Bulletin 250C - Metric

LSWA/LRW

Closed Circuit Coolers

Featuring the Exclusive Thermal-Pak® Coil

IBC COMPLIANT DESIGNS

LRW

LSWA

Low Sound, Forced Draft Closed Circuit Coolers

CERTIFIED ISO 9001 & ISO 14001

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

- Industrial Refrigeration
- Commercial HVAC
- Industrial Process
- Power
- District Energy

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

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

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

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

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

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. These units are also designed with IBC Compliant construction. ALL features shown are available on all models.

Exclusive Thermal-Pak® Coil

- Providing Maximum Efficiency Per Plan Area

NEW! Easy Field Assembly

- Ensures easy assembly and fewer fasteners
- Incorporates self-guiding channels to guide the coil casing section into position improving the quality of the field seam

Totally Enclosed Pump Motors

- Helps assure long, trouble-free operation

NEW! Clean Pan Design

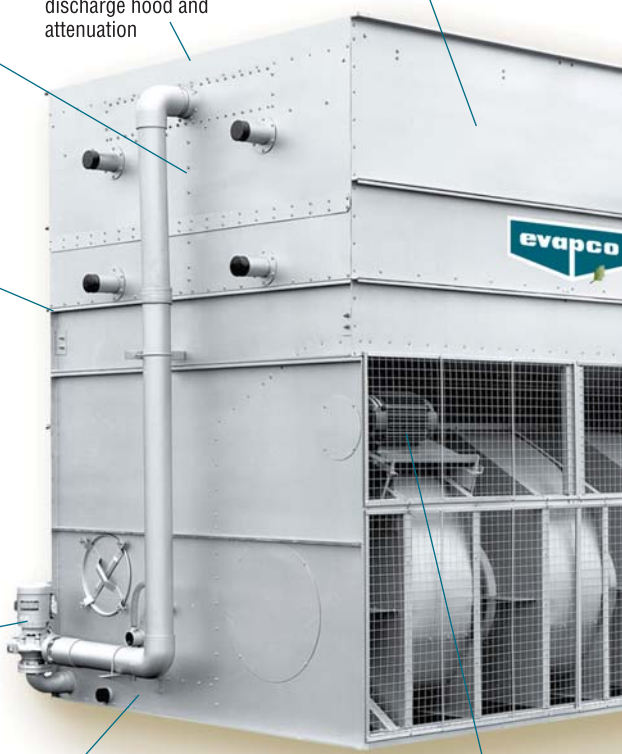
- Sloped design allows water to drain completely from cold water basin
- Easier Removal of dirt and debris

NEW! Drift Eliminators Located in Casing

- Drift eliminators integrate with coil casing section for easy mounting of ductwork, discharge hood and attenuation

G-235 Heavy Mill-Dip Galvanized Steel Construction

(Stainless steel available as an affordable option)



MOTOR AND DRIVE 5 Year WARRANTY

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

NEW!

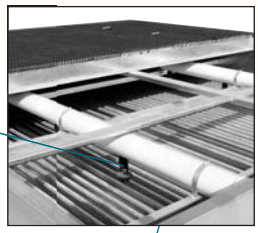
- Motors are now located outboard on multi-motor units for even easier drive system access
- Premium efficient inverter-ready motors are standard
- 5 Year motor and drive warranty is standard

IBC Certification

- Every unit has independent certification and compliance with IBC

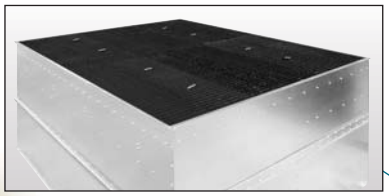
Zero Maintenance PVC Spray Distribution Header with ZMII® Nozzles

- Nozzles are threaded into header at proper orientation
- Fixed position nozzles require zero maintenance
- Large orifice nozzles prevent clogging
- Threaded end caps for ease of cleaning

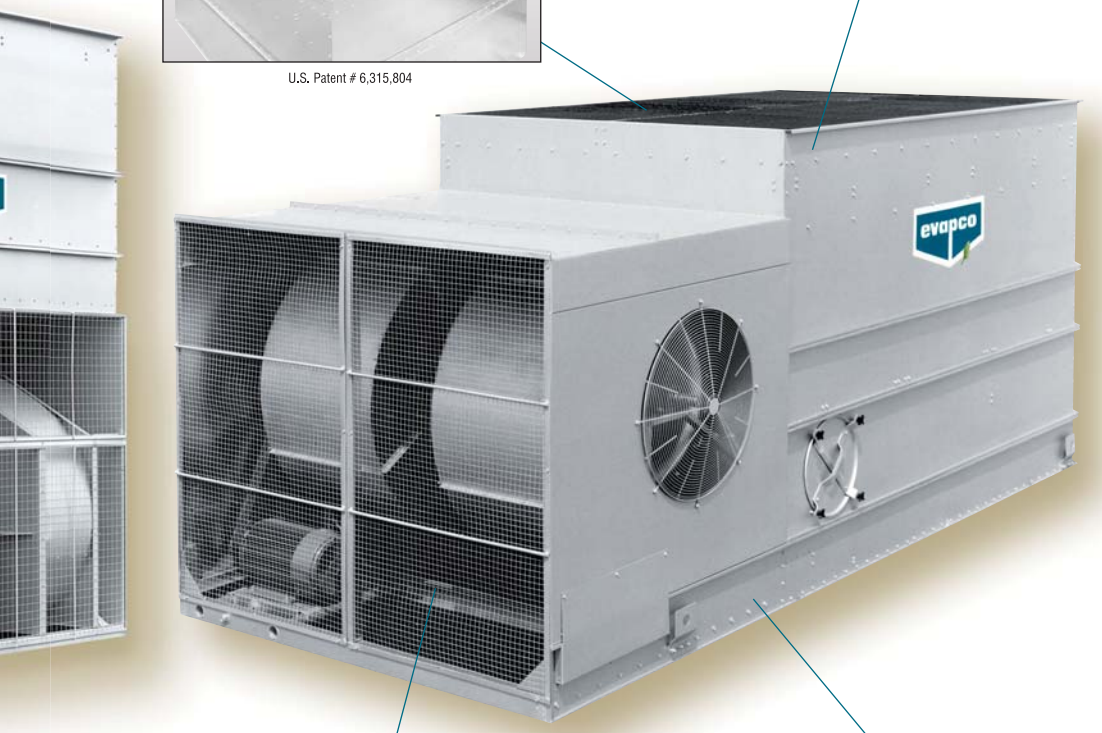


Efficient Drift Eliminators

- Advanced design limits maximum drift rate to 0.001% of circulated spray water rate
- Corrosion resistant PVC for long life



U.S. Patent # 6,315,804



Optional 304L SST COIL

- Featuring Thermal-Pak® Construction
- 304L SST Construction for Superior Corrosion Resistance

Optional Factory Mounted Solid Chemical Water Treatment System

All units are available with EVAPCO's optional ***Smart Shield***® soild chemical water treatment system. Evapco's ***Smart Shield***® System is an environmentally sensitive alternative for treating water in evaporative cooled equipment. The ***Smart Shield***® includes all the components required for an effective water treatment system, factory mounted and wired.

Standard Stainless Steel Cold Water Basin

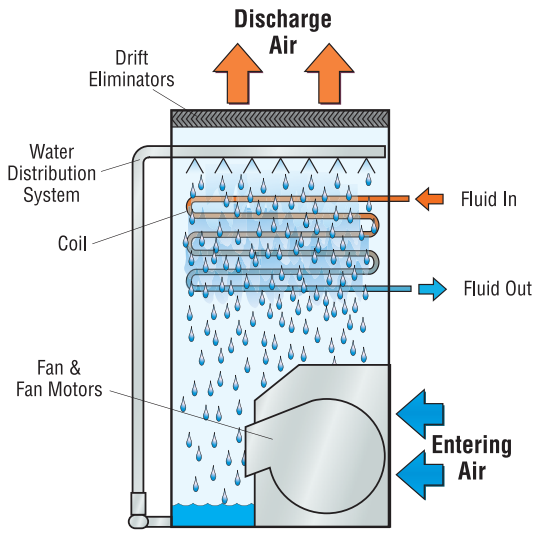
- Eliminates the need for unreliable epoxy coatings

Easy to Service Motor & Drive System

- Belt tensioning and bearing lubrication can be performed from outside the unit
- Locking mechanism can also be used as a wrench to adjust the belts (LRW only)
- Motor is fully accessible by removing one inlet screen
- Split fan housings allow removal of all mechanical equipment through the end of the unit (LRW only)

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 the unit by the fans and travels upward over the coil opposite the water flow. A small portion of the water is evaporated which removes the heat. The warm moist air is forced to the top of the closed circuit cooler by the fan and is discharged to the atmosphere. The remaining water falls to the sump at the bottom of the cooler where it is recirculated by the pump up through the water distribution system and back down over the coils.



Example of an LSWA

EVAPCOAT Corrosion Protection System:

G-235 Hot-Dip Galvanized Steel Construction

The standard material of construction for evaporative cooling equipment for many years has been hot-dip galvanized steel. The purpose of galvanizing is to protect the base metal from corrosion, and the thickness of the galvanized layer directly affects the equipment life.

EVAPCO has been instrumental in the development of corrosion protection technology and was the first manufacturer to use G-235 galvanized steel construction. The G-235 designation equates to a minimum of 2.35 ounces of zinc per square foot (approximately 725 gram of zinc per square meter) of surface area.

The EVAPCOAT Corrosion Protection System is the heaviest galvanized coating available for extended corrosion protection eliminating the need for costly, unreliable epoxy paint finishes.

Stainless Steel Material Options

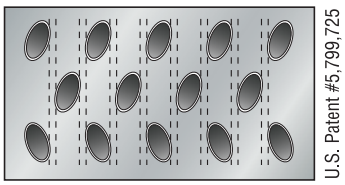
The LRW is standard with a stainless steel cold water basin. Optional upgrades to stainless steel water touch basins, stainless steel water touch units and all stainless steel construction are also available on the LRW.

The LSWA is available with optional stainless steel cold water basins, water touch basins, water touch units and all stainless steel construction.

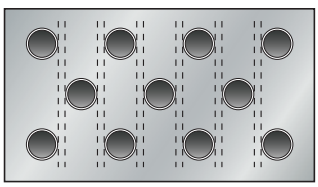
For more information on these stainless steel options, see your local EVAPCO sales representative.

Thermal-Pak® Coil

EVAPCO Closed Circuit Coolers utilize EVAPCO's proprietary Thermal-Pak® coil design which assures greater operating efficiency. The elliptical tube design allows for closer tube spacing, resulting in greater surface area per plan area than round-tube coil designs. In addition, the Thermal-Pak® design has lower resistance to airflow and also permits greater water loading, making the Thermal-Pak® coil the most effective design available.



Thermal-Pak® Coil by EVAPCO



Round Tube Coil by Others

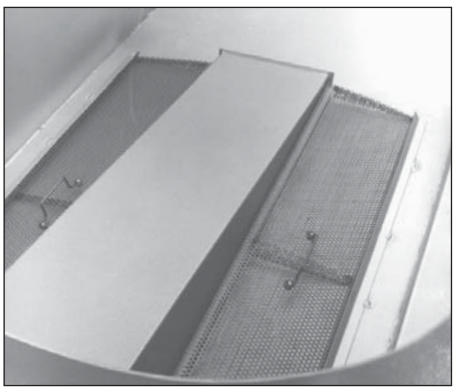
The coils are manufactured from high quality steel tubing following the most stringent quality control procedures. Each circuit is inspected to ensure the material quality and then tested before being assembled into a coil. Finally, the assembled coil is pneumatically tested at 2.69 MPa under water to ensure it is leak free.

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

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

Stainless Steel Strainers

One other component of evaporative cooling equipment which is subject to excessive wear is the suction strainer. **EVAPCO provides a Type 304 stainless steel strainer on all units as standard** (except remote sump applications). Strainers are positioned around a large anti-vortex hood in easily handled sections.



Strainer Assembly

Maintenance Free ZMII® Spray Nozzle Water Distribution System

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

The heavy duty ABS ZMII® Spray nozzles have a 32mm diameter opening and a 32mm splash plate clearance. Furthermore, the fixed position ZMII® nozzles are mounted in corrosion-free PVC water distribution pipes that have threaded end caps. Together, these elements combine to provide unequaled coil coverage and scale prevention, and make the industry's best performing non-corrosive, maintenance-free water distribution system.

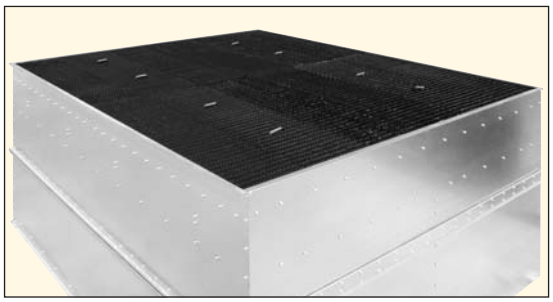
ZMII® Nozzle

Efficient Drift Eliminators

The LSWA & LRW are 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.

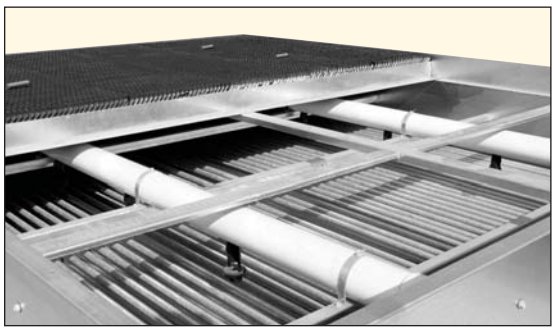
The eliminators are constructed of non-corrosive PVC with a multi-pass design for maximum drift reduction. They are assembled in modular sections for easy removal and access to the water distribution system.

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 # 6,315,804

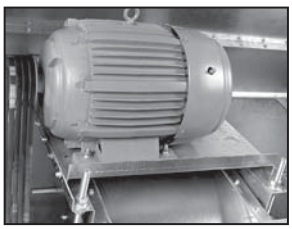
LSWA and LRW Drift Eliminator



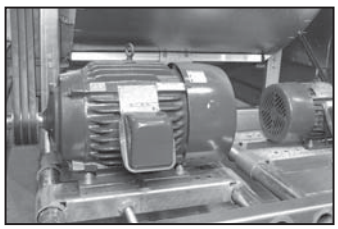
Drift Eliminators Removed for Coil Inspection

Fan Motor Mount

TEFC fan motors are mounted in a convienent open area for ease of belt tensioning, motor lubrication and electrical connection. The motor base is designed for easy adjustment and to be locked into position to maintain proper belt tension.



