Last updated: 11/2025

Delta Cooling Towers Inc.

TMX Series™
Cooling Tower

Installation, Operation & Maintenance Manual

WARNING…..
Before unloading tower, read entire manual and follow instructions.
Failure to do so could void Warranty

Table of Contents

Important: Delta's cooling towers have been designed to provide trouble-free service over an extended period of time. To obtain the design performance, it is necessary that the cooling tower be installed, operated and maintained as prescribed in these instructions.

Only persons possessing the skill and experience described herein should attempt to install this equipment. **Prior to installation, these instructions should be read carefully** by the person who is to install the cooling tower to be certain that its installation, operation and maintenance are thoroughly understood.

Questions regarding the installation, operation or maintenance of this equipment should be directed to Delta Cooling Towers, Inc., (Telephone: 973/586-2201).

Step-by-step instructions contained in this brochure are based on normal installation conditions only. Abnormal or unusual combinations of field conditions should be brought to the attention of Delta Cooling Towers or its representative prior to installation of the equipment. The information contained herein is subject to change without notice in the interest of product improvement.

If installation instructions are not clearly understood, consult Delta Cooling Towers for additional information before commencing erection.

Improper Storage, Handling, Installation, or Field Modifications of equipment may result in damage and loss of warranty protection.

Delta Cooling Towers

Principle of Cooling Towers

All Cooling Towers operate on the principle of removing heat from water by evaporating a small portion of the water that is recirculated through the unit.

The heat that is removed is called the latent heat of vaporization.

Each one pound of water that is evaporated removes approximately 1,000 BTU's in the form of latent heat.

Cooling Tower Terms and Definitions

BTU - A BTU is the heat energy required to raise the temperature of one pound of water one degree Fahrenheit in the range from 32° F. to 212° F.

Cooling Range - The difference in temperature between the hot water entering the tower and the cold water leaving the tower is the cooling range.

Approach - The difference between the temperature of the cold water leaving the tower and the wet-bulb temperature of the air is known as the approach. Establishment of the approach fixes the operating temperature of the tower and is a most important parameter in determining both tower size and cost.

Drift - The water entrained in the air flow and discharged to the atmosphere. Drift loss does not include water lost by evaporation. Proper tower design and operation can minimize drift loss.

Heat Load - The amount of heat to be removed from the circulating water within the tower. Heat load is equal to water circulation rate (gpm) times the cooling range times 500 and is expressed in BTU/hr. Heat load is also an important parameter in determining tower size and cost.

Ton - An evaporative cooling ton is 15,000 BTU's per hour.

Wet-Bulb Temperature - The lowest temperature that water theoretically can reach by evaporation. Wet-Bulb Temperature is an extremely important parameter in tower selection and design and should be measured by a psychrometer.

Pumping Head - The pressure required to pump the water from the tower basin, through the entire system and return to the top of the tower.

Make-Up - The amount of water required to replace normal losses caused by bleed-off, drift, and evaporation.

Bleed Off (Blowdown) - The circulating water in the tower which is discharged to waste to help keep the dissolved solids concentration of the water below a maximum allowable limit. As a result of evaporation, dissolved solids concentration will continually increase unless reduced by bleed off.

Water Treatment

- Proper water treatment will dramatically increase the working life and efficiency of your cooling tower fill and associated piping and components.
- The Delta Cooling Towers are manufactured from corrosion-resistant plastics which are resistant to water treatment chemicals including common fungicides and bactericides.
- Follow appropriate water treatment practices as required and take frequent sample tests to avoid possible water contamination. We also recommend water treatment maintenance as a measure of protection of the environment in the vicinity of any cooling tower or other equipment open to atmosphere.
- To determine the appropriate water treatment practices for your particular application, it is suggested that you contact a water treatment firm for their recommendation. (A list of water treatment firms is available for your reference. It is not necessarily complete, nor do we recommend a specific firm. The list will be e-mailed to you on request or consult your local directories)
- Bleed-off is also important to water quality. Evaporation of the recirculated water does not remove the dissolved solids that are present in the water. Without bleed-off, the continual buildup of these solids will impair the proper functioning of the piping and other equipment in the system.
- A COMPETENT WATER TREATMENT PROGRAM SHOULD NEVER BE CONSIDERED OPTIONAL.

Safety

When handling, lifting, installing or operating the cooling tower, always employ safe work procedures according to best practices of the trade and according to applicable construction, electrical and safety standards, regulations and codes.

Follow all safety practices described in these instructions.

General Information

Approximate Weights & Dimensions

The TMX series cooling towers are manufactured in three basic sections: a polyethylene Upper Housing, a polyethylene Sump w/ Louver housings and fan assemblies.

Approximate Weights (lbs.)					Overall Dimensions (inches)
Model Group	**Shipping**			**Operating**	**L x W x H**
	Body	Sump	Fan Assembly		
TMX-103312 – TMX-125412	3,518	2,178	(2) 1,080	11,800	246” x 102” x 213”
TMX-203312 – TMX-225412	(2) 3,518	(2) 2,178	(4) 1,080	23,600	246” x 204” x 213”
TMX-305312 – TMX-325412	(3) 3,518	(3) 2,178	(6) 1,080	35,400	246” x 306” x 213”
TMX-405312 – TMX-425412	(4) 3,518	(4) 2,178	(8) 1,080	47,200	246” x 408” x 213”
TMX-505312 – TMX-525412	(5) 3,518	(5) 2,178	(10) 1,080	59,000	246” x 510” x 213”
TMX-605312 – TMX-625412	(6) 3,518	(6) 2,178	(12) 1,080	70,800	246” x 612” x 213”

*Does not include anchors or fittings

Other Physical Data

For cooling tower dimensions, design for foundations, assembly and layout; refer to the following drawings which are a part of these instructions:

Model Group	Title	Drawing No.
TMX-103312 – TMX-125412	1 Cell	DCT-TMC_1C-SSD-001
TMX-203312 – TMX-225412	2 Cell	DCT-TMX_2C-SSD-001-1 DCT-TMX_2C-SSD-001-2
TMX-305312 – TMX-325412	3 Cell	DCT-TMX_3C-SSD-001-1 DCT-TMX_3C-SSD-001-2
TMX-405312 – TMX-425412	4 Cell	DCT-TMX_4C-SSD-001-1 DCT-TMX_4C-SSD-001-2
TMX-505312 – TMX-525412	5 Cell	DCT-TMX_5C-SSD-001-1 DCT-TMX_5C-SSD-001-2
TMX-605312 – TMX-625412	6 Cell	DCT-TMX_6C-SSD-001-1 DCT-TMX_6C-SSD-001-2

Handling and Installation of Your TMX Series Cooling Tower

On -Site Inspection

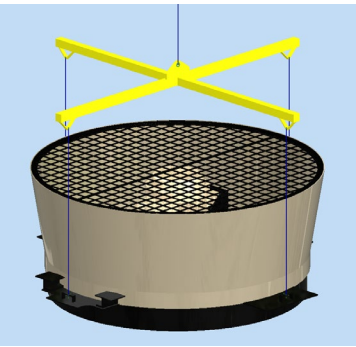
Upon arrival at the job site, carefully inspect the shipment for any damage. If shipping damage has occurred, notify the driver or the carrier immediately and make a notation of the damage on the shipping bill of lading. Contact Delta Cooling Towers Customer Service to discuss proper methods of repair or replacement of damaged items before completing the installation. Always check that all items listed on the B/L have been received.

