

Installation Instruction

[Transport](#) | [Installation](#) | [Operation](#) | [Maintenance](#)



Product line:	Evaporative Condensers
Series description:	Application Specific Condensers and Fluid Coolers
Series:	ECOSS 2.0

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1. Warranty statement

The supplier warrants the product to be free from defects in workmanship and materials under normal usage for the period outlined below. The supplier further warrants against defects in workmanship and materials of the product for a period of 24 months from the date of purchase (the "Warranty Period"), provided that the product is correctly installed and operated within the recommended limits of the manufacturer's technical documentation.

The supplier at its option shall repair or replace, free of charge to the purchaser, all components of the product which are or become defective during the Warranty Period as a result of defects in design, workmanship or materials, ordinary wear and tear excluded, provided, however, that:

- The product is applied correctly
- All operating and installation instructions for the product are complied with
- System component and piping design is in accordance with good refrigeration practice
- Nitrogen or an inert gas is introduced into the piping during the brazing of the piping installation

This warranty shall not include ordinary maintenance or cleaning of the product, or defects in the installation of the product. This warranty also does not cover physical damage to the product during transit, after purchase of the product but before installation.

The purchaser must request repair or replacement of the defective component through a written notice to the supplier, and must provide the purchaser with the time and opportunity to make such repair or replacement. Otherwise, the supplier will be freed from liability for the defect.

Any transport and exchange costs for the repair or replacement shall be borne by the purchaser. The supplier shall also not be liable for costs incurred in dismantling or fitting replacement parts or for any independent inspection undertaken by the purchaser. The purchaser shall return any allegedly defective goods, postage or freight paid, to the supplier at the address below. Upon receipt of the goods and inspection there of the supplier shall repair or replace, at the supplier's discretion, the defective components and shall return the same to the purchaser, return postage and freight paid. This shall constitute full compliance of the supplier's warranty obligations hereunder.

The seller accepts no liability for the direct or indirect consequences of any modifications of or repairs to the product made out by the purchaser or by a third party without the prior consent of the supplier.

This warranty applies only to the repair or replacement of components of the product and expressly excludes responsibility for damage and consequential damages not occurring to the product itself.

This warranty is the purchaser's exclusive remedy. The supplier expressly acknowledges that it shall not be liable to the purchaser or any client of the purchaser for any direct or indirect damages, injury to persons or property or any consequential damage or loss of profits arising from defective goods or workmanship or from any other cause whatsoever.

To obtain warranty service or to ask any questions regarding the foregoing, please contact our office:

Güntner US LLC
3601 Algonquin Road Suite 925
Rolling Meadows, Illinois 60008
847- 781-0900 Tel
847-781-0901 Fax
dq-us-service@guentner.com or sales.us@Guntner.com
Online support: <https://www.guntner-solutions.us/contact>

2 Safety information

2.1 Safety symbols

⚠ WARNING
Addresses a hazardous situation which, if encountered, will result in death or serious injury.
⚠ WARNING
Addresses a hazardous situation which, if encountered, might result in death or serious injury.
⚠ WARNING
Dangerous situation that could cause slight to moderate injury if it is not avoided.
NOTICE
Indicates instructions that pertain to safe equipment operation. Failure to comply with these instructions could result in damage to the equipment.

2.2 Safety instructions

- Installation and maintenance must only be carried out by qualified personnel who are familiar with this type of equipment.
- Always wear safety glasses, gloves and head protection when working on the equipment.
- Avoid contact with sharp edges as these can cause painful lacerations.
- All units must be properly evacuated prior to charging the system.
- Prior to any work being undertaken, verify that the power is switched off and that the unit is properly disconnected, locked out and tagged out!
- Never apply heat to a sealed refrigeration system.
- Keep hands away from fans when the unit is running.
- Ensure all mounting bolts are tight and are the correct length for the specific application.
- Do not remove any of the safety labels from the unit.
- Maintain all safety labels on the unit in good condition. If required replace with new.

2.3 Refrigerant / Fluid safety

⚠ WARNING
Although halocarbon refrigerants are classified as safe refrigerants, certain precautions must be observed when handling them. Refrigerants can be harmful if inhaled. When released to the atmosphere in the liquid state refrigerants evaporate rapidly, freezing anything, they contact. Refrigerants must be used and recovered responsibly.
Failure to follow this warning may result in personal injury or death.

⚠ WARNING**Anhydrous Ammonia (NH₃):**

Specific precaution must be adhered to when people are working with or are exposed to Anhydrous Ammonia.

Ammonia is considered a high health hazard because it is corrosive to the skin, eyes, and lungs. Exposure to 300 parts per million (ppm) is life threatening. Ammonia is also flammable at concentrations of approximately 15% to 28% by volume in air. When mixed with lubricating oils, its flammable concentration range is increased. It can explode if released in an enclosed space with a source of ignition present, or if a vessel containing anhydrous ammonia is exposed to fire.

Personal protective equipment must be worn at all times when working with Ammonia. For systems that have an operating charge greater than 10,000 lbs a process safety management program is mandatory. More information on this topic is available from OSHA.

Failure to follow this warning may result in personal injury or death.

3 General information

ECOSS units are designed to provide optimum efficiency and an extended life when properly installed, operated and maintained. It is therefore highly recommended that a comprehensive maintenance schedule be developed and undertaken on a regular pre-determined basis. This manual will assist the owner – operator in developing such a schedule.

This equipment is relatively complicated and the installation, operation, maintenance and servicing should only be carried out by suitable individuals who are qualified to carry out these functions. These individuals shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the function(s).

NOTICE

The type of refrigerant must comply with what is indicated on the submittal drawings and / or unit's nameplate. Design operating pressures, as indicated on the nameplate, must never be exceeded!

NOTICE

Evaporative condensers and fluid coolers and all piping systems must be correctly evacuated prior to charging the system with refrigerant, to ensure the complete removal of moisture and non – condensable from the entire refrigerant circuit.

NOTICE

For evaporative condenser and fluid coolers installations that will be installed at or near coastal areas please speak to your Güntner representative to confirm the material combination compatibility.

NOTICE

In locations where the fluid within the evaporative fluid cooler could possibly freeze due to ambient temperatures dropping below freezing, the fluid should be drained from the coil when the ambient temperature is at or below 40°F.

⚠ WARNING

Failure to comply with any of these requirements could result in serious damage to the equipment and / or the property where it is installed, as well as personal injury and / or death to themselves and / or people at the specific location.

3.1 Product lines

This manual is relevant for the following product lines:

GCHE ... I Evaporative Condenser – Induced Draft
GFHE ... I Evaporative Fluid Cooler – Induced Draft

4. Evaporative condenser / Fluid cooler terminologies

The following descriptions are provided to ensure all persons working with the ECOSS equipment are familiar with the terminologies used.

- **Basin:** An assembly located at the base of the unit designed to hold a volume of recirculated water while providing connections for the water recirculation pump, drain, and overflow. It is also known as a pan or sump.
- **Water Recirculation Pump:** Closed coupled, centrifugal type impeller, with mechanical seal required to circulate a specified flow rate of water over the heat exchange coil(s).
- **Basin Section (Induced Draft Unit):** An assembly comprised of the basin, support columns, air inlet louvers, make-up water connection and other small parts required for proper unit operation in the field. The basin section is typically shipped separate from the rest of the unit.
- **Basin Section (Forced Draft Unit):** An assembly comprised of the basin, support columns, axial motors/fans, enclosure panels, make-up water connection and other small parts required for proper unit operation in the field. The basin section is typically shipped separate from the rest of the evaporative unit.
- **Inlet Louvers:** Enables ambient air to enter the unit (basin section) while preventing water from splashing out and direct line of sight into the basin during unit operation. There are many different profiles, sizes, and materials of construction.
- **Sump/Strainer Connection:** Appropriately sized cross-sectional area (box or pipe) that is greater than or equal to the suction connection size of the water recirculation pump.
- **Strainer:** An assembly used to catch large suspended particles in the recirculating water prior to entering the water recirculation pump. Periodic maintenance is required to keep the strainer clean.
- **Drain Connection:** Appropriate sized pipe (typically MPT) extending from the lowest point of the basin to facilitate basin drainage.
- **Overflow Connection:** Appropriate sized pipe (typically MPT) extending from the highest point of the basin, connection end to prevent spill out from the air inlet louver section and bleed off.
- **Casing:** perimeter panels of the fan and/or coil section of the unit which house all interior components.

- **Coil Section:** An assembly comprised of the heat exchange coil(s), tube sheets (ECOSS only), casing, and any other structural members required.
- **Condensing Coil:** An assembly comprised of tubes, headers, connections and framing, in a specific serpentine arrangement such that circulating refrigerant is condensed when operating with other unit components. It is also known as the heat transfer coil.
- **Axial Fan Section:** An assembly comprised of the fan(s), fan motor(s), fan nozzle(s), fan motor mount(s), framing, casing, drift eliminators, and water distribution system.
- **Fan Motor Mount:** An assembly comprised of heavy gauge sheet metal, or structure, to rigidly support a single motor and fan coupled together.
- **Drift Eliminators:** Located above the water distribution system to remove entrained water droplets in the leaving air stream.
- **Water Distribution System:** An assembly comprised of a water distribution box (or header), water distribution branches (or pipes), water spray nozzles and other minor parts to fasten, seal and secure all parts in place.
- **Riser Pipe:** Water pipe which connects the discharge side of the water recirculation pump to the water distribution box (header) entrance.
- **Bleed Valve:** Located on the lower portion of the riser pipe where the discharge side of the valve connects to the top of the overflow drain connection (basin). It is necessary to set the appropriate amount of water “bleed” from the unit to maintain the desired cycles of concentration. Also known as a blowdown valve.
- **Lifting Lug:** Heavy gauge or multiple heavy gauge plates (joined together) with a large hole to accommodate the attachment of an industrial lifting connection (e.g. screw pin shackle). Also called a lifting ear.
- **Mechanical Float Make-up Assembly:** Make-up water valve with armature and circular or pancake type float for basin water level adjustment.
- **Make-up Water Connection:** Appropriate sized pipe (typically MPT) extending from the vertical louver support (connection end) connected to the mechanical float make-up assembly (located inside the basin section) to facilitate make-up water feed.

