MARLEY®

user manual

LW fluid cooler

INSTALLATION - OPERATION - MAINTENANCE

Z1047819_C ISSUED 4/2019

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT

contents

Note

This manual contains vital information for the proper installation and operation of your fluid cooler. Carefully read the manual before installation or operation of the fluid cooler and follow all instructions. Save this manual for future reference.

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product. Also, please observe all Caution and Warning labels on the tower.

⚠ Warning

Indicates presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.

⚠ Caution

Indicates presence of a hazard which will or can cause personal injury or property damage if ignored.

Note

Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.

overview

This User Manual, as well as those offered separately on motors, float valves, pumps, etc., is intended to assure that this evaporative fluid cooler serves you properly for the maximum possible time. Since product warrantability may well depend upon your actions, please read this User Manual thoroughly prior to operation.

This User Manual provides information regarding general equipment installation and operation. Any deviation from, change or modification to, the User Manual, the original design conditions or the original intended use of the equipment may result in improper installation and/or operation.

Any such deviation, change or modification shall be the responsibility of the party or parties making such deviation, change or modification. SPX Cooling Technologies, Inc. expressly disclaims all liability for any such deviation, change or modification. The equipment shall be warranted in accordance with the applicable SPX Cooling Technologies Certification of Limited Warranty.

If you have questions about the operation and/or maintenance of this fluid cooler, and you don't find the answers in this manual, please contact your sales representative. When writing for information, or when ordering parts, please include the serial number shown on the equipment nameplate.

Safety First

The location and orientation of the evaporative fluid cooler can affect the safety of those responsible for installation, operation or maintenance. However, since SPX Cooling Technologies does not determine the fluid cooler location or orientation, we cannot be responsible for addressing those safety issues that are affected by fluid cooler location or orientation.

⚠ Warning

The following safety issues should be considered by those responsible for designing the fluid cooler installation.

- ***Access to and from the collection basin***
- ***Access to and from access door(s)***
- ***The possible need for ladders (either portable or permanent) to gain access to the access doors(s)***
- ***Access issues due to obstructions surrounding the evaporative heat exchange equipment***
- ***Lockout of mechanical equipment***
- ***The need to avoid exposing maintenance personnel to the potentially unsafe environment inside the fluid cooler***

receiving and hoisting

Those are only some of the safety issues that may arise in the design process. SPX strongly recommends that you consult a safety engineer to be sure that all safety considerations have been addressed.

Location

Space available around the fluid cooler should be as generous as possible to promote ease of maintenance and to permit freedom of airflow into and through the fluid cooler. If you have questions about the adequacy of the available space or the intended configuration of the equipment, please contact your Marley sales representative for guidance.

Prepare a stable, level support foundation for the fluid cooler, utilizing weight, wind load, and dimensional information appearing on appropriate Marley submittal drawings. Supports must be level to insure proper operation of the fluid cooler.

⚠ Warning

The fluid cooler must be located at such distance and direction to avoid the possibility of contaminated discharge air being drawn into building fresh air intake ducts. The purchaser should obtain the services of a Licensed Professional Engineer or Registered Architect to certify that the location of the equipment is in compliance with applicable air pollution, fire and clean air codes.

Shipment

Unless otherwise specified, fluid coolers ship by truck (on trailer(s)), which lets you receive, hoist, and install in one continuous operation.

Responsibility for the condition of the fluid cooler upon its arrival belongs to the carrier as does the coordination of multiple shipments, if required.

Receiving

Prior to unloading the fluid cooler from the delivering carrier, inspect the shipment for evidence of damage in transit. If damage is apparent, note the freight bill accordingly. This will support your future recovery claim.

Find and remove the installation instructions accompanying the fluid cooler. This information should be kept for future reference and maintenance purposes.

receiving and hoisting

Hoisting

All LW fluid cooler models use reinforced hoisting clips located near the air inlet (bottom section) of the equipment for overhead lifting and handling of assembled shipping modules. A spreader bar should always be used at the top of the unit to help balance the load and prevent damage to the top section – consult the applicable hoisting instructions drawing. **Never use hoisting clips located near the top of the equipment to lift the entire unit, as these are intended for lifting subassemblies only during factory assembly.** If a forklift is used to lift from the base of the equipment, ensure forks extend completely underneath the unit and past the basin flange on the opposite side. Remove fluid cooler from the trailer and hoist into place according to the instructions.

⚠ Warning

Fluid coolers must be hoisted and set according to instructions. Under no circumstances should you use hoisting clips located near the top of the equipment to lift the entire unit.

