Rigging and Assembly Instructions

20’ & 24’ WIDE AT/UT/USS INDUCED DRAFT COOLING TOWERS

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Introduction

Thank you for purchasing your EVAPCO cooling tower. This manual will provide instructions for installation of the cooling tower. If you have purchased a model UT cooling tower or AT or USS with the Super Low Sound Fan option, please be sure to pay attention to the proper rigging instructions for that special option enclosed herein. If any questions arise during the installation, please contact your local EVAPCO representative or us directly at our Global Headquarters location.

International Building Code Provisions

The International Building Code (IBC) is a comprehensive set of regulations addressing the structural design and installation requirements for building systems – including HVAC and industrial refrigeration equipment. As of June 2008, all 50 states plus Washington D.C. have adopted the International Building Code. The code provisions require that evaporative cooling equipment and all other components permanently installed on a structure must meet the same seismic design criteria as the building. The AT/UT/USS Series of Open Cooling Towers are IBC 2006 compliant up to 1g with standard construction and up to 5.12g with additional structural modifications.

All items attached to the Evapco AT/UT/USS cooling tower must be independently reviewed and isolated to meet applicable wind and seismic loads. This includes piping, ductwork, conduit, and electrical connections. These items must be flexibly attached to the Evapco unit so as not to transmit additional loads to the equipment as a result of seismic or wind forces.

Method of Shipment

Models 220-112 to 220-912, 220-118 to 220-918, 224-018 to 224-918,424-28 to 224-928 and 424-036 to 424-936 are shipped with the top section(s) separate from the bottom section(s). These sections have mating flanges and will join together in a waterproof joint when sealed and bolted together as described in the following instructions. Miscellaneous items, such as sealer, screws, drip channels, splash guards and any other required materials, are packaged and placed inside the pan for shipment. A list of these items is given on page 8.

Storage

Do not place tarps or other coverings over the top of the units if the units are to be stored before installation. Excessive heat can build up if the units are covered, causing possible damage to the PVC eliminators, PVC louvers, or PVC fill. **For extended storage beyond six months rotate the fan and fan motor shaft(s) monthly. The fan shaft bearings should also be purged and regreased prior to start-up if it has been stored.**

Structural Steel Support

Three structural "I" beams running the length of the unit are required for support of the units. Two beams should be located underneath the outer flanges of the unit and one should be located longitudinally along the center of the unit (see Figure 1). Mounting holes, 3/4" in diameter, are located in the bottom flange of the unit to provide for bolting it to the structural steel (see certified print for exact bolt hole location). Bolt the bottom sections to the steel support before rigging the top sections.

Beams should be sized in accordance with accepted structural practices. Maximum deflection of the beam under the unit to be 1/360 of the unit length, not to exceed 1/2". Deflection may be calculated by using 56% of the operating weight on the center beam and 22% on each outboard beam as a uniform load (see certified print for operating weight).

The supporting "I" beams should be level before setting the unit. Do not level the unit by shimming between the bottom flange and the beams as this will not provide proper longitudinal support.

Support beams and anchor bolts are to be furnished by others. Always refer to certified print for unit weights, dimensions and technical data.

Rigging Bottom Section

Lifting Bottom Section

Lifting devices are located in the upper corners of the bottom section for lifting and final positioning purposes as shown in Figure 2. The hook of the crane must be a minimum dimension of "H" above the top of the section being lifted to prevent undue strain on the lifting devices.
See Table 1 for the minimum "H" dimension. These lifting devices should not be used for extended lifts or where any hazard exists unless safety slings are employed under the section. **(See "Extended Lifts" on page 5 for proper arrangement.)** Bolt the bottom section to the steel support before rigging the top section.

UNIT NO.	MIN. H
220-118 to 220-918 and 224-018 to 224-918	19 Feet
220-112 to 220-912, 420-124 to 420-924 and 424-024 to 424-924	15 Feet
424-028 to 424-928	16 Feet
420-136 to 420-936 and 424-036 to 424-936	19 Feet

Table 1 - Minimum H Dimension for Bottom Sections.

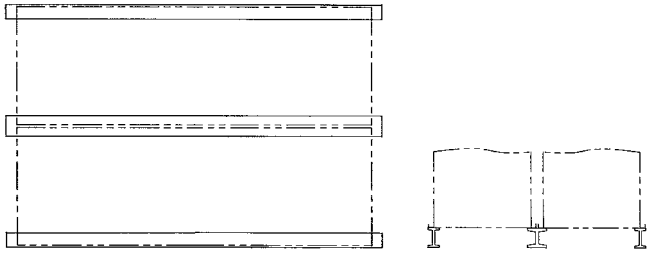


Figure 1 - Structural Steel Support.

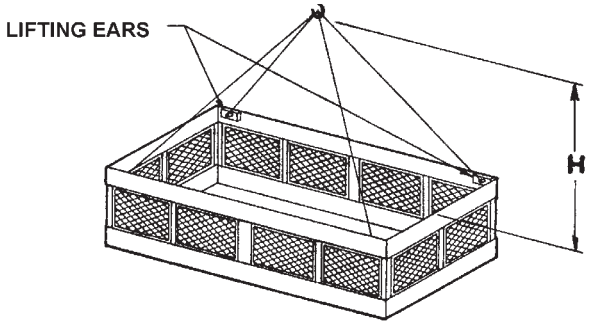


Figure 2a - 12' and 18' Long Bottom Section, Models 220-112 through 220-912, 220-118 through 220-918 and 224-018 through 224-918

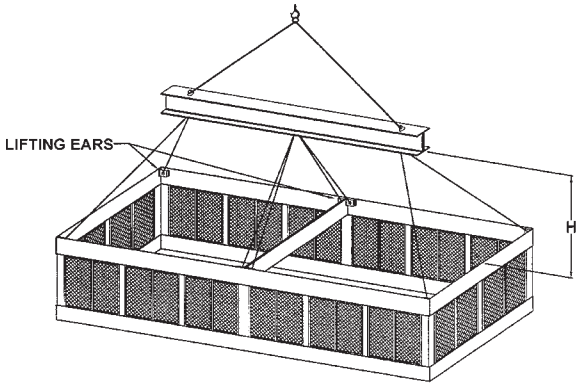


Figure 2b - 20', 24', 28' & 36' Long Bottom Section, Models AT/UT/USS 420-124 through 420-924, 420-136 through 420-936 and 424-024 through 424-936.

