

*/ **Recold** Operation and Maintenance Instructions /*

Manual 06-1339A



General Information

Note

Recold Evaporative Cooling products are designed for extended, trouble-free service when properly installed, operated and maintained. This bulletin is published as a guide to maximizing service life and obtaining optimum performance through a program of regular inspection and maintenance.

Severe Service

It should be noted that these recommended maintenance procedures should be considered as basic requirements. In a normal operating environment, whenever severe operating conditions prevail the frequency of inspection and service should be increased accordingly. Atmospheric conditions, such as industrial and chemical fumes, salt, dust, or unusual airborne contaminants and particulates will be absorbed by the recirculating water system and may form solutions and deposits harmful to the products.

Safety

All recirculating water systems can contain chemical additives for water quality control and biological contaminants removed from the air by the washing action of the water,

Personnel exposed to the saturated effluent, drift, or direct contact should use proper precaution. Proper siting requires good judgement to preclude the air discharge recirculating into fresh air intakes or to avoid directing discharge air from the building into the air supply to the cooling product if the building exhaust could contain contaminants.

⚠ Warning

Cooling Tower Cleaning – Any evaporative-type cooling tower must be thoroughly cleaned on a regular basis to minimize the growth of bacteria, including Legionella Pneumophila to avoid the risk of sickness or death. Service personnel must wear proper personal protective equipment. Do NOT attempt any service unless the fan motor is locked out.

Safety Precautions – Before performing any maintenance or inspection all power should be disconnected and locked in the off position. Operation, maintenance and repair should be performed by qualified personnel familiar with the procedures set forth in this manual.

Warranties – Please refer to the limitation of warranties in effect at the time of purchase of this product.

General Information

Vibration

Vibration is present, to some degree, in all mechanical systems. However, refrigerant piping requires special attention due to the following factors.

1. *Structural Resonance* – when the natural frequency of the piping coincides with the exciting frequency caused by discharge gas pulsations vibration in the piping is amplified.
2. *Forced Vibration* – caused by movement of the compressor
3. *Acoustical Resonance* – occurs when the piping system geometry amplifies discharge gas pulsations at specific locations.

Vibration historically has been a source of refrigerant line breakage and system leaks so problems of this nature are best avoided during the design phase or, alternately, solved early in the system operation.

Coil *(if applicable)*

Condenser Tube – Bundle Inspection

The coil is leak Tested at 350 psig before shipment. Recold will not be responsible for loss of refrigerant. It is The responsibility of the installer to verify that the system is sealed before charging with refrigerant.

Freeze-up Protection

The simplest and most fool-proof method of protecting the coil from freeze-up is to use a glycol solution inside the coil. If this is not possible a heat load must be maintained on the coil at all times so that the water temperature does not drop below 50°F. Also, full flow condition should be maintained in the coil.

In order to keep water temperatures from dropping below 50°F some type of capacity control is normally required during freezing weather. Operating dry with a remote sump is an excellent way to reduce unit capacity at low temperatures (this is covered under recirculating water freeze-up protection). Other methods that can be used are modulating the dampers, fan cycling or two speed motors. These can be used individually or In combination with dry operation.

If an anti-freeze solution is not used the coil must also be drained immediately whenever the pump is shut down or flow stops. This can be accomplished by automatic drain valves and air vents in the piping to and from the cooler.

General Information

Recirculating Water System

The most fool-proof method of protecting the recirculating water system from freeze-up is thru the use of a remote sump located inside the building below the unit.

The recirculating water pump is mounted at the remote sump and whenever it is shut off, all of the water in the unit drains back to the warm sump inside.

If a remote sump cannot be used, pan heaters are available, either steam, hot water or electric type to keep the pan water from freezing when the unit is shut down. Water lines to and from the unit must also be wrapped with electric heating cable and insulated to protect them from freeze-up. A condenser or cooler cannot be operated dry (fans on, pump off) with this method unless water is completely drained from the pan.

