Rigging and Installation Manual

LS SERIES
FORCED DRAFT EVAPORATIVE COOLING TOWERS

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Method of Shipment

Forced draft units are shipped either fully assembled (small units) or 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, fasteners and any other required materials, are packaged and placed inside the pan for shipment.

NOTE: All casing sections are factory inspected prior to shipment to verify proper fit for rigging. Please take extra care to handle and rig unit section per the instructions of this manual to avoid possible distortion and poor casing alignment. It is advisable to check each section upon receipt and during each lift to ensure that the factory alignment has not been altered. Should the field inspection indicate the section alignment ("square") has been altered, please contact the factory or your local EVAPCO representative for additional instructions to obtain proper section fit.

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 and fill. For extended storage beyond six months rotate the fan and fan motor shaft(s) monthly. Also, the fan shaft bearings should be purged and re-greased prior to start-up.

General

For extended lifts, or where hazards may exist, it is recommended that safety slings and spreaders be employed for safety. Refer to the extended lift information in this bulletin.

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 LS Series Cooling Towers are IBC 2006 compliant up to 1.0g (145 psf wind-load) with standard construction and up to 5.12g (145 psf wind-load) with additional structural modifications.

All items attached to the Evapco LS 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.

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 1. See Table 1 for Steel Support Dimensions.

Mounting holes, 3/4" in diameter, are located in the bottom flange for bolting to the structural steel. Refer to the recommended structural steel support drawing and certified print for exact bolt hole location. Bolt the bottom section to the steel support before rigging the top section.

Beams should be sized in accordance with accepted structural practices. Maximum deflection of the beam under the unit should be 1/360 of the unit length, not to exceed 1/2". 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.

NOTE: Consult IBC 2006 for required steel support layout and structural design.

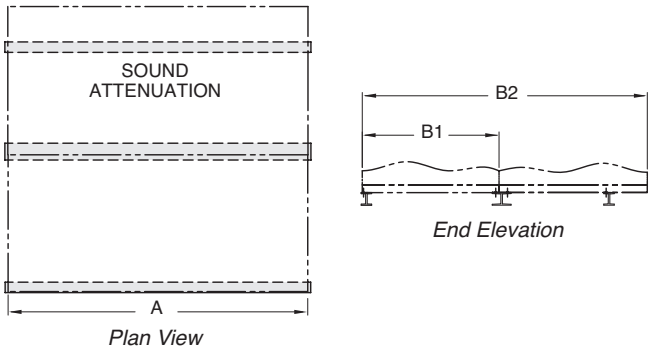

Figure 1 – Structural Steel Support

Table 1 – Steel Support Dimensions

Unit Footprint	B1 (Unit Only)	B2 Unit with Intake Attn.)	A
5' x 12'	5' 5-3/8"	11' 4-1/2"	11' 11-1/2"
5' x 18'	5' 5-3/8"	11' 4-1/2"	18' 1/8"
8P' x 12'	7' 10"	13' 9"	11' 11-3/4"
8P' x 18'	7' 10"	13' 9"	18' 0"
8P' x 24'	7' 10"	13' 9"	24' 1"
8P' x 36'	7' 10"	13' 9"	36' 2-1/4"
10' x 12'	9' 9-3/4"	15' 8-3/4"	11' 11-5/8"
10' x 18'	9' 9-3/4"	15' 8-3/4"	18' 1/4"
10' x 24'	9' 9-3/4"	15' 8-3/4"	24' 3/4"
10' x 36'	9' 9-3/4"	15' 8-3/4"	36' 1-7/8"

Rigging Pan/Fan Section

U-bolts or similar lifting points are located in the pan-fan section for lifting and final positioning purposes as shown below in Figures 2 and 3. Units with lengths up to 18' have 4 total lift points. Units with lengths of 24' and 36' have either 6 or 8 lift points.
NOTE: Use all of the U-bolts or lift points provided for lifting.

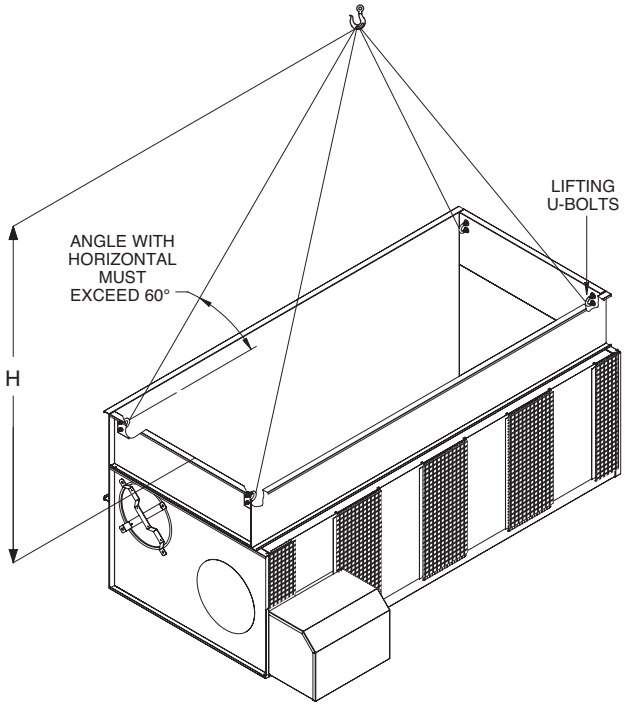

Figure 2 – Pan/Fan Section
(up to 18' Long)

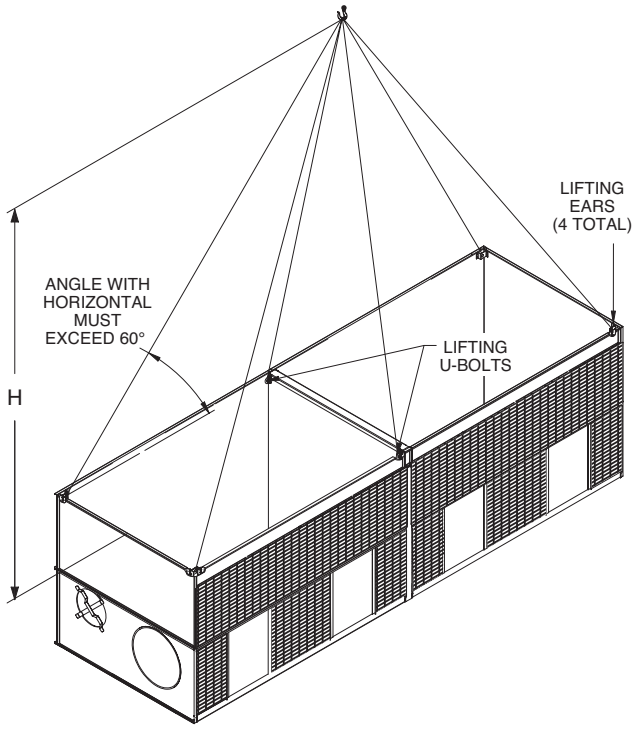

Figure 3 – Pan/Fan Section
(24' and 36' Long - 6 lift points shown)

