Maintenance Instructions

evapco

COOLING TOWERS, CLOSED CIRCUIT COOLERS EVAPORATIVE CONDENSERS

FOR EVAPCO AUTHORIZED PARTS AND SERVICE, CONTACT YOUR LOCAL MR. GOODTOWER SERVICE PROVIDER OR THE EVAPCO PLANT NEAREST YOU.

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Introduction

Congratulations on the purchase of your EVAPCO evaporative cooling unit. EVAPCO equipment is constructed of the highest quality materials and designed to provide years of reliable service when properly maintained.

Evaporative cooling equipment is often remotely located and periodic maintenance checks are often overlooked. It is important to establish a regular maintenance program and be sure that the program is followed. A clean and properly serviced unit will provide a long service life and operate at peak efficiency.

ATTENTION

- **Before carrying out any operation, turn off the power supply to all electrical parts presenr on the unit.**
- **For any work to be carried out on top of the unit, use ladders, protection and adequate safety measures against the risk of a fall, in accordance with safety requirements of the country in question.**
- **During maintenance operations, the worker must use personal precautions (gloves, helmet, masks, etc.) as prescribed by the country in question.**

Recirculated Water System

Evaporative cooling equipment rejects heat by evaporating a portion of the recirculated water spray and discharging it from the unit with the hot, saturated air. As the spray water evaporates, it leaves behind the mineral content and impurities of the supply water. If these residuals are not purged from the water distribution system, they will become concentrated and lead to scaling, corrosion, sludge build-up and biological fouling.

To avoid build-up of residuals in the water distribution system, water must be bled off from the system in an amount equal to the rate of evaporation. In addition, water quality should be checked to ensure that the chemistry is balanced and that the water system is free from biological contamination.

Bleed off

Evaporative condensers and closed circuit coolers are normally supplied with a pump assembly on the side of the unit which incorporates a bleed line and valve. It is recommended that the bleed valve on these units be opened fully to guarantee sufficient bleed volume. If the make-up water is is relatively free of impurities, it may be possible to decrease the bleed, but the unit must be checked periodically to make sure that no scale forms and that the water chemistry remains balanced.

Open cooling towers and coil products supplied without pumps need to have a bleed line installed on the discharge side of the system pump. A metering connection and globe valve should also be provided. The metering connection is used to determine the bleed water volume. The globe valve is used to regulate flow. The bleed line and valve should be large enough to allow bleed off of an amount of water equal to 1,6 (l/hr) x capacity (kW).

Water Treatment

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

Any water treatment system used in the unit must be compatible with the unit's materials of construction. Although high quality galvanized steel is used in most units, alternate materials of construction such as stainless steel (Type 304 or 316) are available as options.

If a chemical water treatment system is used, the chemicals selected must be accurately metered and concentrations properly controlled. See Table 1 for recommended levels.

Soft water systems should be avoided.

The use of acid should be avoided. If acid cleaning is required, only inhibited acids recommended for use with galvanized steel should be used.

Caution - Never batch load chemicals into unit. Always regulate chemical feed.

Parameter	Range
pH	6.5 to 8.0*
Hardness as $CaCO_3$	50 to 300 ppm
Alkalinity as $CaCO_3$	50 to 300 ppm
Chlorides as Cl	200 ppm Galvanized Steel

Table 1 - Recommended Water Chemistry

* Galvanized steel units may require routine passivation when operating with a pH of 8.3 or higher in order to prevent "white rust."

Chlorides as Cl	400 ppm Type 304 Stainless
Chlorides as Cl	4000 ppm Type 316 Stainless

Control of Biological Contamination

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

To minimize the risk of biological contamination, at initial start-up or after an extended shut down, it is recommended that the entire system (cooling tower, system piping, heat exchanger, etc.) be properly treated. Clean all debris such as leaves and dirt from the unit. Completely fill the basin to the overflow level with fresh water. Initiate a biocide water treatment or shock treatment program prior to operating the unit. It is preferable that all such procedures be conducted or supervised by your water treatment specialist.

Air Contamination

If the unit is located in an industrial area where there are chemical fumes, the impurities in the air will be washed out in the recirculated water and may cause scaling or corrosion. It is important not to locate the unit next to a smokestack because the unit will draw in these fumes and severely corrosive conditions may result. Bleed-off will help the situation, but if there is any sign of corrosion or scaling, a qualified water treatment company should be contacted.

Routine Maintenance of the Recirculated Water System

ATTENTION
Before carrying out this operation, clear the tension to the fan motor.

1. Strainer

The pan strainer should be removed and cleaned monthly or as often as necessary to keep it clean.

2. Pan

The pan should be flushed out quarterly or as often as necessary to keep down any accumulation of dirt.

3. Water Make-Up

The float and float valve should be checked monthly to make sure that the water level is correct. See Table 2.

At initial start-up or after the unit has been drained, the unit must be filled to overflow. Overflow is above the normal operating level and accommodates the volume of water normally in suspension and in the water distribution system.

The water level should always be above the strainer and pump suction. Check by running the pump with the fans off and observing the water level through the access door. Maintain make-up water pressure between 140 and 340 kPa.

4. Pressurized Water Distribution Systems - (Forced Draft and Counter-Flow Induced Draft)

Check the water distribution system monthly to make sure it is operating properly. On forced draft models, remove one or two eliminator sections from the top of the unit and observe the operation of the water distribution system. On induced draft models (except direct drive) lifting handles are provided along the top layer of eliminators. These can be easily removed from the access door and the distribution system observed. Always check the spray system with the pump on and the fans off. The diffusers are essentially non-clogging and should seldom need cleaning or maintenance.