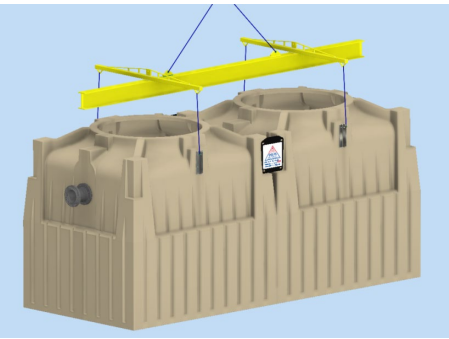
Offloading and Storing

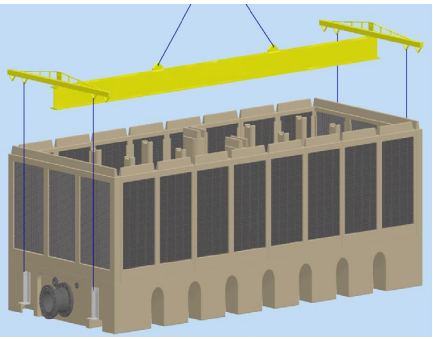
The TMX Series cooling towers are normally delivered to the site on a 30" high drop deck trailer. Both the tower main housing assembly and sump assembly are strapped down to the truck bed. The sump assembly should be unloaded first. **Prior to installation and especially if stored for any period of time, the sump and main housing assembly must be stored upright on level ground providing consistent uniform support. DO NOT use any blocking between assemblies and ground.**

Lifting with crane:

- Use fabric slings of sufficient strength for better load distribution and protection of the plastic tower body.
- Lift tower sump first by attaching slings to the four anchor/lifting lugs, kept separate by a 22' spreader bar, as shown below. Lift tower main housing by attaching slings, kept separate by spreader bars, to the four lifting bars as shown below.
- Lift tower main housing by attaching slings, kept separate by spreader bars, to the four lifting bars as shown below.
- Spreader bars must be used to lift vertically on the lifting bars and lifting lugs. Above the spreader bars use adequate length straps specifically designed for vertical lifting in order to maintain an angle of 60° or less between slings.
- Fan Assemblies need to be positioned onto the Upper Housing with the Vibration Switch (VCOS) towards the inside facing the platform. If no VCOS is present, the same orientation applies. This ensures the switches can easily be reset if tripped, allowing the technician to safely remain within the platform and handrails.
- After the Fan Assemblies have been picked and set onto the Upper Housing, it can be picked and set on the Sump assembly.







Installing

The cooling tower should be assembled in place on the previously prepared level foundation or I-Beams **(8" wide minimum / 22' length minimum.)**

- After re-checking the rigging, lift the sump section of each cell and secure properly to the foundation.
- Body sections and sumps are color match marked. For multi-cell units, towers are to be lined up left to right looking at the outlet connection beginning with tower 1, then tower 2, etc. Inlet and outlet fittings are to be on the same side unless specified different on approval drawings. Ladders are mounted to the side to the left of the inlet as standard.

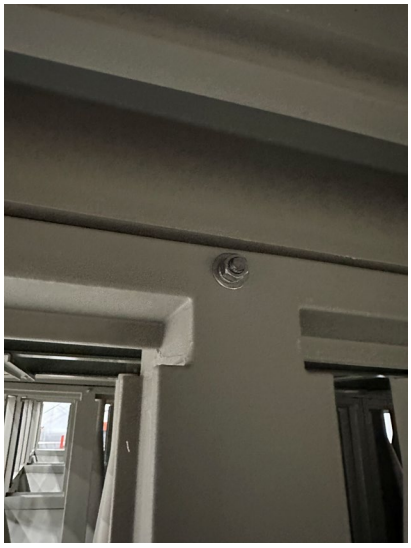
- The main housing section should then be lifted and carefully positioned to align with the corresponding sump louver frames. The main housing and louver frames are a tongue and groove type fitting. A full perimeter groove is on the underside of the main housing. The top of the louver frames have a groove that will support the main housing. A rope tether attached to the lifting bar at one end of the housing may help align the Main housing to the sump. This step may require a couple of installers to align parts simultaneously.

- Installation of TMX connection brackets . There are four different sets of brackets that are used to connect the TMX louver frames and the upper housing sections. The brackets do not have to be installed in any exact order, but all do need to be installed prior to louver panels.

- **Top Connector Bracket (TCB) (Set of 2)**

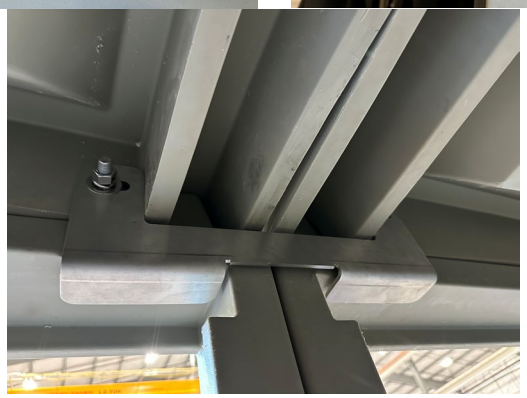
- **Louver Panel Bracket (LPB) (Set of 4)**

- **Louver Frame Bolt Connectors (2 Sets of 4)**

- **Upper Housing Bracket (UHB) (Set of 2)**

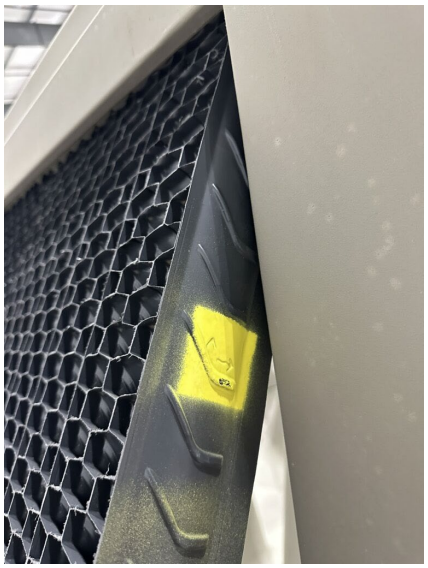
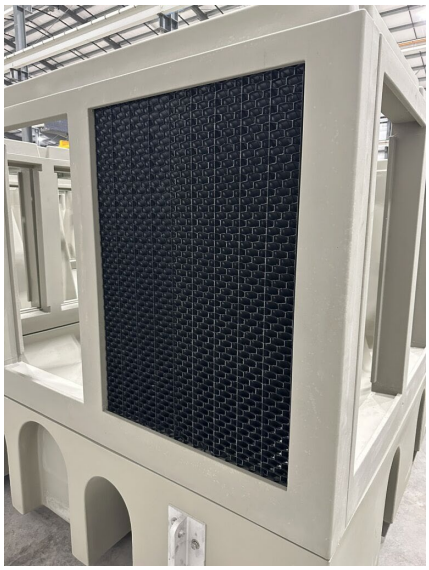




- **Corner Brackets (set of 4) and labeled CBL (Left) and CBR (Right)**

TMX Louver Installation:

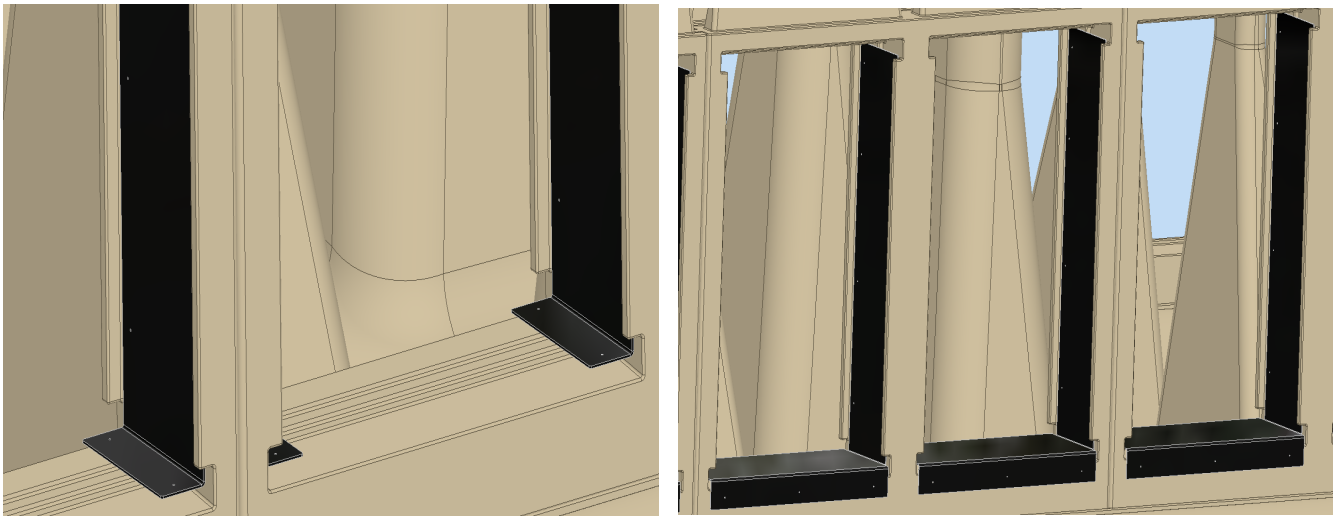
- PVC louver panels are pre-cut to two sizes (approximately 28.75" & 25.5" Widths). There is a top and bottom and front and back. The orientation of the panel is highlighted on the side of every louver. Each should be installed by inserting into top of opening, pushing into the frame and dropping down into final position. No hardware is needed for louver installation. Panels should fit snug but not so tight that they're loose in the frames.

