

XLP2 Evaporative Condenser



THIS MANUAL CONTAINS RIGGING, ASSEMBLY, START-UP, AND MAINTENANCE INSTRUCTIONS. READ THOROUGHLY BEFORE BEGINNING INSTALLATION. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN DAMAGE OR IMPROPER OPERATION OF THE UNIT.

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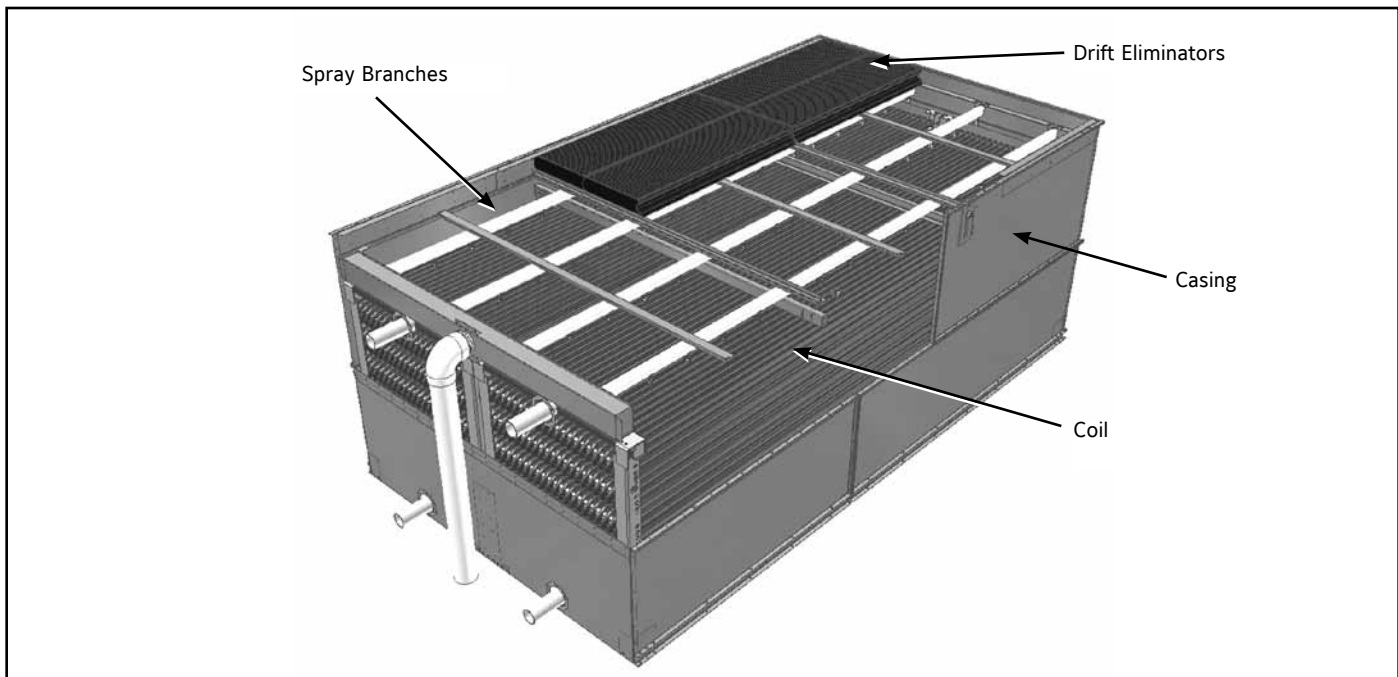
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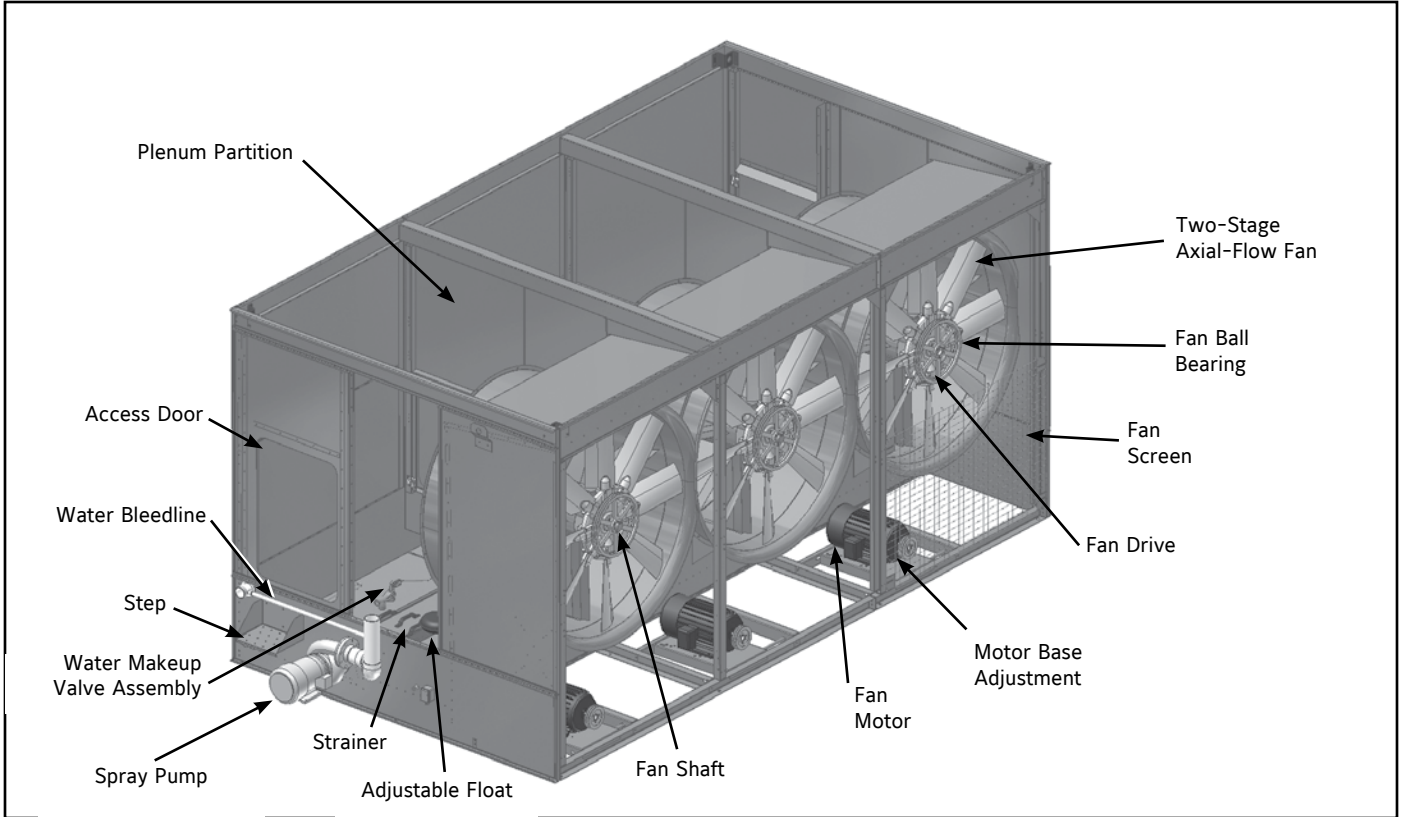
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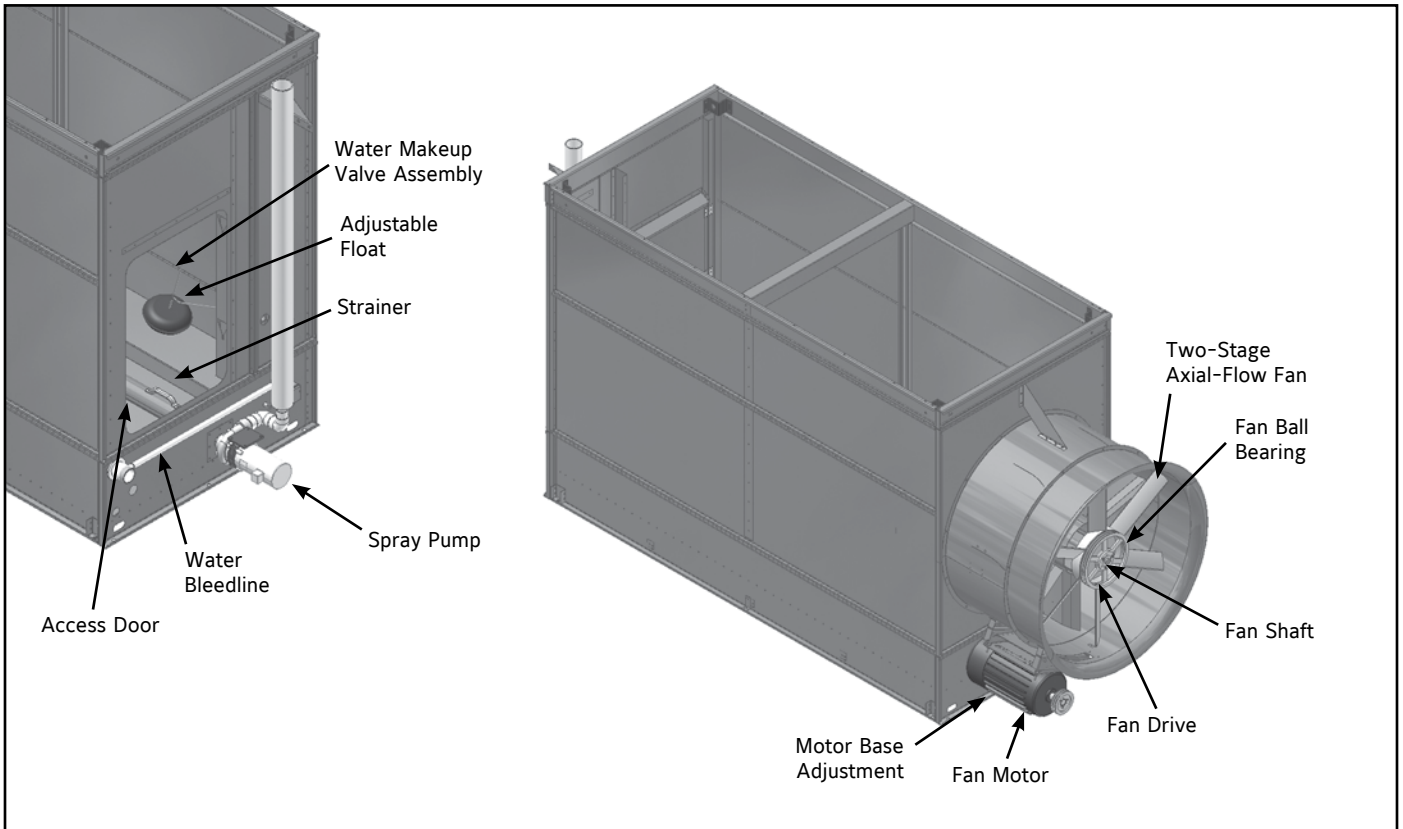
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XLP2 Evaporative Condenser Heat Transfer Coil Section



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XLP2 End Discharge Evaporative Condenser

INSTALLATION

INTRODUCTION

XLP2 units should be rigged and assembled as outlined in this bulletin. These procedures should be thoroughly reviewed **prior** to the actual rigging operation to acquaint all personnel with procedures to be followed and to assure that all necessary equipment will be available at the jobsite.

