaviest section†	kW*	m³/s	kW	l/s	Liters Req'd**	Conn. Size		Height	Length
LSWA- 91A	4840	7460	3195	18,5	24,7	4,0	36,0	1361	250	816	3359	3651
91B	5660	8575	3980	22,0	25,7	4,0	36,0	1361	250	1081	3549	3651
91C	6480	9675	4460	30,0	27,7	4,0	36,0	1361	250	1338	3740	3651
91D	7265	10750	5545	30,0	27,2	4,0	36,0	1361	250	1603	3930	3651
LSWA- 135A	7025	10935	4680	30,0	37,7	5,5	53,0	2003	300	1217	3359	5486
135B	8225	12570	5880	30,0	37,0	5,5	53,0	2003	300	1610	3549	5486
135C	9400	14175	7025	37,0	39,0	5,5	53,0	2003	300	1827	3740	5486
135D	10575	15780	8200	37,0	38,2	5,5	53,0	2003	300	2397	3930	5486
LSWA- 182A	9680	14920	3195	(2) 18,5	49,3	(2) 4,0	72,0	2722	250	1633	3359	7341
182B	11320	17150	3980	(2) 22,0	51,4	(2) 4,0	72,0	2722	250	2162	3549	7341
182C	12960	19350	4460	(2) 30,0	55,2	(2) 4,0	72,0	2722	250	2676	3740	7341
182D	14530	21500	5545	(2) 30,0	54,3	(2) 4,0	72,0	2722	250	3205	3930	7341
LSWA- 270A	14050	21870	4680	(2) 30,0	75,5	(2) 5,5	106,0	4007	300	2434	3359	11011
270B	16450	25140	5880	(2) 30,0	74,0	(2) 5,5	106,0	4007	300	3221	3549	11011
270C	18800	28350	7025	(2) 37,0	78,1	(2) 5,5	106,0	4007	300	4007	3740	11011
270D	21150	31560	8200	(2) 37,0	76,5	(2) 5,5	106,0	4007	300	4793	3930	11011

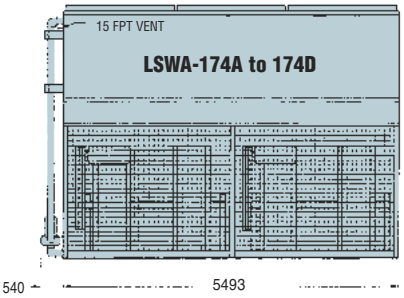
† Heaviest section is the coil section.
* For external static pressure up to 125 Pa., use next larger size fan motor.
** Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300 mm would normally be sufficient).
Dimensions are subject to change. Do not use for pre-fabrication.

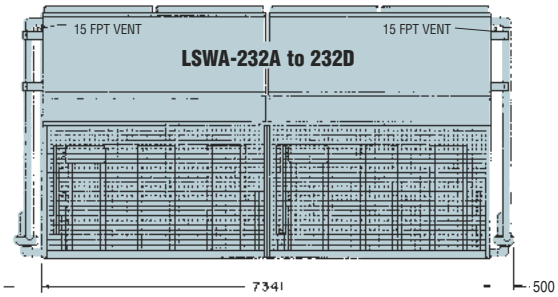
Engineering Dimensions & Data

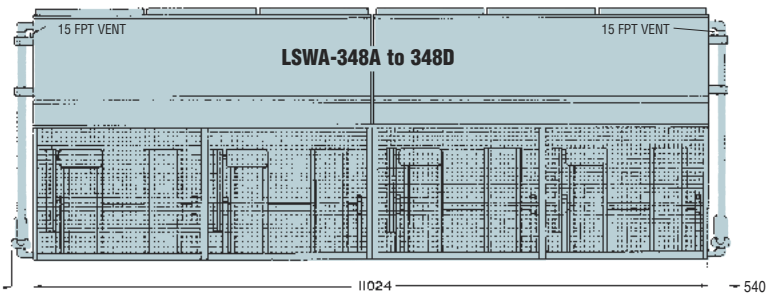
Centrifugal Fan Models LSWA 116A to 116D, LSWA 174A to 174D, LSWA 232A to 232D, LSWA 348A to 348D











▲ NOTE: Coil connection(s) and other unit dimensions may vary to match application requirements and/or shipping regulations. Consult the EVAPCO plant or certified drawings for detailed information.

NOTE: All piping connections are nominal bore sizes in mm.
The number of coil connections doubles when flow rate exceeds 56 l/s on Models 116A thru 174D and 112 l/s on Models 232A thru 348D.