The recommended method for extended lifts is to use slings under the unit as shown in Figures 4 and 5. Spreader bars should always be used between the cables at the top of the section to prevent damage to the upper flanges. **NOTE: The U-bolts or other lifting points should be used for final positioning only and for lifting where no danger exists. If they are used for extended lifts, safety slings and spreader bars should be provided under the sections as shown.**

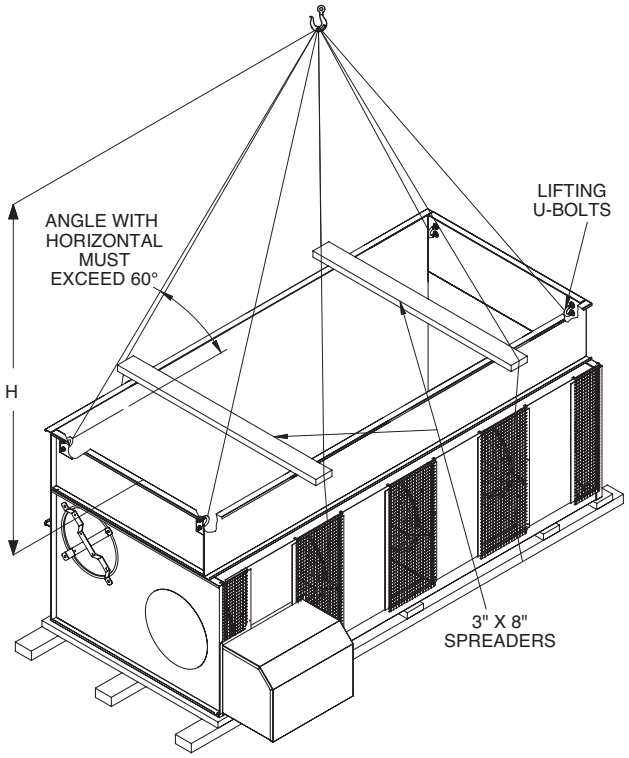

Figure 4 – Extended Lift Pan/Fan Section
(up to 18' Long)

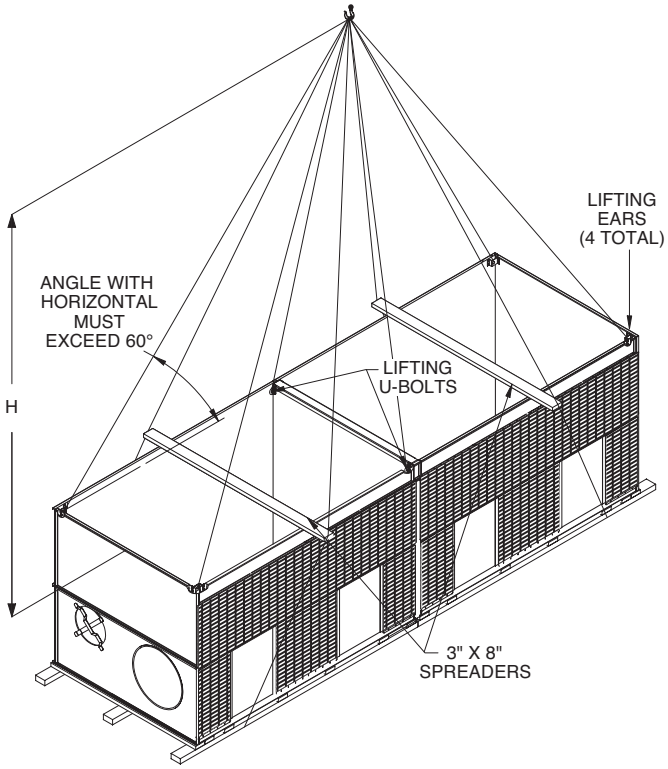

Figure 5 – Extended Lift Pan/Fan Section
(24' and 36' Long - 6 lift points shown)

See Table 2 for the minimum "H" dimensions for rigging the pan-fan assembly for both standard and extended lifts.

Table 2 – Minimum "H" Dimension for Pan/Fan Rigging

Unit Footprint	Minimum "H"
4' x 6'	8'
4' x 9'	10'
4' x 12'	15'
4' x 18'	19'
5' x 12'	15'
5' x 18'	19'
8P' x 12'	15'

Unit Footprint	Minimum "H"
8P' x 18'	19'
8P' x 24'	25'
8P' x 36'	38'
10' x 12'	15'
10' x 18'	19'
10' x 24'	25'
10' x 36'	38'

Applying Sealer Tape

Once the bottom section has been set on the supporting steel and bolted in place, wipe the top flanges to remove any dirt or moisture. Place sealer tape 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.**

For units which have two fill sections, sealer tape must be applied to all internal flanges (Figure 7).

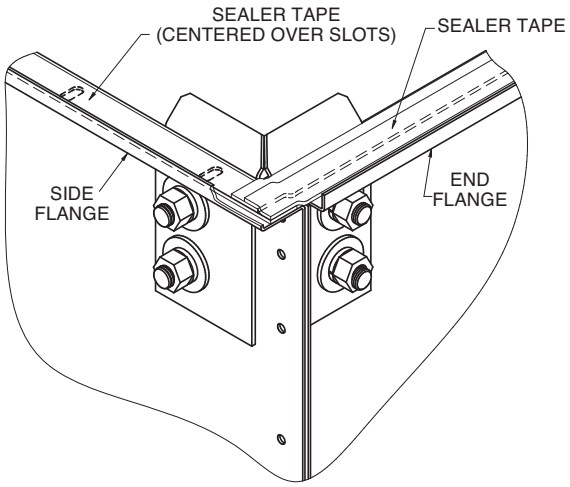

Figure 6 – Proper Sealer Tape Application

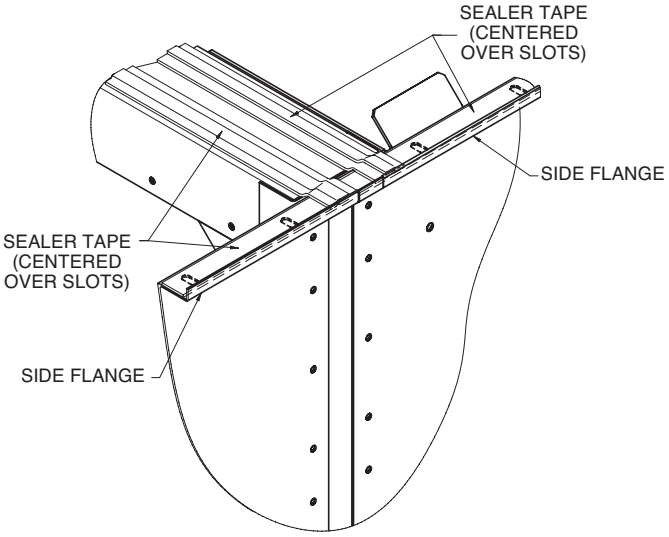

Figure 7 – Sealer Detail for Center Joint of Units with Two of More Casing or Fill Sections

Rigging the Fill Section

U-bolts or lift points are provided in the four corners of the fill section for lifting and final positioning (Figure 8). Refer to the certified drawing for the fill section weight. **NOTE: Use all of the U-bolts or lift points provided for lifting.**

The end and center eliminator sections should be removed before lifting from the U-bolts or lift points. For proper installation of the eliminator sections, refer to the “Eliminators” section in this bulletin.