Locate the unit nameplate on the connection end of the unit and record the unit serial number and model number for reference.

Have a copy of the unit certified drawing available for reference. If you do not have a copy of this drawing, contact your local Representative.

RIGGING AND ASSEMBLY INSTRUCTIONS

Check Unit Before Rigging

When the unit is delivered to the jobsite, check it thoroughly to ensure all required items have been received and are free of any shipping damage before signing the bill of lading. The following parts should be inspected:

- | | |
|--|---|
| <input type="checkbox"/> Sheaves and Belts | <input type="checkbox"/> Interior/Exterior Surfaces |
| <input type="checkbox"/> Bearings | <input type="checkbox"/> Eliminators |
| <input type="checkbox"/> Bearing Supports | <input type="checkbox"/> Float Valve Assembly |
| <input type="checkbox"/> Fan Motor(s) | <input type="checkbox"/> Strainer(s) |
| <input type="checkbox"/> Fan(s) and Fan Shaft(s) | <input type="checkbox"/> Water Distribution System |
| <input type="checkbox"/> Coils | <input type="checkbox"/> Miscellaneous Items: |

If required for field assembly, the following parts will be packaged and usually placed inside the basin-fan section: Sealer, Self-Tapping Screws, and Accessory Items. A checklist inside the envelope attached to the side of the unit marked "Contractor's Installation Instructions" indicates what miscellaneous parts were included with the shipment and where they were packed. Be sure to remove all accessory items from the basin before the unit is assembled.

UNIT WEIGHTS

Before rigging any XLP2 Product, the weight of each section should be verified from the unit certified drawing. Some accessories add additional weight as shown on the respective accessory drawings.

WARNING These weights are approximate only and should be confirmed by weighing before lifting when available hoisting capacity provides little margin for safety. In preparing for a lift, individuals responsible for rigging Frick units must inspect the equipment before the lift to make certain that all water or other liquids have been drained from the unit and any debris removed.

During cold weather, the pre-lift procedure *must* include a check for and removal of accumulations of ice and snow, which will not naturally drain from the equipment and would add substantially to the equipment's lifting weight.

Anchoring

CAUTION Unit must be properly anchored in place before operation begins.

Seven-eighths inch (7/8") diameter bolt holes are provided in the bottom flange of the basin section for bolting the unit to the support beams. Refer to the suggested support details on the certified drawing for locations of the mounting holes. Anchor bolts are supplied by others.

Leveling

The support beams and unit must be level for proper operation. Shims should not be used between the basin and support beams to level the unit.

WARNING Operation, maintenance, and repair of this equipment should be undertaken only by personnel qualified to do so.

Proper care, procedures and tools must be used in handling, lifting, installing, operating, maintaining and repairing this equipment to prevent personal injury and/or property damage.

WARNING Adequate precautions, appropriate for the installation and location of these products, should be taken to safeguard the public from possible injury and the equipment and the premises from damage.

Solid bottom panels may be desirable or necessary for safety and other reasons depending on the location and conditions at the installation site.

WARNING PVC eliminators on this product are not designed to support the weight of a person or to be used as a storage or work surface for any equipment or tools. Use of these plastic eliminators as walking, working or storage surface may result in injury to personnel or damage to equipment. If covering a unit which has PVC eliminators, do not use a clear plastic tarpaulin.

For a discussion of Safety Precautions to be followed when operating or maintaining this equipment, please refer to the Operation and Maintenance Sections of this manual.

WARRANTIES—Please refer to the Limitation of Warranties applicable to and in effect at the time of the sale/purchase of these products.

FREEZE PROTECTION—These products must be protected by mechanical and operational methods against damage and/or reduced effectiveness due to possible freeze-up. Please refer to the Operation and Maintenance sections of this Manual or contact the local Frick Representative for recommended protection alternatives.

Rigging

To simplify rigging and installation, most XLP2 Series Units are shipped in sections consisting of the basin and casing sections.

WARNING The basin and casing components *must* be rigged separately. Never assemble the unit before lifting as the lifting devices provided are not designed to support the weight of the entire assembled unit.

The proper rigging sequence is to lift the basin section into place, apply sealer to the basin where the casing(s) will be located,

and then lift the casing(s) into place. Lifting devices have been provided on all sections. **Spreader bars, spanning the full width of the section, must be used between the lifting cables to prevent damage to the section.**

WARNING

In the event of extended lifts or where hazards exist, the lifting devices should be used in conjunction with safety slings placed under the unit.

Refer to Table 1 for the recommended minimum size of the spreader bar and the recommended vertical dimension "H" from the lifting device to the spreader bar.

1. Rig the basin section. The rigging hook must be placed above the section's center of gravity as detailed in Figures 1 and 2.

CAUTION

Before proceeding, bolt the basin section securely to the supporting steel. Units with multiple cold water basins may employ flume boxes to equalize the water level in the basin of each cell. Follow the directions in the Flume Box Installation section (see Table of Contents).

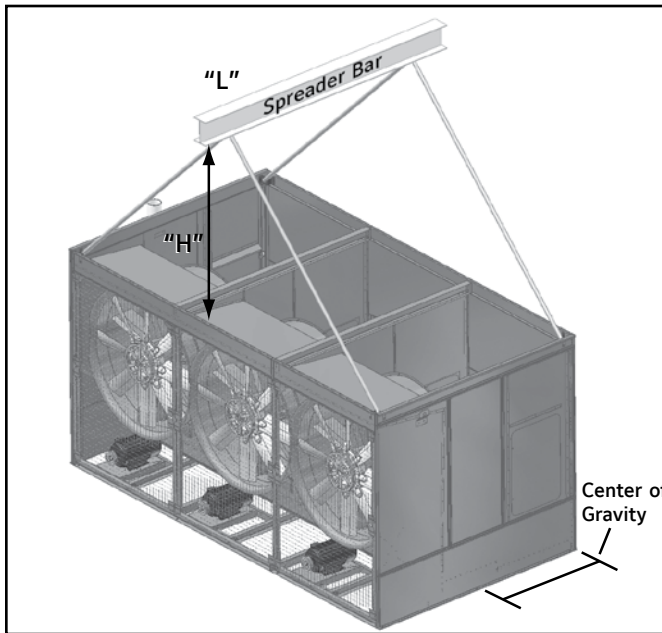


Figure 1

2. Wipe down the flanges with acetone to remove dirt, or moisture which may have accumulated during shipment and storage.

3. Install sealer tape on the mating flange of the basin section to ensure an airtight seal between the casing and basin section. Apply a layer of 1/4" x 1" sealer tape around the face of the flange over the centerline of the holes. Do not overlap or stretch too thinly at the corners. When it is necessary to splice the sealer, press the two ends together to form a smooth, continuous strip. The sealer is to be spliced only along the flanges with holes (Figure 3).

NOTE: The sealer tape is trapezoidal in shape and must be installed with the wide side down (see Figure 4).

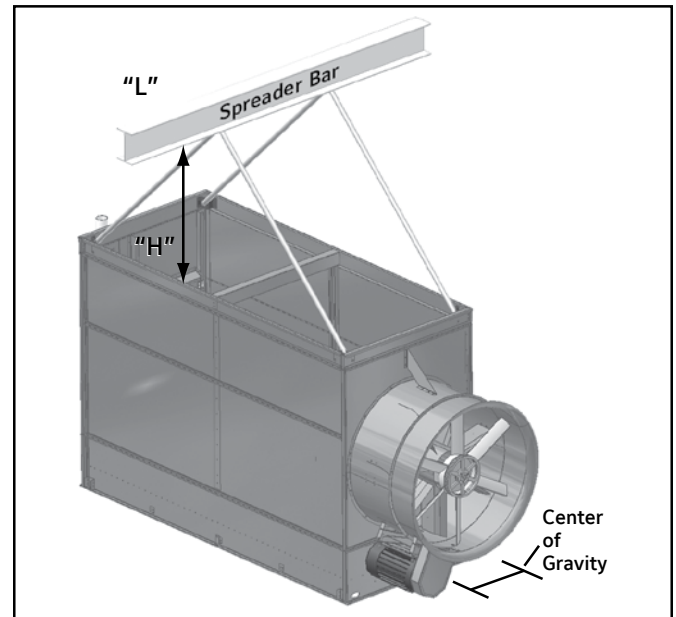


Figure 2

4. Lower the flexible connection on the pump discharge piping below the elevation of the basin section top section before rigging the casing section.

5. After applying sealer tape to the basin flanges, remove the casing skid. Lift the casing (see Figure 6) and position it so that the casing flanges are about 2" above the basin section. Do not permit the casing to damage the sealer.