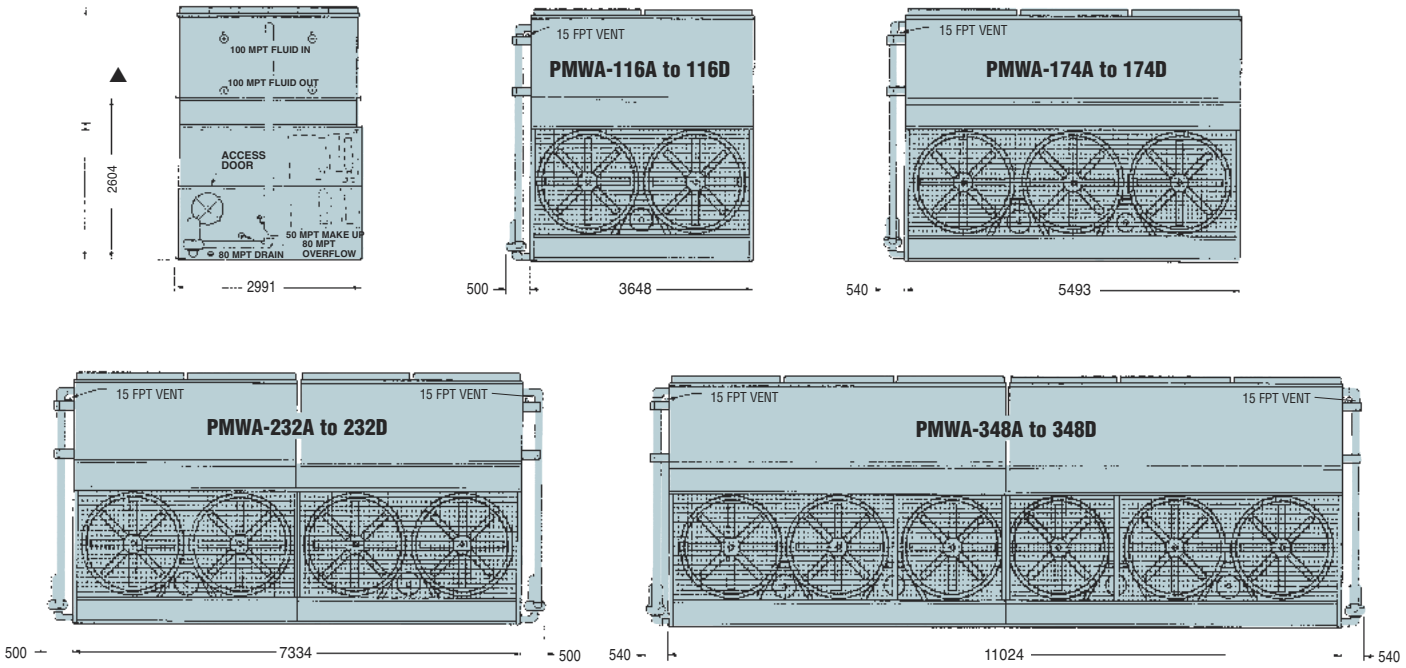
TABLE 5 Engineering Data

UNIT N°	WEIGHTS (kg)			FANS		SPRAY PUMP		REMOTE SUMP		Coil Volume Liters	DIMENSIONS (mm)	
	Shipping	Operating	Heaviest section†	kW*	m³/s	kW	l/s	Liters Req'd**	Conn. Size		Height	Length
LSWA- 116A	6255	9760	3870	30,0	35,8	4,0	43,2	1550	250	1188	3816	3648
116B	7255	11145	4870	30,0	35,1	4,0	43,2	1550	250	1582	4032	3648
116C	8260	12525	5870	30,0	34,1	4,0	43,2	1550	250	1976	4248	3648
116D	9260	13905	6870	30,0	33,4	4,0	43,2	1550	250	2369	4464	3648
LSWA- 174A	9240	14370	5615	(2) 18,5	50,6	5,5	65,0	2270	300	1771	3816	5493
174B	10770	16450	7030	(2) 22,0	53,0	5,5	65,0	2270	300	2362	4032	5493
174C	12265	18515	8475	(2) 22,0	49,2	5,5	65,0	2270	300	2952	4248	5493
174D	13765	20585	9920	(2) 22,0	47,7	5,5	65,0	2270	300	3542	4464	5493
LSWA- 232A	12510	19520	3870	(2) 30,0	71,6	(2) 4,0	86,4	3100	300	2376	3816	7334
232B	14510	22290	4870	(2) 30,0	70,2	(2) 4,0	86,4	3100	300	3164	4032	7334
232C	16520	25050	5870	(2) 30,0	68,2	(2) 4,0	86,4	3100	300	3952	4248	7334
232D	18520	27810	6870	(2) 30,0	66,8	(2) 4,0	86,4	3100	300	4738	4464	7334
LSWA- 348A	18480	28740	5615	(4) 18,5	101,2	(2) 5,5	130,0	5680	350	3542	3816	11024
348B	21540	32900	7030	(4) 22,0	106,0	(2) 5,5	130,0	5680	350	4724	4032	11024
348C	24530	37030	8475	(4) 22,0	98,4	(2) 5,5	130,0	5680	350	5904	4248	11024
348D	27530	41170	9920	(4) 22,0	95,4	(2) 5,5	130,0	5680	350	7084	4464	11024

† Heaviest section is the coil section.
* For external static pressure up to 125 Pa., use next larger size fan motor.
** 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 (300 mm would normally be sufficient).
Dimensions are subject to change. Do not use for pre-fabrication.

Engineering Dimensions & Data

Centrifugal Fan Models
PMWA 116A to 116D, PMWA 174A to 174D,
PMWA 232A to 232D, PMWA 348A to 348D



▲ NOTE: Coil connection(s) and other unit dimensions may vary to match application requirements and/or shipping regulations. Consult the EVAPCO plant or certified drawings for detailed information.

NOTE: All piping connections are nominal bore sizes in mm.
The number of coil connections doubles when flow rate exceeds 56 l/s on Models 116A thru 174D and 112 l/s on Models 232A thru 348D.