The following are typical accessories available for ECOSS units.

- **External Service Walkway Package:** OSHA approved, self –supporting, external walkway (includes vertical access ladder) assembly, connected to the unit, which enables access to the unit fan section, eliminators and water nozzles.
- **Remote Sump:** A separate basin (or water tank) located inside a structure that will not experience at or below freezing temperatures. It is used to hold / circulate the water used by the unit instead of the standard basin with pump supplied. A remote sump connection in the unit basin will be provided for this option.
- **Electric Heaters:** Electric immersion heaters to ensure the basin water does not freeze (typical basin water temperature maintained is approximately +40°F).
- **Electronic Water Level Control:** External stand pipe with level sensor elements to control a separate solenoid valve to provide make-up water to the basin.

- **Motor Davit:** An assembly connected to the unit used to facilitate lifting the fan and/or motor from the fan motor mount.
- **Water Silencers:** Located in the basin (pan) above the operating water level. This option will reduce the overall noise level of the unit.

5. Installation

5.1 Location layout

Ensuring optimum performance of the unit with unobstructed air flow is the responsibility of the installing contractor. In order to not compromise the performance of the unit(s) locations on open roof tops or at ground level with no obstructions such as walls or adjacent buildings are optimal.

When optimal locations are not possible, units must be positioned such that the discharge air is either level or higher than these adjacent obstacles. It is imperative that the location allows for unrestricted airflow into each unit and that there is no recirculation of the saturated discharge air. It is also advisable that the discharge air is not in the direction of, or in close proximity to, any air intake location for the building's ventilation system.

Other points to consider when selecting the installation location:

- Place the unit so that it can be monitored and controlled from all sides at all times.
- Ensure that sufficient space is provided for maintenance.
- Ensure that all liquid-carrying components, connections, lines and all electrical connections and lines are easy to access.
- Ensure that the pipe connection points are visible.

NOTICE

Lightning protection rods beside the unit(s) are recommended.

If the units are intended to be put into a dual or quad position, the height of the louver section in the single box sizes are increased to ensure sufficient air intake (see table and diagram below).

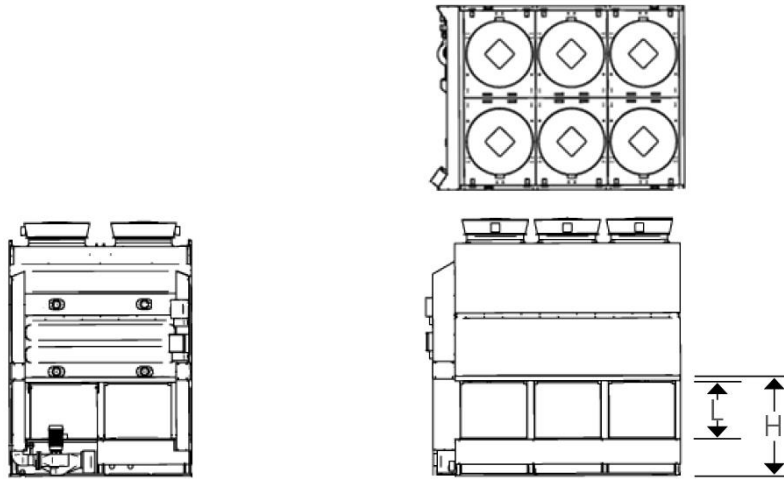
NOTICE

Refer to the submittal package for specific unit information.

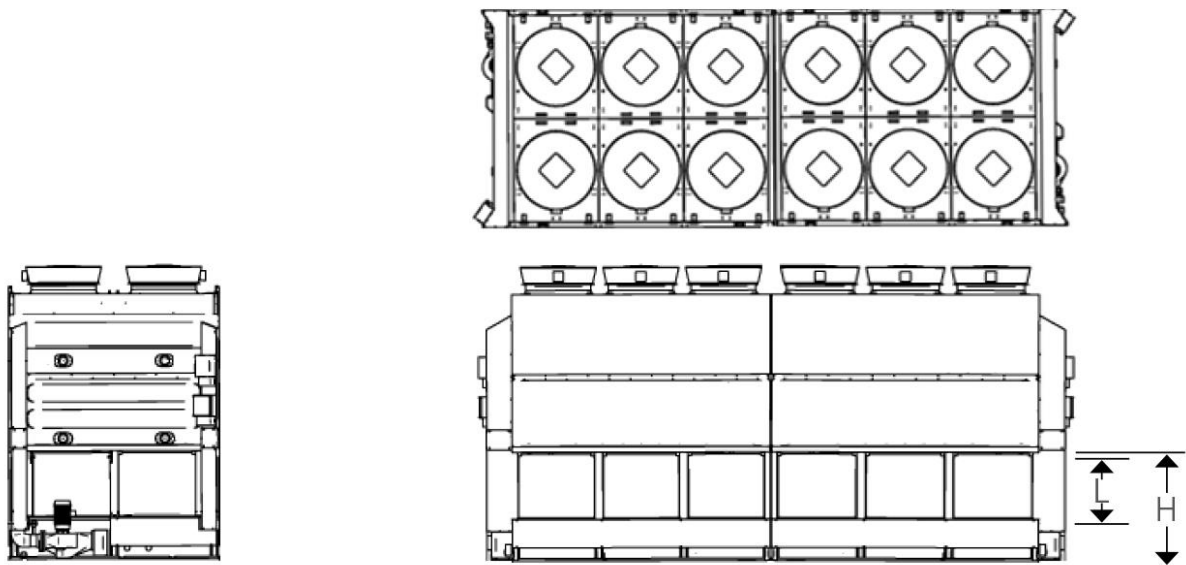
ECOSS INDUCED DRAFT UNIT CONFIGURATIONS AND CORRESPONDING AIR INLET & BASIN HEIGHTS

Unit Size Footprint	Single Unit		Dual Arrangement End to End		Dual Arrangement Side by Side		Quad. Arrangement (4) Units	
	Inlet Louwer Ht.	Basin Height	Inlet Louwer Ht.	Basin Height	Inlet Louwer Ht.	Basin Height	Inlet Louwer Ht.	Basin Height
	L	H	L	H	L	H	L	H
7' x 9'	24"	51.6"	N/A	N/A	N/A	N/A	N/A	N/A
7' x 12'	30"	57.5"	N/A	N/A	N/A	N/A	N/A	N/A
7' x 18'	30"	57.5"	N/A	N/A	N/A	N/A	N/A	N/A
8.5' x 12'	30"	57.5"	N/A	N/A	N/A	N/A	N/A	N/A
10' x 12'	36"	63.5"	48"	75.5"	N/A	N/A	N/A	N/A
12' x 12'	36"	63.5"	48"	75.5"	78"	105.5"	78"	105.5"
10' x 18'	48"	75.5"	48"	75.5"	N/A	N/A	N/A	N/A
12' x 18'	48"	75.5"	78"	105.5"	78"	105.5"	78"	105.5"