If the water diffusers are not functioning properly, it is a sign that the pan strainer has not been working properly and that foreign matter or dirt have accumulated in the water distribution pipes. The nozzles can be cleared by taking a small pointed probed and moving it rapidly back and forth in the diffuser opening with the pumps running and the cooling load and fans off.

If an extreme build-up of dirt or foreign matter occurs, remove the end cap last two nozzles in each branch to flush the debris from the header pipe. The branches or header can be removed for cleaning, but do so only if necessary. Check the strainer in the pan to make sure it is in good condition and positioned properly so that cavitation or air entrainment does not take place. When inspecting and cleaning the water distribution system, always check that the orientation of the water diffusers is correct as shown below.

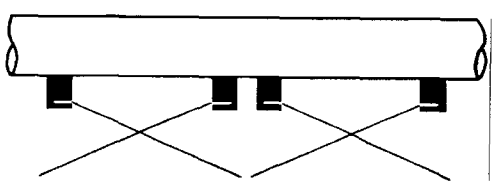

Figure 1 - Water Diffuser Orientation (Only for Cooling Towers)

Model Number				Operating Level
ICT	4-54	through	4-912	180 mm
AT/UAT AT/UAT	19-56 424-024	through through	224-918 428-948	230 mm 280 mm
LSTA LSTA LSTA LSTA	4-61 5-121 8P-121 10-121	through through through through	4-126 5-187 8P-365 10-366	230 mm 230 mm 230 mm 330 mm
LRT	3-61	through	8-128	200 mm
ATW ATW ATW	24 - 3G 48 - 3F 64- 3H	through through through	36 - 5F 48 - 5G 866 - 60	220 mm 260 mm 280 mm
LSWA LSWA LSWA LSWA	20 41 116 91	through through through through	30 87 348 270	260 mm 320 mm 450 mm 360 mm
LRW	18	through	96	200 mm
PMWA	116	through	348	450 mm
LSCB LSCB LSCB LSCB	36 135 400 281	through through through through	120 385 1610 1120	260 mm 320 mm 450 mm 360 mm
LRC	25	through	379	200 mm
ATC ATC ATC	50B 135B M170B	through through through	120B 165B 3459B	220 mm 260 mm 280 mm
PMCB PMCB PMCB	175 290 435	through through through	375 1550 1770	320 mm 450 mm 450 mm

Table 2 - Recommended Operating Water Level

5. Gravity Feed Water Distribution Systems - (Cross-Flow Induced Draft)

Cross-flow cooling towers use a gravity-feed distribution system. Hot water is pumped into distribution pans and is drained by gravity through a matrix of diffusers heads. The hot-water distribution pans and diffusers are accessed from the top of the unit by sliding back the FRP pan cover. The top of the anti-vortex type diffuser can be pulled off if necessary, allowing debris to be removed. The lower body of the diffuser can be removed by turning and pulling.

6. Bleed-Off Valve

The bleed-off valve, whether factory or field installed, must be checked weekly to make sure it is functioning and set properly. Keep the bleed-off valve wide open unless it has been determined that it can be set partially open without causing scaling or corrosion.

7. Pump (When Supplied)

The pump and pump motor should be lubricated and serviced in accordance with the pump manufacturer's instructions as supplied with the unit.

Drift Eliminators

Figure 2 shows the direction of discharge from the drift eliminators. Figures 3, 4 and 5 show the proper orientation for drift eliminators on LR and LS series units. Drift eliminators must be correctly replaced whenever they are removed during service. Improperly oriented drift eliminators may lead to recirculation. Orientation is not critical on induced draft units.