NOTE: Proper louver orientation is vital. Failure to install correctly will result in leaks

- Once the cooling tower is operating, review all louvers for leaks and correct as needed. Due to the high volume of water running through the cooling tower and cross-winds, some intermittent leaks around louvers can occur. This is more common when fans are not running.

- On multi-cell towers, install the PVC water redirecting panels between each sump (See sketch below). First, apply a heavy bead of RTV sealant along the underside perimeter of each vertical panel. Then, from bottom to top, secure to the tower post with the self-tapping screws provided. Repeat this process for the horizontal panels and then, from outside to inside, secure to the tower with the self-tapping screws provided. Do not screw the overlapping panels in the center in order to allow for expansion and contraction.



Multi Cell Water Redirectors

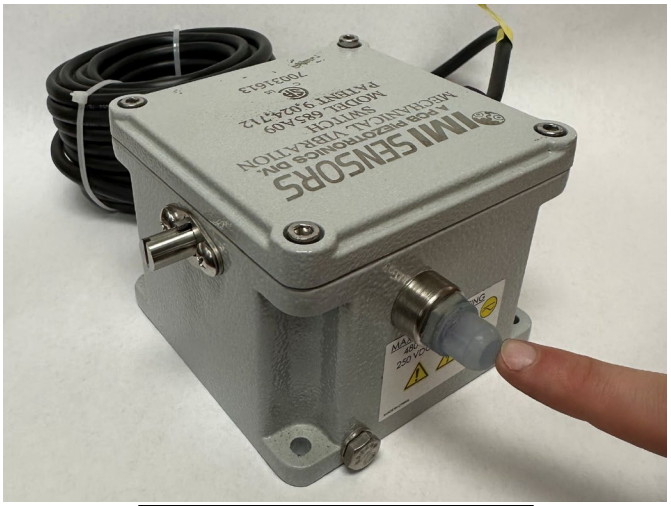
Anchoring

The foundation must be flat, smooth and rigid enough to be capable of independent support of the cooling tower assembly and water load in the sump at its maximum level. The tower assembly may be mounted on I-beams using the integrally molded I-beam pockets (See tower drawings). If tower is mounted and anchored to a concrete pad, the space between the anchor lug and the pad should be filled with grout or a rigid spacer.

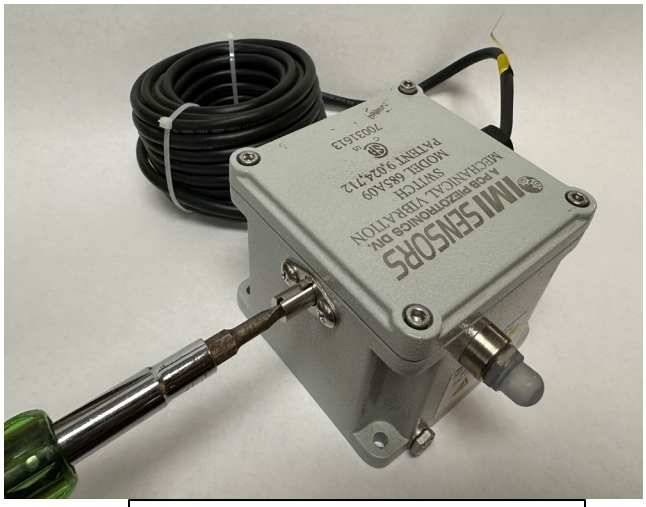
- Four hold-down anchor lugs are provided on the sump of each tower cell
- Support beams and anchor bolts are to be furnished by others.
- Beams should **HAVE A MINIMUM TOP FLANGE WIDTH OF 8" (W8x31 RECOMMENDED)** and be in accordance with acceptable structural design practices. These beams should be located in the integrally molded I-beam pockets, and should over-run the length of the unit.
- **DO NOT PRE-DRILL, WELD OR BOLT DOWN BEAMS PRIOR TO SETTING THE COOLING TOWER SUMPS.**
- Use anchor bolts sized for a minimum of 15,000 lbs. pull-out load per anchor lug for wind loading.
- Vibration isolation is optional with a Delta cooling tower. HDPE does not transfer the majority of vibration to the supporting structure, as does a steel tower. But, if spring isolators are installed they must NOT be affixed directly to the cooling tower anchor lugs. We recommend placing the springs between the I-beams and the supporting structure itself. (Please contact a licensed engineer for structural

Electrical Wiring of Fan Motor and Accessories

- Installation of a vibration cut-out switch is recommended. (Refer to tower accessories available).
- All electrical work should be performed only by qualified personnel and in accordance to prevailing electrical codes, practices and safety standards.
- The Controls / VFD should be sized on voltage, nominal horsepower, and maximum full load current. This current value can be found on the motor nameplate. If the starter cannot accept the maximum full load motor current, the next size higher should be used.
- Standard "Cooling Tower Service" motors are supplied with a minimum of a 1.15 Service Factor.
- Run flexible conduit with some slack from the motor conduit box to terminal box outside the tower where rigid conduit can be used.
- Conduit running vertically up the tower should be independently supported. No clips should be attached directly to the tower plastic.
- For the typical wiring schematic of fan motor and tower accessories, see Delta dwg. DT –B-87-913, included with these instructions. Each motor has a wiring diagram on the name plate or on the inside of the conduit box cover.
- A vibration cut-out switch (VCOS) should be installed with each fan assembly. Prior to operation, the VCOS needs to be adjusted for proper operation. Refer to the VCOS IOM provided.



VCOS Reset Button



VCOS Adjustment Dial

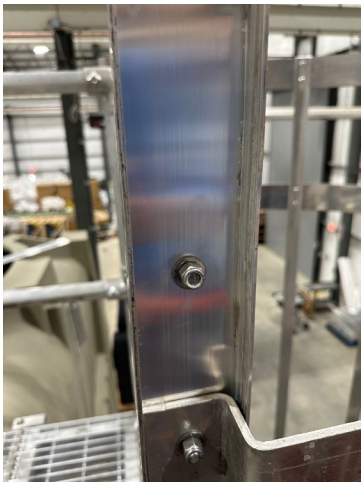
TMX Handrail and Ladder

Upper Housings are shipped with a pre-installed catwalk that includes mounting connections for Ladder and Handrail. Order of installation is below:

- Handrail -
  - Handrails and safety gates are shipped loose, normally in the sump or separate crate.
  - The closed end of the handrail is to be located on the same end as the installed kick-plate.
  - Installed on the top of the catwalk are handrail fittings for the handrail section to slide in. Set the handrail section in the installed fittings. A set screw in the fittings holds the handrail in position.

  - The handrail has pre-drilled holes for the ladder connection

- Ladder and Safety Cage / Fall Arrester -
  - Place the ladder up to the tower. There are bolt studs on the end of the catwalk that will receive the ladder bracket on both sides.
  - There are also predrilled holes on the handrail that will match up with the cage and need to be bolted.



  - The safety gate is installed at the interface between the ladder and handrail, using U-bolts to connect it to the vertical handrail members. The gate should be installed to open inwards towards the tower so that it can automatically close behind the operator/inspector.