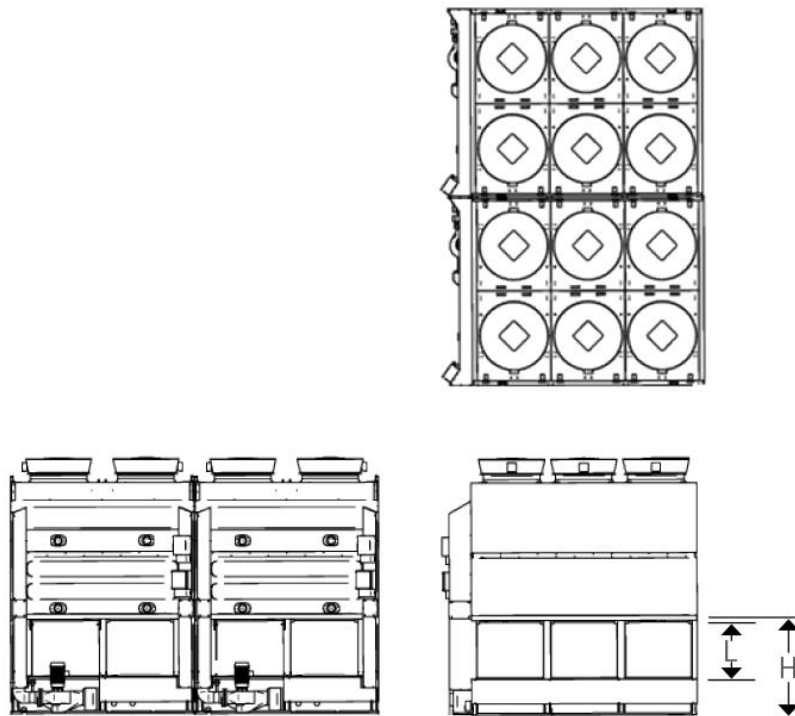
5.1.1 Single unit



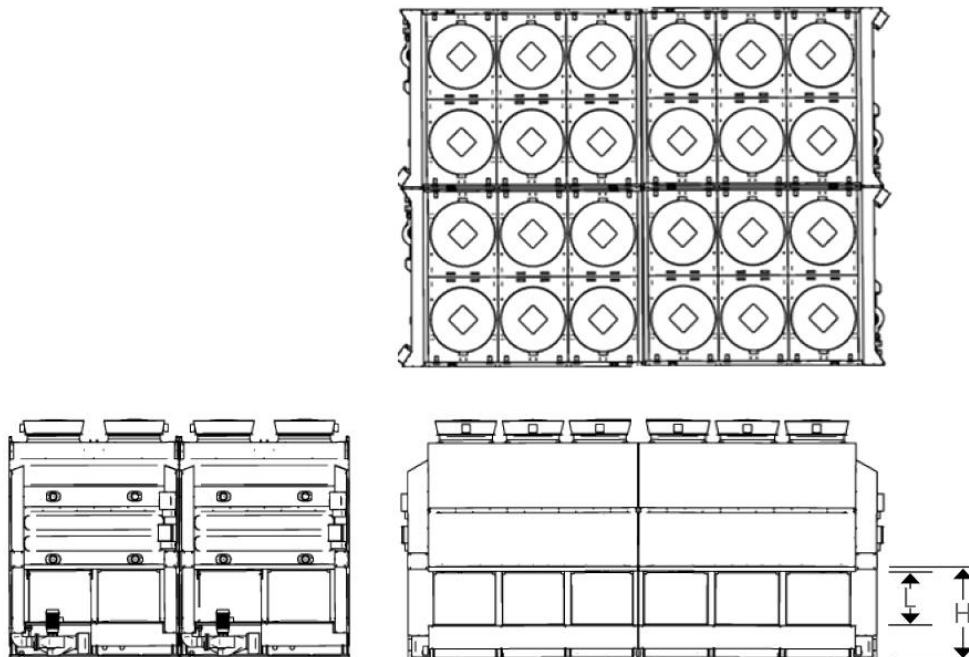
5.1.2 Single unit



5.1.3 Dual units side by side



5.1.4 Quad units



5.2 Equipment layout

ECOSS is an induced draft, counter flow, evaporative cooled product line utilizing a four sided air entry configuration. Properly evaluating equipment location leads to a successful installation and subsequent proper operation. This manual provides recommendations for various layout scenarios including placing equipment in close proximity to an obstruction (e.g. wall). In addition, Güntner offers both “dual” and “quad” unit configurations in which the air inlet openings are increased appropriately (in comparison to a single unit) to enable the absolute minimum clearance between units (see applicable schematic / chart).

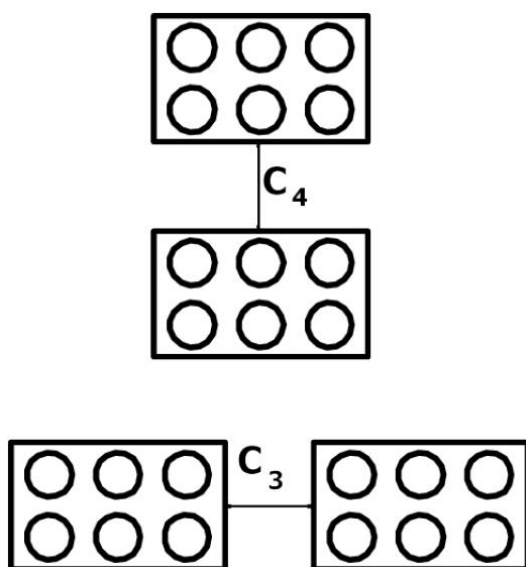
The minimum clearance(s) listed between an obstruction and the air inlet side (or end) is a guideline only. There are always circumstances (i.e. prevailing winds, etc.) coupled with field experience which lead to alternate layouts and thus would increase a minimum clearance presented in this manual to achieve proper operation.

It is recommended to place the equipment in a free-field environment (when possible) to ensure the required ambient air flow and prevent recirculation of the saturated discharge air. Units located on open roof tops or at ground level with no obstructions such as walls or adjacent buildings will be the optimum location. However, in many instances this cannot be realized. Positioning in wells, next to high walls, adjacent buildings, occupied areas or specific enclosures all pose a risk of recirculating the saturated discharge air. This will increase the wet bulb temperature of the intake air and definitely compromise the performance of the condenser, typically resulting in higher condensing temperatures. Discharge hoods or duct extensions should be used in such instances. Units that are located in a well, an enclosure or close to adjacent walls or buildings must be positioned such that the discharge of the condenser (top) is either level or higher than these adjacent obstacles.

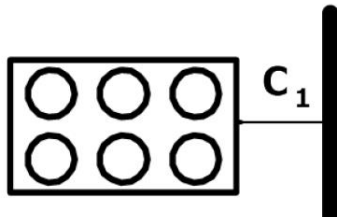
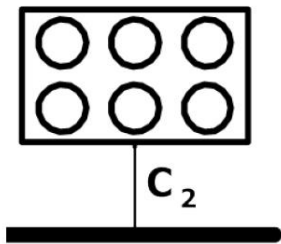
If the unit/s is to be located in occupied areas or close to adjacent buildings, it is good engineering practice that the discharge air is not in the direction of, or in close proximity to, any air intake location for the building's ventilation system.

5.2.1 Single / multiple unit layouts

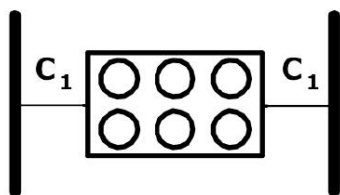
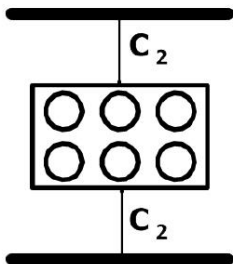
All minimum clearance values indicated (feet), C1, C2, C3, C4, etc. are for ECOSS induced draft units only. In addition, overall nominal unit lengths (feet) are indicated as well. A “Unit” is a specific model number which consists of a single nominal box size (i.e. 7' x 12', 8.5' x 12', 10' x 12', 12' x 12', 10' x 18' or 12' x 18') or multiple, single boxes arranged in very close proximity. There are three different unit configurations available, single, dual and quad. For example; a “dual” unit can be quantity two (2), 12' x 12' single boxes positioned end-to-end which is designated as one model number and is considered one unit. The following lists different potential layouts in which a unit(s) may be properly located on-site.



No Obstructions / Two Units		
Unit Configuration	Unit Length	C3 & C4
Single	9'	3'
Single	12'	6.5'
Single	18'	6.5'
Dual (end-to-end)	All	8.5'
Dual (side-by-side)	All	13'
Quad	All	13'

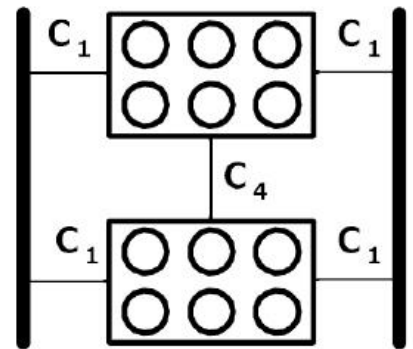
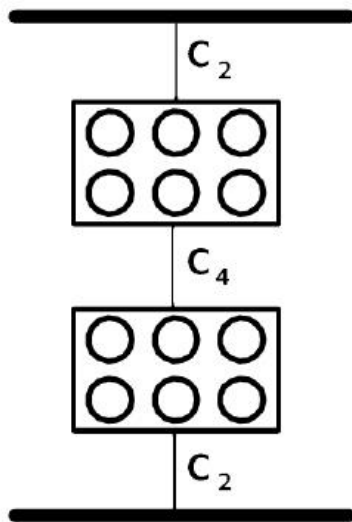
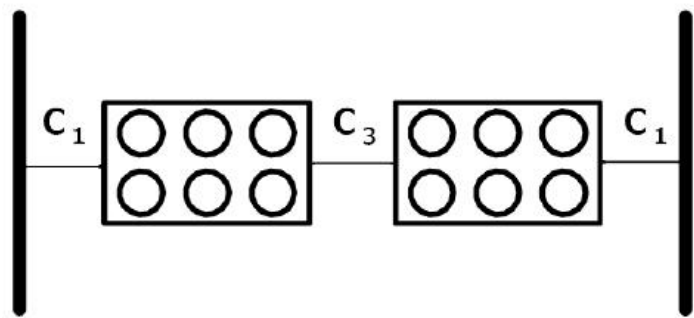
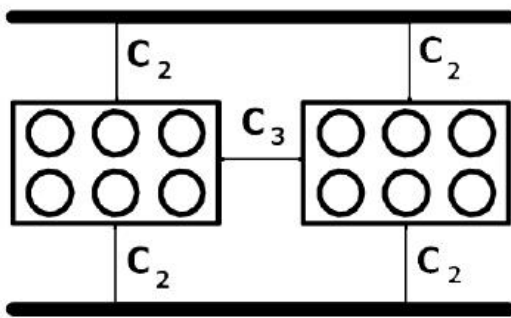


One Wall / One Unit		
Unit Configuration	Unit Length	C1 & C2
Single	9'	3'
Single	12'	3.5'
Single	18'	4.5'
Dual (end-to-end)	All	4.5'
Dual (side-by-side)	All	7'
Quad	All	7'

