



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL FOR DIRECT EVAPORATIVE COOLING MODULES

ATTENTION: READ THIS MANUAL AND ALL LABELS ATTACHED TO THE UNIT CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THESE UNITS! CHECK UNIT DATA PLATE FOR TYPE OF GAS AND ELECTRICAL SPECIFICATIONS AND MAKE CERTAIN THAT THESE AGREE WITH THOSE AT POINT OF INSTALLATION. RETAIN FOR FUTURE REFERENCE. THE APPLIANCE IS NOT TO BE USED BY PERSONS (INCLUDING CHILDREN) WITH REDUCED PHYSICAL, SENSORY OR MENTAL CAPABILITIES, OR LACK OF EXPERIENCE AND KNOWLEDGE, UNLESS THEY HAVE BEEN GIVEN SUPERVISION OR INSTRUCTION. CHILDREN SHOULD BE SUPERVISED TO ENSURE THAT THEY DO NOT PLAY WITH THE APPLIANCE.

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.



FOR YOUR SAFETY

If you smell gas:

1. Open Windows
2. Don't touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

WARNING

Install, operate and maintain unit in accordance with manufacturer's instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The state of California has determined that these substances may cause cancer, birth defects, or other reproductive harm.

INSTALLER'S RESPONSIBILITY

Installer Please Note: This equipment has been tested and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. **It is the installer's responsibility to inspect and correct any problems that may be found.**



SECTION I - FOREWORD

As is the case with any fine piece of equipment, care must be taken to provide the proper attention to the operation and maintenance details of this machine.

This manual has been prepared in order for you to become well-acquainted with those details, and in doing so, you will be able to give your Direct Evaporative Cooling Module the care and attention which any piece of equipment needs and deserves.

It is the customer's and installation personnel responsibility to determine if the unit is equipped with all of the safety devices required for the particular application. Safety considerations include the accessibility of the unit to non-service personnel, the provision of electrical lockout switches, maintenance procedures and automatic control sequences. Clearly mark all emergency shutoff devices.

ETL Operating Parameters:

Maximum elevation is 9,000 ft. (2,743.2m).
Maximum operating temperature is 120°F (48.9°C).
Minimum operating temperature is 0°F (-17.8°C).
Maximum operating pressure is 34 PSIG (234.4 kPa).
Minimum operating pressure is 0 PSIG (0 kPa).

IMPORTANT NOTICE

Alton assumes no responsibility for loss or damage in transit; therefore, you should protect yourself by following these instructions:

Bill Of Lading

Save your bill of lading. It is a contract, and you will need it, provided you have to file a loss or damage claim. Remember, claims are outlawed after nine months.

Loss In Transit

Before you sign for this shipment, check against the bill of lading, also the transportation company's delivery ticket. Make sure that you get the exact total of articles listed. Should the delivery ticket show more or less items than are offered, then the carrier's agent must mark the difference on your freight bill before you sign.

Visible Damage In Transit

If anything is damaged, accept the shipment only if the carrier's agent places a notation on your freight bill explaining the nature and extent of damage. Upon inspection of article, make claim to the delivering carrier.

Table of Contents

Section I: Foreword, Table of Contents, and Important Notice	2
Section II: General Information.....	3
Section III: Installation	4
Section IV: Pre-Start Up	7
Section V: Unit Start Up.....	7
Section VI: Unit Shut Down	8
Section VII: Troubleshooting Guide	9
Section VIII: Maintenance Schedule and Lubrication Requirements.....	11
Section IX: Replacement Parts.....	12

Concealed Damage In Transit

Sometimes transit damage is not noticed until the goods are unpacked. In such cases, notification to the carrier must be made within fifteen (15) days of receipt of shipment. In such cases, save the packages and packing material, then notify the transportation company at once, and request an inspection. When the inspector calls, have him make out and leave a "concealed" bad order report. He is obliged to give one to you. Insist on it.

Disposition Of Damaged Articles

Never return damaged articles to us. They are the property of the transportation company when the claim is filed. They will give you disposition instructions.