TABLE 6 Engineering Data

UNIT N°	WEIGHTS (kg)			FANS		SPRAY PUMP		REMOTE SUMP		Coil Volume Liters	DIMENSIONS (mm)	
	Shipping	Operating	Heaviest section†	kW*	m³/s	kW	l/s	Liters Req'd**	Conn Size		Height	Length
PMWA- 116A	5820	9210	3870	15,0	34,4	4,0	43,2	1590	250	1188	3817	3648
116B	6820	10585	4870	15,0	33,4	4,0	43,2	1590	250	1582	4032	3648
116C	7820	11965	5870	15,0	32,4	4,0	43,2	1590	250	1976	4248	3648
116D	8875	13400	6870	18,5	33,8	4,0	43,2	1590	250	2369	4464	3648
PMWA- 174A	8725	13690	5615	15,0 & 7,5	51,7	5,5	65,0	2350	300	1771	3816	5493
174B	10195	15710	7030	15,0 & 7,5	50,2	5,5	65,0	2350	300	2362	4032	5493
174C	11700	17775	8475	15,0 & 7,5	48,7	5,5	65,0	2350	300	2952	4248	5493
174D	13765	20585	9920	18,5 & 11,0	50,8	5,5	65,0	2350	300	3542	4464	5493
PMWA- 232A	11640	18420	3870	(2) 15,0	68,8	(2) 4,0	86,4	3215	300	2376	3816	7334
232B	13640	21170	4870	(2) 15,0	66,8	(2) 4,0	86,4	3215	300	3164	4032	7334
232C	15640	23930	5870	(2) 15,0	64,9	(2) 4,0	86,4	3215	300	3952	4248	7334
232D	17750	26800	6870	(2) 18,5	67,7	(2) 4,0	86,4	3215	300	4738	4464	7334
PMWA- 348A	17450	27380	5615	(2) 15,0 & (2) 7,5	103,5	(2) 5,5	130,0	6130	350	3542	3816	11024
348B	20390	31420	7030	(2) 15,0 & (2) 7,5	100,4	(2) 5,5	130,0	6130	350	4724	4032	11024
348C	23400	35550	8475	(2) 15,0 & (2) 7,5	97,4	(2) 5,5	130,0	6130	350	5904	4248	11024
348D	26530	41170	9920	(2) 18,5 & (2) 11,0	101,7	(2) 5,5	130,0	6130	350	7084	4464	11024

† Heaviest section is the coil section.
* 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 (300 mm would normally be sufficient).

Dimensions are subject to change. Do not use for pre-fabrication.

Application

Design

Evapco units are heavy-duty construction and designed for long trouble-free operation. Proper equipment selection, installation and maintenance is, however, necessary to ensure good unit performance. Some of the major considerations in the application of a closed circuit cooler are presented below. For additional information, contact the factory.

Air Circulation

In reviewing the system design and unit location, it is important that proper air circulation be provided. The best location is on an unobstructed roof top or on ground level away from walls and other barriers. Care must be taken when locating coolers in wells or enclosures or next to high walls. The potential for recirculation of hot, moist discharge air back into the fan intake exists. Recirculation raises the wet bulb temperature of the entering air causing the leaving fluid temperature to rise above the design. For these cases, a discharge hood or ductwork should be provided to raise the overall unit height even with the adjacent wall, thereby reducing the chance of recirculation. Good engineering practice dictates that the closed circuit coolers discharge air not be directed or located close to or in the vicinity of building air intakes. Engineering assistance is available from the factory to identify potential recirculation problems and recommend solutions.

For additional information see Evapco Bulletin entitled *"Equipment Layout"*.

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 to within 1.7 mm per meter 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.

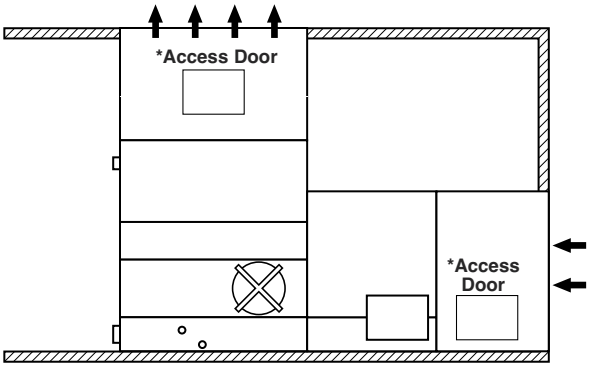
Vibration Isolation

The fans on EVAPCO units are balanced and run virtually vibration free. In addition, the rotating mass is very small in relation to the total mass of the closed circuit coolers, further reducing the possibility of objectionable vibration being transmitted to the building structure.
As a result, vibration isolation is generally not required.
In those cases where it is determined that vibration isolation is necessary, spring type vibration isolator rails can be furnished. The rails are constructed of heavy gauge Z-725 hot-dip galvanized steel for superior corrosion resistance. Rails are designed to be mounted between the closed circuit cooler and the supporting steel framework. They are 90% efficient and have approximately 25 mm static deflection. Rails are designed for wind loading up to 80 km/hr.

It is important to note that vibration isolation must be installed continuously along the full length of the closed circuit cooler on both sides of the unit. Point isolators may be used between the supporting steel and the building framework, but not between the unit and the supporting steel.

Indoor Installations

Centrifugal fan models can be installed indoors where it is desirable to hide the unit or where it is the only location available. Discharge ductwork is required for these installations. Normally it is best to use the room as a plenum for inlet air, but inlet ductwork can be used if required.
The design of ductwork should be symmetrical to provide even air distribution across both intake and discharge openings. The static pressure loss imposed by the ductwork must not exceed 125 Pa. Care must be taken to provide large access doors in the ductwork for accessibility to the unit fan section, eliminators and water distribution system for normal maintenance.
The centrifugal fan cooler can handle the external static of ductwork by using the next larger size fan motor. Units installed with inlet ductwork should also be ordered with the solid bottom panel option. Drawings are available from the factory showing size and location of duct connections.