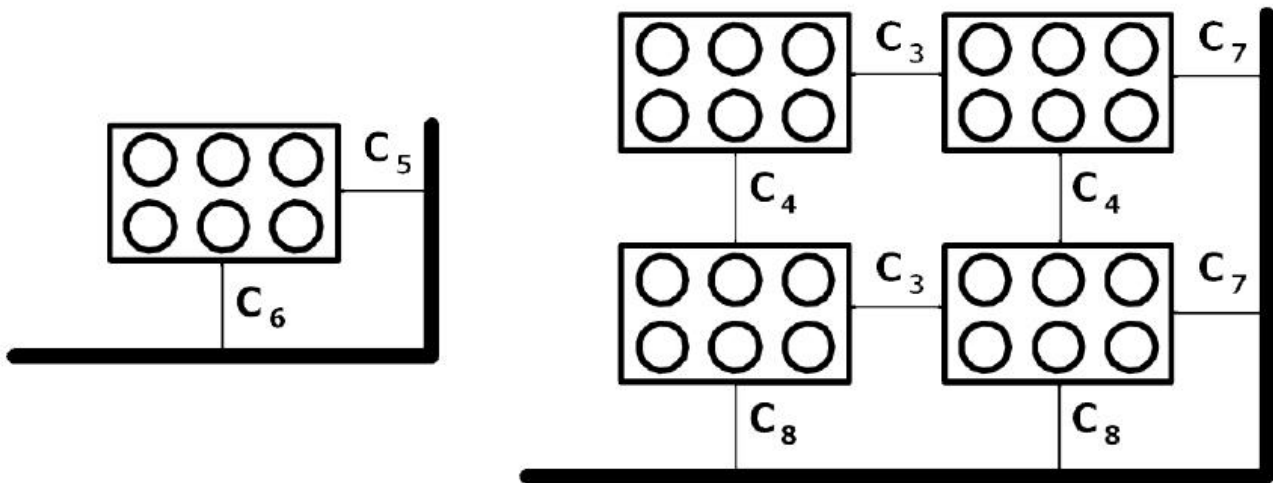


Two Walls / One Unit		
Unit Configuration	Unit Length	C1 & C2
Single	9'	3'
Single	12'	3.5'
Single	18'	4.5'
Dual (end-to-end)	All	4.5'
Dual (side-by-side)	All	7'
Quad	All	7'

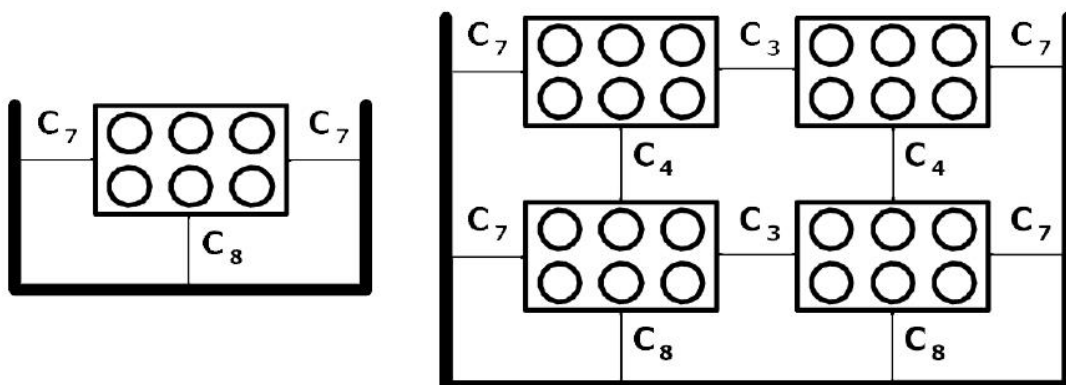
Two Walls / Two Units			
Unit Configuration	Unit Length	C1 & C2	C3 & C4
Single	9'	3'	6'
Single	12'	3.5'	7'
Single	18'	4.5'	9'
Dual (end-to-end)	All	4.5'	9'
Dual (side-by-side)	All	7'	14'
Quad	All	7'	14'



Two Walls (Corner) / Single & Multiple Units			
Unit Configuration	Unit Length	C5 & C6 & C7 & C8	C3 & C4
Single	9'	3'	6'
Single	12'	3.5'	7'
Single	18'	4.5'	9'
Dual (end-to-end)	All	4.5'	9'
Dual (side-by-side)	All	7'	14'
Quad	All	7'	14'

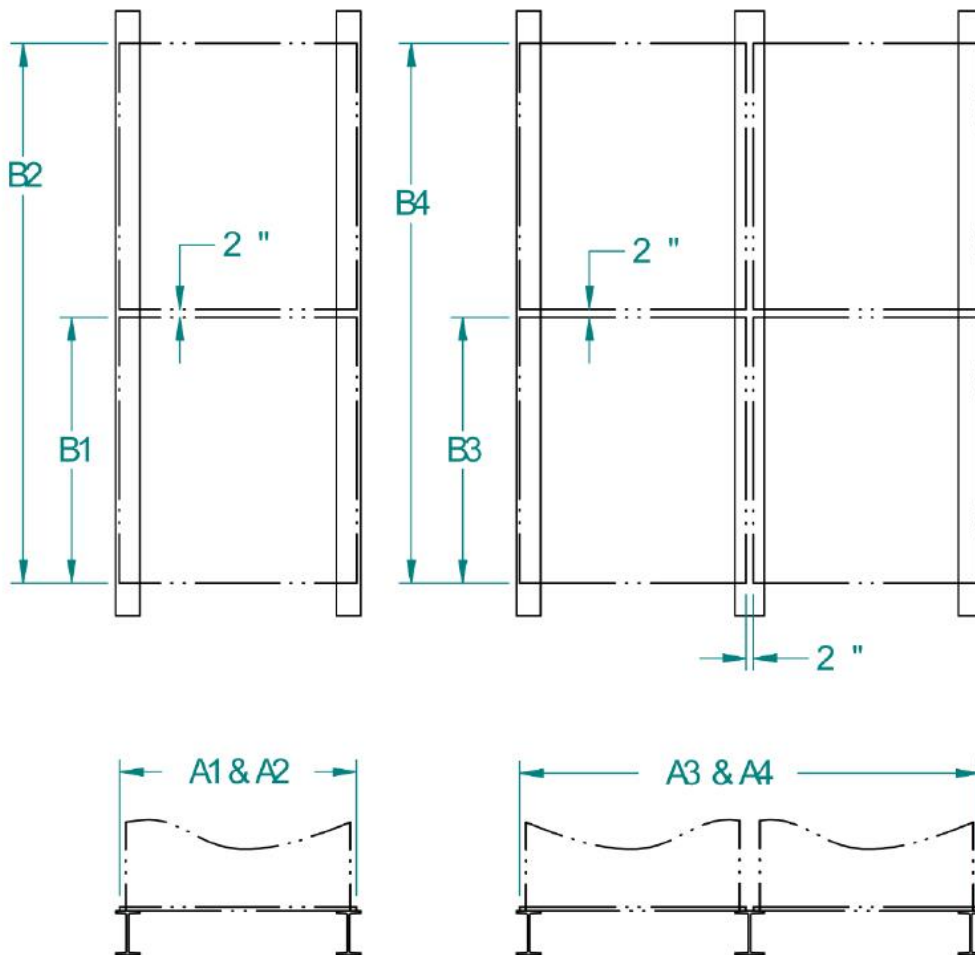


Three Walls / Single & Multiple Units			
Unit Configuration	Unit Length	C5 & C6 & C7 & C8	C3 & C4
Single	9'	3'	6'
Single	12'	3.5'	7'
Single	18'	4.5'	9'
Dual (end-to-end)	All	4.5'	9'
Dual (side-by-side)	All	7'	14'
Quad	All	7'	14'



5.3 Support structure

Units will need to be structurally supported with two parallel "I" beams traversing the entire length of the unit (see drawing below).



NOTICE

Refer to the submittal package for specific unit information.

Use Neoprene gasketing between the "I" beams and the base of the unit.

NOTICE

If Neoprene gasketing is not used, corrosion may occur between the dissimilar materials.

"I" beams must be level to within 1/8" over a 6' span. Shims cannot be used to level off the unit as this will compromise the load bearing surface.

Mounting holes (13/16" diameter) are provided at the base of the basin section, in the side panel flanges, to enable securing each unit to the support structure utilizing suitable 3/4" diameter bolts. Refer to the Güntner unit certified drawing for the bolt hole locations and minimum grade requirements.

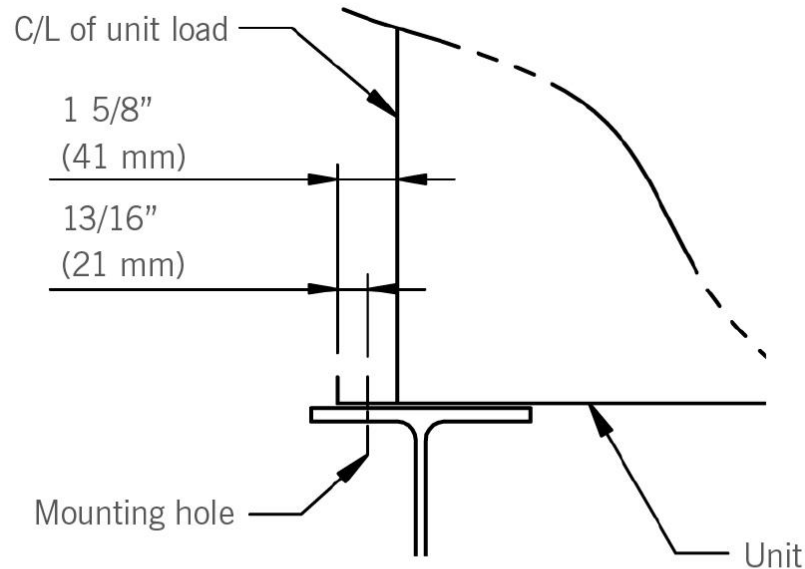
All support beams and anchoring bolts will be provided by others and must be selected in accordance with sound structural engineering standards. When selecting the support beams deflection may be calculated by using 55% of the unit's operating weight as a uniform load on each beam.