Packing

We comply with the packing requirements of the transportation companies, and your bill of lading proved that everything was in good condition when shipped. That bill of lading contract requires them to deliver in perfect condition.

SECTION II - GENERAL INFORMATION

A. Purpose

The purpose of this manual is to present a guide for proper installation, maintenance, and operation of the Direct Evaporative Cooling Module, and to supplement, **but not to replace**, the services of qualified field service personnel to supervise the initial start-up and adjustment of the unit. Persons without previous experience with large commercial and industrial equipment should not attempt the initial adjustment and checkout procedure which is essential before such installations may be considered ready for operation. This manual should be made readily available to all operating personnel as an aid in troubleshooting and proper maintenance. Due to the custom nature of this equipment, not all possibilities are addressed in this manual. The customer or installer can obtain specific unit information from the local sales representative or by contacting the factory directly.

WARNING: Failure to comply with general safety information may result in extensive property damage, severe personal injury or death.

B. Shipping

Base Direct Evaporative Cooling Modules are shipped completely assembled where shipping limitations or job specifications allow.

If the module cannot be installed immediately, they should be stored in a clean dry environment. If this is not possible and the module must be stored outdoors, it should be protected from the weather with tarpaulins or plastic coverings. Do not assume that simply covering a unit will keep insects, dust and condensation out of the unit and critical components. Prior to beginning installation of a module that has been in storage for weeks or months, the module and its components should be closely inspected.

Shipments are made F.O.B. Dallas, Texas by flat-bed truck. The unit is securely strapped, tied, and blocked to prevent shipping damage. All shipments are checked by an inspector before they are accepted by the carrier. Parts that are shipped unmounted are noted on the bill of lading. These parts, where feasible, are packaged and shipped with the units. Upon receipt of shipment, all units should be checked against the bill of lading to insure all items have been received. All equipment (and any optional accessories) should be checked carefully for physical damage in the presence of the carrier's representative. If parts are missing or damage has occurred, a claim should be filed immediately with the carrier.

All Direct Evaporative Cooling Modules are given a complete operations test and control circuit checkout before shipment. Copies of the wiring diagram and bill of material are included with each unit shipped. If correspondence with the factory is necessary, please provide the unit model and serial number.

C. Optional Factory Service

Periodic service on any piece of mechanical equipment is necessary for efficient operation. A nationwide service support network is available to provide quick and dependable servicing of make-up air, heating, ventilating, or air handling types of equipment. Factory start-up service is also available which includes the presence of a service engineer to supervise the initial start-up and adjustment of the equipment and provide instructions for the owner's maintenance personnel in proper operations and maintenance. Consult factory for quotations on start-up or periodic service.

SECTION III - INSTALLATION

All electrical connections must conform to the current edition of ANSI/NFPA No. 70 National Electrical Code and applicable local codes. The following recommendations are not intended to supplant any requirement of federal, state, or local codes having jurisdiction. Authorities having jurisdiction should be consulted before installations are made. Local codes may require additional safety controls and/or interlocks.

A. Handling the Equipment

As explained previously, the basic module is designed for shipping in one piece where shipping limitations allow. Some optional accessories may require field mounting.

Units Without Base Frame

Set unit on lifting platform or run lifting straps around unit. Use spreader bars or place 2 x 4's flat against upper edge of cabinet to prevent damage from lifting cables.

WARNING: Do not attach lifting cables to shipping crate.

Hooks, jacks, or chains must not be used around the casing, main control panel or exterior mounted controls.

During transit, unloading and setting of the unit, bolts and nuts may have become loosened. It is recommended that all nuts and set screws be tightened.

Open the cover on the electrical control box located on the module. Inspect all wire terminals and wiring terminations to ensure that all connections are tight.

IMPORTANT: Lift and install the modules or sections of a unit separately. Flange connections provided between modules or sections are not structural and damage will occur if any attempt is made to lift modules that have been flanged together.