Caution: On units shipped as two separate sections, do not assemble sections and attempt to lift the entire unit. The U-bolts and lift points are designed to carry only the weight of their individual section.

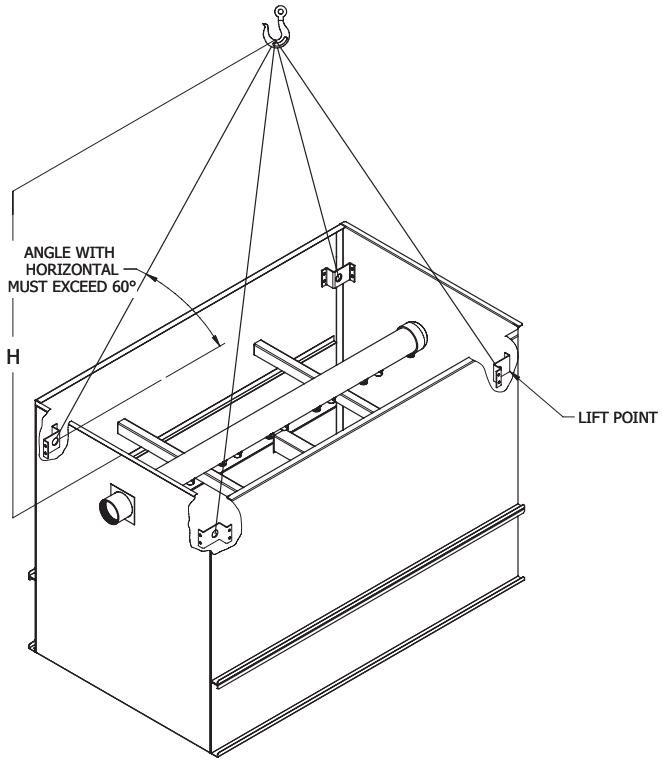

Figure 8 – Small Fill Section

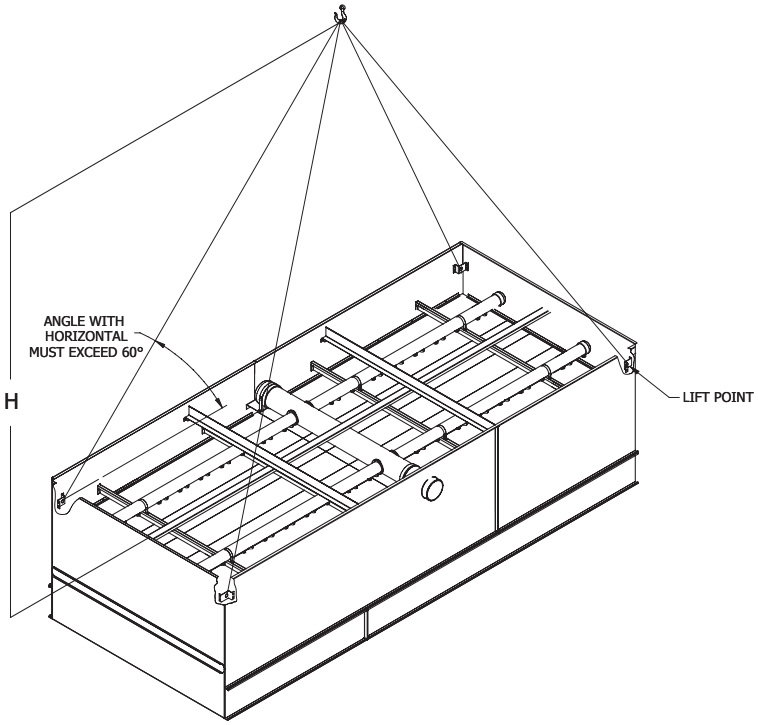

Figure 9 – Large Fill Section

The recommended method for extended lifts is to use slings under the unit as shown in Figures 10 and 11. Spreader bars should always be used between the cables at the top of the section to prevent damage to the upper flanges.

NOTE: The U-bolts or other lifting points should be used for final positioning only and for lifting where no danger exists. If they are used for extended lifts, safety slings and spreader bars should be provided under the sections as shown.