Example LSWA Fan Motor Mount



LRW Fan Motor Mount
(shown with optional pony motor)

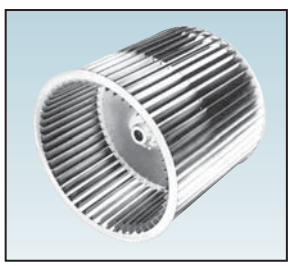
Fan Access-Split Housing

Another unique feature of the LRW Closed Circuit Cooler is the split fan housing. The split fan housing on the LRW allows quick removal of the fans from the front end of the unit. This feature allows fan removal when units are placed side by side where space is minimal.

Mechanical Drive System Access

The LSWA and LRW mechanical drive systems are easy to maintain. Bearing lubrication and belt adjustment can be performed from outside the unit. There is no need to remove fan screens to maintain important drive components. In addition, the locking mechanism used to maintain belt tension can also work as a wrench to adjust the belt.

Centrifugal Fan Assembly



Fans on LSWA and LRW Closed Circuit 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.

Basin Access

The LSWA drain pan is designed to improve maintenance access and make it easier for operating technicians to clean. The bottom of the pan is sloped to the unit drain to ensure that the basin will completely drain and allow sediment and debris that may collect in the basin to be easily flushed from the unit. The design helps to prevent buildup of sedimentary deposits, biological films and standing water.

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

Capacity Control

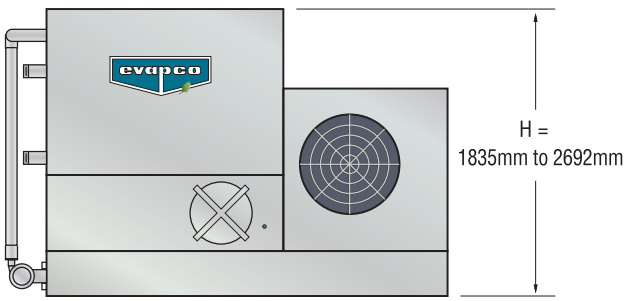
All LSWA and LRW models come standard with inverter capable fan motors that can be used with variable frequency drive (VFD) systems for precise capacity control. VFD systems can control the speed of a fan motor by modulating the voltage and frequency of the motor input electrical signal. When connected to a building automation system a VFD can receive signals varying fan speeds to meet demand loads. This popular method of capacity control can yield significant energy savings.

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

LRW Reduced Height and Maintenance Accessibility

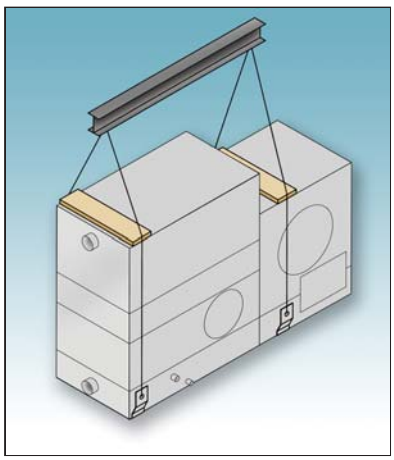
The LRW has been designed to satisfy installation requirements where height limits must be observed. The lower profile design of the LRW does not, however, sacrifice maintenance accessibility for reduced height. Its unique casing design allows the water distribution system, cold water basin, fan section 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. A large circular access door is located on the side 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. Routine bearing lubrication and belt tensioning can be performed from the exterior of the unit without removing the inlet screens.



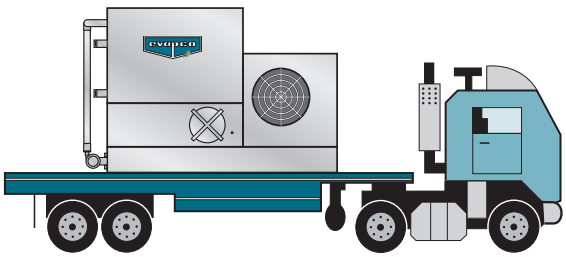
Low Installed Costs

The compact, unitary design of the LRW closed circuit cooler allows it to be shipped completely assembled. This results in lower transportation costs and no assembly requirements 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

Since the LRW ships fully assembled, it is ideal for truck-mounted applications, for remote sites or temporary installations.

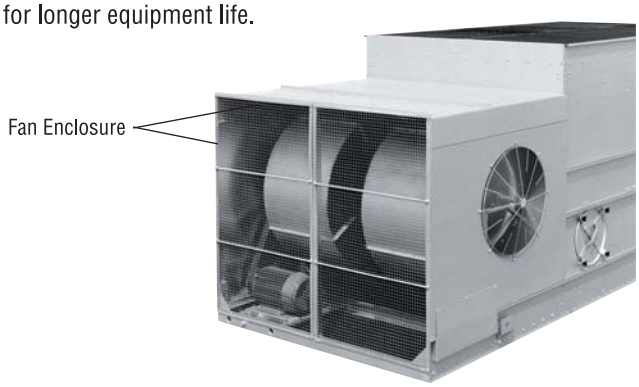


Stainless Steel Cold Water Basin–Standard

The LRW is standard with a stainless steel cold water basin. Optional upgrades to stainless steel water touch basins, stainless steel water touch units and all stainless steel construction are also available on the LRW.

Integral Fan Enclosure for Lower Sound

The LRW comes standard with an integral fan enclosure that reduces sound levels by 2 dB(A). This 3-sided enclosure also protects the fan and drive system for longer equipment life.



Application Versatility

Centrifugal units are recommended for a wide range of installations. They are quiet, can easily be hidden, and the increase in fan kW over propeller fan units is generally not significant in the small size range. They are also excellent for installations where sound is sensitive, such as residential neighborhoods, and when the unit must handle external static pressure.

LSWA Unit

LRW Unit

Very Quiet Operation

Centrifugal fan units operate at low sound levels which make this design preferred for installations with external static pressure where noise is a concern. 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. See the Sound Reducing Options section of this catalog or consult the factory for details.

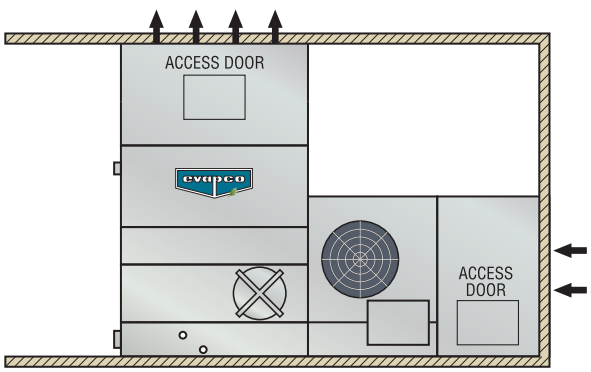
In addition, the LRW features a specially engineered fan enclosure and drive system that is designed to offer very quiet operation without the high cost of external attenuation packages. The LRW fan system was developed through hundreds of hours of laboratory tests resulting in the lowest standardized sound levels available in the industry. In fact, the sound level of the LRW on average is 2 dB(A) quieter than competitors' similar models.

Indoor Installation

All LSWA and LRW Closed Circuit Coolers can be installed indoors where they normally require ductwork to and from the unit. The design of the ductwork should be symmetrical to provide even air distribution across both intake and discharge openings. Guidelines for Ducted Applications:

1) The static pressure loss imposed by the ductwork must not exceed 125Pa. The fan motor size must be increased for ESP up to 125Pa.
2) For ducted installations, the solid bottom panel option must be ordered. On the LRW blank off plates will also be provided in lieu of the side air inlet screens with this option.
3) NOTE: Access Doors must be located in the ductwork for service to the fan drive components and water distribution system.

Drawings are available showing recommended ductwork connections. See EVAPCO's Layout Guidelines for additional information.



Product Applications

Design

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

Air Circulation

It is important that proper air circulation be provided. The best location is on an unobstructed roof top or on ground level away from walls and other barriers. Those closed circuit coolers located in wells, enclosures or adjacent to high walls must be properly located to avoid the problems associated with recirculation.

Recirculation raises the wet bulb temperature of the entering air causing the water temperature to rise above the design. For these cases, the discharge of the unit should be located at a height even with the adjacent wall, thereby reducing the chance of recirculation. For additional information, see the EVAPCO Equipment Layout Manual.

Good engineering practice dictates that the closed circuit cooler discharge air not be directed or located close to or in the vicinity of building air intakes.

Piping

Cooler piping should be designed and installed in accordance with generally accepted engineering practices. The piping layout should be symmetrical on multiple unit systems, and sized for a reasonably low water velocity and pressure drop.

The standard closed circuit cooler is recommended only on a closed, pressurized system. The piping system should include an expansion tank to allow for fluid expansion and purging air from the system.

Note: Closed Circuit Coolers should never be used on an open type system. An open type system with a cooler may result in premature coil failure.

The piping system should be designed to permit complete drainage of the heat exchanger coil. This will require a vacuum breaker or air vent to be installed at the high point and a drain valve installed at the low point of the piping system. Both must be adequately sized.

All piping should be securely anchored by properly designed hangers and supports. No external loads should be placed upon the cooler connections, nor should any of the pipe supports be anchored to the cooler framework.

Recirculating Water Quality

Proper water treatment is an essential part of the maintenance required for evaporative cooling equipment. A well designed and consistently implemented water treatment program will help to ensure efficient system operation while maximizing the equipment's service life. A qualified water treatment company should design a site specific water treatment protocol based on equipment (including all metallurgies in the cooling system), location, makeup water quality, and usage.

Bleed off

Evaporative cooling equipment requires a bleed or blowdown line, located on the discharge side of the recirculating pump, to remove concentrated (cycled up) water from the system. Evapco recommends an automated conductivity controller to maximize the water efficiency of your system. Based on recommendations from your water treatment company, the conductivity controller should open and close a motorized ball or solenoid valve to maintain the conductivity of the recirculating water. If a manual valve is used to control the rate of bleed it should be set to maintain the conductivity of the recirculating water during periods of peak load at the maximum level recommended by your water treatment company.

Water Treatment

The water treatment program prescribed for the given conditions must be compatible with the unit's materials of construction, including any galvanized components. The initial commissioning and passivation period is a critical time for maximizing the service life of galvanized equipment. EVAPCO recommends that the site specific water treatment protocol includes a passivation procedure which details water chemistry, any necessary chemical addition, and visual inspections during the first six (6) to twelve (12) weeks of operation. During this passivation period, recirculating water pH should be maintained above 7.0 and below 8.0 at all times. Batch feeding of chemicals is not recommended.

Control of Biological Contaminants

Evaporative cooling equipment should be inspected regularly to ensure good microbiological control. Inspections should include both monitoring of microbial populations via culturing techniques and visual inspections for evidence of biofouling.

Poor microbiological control can result in loss of heat transfer efficiency, increase corrosion potential, and increase the risk of pathogens such as those that cause Legionnaires' disease. Your site specific water treatment protocol should include procedures for routine operation, startup after a shut-down period, and system lay-up, if applicable. If excessive microbiological contamination is detected, a more aggressive mechanical cleaning and/or water treatment program should be undertaken.

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 evaporation process. Dry operation can be practical in cold climates and/or when reduced winter loads exist. The quantity of finned rows can be varied to optimize dry performance. See your local sales representative for more information.

Electric Water Level Control

EVAPCO LSWA & LRW 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 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 in a vertical standpipe. For winter operation, the standpipe must be wrapped with electric heating cable and insulated to protect it from freezing. 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).

Self Supporting Service Platform

Some LSWA Closed Circuit Coolers are available with self-supporting service platforms that include access ladders which are designed for easy field installation. This option offers significant savings in comparison to field constructed, externally supported catwalks. The EVAPCO service platform option may be installed on either side, or the end opposite the connections.

Screened Bottom Panels

Protective inlet screens are provided on the sides and/or end of the unit's air intake. Screens are not provided below the fan section since most units are mounted on the roof or at ground level. It is recommended that bottom screens be added to the unit when it will be elevated. These screens can be provided by the factory at an additional cost or added by the installing contractor.

Solid Bottom Panels for Ducted Installations

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 air from the room into the fan intakes. When this option is ordered, air inlet screens are omitted.

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.

Water Level Indicator

Units may be supplied with a water level indicator to provide a visual indication of basin water level without opening access doors or air inlet louvers. The level indicator can be furnished with an optional low and high level alarm switches or a transmitter for continuous level monitoring.

Freeze Protection and Heat Loss

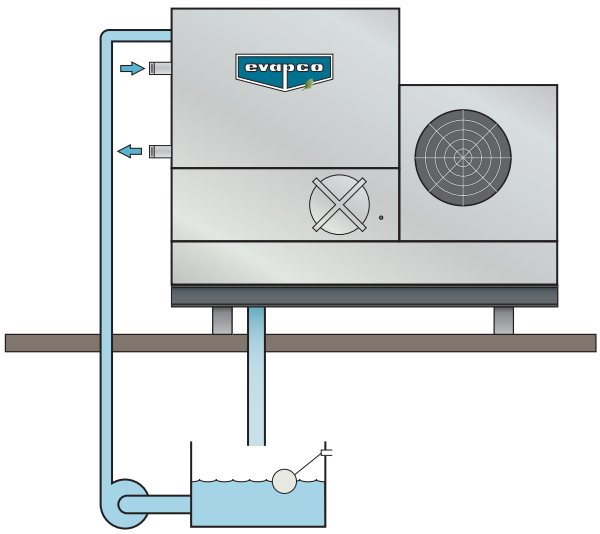
Freeze Protection

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

Recirculating Water System Freeze Protection Options

Remote Sump Configuration

The surest way to protect the recirculating water system from freezing is with a remote sump. The remote sump should be located inside the building and below the unit. When a remote sump arrangement is selected, the spray pump is provided by others and installed at the remote sump. All water in the closed circuit cooler basin should drain to the remote sump when the spray pump cycles off.



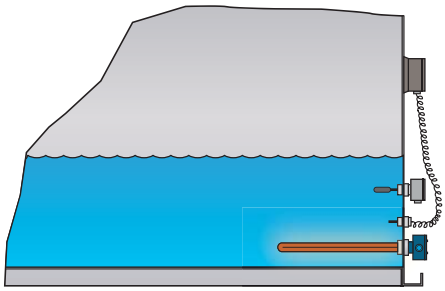
Hot Water Coils

Pan coils are available as an alternate to using electric basin heaters or a remote sump. Constructed of galvanized pipe and installed in the closed circuit cooler basin, they are supplied without controls and are ready for piping to an external hot water source. Pan water heater controls should be interlocked with the water circulating pump to prevent their operation when the pump is energized.

Basin Heater Package

If a remote sump configuration is not practical, electric basin heater packages are available to keep the pan water from freezing when the unit cycles off. Water lines to and from the unit, spray pump and related piping should be heat traced and insulated up to the overflow level to protect from freezing.