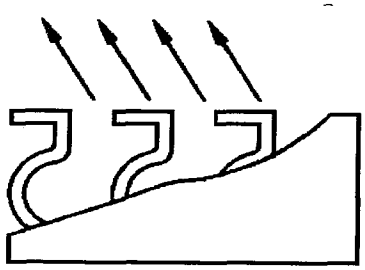

Figure 2 - Air Discharge from Drift Eliminators

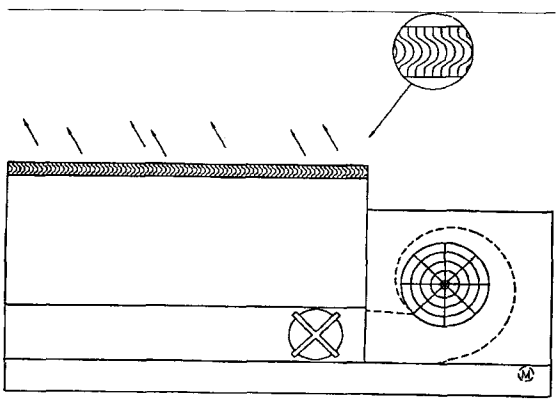

Figure 3 - Drift Eliminators on LR Units

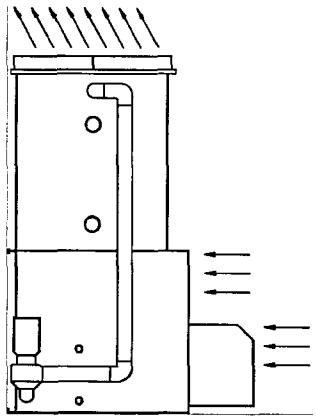

Figure 4 - Drift Eliminators on 1,2 and 1.5 m Wide LS Units

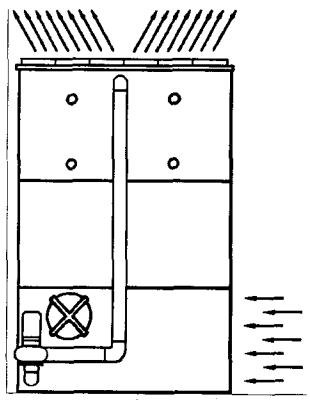

Figure 5 - Drift Eliminators on 2.4, 3.0 and 3.6 m Wide LS/PM Units

Freeze Protection

The simplest and most effective way of keeping the recirculated water from freezing is to use a remote sump. With a remote sump, the recirculating water pump is mounted remotely at the sump and whenever the pump is shut off, all recirculating water drains back to the sump. Recommendations for sizing the remote sump and recirculating water pumps for coil products are presented in their respective catalog bulletins. Contact your local EVAPCO representative for sizing remote sumps for cooling towers.

If a remote sump cannot be used, pan heaters are available. Either electric heaters, hot water coils, steam coils or steam injectors may be used to heat the basin water when the unit is shut down. However, the basin heater will not prevent the external water lines, pump or pump piping from freezing. The make-up water supply , overflow and drain lines, as well as the pump and pump piping up to the overflow level must be heat traced and insulated to protect them from damage.

A condenser or cooler cannot be operated dry (fans on, pump off) unless the water is completely drained from the pan. The pan heaters are sized to prevent pan water from freezing only when the unit is completely shut down.

Fan System

The fan systems of both centrifugal and propeller-driven units are rugged and should require minimal attention. However, the fan system should be checked regularly and lubricated at the proper intervals. The following maintenance schedule is recommended.

Fan Shaft Ball Bearings

Lubricate the fan shaft ball bearings every 1000 hours or every 3 months on induced draft units. Lubricate the fan shaft ball bearings every 2000 hours or every 6 months on forced draft units. Use any of the following waterproof, inhibited greases which are suitable for operation between 4 °C and 120 °C.

Mobil - SHC 32
Chevron - SRI
American - Rycon Premium
Shell - Alvania 3
or similar

Feed grease slowly or bearings seals may be damaged.

Most units are supplied with extended grease lines to allow easy lubrication of fan shaft bearings. Induced draft units up to 4.8 m wide with belt driven fans have extended lube fittings beside the fan casing access door. 3.6 and 7.2 m wide induced draft units have extended lube fittings located just inside the fan casing access door on the support rail. All large LS and PM series forced draft units have extended lube fittings at the front of the unit. LR series units have extended lube lines located at the side of the unit. Removal of fan screens is not necessary on forced draft units with extended lube lines.

Fan Shaft Sleeve Bearings

(1.2 m wide LS series units only)

Lubricate the intermediate sleeve bearing(s) with the oil provided in the rigging pack before start-up. The reservoir should be checked several times during the first week to ensure that the oil reserve is brought up to full capacity. After the first week of operation, lubricate the bearing(s) every 1000 hours or every 3 months. High temperatures or poor environmental conditions may necessitate more frequent lubrication. The oil reservoir consists of a large felt-packed cavity within the bearing. It is not necessary to maintain the oil level within the filler cup.

Use one of the following industrial grade, non-detergent mineral oils. **Do not use a detergent based oil or those designated heavy-duty or compounded.** Different oils may be required when operating at temperatures below -1°C continuously. Table 3 gives a short list of approved lubricants for each temperature range. **Most automotive oils are detergent based and may not be used.**

Ambient Temp	Texaco	Drydene	Exxon
-1°C to 38°C	Regal R&O 220	Paradene 220	Terrestic 220
-32°C to -1°C	Capella WF 32	Refrig. Oil 3G	———

Table 3 - Sleeve Bearing Lubricants

Oil Drippage may result from over-oiling or from using too light an oil. Should this condition persist with correct oiling, it is recommended that the next heavier weight oil be used.

All bearings used on EVAPCO equipment are factory adjusted and self-aligning. Do not disturb bearing alignment by tightening the sleeve bearing cap bolts.

Motor Bearings

EVAPCO uses only totally enclosed motors. Air over type motors (TEAO) have sealed bearings and do not require lubrication. Fan cooled motors (TEFC) require periodic lubrication. For these motors, please follow the guidlines given in the motor manufacturer's maintenance instructions.

Fan Drives

The fan belt tension should be checked at start-up and again after the first 24 hours of operation to correct for any initial stretch. On externally mounted belt-drive units, both J-type adjustment bolts on the motor base should have an equal amount of exposed thread for proper sheave and belt alignment. To check belt alignment on units with externally mounted motors, measure the distance from the motor base to the J-bolt mounting angles to ensure that both sides of the base are located the same distance from the unit. This should ensure that the sheaves are properly aligned since sheaves will have been pre-set at the factory. As a final check, lay a straight-edge from sheave to sheave. There should be four-point contact between the sheaves and the straight-edge. Adjust the position of the motor sheave if necessary.

Proper belt tension can be determined by pressing the belt with one finger about midway between the sheaves using moderate pressure. The belt should deflect about 20 mm on induced draft models and 13 mm on forced draft models. Check belt tension on a monthly basis.

On 3.6 and 7.2 m wide units with internally mounted motors, the motor base and adjusting screw should be lubricated with a high quality waterproof grease on an annual basis.

