Rigging and Assembly Instructions

CONTAINERIZED COOLING TOWERS (C-AT)

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Method of Shipment

The C-AT product line has been designed to fit in a standard shipping container. C-AT towers are shipped with the top (fan) and bottom (basin) sections (less vertical supports) mounted together for shipment, as shown in Figure 1. The middle (fill) section is shipped separately, as shown in Figure 2. These sections have mating flanges and will join together in a waterproof joint when sealed and bolted together as described in the following instructions. The vertical supports, all ancillary equipment, and parts ship disassembled and packaged in the basin section. Miscellaneous items, such as sealer tape, self-tapping screws and any other required materials, are packaged and placed inside the rigging box and shipped in the basin section as well, as shown in Figure 3.

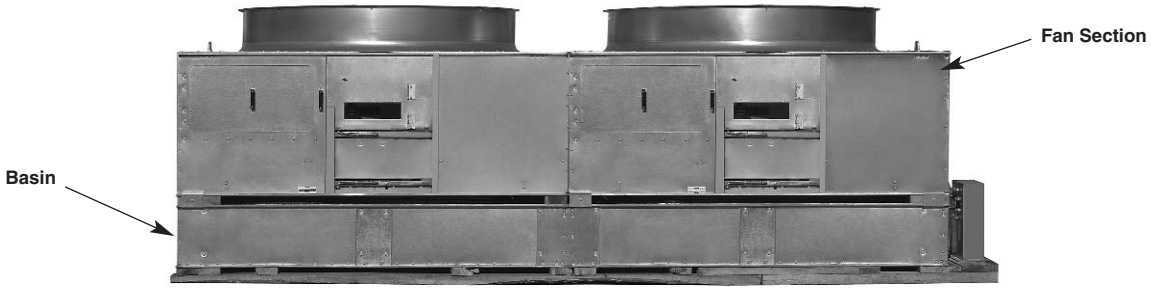


Figure 1 – Skidded fan and basin sections

Figure 2 – Skidded fill section

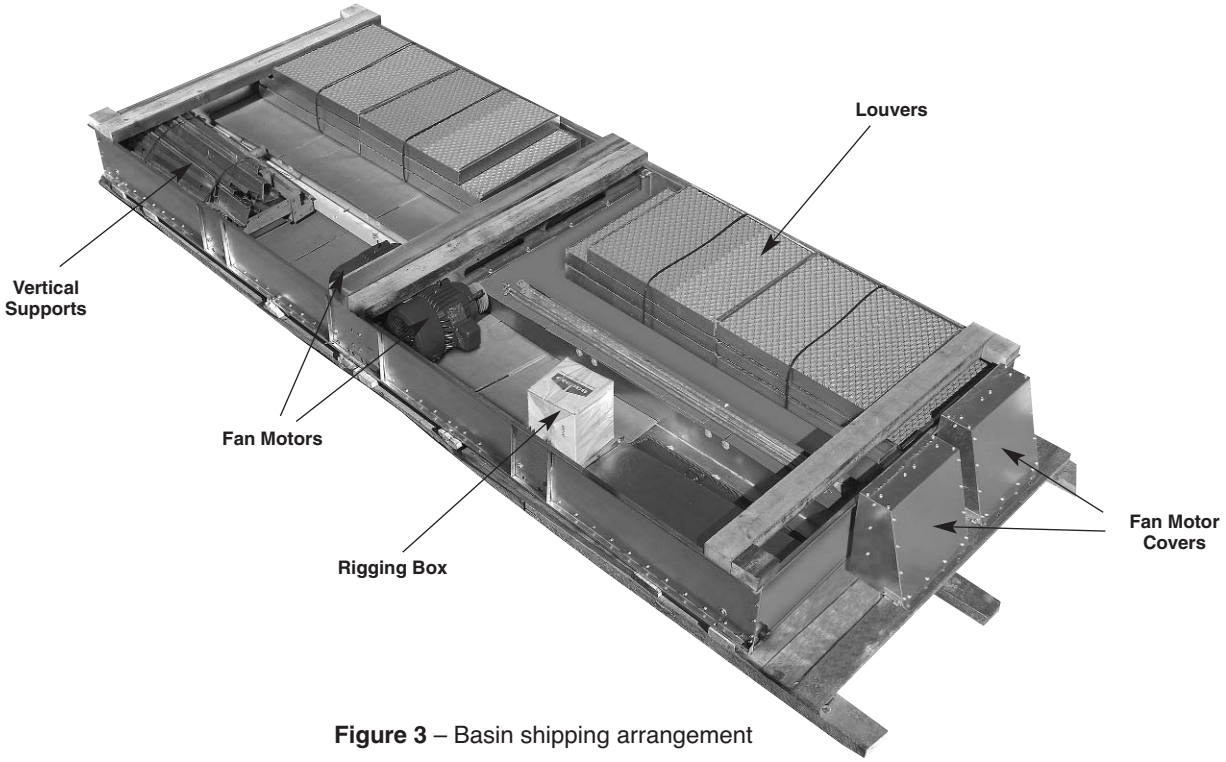


Figure 3 – Basin shipping arrangement

Storage & Excessive Heat Precautions

The temperature inside shipping containers can be significantly higher than ambient outdoor temperatures. Since excessive heat build-up can cause damage to the PVC components such as drift eliminators or air inlet louvers. Units shipped to or through particularly hot climates should utilize 'open top' shipping containers or otherwise make arrangements to have the PVC components shipped separately. Do not place tarps or other coverings over the top of the units. Tarps could have a similar heat trapping effect resulting in damage to PVC components. For extended storage beyond six months, rotate the fan and fan motor shaft(s) monthly. The fan shaft bearings should be purged and re-greased prior to start-up.

Unloading

WARNING! Caution must be exercised when handling the loaded shipping container. The C-AT sections are of unequal weight and may cause excessive shifting or tilting of the container during handling.