NOTICE

The support beams must be level at the top and meet industry acceptable tolerance related to the overall length of the unit installed. Do not level any unit with shims.

ECOSS Steel Support Structure Dimensions (Box Dimensions)		
Single Cell Arrangements	A1	B1
G_HE0709...	7' 4"	8' 11-1/2"
G_HE0712...	7' 4"	11 11-3/4"
G_HE0718...	7' 4"	18' 4"
G_HE0724...	7' 4"	24' 1-1/2"
G_HE0812...	8' 5-1/2"	11 11-3/4"
G_HE1012...	9' 9-3/4"	11' 11-3/4"
G_HE1018...	9' 9-3/4"	18' 4"
G_HE1212...	11' 10"	11' 11-3/4"
G_HE1218...	11' 10"	18' 4"
Dual Cell Arrangements (End to End)	A2	B2
G_HE0712...	N/A	N/A
G_HE0812	N/A	N/A
G_HE1024...	9' 9-3/4"	24' 1-1/2"
G_HE1036...	9' 9-3/4"	36' 10"
G_HE1224...	11' 10"	24' 1-1/2"
G_HE1236...	11' 10"	36' 10"
Dual Cell Arrangements (Side by Side)	A3	B3
G_HE0712	N/A	N/A
G_HE0812	N/A	N/A
G_HE2412...	23' 10"	11' 11-3/4"
G_HE2418...	23' 10"	18' 4"
Quad Cell Arrangements	A4	B4
G_HE2424...	23' 10"	24' 1-1/2"
G_HE2436...	23' 10"	36' 10"

* G_HE: GCHE = Evaporative condenser
GFHE = Fluid cooler



TYPICAL END VIEW

5.4 Installation

5.4.1 Receiving & inspection

All Güntner units are packaged such that they can be removed from a truck with a crane.

All units are factory tested to ensure safe operation and quality assembly. Units are packaged and shipped in two pieces or more (depending on options ordered) for easy handling and storage, if required, at the job site.

NOTICE

Record any unit damage or shortages on the Bill of Lading and report to the carrier and Güntner factory immediately. Shipping and handling damages are not warranty items.

Take photos of all damaged equipment if possible. Damaged equipment is the responsibility of the designated carrier and should not be returned to the manufacturer unless prior approval is given to do so. Confirm that all items listed on bill of lading are received.

NOTICE

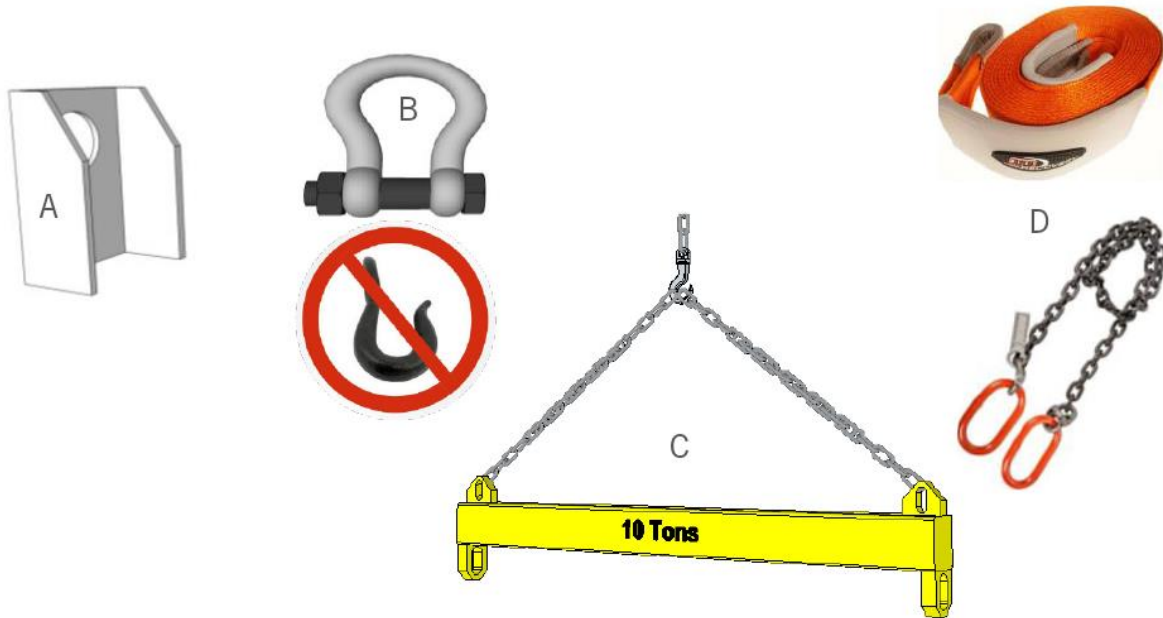
Refer to the submittal package for specific unit information such as weights, dimensions, etc.

NOTICE

When lifting the unit use only the designated lifting lugs as detailed on the rigging drawing attached to the unit at the time of shipping. Always ensure that the lifting points are balanced so that the unit is level during lifting.

5.4.2 Rigging

5.4.2.a Rigging hardware



Parts:

A = Lifting lugs

B = Screw pin shackles *Minimum capacity 3 Tons

C = Spreader bar(s) *Minimum capacity 10 Tons

D = Straps or chains *Minimum capacity 3 Tons



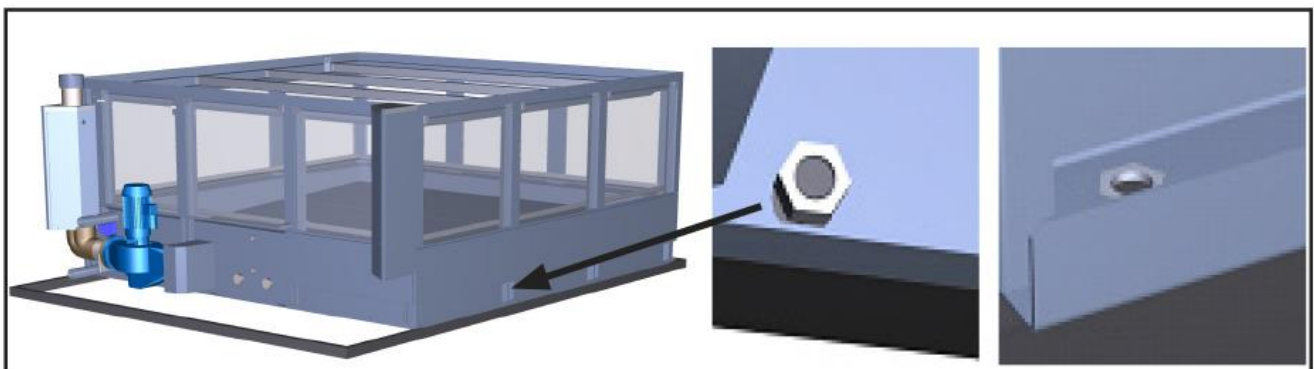
Upper casing section rigged



Basin section

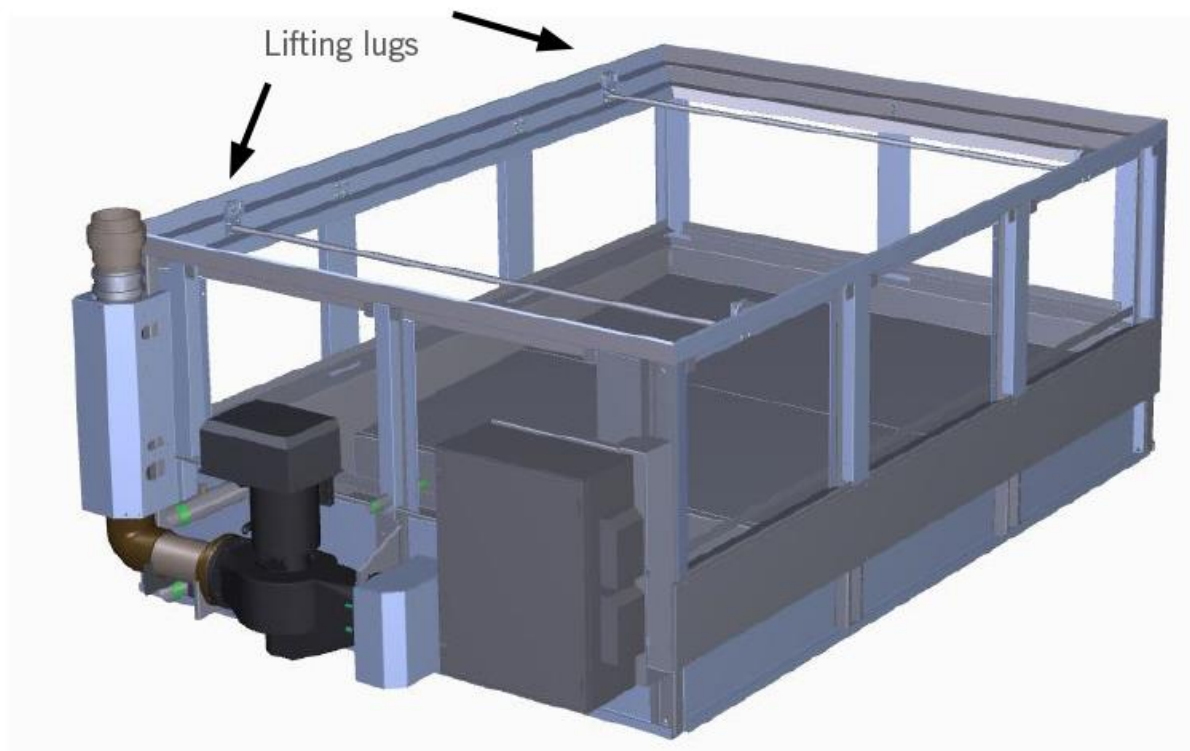
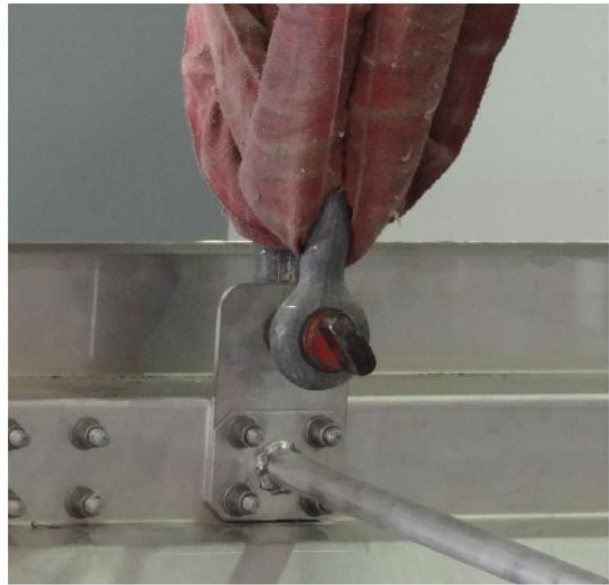
5.4.2.b Basin section rigged