Joining Multi-Cell Units

Bottom Sections - Models 220-112 through 424-936

On 20 and 24-foot-wide models the equalizer flume is located on the sides of adjoining bottom sections. This flume box is shipped loose and must be installed to both bottom sections. In addition to the equalizer flume, these units are provided with drip channels and splash guards to keep water from exiting between the cells.***** The following procedure should be performed in order to assure proper assembly.

1. Install one bottom section of the unit on structural steel and secure as described earlier.
2. Mating flanges which will make contact with others should be cleaned to remove dirt, grease and moisture. Apply a layer of sealer tape on one side panel centered over the flume box holes as shown in Figure 3. Remove paper backing strip from the sealer tape.
3. The side of the flume box which has studs installed in it should now be connected to the side panel. The studs are pushed through the sealer tape and holes of the side panel and are secured by washers, lock washers and nuts.
4. Clean the mating flanges on the equalizer flume on the end to be field connected. Apply a layer of sealer tape on the flange, centered between the hole centers and the outside edge. Remove paper backing strip from the sealer tape.
5. Clean the mating surface of the side panel of any dirt, grease or moisture. Rig the second bottom section adjacent to the equalizer flume on the steel support.
6. Align the bolt holes in the equalizer flume and equalizer opening with drift pins while drawing the second bottom section against the first as shown in Figure 3.
7. Install 3/8" bolts, nuts and washers in every hole around the equalizer opening and tighten.
8. Bolt the second bottom section to the steel support.
9. Remove the 1/4" bolts which hold the drip channel retaining clips to the end panel. Remove the drip channel sections and fasten them together, end to end, by driving a self-tapping 5/16" screw through the section end with the larger hole into the mating end with the smaller hole. Stainless steel units will use 5/16" stainless steel nuts and bolts. See Figure 4.
10. Place the drip channel assembly over the adjoining pan section flanges. Turn around the retaining clips and re-install using the same hardware. See Figures 3 and 4.
11. Place the vertical splash guard in the bend of the vertical supports. Attach the vertical splash guard using 5/16" self-tapping screws. On stainless steel units, attach the vertical splash guard using 5/16" stainless steel nuts and bolts. See Figure 5.

*** 20'x12' units have three drip channel sections.**
20'x18' units have three drip channel sections.
24'x18' units have three drip channel sections.
20'x24' units have three drip channel sections.
24'x24' units have four drip channel sections.
24'x28' units have five drip channel sections.
20'x36' units have six drip channel sections.
24'x36' units have six drip channel sections.
All units have two vertical splash guards (one per end).

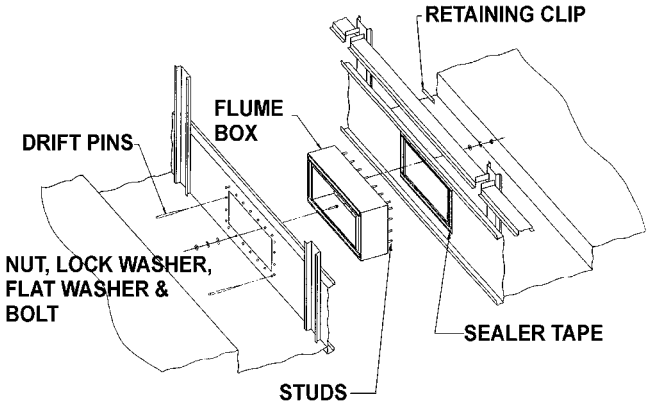


Figure 3 - Flume Assembly.

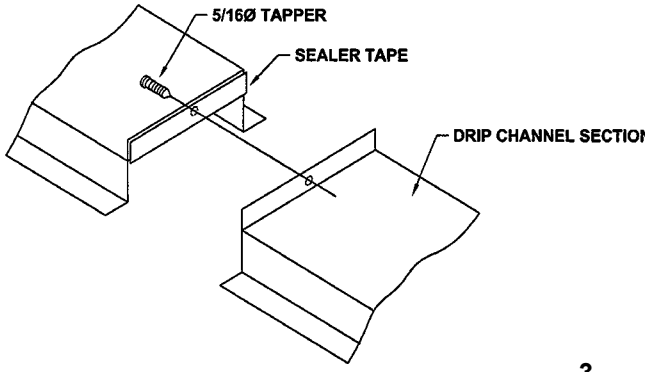


Figure 4 - Drip Channel Assembly

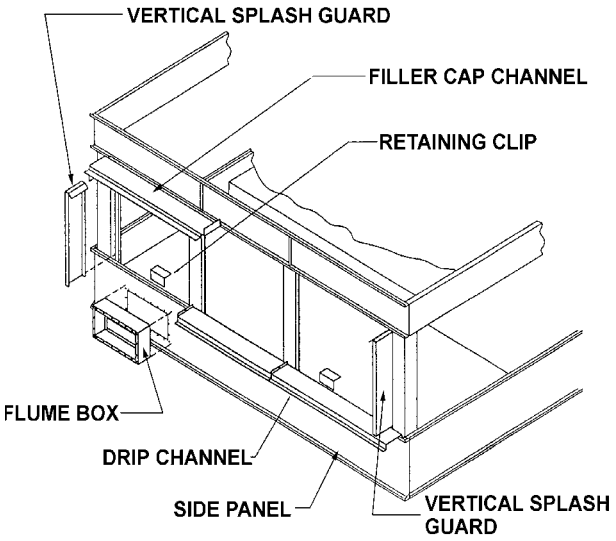


Figure 5 - Attachment of Drip Channel and Splash Guards.

Optional Equalizer Blank-Off Plate For All Multi-Cell Units

An accessory is available to isolate the bottom sections for individual cell operation, periodic cleaning or maintenance. This optional equalizer blank-off plate is factory installed on the equalizer flume and secured by wing nuts. See Figure 6.

For units not requiring the blank-off plate under normal operating conditions, remove the wing nuts, washers, plate and gasket. Reinstall washers and wing nuts for proper leak-free operation of the flume.

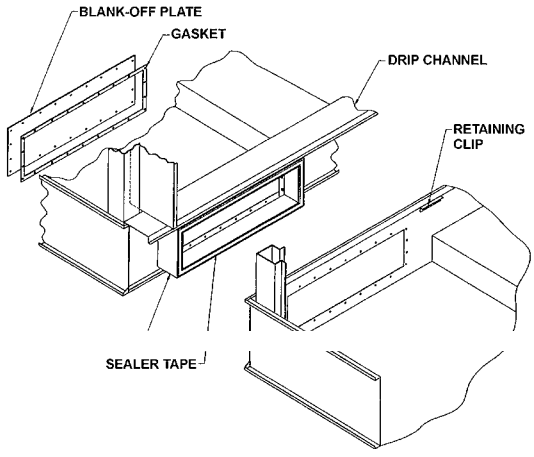


Figure 6 - Optional Blank-Off Plate on the Equalizer Flume

Application of Sealer Tape

Once the bottom section has been set on the supporting steel and bolted in place, the top flanges should be wiped down to remove any dirt or moisture. Sealer Tape should be placed over the mounting hole centerline on the side flanges. Apply two strips of sealer tape, one partially overlapping the other, on the end flanges.