Maintaining the Recirculated Water System

The heat rejection in a cooler is accomplished by the evaporation of a portion of the recirculated spray water. As this water evaporates, it leaves behind all of its mineral content and impurities. Therefore, it is important to bleed-off an amount of water equal to that which is evaporated to prevent the build-up of these impurities. If this is not done, the mineral or the acidic nature of the water will continue to increase. This will ultimately result in heavy scaling or a corrosive condition.

Applications

Bleed-off

Each unit supplied with a pump mounted on the side is furnished with a clear bleed line for visual inspection and a valve which, when fully open, will bleed-off the proper amount of water. If the make-up water supplying to the unit is relatively free of impurities, it may be possible to cut back the bleed, but the unit must be checked frequently to make sure scale is not forming. Make-up water pressure should be maintained between 140 and 340 kPa.

Water Treatment

In some cases the make-up will be so high in mineral content that a normal bleed-off will not prevent scaling. In these cases water treatment will be required and a reputable water treatment company familiar with the local water conditions should be consulted.

Any chemical water treatment used must be compatible with the galvanized construction of the unit. If acid is used for treatment, it should be accurately metered and the concentration properly controlled. The pH of the water should be maintained between 6.5 and 8.0. Units constructed of galvanized steel operating with circulating water having a pH of 8.3 or higher will require periodic passivation of the galvanized steel to prevent the formation of "white rust". Batch chemical feeding is not recommended because it does not afford the proper degree of control. If acid cleaning is required extreme caution must be exercised and only inhibited acids recommended for use with galvanized construction should be used. For more information see EVAPCO Bulletin entitled "Maintenance Instructions".

Control of Biological Contamination

Water quality should be checked regularly for biological contamination, If biological contamination is detected, a more aggressive water treatment and mechanical cleaning program should be undertaken. The water treatment program should be performed in conjunction with a qualified water treatment company. It is important that all internal surfaces be kept clean of accumulated dirt and sludge. In addition, the drift eliminators should be maintained in good operating condition

Note: The location of the closed circuit cooler must be considered during the equipment layout stages of a project. It is important to prevent the discharge air (potential of biological contamination) from being introduced into the fresh air intakes of the building.

Recirculating Water System - Freeze Protection

Water lines to and from the unit, spray pump and related piping should be heat traced and insulated up to the overflow level in order to protect from freezing.

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

Pan Freeze Protection

REMOTE SUMP

Whenever a cooler is idled during subfreezing weather, the water in the sump must be protected from freezing and damaging the pan. The simplest and most reliable method of accomplishing this is with a remote sump tank located in a heated space in the building under the cooler. The recirculating water pump is mounted at the remote sump and whenever it is shut-off, all of the water drains into the indoor tank. When a cooler is ordered for remote sump operation, the standard float valve and strainer are omitted, and the unit is provided with an oversized bottom water outlet connection. Where a remote sump is not possible, a supplementary means of heating the pan water must be provided.

ELECTRIC HEATERS

Electric immersion heaters are available factory installed in the basin of the cooler. They are sized to maintain a +4 or +5°C pan water temperature with –18°C ambient air temperature with the fans and pumps off. They are furnished with a thermostat and low water protection device to cycle the heater on when required and to prevent the heater elements from energizing unless they are completely submerged. Components are enclosed in rugged, weatherproof enclosures for outdoor use. The heater power contactors and electric wiring are not included as standard.

Electric Pan Heaters

Model No.	kW*
LSWA 20AA to 20C	2
LSWA 30A to 30C	3
LSWA 41A to 41C	3
LSWA 58A to 58D	4
LSWA 87A to 87D	(2) 3
LSWA 91A to 91D	5
LSWA 116A to 116D	8
LSWA 135A to 135D	(2) 4
LSWA 174A to 174D	(2) 5
LSWA 182A to 182D	(2) 5
LSWA 232A to 232D	(2) 8
LSWA 270A to 270D	(2) 10
LSWA 348A to 348D	(2) 10
LRW 18-2E to 18-5H	2
LRW 30-2G to 30-5H	3
LRW 45-3I to 45-6J	4
LRW 60-3K to 60-6M	6
LRW 72-3K to 72-5L	7
LRW 96-4L to 96-6N	9
PMWA 116A to 116D	8
PMWA 174A to 174D	(2) 6
PMWA 232A to 232D	(2) 8
PMWA 348A to 348D	(4) 6

* Electric heater selection based on -18°C ambient temperature. For alternate low ambient heater selections, consult the factory.

Optional Equipment

Discharge Hoods with Positive Closure Dampers (LSWA-LRW)

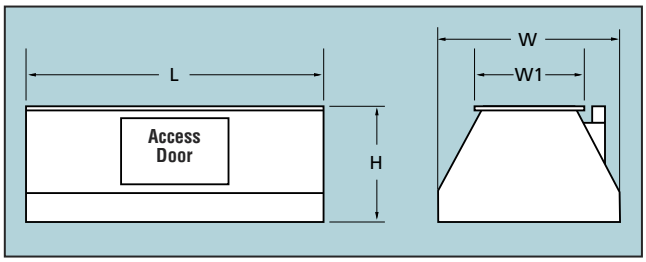
When a closed circuit cooler is used in a water-to-air heat pump system or in certain process cooling applications, a method of reducing the heat loss during idle periods of wintertime operation may be required. For these cases, an optional discharge hood with positive closure dampers and damper actuator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