- At the bottom of the ladder are pre-drilled aluminum angles. These are to be used to secure the ladder at the bottom.
- The kick-plate will be away from the ladder. Handrail fittings are already installed in place on the cooling tower. The handrail fitting has a set screw for securing the aluminum pipe.
- Anchor brackets are are located at the bottom of the ladder intended to be bolted in place

Location, Piping and Connections

- Piping should be adequately sized in accordance with accepted standard practices.
- Piping must be supported independent of the tower. Do not pull tower flanges into mating flanges. Supporting piping with tower will cause leakage and/or damage.
- **All tower inlet and outlet piping should be field fabricated and assembled based on installed tower dimensions. Do Not Prefab any interconnecting piping.**
- Gravity drain to indoor storage sump requires proper head differential and piping design considerations. Allowance must be made for flow, pipe size, piping layout and distance of cooling tower from the indoor storage sump.
- When multiple single cell towers or multiple multi-cell towers are to be installed at the same site, a minimum clearance of 6'-0" must be maintained between towers. This clearance is also necessary between each tower and any external obstructions (walls, buildings, fences, etc.). Please consult Delta Cooling Towers Inc. for a decision on any reduced clearances.
- 6'-0" clearance is also necessary between each tower and any external obstructions (walls, buildings, fences, etc.). Walls and buildings should be limited to no more than 18'-0" above the tower base to prevent warm air recirculation. Please consult Delta Cooling Towers Inc. for a decision on any reduced clearances or for obstructions greater than 20'-0" tall.
- On multiple cell installations, valving and/or pipe sizing should balance pressure drops to provide equal inlet pressures. Equalizing fittings are provided in the sumps of each cell and can piped together to balance sump water level. Each cell should be valved separately to allow for flow balancing or isolation from service.
- Prior to start-up, confirm that the PVC locknuts on all bulkhead fittings are properly tightened to prevent

nuisance leaks. A chain wrench can be used to check and tighten the locknuts.

- Check that the SS hexagonal nuts on the inlet and outlet PVC flanges are properly tightened to prevent nuisance leaks. While tightening the nuts, do not allow the bolt to rotate. This could damage the rubber seal under the flat washer on the bolt head located inside the cooling tower.
- All supply and return piping must be independently supported.

PVC Solvent Cementing Instructions

The following procedure is recommended for the preparation and cementing of internal and external piping for Delta Cooling Towers:

- Cut ends of pipe square using a handsaw and miter box. Tube cutters with wheels designed for use with PVC are acceptable, providing they do not leave a raised bead on the outside diameter of the pipe.
- Use a chamfering tool or file to put a 10° to 15° chamfer on the end of the pipe. Lightly sand the area to be cemented to remove gloss. Using a clean rag, wipe pipe surface and fitting socket to remove dirt, moisture and grease. Acetone or similar solvent is recommended for cleaning.
- Check "dry fit" of pipe and fitting by inserting pipe at least 1/3 of the way into the fitting. Position pipe and fitting to assure alignment. Pipe and fitting should be at same temperature condition.
- Using a clean, natural bristle brush about 1/2 the size of the pipe diameter, apply a primer to the fitting socket. Apply primer with a scrubbing motion until the surface is penetrated. Primer should never be applied with a rag. Repeated applications may be necessary to achieve the desired dissolving action. In the same manner, apply primer to the pipe surface equal to the depth of the fitting socket, making sure the surface is well penetrated. Reapply primer to the fitting socket to make sure it is still wet.
- While both surfaces are still wet with primer, use a clean brush to apply a liberal coat of solvent cement to the male end of the pipe. The amount should be more than sufficient to fill any gap. Next apply a light coat of solvent cement to the inside of the socket, using straight outward strokes to keep excess cement out of the socket.
- While both surfaces are still wet with solvent cement, insert the pipe into the socket with a quarter-turn twisting motion. The pipe must be inserted the full length of the socket. The application of solvent cement to pipe and fitting, and the insertion of the pipe into the fitting, should be completed in less than one minute. If necessary, two persons should apply solvent cement to the pipe and fitting simultaneously.
- Hold the joint together for approximately 30 seconds until both surfaces are firmly gripped. After assembly, a properly made joint will usually show a bead of cement around its entire perimeter. This should be brushed off. It is recommended that the joint be allowed to cure for 24 hours before pressure testing or operation.

Operation and Maintenance of Your TMX Series Cooling Tower

Safety in Operation of the Fan

NEVER operate the fan when the access panel or the entire fan guard is removed.

NEVER operate fan when any work, access, maintenance, trouble-shooting, etc. is being performed on the inside of the fan ring assembly or inside the tower plenum.

- Normally, electrical codes dictate a disconnect box at the cooling tower.
- The handle of the disconnect box **must be locked in the off position and an OSHA DANGER tag**
- **(DO NOT OPERATE) must be attached to handle securely.**

Note: Removing fuses from the disconnect box may provide further assurance, but only when done by qualified personnel.

The foregoing precautions apply when any type of internal access to the tower is required, including the following examples:

- Checking, maintenance or replacement of any fan assembly component.
- Checking, maintenance or replacement of the water distribution system inside the tower.
- Cleaning of the fill.
- Any work that necessitates removal of any access door, the fan guard or the manhole cover.

Water Distribution System

Water distribution is accomplished by a low pressure, non-rotating, spray nozzle system designed to accommodate the specified flow rate.

IMPORTANT:

- The flow rate of the cooling tower must be as close to the design GPM as possible. The water distribution systems, including spray nozzles, are provided for the design flow condition. Under-pumping or over-pumping will cause the cooling tower to perform inefficiently.
- Design pressure at the inlet connection must be maintained for proper water distribution and tower performance.
  If the pressure is less or greater than the design, proper water dispersion over the internal wet decking will be impaired. If inlet pressure is low, water spray will not cover the entire wet decking surface. This causes channeling of air and does not make maximum use of the heat transfer media. High inlet pressures will cause the water to over-spray the wet decking media, hit the internal side walls of the tower shell and drop in a vertical flow along the shell walls without the opportunity for water / air contact through the heat exchange media. Excessive high spray pressure may also cause wet decking fatigue and damage.
- ***The operating inlet pressure should be between 1.5 and 4.0 psi at the tower inlet***.
- The maximum operating inlet water temperature should not exceed 140° F with standard fill, special high-temp options available for order

CAUTION:
When stepping on top of the fill, distribute the body weight by means of two plywood plates on top of fill.

Fan and Mechanical Drive System and Its Maintenance

Safety

Follow all safety instructions previously discussed.

Motor:

- The standard motor is a totally enclosed motor , Class F insulation, 1.15 minimum service factor, epoxy coating on outside frame, and is specifically designed for cooling tower duty to the exclusive specifications of Delta Cooling Towers.
- Should there be a problem with the motor, which may be covered under our standard warranty, the motor **must only** be inspected and serviced by an authorized motor manufactures warranty shop, and Delta Cooling Towers, Inc. must be notified, otherwise the warranty is void.
- If the motor bearings have grease fittings, follow the lubrication recommendations as outlined in instructions from motor manufacturer. The majority of motors do not require greasing.

Motor Lubrication Instructions

If lubrication instructions are shown on the motor nameplate or in motor instructions provided by the vendor, they will supersede this general instruction.

1) Stop motor. Disconnect power and lock out service.
2) Remove contaminants from grease inlet area.
3) Remove filler and drain plugs.
4) Check filler and drain holes for blockages and clean as necessary.
5) Add proper type and amount of grease. See the lubrication Time Intervals table for service schedule and lubrication Amount table for volume of grease required. This information is provided by the motor manufacturer.
6) Wipe off excess grease and replace filler and drain plugs. If motor is name-plated for hazardous locations, do no operate motor without all grease or drain plugs installed.
7) Motor is ready for operation

TMX Start-up Instructions and Checklist

Complete all start-up instructions before applying heat load.

Check that all installation procedures were followed, including:

- If installed using I-beams, verify 8" minimum top flange (8" – 10" recommended).
- If slab mounted, verify 15,000 lb pull anchors.
- On multi-cell installations, verify that the connector brackets and plates were installed.
- On multi-cell installations, verify that the water redirectors were installed.
  - Verify the functionality of the optional vibration cut-out switch.
  - Clean any accumulated debris or packaging material from inside tower sump.
  - Check to be sure that the fan motor is properly wired for correct rotation as viewed from the top of the fan. Reverse leads will cause incorrect rotation and reverse direction of airflow.

Note: Fan rotation should always agree with rotation labels. Standard fan rotation is clockwise. However, non-standard fans may be designed to rotate counter-clockwise.

  - Manually check for free rotation of the fan. Use Lock out Tag out.
  - Fill the cooling tower sump or the cold water storage reservoir on gravity drain applications.
  - Water recirculation pump should be primed and all piping below the tower sump filled with water. Check pump for proper shaft rotation.
  - Start water recirculation pump and adjust flow to design. A flow metering device installed in the inlet is recommended, but if not available, use the pressure differential across the pump in conjunction with the pump curve.
  - Check the nozzles spray pattern from sump to be sure there is no clogging. Look up through a louver open for a consistent, rain-like pattern through the wet decking.
  - Startup fan motor and check amperage and voltage against motor nameplate data.
  - The standard make-up valve assembly is shipped with the plastic float ball strapped against the tower side to prevent damage. To set the ball for proper operation, loosen the screw in the fulcrum arm, lift or depress the arm with the plunger pressed against the valve seat and tighten. Repeat until the proper operating level is obtained (Refer to operating level table below). It is recommended that a shut-off valve be installed in the make-up line in case of failure. 60PSI maximum incoming water pressure. Be sure that the valve is perpendicular to the water level. A few degrees off will cause the valve not to open or close properly.