Table 1

Model Number	No. of Basin Sections	No. of Casing Sections	Basin Section			Casing Section	
			Spreader Bar Length "L"	Minimum Height "H"	Center of Gravity	Spreader Bar Length "L"	Minimum Height "H"
XLP2-512-130 to 512-203	1	1	5'	10' 5"	2 5/8"	5'	8' 10"
XLP2-712-164 to 712-276	1	1	6'	10' 5"	3 1/4"	6'	8' 10"
XLP2-812-235 to 812-343	1	1	8'	10' 5"	3 7/8"	8'	8' 10"
XLP2-818-320 to 818-474	1	1	8'	15' 7"	3 7/8"	8'	8' 10"
XLP2-1012-282 to 1012-545	1	1	10'	10' 5"	6 3/8"	10'	8' 10"
XLP2-1018-433 to 1018-829	1	1	10'	15' 7"	6 3/8"	10'	8' 10"
XLP2-1024-564 to 1024-1089 *	2	2 *	10'	10' 5"	6 3/8"	10'	8' 10" *
XLP2-1036-866 to 1036-1658	2	2	10'	15' 7"	6 3/8"	10'	8' 10"
XLP2-1012-282 to 1012-545	1	1	12'	10' 5"	7 3/8"	12'	8' 10"
XLP2-1218-495 to 1218-1075	1	1	12'	15' 7"	7 3/8"	12'	8' 10"
XLP2-1224-644 to 1224-1405 **	2	2 **	12'	10' 5"	7 3/8"	12'	8' 10" **
XLP2-1236-989 to 1236-2148	2	2	12'	15' 7"	7 3/8"	12'	8' 10"

* For Models 1024-660, 668, 706, 745, 756, 799, 822, 833, 879, 881, 892, 940, No. of Casing sections = 1 and H = 12' 4".

** For Models 1224-743, 775, 812, 876, 917, 965, 992, 1012, 1034, 1064, 1084, 1090, 1139, 1196, 1281, No. of Casing sections = 1 and H = 12' 4".

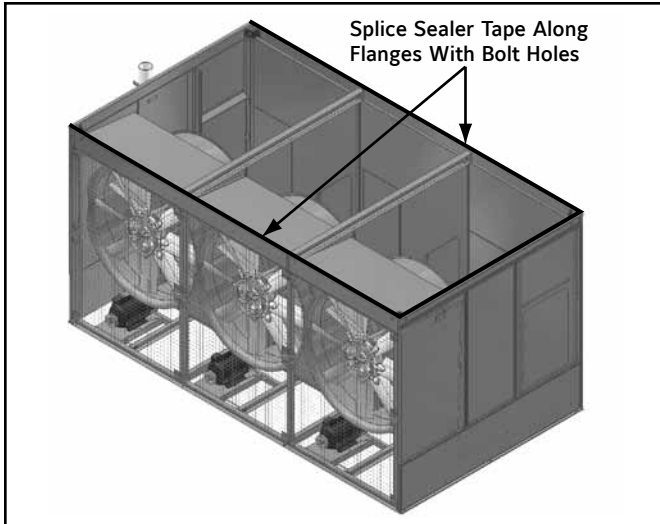


Figure 3

6. Insert drift pins downward through the four corner screw holes in the casing (Figure 5). Continue to lower the casing slowly, maintaining alignment with the drift pins until it rests on the basin section.

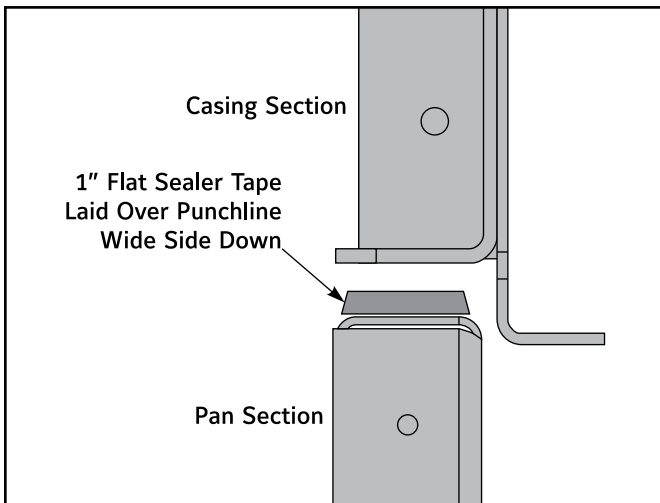


Figure 4

7. Working from the corners towards the center, install the 3/8" bolts, using the drift pin to align the screw holes.

8. Secure the hose connecting the sections of the pump discharge pipe with the hose clamps provided.

9. On units with more than one casing, install the remaining casings using the same procedure as the first. When installing two or more casings, on the basin section, sealer tape must be applied to both cross flanges. (Figure 3)

10. On units operating with a remote sump tank, install a bleed line with valve between the system circulating pump discharge riser and a convenient drain. Locate the bleed line in a portion of the riser piping that drains when the pump is off. Units that are furnished with a factory-installed circulating pump include a bleed line with valve.



Bleed valves should remain open when the unit is in operation, unless the bleed

rate is automatically controlled by a water treatment system. See Bleed Rate section under Water Treatment at the end of the MAINTENANCE section.

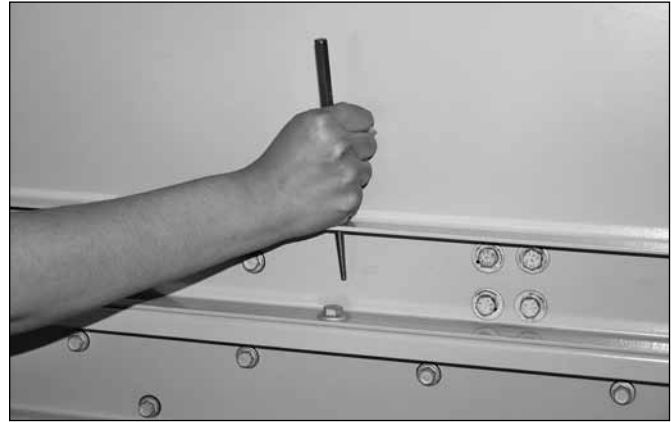


Figure 5

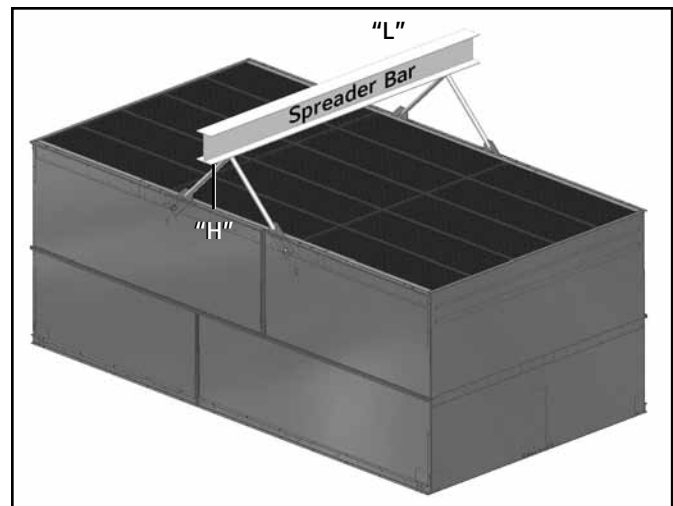


Figure 6

FLUME BOX INSTALLATION

(Required for Models XLP2-1024-xxxx, -1224-xxxx, -1036-xxxx, and -1236-xxxx)

1. Position Cell #1 on the unit support and bolt in place.
2. Wipe down the mating surface by the flume opening to remove any dirt or moisture that may have accumulated during shipment.
3. Wipe down the flanges on both ends of the flume box. On one end, apply a layer of 1/8" x 1" butyl sealer tape around the face of the flange over the centerline of the holes. Do not overlap or stretch too thinly at the corners. When it is necessary to splice the sealer, be sure to press the two ends together to form a smooth, continuous strip. Apply a second layer of sealer tape over the first layer following the same procedure. Refer to Figure 8.
4. Using drift pins to align the bolt holes, place the flume box over the opening in the basin of Cell #1 and fasten into place. Insert the 3/8" self-tapping screws or bolts from the flume box into the basin wall as illustrated in Figure 9 .

NOTE: Flume boxes furnished with units constructed with stainless steel basins are assembled with stainless steel bolts, washers and nuts in lieu of self-tapping screws.

5. Apply sealer to the other end of the flume box as described in Step 3.

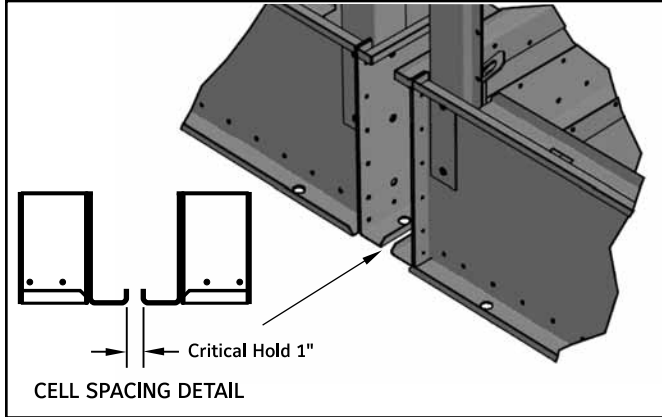


Figure 7

6. Position Cell #2 on the unit supports, exactly 1" between basins (Figure 7). Wipe down the mating surface by the flume opening to remove any dirt or moisture.

7. Using drift pins to ensure alignment, draw Cell #2 tight against the flume box.

NOTE: Units equipped with the positive closure plate option, skip step 8 and go to the positive closure plate section of this document.

8. As illustrated in Figures 9 and 10, insert 3/8" self-tapping screws in each hole from the flume box into the basin wall and tighten.

POSITIVE CLOSURE PLATE OPTION

The optional Positive Closure Plate and gasket are furnished on multicell units to allow individual cells to be isolated for cleaning and maintenance. The plate ships loose inside the basin. To install the Positive Closure Plate and gasket, follow the steps from the Flume Box Installation section, then complete the installation using the instructions listed.