⚠ Warning

Hoisting clips are provided for ease of unloading and positioning the fluid cooler. For overhead lifts or where additional hazards exist, safety slings should also be placed under the unit.

Installation

Note

These installation instructions are intended to help you prepare before your fluid cooler arrives. If discrepancies exist between these instructions and those shipped with the fluid cooler, the instructions shipped with the fluid cooler will govern.

1. Prior to placement of the fluid cooler, confirm that the supporting platform is level, and that the anchor bolt holes are correctly located in accordance with Marley drawings. If your installation uses vibration isolators to dampen vibration, they must be mounted below the supporting steel. See support drawings for further information.
2. Place the fluid cooler on your prepared supports, aligning anchor bolt holes with those in your supporting steel. Make sure that the orientation agrees with your intended piping arrangement. Attach to supporting steel with bolts and flat washers (by others) – see support drawing for size, location and quantity. Position flat washers between the bolt head and the fluid cooler basin flange.
3. Attach makeup water supply piping to appropriately-sized float valve connection. Attach the drain and overflow piping according to drawings shipped with your fluid cooler.

Note

Fasteners and components provided by others that are to be attached to the fluid cooler must be compatible with the fluid cooler materials – i.e. fasteners in a stainless steel cold water basin must be stainless steel.

4. Attach the process fluid supply and return piping to the fluid cooler coil connections. Protect adjacent areas from excessive heat and sparks or damage may occur. Wrapping a large wet rag around piping near braze joints is one method for limiting the conduction of heat through the piping.

⚠ Caution

Except for the horizontal components of piping, do not support your piping from the fluid cooler inlet / outlet connections – support it externally. Normally, one of the following connection arrangements is provided:

Copper Soldered Connection: The piping connections are copper pipe stubs for field soldering/brazing.

⚠ **Caution**

Protect adjacent areas from excessive heat and sparks or damage may occur.

Flanged Connection: The coil piping connections are designed for flat-face flange fittings conforming to 150# ANSI B16.1 specifications. Full faced gaskets and appropriately sized bolts (by others) must be used for proper function.

5. Conduct a visual inspection of the control panel and wiring for loose connections or other damage. Connect electrical supply wiring to main control panel in accordance with wiring diagram(s) and instructions included with control panel.

⚠ **Warning**

For maintenance/safety purposes, SPX recommends a lockout type disconnect switch for all mechanical equipment. Branch circuit protection must be provided for control panels and must meet or exceed all NEC and local codes.

Control Panel

Variable speed operation of fan motors in cooling applications offers advantages over traditional single or two speed motor control. Variable speed fan operation can reduce the cost of electrical energy being used and provide better temperature control. In addition, it reduces the mechanical and electrical stress on the motor and mechanical equipment. Electrical savings can be large during periods of low ambient temperature when the cooling requirement can be satisfied at reduced speeds. LW fluid coolers use Electronically Commutated (EC) fan motors with integral variable speed capability. Multiple-fan units are designed for synchronous variable speed operation of all fans. Fan speed and other operating parameters of LW fluid coolers are typically controlled with a factory mounted starter control panel.

The basic starter control panel enables programmable setpoint fan speed control and pump starter control, and is factory wired and tested. The exterior cover of the panel includes a main disconnect switch, mode selection switches for fans and pump, and a PID controller with clear lockable cover to control fan speed based on a programmable setpoint and the outlet fluid temperature sensed by an RTD factory-installed in coil outlet connection. Also included are a control transformer, fuses for all fans and the pump, disconnect switches for individual fans, pump overcurrent protection, and a T-stat sensor for pump control (and fan control in bypass mode). Positive Closure Damper control, automatic discrete spray systems, and a wired 110 Volt outlet can

also be incorporated into the main control panel. Basin heaters and electric water level packages, when selected, are contained within separate panels, but are wired to the main control panel to provide a single point power connection for power supply.

Mechanical Equipment

⚠ **Warning**

Always use caution when working near electrical and mechanical components. Always shut off electrical power to the fluid cooler fan motor prior to performing any maintenance on the fluid cooler. Any electrical switches should be locked out and tagged out to prevent others from turning the power back on.

LW fluid coolers use Electronically Commutated (EC) fan motor(s) to directly drive the fluid cooler fan(s). The fan, motor, cylinder, guard and mounting plate are combined into one assembly, eliminating installation and maintenance steps typically required with belt or gear-driven fan drive systems. Multiple fan units are designed for synchronous variable speed operation of all fans.