C-AT towers are loaded into shipping containers with the fill section closest to the door. This minimizes the handling of this (heaviest) section and facilitates unloading of all components. Evapco recommends that C-ATs be unloaded from their shipping containers at the receiving port and transported to the final destination using a flatbed truck. Unloading of both sections can be achieved by the use of straps or chains looped through the skid of each section and connected to a forklift.

If a loading dock is available at the jobsite, the container may be transported to its final destination and similarly unloaded. However, if a loading dock is not available the container can be off-loaded to ground level and unloaded using a small ramp to adjust for the height difference between the ground and the inside of the container.

Structural Steel Support

Two structural "I" beams running the length of the unit are required for supporting the unit. These beams should be located underneath the outer flanges of the unit as shown in Figure 4.

Mounting holes, 3/4" (19mm) in diameter, are located in the bottom flange for bolting to the structural steel (see certified print for exact bolt hole location). Bolt the bottom section to the steel support before rigging the top section. Follow the rigging instructions to ensure proper sequence of section installation.

Beams should be sized in accordance with accepted structural practices. Maximum deflection of the beam under the unit is recommended to be 1/360 of the unit length, not to exceed 1/2" (13mm). Deflection may be calculated by using 55% of the operating weight as a uniform load on each beam (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.

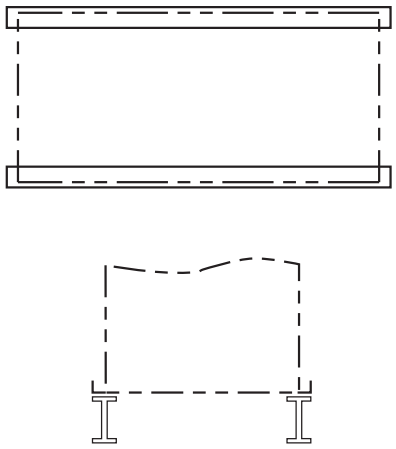


Figure 4 – Steel Support

C-AT RIGGING AND ASSEMBLY

There are (8) basic steps required to assemble a C-AT:

Step #1: Remove Fan Section from Basin Section

Step #2: Rig Fan Section onto Fill Section

Step #3: Rig Basin Section

Step #4: Install Vertical Supports in Basin Section

Step #5: Rig Fan/Fill Section onto Basin section

Step #6: Install WST Air Inlet Louvers

Step #7: Install Motors and Covers

Step #1
Remove Fan Section from Basin Section

Remove all shipping channels holding basin and fan together by removing the hardware securing the shipping channels to the wood beams and chocks as shown in Figure 5.

Prior to rigging the fan section onto the fill section, sealer tape must be applied to the top of the fill section. The top flanges on the fill section and bottom flanges on the fan section should be wiped down to remove any dirt or moisture. One layer of 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 6. Do not splice the sealer tape along the end flanges and preferably not on the side flanges if it can be avoided. **Always remove the paper backing from the sealer tape.**

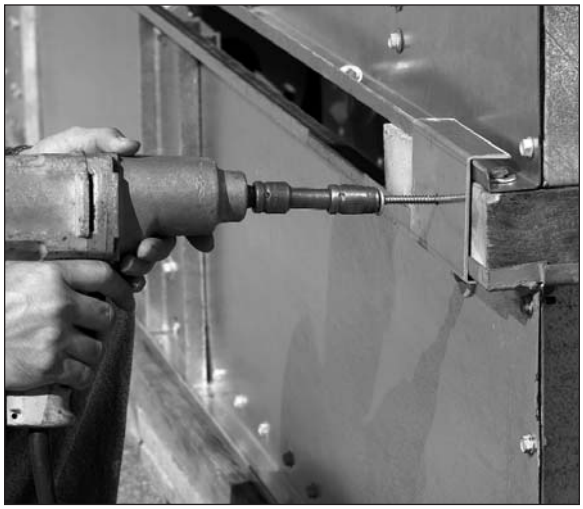


Figure 5 – Removal of shipping channels

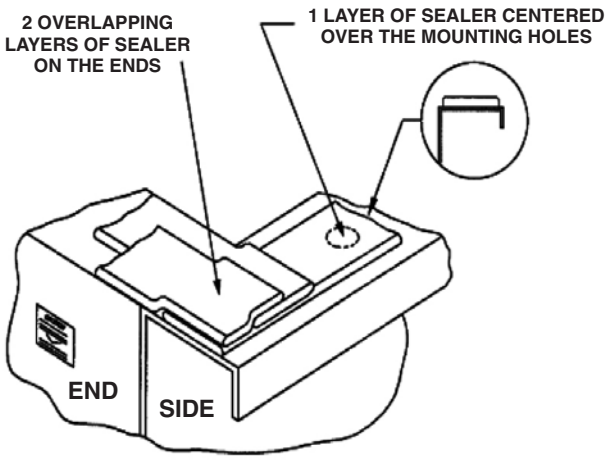


Figure 6 - Proper Sealer Tape Application

Once the shipping channels have been removed from between the basin and fan section and sealer tape has been applied to the top of the fill section, the fan section should be lifted using the U- bolts located at the top corners of the fan section as shown in Figures 7 and 8a and 8b.

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. If the “H” dimension cannot be met with a hook, a spreader bar should be used as shown in Figure 7. The spreader bar should be approximately the same length as the unit.