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

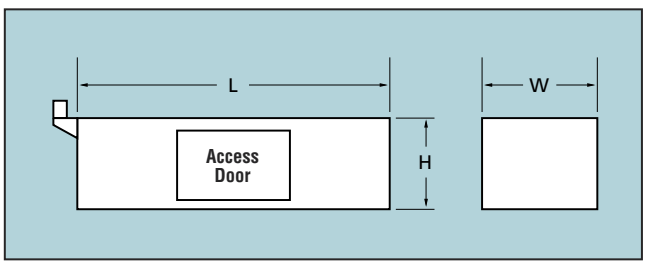
The discharge hood and dampers are constructed of hot-dip galvanized steel. Hoods are equipped with access panels to facilitate maintenance on the eliminators and water distribution system. The dampers, damper actuator and linkage are all factory assembled. Actuator controls and wiring are field supplied by others. Damper actuators require 230 Volt power supply.

The system control sequence should provide for dampers to be fully open before the fans are running and closed when the fans are off; the damper actuator must be interlocked with the temperature control system for this purpose. When a centrifugal fan model uses a tapered discharge hood, the next larger size fan motor must be used to overcome the additional static pressure.

Heat loss data is provided for standard units without hoods, with hoods and with hoods and insulation. Table ratings are based on 10°C water in the coil, -23°C ambient and 70 km/hr winds (fan and pump off).



Tapered Discharge Hood



Straight-Sided Discharge Hood

Heat Loss Data, kW

Model	Standard Unit	With Hood	Hood and Insulation
LRW 18-2E thru 18-2G	10	10	7
LRW 18-3F thru 18-3G	13	10	7
LRW 18-4F thru 18-4G	16	11	7
LRW 18-5G thru 18-5H	18	12	8
LRW 30-2G thru 30-2H	15	13	9
LRW 30-3G thru 30-3H	21	13	9
LRW 30-4H	26	14	9
LRW 30-5H	29	16	10
LRW 45-3I thru 45-3J	32	17	11
LRW 45-4J	39	19	12
LRW 45-5J	44	20	13
LRW 45-6J	47	22	14
LRW 60-3K thru 60-3L	43	22	14
LRW 60-4K thru 60-4L	52	23	15
LRW 60-5L thru 60-5M	59	25	16
LRW 60-6M	62	27	17
LRW 72-3K thru 72-3L	50	23	14
LRW 72-4K thru 72-4L	60	24	16
LRW 72-5L	68	26	17
LRW 96-4L thru 96-4N	81	29	19
LRW 96-5M thru 96-5N	91	31	20
LRW 96-6N	97	34	21

Tapered Discharge Hood Dimensions

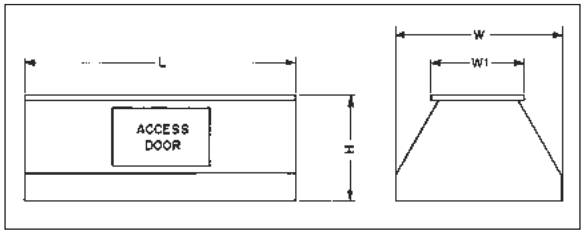
Model	L (mm)	H (mm)	W (mm)	W1 (mm)	Weight (kgs)	Number of Hoods
LRW 18	1823	745	1029	542	176	1
LRW 30	1823	1120	1540	788	255	1
LRW 45	2724	1120	1540	788	350	1
LRW 60	3648	1120	1540	788	430	1
LRW 72	2724	1205	2388	1207	525	1
LRW 96	3648	1205	2388	1207	683	1

Straight-Sided Discharge Hood Dimensions

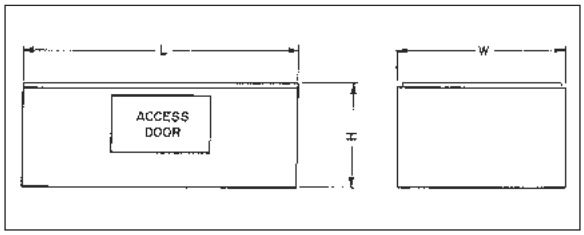
Model	L (mm)	H (mm)	W (mm)	Weight (kgs)	Number of Hoods
LRW 18	1823	780	1029	210	1
LRW 30	1823	780	1540	275	1
LRW 45	2724	780	1540	370	1
LRW 60	3648	780	1540	470	1
LRW 72	2724	780	2388	500	1
LRW 96	3648	780	2388	630	1

Discharge Hood Dimensions

UNIT No.	L (mm)	H (mm)	W (mm)	W1 (mm)	Weight (kgs)	No. of Hoods
LSWA 20	1805	965	1130	590	170	1
LSWA 30	2700	965	1130	590	230	1
LSWA 41	3623	965	1130	590	275	1
LSWA 58	3623	1130	1550	785	305	1
LSWA 87	5465	1130	1550	785	450	1
LSWA 91	3626	1210	2370	1205	370	1
LSWA 116	3626	1410	2975	1522	475	1
LSWA 135	5466	1210	2370	1205	530	1
LSWA 174	5466	1410	2975	1522	660	1
LSWA 182	3626	1210	2370	1205	370	2
LSWA 232	3626	1410	2975	1522	475	2
LSWA 270	5466	1210	2370	1205	530	2
LSWA 348	5466	1410	2975	1522	660	2
PMWA 116	3626	955	2975	-	680	1
PMWA 174	5466	955	2975	-	970	1
PMWA 232	3626	955	2975	-	680	2
PMWA 348	5466	955	2975	-	970	2