Positive Closure Plate Installation (Figures 11 and 12):

1. Thread 3/8" self-tapping screws from the flume box into the basin wall with the positive closure plate as shown.

2. Position gasket and positive closure plate over the bolts and fasten in place with 3/8" wing nut and flat washers.

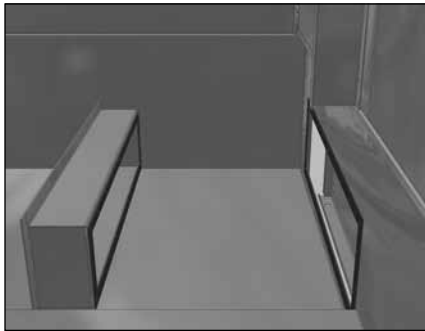


Figure 8

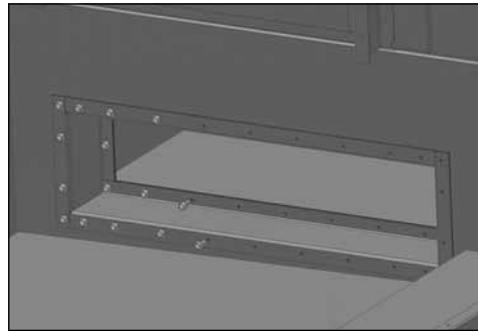


Figure 9

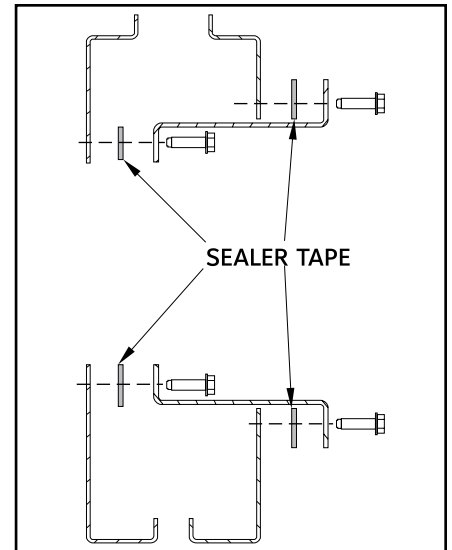


Figure 10

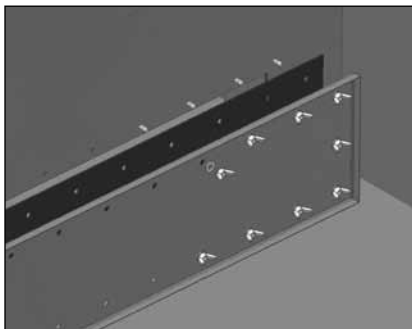


Figure 11

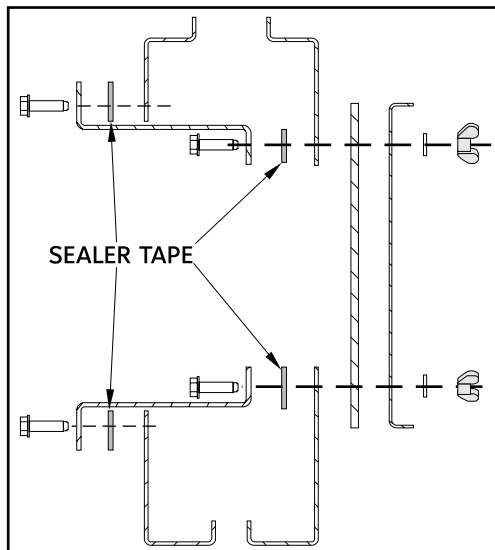


Figure 12

OPERATION

WARNING

Do not perform any service on or near the fans, motors, drives, or inside the unit without first ensuring that the fans and the pumps are disconnected and locked out.

WARNING

Check to ensure the controls for the fan motors are set to allow a maximum of 6 on-off cycles per hour.

NOTES:

1. Recommended service intervals are for typical installations. Different environmental conditions may dictate more frequent servicing.
2. When operating in ambient temperatures below freezing, the unit should be inspected more frequently. Refer to "Cold Weather Operation" section for more details (see Table of Contents).
3. Tension on new belts must be readjusted after the first 24 hours of operation and quarterly, thereafter.

INITIAL AND SEASONAL START-UP

General

- If the unit is mounted on vibration isolators or isolation rails, refer to the vibration isolation manufacturer's guidelines before loading/unloading weight from the unit.
- Verify fan and spray pump motors are disconnected and locked out.
- Conduct external inspection of the equipment. Check for leaks, corrosion, and any structural damage.
- Inspect piping and connections.

Cleaning

- Drain the cold water basin with the strainers in place.
- Remove all dirt and debris from the fan guards.
- Clean all mechanical components, such as the fans and motors.
- Flush the cold water basin interior to remove any accumulated dirt and debris.
- Remove, clean, and replace the strainers.

Inspection

WARNING

Do not perform any service on or near the fans, motors, drives, or inside the unit without first ensuring that the fans and the pumps are disconnected and locked out.

- Thoroughly inspect the fan(s) for any mechanical or physical damage.
- At seasonal start-up or after prolonged shutdown, check the motor insulation with an insulation tester prior to the motor start-up.
- Prior to the seasonal start-up, check and adjust the belt tension. At the initial start-up, the belt tension may not require adjustment as the drive will be properly tensioned at the factory prior to shipment.
- Start the fan motors and check for proper fan rotation.
- Run the fans in manual mode for several minutes to check for any unusual noise or vibrations.
- Check that the float-operated makeup valve is operating freely.

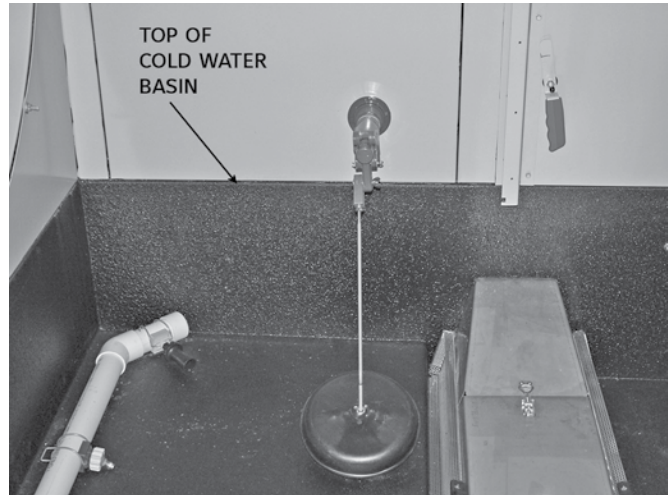


Figure 13 - Water Makeup Valve Assembly

Start-up

WARNING

Do not perform any service on or near the fans, motors, and drives, or inside the unit without first ensuring that the fans and the pumps are disconnected and locked out.

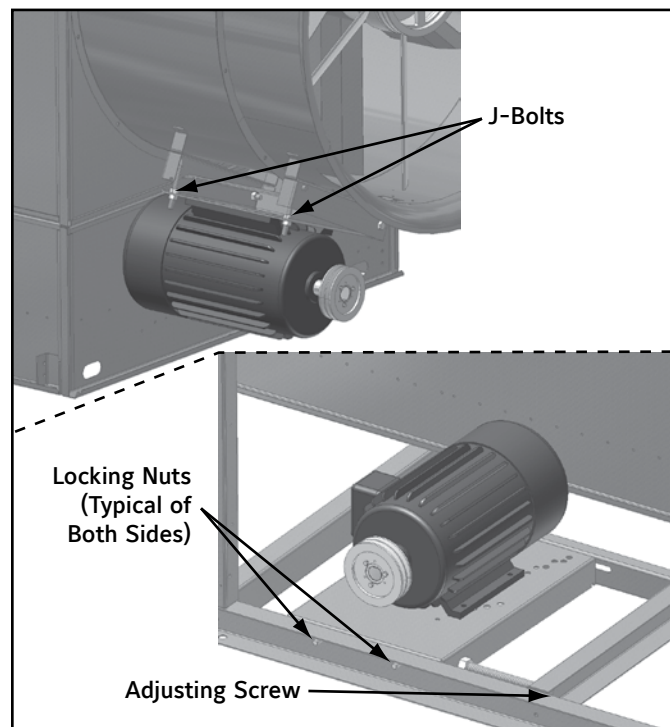


Figure 14 - Lubricating Motor Base Adjusting Screws

- Prior to seasonal start-up, lubricate the motor base adjusting screws and the fan shaft bearings. Then coat the motor base slides and adjusting screws every 3 months using good quality corrosion inhibiting grease such as one recommended for lubricating the fan shaft bearings (see Figure 14). At initial start-up, no bearing lubrication is

required since the bearings are factory lubricated prior to shipment.

- Fill the cold water basin with fresh water to the overflow level via the makeup valve.
- 1. **Water treatment for new installations:** Initiate the biocide water treatment program at this time. Refer to BIOLOGICAL CONTROL section for more details (see Table of Contents).
- 2. **Water treatment for seasonal start-up or after a shutdown period in excess of 3 days:** Resume the biocide treatment program and administer a shock treatment of appropriate biocides prior to operating the fans. This will eliminate accumulated biological contaminants. Refer to the BIOLOGICAL CONTROL section for more details (see Table of Contents).
- Set the makeup valve to shut off below the top of the basin at the operating water levels stated in Table 3 in the COLD WATER BASIN section under MAINTENANCE.
- Start the spray pump. See SPRAY NOZZLES AND HEAT TRANSFER section under MAINTENANCE for more details.
- Open the valve in the unit bleed line, and adjust the bleed by closing or opening the valve.
- Once the evaporative condenser is operating, check the current and voltage of all three phases (legs) of the fan motors with a heat load on the unit under warm ambient conditions. The current must not exceed the nameplate ratings.
- Check the operation of the optional vibration cutout switch.

After 24 hours of operation under thermal load, perform the following services:

- Check the unit for any unusual noise or vibrations.
- Check the operating water level in the cold water basin.
- Adjust makeup valve if necessary.
- Check the belt tension and readjust if necessary.

EXTENDED SHUTDOWN



Do not perform any service on or near the fans, motors, and drives, or inside the unit without first ensuring that the fans and the pumps are disconnected and locked out.

Perform the following services whenever the evaporative condenser is shut down in excess of 3 days:

- If the unit is mounted on vibration isolators or isolation rails, refer to the manufacturer's guidelines before loading/unloading weight from the unit.
- Drain the cold water basin and all the piping that will be exposed to freezing temperatures. Heat trace and insulate all exposed piping.
- Clean all debris, such as leaves and dirt, from the interior and exterior of the unit.
- Clean and flush the cold water basin with the basin strainers in place.
- Leave the cold water basin drain open so rain and melting snow will drain from the unit.