- After 24 hours of operation:

  - ❑ Check tower sump water level.
  - ❑ Check for any water leaks.

Water Level in Tower Sump

When the cooling tower is being operated with pump-suction, the make-up valve assembly with float ball should be adjusted to set the water operating level as follows:

Tower Model #	Operating level (from bottom of sump)
All TMX Towers	14 inches

Note: Bottom of the standard overflow is 15.5". For systems requiring a higher sump level, an overflow extension can be provided. This raises the overflow to 18".

- Access the make-up valve through the window louver marked "Access Panel".

- A lower water level than recommended may cause air to be drawn into the tower outlet piping and cause pump cavitation.
- A water level higher than recommended will cause continuous overflow and waste of water as a result of potential "pull-down" from the piping when the system is shut down.
- The overflow should **NEVER** be capped, or its elevation altered by raising external piping.

Note: On gravity drain cooling tower(s), make-up assembly, overflow, drain and vortex breaker are not typically provided.

Cold Weather Operation

Cold Weather Protection
The cooling tower may require protection against freezing at light heat loads when the wet-bulb temperature is under 32°F., or during shutdown when the temperature drops below 32°F.

The following methods are recommended for use in Delta Cooling towers for protection during cold weather conditions. Recommended equipment is optional and may be ordered from the factory. Consult the factory for further information on which equipment to choose for your specific application.

Separate Indoor Sump
This method is virtually a foolproof antifreeze protection system with the added advantage of minimum maintenance. The indoor sump tank should be large enough to fill the entire recirculation system without danger of pump cavitation. As a general rule, the tank should be sized to hold three times the rate of circulation in gallons per minute (gpm).

The tank should be provided with properly sized overflow, make-up drain and suction connections. When a separate sump is ordered with a cooling tower, the water make-up valve assembly and the overflow and drain connections are installed in the indoor sump only.

When a sump tank is used, the cooling tower should be located high enough above it to allow free cold water gravity drain. A bottom outlet can be provided for gravity drain to indoor sump tank installations.

Reverse siphoning is a back flow of non-potable, recirculating water into a potable water system, which can occur through the make-up float valve assembly located in the water reservoir. Should the valve malfunction, blockage of the overflow or outlet lines would cause water level to rise in the reservoir, and the make-up water pressure could drop below the atmospheric pressure creating a vacuum at the make-up inlet. Although precautions to prevent reverse siphoning are incorporated in the cooling tower design, we also recommend installing a check valve in the water make-up supply line, as a backup precaution.

Electric Immersion Heater for Sump
Cooling towers ordered with anti-freeze systems are shipped with a protective seat secured under the immersion heater element that is to remain in place during operation to protect the polyethylene shell from direct contact with the heater element.

*Note: This protective seat is **NOT** a shipping brace and **must not be removed**.*

Final installation and wiring of the Heater Element, Control Panel, and Heater Probe must be completed in strict accordance with the enclosed manufacturer's Installation, Operation, and Maintenance Instructions. Failure to follow the manufacturer's IOM can lead to potential equipment damage and voiding of equipment warranties.

Thermostatic On/Off Control
A thermostatically controlled fan for on/off operation, should be considered as an energy saving feature, for capacity control during winter operation. The thermostatic control can be field set to insure automatic fan shut-down when cold water drops below design temperatures, as well as fan start-up when cold water rises to design temperature.

A thermostatic control provides excellent cooling tower anti-freeze protection while reducing operating costs throughout cold weather operation.

PVC Distribution System
To prevent damage to the PVC distribution system during cold weather shut-down, install an automatic or manual drain line from the hot water inlet piping as close to the cooling tower inlet as possible. The entire inlet and distribution system must be drained for shut-down in sub-freezing weather.

Piping
When the cooling tower is located outdoors, adequate measures including the use of heating tapes and insulation should be considered to protect water lines from freezing.

Operation at Sub-freezing Ambient
See Thermostatic On/Off control

1. Insure that the cooling tower is operating at the maximum possible heat load - An operating cooling tower will continuously extract heat from the circulating water. Without a heat load, the water will end up either at the air wet bulb temperature, or as ice, whichever occurs first.

2. Maintain Design Water Flow Rate Over The Fill - Reducing water flow over the fill area can produce semi-dry regions that are subject to rapid freezing.

3. Make sure a thermostat is installed to control fan operation to off at low cold-water temperatures.

4. Cycle fans periodically to prevent ice from forming on louvers.
5. It may also be necessary to reverse fans for a short period of time to help melt ice by forcing warm water into tower.
   - De-energize the fan(s) for two full minutes before reversing.
   - Reverse fan(s) no more than 2 minutes at a time (repeat as necessary). Extended reverse operation can cause ice to form on fan blades causing an out-of-balance condition.
   - On multi-cell towers, fans immediately adjacent to reversed fans should be shut off during reversal.
   - After reversal, let fan(s) stand idle 5 to 10 minutes before forward operation.
   - Monitor the tower closely for unusual vibrations or sounds.

7. Frequent visual inspections and routine maintenance during sub-freezing operation is very important and should not be overlooked.

Trouble-Shooting Guide For TMX Series Induced Draft Cooling Towers

Problem	Possible Causes	Corrective Actions
Increase in the leaving water temperature	1. Excess water flow; over pumping. 2. Recirculation of hot discharge air, back into the cooling tower air intakes. Obstructed air intakes 3. Proximity of other heat source or discharge of moist air. 4. Improper operation of spray system. A. Orifices clogged. B. Actual water flow is lower than design sprinkler rating. 5. Clogged fill. 6. Damaged fill. 7. Additional heat load on system. 8. Wet-bulb temperature higher than design.	1. Adjust to the design flow. 2. Eliminate obstructions which impede air discharge. For proper location of cooling tower(s), see Delta dwgs. Baffle air discharge, if necessary. 3. Remove source or relocate tower. 4. See water distribution system instructions. A. Flush spray nozzles, clean orifices, clean system, install outlet strainer. B. Install properly rated spray nozzles or increase to design flow. 5. Clean the fill. 6. Replace the fill. 7. Contact Delta for possible upgrade or addition of another cooling tower selected for additional load. 8. None required if condition is temporary. Otherwise consult Factory for upgrade.
Drop in the water flow rate. Low water flow rate	1. Blockage of spray Nozzle orifices. 2. Low water level in sump causing air to be drawn into pump and piping. 3. Improper selection of water circulating pump. 4. Blockage of strainers. 5. Pump malfunction.	1. Flush spray nozzle. Clean whole system. Install outlet strainer. 2. Adjust float valves. Be sure the system is flooded and balanced. 3. Replace with proper size pump designed for flow and head requirements. Check pump "Net positive suction head." 4. Backwash or clean. 5. Consult pump specialist.
Noise and vibration	1. Loose bolts. 2. Mechanical interference of rotating parts. 3. Fan propeller damaged or out of balance. 4. Air intake at pump. 5. Pump cavitation. 6. Damaged motor bearings.	1. Recheck and tighten all bolts to specified torque. 2. Inspect propeller for free rotation. Check propeller for mechanical interference. Adjust, repair or replace, as necessary. 3. Replace components, as necessary and check balance. Install vibration cut-out switch. 4. Check basin water level and irregular piping design. 5. Match pump NPSH with system hydraulics. 6. Check and replace motor.
Sudden or short term irregularities of cold water level in basin	1. Peculiarities of specific system and its operation.	1. Inspect system and review operation procedures. Correct, as applicable valve settings, loss of water in system, fill system to flooded capacity.
Excessively high water level in sump on gravity drain installation	1. Gravity flow restrictions due to insufficient head differential. 2. Airlock. 3. Unnecessary obstruction of water flow (i.e., partially closed valve). 4. Undersized piping. 5. Horizontal pipe run too long. 6. Improper hydraulic pipe design. 7. Outlet vortex breaker provided.	1. A. Outlet piping should terminate below sump tank water level. B. Increase discharge pipe size. C. Increase head by mean other than A. **2. Install an air bleed valve at highest point of piping, usually at a vertical angle.** 3. Remove obstruction. 4. Increase pipe size. 5. Shorten, if possible. 6. Correct design. 7. Remove vortex breaker.