Figure 7 – Lifting of fan section

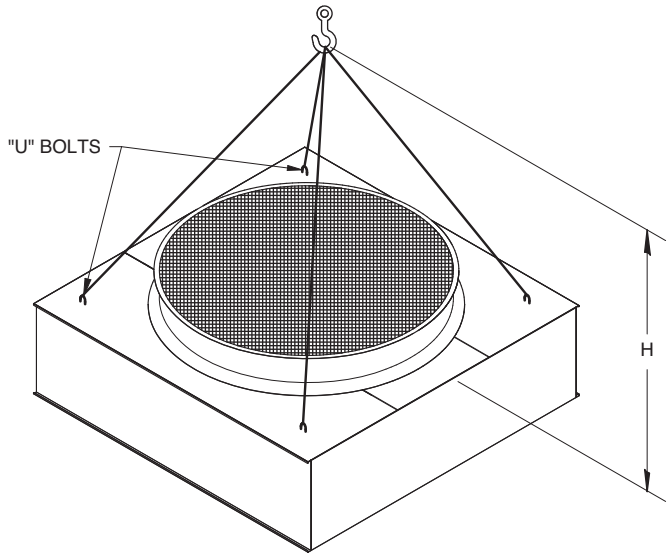


Figure 8a – Lifting of fan section, single-fan units– “H” Dimension

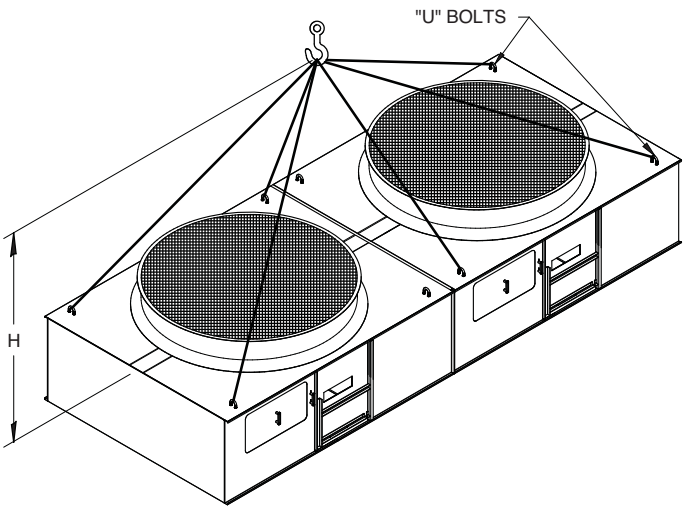


Figure 8b – Lifting of fan section, two-fan units– “H” Dimension

EXTENDED LIFTS

The preferred method for extended lifts is to use slings under the unit (See Figure 9). Spreader bars must always be used between the cables at the top of the section to prevent damage to the upper flanges or fan cylinders.

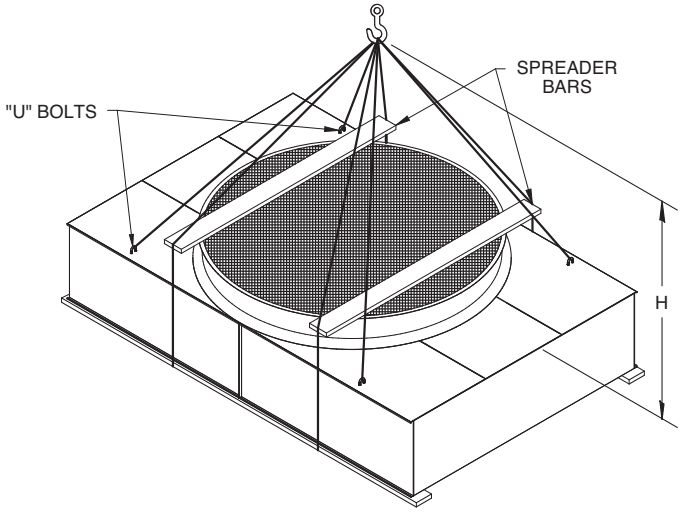


Figure 9 – Extended Lifting of fan section – “H” Dimension

Tower Length	Min. 'H' Dimension
9 Feet (2.7 meters)	9 Feet (2.7 meters)
12 Feet (3.6 meters)	12 Feet (3.6 meters)
14 Feet (4.3 meters)	14 Feet (4.3 meters)
18 Feet (5.5 meters)	17 Feet (5.2 meters)

Table 1 – Minimum 'H' Dimension for Fan Sections

It is recommended that the fan section be rigged onto the fill section at the time that it is removed from the basin section. This requires that the coil section be pre-positioned within reach of the crane. Note that the unit is provided with match markings on each section (i.e. A1 of coil section should match up with A1 of fan section). Alternatively, the fan section can be set aside on a flat and smooth surface and rigged onto the fill section at a later time.

Step #2

Rig Fan Section onto Fill Section

The fan section should be lifted using the U- bolts located at the top corners of the fan section as shown in Step #1 (Figures 7 & 8). Note that the unit is provided with match markings on each section (i.e. A1 of fill section should match up with A1 of fan section).

Lower the fan section to within several inches (centimeters) of the fill section, making sure the two sections do not touch and the sealer tape applied in Step #1 is not disturbed. Place drift pins (see Figure 10) in the (4) corner mounting holes and gradually lower the fan section into place using the drift pins to guide the section down accurately onto the mating flange.

Place self-tapping screws (or stainless steel bolts and nuts in the case of stainless steel construction) in all four corner bolt holes. Then continue to install the rest of the self-tapping screws working from the corners toward the center, using drift pins to align the holes. A self-tapper must be installed in every hole on the side flanges. No self-tappers are required on the end flanges. The assembled fan/fill section is shown in Figure 11.

NOTE: 5/16" stainless steel nuts, bolts and washers are used for stainless steel construction.

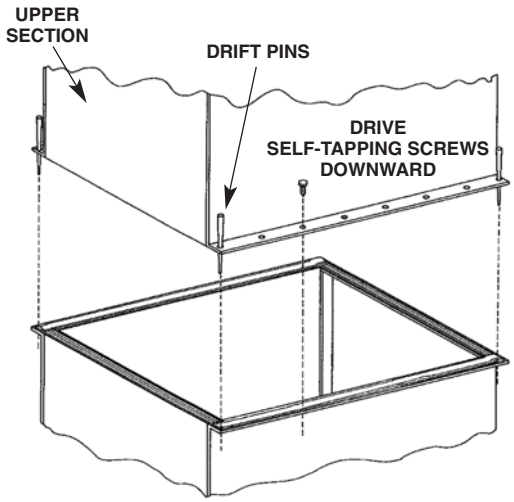


Figure 10 – Mating fan section to fill section

Figure 11 – Assembled fan/fill section

Step #3
Rig Basin Section

Remove the fan section from the basin section as discussed in Step #1.