- Clean the basin strainer and re-install.
- Lubricate the fan shaft bearings, motor base, and motor base adjusting screw.
- Close the shutoff valve in the makeup water line (supplied by others), and drain all exposed makeup water piping. Heat trace and insulate all exposed piping.
- Inspect the protective finish on the unit. Clean and refinish as required. Refer to the CORROSION PROTECTION section for more details (see Table of Contents).
- Secure the fan motors starting device(s) in the "OFF" position to ensure personal safety in case of future inspection or service.

COLD WEATHER OPERATION

Frick condensers can be operated at subfreezing ambient temperatures provided proper operating methods are established and diligently followed.

Inspection and Maintenance

- Carry out the frequent visual inspections and routine maintenance services during operation in subfreezing weather.
- Ensure all controls for capacity and freeze protection are set properly and functioning normally.
- Prevent excessively high water levels and possible overflow of the cold water basin due to overpumping, clogged strainers, or makeup valve malfunction.
- Resolve any icing condition that develops which may damage the unit or the supports or impair system performance.

Fan Section Icing Protection

There are three basic operational methods which can be used to provide the system's required cooling: Temperature Setting, Fan Control, and Dry Operation. The method of controls employed on a given application depends upon the climatic extremes which are expected, the variations in heat load that will be encountered, and the compatibility of the control system with other portions of the installation. Effective icing control in subfreezing ambient conditions will require a combination of these three methods.

Temperature Setting

Low leaving fluid temperature promotes ice formation. During operation in subfreezing ambient temperatures, maintain the leaving fluid temperature as high as possible. Ensure the unit operates with the maximum possible heat load. The recommended minimum fluid temperature is 45°F.

Fan Control

Reduce the unit capacity by cycling fans thus modulating the airflow through the unit. Rapid on-off cycles can cause the fan motor to overheat. Set the controls to allow a maximum of 6 on-off cycles per hour. Periodically, cycle the fans off to prevent ice formation and/or to melt ice that accumulates on the intake louvers or combined inlet shields and face of the fill.

Fan Cycling: Operate each unit with the highest thermal load it can handle, rather than evenly dividing the total heat load across all cells. During prolong periods, bypass the idle units and drain the basins.

Multi-Speed Motors: If the unit is equipped with 2-speed motors or Sentinel™/Sentinel PLUS™ Fan System, operation at a lower speed may be sufficient to prevent icing. When 2-speed motors are used, the motor starter should include a minimum 15 second time delay when switching from high to low speed.

Variable Frequency Drives: VFDs offer the most precise method of capacity control, by modulating fan motor speed. When using VFDs, avoid operating at or near "critical speeds." Units with VFDs require inverter duty motors which are included as standard.

In subfreezing ambient temperatures, cycle the fan off for 5 minutes every 15 to 20 minutes for each cell. If ice continues to build on the louvers, decrease the on-time. Observe inlet louvers every 4 to 8 hours.

NOTE: Modulating the water flow rate to the unit is NOT a recommended method of controlling cooling capacity.

Dry Operation

One method of protecting fans from icing is dry operation. Dry operation of the evaporative condenser protects fans from ice formation due to mist and splash from the cold water basin.

Coil Freeze Protection

Use an industrial grade inhibited glycol solution for protection against coil freeze-up. When the use of glycol is not practical, the system must be designed to meet both minimum flow and minimum temperature requirements.

- Recommended solutions are an industrial grade inhibited ethylene glycol or propylene glycol solution.
- Coil volume for condenser models using liquid cooling circuits is job specific.

Minimum Operation

When a glycol solution is not utilized, operate the system to meet both of the following conditions.

- Maintain the minimum recommended flow through the coil at all the times per the job specifications.
- Maintain a minimum heat load on the circulating fluid so that the temperature of the fluid leaving the coil will not fall below 50°F (10°C).
- To maintain the leaving fluid temperature at 50°F (10°C) when the process load is extremely light or shut off, apply an auxiliary heat load to the circulating fluid.

Positive Closure Damper Hood and Insulation

The amount of auxiliary heat required can be substantially reduced by the use of a positive closure damper hood and insulation. The heat loss data can be found in publication 140.920-SED.

Emergency Coil Drain

Do not drain the coil as a normal method of freeze protection. Frequent draining promotes corrosion inside the coil tube. However, draining is acceptable as an emergency method of freeze protection if the coil is not protected by a glycol solution. If the coil is not protected, an automatic drain valve and vacuum breaker are recommended to drain the coil if flow stops or fluid temperature drops below 50°F (10°C) when the ambient temperature is below freezing. Contact your local Frick Representative for guidelines on the installation of an emergency coil drain system.

- Further protection against coil freeze-up is possible with the installation of an alarm to alert personnel when the temperature of the fluid leaving the coil falls below 50°F (10°C).
- For evaporative cooling applications only, the glycol solution will maintain the leaving fluid temperature as low as 45°F (7.2°C). Contact your local Frick Representative for necessary precautions.

Basin Water and Internal Piping Freeze Protection

Cold Water Basin Protection

The basin water could freeze when the unit is shut down and exposed to subfreezing ambient temperatures.

Indoor Sump: The ideal method of protection is a remote sump located in a heated indoor area. When the circulating pump stops, the water in the connecting piping will drain by gravity to this indoor sump.

Basin Heaters: On applications without a remote sump, provide heat to the cold water basin. Electrical immersion heaters, steam coils or hot water coils can provide the required function. Contact your local Frick Representative for details.

Electric Water Level Control: An electric water level control will maintain the proper water level regardless of the thermal load or variations in makeup water supply pressure. The two-position, slow closing solenoid valve provided in the Frick electric water level control package also minimizes valve freezing problems.

Heat Tracing: Heat trace and insulate all exposed water piping, including pump piping below the overflow level and makeup water lines, with electrical heater tape.

Piping Freeze Protection

- Eliminate all water in the optional SmoothLink™ Piping Arrangement.
- It is essential to drain water from the SmoothLink™ Piping Arrangement and internal piping whenever the potential for freezing temperatures exists. Drain the water by using 1/2" NPT drain port located on the inboard side of the SmoothLink™ Piping Arrangement.
- There are three recommended methods for draining the piping:
 1. Preferred: Install a normally open 1/2" solenoid valve on the 1/2" drain connection of the SmoothLink™ Piping Arrangement. Wire the valve in the pump circuit such that the valve closes when the pump is energized. Select the solenoid valve to operate with a minimum pressure differential of 0 psi, which is required to limit the static head imposed on the valve from the water column.
 2. Install a 1/2" manual valve on the 1/2" drain connection of the SmoothLink™ Piping Arrangement.
Open the valve during cold weather operation. Keep the valve closed during warm weather to achieve full thermal performance.
 3. Remove the 1/2" plug from the 1/2" drain connection of SmoothLink™ Piping Arrangement during cold weather operation. Reinstall the plug during warm weather to obtain full thermal performance.

CORROSION PROTECTION

Frick products are constructed of corrosion-resistant materials. The fill (if applicable) is made of a polyvinyl chloride (PVC), which requires no protection against rot, decay, rust or biological attack.

Other materials listed below are used in the equipment construction:

Galvanized Steel Components: Inspect the galvanized steel components for blemishes or corrosion. Wire brush and recoat the affected areas with a cold galvanizing compound such as zinc rich compound (ZRC).

Thermosetting Hybrid Polymer Components: Galvanized steel components protected with the Thermosetting Hybrid Polymer may develop scratches, scrapes or blemishes. Touch up these with a repair kit. In the unlikely event that the damage is more extensive than simple scratches or minor blemishes, contact your local Frick Representative.

Stainless Steel Components: Inspect stainless steel components for signs of blemishes or corrosion. Clean with stainless steel wool as necessary. If more extensive corrosion is prevalent, contact your local Frick Representative.

TripleGuard™ Corrosion Protection System: Inspect components protected with the TripleGuard™ Corrosion Protection System for signs, deep scratches or blemishes, especially in areas with field penetrations. Touch these up with either rubberized polyurethane caulking such as Vulkem® or a repair kit.

Corrosion and Treatments

- Corrosion – Red rust on steel components and “white rust” on galvanized surfaces will affect the longevity of the unit.
- Scale Formation – Scale not only reduces heat transfer and system efficiency, but also may lead to under deposit corrosion.
- Biological Fouling – Slime and algae formations may reduce heat transfer, promote corrosion, and harbor pathogens such as Legionella.

Since the quality of the ambient air and makeup water varies significantly from job site to job site, Frick strongly recommends obtaining the services of a competent water treatment specialist prior to the initial start-up of the evaporative cooling equipment. Additionally, to protect against the risk of Legionella contamination, never operate the cooling equipment without adequate biological control.

Corrosion and Scale Control

- To control corrosion and scale, maintain the water chemistry of the recirculating water within certain parameters. The specific measures required vary from system to system and are dependent on the chemistry of the makeup water, the metallurgy of the piping and heat transfer devices exposed to the recirculating water, and the temperatures at which the system will be operating.
- Bleed/blowdown, the continuous flow of a small portion of the recirculating water to a drain, is used to control the concentration of dissolved solids. On rare occasions, this may be adequate to control scale and corrosion. More often, however, chemical scale and corrosion inhibitors

are necessary, which raise the allowable level of dissolved solids without the risk of scale and corrosion.

- Keep the chemically treated water within the guidelines given in Table 2. In cases where bleed/blowdown alone is being employed for corrosion and scale control, without chemical treatment, your water treatment specialist may recommend more conservative limits than those shown in Table 2.

Table 2: Quality Guidelines for Chemically Treated Circulating Water

Property of Water	Recommended Level
pH	6.5 to 9.0 ⁽¹⁾
Hardness as CaCO ₃	30 to 750 ppm ⁽²⁾
Alkalinity as CaCO ₃	500 ppm maximum ⁽²⁾
Total Dissolved Solids (TDS)	1500 ppm maximum
Conductivity	2400 micromhos ⁽³⁾
Chlorides	250 ppm maximum Cl (410 ppm maximum as NaCl)
Sulfates	250 ppm maximum
Silica	150 ppm maximum

NOTES:

1. Galvanized steel units require passivation in order to prevent white rust (refer to passivation below).
2. Hardness and alkalinity limits may be exceeded under certain circumstances. Consult your water treatment specialist for recommendations.
3. The conversion factor used to determine conductivity is 0.625 (TDS = 0.625 x Conductivity).