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



LSWA Basin Heater Sizing*

Model No.	kW (-18°C)	kW (-28°C)	kW (-40°C)
LSWA 20	(1) 2	(1) 3	(1) 4
LSWA 30	(1) 3	(1) 4	(1) 5
LSWA 41	(1) 3	(1) 5	(1) 7
LSWA 61	(1) 5	(1) 7	(1) 9
LSWA 58	(1) 4	(1) 6	(1) 8
LSWA 87	(2) 3	(2) 4	(1) 12
LSWA P91	(1) 5	(1) 8	(1) 10
LSWA P135	(2) 4	(2) 6	(2) 7
LSWA P182	(2) 5	(2) 7	(2) 10
LSWA P270	(2) 7	(2) 12	(2) 15
LSWA 116	(1) 7	(1) 10	(1) 15
LSWA 174	(2) 5	(2) 7	(2) 10
LSWA 232	(2) 7	(2) 10	(2) 15
LSWA 348	(2) 10	(4) 7	(4) 9

LRW Basin Heater Sizing*

Model No.	kW (-18°C)	kW (-28°C)	kW (-40°C)
LRW 18	(1) 2	(1) 3	(1) 4
LRW 30	(1) 3	(1) 5	(1) 6
LRW 45	(1) 4	(1) 6	(1) 8
LRW 60	(1) 6	(1) 8	(1) 12
LRW 72	(1) 7	(1) 9	(1) 12
LRW 96	(1) 9	(1) 12	(1) 16

* Electric heater selection based on ambient air temperature shown.

Heat Exchanger Coil Freeze Protection Options

The simplest and most foolproof method of protecting the heat exchanger coil from freeze-up is to use a glycol solution. If this is not possible, an auxiliary heat load must be maintained on the coil at all times so that the water temperature does not drop below 10°C when the cooler is shut down and, a minimum recommended flow rate per unit as shown in the table below must be maintained. Refer to Heat Loss Data Table on page 13 for heat loss data.

LSWA Minimim Flows for Freeze Protection

Model No.	Minimum Flow for Freeze (l/s)	
	Standard Unit	Series Flow Unit (-Z)
LSWA 20	4.2	2.1
LSWA 30	4.2	2.1
LSWA 41	4.2	2.1
LSWA 61	4.2	2.1
LSWA 58	5.9	3.0
LSWA 87	5.9	3.0
LSWA P91	9.3	4.7
LSWA P135	9.3	4.7
LSWA P182	18.7	9.3
LSWA P270	18.7	9.3
LSWA 116	11.9	5.9
LSWA 174	11.9	5.9
LSWA 232	23.7	11.9
LSWA 348	23.7	11.9

LRW Minimim Flows for Freeze Protection

Model No.	Minimum Flow for Freeze (l/s)	
	Standard Unit	Series Flow Unit (-Z)
LRW 18	3.8	1.9
LRW 30	5.9	3.0
LRW 45	5.9	3.0
LRW 60	5.9	3.0
LRW 72	9.3	4.7
LRW 96	9.3	4.7

If an anti-freeze solution is not used, the coil must be drained immediately whenever the pump is shut down or flow stops. Care must be taken to ensure that the piping is 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. **Leaving the coil drained and open to the atmosphere can cause corrosion inside the tubes which may lead to premature coil failure.**

The amount of 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 20-28 provide the water volume contained inside the cooler coils to assist in this calculation.

Discharge Hoods with Positive Closure Dampers

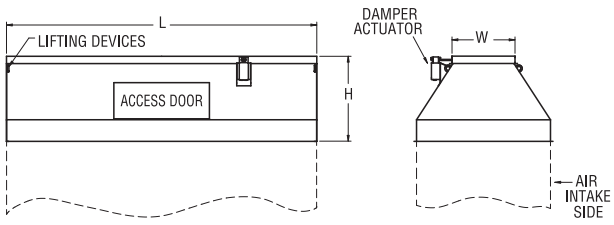
When a closed circuit cooler is used in a water-to-air heat pump system or in certain process cooling applications, a method of reducing the heat loss during idle periods of wintertime operation may be required. For these cases, an optional discharge hood with positive closure dampers and damper actuator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

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

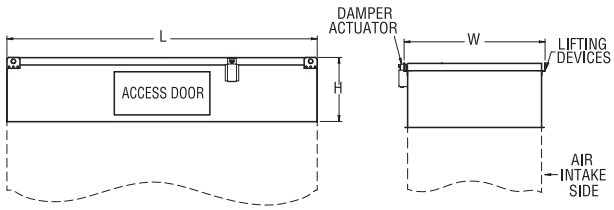
The discharge hood and dampers are constructed of hot-dip galvanized steel. Hoods are equipped with access panels to facilitate maintenance on the eliminators and water distribution system. The dampers, damper actuator and linkage are all factory-assembled. Actuator controls and wiring are field-supplied by others. Damper actuators require 120 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/hour winds (fan and pump off).



Tapered Discharge Hood *(See page 13 for dimensions)*



Straight-Sided Discharge Hood *(See page 13 for dimensions)*

Heat Loss

LSWA Heat Loss Data

LSWA Model	Standard Unit (kW)	Unit with Hood (kW)	With Hood & Insulation (kW)
20AA	10.8	8.5	5.6
20A	14.7	9.7	6.2
20B	17.9	10.5	6.7
20C	19.9	11.4	7.3
30A	22.3	12.9	8.2
30B	27.0	14.1	9.1
30C	30.5	15.2	9.7
41A	30.2	15.8	10.3
41B	36.3	17.6	11.1
41C	41.0	19.0	12.3
61A	45.4	22.3	14.4
61B	55.1	24.6	15.8
61C	61.8	26.7	17.0
58A	43.1	20.5	13.2
58B	52.2	22.6	14.4
58C	58.6	24.3	15.5
58D	62.4	26.4	16.7
87A	65.3	28.1	18.2
87B	78.8	30.8	19.6
87C	88.8	33.4	21.4
87D	94.3	36.0	23.1
P91A	66.5	28.7	18.5
P91B	80.9	30.8	19.6
P91C	90.5	32.8	21.1
P91D	96.4	34.9	22.3
P135A	91.1	38.7	24.9
P135B	110.2	41.3	26.4
P135C	137.1	44.0	28.1
P135D	146.2	46.6	29.9

LSWA Model	Standard Unit (kW)	Unit with Hood (kW)	With Hood & Insulation (kW)
P182A	133.0	57.4	36.9
P182B	161.7	61.5	39.3
P182C	181.1	65.6	42.2
P182D	192.8	69.7	44.5
P270A	201.6	77.4	49.8
P270B	244.4	82.6	52.7
P270C	274.2	87.9	56.3
P270D	292.4	93.2	59.8
116A	86.1	31.9	20.2
116B	104.3	34.3	22.0
116C	117.2	36.6	23.4
116D	124.8	39.3	25.2
174A	130.4	41.9	26.7
174B	157.9	44.8	28.7
174C	177.3	48.1	30.8
174D	188.7	51.3	32.8
232A	172.3	63.6	40.7
232B	208.6	68.6	44.0
232C	234.1	73.5	46.9
232D	249.3	78.2	50.1
348A	254.9	83.5	53.3
348B	315.9	90.0	57.4
348C	354.5	96.1	61.5
348D	377.7	102.3	65.3

LRW Heat Loss Data

LRW Model	Standard Unit (kW)	Unit with Hood (kW)	With Hood & Insulation (kW)
18-2	9.7	8.5	6.4
18-3	13.5	10.5	6.7
18-4	15.8	11.4	7.3
18-5	18.2	12.3	7.9
30-2	15.2	12.9	8.5
30-3	21.1	13.2	8.8
30-4	25.5	14.4	9.1
30-5	28.7	15.5	10.0
45-3	32.2	17.3	11.1
45-4	39.0	18.8	12.0
45-5	43.7	20.2	12.9
45-6	46.6	21.4	13.8
60-3	43.1	21.7	13.8
60-4	52.2	23.4	14.9
60-5	58.6	24.9	16.1
60-6	62.4	26.7	17.3
72-3	49.8	22.6	14.4
72-4	60.1	24.3	15.5
72-5	67.7	26.1	16.7
96-4	80.9	29.6	18.8
96-5	90.8	31.4	20.2
96-6	96.7	33.4	21.4

Discharge Hood Dimensions

LSWA Tapered Discharge Hood Dimensions

Model No.	H (mm)	L (mm)	W (mm)	Weight (kg)	Number of Hoods
LSWA 20	838	1826	537	95	1
LSWA 30	838	2724	537	125	1
LSWA 41	838	3645	537	160	1
LSWA 61	838	5486	537	220	1
LSWA 58	1003	3645	740	205	1
LSWA 87	1003	5486	740	280	1
LSWA P91	1083	3651	1159	280	1
LSWA P135	1083	5486	1159	380	1
LSWA P182	1083	3651	1159	560	2
LSWA P270	1083	5486	1159	755	2
LSWA 116	1280	3648	1476	350	1
LSWA 174	1280	5486	1476	480	1
LSWA 232	1280	3648	1476	705	2
LSWA 348	1280	5486	1476	955	2

LSWA Straight-Sided Discharge Hood Dimensions

Model No.	H (mm)	L (mm)	W (mm)	Weight (kg)	Number of Hoods
LSWA 20	762	1826	1156	80	1
LSWA 30	762	2724	1156	115	1
LSWA 41	762	3645	1156	135	1
LSWA 61	762	5486	1156	180	1
LSWA 58	762	3645	1575	150	1
LSWA 87	762	5486	1575	225	1
LSWA P91	762	3651	2426	205	1
LSWA P135	762	5486	2426	280	1
LSWA P182	762	3651	2426	410	2
LSWA P270	762	5486	2426	560	2
LSWA 116	762	3648	3026	285	1
LSWA 174	762	5493	3026	390	1
LSWA 232	762	3648	3026	565	2
LSWA 348	762	5493	3026	775	2

LRW Tapered Discharge Hood Dimensions

Model No.	H (mm)	L (mm)	W (mm)	Weight (kg)	Number of Hoods
LRW 18	622	1826	483	105	1
LRW 30	997	1826	737	175	1
LRW 45	997	2724	737	235	1
LRW 60	997	3648	737	310	1
LRW 72	1080	2724	1080	355	1
LRW 96	1080	3648	1080	440	1

LRW Straight-Sided Discharge Hood Dimensions

Model No.	H (mm)	L (mm)	W (mm)	Weight (kg)	Number of Hoods
LRW 18	749	1826	1029	170	1
LRW 30	749	1826	1540	215	1
LRW 45	749	2724	1540	310	1
LRW 60	749	3648	1540	390	1
LRW 72	749	2724	2388	445	1
LRW 96	749	3648	2388	565	1

SMART SHIELD® Soild Chemical Water Treatment System

The LSWA/LRW is available with EVAPCO's **Factory Mounted** water treatment systems. EVAPCO offers a soild chemical solution for water treatment to maintain your heat transfer efficiency and extend the life of the equipment. Each system has been specifically designed for your cooler.

EVAPCO's Water Systems offer LSWA/LRW owners a single-souce of responsibility for equipment, water treatment, and service. Smart Shield® is manufactured and warranted by EVAPCO.

Benefits of adding an EVAPCO water treatment system include:

- **SAVES MONEY** by simplifying commission:
  - Single power connection is the only field installation requirement

- **Factory Mounting** your water treatment system ensures that it is installed to factory specifications.

- **Patented self-draining piping** eliminates the need for line insulation and heat tracing above the overflow level..

- **A Factory Authorized Service Partner** provides the first year of water system service and monitoring, to ensure proper operation and ongoing success.

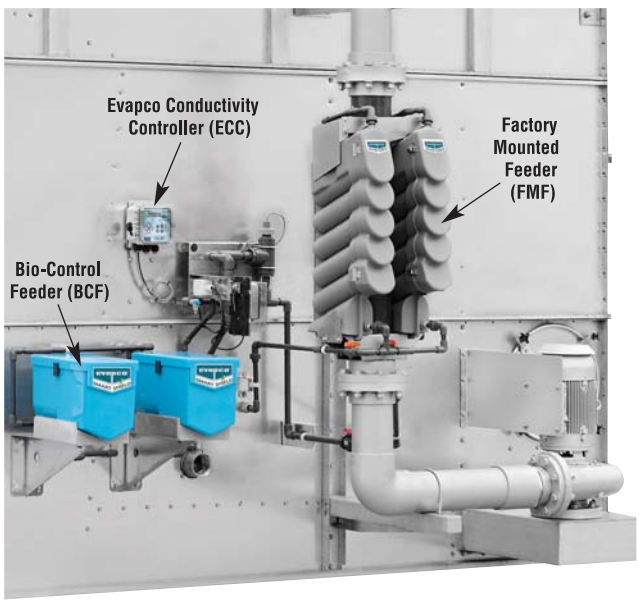
- **Conductivity control package** maximizes water efficiency and features:
  - Low maintenance non-fouling torodial probe
  - USB port for downloadable 60 day audit trail of system operation
  - Motorized blowdown valve that provides the most reliable bleed control with power open / spring return operation.

EVAPCO's **Smart Shield®** system utilizes proven soild chemistry delivered via our revolutionary feed system. Patented controlled relese scale and corrosion inhibitor is fed whenever your spray water pump is energized, keeping your system protected anytime the spray water pump is operating. **Smart Shield®** is a complete water treatment package that:

- Utilizes 'Bag in Bag' no touch chemical replenishments, making reloads easier and safer.

- Creates reduced packaging, shipping and handling providing a reduced carbon footprint compared to liquid chemicals.

- Eliminates the hazards associated with liquid chemicals, potential for liquid spills and the need for expensive feed pumps making it the easiest and safest chemical water treatment system available today.



Sound Reducing Options

Sound Attenuation Packages

The centrifugal fan design of the LSWA and LRW models operate at lower sound levels which make these units preferable for installations where noise is a concern. For noise-sensitive applications, the LSWA and LRW centrifugal fan models may be supplied with various stages of intake and/or discharge attenuation packages which greatly reduce sound levels.

Consult the factory for certified sound data for each sound attenuation option.