1. Spin the fan(s) manually to assure that all fan blades properly clear the inside of the fan cylinder(s).
2. Momentarily bump (energize) the motor(s) and observe rotation of the fan(s).
3. Run the motor(s) and observe the operation of the mechanical equipment. Operation should be stable.

Startup

⚠ **Warning**

Microorganisms including Legionella bacteria can exist in premise plumbing including cooling towers. The development of an effective water management plan (WMP) and implementation of maintenance procedures are essential to prevent the presence, dissemination and amplification of Legionella bacteria and other waterborne contaminants throughout premise plumbing. Before operating the cooling tower, the water management plan and maintenance procedures must be in place and regularly practiced.

Water System:

1. Consult a knowledgeable water treatment professional to clean and treat your new cooling tower prior to startup. Cooling towers must be cleaned and disinfected regularly in accordance with ASHRAE Standard 188 and Guideline 12.

operation

The water conditions during initial fluid cooler operation are crucial in preventing premature corrosion of galvanized steel (white rust). For at least the first eight weeks of operation, pH should be controlled between 6.5 and 8.0 with hardness and alkalinity levels between 100 and 300 ppm (expressed as $CaCO_3$).

2. Do NOT attempt any service unless the fan motor is locked out.
3. Remove any and all accumulated debris from fluid cooler. Pay particular attention to inside areas of collection water basin, distribution water system, louvers and drift eliminators. Make sure that recirculating water suction screens are clear and properly installed.
4. Fill the collection basin water system to a level approximately ⅛" below the lip of the overflow.
5. Start your pump(s) and check for proper rotation as indicated by the arrow on the pump cover, observe system operation. A certain amount of "pump-down" of the basin water level will occur before water completes the circuit and begins to fall from the coil(s). The water makeup valve is factory set to keep the water level in the basin at approximately 7" of depth during operation. The amount of initial pump-down may be insufficient to open the float valve. However, its operation can be checked by pressing down on the operating lever to which the stem of the float valve is attached. The float valve is set so that the water level after pump start-up is deep enough to assure positive suction, but not overflow at pump shutdown.
6. Open the valve on the fluid cooler bleed line and adjust bleed to the recommended rate. See the **Water Quality and Blowdown** section.
7. Continue pump operation for about 15 minutes, after which it is recommended that the water system be drained, flushed and refilled.
8. While operating the recirculating water pump(s) and prior to operating the fluid cooler fan(s), execute one of the two alternative biocidal treatment programs described in the following:
   - Resume treatment with the biocide which had been used prior to shutdown. Utilize the services of the water treatment supplier. Maintain the maximum recommended biocide residual (for the specific biocide) for a sufficient period of time (residual and time will vary with the biocide) to bring the system under good biological control.

     or
   - Treat the system with sodium hypochlorite to a level of 4 to 5 ppm free chlorine residual at a pH of 7.0 to 7.6. The chlorine residual must be held at 4 to 5 ppm for six hours, measurable with standard commercial water test kits.

If the fluid cooler has been in operation and then shut down for a duration of time and not drained, perform one of the two previous biocidal treatment programs directly to the recirculating water storage vessel (collection basin, drain down tank, etc.) without circulating stagnant water over the coil(s) or operating the fan(s).

After biocidal pretreatment has been successfully completed, cooling water may be circulated over the coil(s) with the fan off.

When biocidal treatment has been maintained at a satisfactory level for at least six hours, the fan may be turned on and the system returned to service. Resume the standard water treatment program, including biocidal treatment.

Operation

General:

The cold process fluid temperature obtained from an operating fluid cooler will vary with the following influences:

1. **Heat load:** With the fan in full operation, if the heat load increases, the cold process fluid temperature will rise. If the heat load reduces, the cold process fluid temperature will reduce.

   Note that the number of degrees ("range") through which the fluid cooler

$$\text{Range} - °F = \frac{\text{Heat Load (Btu/hr)}}{\text{gpm x 500}}$$

   cools the process fluid is established by the system heat load and the amount of fluid being circulated, in accordance with the following formula which is only valid for 100% water as the process fluid:

   The fluid cooler establishes only the cold process fluid temperature attainable under any operating circumstance.