Remove the nuts from the shipping support so that when the unit is lifted the shipping support will detached from the unit, allowing for it to be removed.



The shipping support can be disposed of after the basin section is lifted.

Secure 4 screw pin shackles through each of the 4 lifting lugs



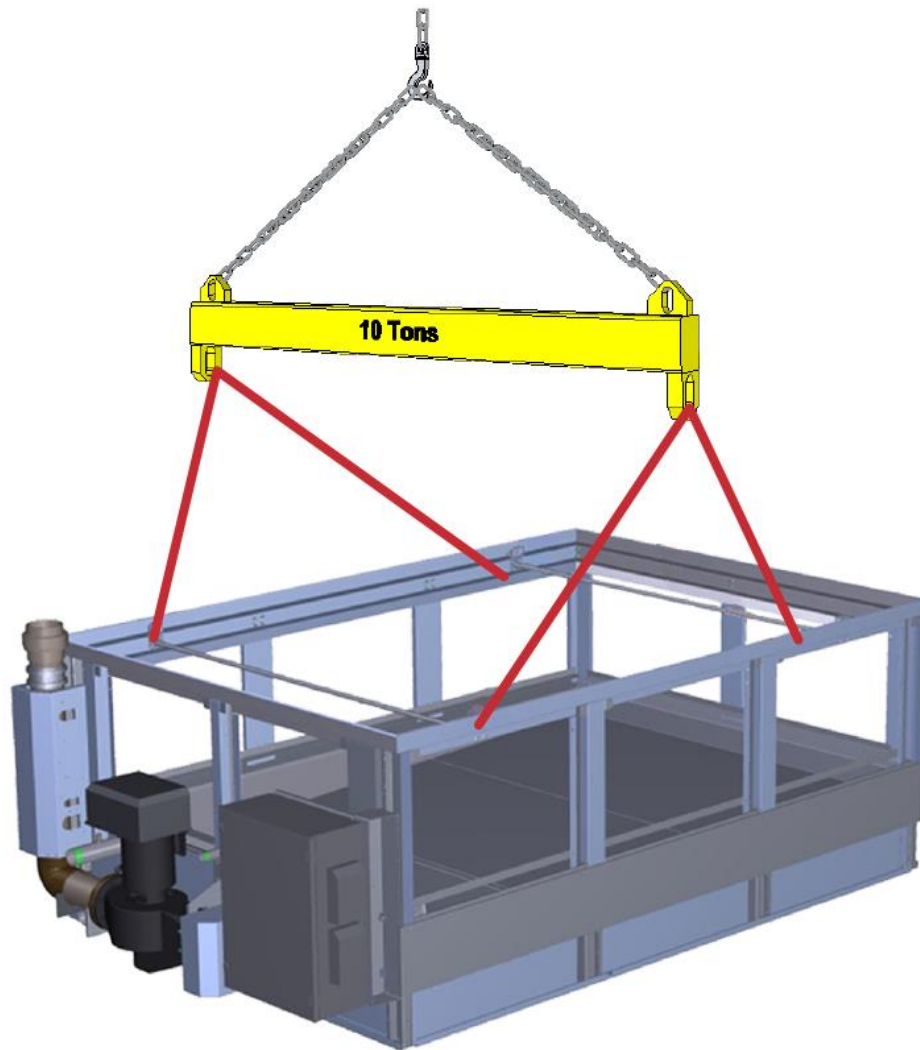
⚠ WARNING

Do not use hooks to lift the unit.

Use the straps or chains to attach the spreader bar to the basin section of the unit.

NOTICE

Spreader bar must traverse the full width of the unit, not the length. Incorrect size and use of the spreader bar may result in equipment damage.

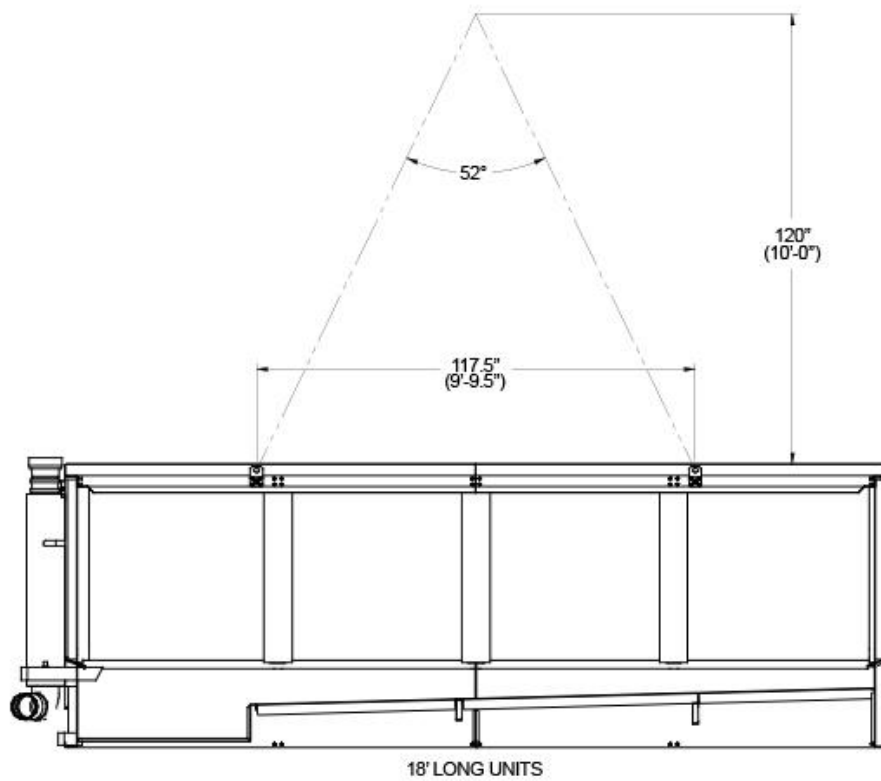
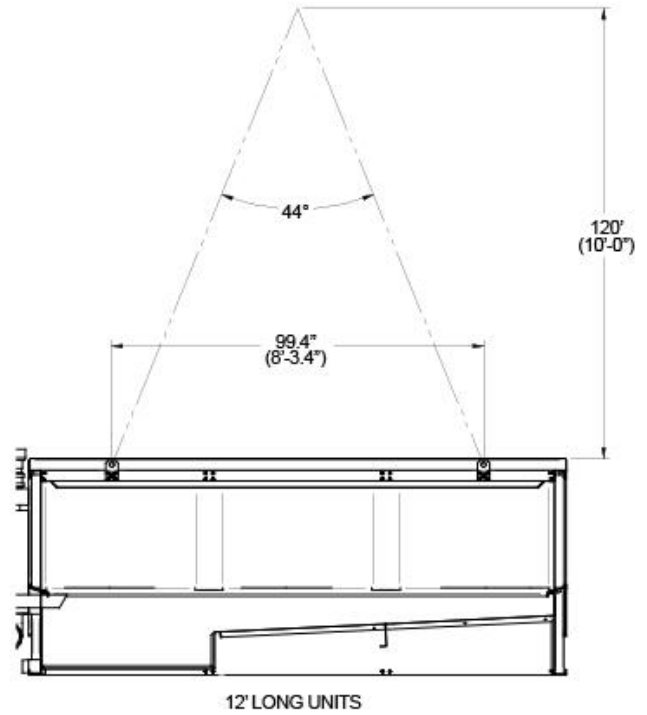
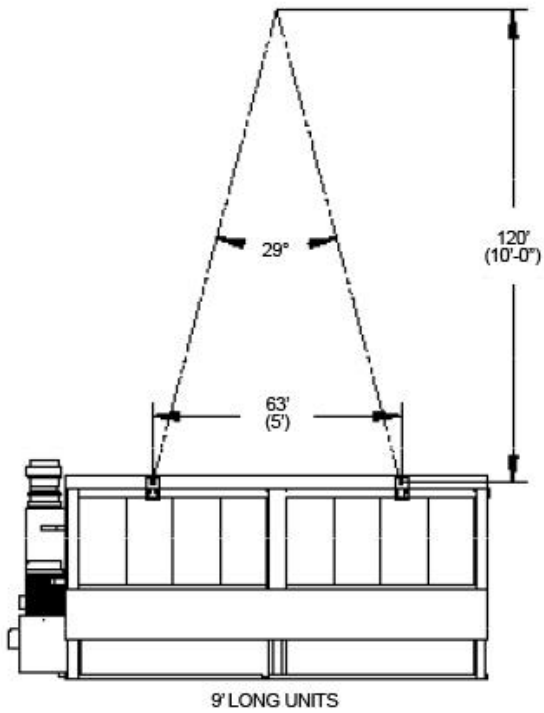


See diagrams below for vertical dimension requirements for a single point lift of the basin section.