Fan Side Inlet Attenuation (LRW Only)

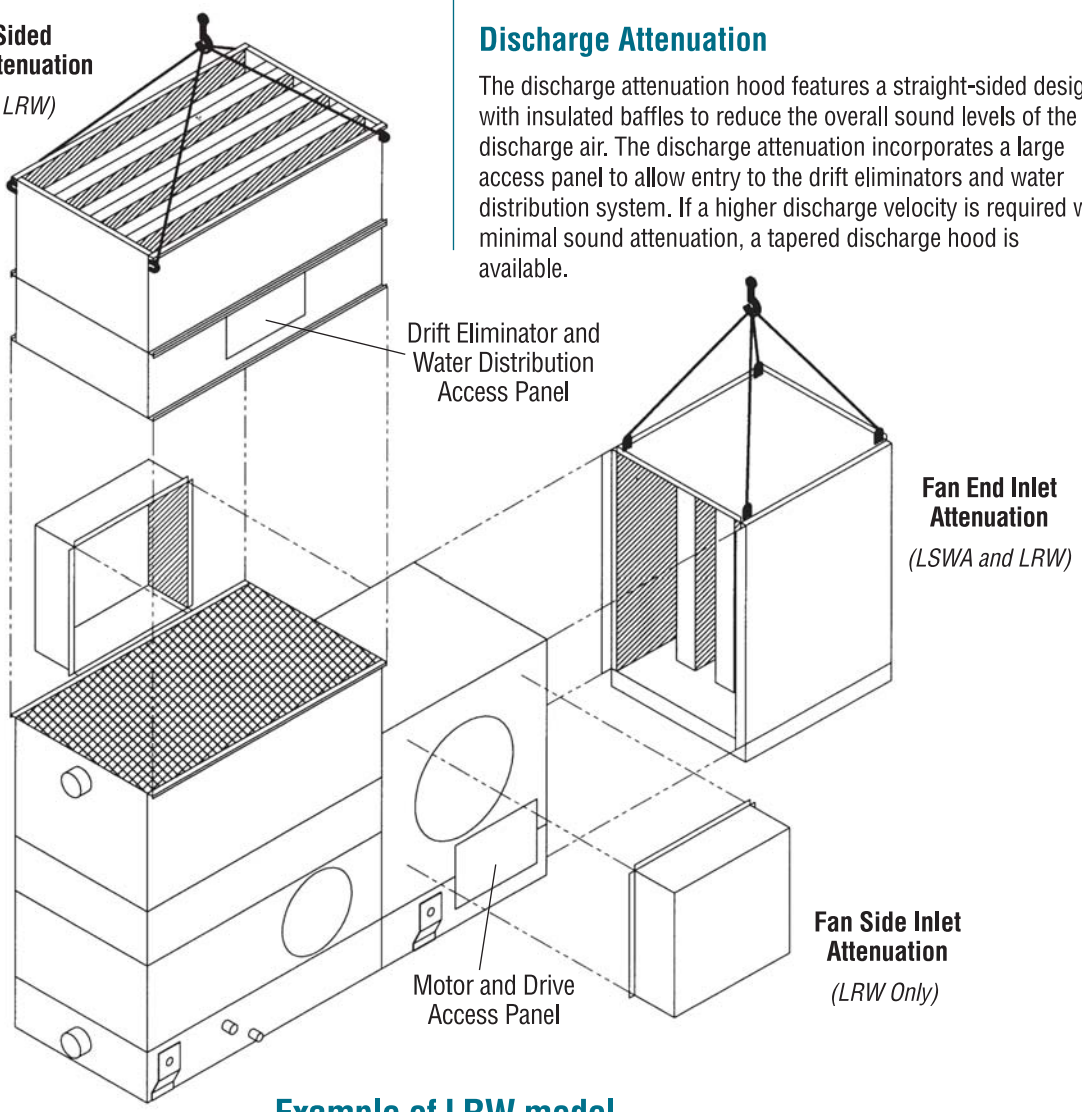
Reduces sound radiated from the fan side air intakes and has an open side to allow for air entry. This attenuation package ships loose to be mounted in the field on each side of the closed circuit cooler over the fan intakes.

Fan End Inlet Attenuation

Reduces sound radiated through the end air intakes. It consists of baffled panels that change the path of the air entry and 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 for easy adjustment without having to enter the unit. Solid bottom panels are included with this option to force the inlet air through the attenuator.

Discharge Attenuation

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.



Example of LRW model

Discharge & Intake Attenuation Dimensions

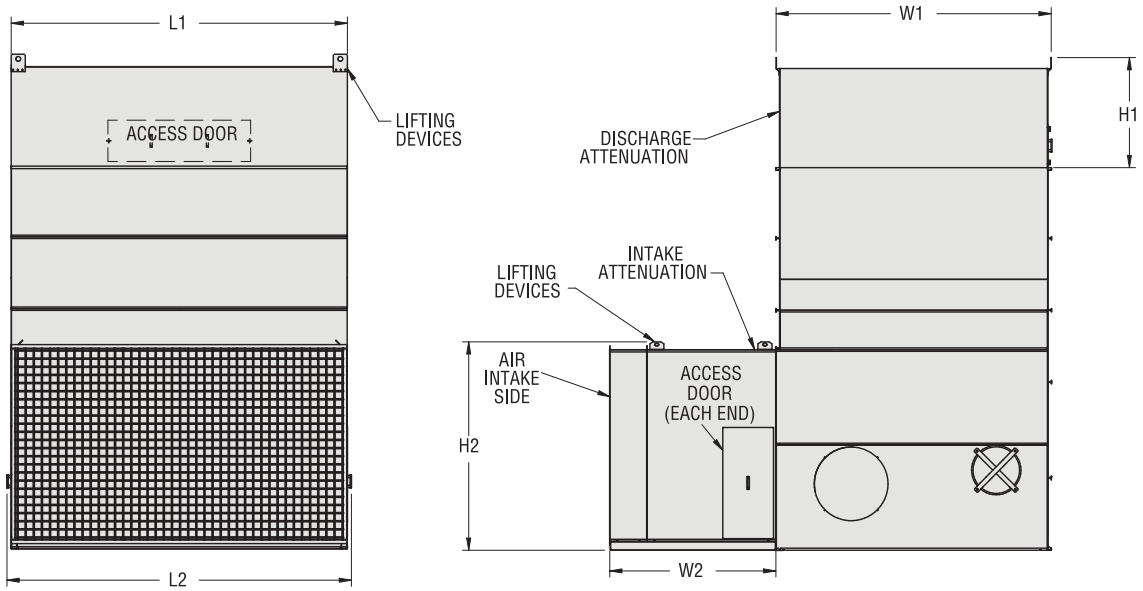
LSWA Discharge Attenuation Dimensions*

Model No.	H1 (mm)	L1 (mm)	W1 (mm)	Weight per Attenuator (kg)	Number of Attenuators
LSWA 20	1194	1823	1156	255	1
LSWA 30	1194	2724	1156	340	1
LSWA 41	1194	3645	1156	455	1
LSWA 61	1194	5486	1156	620	1
LSWA 58	1194	3645	1572	550	1
LSWA 87	1194	5486	1572	755	1
LSWA P91	1813	3651	2343	1040	1
LSWA P135	1813	5486	2343	1415	1
LSWA P182	1813	3651	2343	1040	2
LSWA P270	1813	5486	2343	1415	2
LSWA 116	1813	3645	3023	1230	1
LSWA 174	1813	5486	3023	1670	1
LSWA 232	1813	3645	3023	1230	2
LSWA 348	1813	5486	3023	1670	2

LSWA Intake Attenuation Dimensions*

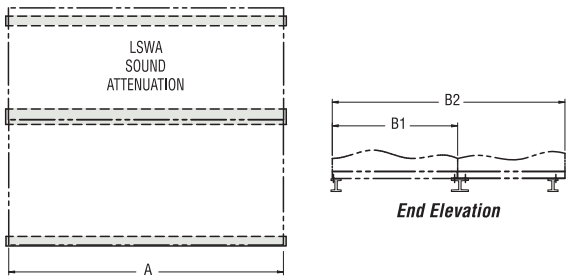
Model No.	H2 (mm)	L2 (mm)	W2 (mm)	Weight per Attenuator (kg)	Number of Attenuators
LSWA 20	1010	1895	1816	390	1
LSWA 30	1010	2819	1816	545	1
LSWA 41	1010	3740	1816	695	1
LSWA 61	1010	5582	1816	1015	1
LSWA 58	1175	3740	1816	750	1
LSWA 87	1175	5582	1816	1090	1
LSWA P91	2070	3743	1816	1015	1
LSWA P135	2070	5582	1816	1455	1
LSWA P182	2070	3693	1816	1015	2
LSWA P270	2070	5534	1816	1455	2
LSWA 116	2261	3747	1816	1055	1
LSWA 174	2261	5588	1816	1540	1
LSWA 232	2261	3696	1816	1055	2
LSWA 348	2261	5540	1816	1540	2

* Attenuation dimensions may vary slightly from catalog. See Factory certified prints for exact dimensions.



LSWA Attenuation

Note: Intake sound attenuation must be fully supported. If the recommended steel suport is being used a third "I" beam is required for the intake attenuation. Refer to page 29.



Plan View

End Elevation

Discharge & Intake Attenuation Dimensions

LRW Discharge Attenuation Dimensions*

Model No.	H1 (mm)	L1 (mm)	W1 (mm)	Weight per Attenuator (kg)	Number of Attenuators
LRW 18	1102	1822	1029	305	1
LRW 30	1102	1822	1540	385	1
LRW 45	1102	2724	1540	530	1
LRW 60	1102	3648	1540	905	1
LRW 72	1102	2724	2388	710	1
LRW 96	1102	3648	2388	920	1

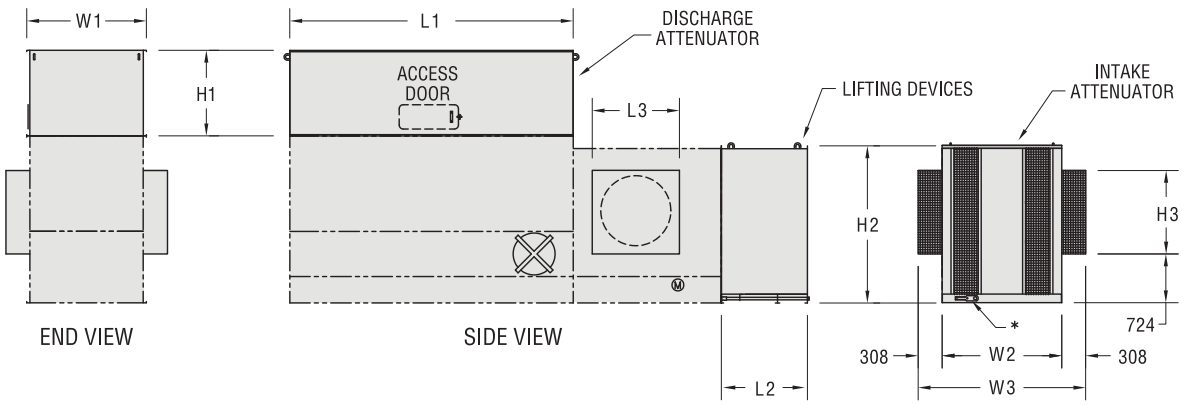
LRW Fan End Attenuation Dimensions*

Model No.	H2 (mm)	L2 (mm)	W2 (mm)	Weight per Attenuator (kg)	Number of Attenuators
LRW 18	1622	1029	1108	365	1
LRW 30	2022	1540	1105	580	1
LRW 45	2022	1540	1105	580	1
LRW 60	2022	1540	1105	580	1
LRW 72	2022	2394	1108	695	1
LRW 96	2022	2394	1108	695	1

LRW Fan Side Attenuation Dimensions*

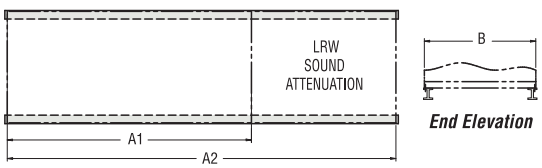
Model No.	H3 (mm)	L3 (mm)	W3 (mm)	Weight per Attenuator (kg)	Number of Attenuators
LRW 18	854	1645	883	27	2
LRW 30	937	2156	1372	27	2
LRW 45	937	2156	1372	27	2
LRW 60	937	2156	1372	27	2
LRW 72	1076	3010	1121	27	2
LRW 96	1076	3010	1121	27	2

* Attenuation dimensions may vary slightly from catalog. See Factory certified prints for exact dimensions.



LRW Attenuation

Note: Intake sound attenuation must be fully supported. If the recommended steel suport is being used a third "I" beam is required for the intake attenuation. Refer to page 29.
*External belt adjustment mechanism.



Plan View *End Elevation*

IBC Compliance

EVAPCO has been applying advanced structural technology to evaporative cooling equipments for many years. Following seismic events in the mid 1990's EVAPCO introduced the UB Series of induced draft cooling towers, fluid coolers and evaporative condensers. These products were designed, built and independently certified for extreme seismic and wind forces. With the advent of the International Building Code, EVAPCO is now offering a new line of LSWA & LRW Closed Circuit Coolers that is IBC compliant as standard construction.

What is IBC?

International Building Code

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. Compared to previous building codes that solely examined anchorage, the earthquake provisions contained within the International Building Code address anchorage, structural integrity, and operational capability of a component following a seismic event. The goal of the IBC is to minimize the loss of life and improve the capability of essential facilities to operate after a seismic event.

The International Building Code (IBC) was developed to replace the BOCA National Building Code, ICBO's Uniform Building Code and SBCCI's Standard Building Code. The International Building Code specifies that all components be designed to resist the equivalent seismic forces as the structure to which they are installed whereas previous building codes focused exclusively on the structure of the building to provide resistance against seismic forces. These components include all aspects of the building architectural, electrical and mechanical systems. The failure of these components during a seismic event has been a common occurrence in recent history. Although the structure of the building may be relatively undamaged from an earthquake, the damage to the nonstructural components could be significant and result in considerable secondary damage to the building (ie. flooding, fire, structural damage).

How Does IBC Apply to Evaporative Equipment?

Based on the project specified location and site design factors, calculations are made to determine the equivalent seismic "g force" and wind load on the unit. The Closed Circuit Cooler must be designed to withstand the greater of either the seismic or wind load.
The New LSWA and LRW are offered with a choice of TWO structural design packages:

- Standard Structural Design - For projects with ⩽ 1.0g seismic or 6.94kPa wind loads
- Upgraded Structural Design - Required for projects with >1.0 g seismic or 6.94kPa max wind loads

All locations with design criteria resulting in a seismic design force of up to 1.0g or a wind load of 6.94kPa or below will be provided with the standard LSWA or LRW structural design. An upgraded structural design is available for installations with design criteria resulting in "g forces" greater than 1.0g. The highest upgraded structural is designed for 5.12g and 6.94KPa wind loads.

Seismic Design

The IBC specifies that all installed components must meet the requirements of ASCE 7-05 (American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures) . Exemptions noted in the code are for all mechanical components assigned to seismic design categories A or B. ASCE 7-05 explicitly states that in addition to the attachment and supports, the component itself must be designed to withstand the seismic forces prescribed in the code. Simply stated, the code provisions require that evaporative cooling equipment and all other components permanently installed on a structure must meet the same seismic design criteria as the building.

Wind Design

The IBC code book includes a map of basic wind speed (3-second gust) by contour lines. However, local regulations may be more stringent than these published speeds.

Whichever design force-seismic or wind-is more severe for the building, governs the design of the building and all attached equipment.

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.