2. **Air wet-bulb temperature:** Cold process fluid temperature will also vary with the wet-bulb temperature of the air entering the fluid cooler. Reduced wet-bulb temperatures will result in colder process fluid temperatures. However, the cold process fluid temperature will not vary linearly with the wet-bulb. For example, a 20°F reduction in wet-bulb may result in only a 15°F reduction in cold process fluid temperature.
3. **Fluid flow rate:** Increasing the process fluid flow rate (gpm) will cause a slight elevation in cold process fluid temperature, while reducing the

fluid flow rate will cause the cold process fluid temperature to decrease slightly. However, at a given heat load (see formula above), process fluid flow reductions also cause an increase in the incoming hot process fluid temperature and thermal range.

4. **Air flow rate:** Reducing air flow through the fluid cooler causes the cold process fluid temperature to rise. This is the recommended method by which to control leaving process fluid temperature.

   For greater insight on process fluid temperature control, please read *Marley Technical Report H-001* **"Cooling Tower Energy Management"**, available at spxcooling.com.

Pump cycling limits: Cycling the recirculating water pump(s) to control process fluid temperature is not typically recommended. If the recirculating water pumps(s) are cycled as part of normal system operation, care must be exercised – frequent wet/dry cycles may lead to premature scaling of the coil surface. Motor cycling limits apply.

Dampers: If equipped, the positive closure damper system is designed to help prevent heat loss from the coil due to air movement caused by convection or wind conditions when both the fans and pump are off. Dampers are installed above the discharge of the fans and are opened/closed via a switch on the control panel door.

Note

Operation of the fans and pump is only enabled when the dampers are opened.

Dry Operation

Note

Also refer to the Freezing Weather Operation and Protection Against Coil Freezing sections.

LW fluid cooler models may be operated dry without recirculating water during colder weather as heat load and ambient conditions permit.
If dry operation is intended and the recirculating water is at risk of freezing, the recirculating pump should be turned off, and the water in the collection basin, pump and make-up supply piping should be drained.
Care must be exercised when cycling the recirculating water pump(s)– frequent wet/dry cycles may lead to premature scaling of the heat transfer surface.

Freezing Weather Operation

During operation in subfreezing weather, the opportunity exists for ice to form in the colder regions of the fluid cooler. Primary concerns are to protect the heat transfer coil from freezing and prevent the formation of destructive ice on the fluid cooler air inlet and louvers. Your understanding of cold weather operation will be enhanced if you read *Marley Technical Report H-003* **"Cooling Towers and Freezing Weather"**.

Note

It is the operator's responsibility to prevent the formation of destructive (hard) ice on the fluid cooler air inlet louvers. Certain guidelines should be followed:

1. Do not allow the fluid cooler's leaving process fluid temperature to drop below 50°F. If low temperature operation is necessary or beneficial to your process, establish the minimum allowable level as follows:

   During the first coldest days of operation, observe whether any ice is forming on the louver face, particularly near the bottom part of the louver face. If hard ice is present on the louvers, you must increase the allowable cold water temperature.

2. As cold air enters the louvers, it causes the water flowing over the coil(s) to be drawn inward toward the center of the fluid cooler. Thus, under fan operation, the louvers and lower periphery of the fluid cooler structure remain partly dry, seeing only random splashing from within the fluid cooler – plus normal atmospheric moisture from the entering air. Such lightly wetted areas are most subject to freezing.

   Therefore, if excessive ice forms on the louvers, stop the fan for a few minutes. With the fan off, the water flow will increase in the vicinity of the louvers and reduce the ice buildup.

Intermittent Freezing Weather Operation:

If periods of shutdown (nights, weekends, etc.) occur during freezing weather, measures must be taken to prevent the water in the cold water basin and all exposed pipework from freezing. Several methods are used to combat this, including Marley automatic basin heater systems and pump freeze protection systems.

⚠ Caution

Basin heaters systems will not prevent the coil from freezing. Unless some means of freeze prevention is incorporated into your system, the fluid cooler basin and exposed pipework should be drained at the beginning of each freezing weather shutdown period.

Note

If fluid cooler basin is drained, verify that all basin heaters have been shut off either by automatic cutoff or disconnect switch.

Protection Against Coil Freezing:

Fluid cooler systems installed in areas with the possibility of freezing ambient conditions must incorporate measures to protect the fluid in the heat transfer coil(s) from freezing and damaging the coils. Industrial inhibited ethylene and propylene glycol solutions are the best means to protect the coil(s) from freeze damage. The following table provides the coil volume for each LW fluid cooler model, per cell.