On 3.0 and 3.6 m wide vane-axial fan models and on LR models, a motor adjustment tool is provided to facilitate belt tensioning. The tool will be found threaded onto one of the motor adjustment all threads. To use, unthread and invert the tool, placing the hex end over the locknut. Tension the belts by turning the nut on the underside of the motor plate counterclockwise. When the belts are properly tensioned, tighten the locknut.

Gear Drives

Induced draft units with gear drive systems require special maintenance. Please refer to the gear manufacturer's recommended maintenance instructions. These will be enclosed and shipped with the unit.

Air Inlet

Inspect the air inlet louvers (induced draft units) or fans (forced draft units) monthly to remove any paper, leaves or other debris that may be blocking airflow into the unit.

Basin and Casing Materials

Clean and inspect the basin and casing materials inside and out once each year.

Galvanized Steel Construction

Heavy mill galvanizing provides an excellent corrosion resistant barrier for the substrate steel on an evaporative cooling unit. The zinc finish is a reactive metal which acts as a sacrificial anode to protect the steel substrate. Units that are operated within the recommended pH levels of 6.5 to 8.0 allow a surface barrier of non-porous zinc carbonate and zinc hydroxide to form which prevents rapid galvanic corrosion. This basic zinc carbonate barrier must be allowed to form in order to provide maximum protection for the mill galvanized steel.

In recent years, some evaporative cooling systems have experienced a phenomenon which results in the rapid formation of non-protective zinc carbonate cells. These deposits appear as white powdery cells and are considered to be a zinc corrosion by-product. Since the cells are porous, they will allow continued corrosion of the non-passivated galvanized surface. This type of corrosion is usually found in the wetted areas of the unit and is associated with operation at a pH of 8.0 or greater.

To prevent the formation of these porous zinc carbonate cells, the interior of the unit must be passivated during start-up and monitored periodically as part of the water treatment program. A qualified water treatment company can provide a treatment program which is designed to inhibit zinc corrosion while maintaining chemical concentrations within recommended levels. Since re-passivation may be necessary during normal operation, the water treatment program should be continually monitored.

Should any white cells begin to form, the system should be passivated with inorganic phosphate to prevent further cell formation. These deposits should not be removed with pressure washing, wire brushing or by any other mechanical means. For more information consult Evapco's Engineering Bulletin on white rust.

Stainless Steel Construction

Units constructed of stainless steel should be inspected annually to ensure that the surface areas remain clean and free of blemishes. Stainless steel surfaces may sometimes become tarnished due to iron contamination such as field weld spatter or due to severe atmospheric conditions such as acidity or salty air.

Any areas found with surface contamination on stainless steel components should be cleaned thoroughly to restore their appearance and to prevent further corrosion. All weld spatter should be scubbed using an abrasive pad or stainless steel bristle brush. Surface tarnish can be removed with a commercial grade stainless steel cleaner.

Stainless steel construction units that are near the sea or are exposed to high chloride or other harsh operating environments may experience surface tarnish that requires more frequent cleaning.

Maintenance of Painted Surfaces

Once a year, the protective paint of the outside the unit should be inspected and cleaned.
If there are any signs of corrosion, clean thoroughly with a wire brush and touch up with cold zinc.
Clean the casings of the fan motor, pump and inlet air grill.

Freeze Protection of Closed Circuit Fluid Cooler Coils

The simplest and most effective way of protecting the heat exchanger coil from freezing is to use an inhibited ethylene glycol anti-freeze. 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. A minimum recommended flow rate should also be maintained. See Table 4.

If an anti-freeze solution is not used, the coil must be drained immediately whenever the pumps are shut down or flow stops. This is accomplished by automatic drain valves and air vents in the piping to and from the cooler. Care must be taken to ensure that the piping is adequately insulated and sized to allow the water to flow quickly from the coil. This method of protection should be used only in emergency situations and is neither a practical nor recommended method of freeze protection. Coils should not be drained for an extended period of time.

When the unit is in operation during freezing weather, some type of capacity control is normally required in order to keep water temperatures from dropping below 10°C. Operating dry with a remote sump is an excellent way of reducing unit capacity at low temperatures. Other methods of capacity control include two-speed motors, VFDs, fan cycling and fan dampers (on forced draft units only). These can be used individually or in combination with dry / remote sump operation.

Unit Number				Minimum Flow (l/s)
ATW	24	through	48	4.4
ATW	64	through	166	8.8
ATW	192	through	332	17.6
ATW	166W	through	224W	17.6
ATW	144	through	240	25.0
ATW	286	through	478	50.0
ATW	290	through	482	50.0
ATW	576	through	960	100.0
LSWA	20	through	41	3.8
LSWA	58	through	87	4.7
LSWA	116	through	174	9.5
LSWA	232	through	348	19.0
LSWA	91	through	135	8.8
LSWA	182	through	270	17.6
LRW	18			3.3
LRW	30	through	60	4.7
LRW	72	through	96	8.8
PMWA	116	through	174	9.5
PMWA	232	through	348	19.0

Table 4 - Recommended minimum flow rates

Rigging and Assembly Instructions

evapco

LR SERIES FORCED DRAFT COOLING TOWERS, CLOSED CIRCUIT COOLERS AND EVAPORATIVE CONDENSERS

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Method of Shipment

All standard LR products ship fully assembled regardless of size. Only one lift is required. Options such as attenuation and/or discharge hoods will make additional lifts and some field assembly necessary. Those materials necessary for on site assembly (fasteners, sealer tape, etc.