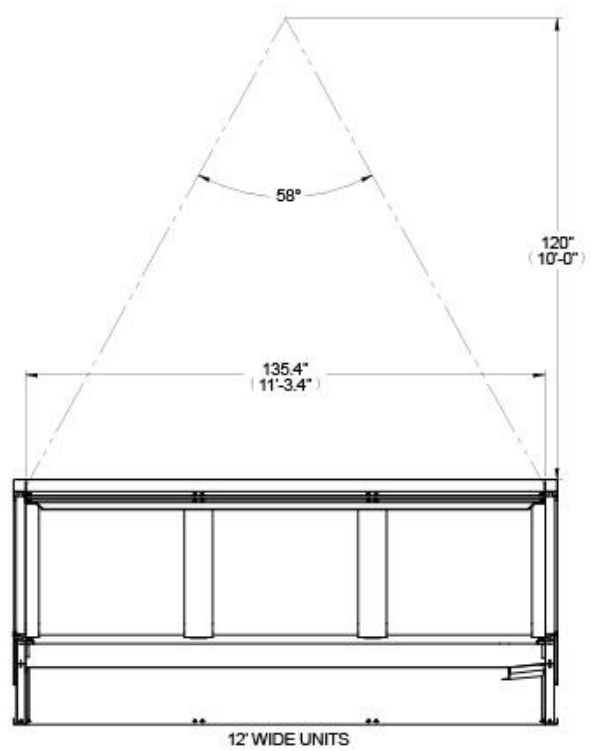
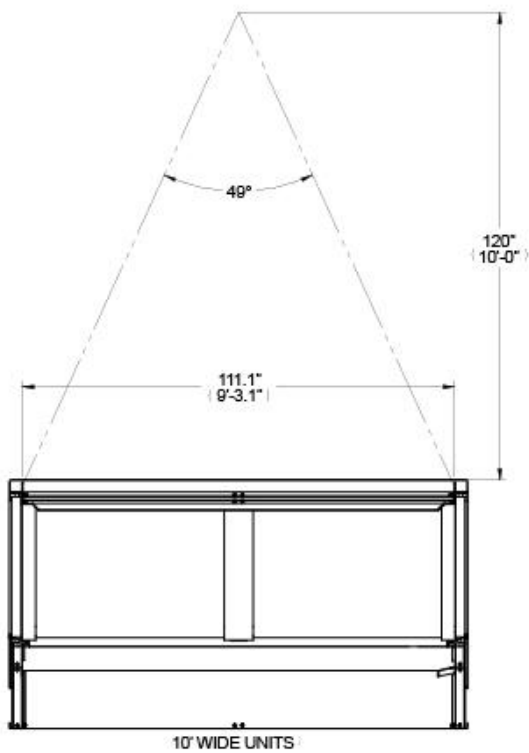
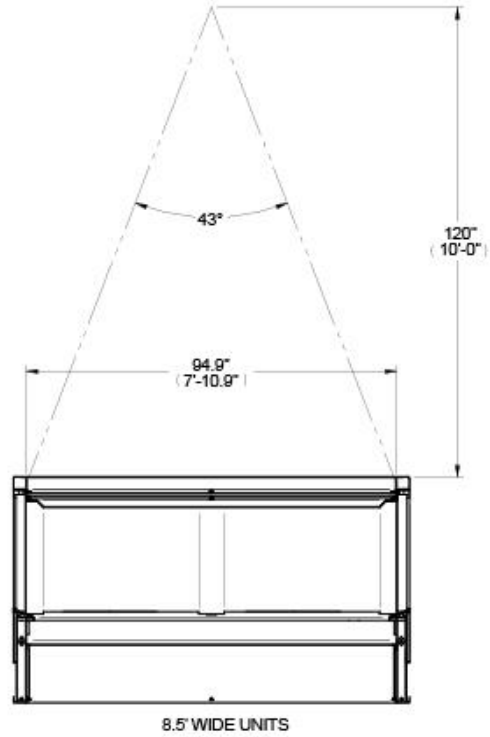
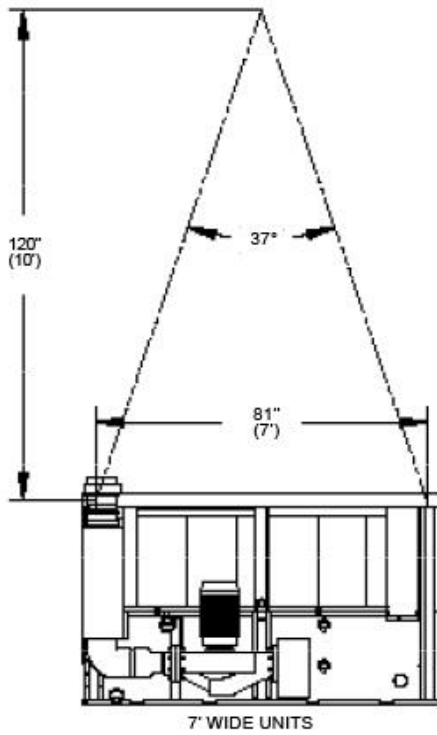
NOTICE

Compromising the vertical dimensions indicated below may result in equipment damage.