Model	Coil Volume US Gallons	Model	Coil Volume US Gallons
LW032*B	46	LW064*B	88
LW032*C	46	LW064*C	88
LW032*E	67	LW064*E	129
LW032*F	67	LW064*F	129
LW048*B	69	LW096*B	132
LW048*C	69	LW096*C	132
LW048*E	102	LW096*E	196
LW048*F	102	LW096*F	196

When the use of industrial antifreeze solutions is not possible, the system must be operated to meet both of the following conditions at all times.

1. Maintain sufficient flow rate through the coil.
2. Maintain sufficient heat load on the process fluid. Fluid exiting the coil must be maintained at or above 50°F.

⚠ Caution

If an antifreeze solution is not used and sufficient heat load and/or flow rate are not available, the coil(s) must be drained immediately. Automatic drain valves and air vents in the piping to and from the fluid cooler are necessary to facilitate full and timely drainage. Draining of the coil during extreme cold conditions should be undertaken in emergency situations only, and not as part of a routine operating sequence, as risk of freeze damage is not completely eliminated.

Water Quality and Blowdown

Maintaining Water Quality:

Galvanized steel structural and casing components used in LW fluid coolers have been galvanized with a heavy zinc coating averaging 2.0 mils in thickness. Other materials used (PVC fill, drift eliminators, and louvers, aluminum fans, etc.) are selected to offer maximum service life in a "normal" fluid cooler environment, defined as follows:

Recirculating water with a pH between 6.5 and 8; a chloride content (as NaCl) below 500 ppm; a sulfate content (SO_4) below 250 ppm; total alkalinity (as $CaCO_3$) below 500 ppm; calcium hardness (as $CaCO_3$) above 50 ppm; no significant contamination with unusual chemicals or foreign substances; and adequate water treatment to minimize scaling.

- Startup Conditions: The water conditions during initial fluid cooler operation are crucial in preventing premature corrosion of galvanized steel (white rust). For at least the first eight weeks of operation, pH should be controlled between 6.5 and 8.0 with hardness and alkalinity levels between 100 and 300 ppm (expressed as $CaCO_3$).
- Chlorine (if used) shall be added intermittently, with a free residual not to exceed 1 ppm maintained for short periods. Excessive chlorine levels may deteriorate sealants and other materials of construction.
- An atmosphere surrounding the fluid cooler no worse than "moderate industrial", where rainfall and fog are no more than slightly acid, and they do not contain significant chlorides or hydrogen sulfide (H_2S).
- Many proprietary chemicals exist for control of scale, corrosion, and biological growth and should be used prudently. Also, combinations of chemicals may cause reactions which reduce treatment effectiveness, and certain chemicals such as surfactants, biodispersants and antifoams may increase drift rate.

Note

The structure your fluid cooler contains galvanized steel, and the heat transfer coil is constructed with copper, therefore, your water treatment program must be compatible with zinc and copper. In working with your water treatment supplier, it is important that you recognize the potential effects of the specific treatment program you choose on zinc and copper.

operation

Blowdown:

Evaporative heat exchange equipment functions by continuously causing a portion of the water circulated over the heat transfer media to evaporate. Although the water lost by evaporation is replenished by the makeup system, it exits the fluid cooler as pure water–leaving behind its burden of dissolved solids to concentrate in the remaining water. Given no means of control, this increasing concentration of contaminants can reach a very high level.

In order to achieve water quality which is acceptable to the fluid cooler, the selected water treatment company must work from a relatively constant level of concentrations. This stabilization of contaminant concentrations is usually accomplished by blowdown, which is the constant discharge of a portion of the circulating water to waste. As a rule, acceptable levels on which to base a treatment schedule will be in the range of 2-4 concentrations. The following table shows the minimum amount of blowdown (percent of flow) required to maintain different concentrations with various cooling ranges*:

Cooling Range	Number of Concentrations						
	1.5X	2.0X	2.5X	3.0X	4.0X	5.0X	6.0X
5° F (2.78° C)	.78	.38	.25	.18	.11	.08	.06
10° F (5.56° C)	1.58	.78	.51	.38	.25	.18	.14
15° F (8.33° C)	2.38	1.18	.78	.58	.38	.28	.22
20° F (11.11° C)	3.18	1.58	1.05	.78	.51	.38	.30
25° F (13.89° C)	3.98	1.98	1.32	.98	.64	.48	.38
Multipliers are based on drift of 0.02% of the circulating water rate.							

* Range = Difference between hot water temperature coming to the fluid cooler and cold water temperature leaving the fluid cooler.

EXAMPLE: 530 gpm recirculating water rate, 18°F cooling range. To maintain 4 concentrations, the required blowdown is 0.458% or .00458 times 530 gpm, which is 2.4 gpm.