The sealer tape should overlap on the corners as shown in Figure 7. Do not splice the sealer tape along the end flange and preferably not on the side flanges if it can be avoided. **Always remove the paper backing from the sealer tape.**

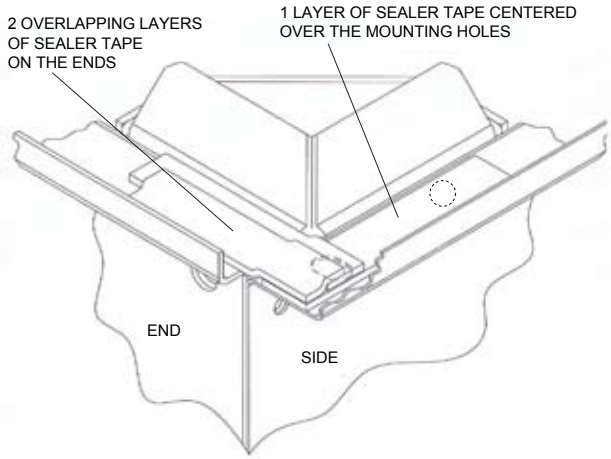


Figure 7 - Sealer Tape on flange of Bottom Section.

Models 424-024 through 424-936 have four top sections. In these cases, sealer tape must be applied to internal flanges as shown in Figure 8.

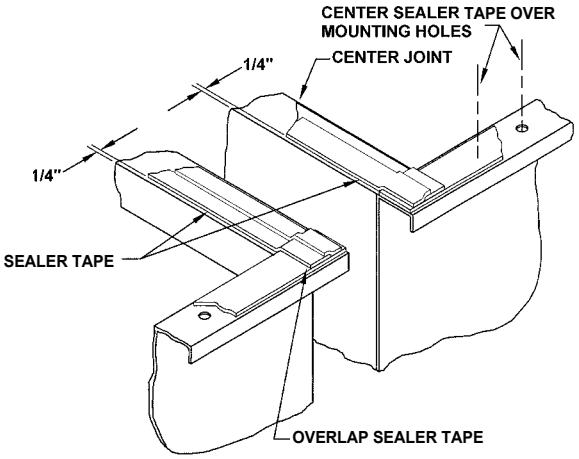


Figure 8 - Sealer Tape Detail for Center Joint of Units with four Top Sections.

Rigging Top Section

"U" bolts are provided in the four corners of the top section for lifting and final positioning (See Figure 9). The hook of the crane must be a minimum dimension "H" above the top section being lifted to prevent undue strain on the "U" bolts. See Table 2 for the minimum "H" dimension.

UNIT NO.	Standard Fan	Super Low Sound Fan
220-118 to 220-918 and 224-018 to 224-918	14 Feet	19 Feet
424-024 to 424-924	12 Feet	15 Feet
424-028 to 424-928	13 Feet	17 Feet
420-136 to 420-936 and 424-036 to 424-936	14 Feet	19 Feet

Table 2 -Minimum H Dimension for Top Sections.

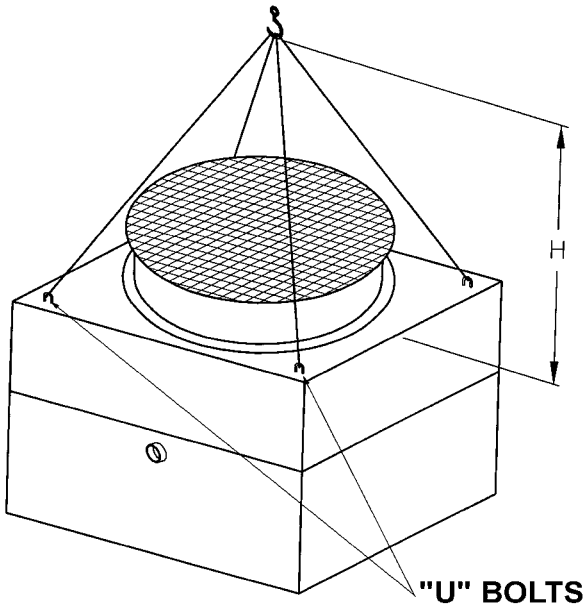


Figure 9 - Top Section(s)

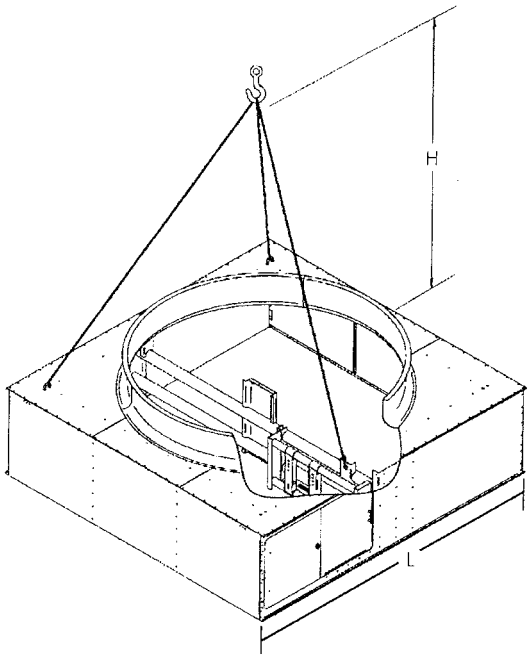


Figure 10 - Three Point Rigging of the Fan Section

Fan Sections Shipped Seperate From Casing Sections

Fan sections will be rigged as a three-point lift, two pick points are the U-bolts on the fan deck and the third is the lifting ear on the mechanical equipment support (see Figure 10). The hook of the crane must be a minimum dimension “H” above the top section being lifted to prevent undue strain on the “U” bolts. See Table 3 for the minimum “H” dimension.

Casing sections will be rigged as a four-point lift. The pick points will be the four lifting points as shown on Figure 11.

After rigging, the installer will have to tapper the end panels of the fan section to the end panels of the casing sections as well as all the side panel flanges, a task which is currently not required because it is a factory assembled. The fan screen will also have to be replaced and secured after rigging.