 **Caution**

The pan heaters are sized to prevent pan water from freezing when the unit is shut down but they are not sufficient to prevent freeze-up when the fans are turned on.

Pre Start-Up

Cleanliness

Dirt and debris may accumulate in the pan section during shipping and storage. This should be flushed out prior to start-up to prevent clogging the water distribution system. The inlet screens should be inspected for foreign material at this time.

Pump Operation

Before initial start of the pump, check as follows:

1. Be sure that pump operates in direction indicated by the arrow on the pump casing (suction cover). Check rotation each time motor leads have been disconnected.
2. Check all connections of motor and starting device with wiring diagram. Check voltage, phase and frequency of line circuit with motor nameplate.
3. Check suction and discharge piping and pressure gauges for proper operation.
4. Turn rotating element by hand to assure that it rotates freely.

Note

Running – Periodically inspect pump while running, but especially after first start and following repair

1. Check pump and piping for leaks. Repair immediately.
 2. Record pressure gauge readings for future reference.
 3. Record voltage, amperage per phase, and kW.
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Fan Motor / Sheave Alignment

RECOLD Evaporative Cooling Equipment is shipped with fan motor(s), sheaves and belts factory adjusted. No adjustments are required at start-up. A straight edge placed across both sheaves should make (4) point contact when properly aligned.

Make-up Valve

Adjust the float level upon the initial fill so the valve is completely closed when the water level is 1/2" below overflow level. Make-up water supply pressure should be maintained between 15 and 45 psig for proper operation of the valve. The valve assembly should be inspected monthly and adjusted as required. Replace the valve seat if leakage occurs when the valve is in the closed position.

Maintenance Recommendations

Pump Maintenance

Cleaning – Remove oil, dust, water, chemicals from exterior of motor and pump. Keep motor air inlet and outlet open. Blow out interior of open motors with clean compressed air at low pressure. Regularly drain moisture from TEFC motors,

Labeled Motors – It is imperative for repair of a motor with Underwriters Laboratories' label that original clearances be held, that all plugs, screws, other hardware be fastened securely, and that parts replacements be exact duplicates or approved equals. Violation of any of the above invalidates Underwriters' Label.

Motor Maintenance (*same as pump maintenance*)

If the fan motor is cycled for capacity control or power savings, the control device should be adjusted for sufficient "deadband" operation to prevent starting the motor more than 5 times per hour. If two-speed motors are used, the motor starter should include a 15 second time delay when switching from high to low speed. Each low speed start and each high speed start count as one start.

Access Doors

If scale deposits or water is found around the access doors, adjust the two tension tabs inside the door trough. With the fan and pump off and the access door removed, reach inside and bend the tabs away from the trough until they align with the edge of door track. A six inch screw driver or channel lock pliers can be used. Adjust as necessary until leaking stops when door is installed.

Bearings - Lubrication

Grease should be fed slowly every 6 months or after a prolonged shut down. Use waterproof lithium based grease. Below 32°F – Esso, Exxon or Beacon 325. Above 32°F – Mobil Mobilox EP2, Shell Alvania EP2 or Texaco RB2.

Belts

Should be inspected for proper tension after the first 18 hours of operation and monthly thereafter. Belts should not "chirp" or squeal" on start-up.

Maintenance Recommendations

Recommended Monthly Inspection

1. Clean pan section interior. Dirt and other impurities which have washed into the pan should be hosed from the pan area. Shut off water to float valve and open the drain connection for flushing
2. Clean pan suction strainer, if furnished,
3. Check water operating level. Adjust float arm as required, (Do not bend float arm).
4. Check belt tensioning. Belts should be re-adjusted after 18 hours of initial operation and monthly thereafter.
5. Inspect fan motor(s) and water circulation pump(s) and lubricate per the lubrication nameplate or manufacture's recommendations.
6. Inspect fan wheels, housing and inlet screens removing any debris which may have accumulated during operation
7. Inspect the water distribution system to insure that nozzles and spray orifices are functioning correctly. The inspection should be made with the circulation pump on and fans off, (See Maintenance Check List Form 1192).