The basin section can then be lifted using the lifting brackets located in the inside corners of the basin section as shown in Figures 12a and b. 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 2 for the minimum "H" dimension. If the "H" dimension cannot be met with a hook, a spreader bar should be used. The spreader bar should be approximately the same length as the unit.

Position the basin section on the unit steel supports and bolt into place per Figure 4. Bolt the basin section to the steel support before rigging the fill section.

The lifting devices alone should **NOT** be used for extended lifts or where any hazard exists. For extended lifts, safety slings must be provided under the sections in combination with the lifting devices on the unit as described below.

Tower Length	Min. 'H' Dimension
9 Feet (2.7 meters)	9 Feet (2.7 meters)
12 Feet (3.6 meters)	12 Feet (3.6 meters)
14 Feet (4.3 meters)	14 Feet (4.3 meters)
18 Feet (5.5 meters)	17 Feet (5.2 meters)

Table 2 – Minimum 'H' Dimension for Fan Sections

EXTENDED LIFTS

The preferred method for extended lifts is to use slings under the unit (See Figure 13). Spreader bars must always be used between the cables at the top of the section to prevent damage to the upper flanges or fan cylinders.

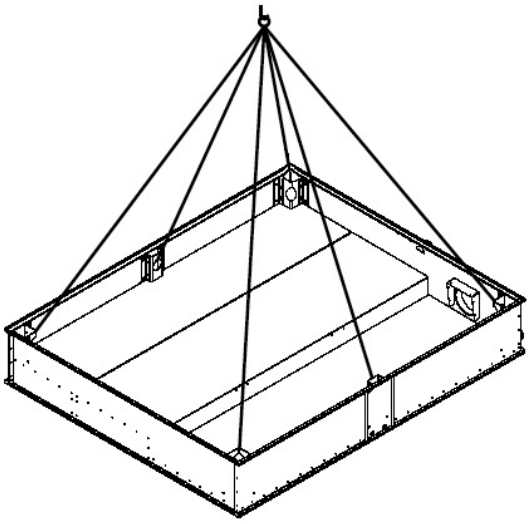


Figure 12a – Lifting of basin section, single-fan units– "H" Dimension

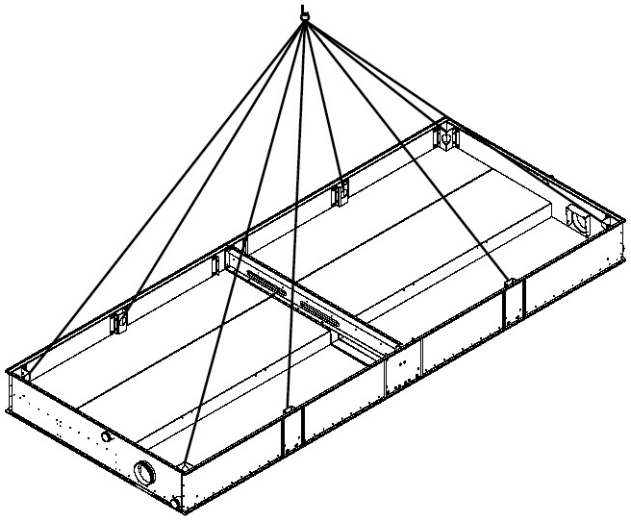


Figure 12b – Lifting of basin section, two-fan units– "H" Dimension

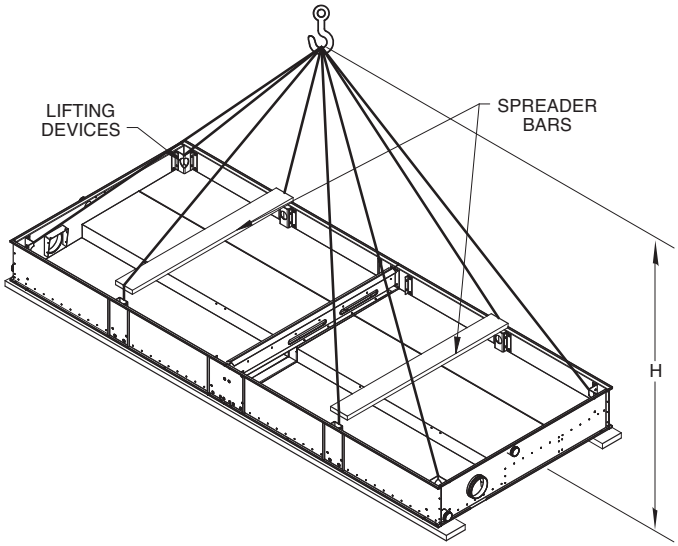


Figure 13 – Extended Lifting of fan section– "H" Dimension

Step #4

Install Vertical Supports in Basin Section

Once the basin has been set into its final position and bolted to the steel, the lifting brackets should be removed from the mounting angles for the pan vertical supports as shown in Figure 14.

Unpack the components shipped in the basin and set them aside near the unit. Prepare the basin section for assembly by matching the marks on the vertical posts with those on the basin brackets and laying out the vertical posts in their proper location, as shown in Figure 15.