In order to achieve this goal, an architect or civil engineer is responsible for analyzing the soil and the design of a structure to determine the factors to be used. A mechanical consulting engineer and/or design build contractor applies these factors to advise the manufacturer on the proper design for the application. EVAPCO takes this information and determines the necessary equipment to meet IBC regulations. Evapco then determines the closed circuit cooler design requirements based on the IBC criteria. The standard LSWA or LRW design is independently certified to meet the 1g IBC compliance factors. For applications that require a more severe seismic duty, EVAPCO offers an optional 5.12g construction design. This process ensures that the mechanical equipment and its components are seismically compliant per the provisions of the International Building Code.

Independent Certification

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 Vibrations Mountings and Controls Group (VMC) to complete the independent equipment testing and analysis.

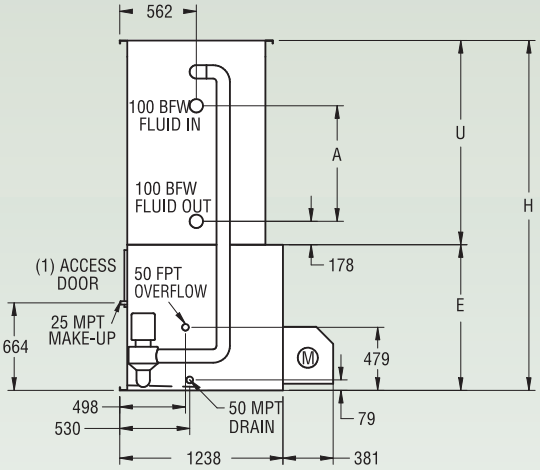
If the seismic "g force" or wind load kPa requirements for the project site are known, please contact your local EVAPCO Representative to choose the required structural design package - either standard construction or upgraded construction.

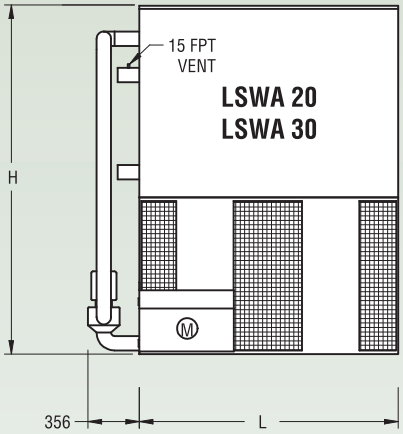
For further questions regarding IBC compliance, please contact your local EVAPCO Representative or visit www.evapco.com and www.evapcoasia.com.

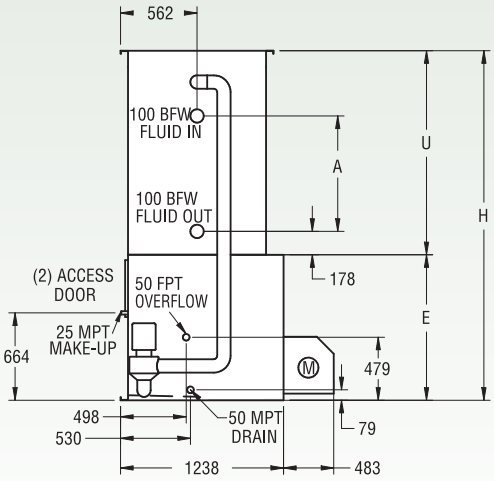
A sample of the certificate of compliance and unit label is presented below.

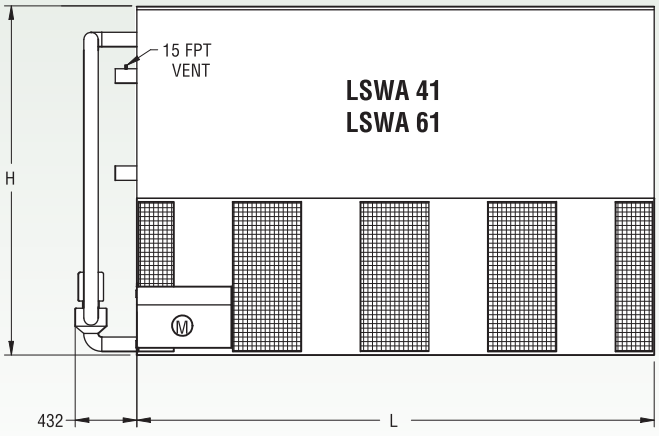
Engineering Data & Dimensions

LSWA Engineering Data & Dimensions LSWA Models 20AA to 61C









Note: The number of coil connections doubles when the flow rate exceeds 28 l/s on LSWA 20, LSWA 30, LSWA 41 and LSWA 61 models. This required option is referred to as the High Flow coil configuration.

LSWA Model Number†	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump△			Dimensions (mm)▲				
	Shipping	Heaviest Section*	Operating	kW	m^3/s	kW	l/s		Liters Required**	Conn. Size (mm)	Operating Weight (kg)	Height H	Length L	Lower E	Upper U	Coil A
LSWA 20AA	1,075	560††	1,495	4	5.7	0.55	7.6	126	303	100	1,305	2083	1826	1105	978	305
LSWA 20A	1,240	720	1,715	4	5.6	0.55	7.6	177	303	100	1,520	2273	1826	1105	1168	495
LSWA 20B	1,395	880	1,925	4	5.5	0.55	7.6	229	303	100	1,730	2464	1826	1105	1359	686
LSWA 20C	1,585	1,045	2,160	5.5	6.2	0.55	7.6	280	303	100	1,970	2654	1826	1105	1549	876
LSWA 30A	1,725	1,025	2,440	5.5	8.4	0.75	11.4	258	454	150	2,190	2273	2724	1105	1168	495
LSWA 30B	1,965	1,255	2,760	7.5	9.1	0.75	11.4	336	454	150	2,510	2464	2724	1105	1359	686
LSWA 30C	2,205	1,495	3,080	7.5	8.9	0.75	11.4	414	454	150	2,825	2654	2724	1105	1549	876
LSWA 41A	2,265	1,360	3,180	7.5	11.2	1.1	15.5	338	644	150	2,905	2273	3651	1105	1168	495
LSWA 41B	2,630	1,675	3,650	11	12.6	1.1	15.5	443	644	150	3,375	2464	3651	1105	1359	686
LSWA 41C	2,925	1,970	4,050	11	12.4	1.1	15.5	548	644	150	3,785	2654	3651	1105	1549	876
LSWA 61A	3,305	2,000	4,620	11	16.9	1.5	23.0	499	946	200	4,080	2273	5486	1105	1168	495
LSWA 61B	3,790	2,460	5,265	15	18.2	1.5	23.0	657	946	200	4,730	2464	5486	1105	1359	686
LSWA 61C	4,240	2,910	5,875	15	17.9	1.5	23.0	816	946	200	5,340	2654	5486	1105	1549	876

† Model Number will end in "-Z" for units with Series Flow piping configuration. Series Flow units may require additional coil connections and will require crossover piping.

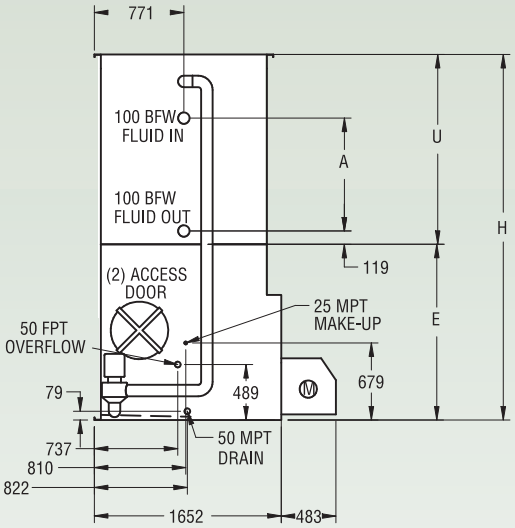
* Heaviest section is the coil section.

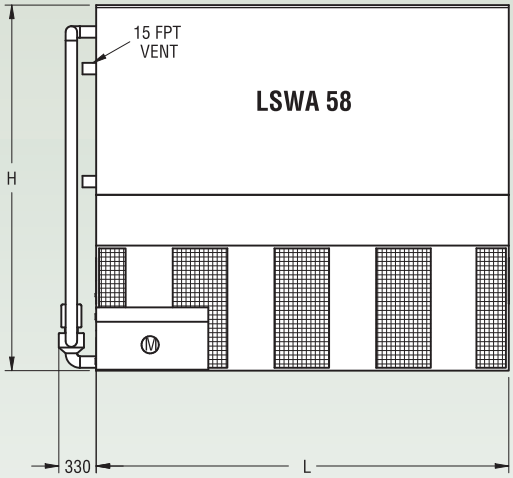
** Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm would normally be sufficient).

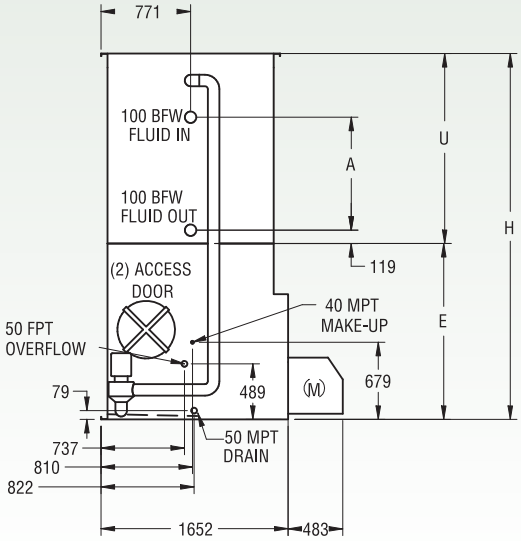
△ When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

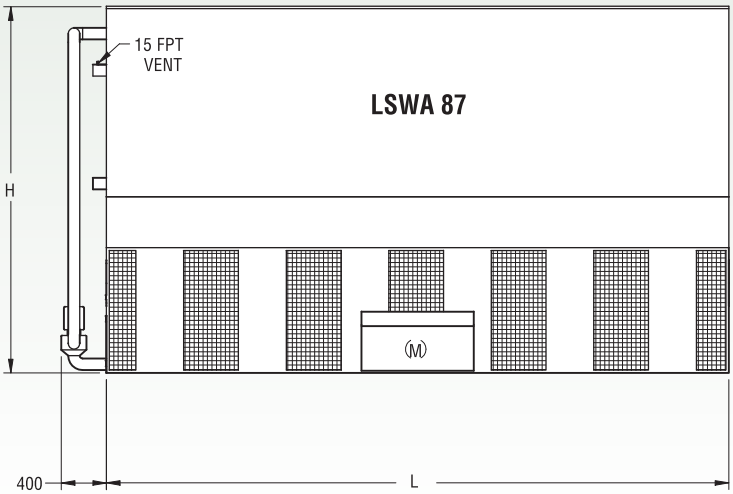
▲ Unit dimensions and coil connections may vary slightly from catalog. See factory certified prints for dimensions, quantity of coil connections, and piping configuration. Coil connections are 100mm bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

LSWA Engineering Data & Dimensions **LSWA Models 58A to 87D**









Note: The number of coil connections doubles when the flow rate exceeds 28 l/s on LSWA 58 and LSWA 87 models. This required option is referred to as the High Flow coil configuration.

LSWA Model Number†	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump△			Dimensions (mm)▲				
	Shipping	Heaviest Section*	Operating	kW	m³/s	kW	l/s		Liters Required**	Conn. Size (mm)	Operating Weight (kg)	Height H	Length L	Lower E	Upper U	Coil A
LSWA 58A	3,020	1,800	4,600	11	16.2	1.5	21.8	479	871	150	3,820	2797	3645	1553	1245	565
LSWA 58B	3,455	2,235	5,185	11	15.8	1.5	21.8	629	871	150	4,420	3013	3645	1553	1461	781
LSWA 58C	3,935	2,690	5,815	15	17.1	1.5	21.8	778	871	150	5,055	3229	3645	1553	1676	997
LSWA 58D	4,380	3,135	6,410	15	16.7	1.5	21.8	928	871	150	5,650	3445	3645	1553	1892	1213
LSWA 87A	4,485	2,700	6,750	15	23.4	2.2	32.5	708	1287	200	5,400	2797	5483	1553	1245	565
LSWA 87B	5,155	3,350	7,640	18.5	24.7	2.2	32.5	934	1287	200	6,285	3013	5483	1553	1461	781
LSWA 87C	5,840	4,035	8,550	18.5	24.2	2.2	32.5	1160	1287	200	7,210	3229	5483	1553	1676	997
LSWA 87D	6,525	4,705	9,465	22	25.2	2.2	32.5	1386	1287	200	8,135	3445	5483	1553	1892	1213

† Model Number will end in "-Z" for units with Series Flow piping configuration. Series Flow units may require additional coil connections and will require crossover piping.

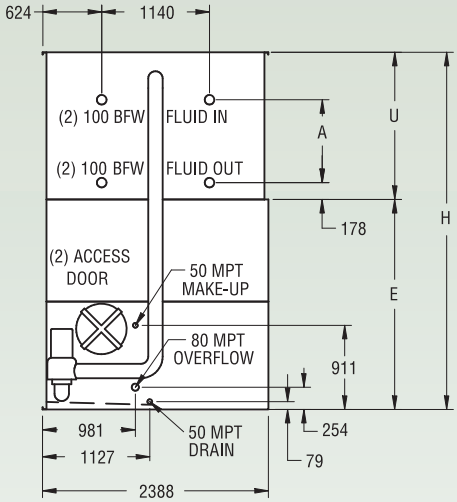
* Heaviest section is the coil section.

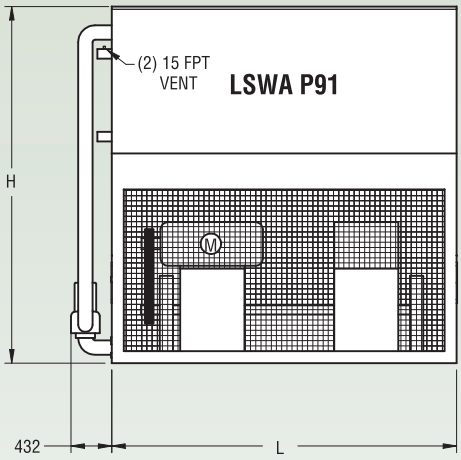
** Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm would normally be sufficient).