Recommended Annual Inspection

In addition to the above maintenance activities a general inspection of the unit surface should be completed at least once a year. Surface corrosion in spot areas should be wire brushed and cleaned thoroughly. These locations may then be resurfaced with rust inhibitive paint. Remove spray header caps and flush out.

Water Quality

Recirculating Water Quality Guidelines

	G235 Galvanized Steel	Stainless Steel (optional)
pH	7.0 to 9.0	6.5 to 9.0
Hardness as CaCO ₃	500 ppm max.	500 ppm max.
Alkalinity as CaCO ₃	500 ppm max.	500 ppm max.
Total Dissolved Solids	1500 ppm max.	2000 ppm max.
Chlorides as NaCl	750 ppm max.	1500 ppm max.
Sulfates	500 ppm max.	750 ppm max.

Note

Cycles of concentration, i.e., ratio of dissolved solids in recirculated water to dissolved solids in make-up, should be determined and monitored frequently by a competent water treatment expert.

To limit cycles of concentration so the above guidelines are maintained, it is necessary to “bleed” or “blowdown” a certain portion of the recirculated water. Normally this is achieved automatically with a solenoid valve actuated by a conductivity meter set at the desired “micromhos” corresponding to the desired cycles of concentration. It should be noted that these are guidelines and even though these individual values are met, under certain conditions the water quality can be aggressive. For example, water with very alkalinity and levels of chlorides and sulfates approaching maximum recommended levels can be corrosive.

Bleed

All Recold products are furnished with a bleed system fitting and valve to continuously remove a small portion of the recirculated water to keep the water quality within the above listed parameters. On Evaporative Condensers and Fluid Coolers this device is located on the discharge side of the pump. On Cooling Towers the fitting is located in the water distribution piping. It is important to note that since “bleed” rate is a function of evaporation rate (i.e., amount of heat rejected), if the bleed setting is manual based on design heat load, too much water will be removed when the heat load is less than design.

One method of calculating evaporation and bleed is shown below:

Water Quality

Evaporation rate = water flow rate (gpm) x range (°F) x .001 (or for each 10° cooling range, 1% of the water flow will be evaporated).

$$\text{Bleed Rate} = \frac{\text{Evaporation Rate}}{\text{Cycles of Concentration, less 1}}$$

Assume a 100 ton system, 300 gpm cooled from 95° to 85°
Evaporation Rate- 300 x 10 x .001 = 3 gpm

Assume 4 cycles of concentration:

$$\text{Bleed Rate} = \frac{3}{4-1} = 1 \text{ gpm (at full heat load)}$$

The above water bleed system is a good means of control for many forms of scale build up or corrosion. Some system conditions, however, may be much more severe requiring more extensive forms of water treatment. It is important that operating and maintenance personnel be aware of this problem and know when to recommend water treatment. Following are important signs to look for when inspecting a given unit.

1. Scale formation on the heat exchanger surfaces with resulting decreased operating efficiency of equipment.
2. Accelerated corrosion or rusting of the metal surfaces, resulting in coil or casing failure.
3. Slime and algae formation on the metal surfaces, tending to block circulation piping and the water distribution system.

Following are guidelines to be used in water treatment:

1. Any water treatment must be compatible with galvanized steel and copper.
2. The water pH should be maintained between 7.0 and 9.0 at all times, (see water quality guidelines).
3. Batch feed process should never be used.
4. Acid treatment not recommended due to corrosive effect on galvanized steel and other materials.

Parts

Contact your local Recold sales representative for factory authorized parts. Be sure to include the Serial Number from the product nameplate when ordering or requesting quotations.

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COOLING TECHNOLOGIES

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