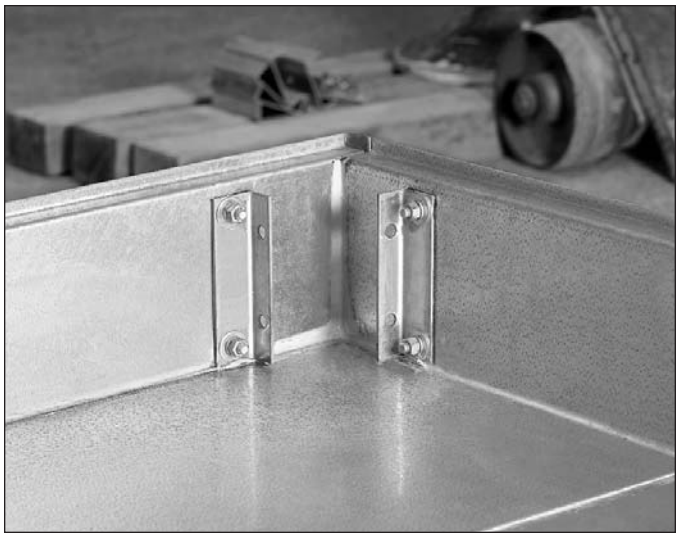


Figure 14 – Lifting Bracket Removed From Mounting Angles

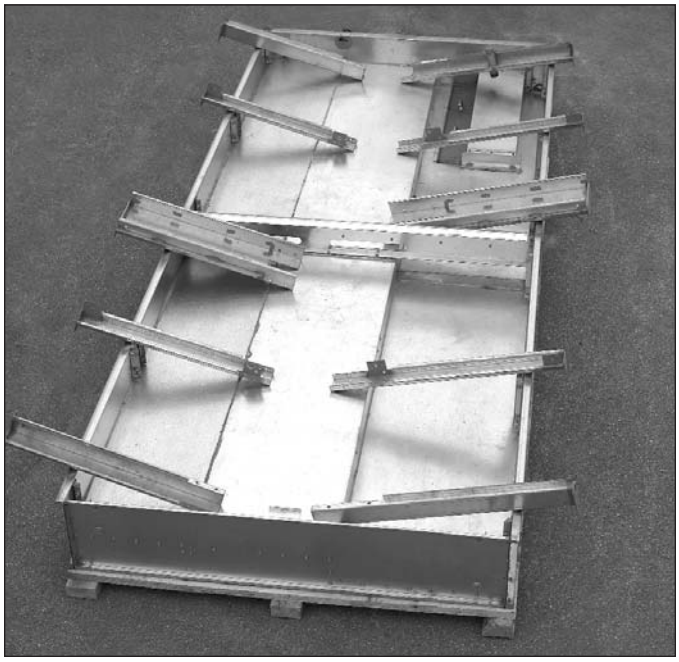
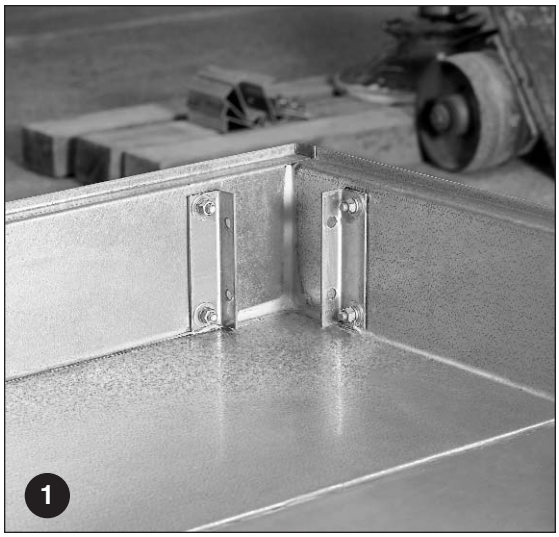


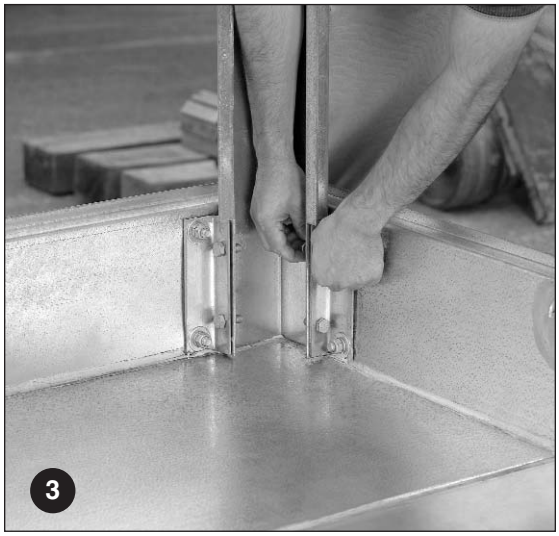
Figure 15 – Vertical posts layout

Install each vertical post using the hardware installed from the factory on each bracket. Ensure that a lock-washer is in place on both sides of the vertical post next to the bolt head and nut. Installation sequence for each type of vertical post is shown in Figures 16 through 18.

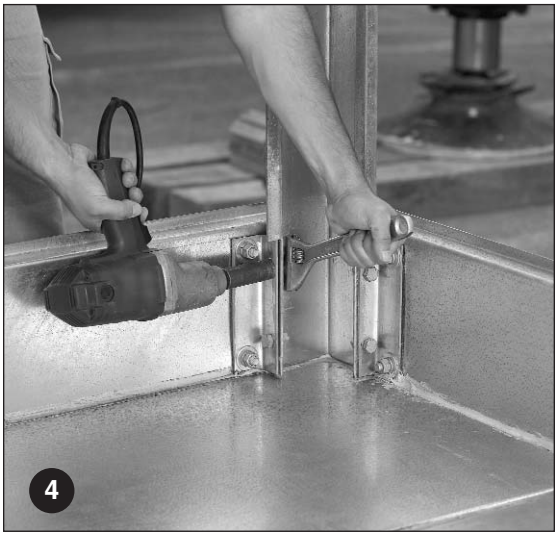


Step #1: Clean corner brackets and locate hardware in rigging box

Step #2: Install corner vertical between brackets



Step #3: Loosely install hardware



Step #4: Tighten all hardware

Figure 16 – Corner vertical post installation

Step #1: Clean brackets and locate hardware in rigging box

Step #2: Install louver vertical support and tighten hardware.

Figure 17 – Louver vertical post installation

Step #1: Clean brackets and locate hardware in rigging box

Step #2: Install vertical support and tighten hardware.

Figure 18 – Fill support installation (18' long models only)

The final step in assembling the basin is installing the cross-braces as shown in Figure 19 (use ½" x 1-¼" bolts and ½" lock-washer and nut).

Some drilling (9/16 Ø) on vertical support tabs is required.