Problem	Possible Causes	Corrective Actions
Excessively high water level in tower basin on closed loop system installations	1. Make-up valve float set too high. 2. Valve or float damaged or malfunctioning. 3. Make-up water pressure too high.	1. Readjust float arm. 2. Repair or replace. 3. Reduce pressure or contact Delta for alternate solutions.
Uneven water level in tower basins of multi-cell installations	1. Unbalanced system hydraulics. 2. More than one make-up valve operating, and set for different water levels.	1. A. Install equalizer line with isolation valves between modules. C. Adjust inlet water flow to insure equal distribution to each cooling tower module. D. Review outlet header hydraulics and correct piping design, if applicable. E. Contact Delta for assistance. 2. A. Adjust float level settings relative To one another. B. Shut-off and or/throttle flow to one or more valves. C. Installation of equalizers is highly recommended.
Excessive water carry over (drift)	1. Surfaces of top layer of fill damaged causing "pooling" of water. 2. Eliminator(s) not in place. 3. Damaged eliminator. 4. Excess water flow. 5. Orifices in spray nozzles clogged causing improper water dispersement. 6. Blockage of fill.	1. Replace top layer. Protect fill when working inside tower. 2. Reinstall. 3. Replace. 4. Reduce water flow or install spray nozzles designed for the actual operating flow. 5. Install outlet strainer. Clean whole system and spray nozzles. 6. Clean fill.
Premature or excessive **corrosion** of fan drive components	1. Excessive drift. 2. Presence of corrosive chemicals in air or water that was not known at time of supply.	1. See "Excessive Water Carry Over (Drift)" above. 2. Remove source of corrosion or contact Delta for alternative materials, premium coatings or other precautions.

Motor Trouble Shooting Guide (General)

Problem	Possible Causes	Corrective Actions
High current draw (all 3 phases)	1. Low line voltage (5 to 10% lower than nameplate). 2. 200V motor on 230/240V system. 3. 230V motor on 208V system. 4. Incorrect propeller. 5. Incorrect pitch if adjustable	1. Consult Power Company. 2. Change to 230V motor. 3. Change to 200V or 280V motor. 4. Consult factory. 5. Reduce pitch / consult factory
Low motor current draw	1. Incorrect propeller. 2. Incorrect pitch if adjustable.	1. Consult factory 2. Increase pitch / consult factory
Unbalanced current (5% from average)	1. Unbalanced line voltage due to: A. Power supply. B. Unbalance system loading. C. High resistance connection. D. Undersized supply lines. 2. Defective Motor.	1. Consult Power Company and/or electrician. 2. Replace motor.
Excessive voltage drop (2 or 3% of supply voltage)	1. Inadequate power supply. 2. Undersized supply lines. 3. High resistance connections.	1. Consult Power Company. 2. Increase line sizes. 3. Check motor leads and other connections.
Overload relays tripping	1. Overload. 2. Unbalanced input current. 3. Single phasing. 4. Excessive voltage drop. 5. Frequent starting or intermittent overloading. 6. High ambient starter temperature. 7. Wrong size relays. 8. Improper overload settings of adjustable relays.	1. Reduce load on motor or increase motor size. 2. Balance supply voltage. 3. Eliminate. 4. Eliminate (see above). 5. Reduce frequency of starting and overloading or increase motor size. 6. Reduce ambient temperature. 7. Correct size per nameplate current and service factor. 8. Readjust to motor FL Amps x S.F.
Motor runs very hot	1. Overloaded. 2. Blocked ventilation. 3. High ambient temperature. 4. Unbalanced input current. 5. Single phased.	1. Reduce overload. 2. Fouled fill or air restriction. 3. Reduce ambient temperature. 4. Balanced supply voltage. 5. Eliminate.
Motor will not start	1. Single phased. 2. Rotor or bearings locked.	1. Shut power off – eliminate. 2. Shut power off – check shaft rotation.
Excessive vibration (Mechanical)	Out of balance 1. Motor mounting. 2. Motor.	1. Check to be sure motor mounting hardware is tight. 2. Replace motor.

Note: Consult Warranty page prior to replacing or repairing any cooling tower components. Delta recommendation and consent to remedy material and workmanship defects is necessary, to avoid breach of Warranty.

TMX Series Optional Accessories

TMX Series Optional Accessories Available

- Aluminum Ladder(s) with a step platform and railing at the fan elevation **custom designed** for the cooling tower.
- Fall Arresters
- Variable frequency drive (VFD) on fan motors, controlled by temperature controller.
- Vibration cut-out switch provides for fan motor circuit disconnect for shutdown protection should abnormal fan vibration develop during service. Installation of vibration cut-out switches **is recommended** as good safety practice.
- Thermostat on/off control of fan operation through sensing the temperature of water leaving the tower.
- Basin anti-freeze system for cold weather operation.
- Custom designed top platform with handrails.
- Pre-wired control panels.
- Elevated mounting frame structures.
- Pumps
- Polyethylene Sump tanks up to 10,000 gallons for indoor installation for anti-freeze protection during winter operation.
- Motor space heaters are recommended for unusually high relative humidity conditions where extreme day to night temperatures can cause excessive condensation in the motor, when in operation during this period.
- Outlet sump strainer.
- High sump level switch
- Automatic drain valve

Consult factory or a Delta representative for further information and an updated list of accessories.

TMX Series Recommended Replacement Parts

To avoid costly cooling tower downtime, the following replacement parts should be carried in inventory at the installation site:

- ❑ Make-up valve assembly.
- ❑ Cartridge of recommended moisture resistant lubricant.
- ❑ Fan Motor.
- ❑ Spray Nozzles.
- ❑ Louver Panels.

When ordering, include model number and serial number of the cooling tower as it appears on the tower nameplate. Under normal conditions, shipment of factory replacement parts is made within one day after the order is received. Spare pumps and pump parts, as well as control panel components, such as fuses and heaters for magnetic starters, are also available.

Preventative Maintenance Checklist

Procedure	Monthly	Every 3 Months	Every 6 months
Inspect **General Condition** of cooling tower.	♦		
Check **Water Level** in cold water basin. Adjust if needed.	♦		
Check float ball & **Make-up Valve** for proper operation.	♦		
Check **Line Voltage, Motor Amperage, Water Pressure**.	♦		
Clean **Sump Strainers**, if installed.	♦		
Lubricate Motor Bearing. Use **Proper Lubricants**. Increase frequency, as necessary depending on conditions of service.		♦	
Check for obstructed **Water Flow Through Orifices**. Clean and flush spray nozzles, as required. (View through Sump)	♦		
Check **Condition of Water** for proper treatment to prevent build-up of algae and solids concentration		♦	
Clean and flush **Cold Water Sump**			♦