Chemical Treatment Requirements

Chemical treatment programs must meet the following requirements:

- The chemicals must be compatible with the unit materials of construction as well as other materials used in the system (pipe, heat exchanger, etc.).
- Chemical scale and corrosion inhibitors, particularly acid (if used), should be introduced into the circulating water through automatic feeders. This should be done at a point in the system where total mixing and dilution occur, before reaching the evaporative cooling equipment. The preferred injection point for chemical scale and corrosion inhibitors is on the discharge side of the system circulating pump(s). These chemicals should not be batch fed directly into the unit's cold water basin or water distribution system, as this can severely damage areas directly contacted.
- When chlorine is added to the system, free residual chlorine should not exceed 1 ppm, except as noted in start-up and shutdown section. Exceeding this limit may accelerate corrosion.

Passivation

- Passivation is the formation of a protective, passive, carbonate layer on galvanized steel surfaces.
- On the newly installed units, to provide maximum protection from corrosion, take special measures to passivate galvanized steel surfaces.

- To ensure proper passivation of the galvanized steel, keep the pH of the circulating water between 7.0 to 8.2 for four to eight weeks after start-up, or until new zinc surfaces turn dull gray in color.
- If white deposits form on galvanized steel surfaces after the pH is returned to normal service levels, it may be necessary to repeat the passivation process.

NOTE: Stainless steel cold water basins and basins protected by the TripleGuard™ Corrosion Protection System or Thermosetting Hybrid Polymer do not require passivation. However, if the upper structure is galvanized steel, passivation is required.

BIOLOGICAL CONTROL

- The warm, oxygen and nutrient rich environment inside evaporative cooling equipment provides an ideal environment conducive to the growth of algae, slime, and other micro-organisms. Uncontrolled, this can reduce heat transfer, promote corrosion, and promote the growth of potentially harmful organisms such as Legionella. To avoid biological contamination and minimize the risk of Legionella, initiate the biocide treatment program at start-up and continue on a regular basis thereafter in accordance with the treatment supplier's instructions.
- Bleed/blowdown or chemical treatment used for corrosion and scale control alone is not adequate for control of biological contamination.
- Introduce solid or granular biocides through a chemical "pot" feeder installed in parallel with the system circulating pump. Diluted liquid biocides may be added directly to the cold water basin.
- If ozone water treatment is used, at no point should concentrations exceed 0.5 ppm.
- Initial Start-up and Start-up Following a Shutdown Period:
 1. To minimize the risk of biological contamination during a shutdown period of three days or more, it is recommended that the entire system (evaporative cooling equipment, system piping, heat exchangers, etc.) be drained.
 2. To resume operation of a drained system and at initial start-up, clean all debris from the cold water basin and fill the system with fresh water. Then execute one of the following biocide treatment programs while operating the circulating pump and prior to operating the unit fans:
 - a. Resume treatment with the biocide that was used prior to shutdown. Then run the pump only while maintaining the maximum recommended biocide residual for a sufficient duration (residual and time will vary with the biocide) as recommended by the

- water treatment supplier. Start the fan only after this treatment period is completed.
- b. Check the pH of the circulating water and, if necessary, adjust it to 7.0 - 7.6 pH. Then, running the pump only, treat the system with sodium hypochlorite to maintain a level of 4 to 5 mg/l (ppm) free chlorine (as Cl₂) over a 6 hour period. Test kits for measuring the free residual of chlorine are commercially available. Start the fan only after this treatment period is completed.
- c. When it is not practical to drain the system during shutdown periods, install a bypass line with shutoff valves to permit the recirculating water to circulate throughout the system, including the unit basin, while bypassing the fill section of the evaporative cooling equipment (fans should remain off).
- d. Treat the system as per one of the above-described methods prior to restarting the unit.

MAINTENANCE

COLD WATER BASIN

The refrigerant to be condensed is circulated inside the tubes of the unit's heat exchanger. Heat flows from the refrigerant through the coil to the spray water outside which is cascading over the tubes. The spray water collects in the cold water basin, passes through the suction strainer and is pumped back to the distribution system. The cold water basin is constructed from one of the following materials:

- Galvanized steel
- TripleGuard™ Corrosion Protection System
- Welded Type 304 stainless steel

Water Levels

Table 3: Cold Water Basin Water Levels

Model Number	Nominal Box Size (ft x ft)	Model Type	Operating Water Level Below Top of Basin
XLP2-1012-282 thru 1012-545	10 x 12	Side Discharge	11¾"
XLP2-1018-433 thru 1018-829	10 x 18		
XLP2-1024-564 thru 1024-1089	10 x 24		
XLP2-1036-866 thru 1036-1658	10 x 36		
XLP2-1212-321 thru 1212-703	12 x 12		
XLP2-1218-495 thru 1218-1075	12 x 18		
XLP2-1224-644 thru 1224-1405	12 x 24		
XLP2-1236-989 thru 1236-2148	12 x 36	End Discharge	6¾"
XLP2-512-130 thru 512-203	5 x 12		
XLP2-712-164 thru 712-276	7 x 12		
XLP2-812-235 thru 812-343	8 x 12		
XLP2-818-320 thru 818-474	8 x 18		

- The makeup valve controls the operating level, which is maintained at the levels shown in Table 3.
- The operating water level in the cold water basin will vary with system thermal load (evaporation rate), the bleed rate employed, and the makeup water supply pressure.
- Check the operating water level monthly, and readjust the float when necessary to maintain the recommended operating level.

Inspection and Maintenance



Openings and/or submerged obstructions may exist in the bottom of the cold water basin. Use caution when walking inside this equipment.

- Inspect the cold water basin regularly. Remove trash or debris accumulated in the basin or on the strainer.
- Quarterly, or more often if necessary, drain, clean, and flush the entire cold water basin with fresh water. This will remove the silt and sediment, which normally collects in the basin during operation. If not removed, sediment can become corrosive and cause deterioration of the protective finish of metallic basins.
- When flushing the basin, leave the strainers in place to prevent the sediment from re-entering the system.
- Remove the strainers after the basin has been flushed.

- Clean and replace the strainers before refilling the basin with fresh water.
- Adjust the float to maintain the design operating level. See Table 3: "Cold Water Basin Water Levels".

FAN

The XLP2 Evaporative Condenser uses axial fans. Thoroughly inspect the fans for damaged or deteriorated fan blades and replace the fan as required.

Inspection and Maintenance

- If the unit is already in operation, while the fans are still running, check for any unusual noise or vibration.
- With the fans off and the motor locked out and tagged, check the general condition of the fans:
 1. Inspect for any loose or missing bolts in the fan shaft bushing, fan hub, and fan shaft bearing(s).
 2. Check if the fan blades are loose, first by twisting the blade by hand; and then, by moving the blade tip up and down. There should be no play or slippage.
 3. Inspect each blade for excessive scale buildup that could cause vibration.
 4. Check each blade, in the area of the shank, for any signs of cracking. If cracking is found, the fan motor should be locked out immediately. Contact your local Frick Representative for assistance.
- **Tip Clearance:** Check the clearance between the tip of the blade and the fan cowl. The clearance should be within 3/16" and 3/4".
- **Blade Pitch:** Check to ensure that the blades are all at the same pitch. If uncertain, measure the pitch with an inclinometer. All blades should be within -1/2° to 0°.
- **Rotation:** Turn the fan shaft by hand to ensure that the shaft moves freely with no rough spots, binding or other malfunctions that could cause vibration or fan motor overload.
- **Direction of Rotation:** On initial start-up, or if the fan motor has been rewired, bump the fan motor and note the direction of rotation. While rotating the fan, check the blade tracking. All blades should track within a 3/4" band at any single point around the cowl.
- **Operation:** On initial start-up, run the fan in the manual position for several minutes and check for any unusual noises or vibration.

FAN DRIVE SYSTEM

Inspection and Maintenance

- These drives require a periodic check of the belt condition and, when necessary, tension adjustment. The recommended service intervals are as follows:
 1. Initial Start-up: Servicing is not required prior to initial unit start-up. The drive has been tensioned and aligned at the factory.
 2. Seasonal Start-up: Readjust the belt tension.
 3. Operation: After the first 24 hours of operation, readjust the belt tension on a new unit start-up or installation

of a new belt. Thereafter, check the belt condition monthly, and adjust tension as necessary. Readjust tension at least once every 3 months.

Fan Belt Adjustment:

To properly adjust the belt tension, position the fan motor so that moderate pressure on the belt midway between the sheaves will produce the deflection shown in Figures 15a and 15b.

- Side draft motor base and idler adjustment:
 1. Loosen four motor base locknuts.
 2. Rotate adjusting nut counterclockwise to tighten belt, clockwise to loosen belt.
 3. Check belt tension.
 4. Tighten four motor base locknuts.
- End draft motor base adjustment
 1. Loosen two motor base locknuts on top side of J-Bolts.
 2. Adjust motor base on J-Bolts by turning motor base nuts on bottom side of J-Bolts.
 3. Check belt tension.
 4. Tighten two motor base locknuts on top side of J-Bolts.
- Belt tension check:
 1. Place a straight edge along the belt from sheave to sheave as shown in Figure 15a, or use a tape measure as shown in Figure 15b, to measure belt deflection.
 2. Apply a moderate force by hand (approximately 40 lb/18.1 kg) evenly across the width of the belt in the center of the span between the sheaves.
 3. There is adequate belt tension if the belt deflects between 1/4" and 3/8" as shown in Figures 15a and 15b.
- Belt tension adjustment (if required):
 1. Loosen the locknut on the motor base adjusting screw.
 2. Turn the motor base adjusting screw clockwise to tension the belt, or counterclockwise to relieve belt tension. During adjustment of belt tension, rotate the drives several times by hand to evenly distribute the tension throughout the belt.
- When the belt is properly tensioned, retighten the locknut on the motor base adjusting screw.

NOTE: There should be no "chirp" or "squeal" when the fan motor is started.