Table 3

L	H (STD)	H (SLSF)
12’	12’	15”
14’	13’	17”
18’	14’	19’
20’	15’	21’

Table 4

L	H
12’	12’
14’	14’
18’	17’
20’	18’

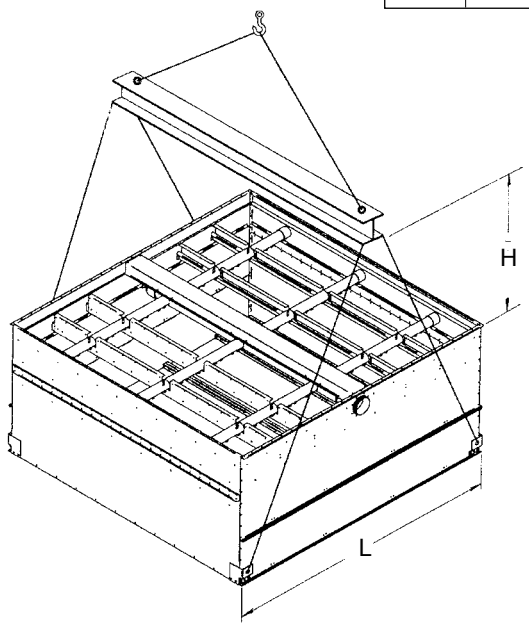


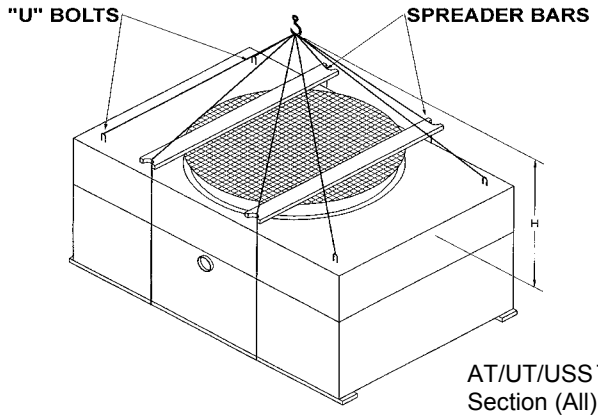
Figure 11 - Four Point Rigging of the Tower Casing Section with Added Ears

Extended Lifts

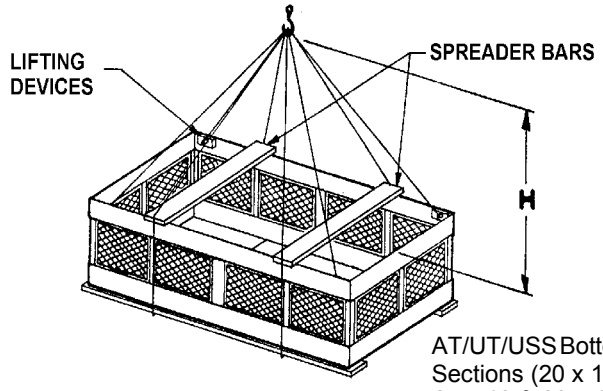
Important: The lifting devices and "U" bolts should be used for final positioning only and for lifting where no danger exists. If they are used for extended lifts, safety slings should be provided under the sections.

The preferred method for extended lifts is to use slings under the unit (see Figure 12). Spreader bars should always be used between the cables at the top of the section to prevent damage to the upper flanges or fan cylinders.

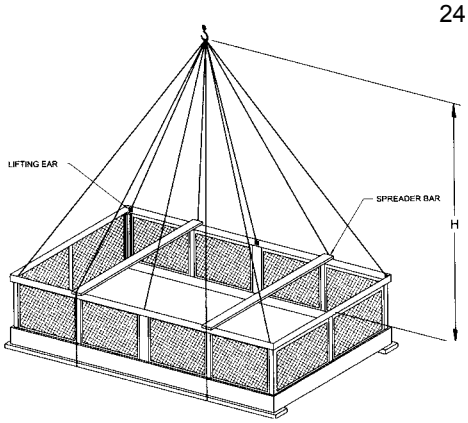
Safety slings and skids should be removed before final positioning of the unit.



AT/UT/USS Top Section (All)



AT/UT/USS Bottom Sections (20 x 12, 24 x 18 & 20 x 18)



AT/UT/USS Bottom Sections (20 x 24 to 24 x 36)

Figure 12 - Proper Rigging Method for Extended Lifts.

Assembly of the Top Section to the Bottom Section

Before assembling the top section to the bottom section, remove any loose parts shipped in the pan.

Wipe the flanges on the bottom of the top section. Check to see that the water distribution connection on the top section is in the correct position relative to the bottom section (see certified print). Units are also provided with matched markings on each section (i.e. A1 of bottom section should match up with A1 of top section).

Lower the top section to within several inches of the bottom section making sure the two sections do not touch and that the sealer is not disturbed. Fasten all four corners. Install the remaining fastners, working from the corners toward the center. Fasteners must be installed in every hole on the side flange. None are required on the end flanges. Galvanized and stainless steel units will use 1/2" nuts and bolts. See Figure 13.

These units will have multiple top sections that will be mounted in the same fashion as described above. When assembling the top sections to the bottom sections, nuts and bolts are required along all mounting flanges. The internal mating flange can be accessed from inside the unit. All bolts are driven upward through the mating flange. See Figure 13.

Note: 1/2" stainless steel nuts and bolts are used on stainless steel models.

NOTE: Drift pins provided in rigging box to assist with alignment.

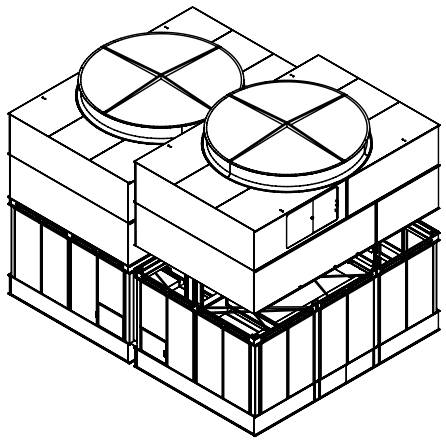


Figure 13 - Mating Upper Section to Bottom Section.

After the top sections have been secured to the bottom sections, a Filler Cap Channel should be installed between the top sections to prevent debris from entering the bottom sections. These sections are simply positioned over the mating flanges as shown in Figure 14. The Filler Cap Channel can be installed from inside the unit by inserting the channel through the space between the basin and casing sections. The channel does not require fastening.