Storage

Do not place tarps or other coverings over the top of the units if the units are to be stored before installation. Excessive heat can build up if the units are covered, causing possible damage to the PVC eliminators or PVC fill. For extended storage beyond six months rotate the fan and fan motor shaft(s) monthly. Also, the fan shaft bearing grease should be purged and regreased prior to start-up.

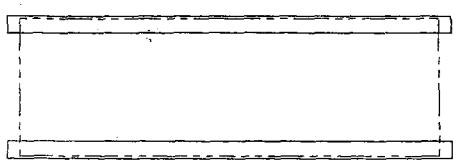
Structural Steel Support

Two structural "I" beams running the length of the unit are required to support the units. These beams should be located underneath the outer flanges of the unit (Figure 1). Mounting holes, 19 mm in diameter, are located in the bottom flange of the unit to provide for bolting to the structural steel (see certified print for exact bolt hole location).

Beams should be sized in accordance with accepted structural practices. Maximum deflection of the beam under the unit to be 1/360 of the unit length, not to exceed 13 mm. Deflection may be calculated by using 55% of the operating weight as a uniform load on each beam (see certified print for operating weight).

The supporting "I" beams should be level before setting the unit. Do not level the unit by shimming between the bottom flange and the beams as this will not provide proper longitudinal support.

Support beams and anchor bolts are to be furnished by others. Always refer to certified print for unit weights, dimensions and technical data.



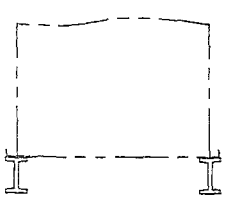


Figure 1 - Structural Steel

Rigging the Main Unit

Lifting devices are located on the sides of the unit near the bottom as shown in Figure 2. It is recommended that units be lifted using a boom oriented along the length of the unit with the cables straddling the unit at the lift points (Figure 2a). An alternative method is to lift the unit with a single hook, lashing the cables to the lift points on the unit directly (Figure 2b). Spreader bars are necessary in both cases to prevent damage to the sides of the unit.

When a boom is used, the distance "A" between the lift points on the boom should be set equal to the distance between the lift points on the unit and the crane hook must be located a minimum distance "H_1" above the top of the unit as shown in Figure 2a. When no boom is used, the crane hook must be a minimum distance "H_2" above the lifting points on the unit as shown in Figure 2b.

Table 1 shows minimum "H" dimensions and gives "A" dimensions for the different unit number.