If fluid cooler is operated at 4 concentrations, circulating water will contain four times as much dissolved solid as the makeup water, assuming none of the solids form scale or are otherwise removed from the system.

Note

When water treatment chemicals are added, they should not be introduced into the circulating water system via the water collection basin of the fluid cooler. Water velocities are lowest at that point, which results in inadequate mixing.

maintenance

Fluid Cooler Inspection and Maintenance

⚠ **Warning**

Microorganisms including Legionella bacteria can exist in premise plumbing including fluid coolers. The development of an effective water management plan (WMP) and implementation of maintenance procedures are essential to prevent the presence, dissemination and amplification of Legionella bacteria and other waterborne contaminants throughout premise plumbing. Before operating the fluid cooler, the water management plan and maintenance procedures must be in place and regularly practiced.

In addition, the following steps are recommended:

Do NOT attempt any service unless the fan motor is locked out.

- Consult a knowledgeable water treatment professional to clean and treat your cooling tower. See **Fluid Cooler Startup** section of this manual.
- Fluid coolers must be cleaned and disinfected regularly in accordance with ASHRAE Standard 188 and Guideline 12.
- Workers performing decontamination procedures must wear personal protective equipment (PPE) as directed by their facility safety officer.
- Fluid coolers must be visually inspected regularly to assess signs of bacterial growth, appearance of debris and scale on drift eliminators and general operating conditions. Refer to ASHRAE Standard 188 and Guideline 12 for specific frequency recommendations.
- Replace worn or damaged components.

To minimize the presence of waterborne microorganisms, including Legionella, follow the water management plan for your facility, perform regularly scheduled fluid cooler inspections and maintenance, and enlist the services of water treatment professionals.

For additional technical support, contact your Marley sales representative.

References: ashrae.org. Search “ASHRAE Standard 188” and “ASHRAE Guideline 12.”

cdc.gov. Search “Water Management Program.”

Water Collection Basin Access / Air Inlet Louver Removal:

Some maintenance procedures require access to components located in the water collection basin. These maintenance procedures can be performed from the perimeter of the fluid cooler without entering the basin. To access the basin, one or more of the air inlet louver frames must be removed. To remove,

loosen the tap screws securing the frame in place and pull the frame away from the fluid cooler. Louver frames are not always the same size; if more than one louver frame is removed, the original location should be noted.

⚠ Caution

Collection basin floor has uneven surfaces and has the potential to be slippery. Care should be taken if entering the basin.

⚠ Caution

Louver edges can be very sharp and could cut skin if proper protection is not used. Always wear gloves and sleeves when handling louver packs.

Access Doors:

To allow access to the mechanical system, eliminators, water distribution system, coil surface and fill media, multiple access doors are provided in various locations of the fluid cooler. To open, lift up on the handles to slide free and remove. To close, position door over frame and slide downward until door seats in trough. Replace doors prior to operation.

Heat Transfer Fill Media Removal and Replacement:

⚠ Caution

Fill edges can be very sharp and can cut skin if proper protection is not used. Always wear gloves and sleeves when handling eliminator packs.

PVC heat transfer media (fill) is used in the LW fluid cooler to enhance the evaporative cooling process. The fill is assembled into packs supported by beams above the air inlet, and may be removed for inspection, cleaning or replacement.

To remove the fill, open the lower access door(s) and locate a fill pack with a paint-marked end. Marked packs are smaller than the remainder of the packs, and one is installed near each lower access door. Pull the marked pack out through the access door, and then the rest of the packs can be removed. Pay close attention to the orientation and placement. Replace packs in the reverse order in which they were removed.

Drift Eliminator Removal and Replacement:

⚠ Caution

Eliminator edges can be very sharp and can cut skin if proper protection is not used. Always wear gloves and sleeves when handling eliminator packs.

The drift eliminators may be removed for cleaning, replacement or access to the distribution system. The eliminators are held in place by a press fit, and are formed into packs that nest with each other to form a monolithic barrier. It is recommended that personal protection is used when handling the eliminator pieces, sharp edges and corners can cause abrasions.

To remove the eliminators, open the upper access door(s) and lift with two hands on an eliminator section – this will indicate where eliminator packs are nested. Lift the eliminators at that intersection to free an eliminator pack, and remove through the access door(s). Pay close attention to the orientation and placement, they are not symmetrical. Each pack should be replaced at the location which it was removed.