See the specification sheet and submittal drawing for unit or section weight and to determine proper orientation for each section.

When unloading sections and/or units or moving equipment to its final location, exercise care to avoid distortion.

B. Locating the Unit

Prior to locating the unit, authorities having jurisdiction should be consulted before installations are made. Approval permits should be checked against the unit received.

If in doubt regarding the application of this appliance, consult the factory.

Locate the unit exactly level. Special attention should be given to the duct, electrical and water connection points.

A minimum of 3 feet access clearance for service is recommended on all sides.

Make a visual inspection to insure no damage has occurred to the unit during installation.

C. Location of Accessories

Where applicable, standard or optional accessories will be placed inside the module for shipment, and must be removed and installed by the mechanical or electrical contractor. Remotely located discharge or inlet dampers must be equipped with an end switch and interlocked to insure maximum design opening before starting and running circuits may be energized.

Field constructed intake accessories should be properly designed to minimize the entry of rain and snow.

D. Electrical Connections

WARNING: Open all disconnect switches and secure in that position before wiring unit. Failure to do so may result in personal injury or death from electrical shock.

WARNING: Controls must be protected from water. Do not allow water to drip on the ignition system.

NOTE: Before installing any wiring, check the unit rating plate for supply power rating.

All electrical connections must conform to the current edition of: ANSI/NFPA No. 70 National Electrical Code and applicable state and local codes.

Entry location for all field-installed and control wiring is through the control panel.

If optional disconnect is not furnished with the unit, the field provided disconnect must be of the proper size and voltage. Refer to unit rating plate for minimum circuit ampacity and voltage. The disconnect must be installed in accordance with Article 430 of the current edition of ANSI/NFPA No. 70 National Electrical Code.

Check the supply voltage before energizing the unit. The maximum voltage variation should not exceed $\pm 10\%$.

NOTE: Should any original wire supplied with the unit have to be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C.

E. Field Piping

CAUTION: To prevent water damage to building and equipment piping, drain and vent plugs must be installed.

NOTE: All field-installed piping must conform to applicable codes.

Water Piping

All water piping must be in accordance with project specifications and the requirements outlined in any applicable local, state, and national codes.

Insert a manual shut-off valve in the water supply line required for the unit's direct evaporative section. Complete the piping to each section's 3/8" make-up water inlet.

NOTE: Soft water equipment should not be attached to water lines going to the evaporative cooler. "Soft Water" will cause corrosion and decrease the effective life of the cooler.

Proper water quality and environmental conditions will give you long service life from your direct evaporative cooling unit. Significant deviation from "normal" conditions may have a bearing on longevity of the equipment.

"Normal" circulating water chemistry falls within the following limits:

- pH between 6.5 and 8.0.
- Chlorides (expressed as NaCl) below 750 ppm.
- Calcium (expressed as CaCO₃) below 1200 ppm - except in arid climates where the critical level for scale formation may be much lower.
- Sulfates below 5,000 ppm – if calcium exceeds 1200 ppm, sulfates should be limited to 800 ppm (less in arid climates) to prevent scale formation.
- Sulfides below 1 ppm.
- Silica (expressed as SiO₂) below 150 ppm.
- Iron below 3 ppm.
- Manganese below 0.1 ppm.
- No organic solvents.
- No organic nutrients which could promote growth of algae or slime.
- Chlorine (from water treatment) below 1 ppm free residual for intermittent treatment, below 0.4 ppm free residual for continuous chlorination.

Insert a manual shut-off valve in the drain line from each unit's direct evaporative section's drain.

NOTE: The direct evaporative section of every module is provided with an adjustable bleed valve that is plumbed to each section's overflow stand pipe. System drainage for the constant water bleed from each evaporative section must be provided.

If units are provided with optional freeze protection and automatic drain down kit, install the solenoid valves in the following manner:

1. Install the normally closed and, if provided, the 1/2" or 3/8" normally open water fill line drain solenoid valve in the water supply line at a point not subject to freezing temperatures and complete the piping to the make-up water inlet connection provided on each unit.