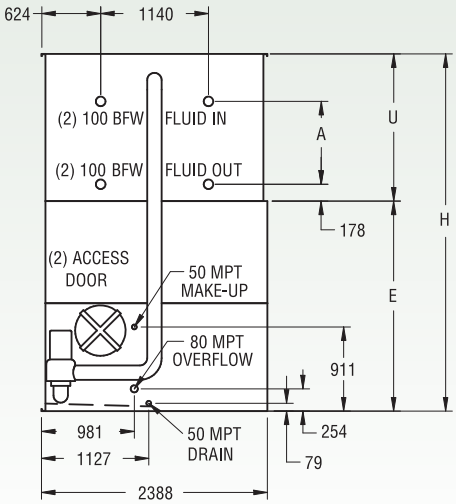
△ When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

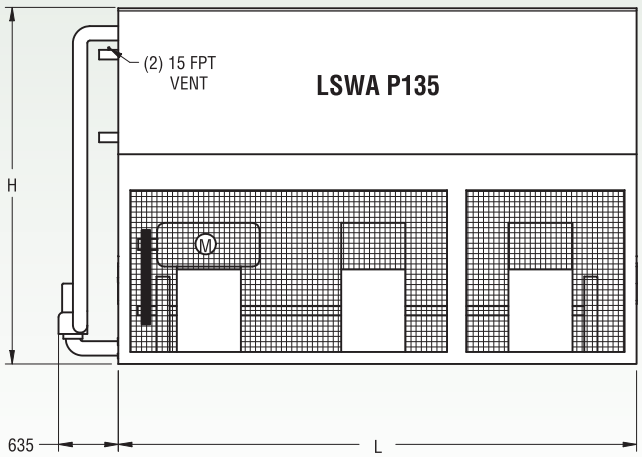
▲ Unit dimensions and coil connections may vary slightly from catalog. See factory certified prints for dimensions, quantity of coil connections, and piping configuration. Coil connections are 100mm bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

LSWA Engineering Data & Dimensions **LSWA Models P91A to P135D**









Note: The number of coil connections doubles when the flow rate exceeds 56 l/s on LSWA P91 and LSWA P135 models. This required option is referred to as the High Flow coil configuration.

LSWA Model Number†	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump△			Dimensions (mm)▲				
	Shipping	Heaviest Section*	Operating	kW	m^3/s	kW	l/s		Liters Required**	Conn. Size (mm)	Operating Weight (kg)	Height H	Length L	Lower E	Upper U	Coil A
LSWA P91A	4,395	2,665	6,680	18.5	24.7	4	36.0	756	1363	250	5,790	3394	3651	2219	1175	495
LSWA P91B	5,080	3,325	7,600	22	25.8	4	36.0	991	1363	250	6,760	3585	3651	2219	1365	686
LSWA P91C	5,790	3,965	8,550	30	27.8	4	36.0	1227	1363	250	7,755	3775	3651	2219	1556	876
LSWA P91D	6,455	4,625	9,450	30	27.2	4	36.0	1462	1363	250	8,710	3966	3651	2219	1746	1067
LSWA P135A	6,395	3,945	9,845	30	37.8	5.5	53.0	1117	2006	300	8,530	3394	5486	2219	1175	495
LSWA P135B	7,390	4,940	11,190	30	37.1	5.5	53.0	1472	2006	300	9,955	3585	5486	2219	1365	686
LSWA P135C	8,340	5,890	12,495	37	39.1	5.5	53.0	1827	2006	300	11,340	3775	5486	2219	1556	876
LSWA P135D	9,350	6,895	13,860	37	38.3	5.5	53.0	2183	2006	300	12,780	3966	5486	2219	1746	1067

† Model Number will end in "-Z" for units with Series Flow piping configuration. Series Flow units may require additional coil connections and will require crossover piping.

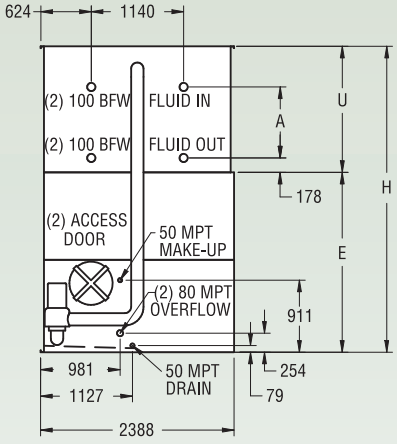
* Heaviest section is the coil section.

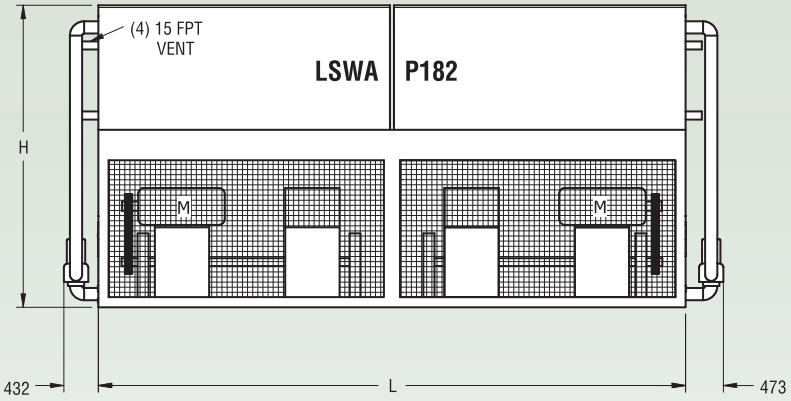
** Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm would normally be sufficient).

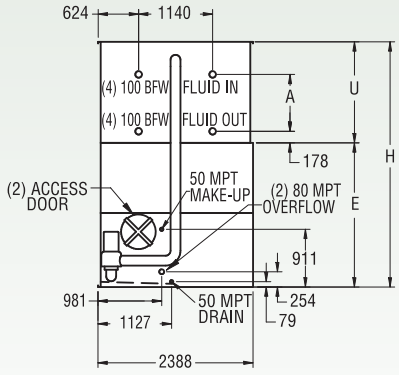
△ When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

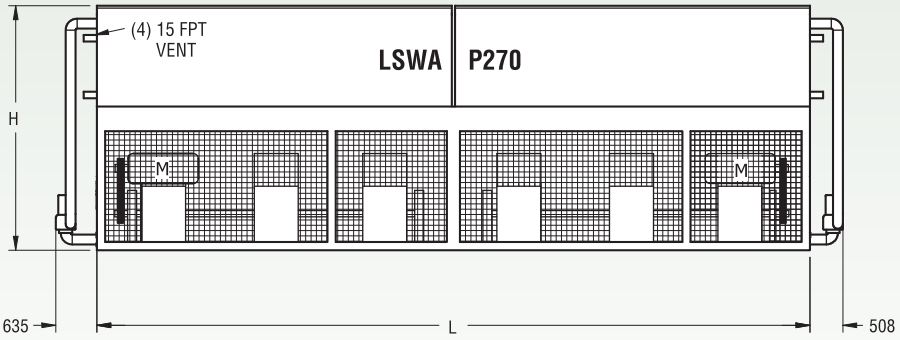
▲ Unit dimensions and coil connections may vary slightly from catalog. See factory certified prints for dimensions, quantity of coil connections, and piping configuration. Coil connections are 100mm bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

LSWA Engineering Data & Dimensions **LSWA Models P182A to P270D**









Note: The number of coil connections doubles when the flow rate exceeds 112 l/s on LSWA P182 and LSWA P270 models. This required option is referred to as the High Flow coil configuration.

LSWA Model Number†	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump△			Dimensions (mm)▲				
	Shipping	Heaviest Section*	Operating	kW	m³/s	kW	l/s		Liters Required**	Conn. Size (mm)	Operating Weight (kg)	Height H	Length L	Lower E	Upper U	Coil A
LSWA P182A	8,480	3,155	13,085	(2) 18,5	49.4	(2) 4	71.9	1512	2725	(2) 250	11,690	3394	7341	2219	1175	495
LSWA P182B	9,845	3,320	14,920	(2) 22	51.5	(2) 4	71.9	1983	2725	(2) 250	13,685	3585	7341	2219	1365	686
LSWA P182C	11,275	3,965	16,825	(2) 30	55.6	(2) 4	71.9	2453	2725	(2) 250	15,830	3775	7341	2219	1556	876
LSWA P182D	12,600	4,625	18,620	(2) 30	54.4	(2) 4	71.9	2924	2725	(2) 250	17,740	3966	7341	2219	1746	1067
LSWA P270A	12,450	4,560	19,390	(2) 30	75.6	(2) 5.5	106.0	2233	4013	(2) 300	17,365	3394	11024	2219	1175	495
LSWA P270B	14,445	4,945	22,095	(2) 30	74.1	(2) 5.5	106.0	2944	4013	(2) 300	20,220	3585	11024	2219	1365	686
LSWA P270C	16,360	5,895	24,715	(2) 37	78.2	(2) 5.5	106.0	3655	4013	(2) 300	23,020	3775	11024	2219	1556	876
LSWA P270D	18,355	6,895	27,430	(2) 37	76.7	(2) 5.5	106.0	4366	4013	(2) 300	25,875	3966	11024	2219	1746	1067

† Model Number will end in "-Z" for units with Series Flow piping configuration. Series Flow units may require additional coil connections and will require crossover piping.

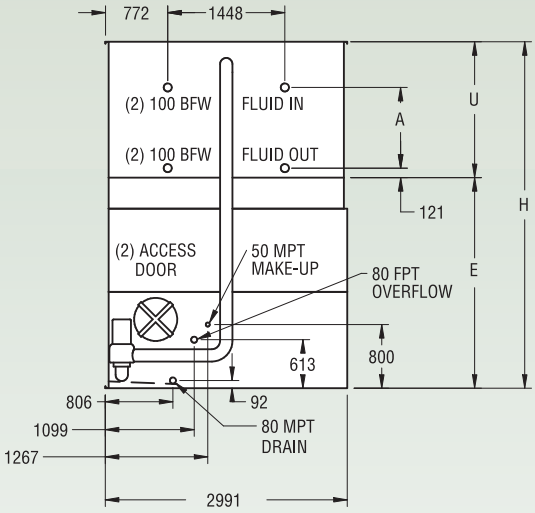
* Heaviest section is the coil section.

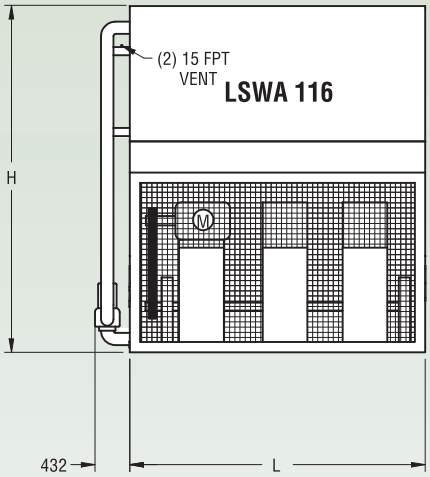
** Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm would normally be sufficient).

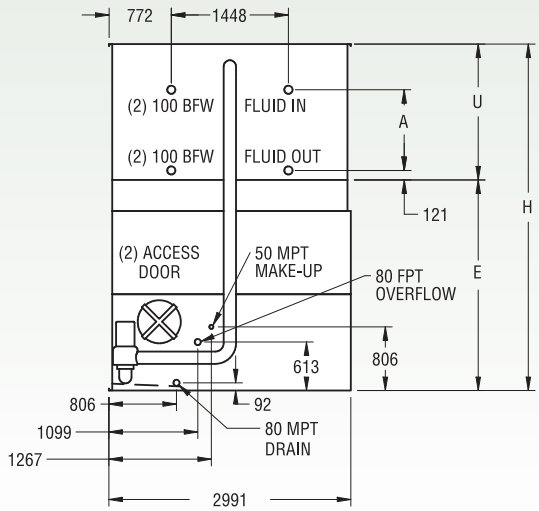
△ When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

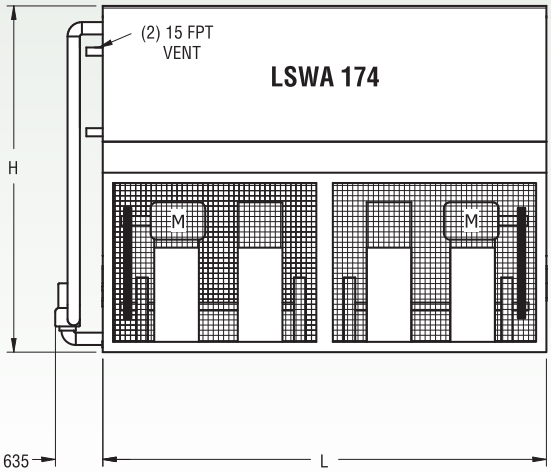
▲ Unit dimensions and coil connections may vary slightly from catalog. See factory certified prints for dimensions, quantity of coil connections, and piping configuration. Coil connections are 100mm bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

LSWA Engineering Data & Dimensions **LSWA Models 116A to 174D**









Note: The number of coil connections doubles when the flow rate exceeds 56 l/s on LSWA 116 and LSWA 174 models. This required option is referred to as the High Flow coil configuration.

LSWA Model Number†	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump△			Dimensions (mm)▲				
	Shipping	Heaviest Section*	Operating	kW	m^3/s	kW	l/s		Liters Required**	Conn. Size (mm)	Operating Weight (kg)	Height H	Length L	Lower E	Upper U	Coil A
LSWA 116A	5,865	3,575	8,800	30	35.5	4	43.2	959	1552	250	7,780	3851	3651	2604	1248	565
LSWA 116B	6,735	4,445	9,970	30	34.8	4	43.2	1258	1552	250	9,030	4067	3651	2604	1464	781
LSWA 116C	7,555	5,265	11,090	30	34.1	4	43.2	1557	1552	250	10,230	4283	3651	2604	1680	997
LSWA 116D	8,420	6,130	12,245	30	33.4	4	43.2	1855	1552	250	11,465	4499	3651	2604	1895	1213
LSWA 174A	8,490	5,230	12,915	(2) 18.5	50.2	5.5	65.0	1417	2271	300	11,320	3851	5493	2604	1248	565
LSWA 174B	9,810	6,505	14,685	(2) 22	52.3	5.5	65.0	1868	2271	300	13,190	4067	5493	2604	1464	781
LSWA 174C	11,040	7,735	16,365	(2) 22	51.3	5.5	65.0	2320	2271	300	14,990	4283	5493	2604	1680	997
LSWA 174D	12,320	9,015	18,095	(2) 22	50.2	5.5	65.0	2771	2271	300	16,835	4499	5493	2604	1895	1213

† Model Number will end in "-Z" for units with Series Flow piping configuration. Series Flow units may require additional coil connections and will require crossover piping.

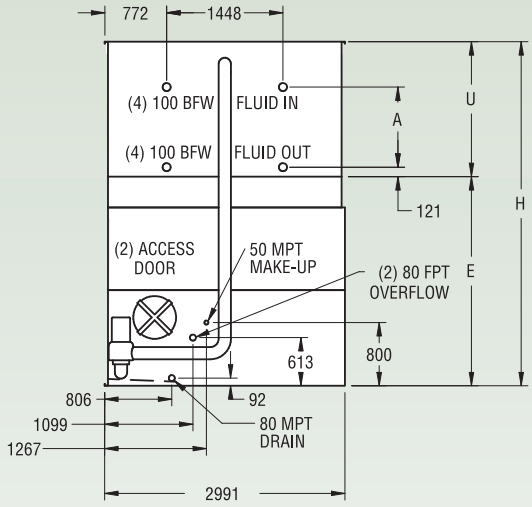
* Heaviest section is the coil section.