CENTRIFUGAL FAN MODELS



POWER-MIZER MODELS

Heat Loss Data, KW

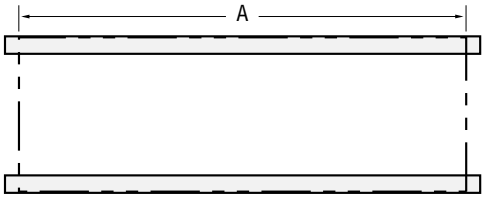
CENTRIFUGAL FAN MODELS								POWER-MIZER MODELS			
Unit No.	Std. Unit	With Hood	Hood and Insulation	Unit No.	Std. Unit	With Hood	Hood and Insulation	Unit No.	Std. Unit	With Hood	Hood and Insulation
LSWA- 20AA	11	8	6	LSWA- 174A	130	42	27	PMWA- 116A	99	37	23
20A	15	10	6	174B	158	45	29	116B	120	40	25
20B	18	11	7	174C	177	48	31	116C	135	42	27
20C	20	11	7	174D	189	51	33	116D	143	45	29
LSWA- 30A	22	13	8	LSWA- 182A	133	57	37	PMWA- 174A	150	48	31
30B	27	14	9	182B	162	62	39	174B	182	52	33
30C	30	15	10	182C	181	66	42	174C	204	55	35
LSWA- 41A	30	16	10	182D	193	70	45	174D	217	59	38
41B	36	18	11	LSWA- 232A	172	64	41	PMWA- 232A	198	73	47
41C	41	19	12	232B	209	69	44	232B	240	79	50
LSWA- 58A	43	21	13	232C	234	74	47	232C	269	84	54
58B	52	23	14	232D	249	78	50	232D	287	90	58
58C	59	24	16	LSWA- 270A	202	77	50	PMWA- 348A	300	96	62
58D	62	26	17	270B	244	83	53	348B	363	103	66
LSWA- 87A	65	28	18	270C	274	88	56	348C	408	110	71
87B	79	31	20	270D	242	93	60	348D	434	118	75
87C	89	33	21	LSWA- 348A	255	84	53				
87D	94	36	23	348B	316	90	57				
LSWA- 91A	67	29	18	348C	355	96	62				
91B	81	31	20	348D	378	102	65				
91C	91	33	21								
91D	96	35	22								
LSWA- 116A	80	32	20								
116B	104	34	22								
116C	117	37	23								
116D	125	39	25								
LSWA- 135A	101	39	25								
135B	122	41	26								
135C	137	44	28								
135D	146	47	30								

Steel Support

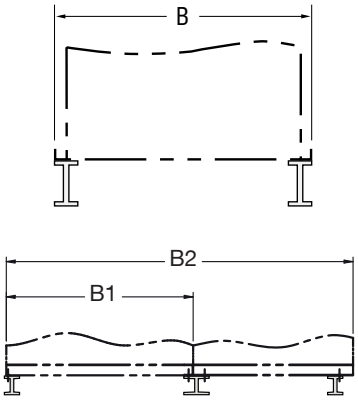
The recommended support for EVAPCO coolers is structural "I" beams located under the outer flanges and running the entire length of the unit. Mounting holes, 19 mm in diameter are located in the bottom channels of the pan section to provide for bolting to the structural steel. (Refer to certified drawings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

Beams should be level to within 3 mm per 2 m 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.

Plan Views



End Elevations



LRW DIMENSIONS			
Models		A	B
LRW	18-2E to 18-5H	3083	1029
	30-2G to 30-5H	3731	1540
	45-3I to 45-6J	4636	1540
	60-3K to 60-6M	5553	1540
	72-3K to 72-5L	4629	2388
	96-4L to 96-6N	5553	2388

LSWA DIMENSIONS					
			Compact	Basic	Extended
Box size	A	B1	B2	B2	B2
4x6	1826	1235	2378	2648	3048
4x9	2724	1235	2378	2648	3048
4x12	3645	1235	2378	2648	3048
4x18	5486	1235	2378	2648	3048
5x12	3645	1651	2794	3064	3453
5x18	5483	1651	2794	3064	3453
8x12	3651	2388	3531	3800	4188
8x18	5486	2388	3531	3800	4188
8x24	7341	2388	3531	3800	4188
8x36	11011	2388	3531	3800	4188
10x12	3651	2991	4134	4404	4791
10x18	5493	2991	4134	4404	4791
10x24	7344	2991	4134	4404	4791
10x36	11027	2991	4134	4404	4791

PMWA DIMENSIONS			
Models		A	B
PMWA	116A to 116D	3648	2991
	174A to 174D	5493	2991
	232A to 232D	7334	2991
	348A to 348D	11024	2991

Application

Piping

Unit piping should be designed and installed in accordance with generally accepted engineering practice. The piping layout should be symmetrical on multiple unit systems, and sized for a reasonably low water velocity and pressure drop.
The closed circuit cooler is recommended only on a closed, pressurized system. The piping system should include an expansion tank to allow for fluid expansion and purging air from the system.
Note: Closed Circuit Coolers should never be used on an open type system. An open type system with a cooler may result in premature coil failure.
The piping system should be designed to permit complete drainage of the heat exchanger coil. This will require a vacuum breaker or air vent to be installed at the high point and a drain valve installed at the low point of the piping system. Both must be adequately sized.
All piping should be securely anchored by properly designed hangers and supports. No external loads should be placed upon the cooler connections, nor should any of the pipe supports be anchored to the cooler framework.