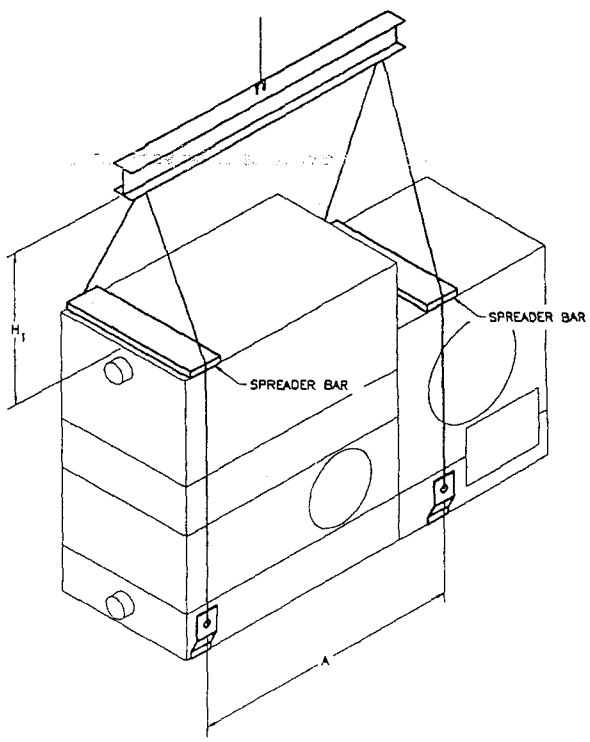


Figure 2a - Recommended Rigging - LR Main Unit

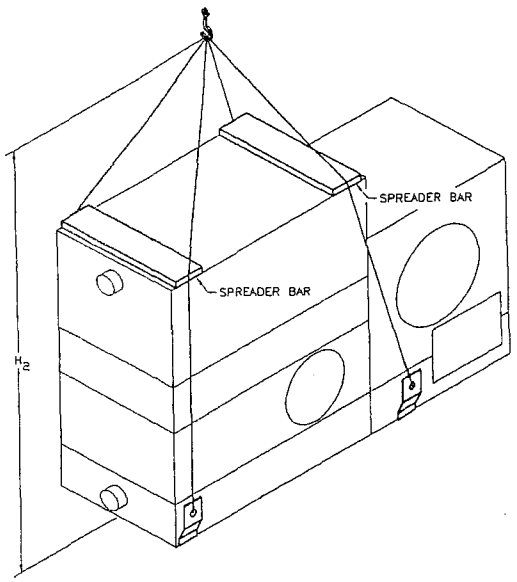


Figure 2b - Alternative Rigging - LR Main Unit

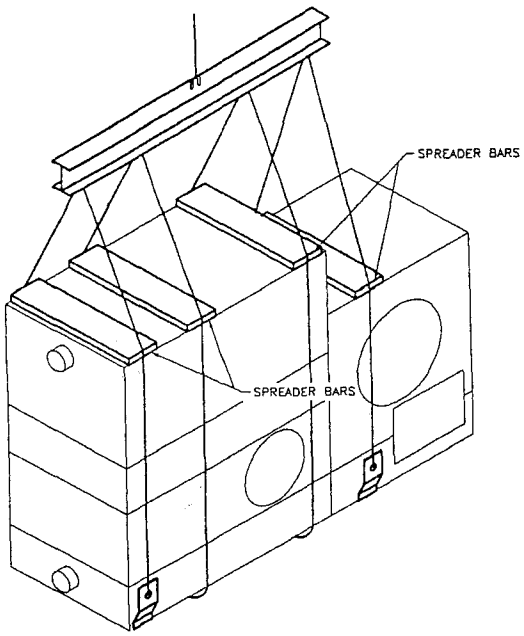


Figure 3a - Recommended Safety Sling Rigging

Unit Number				A (mm)	H_1 (mm)	H_2 (mm)
LRT LRC LRW	3-61 25 18-2E	thru thru thru	3-66 72 18-5H	2200	920	3060
LRT LRC LRW	5-61 76 30-2G	thru thru thru	5-69 114 30-5H	2590	1530	3660
LRT LRC LRW	5-91 108 45-3I	thru thru thru	5-96 183 45-6J	3480	1530	3970
LRT LRC LRW	5-121 190 60-3K	thru thru thru	5-127 246 60-6M	4300	1530	4270
LRT LRC LRW	8-91 188 72-3K	thru thru thru	8-97 269 72-5L	3380	2140	5190
LRT LRC LRW	8-121 249 96-4L	thru thru thru	8-128 379 96-6N	4420	2140	6100

Table 1 - Dimensional Guidelines for Lift Cables. Dimensions Refer to Drawings in Figure 2a - 2b.

Note: Always use safety slings for extended lifts or where any safety hazard exists.

Extended Lifts

The recommended method for extended lifts is to use slings under the unit (Figure 3a - 3b). Safety slings, spreaders and skids should be removed before final positioning of the unit.

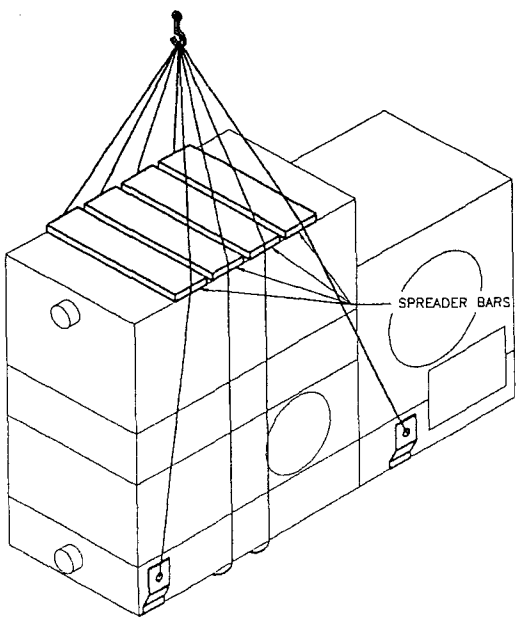


Figure 3b - Alternative Safety Sling Rigging

Rigging and Assembling Discharge and Intake Accessories

Intake sound attenuators and discharge hoods are not assembled to the main unit when shipped and must be separately rigged and assembled in the field. Three accessories fall into this group - the discharge hood assembly (may be straight or tapered), the fan-end sound attenuator assembly and fan side attenuators. These are shown mounted in Figure 4 and construction details are referenced to Figures 6,8 and 10 respectively.

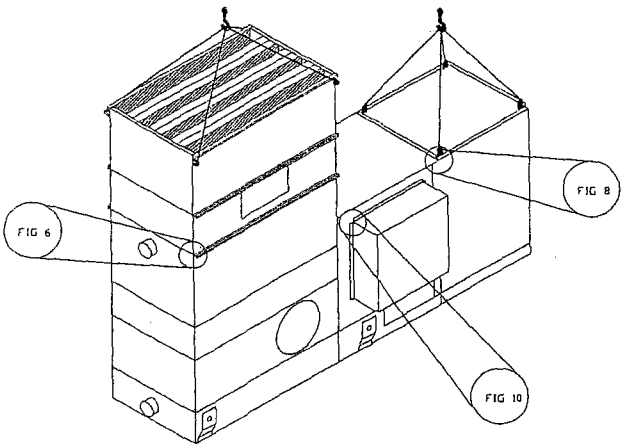


Figure 4 - Discharge and Intake Accessory Rigging

Rigging Discharge Hoods

Discharge Hoods may be either straight or tapered. Both must be rigged with a seperate lift after the main unit has been secured to the structural supports. The rigging for both types of hood is shown in Figure 5a - 5b. The lifting cables must be long enough to allow the crane hook to be a minimum dimension "H" above the top of the assembly. These "H" values are given in Table 2.