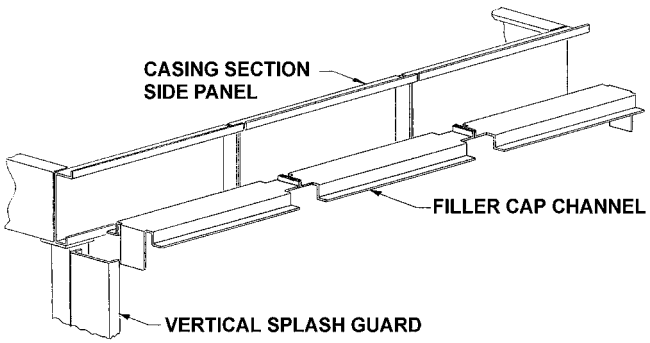


Figure 14- Filler Cap Channel Assembly.

Caution: 20' and 24' wide units cannot be rigged fully assembled.

Accessing Internal Mating Flanges on Units with Wind Panels or Water Tight Partitions

When wind panels or water tight partitions are supplied between bottom sections, the upper half of the partition must be lowered to gain access to the upper mating flanges. The upper partition can be lowered by removing the bolts along the bottom edge of the panel. Bolt access is from the inside of the unit. After the mounting flange bolts or screws are installed, raise the upper partition and bolt it back into its original position. Seal the edges of the wind panel and bolt heads with the supplied caulk sealer. See Figure 15.

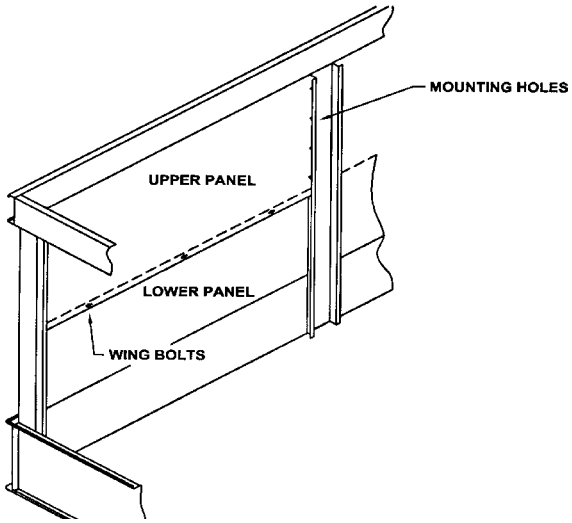


Figure 15 - Lowering of Wind Panels

Mounting Fan Screens

In certain situations some units may be shipped with the fan screens in the basin. Under these circumstances use the following procedures to mount the fan screen on the discharge cylinder.

WARNING: DO NOT WALK ON THE FAN SCREENS AT ANY TIME!

Models 420-124 through 424-924

1. Place both halves of the fan screen on top of the discharge cylinder. Each half will be tagged to match markings on the cylinder. Align the eyelets of the fan screen with the holes that can be found on the perimeter of the discharge cylinder.

2. At each hole, attach the fan screen to the discharge cylinder as shown in Figure 16.

3. Join the two screen halves with wire clips (Figure 17). There should be 4 wire clips on each side of the fan screen. Space the wire clips evenly across the radius of the fan screen as shown in Figure 18.

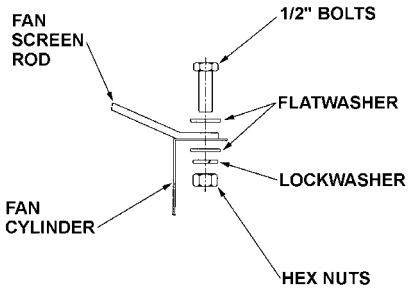


Figure 16 - Attachment of Fan Screen to Discharge Cylinder.

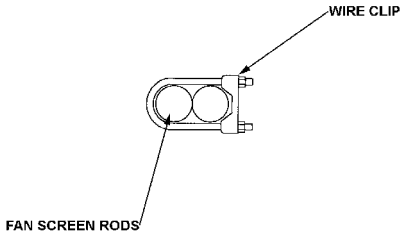


Figure 17 - Wire Clip Arrangement.

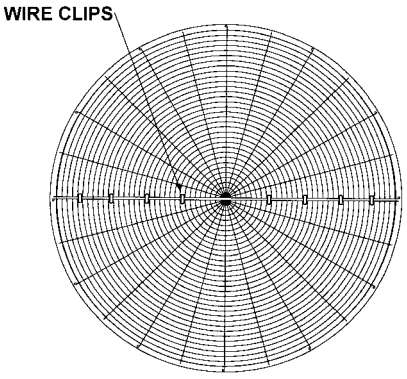


Figure 18 - Wire Clip Spacing.

Models 220-112 through 220-912, 220-118 through 220-918, 224-018 through 424-928, 420-124 through 420-924, 424-028 through 424-928, 420-136 through 420-936 and 424-036 through 424-936

On these models, the fan screen is supported from underneath by an “X” shaped support frame.

1. Set the support frame across the top of the discharge cylinder. (See Figure 19).
2. Place both halves of the fan screen on top of the support frame. Each half will be tagged to match markings on the cylinder. Align the eyelets of the fan screen with the holes on the cylinder perimeter.
3. Join the two screen halves with wire clips (See Figure 17). There should be 4 clips on either side of the fan screen. Space them evenly as shown in Figure 18.
4. At each hole, attach the fan screen to the discharge cylinder as shown in Figure 16. At the four points where the support frame meets the cylinder, bolt the support frame to the cylinder together with the fan screen.

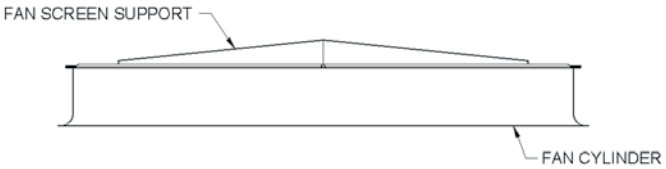


Figure 19 - Support Frame Installation.

Optional Motor & Gear Box Davit

An accessory is available to aid in the removal of fan motors and gear boxes. The assembly consists of a davit and a mounting base that is to be attached to the side of the unit next to the access door (See Figure 20). Both of these items will ship in the unit’s basin. Use the following procedure to install the mounting base.

1. Align the mounting channel with 3/8" bolts and flat washers to the mounting bracket (factory mounted).
2. Use 3/8" flat washers, lock washer and nuts to secure the mounting channel to the bracket (See Figure 21).