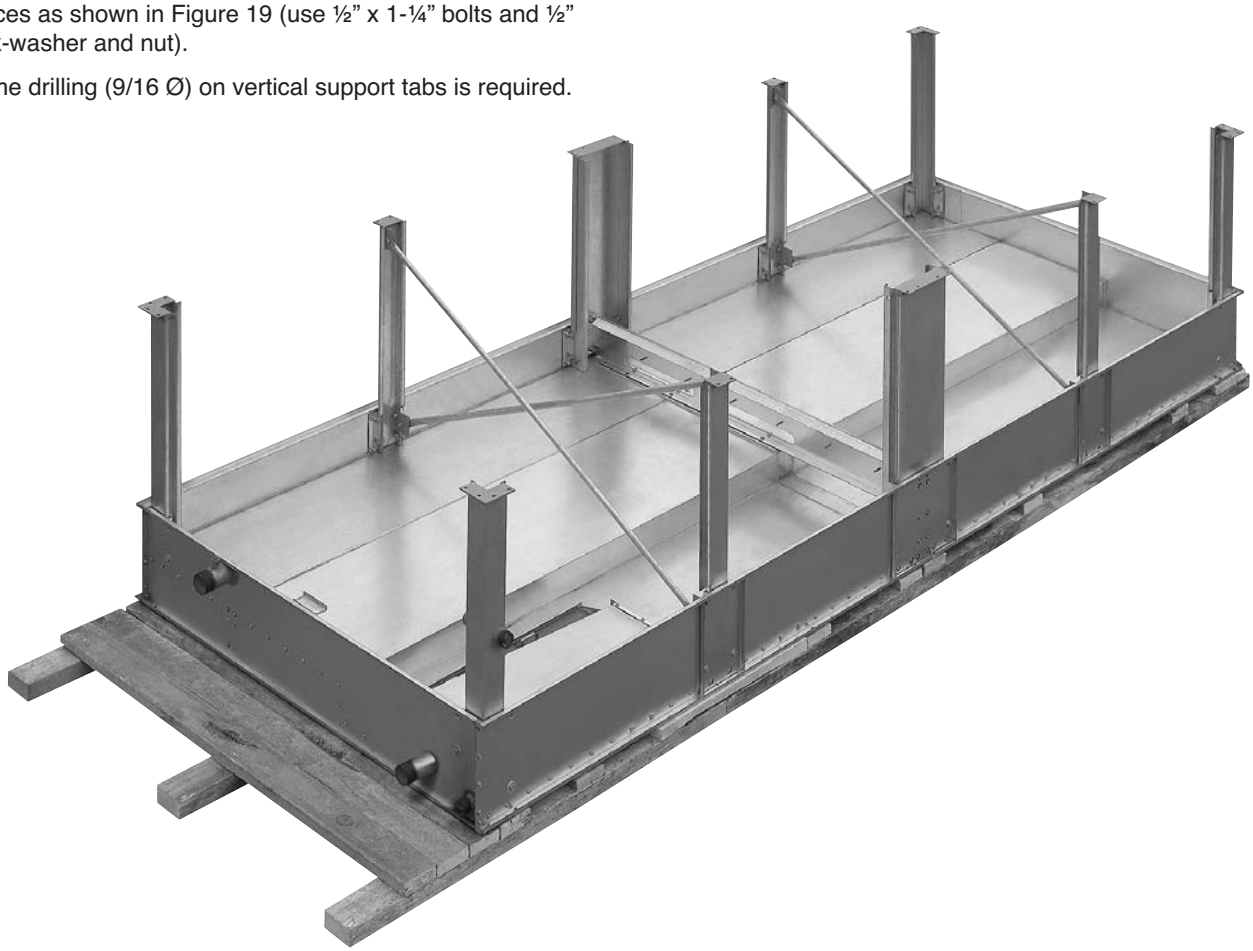


Figure 19 – Assembled basin section

Applying Sealer Tape

Prior to rigging the fan/fill sections onto the basin section, sealer tape must be applied. The top surfaces of the basin vertical posts and bottom flanges on the fill section should be wiped down to remove any dirt or moisture. Sealer tape should be placed over the mounting hole centerline on the vertical posts. Apply two strips of sealer tape, one partially overlapping the other. The sealer tape should overlap on the corners as shown in Figure 20. Do not splice the sealer tape along the end flanges and preferably not on the side flanges if it can be avoided. **Always remove the paper backing from the sealer tape.**

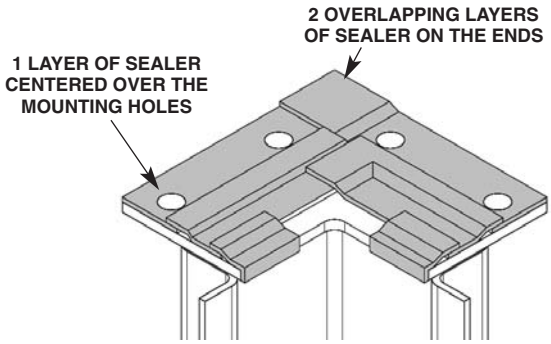


Figure 20 – Proper sealer tape application

Step #5

Rig Fan/Fill Section onto Basin section

All “U” bolts on the top section are to be used for lifting and final positioning of the unit as shown in Figure 21. The hook of the crane must be a minimum dimension of “H” above the top of the unit being lifted to prevent undue strain on the “U” bolts. See Table 3 for minimum “H” dimension.

The “U” bolts 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 13 for proper arrangement.)

The spreader beam must be a minimum dimension “H” above the top section being lifted to prevent undue strain on the lifting ears. See Table 3 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” in Step #1 for proper arrangement using the lifting ears instead of the fan section U-Bolts.)

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 22). 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.