2. Install a manual shut-off valve and the factory provided normally open solenoid valve in the line from the unit's direct evaporative section's sump drain connection.
3. Connect the line from the unit's direct evaporative section's sump drain connection to the direct evaporative section's overflow connection to form a common drain line and plumb to an appropriate drain. Install a P-Trap in the common drain line from the unit's the direct evaporative section drain and overflow connections. Provide the P-Trap height as shown in Drawing #C000659B.
4. For colder climates; be sure to provide means to completely drain the direct evaporative section sumps for freeze protection.
5. Solenoid valves, in addition to those referenced above may be provided in some applications. Refer to the wiring and piping diagrams provided with the unit for installation information.

Before electrically activating any section of the unit, fill the direct evaporative section's sump with water. Check the water level in the sump(s) and verify the setpoint level will not cause the sump to overflow. Adjust the height of sump water fill and level control valve (if necessary) based on variations of water supply line pressure. The depth of the water in the sump should be 1/2" below the top of the sump's overflow stand pipe.

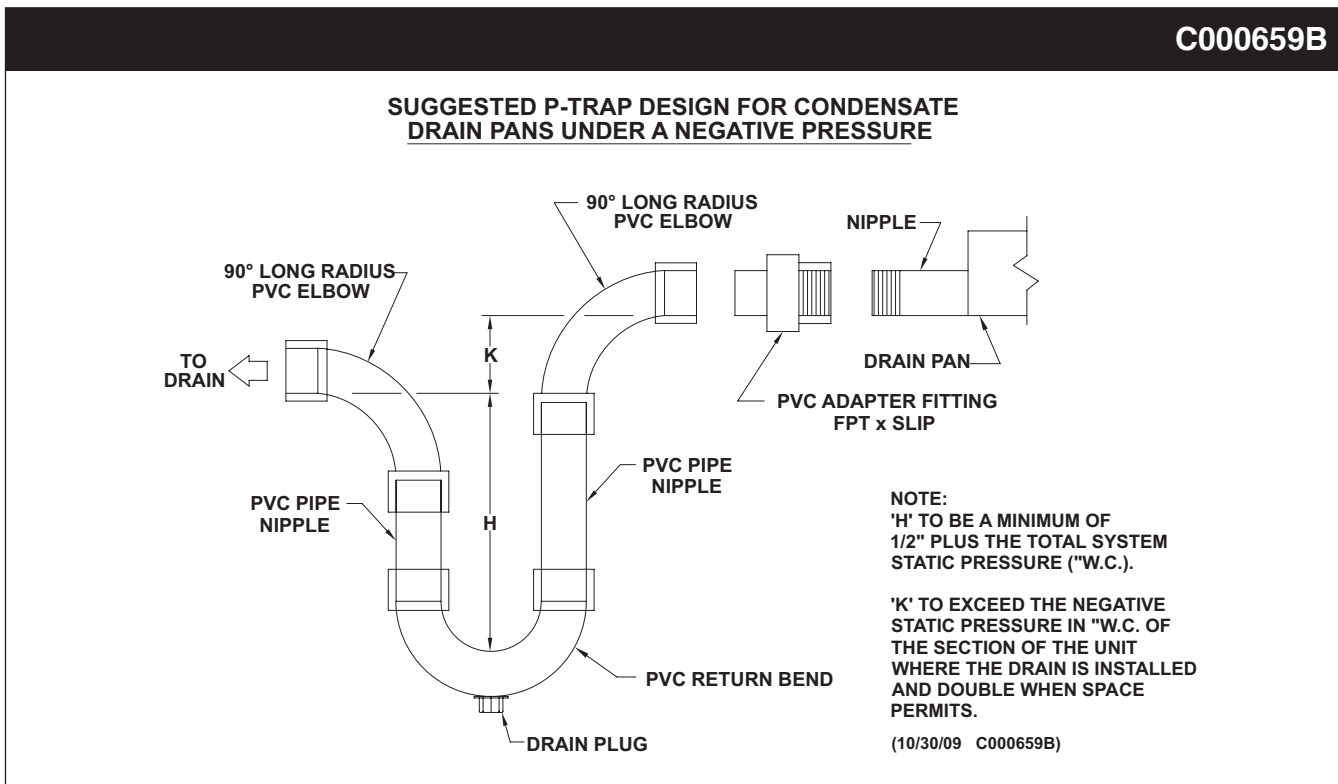
F. Field Wiring and Remote Control Installation