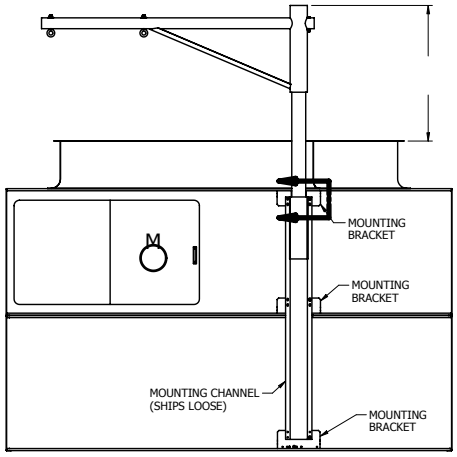


Figure 20 - Dual Point Davit Arrangement.

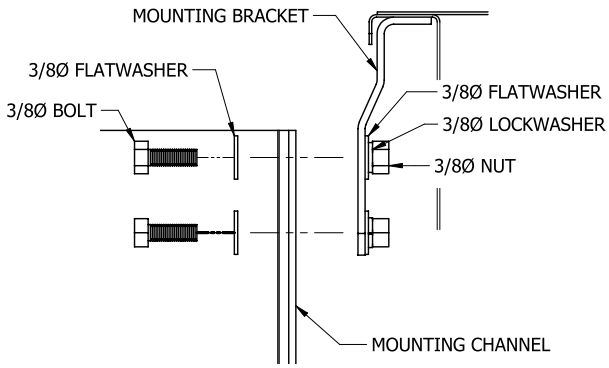


Figure 21 - Mounting Base Installation.

Assembly of Sloped Ladders

When sloped ladders are supplied with a unit, they are shipped in the basin of the unit. One sloped ladder will be provided for each cell. Assembly is identical for each cell.

Sloped ladders are attached at a minimum of three points. Taller units will be attached at four points. At each point of attachment, the ladder will be fitted with a ladder bracket assembly. The ladder bracket assembly looks like a metal box and is shown in detail (component #4) in Figure 22 below. The upper two assembly brackets will be rigidly mounted to the ladder and are not adjustable. These two bracket define the slope of the ladder. The lower brackets are adjustable.

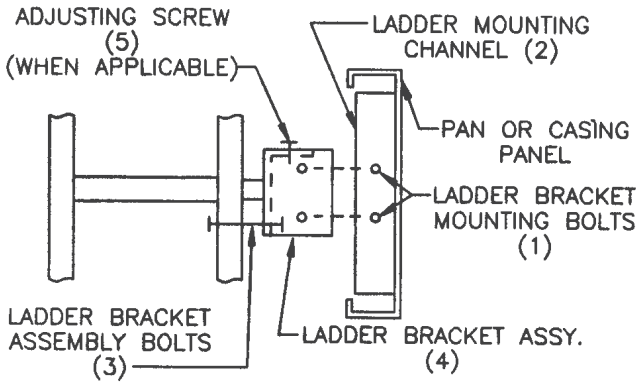


Figure 22 - Detail of Ladder, Ladder Bracket Assembly and Mounting Channel

To install the ladder assembly, follow the steps outlined below which refer to Figure 23:

1. Remove the ladder bracket mounting bolts (1) from the ladder mounting channels (2) on pan and casing sections.

2. Loosen, but do not remove, the ladder bracket and assembly bolts (3).

3. Slide the ladder bracket assembly (4) over the ladder mounting channels (2) located on the pan and casing sections. Do not remove the ladder bracket assembly (4) from the ladder.

4. Align the bolt holes and reinstall the ladder bracket mounting bolts (1) through the ladder bracket assembly and the ladder mounting channels (2).

5. Tighten all bolts.

6. Tighten the adjusting screw (5) in the adjustable mounting bracket where applicable.

Note: Upper Section of Unit Must Be Properly Oriented with Respect to Lower Section. All Mounting Brackets Must be on Same Side of Unit. Refer to Certified Print For Proper Orientation.