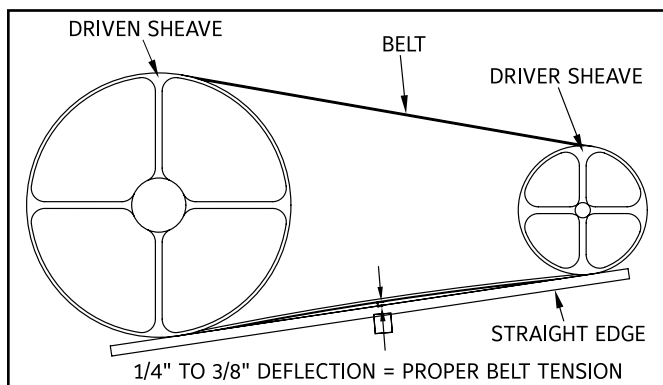


Figure 15a: Checking Belt Tension

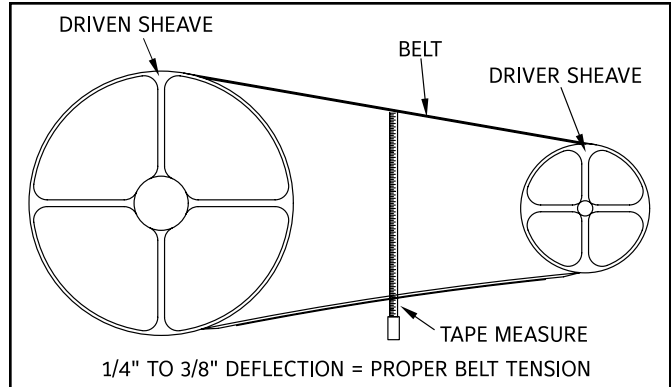


Figure 15b: Checking Belt Tension

Alignment:

- Check the drive alignment annually to ensure maximum belt life.
- Drive alignment check and adjustment:
 1. Place a straight edge across the driver and the driven sheaves as shown in Figure 16.
 2. The straight edge should contact all four points as shown in Figure 16 indicating proper drive alignment.
 3. There should be no more than 1/16" deviation from four points of contact.
 4. In case of realignment, loosen the motor sheave and align it with the fan sheave. Allow 1/4" for draw-up as the bushing screw is retightened.

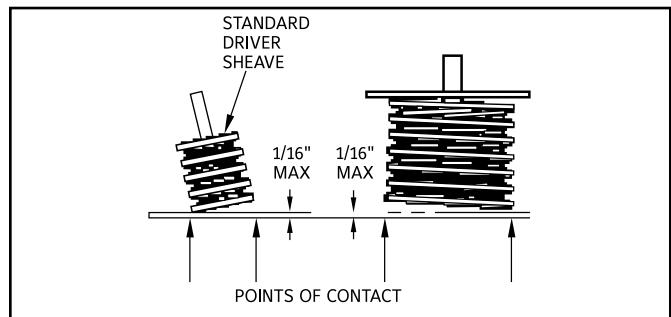


Figure 16 - Standard Drive Alignment

FAN MOTORS

XLP2 Evaporative Condensers use inverter duty, premium efficient, totally enclosed, single-speed, single-winding, reversible ball bearing type motor(s).

Inspection and Maintenance

- Clean the outside of the motor at least quarterly to ensure proper motor cooling.
- After prolonged shutdowns, check the motor insulation with an insulation tester prior to restarting the motor.

Adjustable Motor Base

Coat the motor base slides and adjusting screws (see Figure 14 in the Operation section) every 3 months using good quality corrosion inhibiting grease such as one recommended for lubricating the fan shaft bearings.

FAN SHAFT SUPPORTS

The fan shafts are supported by ball bearings (see Figure 17) in the middle of the shaft with fans at each end. Each bearing is equipped with a lubrication fitting and locking collar. Lubrication lines are extended to the outside of the unit as standard (see Figure 18).

Ball Bearings

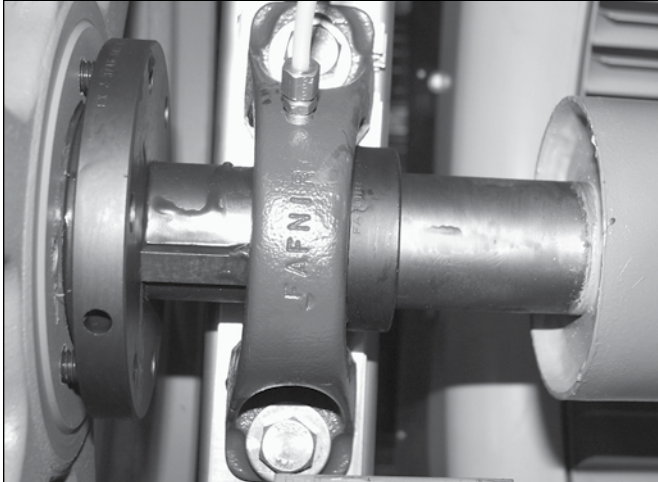


Figure 17: Ball Bearing

Under normal operating conditions, the bearings should be greased every 2,000 operating hours or at least quarterly. The bearings should also be greased at seasonal start-up and shut-down. **Only lubricate the bearings with one of the following water resistant inhibited greases which are good for ambient temperatures ranging from -65°F (-53.9°C) to 250°F (121.1°C):**

Amoco-Rycon Premium#3	MobilGrease®-AW2
Chevron-SRI	Shell-Alvania RL3™
Citgo-Polyurea MP2™	Shell-Alvania #3
Conoco-Polyurea 2™	Shell-Dolium "R"
Exxon-Polyrex® EM	SKF-LGHP2™
Exxon-Unirex N™	Unocal76-Unilife Grease™

Only lubricate the bearings with a hand grease gun. Do not use high pressure grease guns since they may rupture the bearing seals. When lubricating, purge the old grease from the bearing by gradually adding grease until a bead of new grease appears at the seal.



Figure 18 - Extended Lubrication Lines

Locking Collars

Each eccentric locking collar should be checked quarterly to ensure that the inner bearing race is secured to the fan shaft. The locking collar can be set using the following procedure (see Figure 19):

- Loosen the set screw.
- Using a drift pin or center punch, tap the collar (in the hole provided) tangentially in the direction of rotation while holding the shaft.
- Retighten the set screw.

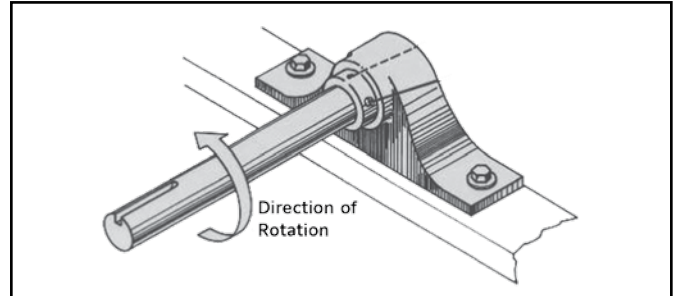


Figure 19: Locking Collar Assembly

SPRAY NOZZLES AND HEAT TRANSFER

The water is distributed through a corrosion resistant polyvinyl chloride (PVC) spray distribution system. The drift eliminators are also made of PVC, which requires no protection against rot, decay, rust, or biological attack.

The spray nozzles and heat transfer section should be inspected and cleaned each month. Inspect as follows:

1. Shut off the fan, lock out and tag out the fan motor, but leave the system pump running.
2. Remove the drift eliminators to allow a clear view of the spray distribution system and nozzle patterns.
3. Check to see if the nozzles are all spraying consistently and producing the spray pattern in Figure 20.

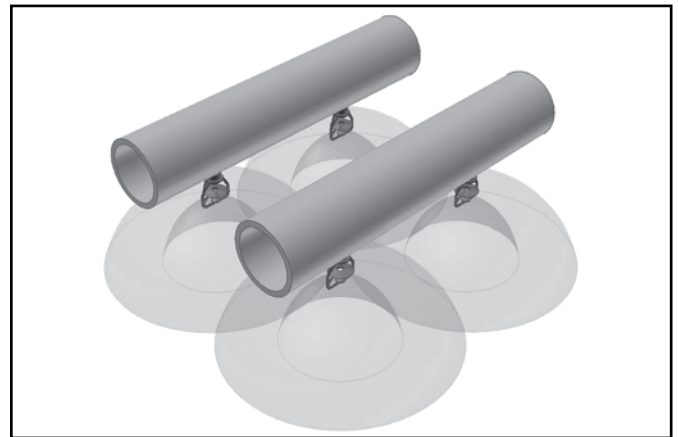


Figure 20: Nozzle Spray Pattern

4. Clean any nozzles which are clogged. If necessary, the nozzle and rubber grommet may be removed for cleaning. If additional cleaning is necessary the branch may be removed for cleaning. Tools are not required to remove eliminator support channel or branches.

5. Inspect the coil surface. Any corrosion, damage, or obstructions must be corrected.

Some units are provided with an extended surface finned coil. During the winter season, when the ambient temperature is well below design, units can operate with the spray pump off.

The coil is designed for seasonal dry operation followed by seasonal wet operation, and not for frequent cycling of the spray pump. Frequent spray pump cycling may lead to excessive scale buildup.



Don't use steam or high pressure water to clean PVC eliminators or materials other than steel.

WATER LEVEL CONTROL

There are two types of water level controls used on XLP2 units:

- Mechanical makeup valve assembly
- Optional electric water level control package

The unit water makeup valve assembly is located within easy reach from the access door at the connection end of the unit.

Mechanical Makeup Valve Assembly

A float-operated mechanical water makeup assembly is furnished as standard equipment on the unit. The standard makeup assembly consists of a corrosion resistant makeup valve connected to a float arm assembly actuated by a polystyrene-filled plastic float. The float is mounted on an all-thread rod held in place by wing nuts. The cold water basin operating water level can be adjusted by repositioning the float and all-thread rod using the wing nuts provided.

NOTE: If the unit has been ordered with the optional electric water level control package or is intended for remote sump application, a mechanical water makeup valve will not be provided.