Tower Length	Min. ‘H’ Dimension
9 Feet (2.7 meters)	9 Feet (2.7 meters)
12 Feet (3.6 meters)	12 Feet (3.6 meters)
14 Feet (4.3 meters)	14 Feet (4.3 meters)
18 Feet (5.5 meters)	17 Feet (5.2 meters)

Table 3 – Minimum ‘H’ Dimension for Fan/Fill Sections

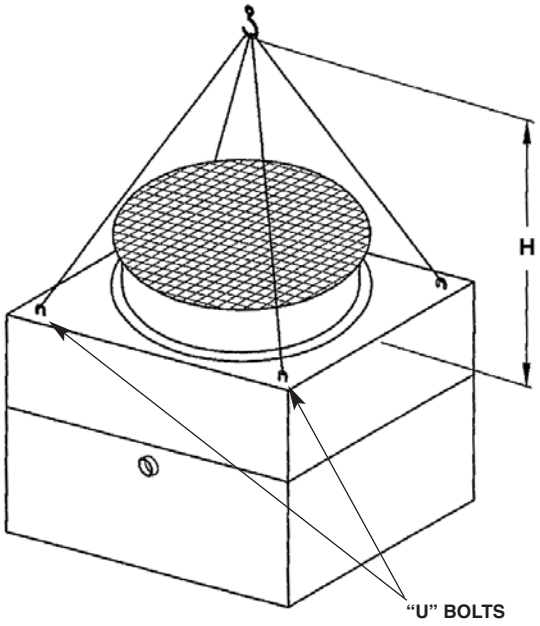


Figure 21 – Four point lift

Lower the fan/fill section to within several inches (centimeters) of the basin vertical posts, making sure the two sections do not touch and the sealer is not disturbed. Place drift pins (see Figure 22) in at least (3) of the corner mounting holes and gradually lower the fan/coil section into place using the drift pins to guide the section down accurately onto the mating vertical posts. Place washers, nuts and bolts in all four corner bolt holes. Then continue to install the rest of the washers, nuts and bolts on the remaining vertical posts.

NOTE: 5/16" stainless steel nuts, bolts and washers are used for stainless steel construction.

EXTENDED LIFTS

The preferred method for extended lifts is to use slings under the unit (See Figure 13). Spreader bars must always be used between the cables at the top of the section to prevent damage to the upper flanges or fan cylinders.

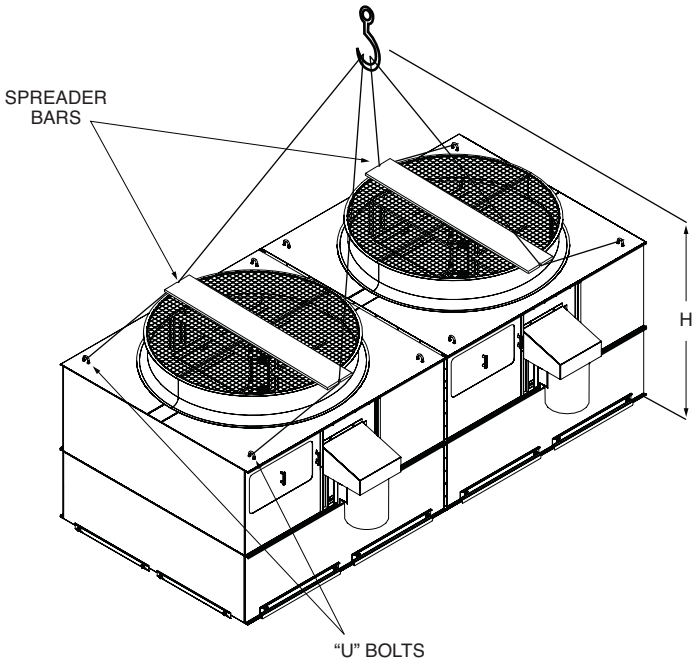


Figure 22 – Top Sections, Models 27-518-27-918

Step #6

Install WST Air Inlet Louvers

Air inlet louvers are shipped with an integral metal frame for ease of handling and maintenance. Install all louvers into place, ensuring that the drain holes are located on the **lower** frame, facing the **interior** of the basin. The louver retaining angles should then be installed and secured with plastic quick-release knobs. Finally, install plastic cap on wing-nut bolts, as shown in Figure 26, to prevent loss of the wing-nuts during maintenance.

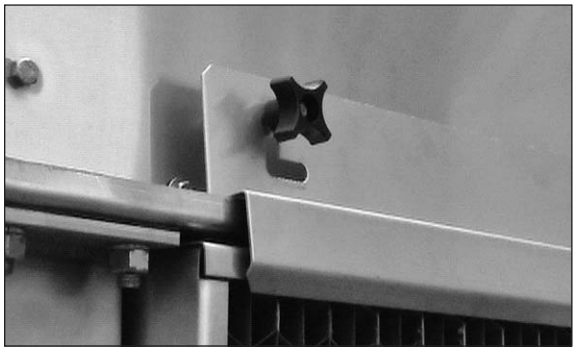


Figure 23 – Installed WST louver

Step #7
Install Motors and Covers

External Motor Installation

1. Study Figure 24 before installing the motor base on the unit.
2. Insert the lifting device into “U” bolt **A** on motor base **B**.
3. Lift the motor base and insert the pivot pin **C** down into hole **E** and pivot pin **F** into hole **D**.
4. Install washer and nut (do not overtighten) on pivot pins. Install jam nut on pivot pin **C**.
5. Insert “J” bolts **G** into holes **H**. Install flat washers and cotter pins. Place nuts and washers on threaded portion of “J” bolts. These will be behind the motor base installed in the next step.
6. Insert “J” bolts into holes **J** in the motor base. Install flat washers, lock washer and nuts. Remove lifting device from the “U” bolt on the motor base. Position motor base toward casing of unit for belt installation.
7. Install Powerband belt **K** (Figure 25) around fan sheave and motor sheave. Tighten belt by adjusting nuts on “J” bolts. Do not over tighten the belts. The center of the belt should deflect approximately 3/4” with moderate hand pressure.
8. Measure to see that the top and bottom of the motor base are the same distance out from the casing of the unit. This should ensure that the sheaves are properly aligned as they have been pre-set at the factory.
9. As a final check, lay a straight edge from sheave to sheave. There should be four point contact. (See Figure 26.) Adjust the position of the motor sheave as necessary.
10. To install Motor Guard **L**, match up hinges and install hinge pins **M**. (See Figure 25.)
11. Close Motor Guard and install (2) wing bolts **N**.