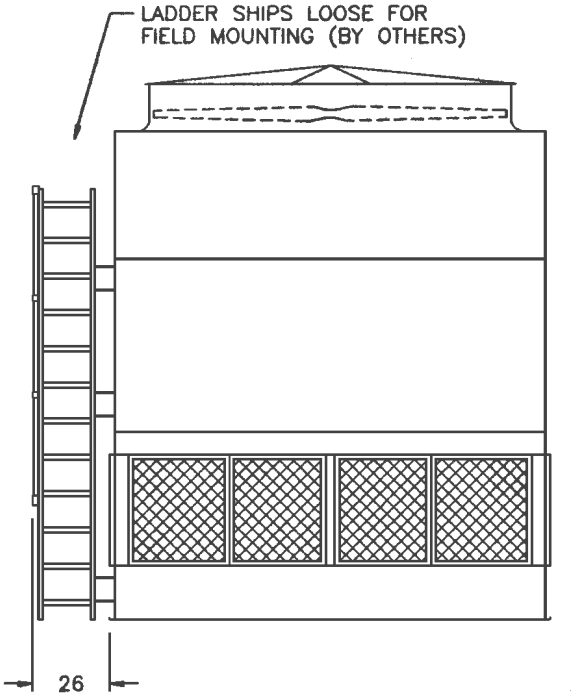


Figure 23A - End View of Ladder Assembly

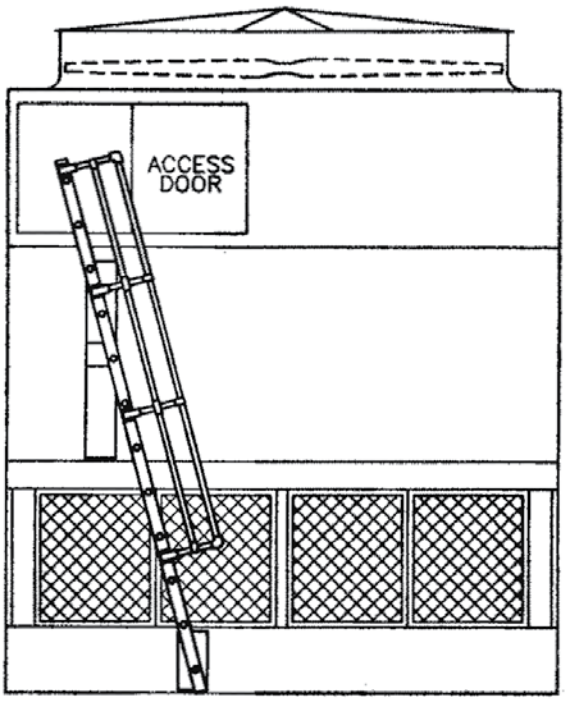
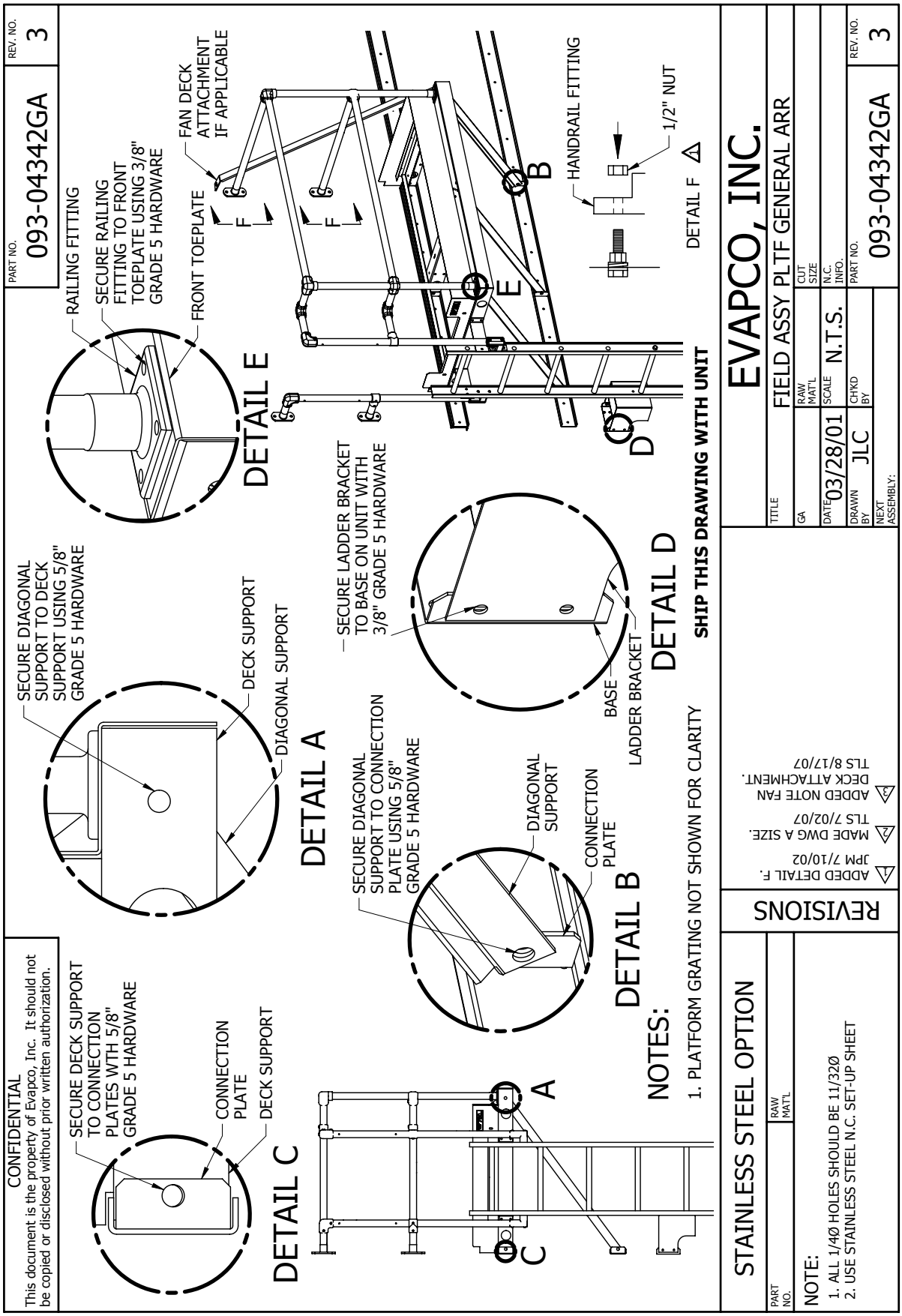


Figure 23B - Side View of Ladder Assembly

Field Assembly of Working Platform and Ladder

The working platform/ladder assemblies are shipped in the basin of the unit. In some cases they are shipped separately due to basin accessories that interfere with storage. The platform is partially assembled prior to shipment for minimal field assembly.

For 20' and 24' wide units, there will be one working platform/ladder assembly per fan section.



Field Assembly of the Bottom Inlet Option

An option is available which locates the hot water inlet connection on the bottom of the unit. There is a bottom inlet connection assembly that ships loose and requires field installation. Follow these assembly instructions to complete the bottom inlet connection installation.

Assembly Instructions (Refer to Figure 24.)
(read all instructions before proceeding):

1. Assemble the cooling tower in accordance with the unit Rigging & Assembly Instructions.
2. Find the bottom inlet connection assembly. The assembly, consisting of the pipe spool, flexible reinforced pipe connectors and pipe clamps, comes uninstalled, fastened securely inside the basin section. See table 5 for details on the assembly.
3. Position the bottom inlet connection assembly over the lower pipe nipple on the basin section. (see Figure 24.)
4. Loosen the pipe clamps and slip the pipe connector down over the lower pipe nipple.
5. Align the bottom inlet connection assembly with the upper pipe nipple on the unit fill section, loosen the pipe clamps and slip the connector up over the upper pipe nipple.
6. Tighten all pipe clamps. A ratchet wrench is recommended.
7. Repeat for multi-cell units.

Model Number	# Bottom Inlet Connection Assemblies	Assembly Length (inches)	# Pipe Connectors	# Pipe Clamps
220-112 to 220-912	2	50-1/4	2	4
220-118 to 220-918	2	62-1/4	2	4
224-018 to 224-918	2	73-3/4	4	8
224-720 to 224-920	2	73-3/4	4	8
2120-124 to 420-924	4	73-3/4	4	8
424-024 to 424-924	4	73-3/4	8	16
424-028 to 424-928	4	73-3/4	8	16
420-136 to 420-936	4	73-3/4	4	8
424-036 to 424-936	4	73-3/4	8	16