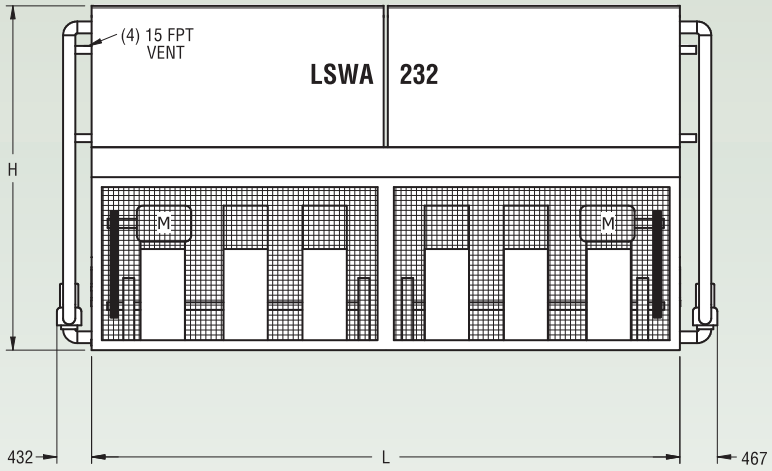
** Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm would normally be sufficient).

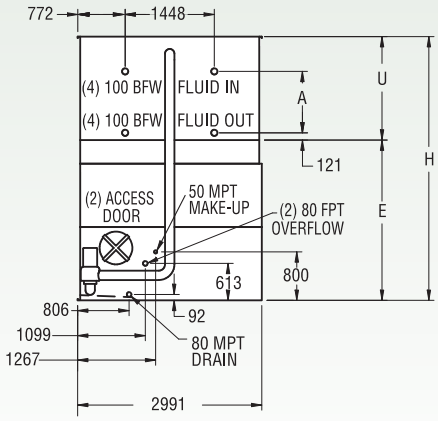
△ When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

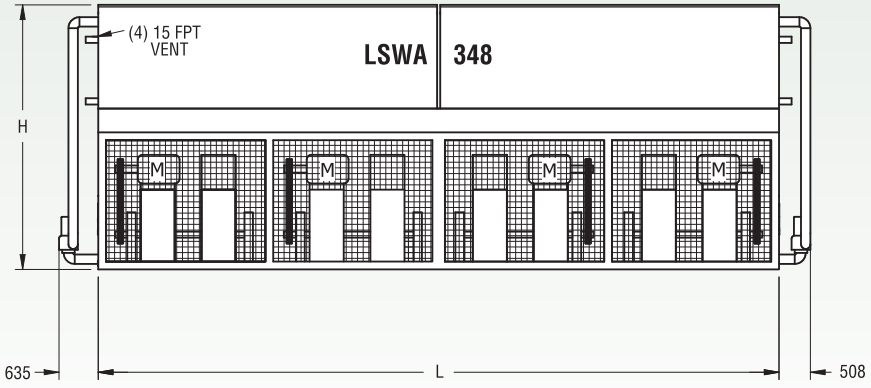
▲ Unit dimensions and coil connections may vary slightly from catalog. See factory certified prints for dimensions, quantity of coil connections, and piping configuration. Coil connections are 100mm bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

LSWA Engineering Data & Dimensions LSWA Models 232A to 348D









Note: The number of coil connections doubles when the flow rate exceeds 112 l/s on LSWA 232 and LSWA 348 models. This required option is referred to as the High Flow coil configuration.

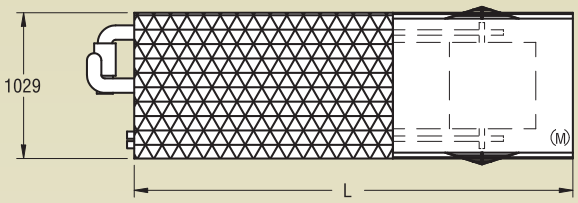
LSWA Model Number†	Weights (kg)			Fans		Spray Pump		Coil Volume (Liters)	Remote Sump△			Dimensions (mm)▲				
	Shipping	Heaviest Section*	Operating	kW	m³/s	kW	l/s		Liters Required**	Conn. Size (mm)	Operating Weight (kg)	Height H	Length L	Lower E	Upper U	Coil A
LSWA 232A	11,465	4,320	17,410	(2) 30	71.0	(2) 4	86.4	1918	3104	(2) 250	15,770	3851	7347	2604	1248	565
LSWA 232B	13,200	4,440	19,740	(2) 30	69.6	(2) 4	86.4	2515	3104	(2) 250	18,255	4067	7347	2604	1464	781
LSWA 232C	14,850	5,265	21,990	(2) 30	68.2	(2) 4	86.4	3113	3104	(2) 250	20,650	4283	7347	2604	1680	997
LSWA 232D	16,575	6,130	24,305	(2) 30	66.8	(2) 4	86.4	3711	3104	(2) 250	23,110	4499	7347	2604	1895	1213
LSWA 348A	16,955	6,495††	25,805	(4) 18.5	100.5	(2) 5.5	130.0	2833	5678	(2) 300	23,385	3851	11036	2604	1248	565
LSWA 348B	19,595	6,585††	29,345	(4) 22	104.7	(2) 5.5	130.0	3736	5678	(2) 300	27,205	4067	11036	2604	1464	781
LSWA 348C	22,055	7,735	32,710	(4) 22	102.6	(2) 5.5	130.0	4639	5678	(2) 300	30,810	4283	11036	2604	1680	997
LSWA 348D	24,605	9,010	36,155	(4) 22	100.5	(2) 5.5	130.0	5542	5678	(2) 300	34,490	4499	11036	2604	1895	1213

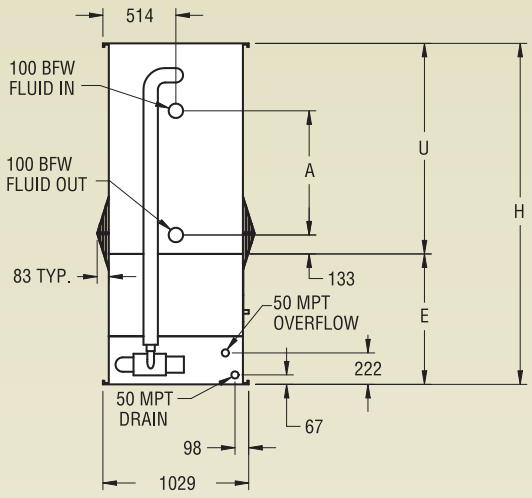
† Model Number will end in "-Z" for units with Series Flow piping configuration. Series Flow units may require additional coil connections and will require crossover piping.
* Heaviest section is the coil section.
** Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (300mm would normally be sufficient).
△ When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.
▲ Unit dimensions and coil connections may vary slightly from catalog. See factory certified prints for dimensions, quantity of coil connections, and piping configuration. Coil connections are 100mm bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

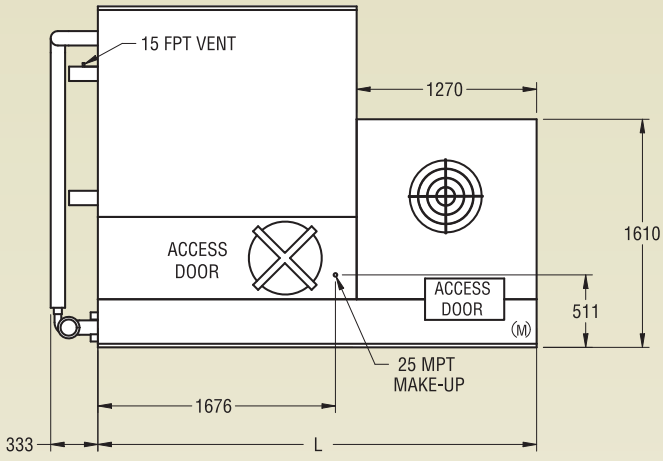
LRW

Engineering Data & Dimensions

LRW Models 18-2E to 18-5H







Note: The number of coil connections doubles when the flow rate exceeds 28 l/s on LRW 18 models. This required option is referred to as the High Flow coil configuration.

LRW Model Number†	Weights (kg)		Fans		Spray Pump		Coil Volume (Liters)	Remote Sump△			Dimensions (mm)▲				
	Shipping	Operating	kW	m^3/s	kW	l/s		Liters Required**	Conn. Size (mm)	Operating Weight (kg)	Height H	Length L	Lower E	Upper U	Coil A
LRW 18-2E	1,050	1,615	1.5	3.9	0.37	6.3	115	303	100	1,225	1835	3096	921	914	305
LRW 18-2F	1,055	1,620	2.2	4.5	0.37	6.3	115	303	100	1,235	1835	3096	921	914	305
LRW 18-2G	1,060	1,625	4	5.3	0.37	6.3	115	303	100	1,240	1835	3096	921	914	305
LRW 18-3F	1,205	1,825	2.2	4.4	0.37	6.3	162	303	100	1,435	2026	3096	921	1105	495
LRW 18-3G	1,210	1,830	4	5.2	0.37	6.3	162	303	100	1,440	2026	3096	921	1105	495
LRW 18-4F	1,365	2,030	2.2	4.3	0.37	6.3	208	303	100	1,640	2216	3096	921	1295	686
LRW 18-4G	1,370	2,030	4	5.1	0.37	6.3	208	303	100	1,645	2216	3096	921	1295	686
LRW 18-5G	1,540	2,260	4	5.0	0.37	6.3	255	303	100	1,875	2407	3096	921	1486	876
LRW 18-5H	1,565	2,275	5.5	5.8	0.37	6.3	255	303	100	1,890	2407	3096	921	1486	876

† Model Number will end in "-Z" for units with Series Flow piping configuration. Series Flow units may require additional coil connections and will require crossover piping.

** 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).

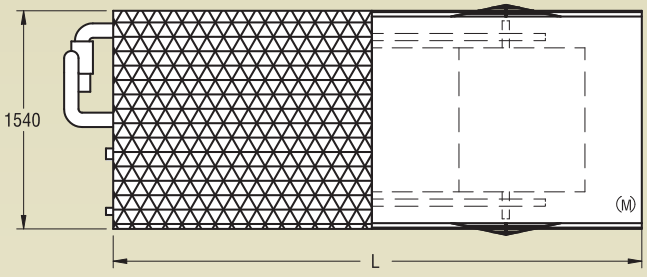
△ When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

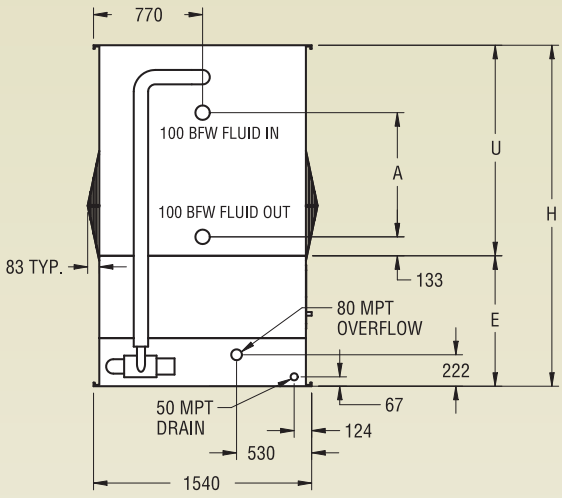
▲ Unit dimensions and coil connections may vary slightly from catalog. See factory certified prints for dimensions, quantity of coil connections, and piping configuration. Coil connections are 100mm bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

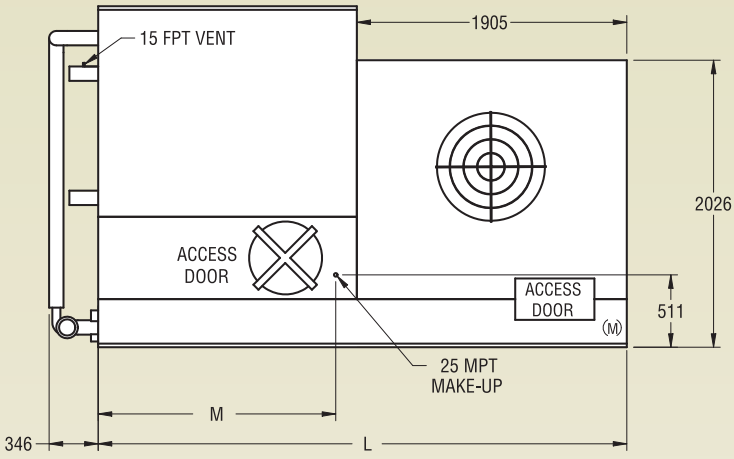
LRW

Engineering Data & Dimensions

LRW Models 30-2G to 60-6M







Note: The number of coil connections doubles when the flow rate exceeds 28 l/s on LRW 30, LRW 45 and LRW 60 models. This required option is referred to as the High Flow coil configuration.

LRW Model Number†	Weights (kg)		Fans		Spray Pump		Coil Volume (Liters)	Remote Sump△			Dimensions (mm)▲					
	Shipping	Operating	kW	m³/s	kW	l/s		Liters Required**	Conn. Size (mm)	Operating Weight (kg)	Height H	Length M	Length L	Lower E	Upper U	Coil A
LRW 30-2G	1,605	2,590	4	7.7	0.75	10.1	177	454	150	1,920	1835	1676	3731	921	914	305
LRW 30-2H	1,625	2,610	5.5	8.8	0.75	10.1	177	454	150	1,935	1835	1676	3731	921	914	305
LRW 30-3G	1,835	2,895	4	7.6	0.75	10.1	251	454	150	2,225	2026	1676	3731	921	1105	495
LRW 30-3H	1,850	2,910	5.5	8.7	0.75	10.1	251	454	150	2,240	2026	1676	3731	921	1105	495
LRW 30-4H	2,095	3,235	5.5	8.5	0.75	10.1	324	454	150	2,565	2216	1676	3731	921	1295	686
LRW 30-5H	2,365	3,585	5.5	8.3	0.75	10.1	397	454	150	2,910	2407	1676	3731	921	1486	876
LRW 45-3I	2,400	3,975	7.5	11.7	1.1	16.1	365	644	150	2,995	2026	2575	4629	921	1105	495
LRW 45-3J	2,450	4,025	11	13.4	1.1	16.1	365	644	150	3,045	2026	2575	4629	921	1105	495
LRW 45-4J	2,820	4,520	11	13.1	1.1	16.1	476	644	150	3,540	2216	2575	4629	921	1295	686
LRW 45-5J	3,215	5,035	11	12.8	1.1	16.1	588	644	150	4,055	2407	2575	4629	921	1486	876
LRW 45-6J	3,555	5,500	11	12.6	1.1	16.1	699	644	150	4,520	2597	2575	4629	921	1676	1067
LRW 60-3K	2,960	5,095	15	16.5	1.5	21.8	479	908	200	3,800	2051	3499	5553	921	1130	495
LRW 60-3L	2,965	5,100	18.5	17.7	1.5	21.8	479	908	200	3,805	2051	3499	5553	921	1130	495
LRW 60-4K	3,465	5,770	15	16.1	1.5	21.8	629	908	200	4,470	2242	3499	5553	921	1321	686
LRW 60-4L	3,470	5,775	18.5	17.4	1.5	21.8	629	908	200	4,475	2242	3499	5553	921	1321	686
LRW 60-5L	3,965	6,430	18.5	17.0	1.5	21.8	778	908	200	5,135	2432	3499	5553	921	1511	876
LRW 60-5M	3,975	6,440	22	18.1	1.5	21.8	778	908	200	5,150	2432	3499	5553	921	1511	876
LRW 60-6M	4,430	7,070	22	17.7	1.5	21.8	928	908	200	5,775	2623	3499	5553	921	1702	1067

† Model Number will end in "-Z" for units with Series Flow piping configuration. Series Flow units may require additional coil connections and will require crossover piping.