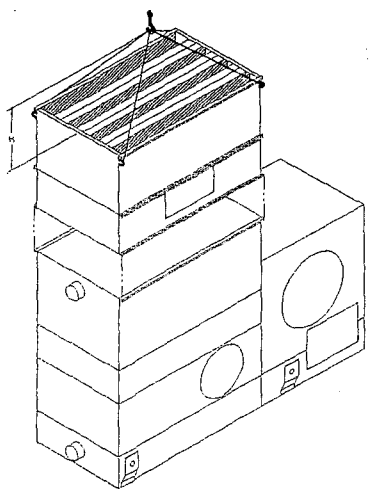


Figure 5a - Rigging Straight Discharge Hood

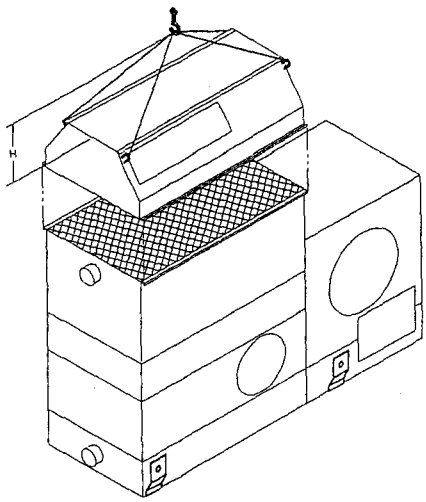


Figure 5b - Rigging Tapered Discharge Hood

Assembling Discharge Hoods

On galvanized units, discharge hoods are connected to the main unit with 8 mm self-tapping screws. Stainless steel units use 8 mm stainless steel nuts and bolts. Construction details referenced in Figure 4 are shown in Figure 6 below.

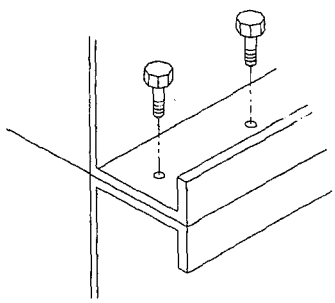


Figure 6 - Discharge Hood Assembly Details

Unit Number				H (mm)
LRT LRC LRW	3-61 25 18-2E	thru thru thru	3-66 72 18-5H	1830
LRT LRC LRW	5-61 76 30-2G	thru thru thru	5-69 114 30-5H	2140
LRT LRC LRW	5-91 108 45-3I	thru thru thru	5-96 183 45-6J	2750
LRT LRC LRW	5-121 190 60-3K	thru thru thru	5-127 246 60-6M	3360
LRT LRC LRW	8-91 188 72-3K	thru thru thru	8-97 269 72-5L	3050
LRT LRC LRW	8-121 249 96-4L	thru thru thru	8-128 379 96-6N	3970

Table 2 - "H" Dimensions for Disharge Hood

Rigging Fan End Sound Attenuation

Fan end sound attenuators must be rigged with a separate lift after the main unit has been secured to the structural supports. The rigging for the fan-end sound attenuator assembly is shown in Figure 7. The lifting cables must be long enough to allow the crane hook to be a minimum dimension "H" above the top of the assembly. These "H" values are given in Table 3.

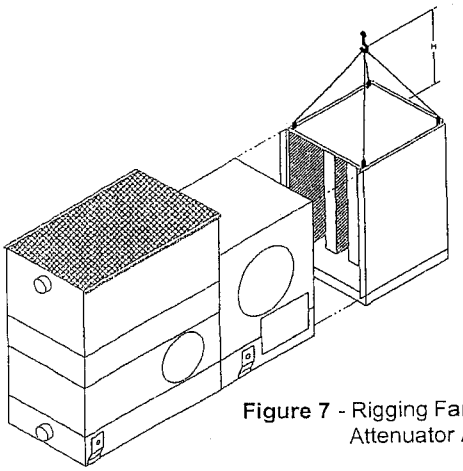


Figure 7 - Rigging Fan-End Sound Attenuator Assembly

Unit Number				H (mm)
LRT LRC LRW	3-61 25 18-2E	thru thru thru	3-66 72 18-5H	1220
LRT LRC LRW	5-61 76 30-2G	thru thru thru	5-69 114 30-5H	1530
LRT LRC LRW	5-91 108 45-3I	thru thru thru	5-96 183 45-6J	1530
LRT LRC LRW	5-121 190 60-3K	thru thru thru	5-127 246 60-6M	1530
LRT LRC LRW	8-91 188 72-3K	thru thru thru	8-97 269 72-5L	2440
LRT LRC LRW	8-121 249 96-4L	thru thru thru	8-128 379 96-6N	2440

Table 3 - "H" Dimensions for Fan-End Sound Attenuator Assembly

Assembling Fan-End Sound Attenuator Assembly

On galvanized units, the fan-end sound attenuator housing is secured on the sides and top with 8 mm self-tapping bolts. On stainless steel units, the fan-end sound attenuator housing is secured on the sides using 6 mm threaded machine bolts that are set into rivnuts located in the side panel of the main unit and on the top using 8 mm stainless steel nuts and bolts. Construction details referenced in Figure 4 are shown in Figure 8. At the time the fan-side attenuator is fitted to the main unit, be sure that the fan belt adjustment extension tube at the base of the fan-end sound attenuator assembly is properly mated with the hex head fitting at the main unit.

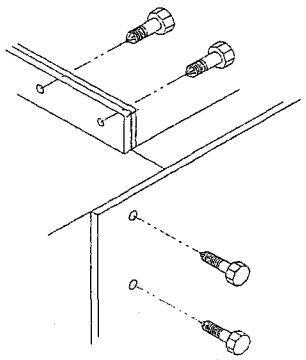


Figure 8 - Fan-End Sound Attenuator Assembly Details

Assembling Fan-Side Sound Attenuators

On galvanized units, the fan-side sound attenuators are secured to themain unit using 8 mm self-tapping bolts. On stainless steel units, it is secured using 6 mm threaded machine bolts which are set into rivnuts located in the side panel of the unit. Assembly is shown in Figure 9 and construction details referenced in Figure 4 are shown in Figure 10 below.