Freeze-Up Protection

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

Recirculating Water System

The simplest and most foolproof method of protecting the recirculating water system from freeze-up is through the use of a remote sump located inside the building below the unit. The recirculating water pump is mounted at the remote sump and whenever it is shut off, all of the water in the cooler drains back to the warm inside sump. The Engineering Data Tables presented on pages 14 thru 19 provide information to size the remote sump tank.
If a remote sump cannot be used, pan heaters are available, either steam, hot water, or electric type, to keep the pan water from freezing when the unit is shut down. Water lines to and from the unit, the pump and pump piping up to the overflow connection must also be wrapped with electric heating cable and insulated to protect them from freeze-up. The cooler cannot be operated dry (fans on, pump off) with this method unless water is completely drained from the pan. The pan heaters are sized to prevent pan water from freezing when the unit is shut down, but they are not sufficient to prevent freeze-up in a cooler operating dry.

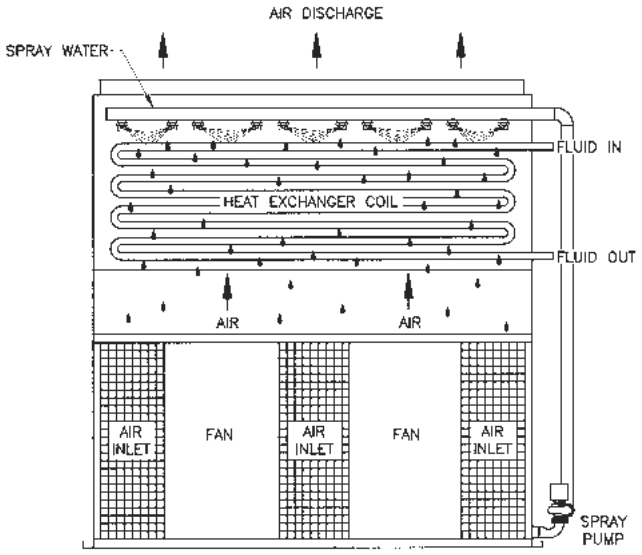
Heat Exchanger Coil

The simplest and most foolproof method of protecting the heat exchanger coil from freeze-up is to use an ethylene glycol solution. If this is not possible, an auxiliary heat load must be maintained on the coil at all times so that the water temperature does not drop below 10°C when the cooler is shut down. Also, a minimum recommended flow rate must be maintained. Refer to pages 22-23 for heat loss data.
When the unit is operating during freezing weather, some type of capacity control is normally required in order to keep water temperatures from dropping below 10°C. Operating dry with a remote sump is an excellent way to reduce unit capacity at low temperatures (this is covered under recirculating water freeze-up protection). Other methods that can be used are modulating fan dampers, fan cycling or two-speed motors. These can be used individually or in combination with dry operation. Which method will depend upon the particular application, and EVAPCO engineers are available for recommendations.
If an anti-freeze solution is not used, the coil must also be drained immediately whenever the pump is shut down or flow stops. This can be accomplished by automatic drain valves and air vents in the piping to and from the cooler. Care must be taken to ensure that the piping is adequately insulated and sized to allow the water to flow quickly from the coil. This method of freeze control should only be used in an emergency situation. Coils should not be drained for an extended period of time.
The amount of ethylene glycol required for a system will depend upon the total volume of water in the closed loop and the winter ambient conditions for the installation. The Engineering Data Tables presented on pages 14 thru 19 provide the amount of water contained inside the cooler coils to assist in this calculation.

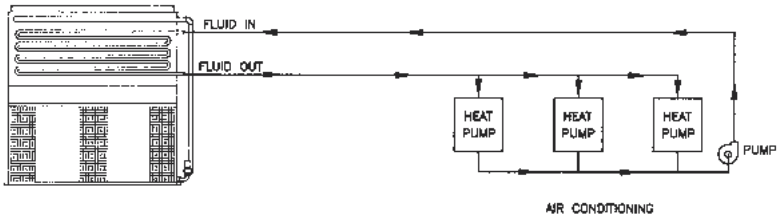
Unit No.		Minimum Flow (l/s)
LSWA / PMWA	20, 30, 41	3,8
	58, 87	4,7
	91, 135	8,8
	182, 270	17,6
	116, 174	9,5
	232, 348	19,0
LRW	18	3,3
	30, 45 and 60	4,7
	72 and 96	8,8

Principle of Operation

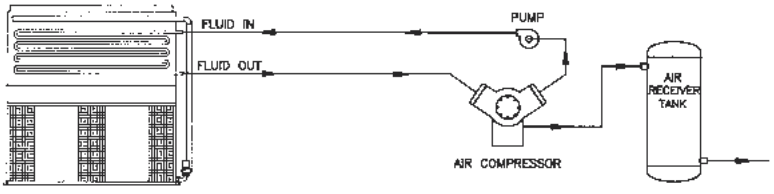
The process fluid is circulated through the coil of the closed circuit cooler. Heat from the process fluid is dissipated through the coil tubes to the water cascading downward over the tubes. Simultaneously, air is blown through by the fans at the base of the cooler and travels upward through the coil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