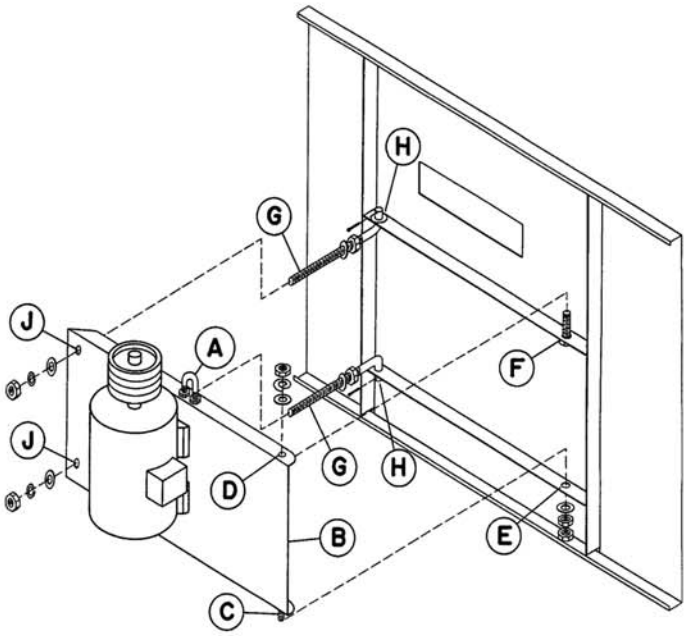


Figure 24 – External motor installation

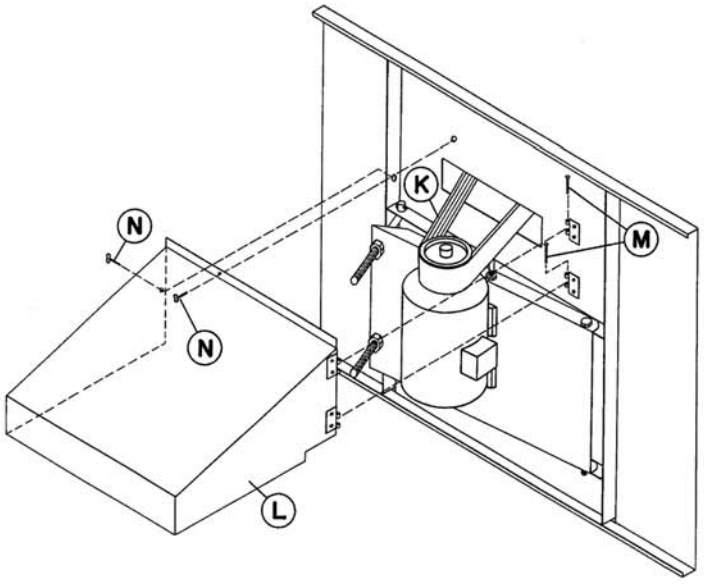


Figure 25 – Motor guard and powerband belt installation

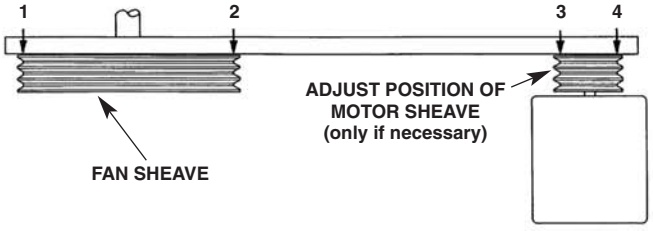


Figure 26 – Sheave alignment check

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 if applicable. Clean all debris from the basin prior to start-up. Close and secure all access doors.

Strainer

Check the strainers, if applicable, in the basin section to make certain they are in the proper location, along side of the anti-vortex hood (See Figure 27).

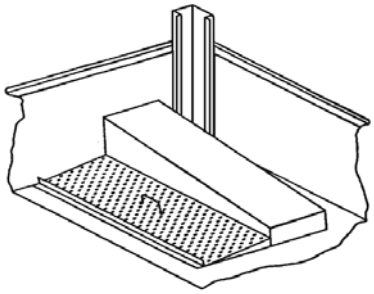


Figure 27 – Strainer Location

Screens

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

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

Float Valve Adjustment

The float valve is pre-set at the factory; however, adjustment should be checked after rigging. The float valve should be adjusted so that the centerline of the float is 11 inches (28 cm) from the basin bottom. Raise or lower the float by using the wing nuts on the vertical threaded rod only. Do not adjust the horizontal rod.

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. Bump start and check the fan(s) for proper rotation. Directional arrows are placed on the side of the fan cylinder.

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.

C-AT RIGGING BOX		50 Hz MOTORS				60 Hz MOTORS			
		Unit Length				Unit Length			
		9'	12'	14'	18'	9'	12'	14'	18'
Sump Box Mounting Hardware									
3/8" x 1"	Bolt, Lock Washer, Nut	12	12			12	12		
	Sealer Tape	1	1			1	1		
Field Joint									
1/2" x 1-1/4"	Bolt, (2) Washer, Lock Washer, Nut	20	20	20	32	20	20	20	32
	Sealer Tape	2	2	2	2	2	2	2	2
Pan - Pipe Braces									
1/2" x 1-1/4"	Bolt, Lock Washer, Nut		4	4	8		4	4	8
Float Rod Assembly									
	Assembly	1	1	1	1	1	1	1	1
Vertical Hardware									
1/2"	(2) Bolt, Washer, Large Washer,	12	12	12	20	12	12	12	20
	(2) Lock Washer, (2) Nut								
Louver Handles									
3/8"	Phenolic handles and End Caps	16	16	16	24	16	16	16	24
Center Support - 18 foot only									
5/16" x 1"	Bolt, (2) Washer, Lock Washer, Nut				8				8
Fan to Casing Section Joint									
5/16" x 1"	Tapper	45	60	70	90	45	60	70	90
	Sealer Tape	2	2	3	3	2	2	3	3

Table 4 - Rigging Hardware

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