1. Connect the power lines to the line side of the main disconnect switch.
2. Mount and wire remote control panel, thermostats, temperature sensors, and any other field installed controls as indicated on the unit control wiring diagram.
3. Connect the wires to the appropriate field wiring terminals as indicated on the unit control wiring diagram.
4. Field wiring shall have a temperature rating of at least 105°C. The minimum size of the supply cable circuit shall be sufficient for the maximum ampacity of the unit.

G. Locating Temperature Controls

The room or outdoor sensors should be mounted where they will not be subjected to direct impact of the heated air or radiant heat from the sun. The side of building columns away from the heater or interior walls are usually the location best suited for mounting thermostats.

Controls with outdoor sensors require that the outdoor sensor be shielded from direct radiation from the sun. Unit mounted sensors are factory located and mounted.



SECTION IV - PRE START-UP

Pre Start-Up

The owners representative or equipment operator should be present during start-up to receive instructions on care and adjustments of the equipment.

All equipment has been factory tested, adjusted, metered and inspected to meet conditions set at the time the order was placed. Only minimal adjustments should be required. All information in this service manual is typical. All products are semi-custom and changes may occur.

CAUTION: Line side of disconnect may be energized. Follow proper “lockout/tagout” procedures.

Perform a visual inspection, internally and externally, to make sure no damage has occurred, that unit is level, and that everything is secure. This inspection is very important and should be completed with greatest care given to detail. A good pre-start inspection will insure against possible unit damage on start-up and will save valuable analysis time.

1. Check that the physical condition of the unit exterior is acceptable.
2. Check all terminals for loose connections and inspect all wiring terminations to insure that all crimped connections are tight.
3. Check voltage supplied to disconnect switch; the maximum voltage variation should not exceed $\pm 10\%$.
4. Check thermostat(s) for normal operation.
5. Check that system duct work is installed and free from obstructions.
6. Check that the area in and around the unit is clear of debris or containers of flammable liquids.
7. Check that all piping connections, particularly unions, are tight and installed correctly.
8. Check that all accessories requiring field wiring have been properly installed and wired.
9. **Do not run the pump without water in the sump of the direct evaporative cooling section.**
10. All float and liquid levels and bleed off rate are pre-set at the factory during final equipment testing and quality control inspection. However, these settings should be verified at the job site.
11. Depending on local water pressure, a pressure regulating valve may be required to stabilize the make-up water flow and the operation of the water fill and level control valve in the unit's direct evaporative section.

This equipment has been tested prior to shipment. However, during transit control setpoints can change, and wiring can come loose. Do not assume controls are defective until all associated setpoints and wiring are checked.

SECTION V - UNIT START-UP

WARNING: During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components to perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Make sure all doors and service panels have been closed or replaced.

A. UNIT START-UP

After completing all prestart-up checks and procedures, the unit may now be operated. The following checks and adjustments should be made during the initial start-up:

1. Turn on pump motor disconnect and check for proper operation of the water distribution system.
2. Measure the pump motor voltage and amperage to ensure proper operation. The readings should fall within the range given on the unit nameplate. If voltage is over $\pm 10\%$ of nameplate rating, notify contractor or power company.
3. Turn disconnect switch on.

B. COOLING OPERATION

The evaporative cooling module works by drawing outside air through specially designed cooling media. Due to the media's unique design, a turbulent mix of air and water is created which optimizes heat transfer. An air washing effect is also created which removes most dust and dirt from the airstream providing a clean, cool environment.