Table 5 - Bottom Inlet Connection Assembly details

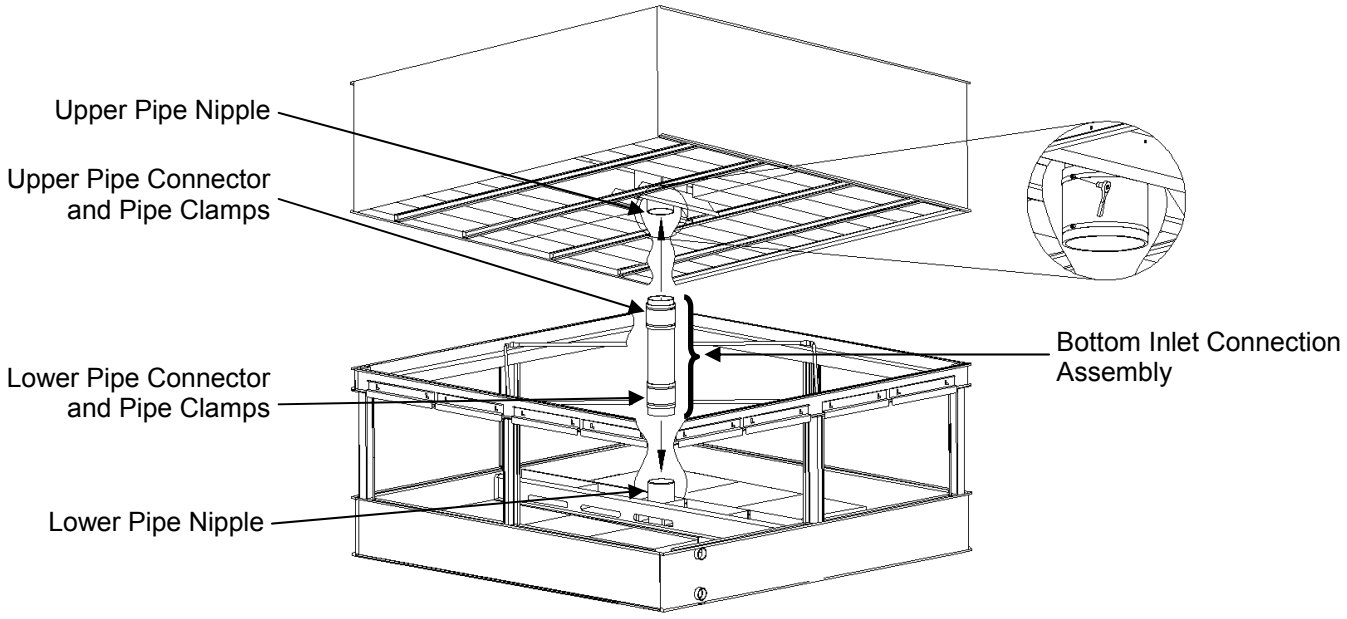


Figure 24 - Bottom Inlet Pipe Spool Installation

General Information - Start-up & Maintenance

Start-up Details

Shipping Chocks and Debris

Remove any chocks that have been placed inside the unit for shipping purposes. Be sure to remove the chocks from between the fan and fan guard. Clean all debris from the pan prior to start-up. Close and secure all access doors.

Belt Tensioning and Sheave Alignment

Units are equipped with a factory mounted motor on a sliding base with single bolt adjustment on each motor. Check the belt tension by applying moderate hand pressure to the center of the belt, it should deflect approximately 1/2". As a final check, confirm the sheave alignment by laying a straight edge from sheave to sheave. There should be four point contact (see Figure 25). Adjust the position of the motor sheave as necessary.

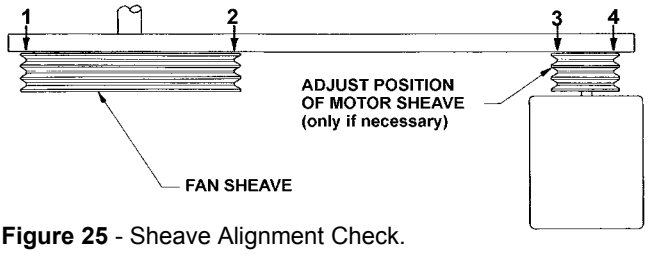


Figure 25 - Sheave Alignment Check.

Bleed-off Line

Make sure a bleed line and valve are installed on the pump discharge side of the system piping to a convenient drain. The bleed-off valve should be open. For installation details, see the "Maintenance Instructions Bulletin."

Strainer

Check the strainer(s) in the pan to make sure they are in the proper location over the pump suction, alongside of the anticavitation hood. See Figure 26.

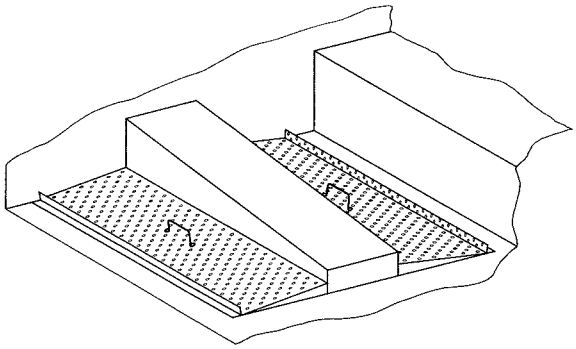


Figure 26 - Strainer Location.

Adjustment of Float Valve

The float valve should be adjusted to maintain the proper water level as specified in the maintenance instructions. At start-up, the pan should be filled to the overflow level.

During operation, the water level will drop to no more than 5" below the overflow. The water level can be checked during operation by opening the removable louver section at the valve while the pump is running and the fans are off.

Screens

Protective fan screens are provided across the top of the fan cylinders of all models. Check and tighten all bolts.

Starting Sequence

Before starting the unit, check that all access openings, safety screens and covers are in place. Start the unit as outlined below:

1. Fill the pan to the overflow level.
2. Start the water pumps. Check the water flow to the unit by checking the spray water pressure at the water inlet. It should be the same as the pressure indicated on the certified drawing.
3. Start the fans. Check the fans for proper rotation. Directional arrows are on the side of the fan cylinder.

NOTE: Do not operate the fans while the pump is off. Damage to the PVC fill can result during dry operation. Always start the water pumps first.

Maintenance

Once the installation is complete and the unit is turned on, it is important that it be properly maintained. Maintenance is not difficult or time-consuming but must be done regularly to assure full performance of the unit. Refer to the maintenance instructions enclosed with the unit for proper maintenance procedures.

Freeze Protection

Proper freeze protection must be provided if the unit is located in a cold climate. Refer to maintenance instructions as well as product bulletins for further information.

Rigging Hardware Parts List

The following table lists those parts which are shipped together with the unit(s) for field assembly and/or spare parts.

Model Number	Flume Hard-ware[1]	Rigging Hard-ware [2]	Sealer Tape	Nozzles
220-112 to 220-912	26	36	10	0
220-118 to 220-918	26	52	12	0
420-124 to 420-924	26	72	20	0
224-018 to 224-918	26	52	12	0
424-024 to 424-924	26	72	20	0
424-028 to 424-928	26	88	24	0
420-136 to 420-936	26	104	24	0
424-036 to 424-936	26	104	24	0

Notes:
1. 3/8 x 1" bolt, hex nut, lockwasher and flat washer.
2. 1/2 x 1" bolt, (2) flat washers, lock nut