CONDITIONS OF SALE AND WARRANTY

Terms and Conditions

1. Sale Not a Consumer Transaction: Buyer agrees that the purchase of Delta's Products (hereinafter "Product") is not for consumer, household or family purposes.
2. Agreement of Sale: Acceptance: Any acceptance contained herein is expressly made conditional on Buyer's assent to any terms contained herein that are additional to or different from those proposed by Buyer in its purchase order and hence any terms and provisions of Buyer's purchase order which are inconsistent with the terms and conditions hereof shall not be binding on the Seller. Unless Buyer shall notify Seller in writing to the contrary as soon as practicable after receipt hereof, acceptance of the terms and conditions hereof by Buyer shall be deemed made and, in the absence of such notification the sale and shipment by the Seller of the goods covered hereby shall be conclusively deemed to be subject to the terms and conditions hereof.
3. Entire Contract: This contract constitutes the final and entire agreement between Seller and Buyer and any prior or contemporaneous understandings or agreements, oral or written are merged herein. The sales and technical representatives of the Seller are not authorized to make warranties about the product. Seller's representatives' oral statements do not constitute warranties, shall not be relied upon by the Buyer, and are not part of the contract for sale. Any product-literature, operating instructions, and statements contained therein, do not constitute warranties, shall not be relied upon by the Buyer and are not part of the contract for sale. The entire contract is embodied in this writing and no other warranties are given beyond those set forth in this contract. This writing constitutes the final written expression of the parties agreement, and it is a complete an exclusive statement of the terms of the agreement.
4. Prices: Except where expressly agreed, all prices are subject to change without notice. If there is a delay in approval of drawings related to this contract beyond 30 days, an escalation in selling price may occur due to a rise in labor and/or material prices.
5. Taxes: The price of goods does not include sales, use, excise, ad valorem, property or other taxes now or hereinafter imposed, directly or indirectly by any governmental authority or agency with respect to the manufacture, production, sale, delivery, consumption or use of goods covered by this contract. Buyer shall pay such taxes directly or reimburse Seller for any such taxes which it may be required to pay.
6. Payment: The specific terms of payment are as specified in writing by Seller. If the Buyer shall fail to make any payments in accordance with the terms and provisions hereof, the Seller, in addition to its other rights and remedies, but not in limitation thereof, may, at its option, defer shipments or deliveries hereunder, or under any other contract with the Buyer, except upon receipt of satisfactory security or of cash before shipment.
7. Shipment; Risk of Loss Title: The goods shall be shipped FOB Seller's shipping points. Risk of loss shall pass to Buyer upon delivery to the carrier. Title shall pass to Buyer on delivery to the carrier.
8. Delivery; Delays in Deliveries: The date of delivery provided herein is an approximation based on Seller's best judgment. Seller shall be excused for delay in delivery, may suspend performance and shall under no circumstances be responsible for failure to fill any orders when due to acts of God or of the public enemy; fires; floods; riots; strikes, freight embargos or transportation delays; shortage of labor; inability to secure fuel; material supplies, or power at current prices or on account of shortages thereof; any existing or future laws or acts of the Federal or of any State Government (including specifically, but not exclusively, any orders, rules or regulations issued by any official or agency of any such government).
9. LIMITED WARRANTY: Seller warrants that the seamless molded polyethylene shell of the Product shall be free from defects in materials and workmanship and will not peel, chip, rust or need painting for a period of TWENTY (20) years from the date of shipment. Since the Product, once in operation is under the sole control of the User, this warranty is further subject to and shall be applicable only if all of the following conditions are met:
   a. The Product has been properly erected in accordance with the Seller's instructions and in accordance with good installation practices;
   b. Seller's instructions and recommendations as to operation and maintenance have been followed, including those contained in the manual furnished with the Product;
   c. The Product has been used under normal operating conditions;
   d. The Product has not been affected by misuse, neglect, accident or abrasion;
   e. The User has not attempted or performed corrective work on the Product without Seller's prior written consent; and
   f. The Seller shall have received notice of any defect no later than 10 days after User first has knowledge of same.

   Except where expressly noted otherwise, Seller warrants all Product components, other than moving parts, against defects in workmanship and material for a period of ONE (1) year from the date of shipment, provided the equipment has been properly maintained and operated under normal conditions. Motors carry a normal manufacturer's FIVE (5) year warranty against defects in workmanship and materials beginning from the date of shipment and subject to the same conditions of proper use and operation as other components of the Product. Bearings, pulleys, belts or other moving parts and components are sold without any warranty.
10. DISCLAIMER OF ALL OTHER WARRANTIES AND GUARANTEES: The aforesaid warranty is the sole and only warranty or guarantee relating to the product provided under this Agreement, and is in substitution for, and in lieu of, any and all other warranties, written or oral, expressed, implied or statutory including any warranty of merchantability or of fitness for a particular purpose.
11. CORRECTION OF DEFECTS AS SOLE REMEDY: If the Buyer/User gives the Seller written notice of defects in the product within any period of warranty described herein and the Seller's inspection confirms the existence of such defect, the Seller, at its option, shall correct the defect or defects either by repair, providing repair tools and instructions, or replacement, FOB Seller's shipping point, or refund the purchase price of the product. The remedies provided Buyer/User herein for breach of Seller's warranty shall be exclusive.
    No expense, liability or responsibility will be assumed by the Seller for repairs made by other than Seller's agent without written authority from the Seller.
    Remedial action, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of Seller to the Buyer/User, and Buyer/User's sole remedy hereunder, whether based on contract, tort or otherwise.
    The sole purpose of stipulated exclusive remedy shall be to provide the User with free repair and replacement of defective parts in the manner provided herein. This exclusive remedy shall not be deeded to have failed of its essential purpose so long as the Seller is willing and able to repair or replace defective parts in the prescribed manner.
    An action for breach of this limited warranty or any other action otherwise arising out of this contract must be commenced within one (1) year from the date the right, claim, demand or cause of action shall first occur, or be barred forever.
12. STATEMENT OF BUYER/USER'S RESPONSIBILITIES: It is the sole responsibility of the Buyer/User, and not in any manner the responsibility of the Seller, to test, control and properly dispose of all discharges, both gaseous and liquid, from the product to assure:
    a. Compliance with all federal, state and municipal (or any political subdivision thereof) statutes, laws, codes, ordinances, rules and regulations concerning the environment, including but not limited to: The Clean Air Act, 42 U.S.C. S7401 *et seq.*; The Clean Water Act, 33 U.S.C. S1251 *et seq.*; The Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. S9601 *et seq.*; The Toxic Substance Control Act, 15 U.S.C. S2601 *et seq.*; The Resource Conservation and Recovery Act, 42 U.S.C. S6901 *et seq.*; The Safe Drinking Water Act, 21 U.S.C. S349 *et seq.*; The National Environmental Policy Act, 42 U.S.C. S4321 *et seq.*; Occupational Safety and Health Act, 29 U.S.C. S651 *et seq.*; together with any amendments thereto and regulations promulgated hereunder;
    b. Adequate protection for the health and safety of people, property, wildlife and environment; and
    c. Adequate protection for all persons, including employees, coming in contact with the Product and its discharges for all purposes including, without limitation, installation, maintenance, use and repair of the Product.

    It is also the sole responsibility of the Buyer/User to:
    d. Maintain the Product in accordance with the "Installation, Operating and Maintenance Instructions";
    e. Comply with the maintenance checklist contained in the "Installation, Operating and Maintenance Instructions"; and
    f. Periodically monitor and test the Product to verify proper functioning, and to insure the Product performs properly.

    It is further the sole responsibility of the Buyer/User to comply with all laws, codes, and regulations relating to the Product and its use. Seller makes no warranty or representation with respect thereto.
    Buyer/User assumes the responsibility for providing and installing all devices required to protect the health and safety of people, property, wildlife and environment.
    Buyer/User acknowledges having read the "Installation, Operating and Maintenance Instructions", including all warnings contained therein, and is aware of the precautions recommended for protection to the health and safety of people, property, wildlife, and the environment, including employees coming in contact with the Product discharges.
    Buyer/User assumes full responsibility to assure proper use of the Product, including the determination and control of what chemicals, pollutants and toxic substances are introduced into the product, and the determination and control of all discharges from the Product.
13. DISCLAIMER OF TORT, CONTRACT, STATUTORY AND ALL OTHER LIABILITY: The Seller hereby disclaims all tort, contract or statutory liability to the Buyer/User, and any other basis of liability to Buyer/User regarding claims for injury or damage to people, property, wildlife, or the environment, including, without limitation, claims of negligence, strict product's liability, breach of warranty (except the limited warranties as provided in paragraph 9 entitled: "Limited Warranty"), breach of contract or violation of stature, law, ordinance, code, rule or