1. Turn optional system switch to the Cool position.
2. Adjust water regulator valve:

SECTION VI - UNIT SHUTDOWN

Turbocell Units

The water regulator valve should be adjusted so that the media is damp from top to bottom. If water is flowing down the outside surface of the media, the water flow is too high. Adjust the water regulator valve so that media is only damp on the entering air side.

After unit has been shut down, check ductwork downstream for any signs of water carry over. If water is in the ductwork, the water flow is too high. Adjust the water regulator valve until this condition has been corrected.

3. Adjust water bleed-off valve. The unit is provided with a manually adjustable bleed-off valve which will allow for continuous bleed-off of water into the overflow connection on the sump.

The bleed-off required is dependent on the quality of water used and the rate of evaporation. As climate conditions change, the rate of evaporation may increase, thereby requiring an increase in the bleed-off rate. It is recommended that the bleed-off rate be set for the condition of maximum water evaporation.

An indication of insufficient bleed-off is a uniform build-up of minerals on the entering air face of the cooling media. If this condition is observed, increase the rate of bleed-off until the mineral deposits dissipate. Repeated drying of the cooling media will also cause the rapid build-up of insoluble mineral deposits.

A. Extended Shutdown —

1. Disable the cooling for 30 seconds, then disable the fan.
2. Open the electrical disconnect switch.
3. Drain sump(s) and shut-off all water valves.

B. Emergency Shutdown ONLY —

1. Open the electrical disconnect switch.

SECTION VII - TROUBLESHOOTING GUIDE

The following is a simplified list of possible problems and typical causes and remedies. However, it does not cover all possibilities, and is intended as a guide only.

WARNING: Many of the steps listed on the following pages require electrical cabinet and blower access while the unit is powered. High voltage and moving parts are present, and these steps should be performed by qualified service personnel. If any of the controls requiring manual reset were at fault this is an indication of a problem with the system that should be investigated.

Cooling Module

Symptom	Cause	Remedy
A. Water pump in direct evaporative section does not operate or the volume of water being recirculated is not sufficient.	<ol style="list-style-type: none"> 1. Water level in indirect or direct evaporative section sump is low. 2. Low sump water level switch is defective. 3. Customer interlock not closed or connected. 4. Water pump may be internally grounded or have heat damage. 5. Pump basket screen is blocked. 	<ol style="list-style-type: none"> 1. Fill to proper level. 2. Check and/or replace. 3. Close or connect customer interlock. 4. Turn off power and check pump and wiring. 5. Clean screen if necessary.
B. White mineral deposits collecting on face of media in direct evaporative section.	<ol style="list-style-type: none"> 1. Water bleed rate is too low. 2. Low recirculating water flow rate. 	<ol style="list-style-type: none"> 1. Increase water bleed rate by opening the adjustable bleed valve provided. Minimum bleed off rate is 3-6% of the total water flow being recirculated. 2. Open the water flow balancing valve provided in the direct evaporative section's recirculating pump riser. The media is essentially self-cleaning with a water flow rate of 1.5 – 2 GPM per square foot of media pad top area. If water flow is increased, be sure to check again for water carry over.
C. Uneven water distribution over evaporative media surface.	<ol style="list-style-type: none"> 1. Evaporative media damaged or partially blocked. 2. Media water distribution header or orifices plugged. 	<ol style="list-style-type: none"> 1. Remove media. Clean and/or replace. 2. Remove media and clean header and orifices.
D. Water being carried over from the direct evaporative section.	<ol style="list-style-type: none"> 1. Localized media face velocity exceeding 500 FPM. 2. Evaporative media is damaged. 3. Too much recirculating water. 4. Average media face velocity exceeds 500 FPM. 5. Uneven water distribution over evaporative media. 	<ol style="list-style-type: none"> 1a. Inlet air filters are partially obstructed – Clean or replace filters as required. 1b. Inlet face of media is partially obstructed – Clean or replace evaporative media as required. 2. Check both faces of evaporative media for damage. Replace as required. 3. Adjust water flow rate to evaporative media until carryover stops by slowly closing the water flow balancing valve in the recirculating pump's riser. 4. Decrease air flow through air handler. 5. Clean evaporative media and/or orifices.