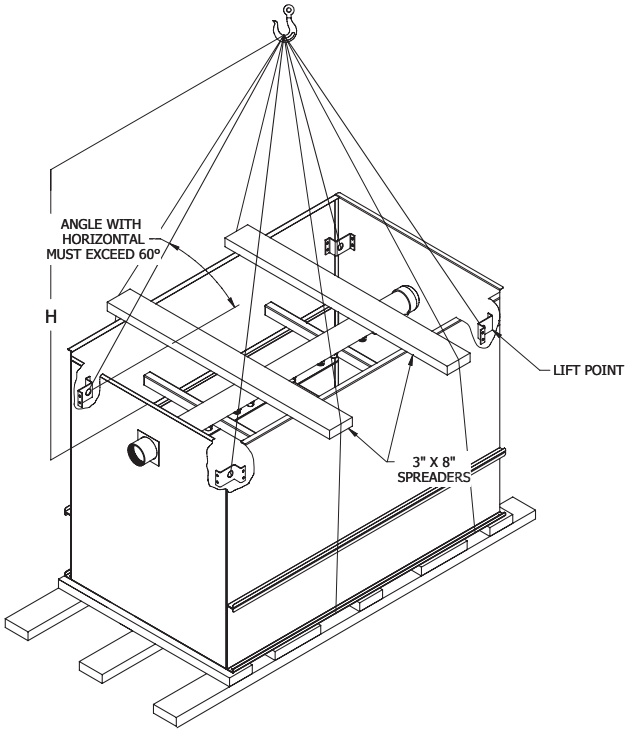

Figure 10 – Extended Lift Small Fill Section

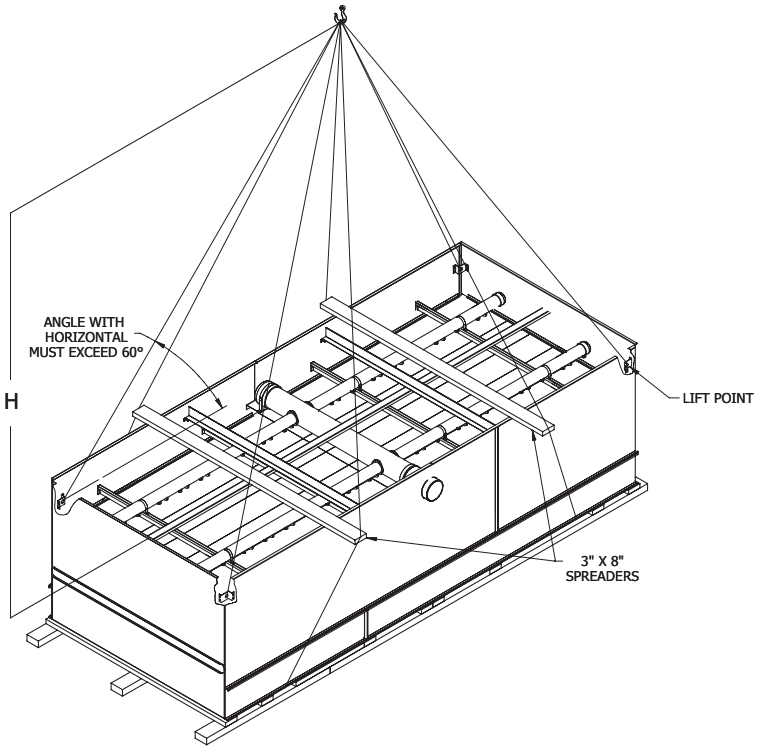

Figure 11 – Extended Lift Large Fill Section

See Table 3 for the minimum "H" dimensions for rigging the fill section for both standard and extended lifts.

Table 3 – Minimum "H" Dimension for Fill Section Rigging

Unit Footprint	Minimum "H"
4' x 6'	8'
4' x 9'	10'
4' x 12'	15'
4' x 18'	19'
5' x 12'	15'
5' x 18'	19'
8P' x 12'	15'
8P' x 18'	19'
8P' x 24'	15'
8P' x 36'	19'
10' x 12'	15'
10' x 18'	19'
10' x 24'	15'
10' x 36'	19'

Assembly of the Fill Section to the Pan-Fan Section

Before assembling the fill section to the pan/fan section, remove any loose parts shipped in the pan. On small centrifugal fan units, the fan motor guard is normally shipped in the basin to avoid damage. It should be attached to the unit with the self-tapping screws provided. On double fan sided centrifugal units, the fan motor guards are shipped in a separate crate with the motors, see the "Motor Installation" section in this bulletin.

Wipe the flanges on the bottom of the fill section. Check to see that the water distribution connection on the fill section is in the correct position relative to the pan-fan section (see certified print). Confirm that sealer tape has been applied to the top of the pan-fan section as shown in Figures 6 and 7.

Lower the fill section to within several inches of the pan-fan section making sure the two sections do not touch and the sealer tape is not disturbed. Place drift pins (see Figure 12) in at least 3 of the corner mounting holes and gradually lower the fill section into place using the drift pins to guide the section down accurately onto the mating flange. On 18 foot and 24 foot long sections, drift pins should be used midway along the sides as well.

Place fasteners in all four corner bolt holes. Then continue to install the rest of the fasteners working from the corners toward the center, using drift pins to align the holes. A fastener must be installed in every hole on the side flanges although none are required on the end flanges. For units with two fill sections, mount the first as described, and then follow the same procedure for the second section.

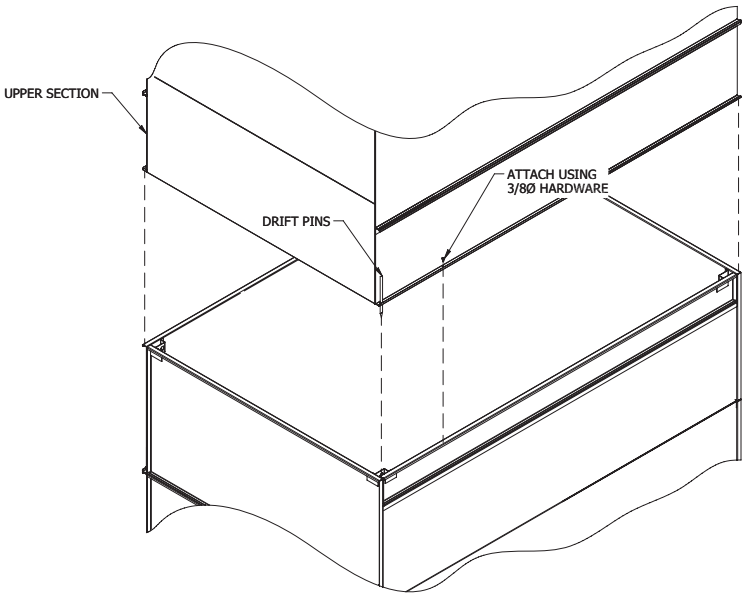

Figure 12 – Mating Fill Section to Pan-Fan Section

Rigging Complete Units

Units that are shipped with the pan-fan and fill sections assembled can be lifted into final position on the structural steel as a complete unit. U-bolts or lift points are provided in the fill section below the eliminators for lifting and final positioning (Figure 13).
NOTE: Use all of the U-bolts or lift points provided for lifting.