regulation. Seller also disclaims any liability to the Buyer/User in contribution or indemnification for the Buyer/User's liability or alleged liability to any third person or entity for injury or damage to people, property, wildlife or the environment.
Without limiting the generality of the foregoing, Seller disclaims liability for all claims for compensatory, consequential, incidental or other damages and for damages for personal injury and property damage, loss of use, revenue or profit, injury to good will, inability to fulfill contracts to third parties, other economic loss, response costs and other environmental clean-up costs or other damages arising out of the actual, alleged or threatened discharge, dispersal, release or escape of pollutants, contaminants, hazardous waste, or liquid or gaseous materials discharged from or through the Product and any loss, cost or expense arising out of any governmental or other direction or request to test for, monitor, clean-up, remove, contain, treat, detoxify or neutralize the foregoing.
Seller also disclaims liability for all claims for damages arising from the actual or alleged violation of any federal, state, municipal (or political subdivision thereof) statute, law, ordinance, code, rule or regulation relating to the environment, including but not limited to: The Clean Air Act, 42 U.S.C. S7401 *et seq*.; The Clean Water Act, 33 U.S.C. S1251 *et seq*.; The Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. S9601 *et seq*.; The Toxic Substances Control Act, 15 U.S.C. S2601 *et seq*.; The Resource Conservation and Recovery Act, 42 U.S.C. S6901 *et seq*.; The Safe Drinking Water Act, 21 U.S.C. S349 *et seq*.; The National Environment Policy Act, 42 U.S.C. S4321 *et seq*.; Occupational Safety and Health Act, 29 U.S.C. S651 *et seq*.; together with any amendments thereto and regulations promulgated hereunder.
Seller further disclaims any liability, direct or indirect, resulting from the Buyer/User's failure to fulfill the responsibilities enumerated in the preceding paragraph entitled "Statement of Buyer/User's Responsibility" including without limitation:

a. Buyer/User's failure to comply with statutes, laws, codes, rules and regulations relating to the Product and the environment; and
b. Buyer/User's failure to provide and install all devices required for the protection of the safety and health of people, property, wildlife and the environment and all persons, including employees of the User coming in contact with the Product and its discharges; and
c. Buyer/User's failure to adhere to the "Installation, Operating and Maintenance Instructions" and the product literature, including all warning contained therein;
d. Buyer/User's failure to test and monitor the functioning of the Product; and
e. Buyer/User's failure to determine and control the safety and cleanliness of discharged effluents, both gaseous and liquid, from the Product.

14. EXCULPATORY AND INDEMNIFICATION AGREEMENT: Buyer/User hereby agrees that the Seller will not be liable to the Buyer/User for the matters referred in paragraph 13 entitled "Disclaimer of Tort, Contract, Statutory and All Other Liability." This exculpatory agreement applies even if the defect and/or loss, damage or injury to persons, property, wildlife and the environment resulted solely or in part from the Seller's actual or alleged negligence, breach of warranty, violation an statute, law, ordinance, rule or regulation, or actions resulting in strict liability.
The Buyer/User hereby agrees to defend, hold harmless and indemnify the Seller and Seller's agents from and against all claims, suits, actions, and liabilities for injury or damage to people, property, wildlife, or the environment, including, without limitation, claims of negligence, strict products liability, breach of warranty (except the limited warranties provided in paragraph 9 entitled "Limited Warranty"), breach of contract or violation of statute, law, ordinance, code, rule or regulation.
The Buyer/User hereby agrees to defend, hold harmless and indemnify the Seller and Seller's agents from and against all claims, suits, and actions including claims for contribution or indemnification for another's liability or alleged liability to any third person or entity for injury or damage to people, property, wildlife or the environment.
Without limiting the generality of the foregoing, the Buyer/User hereby agrees to defend, hold harmless and indemnify the Seller and Seller's agents from and against all claims, suits, actions, and liabilities for compensatory, consequential, incidental or other damages and for damages for personal injury and property damage, loss of use, revenue or profit, injury to good will, inability to fulfill contracts to third parties, other economics loss, response costs and other environmental clean-up cost or other damages arising out of the actual, alleged or threatened discharge, dispersal, release or escape of pollutants, contaminants, hazardous waste, or liquid or gaseous materials discharged from or through the Product and any loss, cost or expense arising out of any governmental or other direction or request to test for, monitor, clean-up, remove, contain, treat, detoxify or neutralize the foregoing.
The Buyer/User hereby agrees to defend, hold harmless and indemnify the Seller and Seller's agents from and against all claims, suits, actions, and liabilities for damages arising from the actual or alleged violation of any federal, state, municipal (or political subdivision thereof) statute, law, ordinance, code, rule or regulation relating to the environment, including but not limited to: The Clean Air Act, 42 U.S.C. S7401 *et seq*.; The Clean Water Act, 33 U.S.C. S1251 *et seq*.; The Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. S9601 *et seq*.; The Toxic Substances Control Act, 15 U.S.C. S2601 *et seq*.; The Resource Conservation and Recovery Act, 42 U.S.C. S6901 *et seq*.; The Safe Drinking Water Act, 21 U.S.C. S349 *et seq*.; The National Environment Policy Act, 42 U.S.C. S4321 *et seq*.; Occupational Safety and Health Act, 29 U.S.C. S651 *et seq*.; together with any amendments thereto and regulations promulgated hereunder.
The Buyer/User hereby agrees to defend, hold harmless and indemnify the Seller and Seller's agents from and against all claims, suits, actions, and liabilities, direct or indirect, resulting from the Buyer/User's failure to fulfill the responsibilities enumerated above in number 12 entitled "Statement of Buyer/User's Responsibilities" as if the Buyer were the User as referred to therein, including without limitation:

a. Buyer/User's failure to comply with statutes, laws, codes, rules and regulations relating to the Product and the environment; and
b. Buyer/User's failure to provide and install all devices required for the protection of the safety and health of people, property, wildlife and the environment and all persons, including employees of the User coming in contact with the Product and its discharges; and
c. Buyer/User's failure to adhere to the "Installation, Operating and Maintenance Instructions" and the product literature, including all warning contained therein;
d. Buyer/User's failure to test and monitor the functioning of the Product; and
e. Buyer/User's failure to determine and control the safety and cleanliness of discharged effluents, both gaseous and liquid, from the Product.

The Buyer/User hereby agrees to defend, hold harmless and indemnify the Seller and Seller's agents from and against all claims, suits, actions, and liabilities as enumerated above without limitation even if said claims, suits, actions, and liabilities are based upon actual or alleged negligence, breach of warranty (other than the limited warranty provided in paragraph 9 entitled: "Limited Warranty"), violation of any law, statute, ordinance, rule or regulation, or any other basis of liability on the part of Seller or Seller's agents.

15. Assignment: No right or interest in this contract shall be assigned by Buyer/User without prior written agreement by the Seller. No delegation of any obligation by the Buyer/User shall be made without prior written agreement by the Seller.
16. Modifications; waiver: No Waiver, alteration or modification of any of the provisions hereof shall be binding on the Seller unless made in writing and agreed to by a duly authorized official of the Seller. No waiver by the Seller of any one or more defaults by the Buyer/User in the performance of any provision of this contract shall be construed as a waiver of any future default or defaults whether of a like or of a different character.
17. Changes & Improvements: Seller reserves the right to make changes, and improvements in its Products at any time without notice. Where such change and improvements have been made, Seller shall not be obligated to incorporate such changes and improvements in Products previously sold to any customer, nor shall Seller be obligated to replace previously sold products with products incorporating such changes and improvements.
18. Return of Goods: Where Seller has provided prior written authorization, Seller will accept the return for credit or exchange of products which have been made to the specifications set forth in its catalogs and other literature, provided the product has not been altered or damaged. Products returned for credit will be subject to a 20% restocking charge. Return products must be shipped prepaid to Seller at the location noted in written authorization.
19. Technical Services: Upon request of Buyer/User, Seller will endeavor to furnish such technical advice as it has available in reference to the use of its products. Any technical advice furnished by Seller with reference to the use of its products is given and accepted at Buyer/User's risk and the Seller assumes no obligation or liability for the advice given or results obtained.
20. APPLICABLE LAW: The validity, interpretation and performance of all terms, conditions, warranties, disclaimers, indemnification and exculpatory provisions, and all other provisions described herein, and any purchase or sale made hereunder shall be governed by the law of New Jersey in force at the date this contract is made. Where not modified by the terms herein, the provision of Article 2 of the Uniform Commercial Code as enacted by the State of New Jersey shall apply to this transaction.
21. SEVERABILITY: If any provision or clause of this contract or application thereof to any person or circumstances is held invalid or unconscionable such invalidity or unconscionability shall not affect other provisions or applications of the contract which can be given effect without the invalid or unconscionable provision or application, and to this end the provisions of the contract are declared to be severable.
22. WAIVER: If the Seller, at its option, agrees to a waiver of any of the terms and conditions recited herein, such waiver shall not for any purpose be construed as a waiver of any succeeding breach of the same or any other terms or conditions of said contract; nor shall such a waiver be viewed as a course of performance.
23. BUYER/USER'S ACKNOWLEDGMENT: User/Buyer acknowledges that he has read both sides of this contract and accepts its terms.