Inspection and Maintenance:

- Inspect the makeup valve assembly monthly and adjust if necessary.
- Inspect the valve annually for leakage. Replace the valve seat if necessary.
- Maintain the makeup water supply pressure between 15 psig and 50 psig for proper operation. A surge protector (provided by others) is recommended for pressures over 50 psig.
- Set the initial basin water level by adjusting the wing nuts, so that the makeup valve is completely closed when the water level in the cold water basin is at the overflow connection.
- With the design thermal load and the average water pressure (15 to 50 psig) at the valve, the above setting will produce operating water levels as stated in Table 3 in the Water Level section (see Table of Contents).
- If the thermal load is less than the design load at the time of unit start-up, the procedure may produce operating levels greater than those shown in Table 3. If operating levels are higher than specified, readjust the float in order to attain the recommended operating level.

- Closely monitor the water level in the cold water basin and adjust the level if necessary during the first 24 hours of operation.
- Operating at the recommended water level will ensure that the unit basin contains sufficient water volume to prevent air entrainment in the circulating spray pump during system start-up.

Optional Electric Water Level Control Package

As an option, an electric water level control package is available in lieu of the mechanical makeup assembly. The package consists of a probe-type liquid level control assembly and a slow-closing solenoid valve. Stainless steel electrodes, factory-set at predetermined lengths, extend from an electrode holder into the cold water basin.

Inspection and Maintenance:

- Clean the stainless steel electrodes periodically to prevent accumulations of scale, corrosion, sludge or biological growth, which could interfere with the electrical circuit.
- The water level is maintained at the recommended operating level regardless of the system thermal load. Therefore, it is not recommended that the operating level be adjusted.
- During the start-up of units equipped with the electric water level control package, by-pass the control unit in order to fill the unit to the overflow connection.

SYSTEM CLEANING

Coil Cleaning

Both the inside and outside of the heat exchange coil may require occasional cleaning. The chemicals used must be compatible with the materials being treated. For example, the standard coil outside is galvanized steel. The inside of the coil is black carbon steel. For finned coils, the coil cleaning must be careful not to damage the fins (outside of the coils) and the coils themselves. For specific recommendations on coil cleaning, contact a qualified consultant.

Weld Byproduct Cleaning

The installation and manufacturing processes commonly used for field assembly of steel-piped systems may leave weld byproducts inside coils and connecting piping (especially in refrigeration systems). It is common practice to install filters and/or strainers that remove contaminants during initial system operation. Shortly after system start-up, the filters and/or strainers should be cleaned or replaced.

WATER TREATMENT

A proper water treatment program, administered under the supervision of a competent water treatment specialist, is an essential part of routine maintenance to ensure the safe operation and longevity of evaporative cooling equipment, as well as other system components.

Bleed Rate

- In evaporative cooling, evaporation of a small portion of the recirculating spray water as it flows through the equipment causes the cooling effect. As this water evaporates, the impurities originally present remain in the recirculating

water. The concentration of the dissolved solids increases over time and can reach unacceptable levels.

- In addition, airborne impurities are often introduced into the recirculating water. If these impurities and contaminants are not effectively controlled, they can cause scaling, corrosion, and sludge accumulations that reduce heat transfer efficiency and increase system operating costs, potentially shortening the useful life of the equipment.
- The degree to which dissolved solids and other impurities build up in the recirculating water may be defined as the cycles of concentration. Specifically, cycles of concentration is the ratio of the concentration of dissolved solids (for example - chlorides, sulfates, etc.) in the recirculating water to the concentration of the same material in the makeup water.
- In order to optimize heat transfer efficiency and maximize equipment life, "bleed" or "blowdown" a small amount of recirculating water from the system. This controls the cycles of concentration to maintain the quality of the recirculating water within the guidelines given in Table 3, under Corrosion and Scale Control in the OPERATION section.
- Replenish the "bleed" water with fresh makeup water, thereby limiting the buildup of impurities.
- Bleed/Blowdown:
 1. Accomplish the bleed automatically through a solenoid valve controlled by a conductivity meter. The conductivity meter setpoint is the water conductivity at the desired cycles of concentration and should be determined by a competent water treatment expert.
NOTE: The solenoid valve and conductivity meter must be supplied by others.
 2. Alternatively, use a bleed line with a valve to continuously bleed from the system. In this arrangement, adjust the rate of bleed using the valve in the bleed line. Measure the rate of bleed by filling a container of known volume while noting the duration. Check the bleed rate and water quality periodically to ensure that adequate control of the water quality is being maintained.

Bleed Line Calculations: Bleed rate is determined by the following formula:

$$\text{Bleed Rate} = B = \frac{E}{(n-1)}$$

- Where:** B = Bleed Rate (GPM)
 E* = Evaporation Rate (GPM) = Q (GPM) x R (°F) x .001
 Q = Process Fluid Flow Rate (GPM)
 R = Range
 n = Number of Cycles of Concentration = CR/CM
 CR = Concentration in Recirculating Water
 CM = Concentration in Makeup Water

* The evaporation rate "E" can be determined by any one of the following methods:

1. The evaporation rate is approximately 2 GPM per 1 million BTUH of heat rejection.
2. The evaporation rate is approximately 3 GPM per 100 tons of refrigeration.

3. Evaporation Rate = Q (GPM) x R x .001 (as shown in the example).

The following example illustrates a bleed rate calculation:

Given:

- Condenser
- Process Fluid Flow Rate = 800 GPM
- Maximum Allowable Chloride Concentration = 250 ppm
- Concentration of Chlorides in Makeup Water = 45 ppm
- Range = 10°F

Find: Bleed Rate

Solution: So in this case,

$$E = Q \times R \times 0.001 = 800 \times 10 \times 0.001 = 8 \text{ GPM}$$

$$n = \frac{CR}{CM} = \frac{250 \text{ ppm}}{45 \text{ ppm}} = 5.55$$

$$\text{Bleed Rate} = B = \frac{E}{(n-1)} = \frac{8 \text{ GPM}}{(5.55-1)} = 1.75 \text{ GPM}$$

Therefore, in this case we must bleed approximately 1.75 GPM to limit the concentration of impurities.

NOTE: This example focuses on a single parameter (chloride concentration) of water only. The bleed rate required for a system (when evaluating more than one parameter) is the highest bleed rate required to keep all parameters within recommended limits.

RECOMMENDED MAINTENANCE SERVICES⁽¹⁾

Type Service	Start-Up	Monthly	Quarterly	Annually	Shutdown
Inspect and clean as necessary:					
Inspect general condition of the unit ⁽²⁾ and check unit for unusual noise or vibration	X	X			
Clean and flush basin	X	X			X
Inspect spray nozzles	X	X			X
Clean basin strainer	X	X			X
Drain basin and piping					X
Check and adjust water level in basin	X	X			
Check operation of makeup valve	X	X			
Check and adjust bleed rate	X	X			
Inspect heat transfer section	X	X			
Inspect protective Finish				X	
Mechanical equipment system:					
Check belt condition	X	X			
Adjust belt tension ⁽³⁾	X		X		
Lubricate fan shaft bearings	X		X		X
Lubricate motor base adjusting nut	X		X		X
Check drive alignment				X	
Check motor voltage and current	X		X		
Check fan bearing locking collars	X		X		
Check fan motors for proper rotation	X				
Check fans for rotation without obstruction	X		X		

1. Recommended service intervals are for typical installations. Different environmental conditions may dictate more frequent servicing.
2. When operating in ambient temperatures below freezing, the evaporative condenser should be inspected more frequently. Refer to "Cold Weather Operation" on Page N102 for more details.
3. Tension on new belts must be readjusted after the first 24 hours of operation and quarterly, thereafter.

RECOMMENDED SPARE PARTS

Frick parts are the "Perfect Fit" for your condenser. These parts are specifically designed, engineered and manufactured to work in a condenser environment. They are the right parts, at competitive pricing levels, and Frick offers the best deliveries in the industry.

The most common repair and retrofit parts are in stock and can be ordered from Frick. In most cases they can ship overnight. In addition, most Frick Representatives maintain a local inventory of commonly used parts.

Even with this fast delivery capability, it is still recommended that certain essential, emergency repair parts be maintained in your local inventory, to minimize any potential downtime.

Basic Recommended Spare Parts

Bearing set

Float valve or repair kit

Float ball

Solenoid valve (if unit is equipped with electric water level control)

Powerband or set of belts

Spray nozzle kit with grommets

Basin heater and low water cut out

Door gasket

Strainer (inlet and suction)

Fan and sheave bushings

Pump seal and gasket kit for coil products

Automatic bearing greaser refill kit



Parts to Consider if Extended Downtime is a Concern

Spray pump for coil products

Fan or fan wheel

Fan shaft

Sheave set

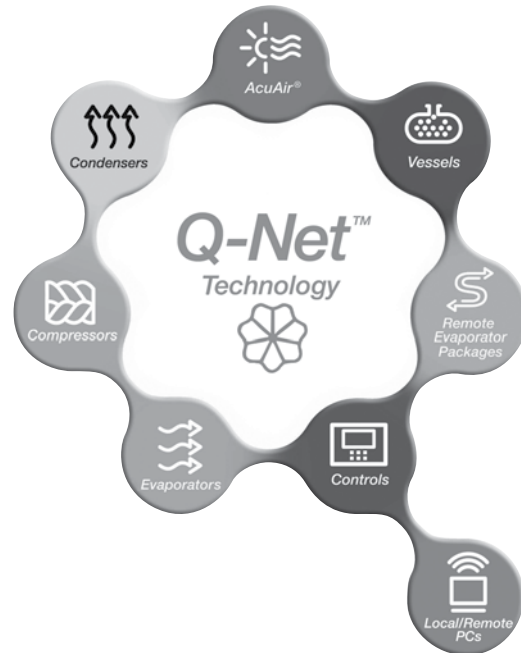
Fan motor



Q-NET™ network technology...

Connect Your PC
with QUANTUM™ LX!

Take full advantage of Q-NET™
technology with all Frick products!



System integration is what we do...

- Q-NET™ ... supports open-protocols for SCADA systems (i.e. Allen-Bradley® DF1, Modbus RTU, Modbus ASCII, and Industrial Ethernet Protocols)
- Q-NET™ ... connects instantly for local or remote access; no software required
- Q-NET™ ... can be applied to both new and existing systems
- Q-NET™ means precise control 24 hours a day, seven days a week
- Q-NET™ distributed architecture mean faster, easier, economical installations
- Q-NET™ delivers increased operating efficiency and lowers energy costs

Available on Frick screw compressors, condensers, evaporators, AcuAir® hygienic air handlers, and refrigerant vessels.