Note

Proper eliminator pack replacement is essential to fluid cooler operation. Incorrect installation may result in excessive drift rates and fan inefficiency! To ensure packs are reinstalled in the correct orientation, it is recommended that one pack is left in its original location inside the fluid cooler as a reminder of pack orientation. Place packs in the fluid cooler in the reverse order of removal. Packs should nest tightly with each other, leaving a level surface with no gaps.

Distribution System Maintenance:

To keep your LW fluid cooler operating at peak performance, it may be necessary to clear the spray system of debris or sediment. To access the spray system, remove one or more of the upper access doors and observe the spray system with full-flow on the unit. Each nozzle should produce a rectangular pattern spray that overlaps the adjacent nozzle patterns.

If a nozzle appears clogged or is not producing a cone pattern, remove the nozzle and clean all surfaces. To remove the nozzle, unscrew it from the spray pipe. Inspect the nozzle for cleanliness or broken pieces. If the nozzle appears broken or damaged, consult your Marley representative for replacement parts. Insert the nozzle by threading it back into the spray pipe.

maintenance

Routine Maintenance:

Included with the instruction packet are separate User Manuals on major operating components of the fluid cooler, and it is recommended that you read them thoroughly. Where discrepancies may exist, the separate User Manuals will take precedence. The following is recommended as a minimum routine of scheduled maintenance:

⚠ Warning

Always shut off electrical power to the fluid cooler fan motor prior to performing any inspections that may involve physical contact with the mechanical or electrical equipment in or on the fluid cooler. Lock out and tag out any electrical switches to prevent others from turning the power back on. Service personnel must wear proper personal protective clothing and equipment. The purchaser or owner is responsible for providing a safe method for entering or exiting the access doors if required.

Weekly visually inspect the fluid cooler to assess general operating conditions and for signs of microbial growth and appearance of debris, scale and corrosion. Refer to ASHRAE Standard 188 and Guideline 12 for specific frequency recommendations. Consult a knowledgeable water treatment professional to maintain fluid cooler hygiene.

If equipped, the damper actuator and assembly should be cycled open and closed several times. Observe the cycle to assure that the blades and linkage move freely. The fan motor should be shut off when dampers are closed. Seasonal periods where the damper assembly remains open or closed for extended periods of time can allow pivot points to scale up, causing premature failure.

Monthly (Weekly at start up) Observe, touch, and listen to the fluid cooler. Become accustomed to its normal appearance, sound, and level of vibration. Abnormal aspects relating to the rotating equipment should be considered reason to shut down the fluid cooler until the problem can be located and corrected. Observe operation of the pump, motor(s) and fan(s). Become familiar with the normal operating temperature of the motor(s), as well as the sight and sound of all components as a whole.

Inspect fill media, louvers, drift eliminators and basin trash screens and remove any debris or scale which may have accumulated. Replace any damaged or worn out components. Use of high-pressure water may damage the fluid cooler components.

Observe operation of the float valve. Depress the operating lever to make sure that the valve is operating freely. Inspect the suction screen for plugging. Remove any debris that may have accumulated.

Check for any buildup of silt on the floor of the collection basin. Flush and remove excessive buildup.

View the water pattern on the heat transfer coil. If there are dry spots on the coil or inconsistent coverage, this may be evidence of a clogged nozzle. Inspect nozzles for blockage.

Inspect heat transfer coil for scale buildup. If scale exists, discuss remediation with your water treatment provider.

Annually Inspect the fluid cooler thoroughly, making maximum use of instructions given in the separate User Manuals. Check structural bolted connections and tighten as required. Check to see that all bolts are tight in the fan and mechanical equipment region. Make preventive maintenance repairs as necessary.

Seasonal Shutdown Instructions

When the system is to be shut down for an extended period of time, it is recommended that the recirculating water system be drained. Leave the basin and pump drains open.

During shutdown, follow recommendations in the **Fluid Cooler Inspection and Maintenance** section of this manual before attempting repairs.

Following each year's shutdown and cleaning, inspect the fluid cooler's metal surfaces for evidence of the need to apply a protective coating. Do not misinterpret grime as a need to have the fluid cooler painted. If relatively bright metal can be exposed by cleaning, consider that the galvanizing has remained effective. Unless there is evidence of a generalized failure of the galvanizing, localized touch-up should be all that is required.

Note

To the extent that the galvanizing (zinc coating) still exists, paint will not adhere to it readily. Contact the manufacturer of the coating you intend to use for instructions.

Fluid cooler framework Check structural bolted connections and tighten as required.