SECTION VII - TROUBLESHOOTING GUIDE *continued*

Cooling Module *continued*

Symptom	Cause	Remedy
E. Excess water flow from the direct evaporative section's sump into the system drain.	<ol style="list-style-type: none">1. Check if adjustable water bleed off valve is open too far and bleed off rate is excessive.2. Verify that water level in direct evaporative section's sump is correct.3. Direct evaporative section's sump water fill and level control valve defective.	<ol style="list-style-type: none">1. Minimum bleed off rate is 3-6% of the total water flow being recirculated.2. Water level in the sump should be 1/2" below the top of the sump's overflow standpipe.3. Repair or replace valve.

SECTION VIII - MAINTENANCE SCHEDULE AND LUBRICATION REQUIREMENTS

WARNING: Failure to comply with the general safety information may result in extensive property damage, severe personal injury or death.

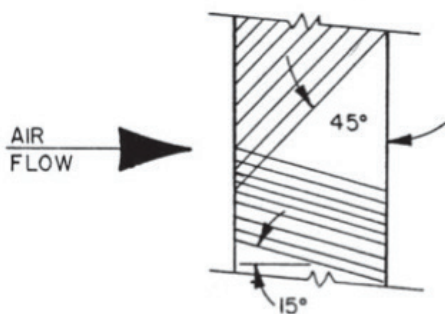
Periodic maintenance is essential to the efficient operation and extended service life of this equipment. Failure to provide maintenance as recommended may void the equipment warranty.

A. Maintenance Schedule

1. Every Spring
 - a. Check all electrical connections for tightness.
 - b. Inspect for rust – wirebrush, sand and repaint as necessary.
 - c. Replace cooling media-
Turbospray units – every spring
Turbocell units – should be done every five years or if passages become blocked or damaged.
 - d. Clean water pump
 - e. Verify proper bleed-off rate.
2. Every Fall
 - a. Drain units
 - b. Lightly grease all door latches

WARNING: DO NOT OPERATE THE SUPPLY FAN IN THE AIR HANDLER'S DIRECT EVAPORATIVE SECTION DURING ANY CLEANING OF THE UNIT'S EVAPORATIVE MEDIA.

CAUTION: The Turbocell evaporative media has a definite polarity and must be installed correctly to give trouble free results. Proper installation is that the 45° flutes slope toward the air entering side. The 15° flutes slope down toward the leaving air side. See drawing below.



NOTE: Keep screened air intakes clear of obstructions at all times.

B. Evaporative Media

To attempt to clean evaporative media, add one (1) cup of tri-sodium phosphate (TSP) to the sump and operate recirculating pump for at least 30 minutes or until deposits have disappeared. Drain sump. Fill the sump with fresh water and operate the recirculating pump for 30 minutes to rinse the media. Drain sump. Fill the sump with fresh water before placing unit back into operation.

C. Casing

Periodic cleaning of the casing is recommended to remove dirt, grease and any corrosive substances that may harm the finish. Rusted or corroded spots should be cleaned and repainted.

D. Support Means

Inspect the entire unit support means to be sure everything is firmly in place.

SECTION IX - REPLACEMENT PARTS

Replacement parts may be ordered from the factory Parts Department at 214-638-6010. The Parts Department can also be reached by email at parts@mestek.com. When parts are ordered, MODEL NUMBER, SERIAL NUMBER, FACTORY ORDER (F.O.) and PART NUMBERS are required.

Contact the Technical Services Department at 214-638-6010 for all warranty issues. All warranty parts will be shipped freight allowed from the factory by normal ground service. Warranty parts must be returned prepaid within 30 days. Credit will be issued if part is complete, defective, and returned on time.

Dealer/Contractor Name: _____

Address: _____

City: _____

State: _____ Zip: _____ Ph: _____



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