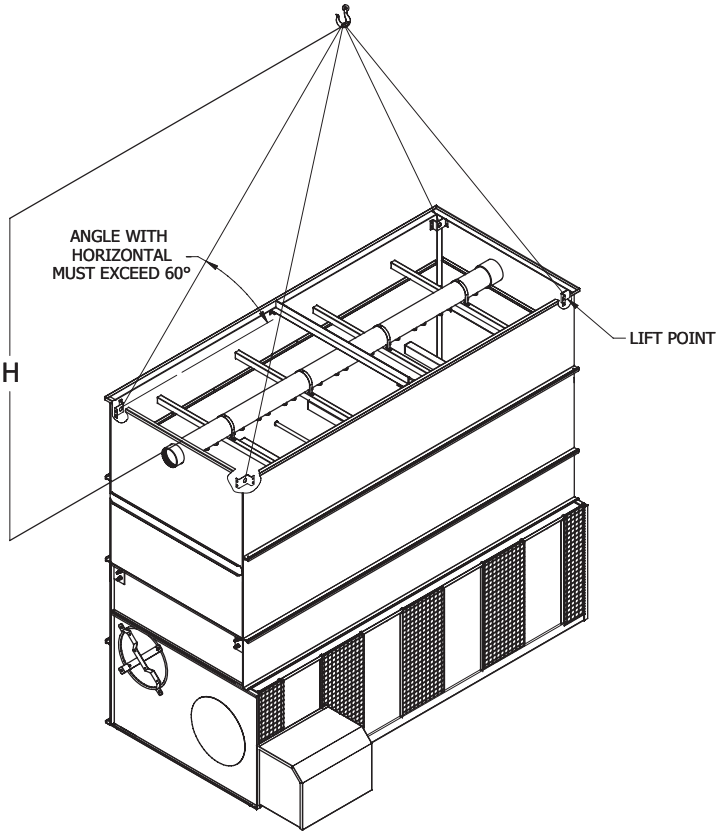

Figure 13 – Complete 4' and 5' Wide Units

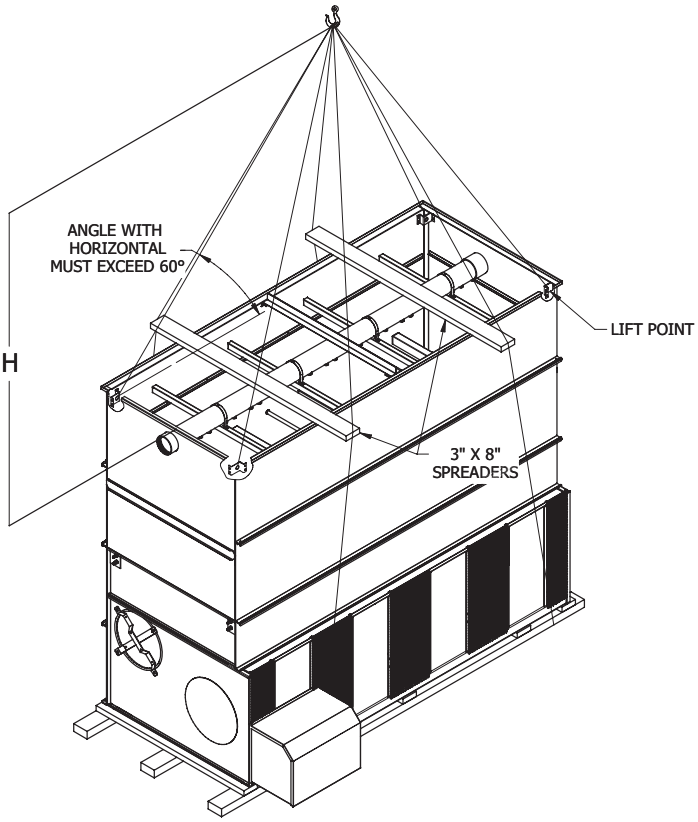

Figure 14 – Extended Lift Complete Unit

The recommended method for extended lifts is to use slings under the unit as shown in Figure 14. Spreader bars should always be used between the cables at the top of the section to prevent damage to the upper flanges.

NOTE: The U-bolts or other lifting points should be used for final positioning only and for lifting where no danger exists. If they are used for extended lifts, safety slings and spreader bars should be provided under the sections as shown.

See Table 4 for the minimum "H" dimensions for rigging the entire unit for both standard and extended lifts.

Table 4 – Minimum "H" Dimension for Complete Unit Rigging

Unit Footprint	Minimum "H"
4' x 6'	8'
4' x 9'	10'
4' x 12'	15'
4' x 18'	19'
5' x 12'	15'
5' x 18'	19'
8P' x 12'	15'

Unit Footprint	Minimum "H"
8P' x 18'	19'
8P' x 24'	15'
8P' x 36'	19'
10' x 12'	15'
10' x 18'	19'
10' x 24'	15'
10' x 36'	19'

Optional Tapered or Straight-Sided Hood Section

Some Units may be supplied with an optional discharge hood section. This section will ship from the factory as a separate item or mounted on top of either the pan-fan section or fill section to reduce freight charges. Each hood section is equipped with U-bolts located at the four corners for lifting and final positioning (Figure 15). Always use safety slings for extended lifts or where any hazard exists.

NOTE: When combined with other sections, the hood must be removed prior to any lift. In all cases the hood section must be rigged as a separate part.

Once the fill section has been secured to the pan-fan section, wipe the top flanges to remove any dirt or moisture. Place sealer tape over the mounting hole centerline on the side flanges. Apply two strips of sealer tape, one partially overlapping the other, on the end flanges as shown in Figures 6 and 7. Remove any shipping blocks or other obstructions. Lower the hood onto the top flange of the fill section.

Install the fasteners in all four corners as shown in Figure 15. For 18 foot long hoods, two additional fasteners are provided and are to be fastened in the middle of each side. **NOTE: Always lift the hood separately and follow the rigging sequence shown.**