** 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).

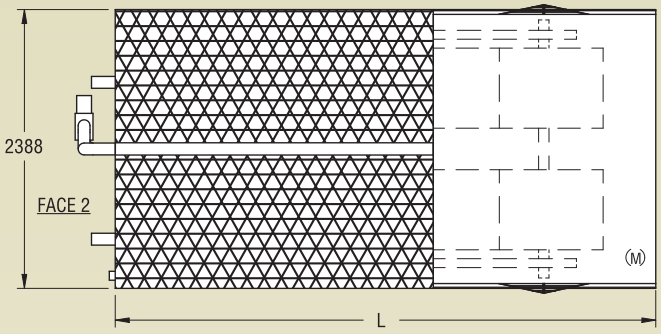
△ When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

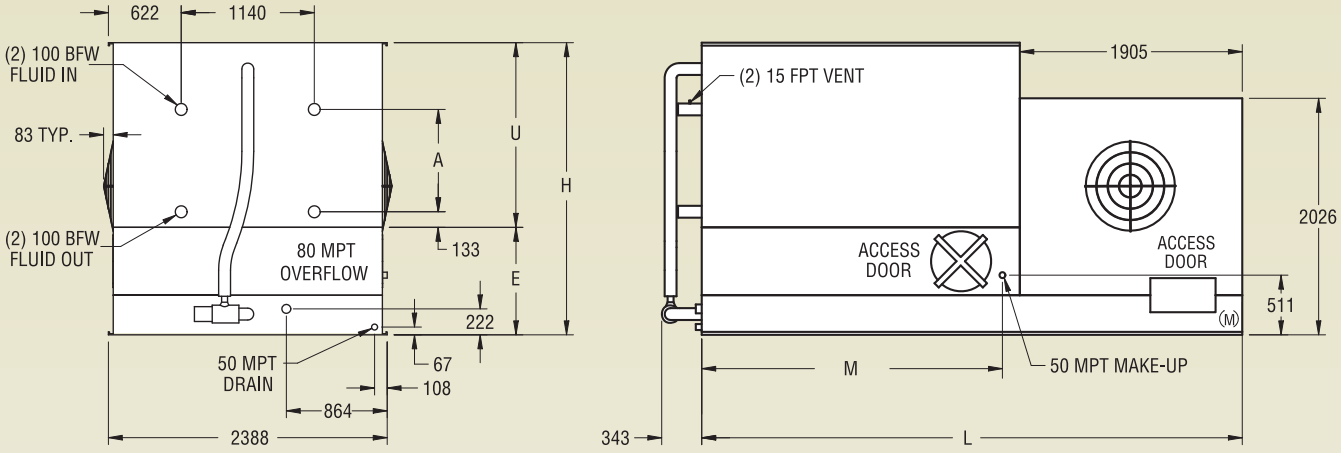
▲ Unit dimensions and coil connections may vary slightly from catalog. See factory certified prints for dimensions, quantity of coil connections, and piping configuration. Coil connections are 100mm bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

LRW

Engineering Data & Dimensions

LRW Models 72-3K to 96-6N





Note: The number of coil connections doubles when the flow rate exceeds 56 l/s on LRW 72 and LRW 96 models. This required option is referred to as the High Flow coil configuration.

LRW Model Number†	Weights (kg)		Fans		Spray Pump		Coil Volume (Liters)	Remote Sump△			Dimensions (mm)▲					
	Shipping	Operating	kW	m³/s	kW	l/s		Liters Required**	Conn. Size (mm)	Operating Weight (kg)	Height H	Length M	Length L	Lower E	Upper U	Coil A
LRW 72-3K	3,680	5,830	15	19.7	1.5	25.6	576	946	200	4,390	2121	2575	4629	921	1200	495
LRW 72-3L	3,685	5,835	18.5	21.3	1.5	25.6	576	946	200	4,395	2121	2575	4629	921	1200	495
LRW 72-4K	4,230	6,550	15	19.4	1.5	25.6	751	946	200	5,110	2311	2575	4629	921	1391	686
LRW 72-4L	4,235	6,555	18.5	20.8	1.5	25.6	751	946	200	5,115	2311	2575	4629	921	1391	686
LRW 72-5L	4,925	7,435	18.5	20.4	1.5	25.6	926	946	200	5,995	2502	2575	4629	921	1581	876
LRW 96-4L	5,110	8,340	18.5	24.3	2.2	34.4	991	1363	250	6,400	2311	3499	5553	921	1391	686
LRW 96-4M	5,125	8,350	22	25.9	2.2	34.4	991	1363	250	6,410	2311	3499	5553	921	1391	686
LRW 96-4N	5,255	8,480	30	28.5	2.2	34.4	991	1363	250	6,535	2311	3499	5553	921	1391	686
LRW 96-5M	5,875	9,350	22	25.3	2.2	34.4	1227	1363	250	7,405	2502	3499	5553	921	1581	876
LRW 96-5N	6,010	9,480	30	27.9	2.2	34.4	1227	1363	250	7,540	2502	3499	5553	921	1581	876
LRW 96-6N	6,720	10,445	30	27.3	2.2	34.4	1462	1363	250	8,500	2692	3499	5553	921	1772	1067

† Model Number will end in "-Z" for units with Series Flow piping configuration. Series Flow units may require additional coil connections and will require crossover piping.

** 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).

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

▲ Unit dimensions and coil connections may vary slightly from catalog. See factory certified prints for dimensions, quantity of coil connections, and piping configuration. Coil connections are 100mm bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

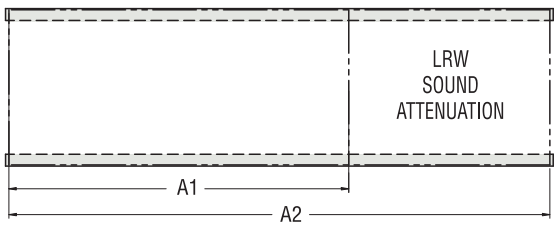
Steel Support

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

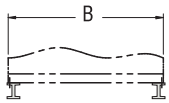
Beams should be level to within 1/360 of unit length, not to exceed 13mm before setting the unit in place. Do not level the unit by shimming between it and the "I" beams as this will not provide proper longitudinal support.

LRW Dimensions

Model No.	A1 (mm) (Unit Only)	A2 (mm) (Unit with Intake Atten.)	B (mm)
LRW 18	3096	4207	1029
LRW 30	3731	4842	1540
LRW 45	4629	5740	1540
LRW 60	5553	6664	1540
LRW 72	4629	5740	2388
LRW 96	5553	6664	2388



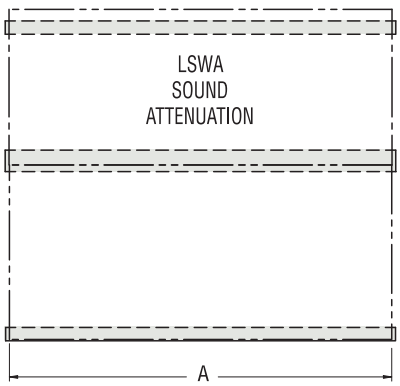
Plan View



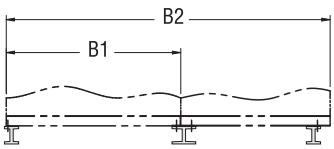
End Elevation

LSWA Dimensions

Model No.	B1 (mm) (Unit Only)	B2 (mm) (Unit with Intake Atten.)	A (mm)
LSWA 20	1235	219	1826
LSWA 30	1235	219	2724
LSWA 41	1235	219	3645
LSWA 61	1235	219	5486
LSWA 58	1661	3467	3645
LSWA 87	1661	3467	5490
LSWA P91	2388	4191	3651
LSWA P135	2388	4191	5486
LSWA P182	2388	4191	7341
LSWA P270	2388	4191	11030
LSWA 116	2991	4794	3648
LSWA 174	2991	4794	5493
LSWA 232	2991	4794	7334
LSWA 348	2991	4794	11020



Plan View



End Elevation

Part 1 – General

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

1.2 SUMMARY:
- A. This Section includes factory assembled and tested, closed-circuit forced-draft cooling tower (also known as a closed circuit cooler).

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

1.4 QUALITY ASSURANCE
- A. Verification of Performance:
  1. Test closed circuit cooler thermal performance according to CTI Standard 201.
  2. Test closed circuit cooler sound performance according to CTI ATC-128.

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

Part 2 – Products

2.1 MANUFACTURERS
- A. Manufactures: Subject to compliance with requirements, provide closed circuit cooler manufactured by one of the following:
  1. EVAPCO, Inc.
  2. Approved Substitute

2.2 MATERIALS
- A. Galvanized Sheet Steel casing and fan housing having G-235 designation.
- B. Optional Type 304 and/or 316 Stainless Steel as specified.

2.3 FORCED-DRAFT, CLOSED CIRCUIT COOLER
- A. Description: Factory assembled and tested, forced draft closed circuit cooler complete with heat transfer coil, fan(s), fan screens, accessories, and rigging supports.
- B. Closed Circuit Cooler Characteristics and Capacities: Refer to the Closed Circuit Cooler schedule.
- C. Fan(s):
  1. Type and Material: forward curved, centrifugal of hot-dipped galvanized construction. The fans shall be factory installed, and statically and dynamically balanced for vibration free operation.
  2. Fan Housing: The complete drive system, including the electric motor, belts, bearings, fan, and drives shall be completely enclosed in a protective housing which covers the drive system and provides sound reduction.
  3. Maximum sound pressure level of ____dB(A) measured at 1.5m from the fan inlet during full speed operation in accordance with CTI Standard ATC-128.
- D. Water Distribution System: Non-corrosive materials.
  1. Evenly distribute water over heat transfer coil with pressurized spray tree.
     a. Pipes: Schedule 40 PVC, Non-corrosive Materials
     b. Nozzles: Non-clogging, ABS Plastic, threaded into branch piping.
  2. Maximum pressure at inlet shall be ____ Pa.
- E. IBC Compliance: The unit structure shall be designed, analyzed, and constructed in accordance with the latest edition of the International Building Code (IBC) Regulations for seismic loads up to ____ g and wind loads up to ____ kPa.
- F. Collection Basin Material: Type 304 Stainless Steel (standard LRW, optional LSWA) or Heavy Gauge G-235 Galvanized Steel (standard LSWA, optional LRW) for long life and durability:
  1. Removable Type 304 Stainless Steel strainer with openings smaller than nozzle orifices.
  2. Joints: Bolted and sealed watertight.
  3. Overflow, Makeup and Drain connections: G-235 Galvanized Steel (MPT and FPT).
- G. Casing: Heavy Gauge G-235 Galvanized Steel or Type 304 Stainless Steel (Optional):
  1. Casing panels shall totally encase all sides of the heat transfer surface to protect it from direct exposure to environmental elements. All galvanized steel panel edges shall be coated with a 95% pure zinc compound during fabrication.
  2. Fasteners: Corrosion resistance equal to or better than materials being fastened.
  3. Joints: Sealed watertight.
  4. Welded Connections: Continuous and watertight
- H. Heat Transfer Coil: Heavy Gauge G-235 Galvanized Steel encased in a steel framework with the entire assembly hot-dip galvanized after construction or Type 304 Stainless Steel (Optional). The coil assembly shall be completely enclosed and protected from sunlight exposure, environmental elements and debris. The tubes shall be sloped for free drainage of the coil and designed for low pressure drop. The coil shall be pneumatically tested at 2.69MPa under water. The coil connections shall be Beveled for Weld or Flanged (Optional) or Grooved (Optional).
- I. Drift Eliminators: PVC, for long life and durability resistant to rot, decay and biological attack; formed, bonded together for strength and durability in block format for easy removal and replacement; self extinguishing with flame spread rating of 5 per ASTM E84-81a; 0.001% drift rate.
- J. Water Level Control: Brass mechanical makeup water valve and plastic float with an adjustable linkage.
- K. Water Recirculation Pump: Close-coupled, centrifugal type with mechanical seal. The pump motor shall be ____ kW totally enclosed for outdoor service on ____ volts, ____ hertz, and ____ phase.

2.4 MOTORS AND DRIVES
- A. General requirements for motors are specified in Division 23 Section “Motors”.
- B. Enclosure Type: TEFC
- C. Fan Motor Speed: VFD Duty (Option: 2-speed)
- D. Drive: Power Band Belt designed for 150% of the motor nameplate kW.
  1. Belt: V-belt type neoprene.
  2. Sheaves: Steel, taper lock design.
  3. Bearings: Heavy duty, self-aligning bearings with extended grease lines and fittings.
  4. Fan Shaft: Solid steel shaft (LRW). Hollow shaft with forged bearing journals (LSWA).
  5. Vibration Cutout Switch (Optional): Mechanical switch to de-energize fan motors if excessive vibration.

2.5 MAINTENANCE ACCESS
- A. Access Door: A circular access door shall be located above the basin to allow for easy access to the pan interior.
- B. Ladders (Optional): Aluminum, vertical complying with 29 CFR 1910.27.

2.6 SOUND ATTENUATION (OPTIONAL)
- A. Inlet Attenuation: Materials to be same as fan section. Baffled panels shall change the path of air entry and capture radiated noise. External belt adjustment and lubrication points shall be provided.
- B. Discharge Attenuation: Straight-sided discharge hood with insulated baffles to reduce the overall sound level of the discharge air. A large access panel to allow access to the water distribution system and drift eliminators shall be provided.

Notes:

EVAPCO PRODUCTS ARE MANUFACTURED WORLDWIDE.

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