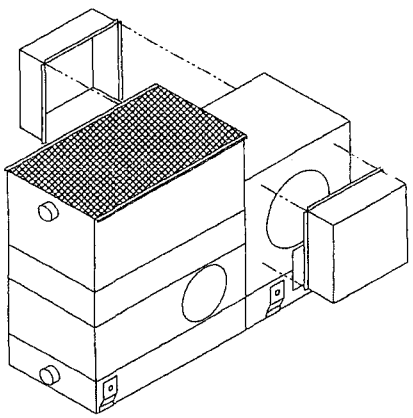


Figure 9 - Fan-Side Sound Attenuator Assembly

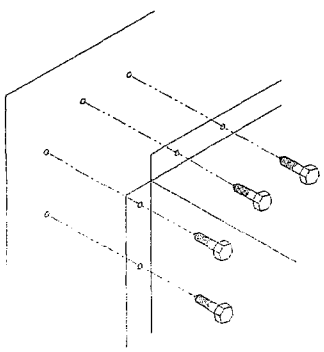


Figure 10 - Fan-Side Sound Attenuator Assembly Details

ATTENTION

When the installation has been completed, limit the access area of the unit; this area must be accessible only to the workers who need to operate the unit and carry out maintenance work. If the units are installed in a raised position, protection grills must be fitted underneath.

Start-up Details

Shipping Chocks and Debris

Remove any chocks that have been placed inside the unit for shipping purposes. Clean all debris from the pan prior to start-up. Close and secure all access doors.

To avoid the risk of an uncontrolled start and to ensure the safety of the operators during the start-up phase and during maintenance, a visible disconnect switch should be installed.

Bleed-off Line

Make sure a bleed line and valve are installed on the pump discharge side of the system piping to a convenient drain. The bleed-off valve should be open. For installation details, see the "Maintenance Instructions Bulletin."

Strainer

Check the strainer(s) in the pan to make sure they are in the proper location over the pump suction, alongside the anticavitation hood. See Figure 17a - 17b.

Screens

Protective fan screens are provided across the front of the unit. Check and tighten all bolts.

Adjustment of Float Valve

The float valve should be adjusted to maintain the proper water level as specified in the maintenance instructions. At start-up, the pan should be filled to the overflow level.

During operation, the water level will drop to no more than 130 mm below the overflow. The water level can be checked during operation by opening circular access cover at the valve while the pump is running and the fans are off.

Starting Sequence

Before starting the unit, check that all access openings, safety screens and covers are in place. Then start the unit as outlined below:

1. Fill the pan to the overflow level.
2. Start the water pumps. Check the water flow to the unit by checking the spray water pressure at the water inlet. It should be the same as the pressure indicated on the certified drawing.
3. Start the fans. Check the fans for proper rotation. Directional arrows are placed on the fan housing.

Pump Rotation

Bump start and check the pump for proper rotation. Directional arrows are found on the pump housing.

NOTE: Do not operate cooling tower fans when the system pump is off. Damage to the PVC fill can result during dry operation. Always start the water pumps first, with the fan motors following.

Maintenance

Once the installation is complete and the unit is turned on, it is important that it be properly maintained. Maintenance is not difficult or time-consuming but must be done regularly to assure full performance of the unit. Refer to the maintenance instructions supplied with the unit for proper maintenance procedures.

Freeze Protection

Proper freeze protection must be provided if the unit is located in a cold climate. Refer to maintenance instructions as well as product bulletins for further information.

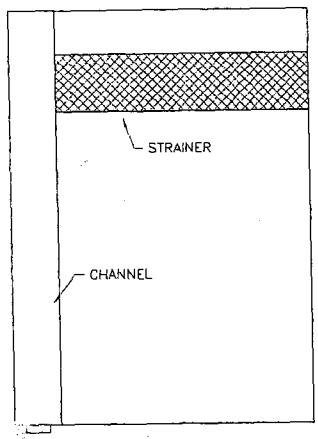


Figure 17a - Strainer Location on 0.9 and 1.5 m Wide Units.

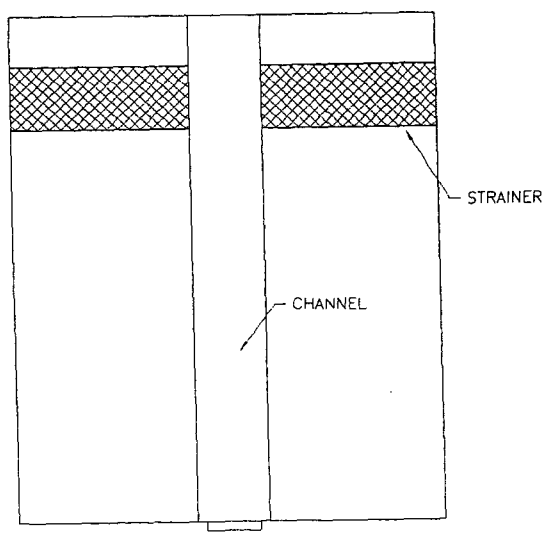


Figure 17b - Strainer Location on 2.4 m Wide Units.

Rigging Hardware Parts are shipped together with the unit(s) for field assembly.