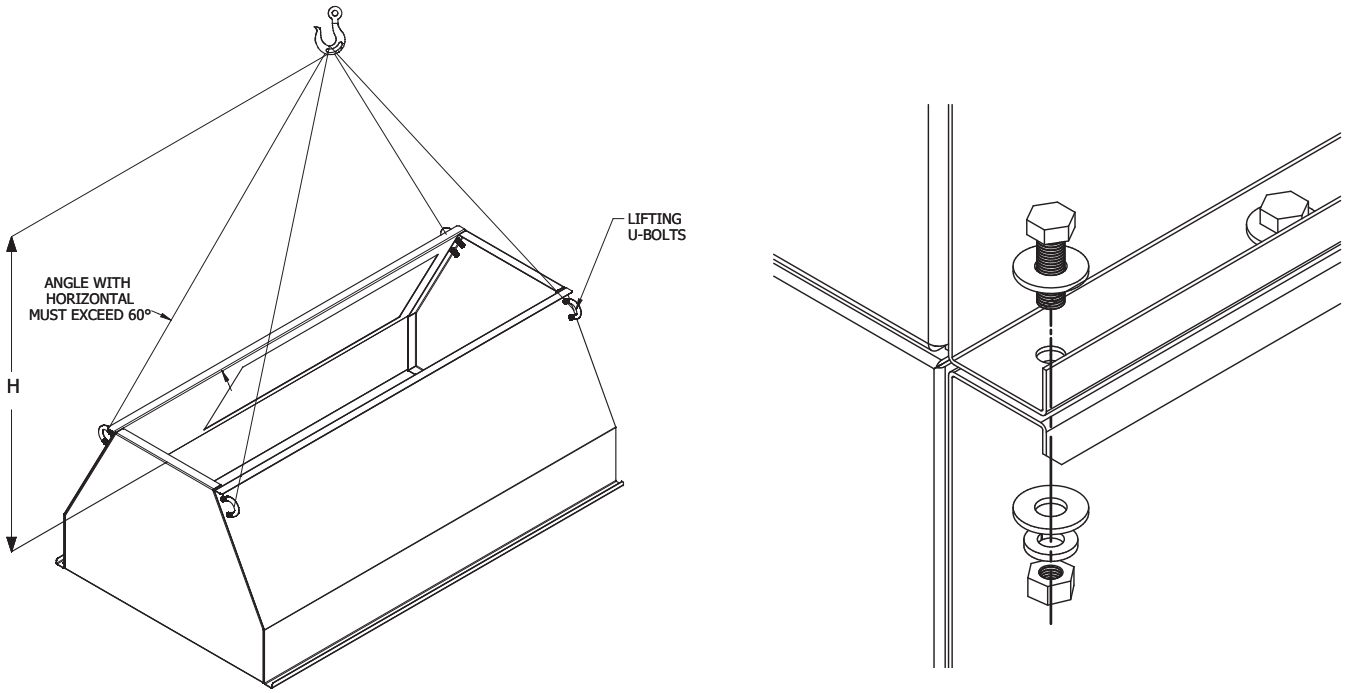

Figure 15 – Discharge Hood Rigging and Assembly (Tapered Hood Shown)

See Table 5 for the minimum "H" dimensions for rigging the discharge hood for both standard and extended lifts.

Table 5 – Minimum "H" Dimension
for Rigging Discharge Hoods and Discharge Attenuation

Unit Footprint	Minimum "H"
4' x 6'	8'
4' x 9'	10'
4' x 12'	15'
4' x 18'	19'
5' x 12'	15'
5' x 18'	19'
8P' x 12'	15'

Unit Footprint	Minimum "H"
8P' x 18'	19'
8P' x 24'	15'
8P' x 36'	19'
10' x 12'	15'
10' x 18'	19'
10' x 24'	15'
10' x 36'	19'

Optional Discharge Attenuation Section

Some units may be supplied with an optional discharge attenuation section. This section will ship from the factory as a separate item or mounted on top of either the pan-fan section or fill section to reduce freight charges. Each discharge attenuation section is equipped with U-bolts located at the four corners for lifting and final positioning (Figure 16). Always use safety slings for extended lifts or where any hazard exists.

NOTE: When combined with other sections, the attenuation must be removed prior to any lift. In all cases the hood section must be rigged as a separate part.

Once the fill section has been secured to the pan-fan section, wipe the top flanges to remove any dirt or moisture. Place sealer tape over the mounting hole centerline on the side flanges. Apply two strips of sealer tape, one partially overlapping the other, on the end flanges as shown in Figures 6 and 7.

Lower the attenuation section to within several inches of the fill section making sure the two sections do not touch and the sealer tape is not disturbed. Place drift pins (see Figure 17) in at least 3 of the corner mounting holes and gradually lower the fill section into place using the drift pins to guide the section down accurately onto the mating flange. On 18 foot and 24 foot long sections, drift pins should be used midway along the sides as well.

Place fasteners in all four corner bolt holes. Then continue to install the rest of the fasteners working from the corners toward the center, using drift pins to align the holes. A fastener must be installed in every hole on the side flanges although none are required on the end flanges. For units with two attenuation sections, mount the first as described, and then follow the same procedure for the second section.