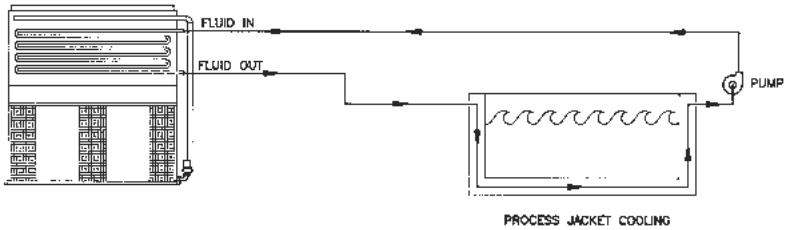
Principle of Operation



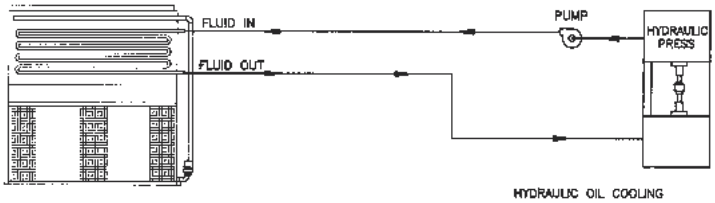
AIR CONDITIONING



AIR COMPRESSOR COOLING



PROCESS JACKET COOLING



HYDRAULIC OIL COOLING

Air Conditioning
- Unitary Heat Pump Systems
- Computer Room Cooling
- Refrigeration Supplement

Manufacturing
- Air Compressors
- Plastic Mold Machines
- Transformers
- Engines

Steel Mills & Foundries
- Quench Tanks
- Rolling Mills
- Induction Furnaces
- Continuous Casters

Industrial Fluids
- Hydraulic Oils
- Plating Solutions
- Quench Oils

Closed Circuit Coolers Specifications

Furnish and install as shown on the plan an EVAPCO Model _____ __Closed Circuit Cooler. Each unit shall have the capacity to cool _____ of _____ from _____ to _____with a _____entering wet bulb temperature. Unit height shall not exceed _____.

Casing and Fan Section

The casing and fan section shall be constructed of Z-725 galvanized steel for long life and durability. Fan section shall include fans, motors and drives. The entire drive system (including fans, motors, pulleys and belts) shall be located in the dry entering airstream.

Cold Water Basin *(only for LRW)*

The complete cold water basin shall be constructed of Type 304 stainless steel for long life and durability. Standard cold water basin accessories shall include Type 304 stainless steel overflow, drain, anti-vortexing hood, strainers and brass make-up valve with unsinkable, foam filled plastic float. A circular access door shall be located above the basin to allow easy access to the pan interior.

The outlet shall be Type 304 stainless steel beveled for welding or a threaded connection.

Model LSWA & LRW - Centrifugal Fans/Drives

Fans shall be forwardly curved centrifugal type of hot-dip galvanized construction. The fans shall be factory installed into the pan-fan section, and statically and dynamically balanced for vibration free operation. Fans shall be mounted on either a solid steel shaft or a hollow steel shaft with forged bearing journals. The fan shaft shall be supported by heavy-duty, self-aligning bearings with cast-iron housings and lubrication provided fittings for maintenance.
The fan drive shall be V-belt type with taper lock pulleys designed for 150% of the motor nameplate kW. Drives are to be mounted and aligned at the factory.

Model PMWA - Power-Mizer Fans/Drives

Fans shall be vane-axial type constructed of cast aluminum alloy blades. They shall be arranged in a two-stage system installed in a closely fitted cowl with venturi air inlet and air stabilizing vanes. Fan shaft bearings shall be heavy-duty self aligning ball type with grease fittings extended to the outside of the unit.
The fan drive shall be solid backed Power-Band constructed of neoprene with polyester cords and designed for 150% of motor nameplate kW. Drives are to be mounted and aligned at the factory.

Fan Motor

Fan motor(s) shall be _____ kW T.E.F.C. suitable for outdoor installation on ___ volts, ___ hertz, and ___ phase electrical service. Motor(s) shall be mounted on an adjustable base.

Heat Transfer Coil

The coil(s) shall be all prime surface steel, encased in steel framework with the entire assembly hot-dip galvanized after fabrication. Coil(s) shall be designed with sloping tubes for free drainage of liquid and air pressure tested under water in accordance with the “Pressure Equipment Directive” (PED) 97/23/EC.

Water Recirculation Pump

The pump shall be a close-coupled, centrifugal type with a mechanical seal. Pump motor shall be _____ kW T.E.F.C. design suitable for outdoor installation on _____volts, ____ hertz, and ____ phase electrical service.

Water Distribution System

The system shall provide a water flow rate of not less than 4 l/s over each square meter of unit face area to ensure proper flooding of the coil. The spray header shall be constructed of polyvinyl chloride pipe for corrosion resistance. All spray branches shall be removable and include a threaded end plug for cleaning. The water shall be distributed over the entire coil surface by precision molded from heavy-duty, glass reinforced nylon spray nozzles for long life and 100% corrosion resistance (34 mm diameter orifice and 38 mm clearance between the nozzle bottom and water diverter plate) with an internal sludge ring to eliminate clogging. Nozzles shall be threaded into the spray header to provide easy removal for maintenance.

Eliminators

The eliminators shall be constructed of inert polyvinyl chloride that has been specially treated to resist UV degredation. Assembled in easily handled sections, the eliminators shall incorporate three changes in air direction to assure removal of entrained moisture from the discharge airstream. The maximum drift rate shall not exceed 0.001% of the recirculated water rate.

Finish

The casing and fan section shall be constructed of Z-725 heavy gauge mill hot-dip galvanized steel. During fabrication, all panel edges shall be coated with a 95% pure zinc compound.

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