Fan and motor assemblies Check fan assembly bolting and tighten as required. Fan motor(s) should be operated for two hours twice a month. This serves to dry out windings and re-lubricate bearing surfaces.

Long Term Storage Procedures

Instructions for protection of non-operating equipment for more than 3 months.

After installation of the fluid cooler and completion of the pre-startup instructions, the operational availability of equipment will last for a maximum period of three months. Ensure that the fluid cooler and coil are completely drained of all water and process fluid.

After this initial period of 3 months, or until the unit is employed into continuous operation, the fan shaft should be turned by hand for a few minutes every month thereafter.

General Protective Requirements for Fluid Coolers:

The fan opening at the top of the fluid cooler should be covered with a tarp. This will protect the mechanical components from rain as well as keep out dirt, trash, leaves, etc.

All coils on every fluid cooler model are protected from the environment by the structure of the fluid cooler as well as the PVC air inlet louvers. No external protection of the coil is required for long-term storage.

For those units equipped with dampers, the blades of the dampers should be kept in closed position. Damper actuators should be removed and stored in a dry location to prevent condensation buildup inside the actuator.

Internal Protection of Coil All of the coil inlet and outlet connections should be sealed off with blind flanges. One flange per coil should be fitted with a valve, pressure gage and blocking plug. The coils should be charged with nitrogen gas to prevent corrosion. Connect a nitrogen supply line to the blind flange with valve. Loosen the bolts at one of the inlet nozzle blind flanges to let air escape. Inject inert gas into coil so as to effect nitrogen flushing for about 10 minutes and thus to expel all air out of the unit. Finally, re-tighten the inlet nozzle blind flange bolts and let nitrogen pressure build up to 7 psig inside the tube-bundle. Disconnect the nitrogen line and plug the isolation valve to avoid any pressure drop in case of valve leak.

Mechanical Equipment:

Electric Motors: All drive motors should be taken down and stored indoors. Then, every month, turn motor shafts to evenly distribute lubricant to the bearing parts.

Recirculation pumps: All pumps and pump motors should be taken down and stored indoors (pumps and motors may be stored fully assembled). Then, every month, turn pump impeller shaft to evenly distribute lubricant to the bearing parts.

maintenance

SPX Cooling Technologies Services

Our interest in your LW fluid cooler does not end with the sale. Having designed and manufactured one of the most reliable and longest-lasting fluid coolers in its class, we want to make sure that you gain the maximum possible benefit from its purchase.

Therefore, the following services are available which are intended to: assure the maximum possible service life under your operating conditions; tailor the operating characteristics to your specific needs and maintain consistently optimum thermal performance capability. They are available by contacting your Marley sales representative.

Replacement parts A complete stock of parts and components is maintained at one or more of the various manufacturing plants. In cases of emergency, they can normally be shipped within 24 hours, by air freight if necessary. However, you would obviously benefit from anticipating your need in advance, thus avoiding the cost of special handling.

Be sure to mention your fluid cooler serial number (from the fluid cooler nameplate) when ordering parts.

Periodic maintenance You may wish to contract with SPX Cooling for regularly scheduled visits for the purpose of inspecting and reporting your fluid cooler's condition, to make recommendations intended to prevent emergencies and to perform maintenance considered outside the norm.

This service is not intended to replace the important function performed by your maintenance staff. Their attention assures the fluid cooler's routine operating performance, and is invaluable. However, we recognize that the unusual manner in which a fluid cooler performs its function as well as the unique forces which act upon it may be considerations which occasionally require the services of an expert technician.

maintenance

Increased load requirements LW fluid coolers are designed so that cells of either equal or unequal capacity can be added in the future. This allows you to compensate for the load increases that normally occur with the replacement or addition of production equipment and still retain continuity with respect to your fluid cooler system.

Fluid Cooler rebuilding SPX routinely rebuilds and upgrades evaporative condensers, fluid coolers and cooling towers of all materials and manufacture. If your product ever reaches the limit of its service life, we recommend that you investigate the cost of rebuilding before you routinely order a new replacement fluid cooler.

Numerous technical reports are published by SPX including more detailed information on a variety of evaporative heat rejection equipment operation and service topics. Your Marley sales representative will be happy to give you copies of these reports at no charge or you can download copies from our website at spxcooling.com.

For complete parts and service assistance, contact the Marley sales representative in your area. If you need help locating your representative, please phone 913 664 7400 or check the internet at spxcooling.com.

LW fluid cooler

USER MANUAL

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Z1047819_C | ISSUED 04/2019

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