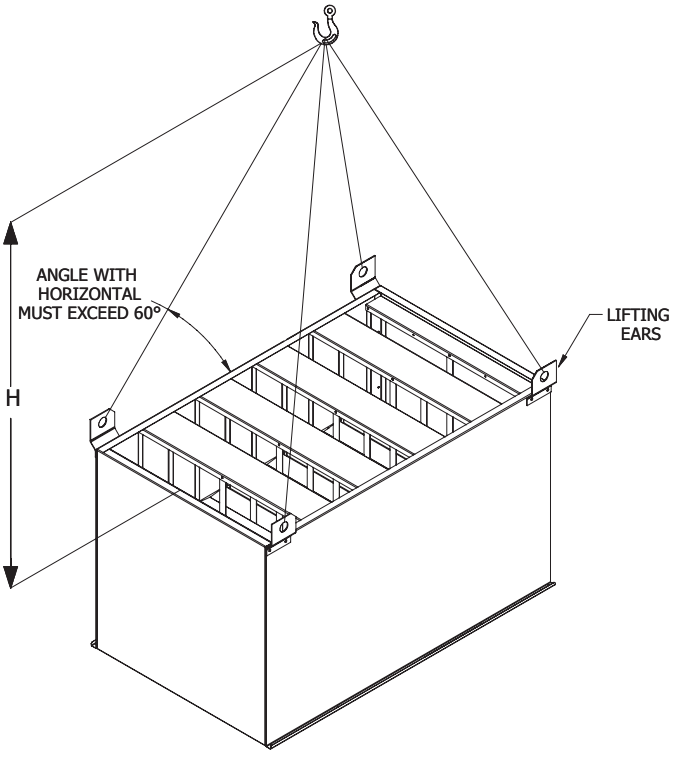

Figure 16 – Discharge Attenuator Rigging

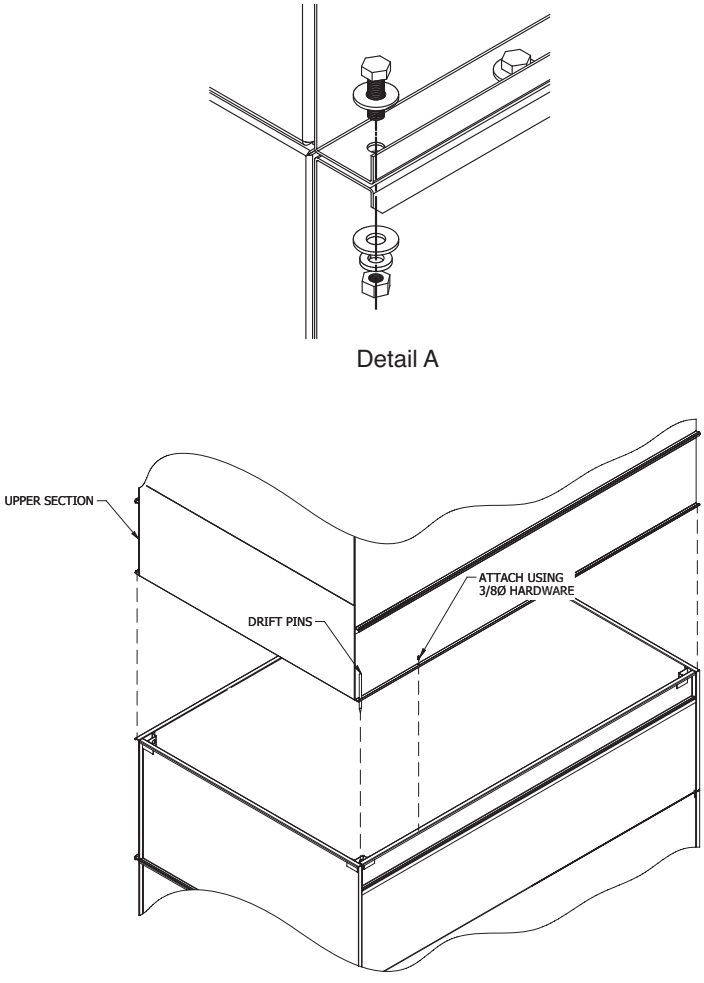

Figure 17 – Discharge Attenuator Installation Instructions

Optional Intake Attenuation

Some units may be supplied with an optional intake attenuation section. This section will ship from the factory as a separate item or mounted on top of either the pan-fan section or fill section to reduce freight charges. Each intake attenuation section is equipped with U-bolts located at the four corners for lifting and final positioning (Figure 18). Always use safety slings for extended lifts or where any hazard exists.

NOTE: When combined with other sections, the attenuation must be removed prior to any lift. In all cases the hood section must be rigged as a separate part.

Move the attenuation section to within several inches of the fan intake section. Place drift pins (see Figure 17) in at least 3 of the corner mounting holes and gradually move the fill section into place using the drift pins to guide the section accurately onto the mating flange. On 18 foot and 24 foot long sections, drift pins should be used midway along the sides as well.

Table 6 – Minimum "H" Dimension for Rigging Inlet Attenuation

Unit Footprint	Minimum "H"
4' x 6'	8'
4' x 9'	10'
4' x 12'	15'
4' x 18'	19'
5' x 12'	15'
5' x 18'	19'
8P' x 12'	15'

Unit Footprint	Minimum "H"
8P' x 18'	19'
8P' x 24'	15'
8P' x 36'	19'
10' x 12'	15'
10' x 18'	19'
10' x 24'	15'
10' x 36'	19'

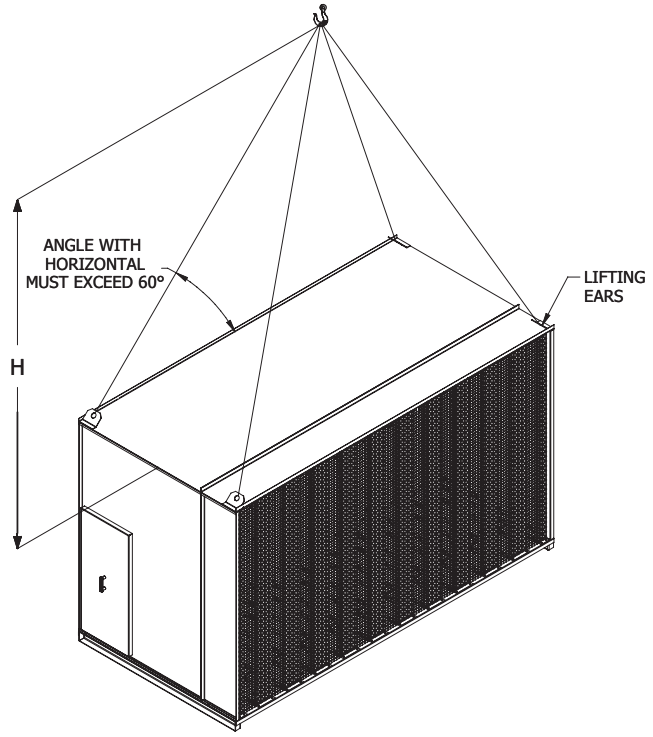

Figure 18 – Intake Attenuator Rigging

Motor Installation (4' and 5' wide models)

1. Study Figure 19 before installing the motor bases on the unit.
2. Insert the lifting device into the lifting hole A provided in the motor base.
3. Lift the motor/motor base assembly and align holes B to B1 and C to C1. Insert the 1/2 inch diameter pivot bolts with flat washer D. Install flat washer, nut and jam nut E on the pivot bolt. DO NOT OVERTIGHTEN.
4. Insert the J-bolts F into holes G. Install flat washers and cotter pins H. Place nuts, lock washers, and flat washers J on the threaded portion of J-bolts. Their final location will be behind the motor base installed next.
5. Insert the J-bolts into the holes K in the motor base. Install flat washers, lock washers, and nuts L. Remove the lifting device from the motor base and position motor base toward the unit for belt installation.
6. Install the belts M around the fan sheave and motor sheave (Figure 20). Tighten belts by adjusting nuts on J-bolts. Do not over tension the belts. When the belts are properly adjusted, the deflection at the center of the belt should be approximately 1/2" with moderate hand pressure.
7. Measure the distance from the motor base to the J-bolt mounting angles to ensure that both sides of the base are located the same distance from the unit. This should ensure that the sheaves are properly aligned since they were pre-set at the factory.
8. As a final check, lay a straight edge from sheave to sheave (Figure 21). There should be 4 point contact. Adjust the position of the motor sheave if necessary.
9. To install the motor guard N, line up the holes and fasten with the self-tapping screws P (Figure 20). Check to ensure that the motor guard does not make contact with the drive sheave or belts.

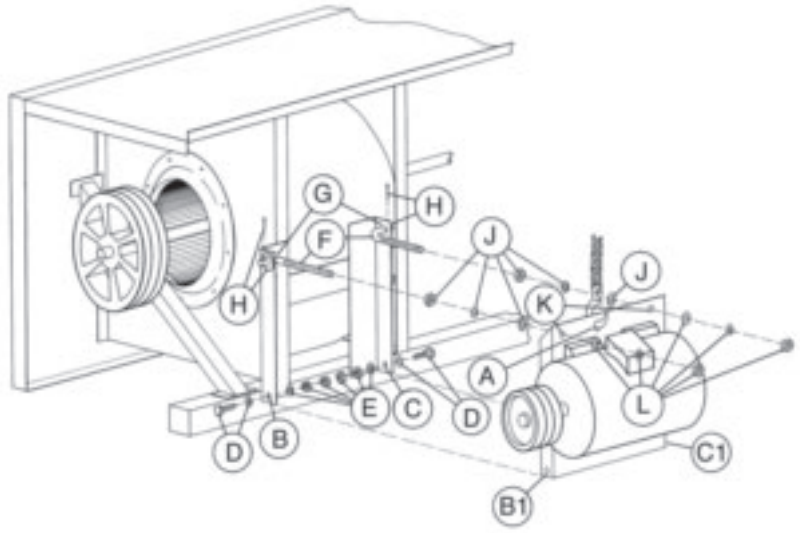

Figure 19 – Motor Installation

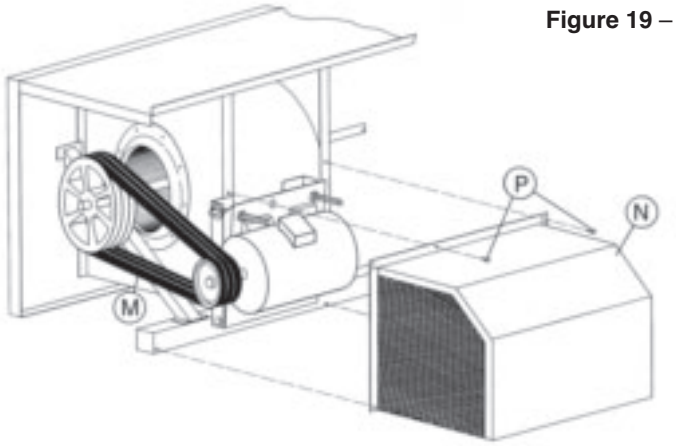

Figure 20 – Motor Guard and Powerband Belt Installation

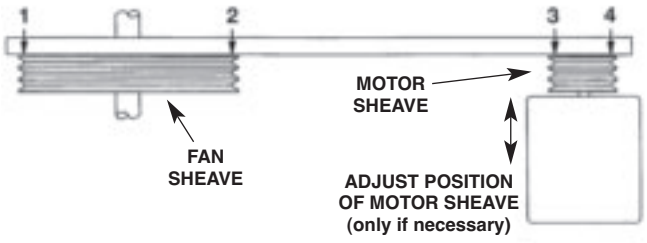

Figure 21 – Sheave Alignment Check

Final Assembly and Start-up Details

Shipping Materials - Remove any wood chocks, spare parts, or miscellaneous items that have been placed inside the unit for shipping purposes. Clean all debris from the basin.

Strainer - Check the strainer in the basin to ensure that it is in its proper location over the pump suction.

Screens - Protective air inlet screens are provided across the front of the fan section of all models. Screens are not provided on the bottom of the fan section since most of the units are mounted on steel beams, either on the roof or at ground level. If units are installed in an elevated position, bottom screens are recommended for safety protection and should be provided by the installing contractor.

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 center of the float is 1" below the center of the overflow connections when the valve is in the fully closed position. Raise or lower the float by using the wing nuts on the vertical threaded rod. Do not adjust the horizontal rod. During normal operation, the water level will drop 3" to 4" below the overflow in condensers and coolers; and to approximately 5" to 6" below the overflow in cooling towers. See Table 6 for normal operating level for the LS style units. **Note: The float valve has an available operating pressure between 20 and 50 psi.**

Fan Rotation - Bump start and check the fans for proper rotation. Directional arrows are placed on the outside of centrifugal fan housings or on the inside of axial fan cylinders.

Table 6 – Minimum Operating Level

Unit Footprint	Minimum Level (inches)
4' x 6'	11"
4' x 9'	11"
4' x 12'	11"
4' x 18'	11"
5' x 12'	11"
5' x 18'	11"
8P' x 12'	12"

Unit Footprint	Minimum Level (inches)
8P' x 18'	15"
8P' x 24'	12"
8P' x 36'	15"
10' x 12'	12"
10' x 18'	15"
10' x 24'	12"
10' x 36'	15"

Freeze Protection

The simplest and most effective way of keeping the recirculated water from freezing is to use a remote sump. With a remote sump, when the recirculating water pump is shut off all recirculating water drains back to the sump.

If a remote sump is not being used, pan heaters are available. However, the basin heater will not prevent the external piping from freezing. For installations where water will be left in the basin during freezing conditions, the make-up water supply, and overflow and drain lines must be heat traced and insulated to protect them from damage. All other connections or accessories at or below the water level must also be heat traced and insulated.

Water Treatment

Proper water treatment is an essential part of the maintenance required for evaporative cooling equipment. Galvanized equipment should be passivated prior to equipment startup to avoid the formation of white rust. For more information on passivation and white rust, please download a copy of EVAPCO's Engineering Bulletin 36 at www.evapco.com. The spray water and the fluid inside the heat transfer coil should both be maintained with a water treatment program to ensure efficient system operation while maximizing the equipment's service life. For more information on recommended water chemistry for EVAPCO equipment, see the Operation and Maintenance Instructions for this equipment.

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 operation and maintenance instructions supplied with the unit for proper maintenance procedures.

Accessory Location Checklist

Accessories can ship in a variety of locations depending on the type of accessory, the size of the unit and the accessories purchased with the unit. See Table 10 for a guide to accessory location.

Table 10 – Unit Accessory Shipping Location

Unit Accessories	Shipping Location
Aluminum Ladder	Shipping Location is Unit and Accessory Dependent - If Space is Available: Strapped Inside Unit Basin - If No Space is Available: Shipped Separately on Truck Bed
Discharge Attenuation	Shipping Location is Unit Dependent - 4' Wide Units: Shipped Separately on Truck Bed - 8' Wide Units and Larger: Mounted Loosely Bolted on Basin
Discharge Hood with Dampers	Shipping Location is Unit Dependent - 4' Wide Units: Shipped Separately on Truck Bed - 8' Wide Units and Larger: Mounted Loosely Bolted on Basin
Electric Basin Heater	Shipping Location is Unit Dependent - End Mounted Heater: Installed in Unit Basin - Side Mounted Heater: Strapped Inside Unit Basin
Electric Basin Heater Control Panel	Shipping Location is Dependent on Control Panel Size - If Space is Available: Mounted on Unit Basin - If No Space is Available: Boxed, Wrapped and Wire Tied Inside Unit Basin
Electric Basin Heater Low Water Cutout	Shipped in Rigging Box Strapped Inside Unit Basin
Electric Basin Heater Thermostat	Shipping Location is Unit Dependent - End Mounted Thermostat: Mounted on Unit Basin - Side Mounted Thermostat: Shipped in Rigging Box
Electronic Water Level Control Probes	Mounted in PVC standpipe
Electronic Water Level Control	PVC Standpipe Strapped Inside Unit Basin
External Service Platform with Ladder	Shipping Location is Unit and Accessory Dependent - If Space is Available: Strapped Inside Unit Basin - If No Space is Available: Crated and Shipped Separately on Truck Bed
Fan Screens (If not mounted)	Shipping Location is Unit and Accessory Dependent - If Space is Available: Strapped Inside Unit Basin - If No Space is Available: Crated and Shipped Separately on Truck Bed
Fan Screen Supports (If not mounted)	- If Space is Available: Strapped Inside Unit Basin - If No Space is Available: Crated and Shipped Separately on Truck Bed
Flume Plate	Mounted to Flume Box
Hot Water or Steam Coil	Installed in Unit Basin
Inlet Attenuation	Shipping Location is Unit Dependent

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