Side View

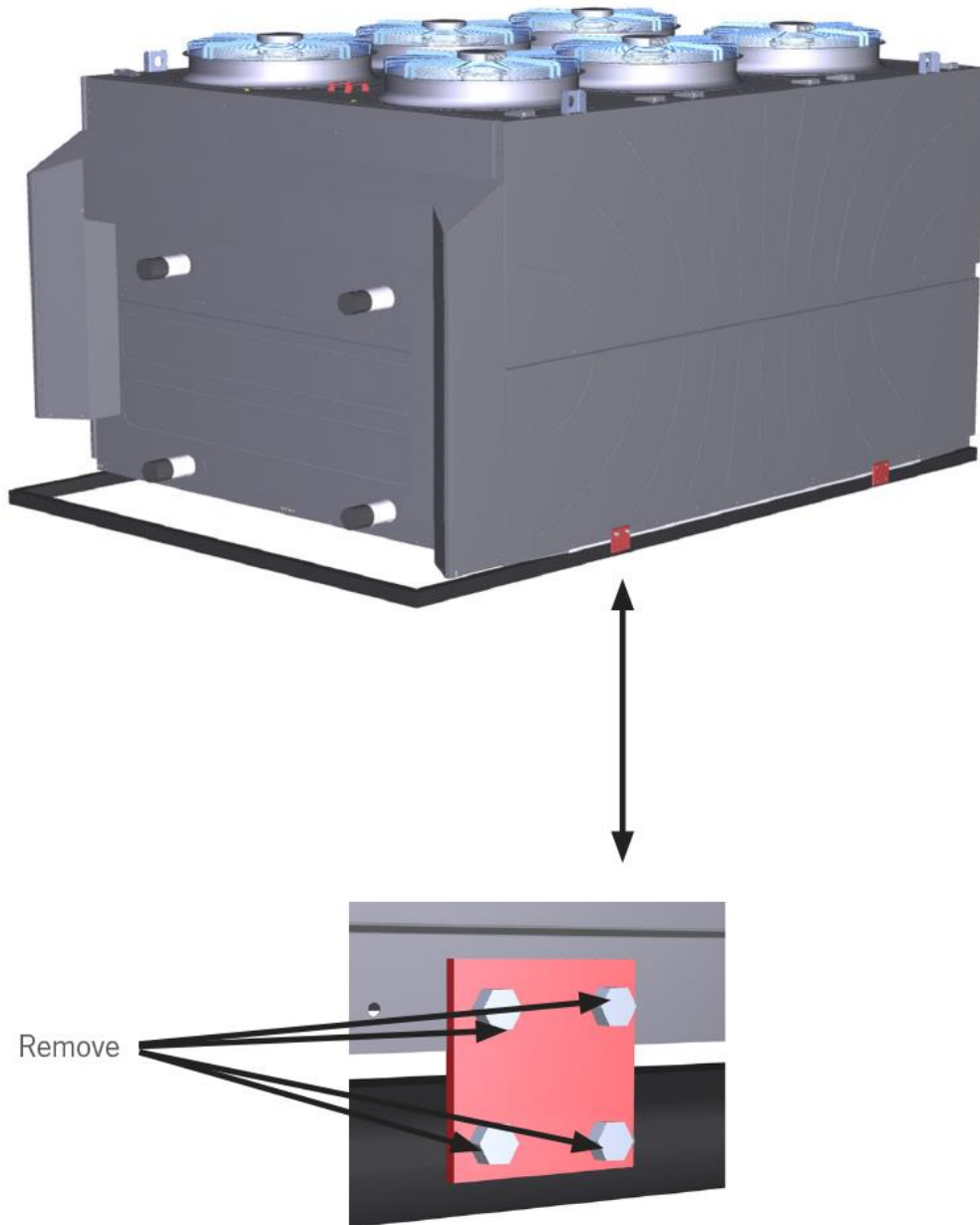


Front View



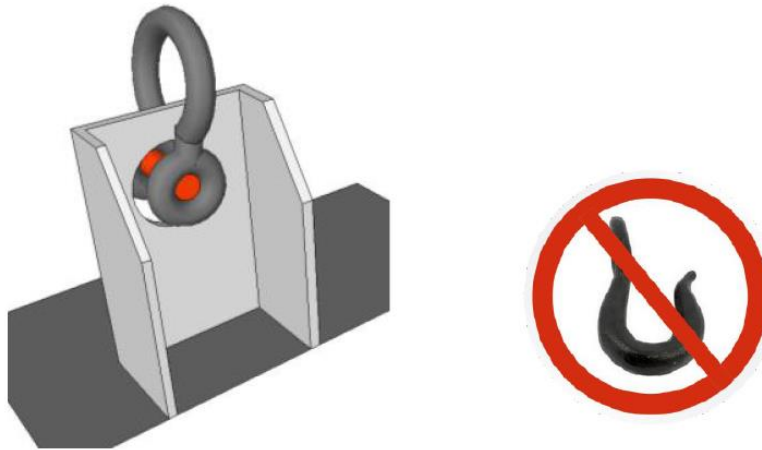
NOTICE

Refer to the submittal package for specific installation instructions.

5.4.2.c Upper casing section

Remove all four screws from each plate that holds the shipping support structure to the unit. This way when the unit is lifted off the truck it will also lift off of the shipping support structure.

Secure 4 screw pin shackles through each of the 4 lifting lugs.



⚠ WARNING

Do not use hooks to lift the unit.



Use the straps or chains to attach the spreader bar to the upper section of the unit

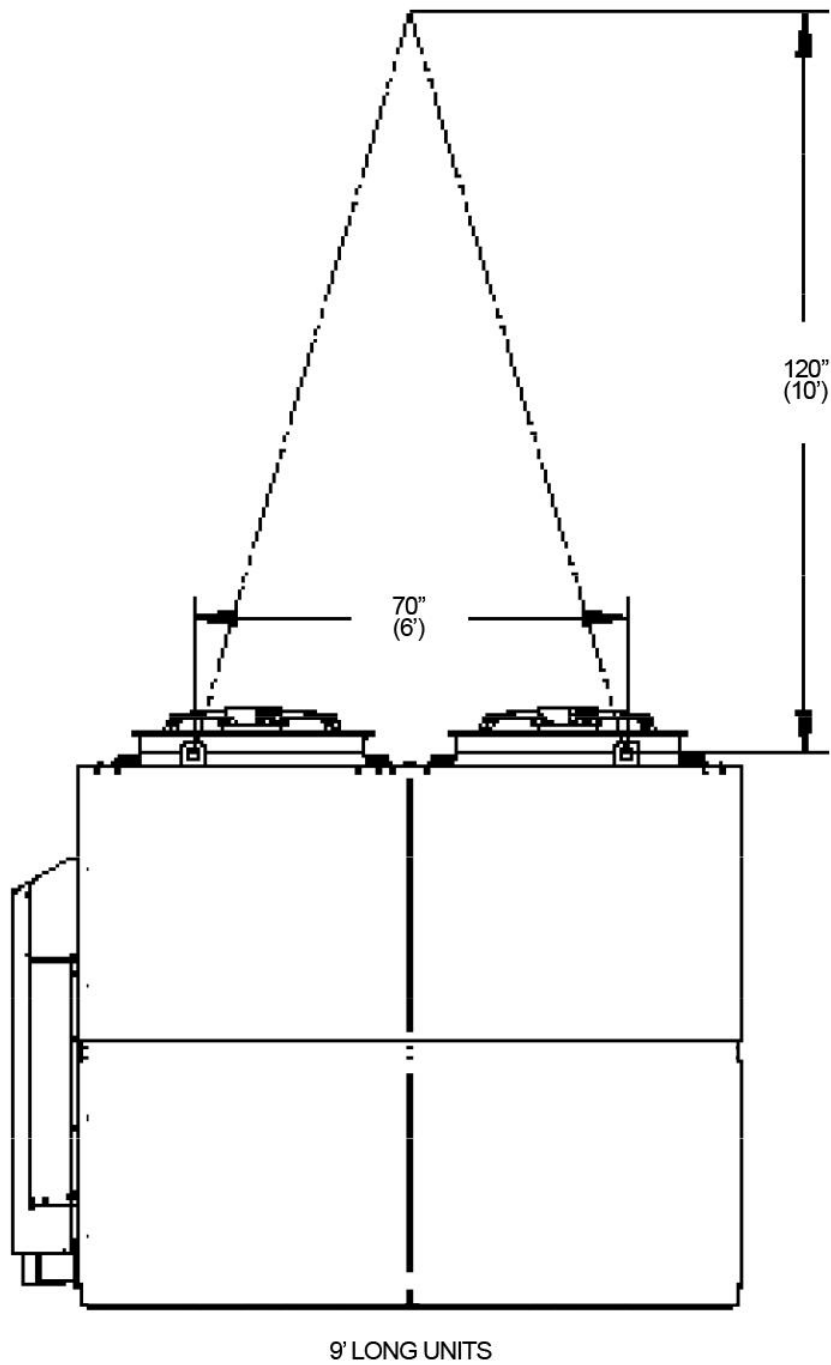


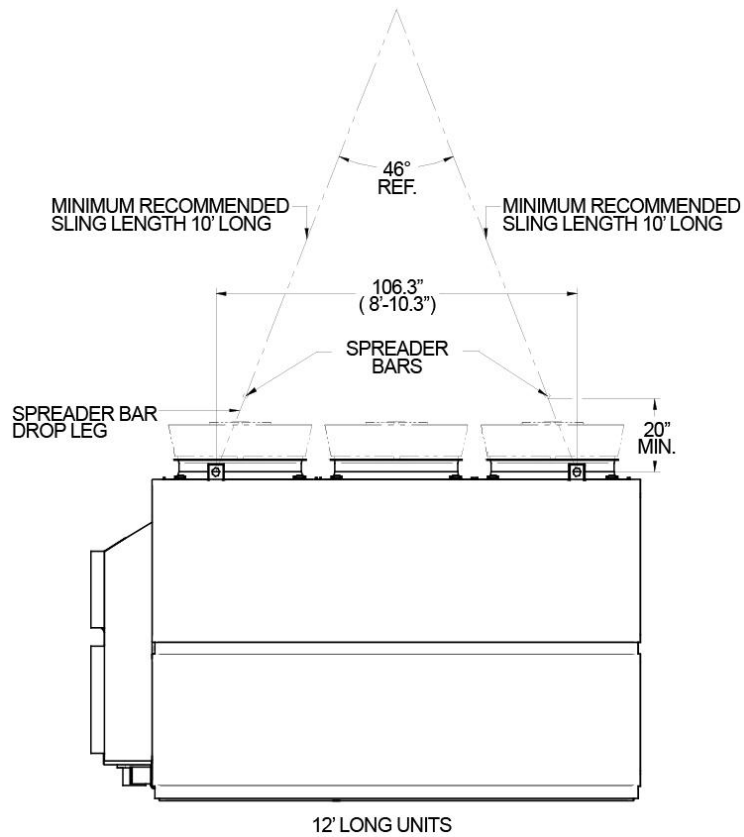
See diagram below for vertical dimension requirements for lifting the top section of the unit with two spreader bars.

NOTICE

Compromising the vertical dimensions indicated below may result in equipment damage.

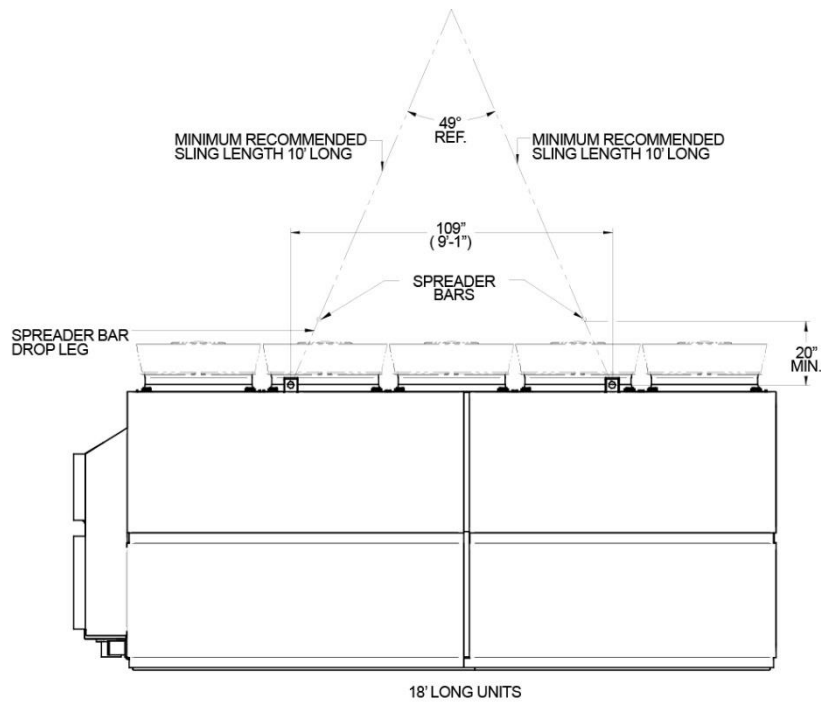
Side view





NOTICE

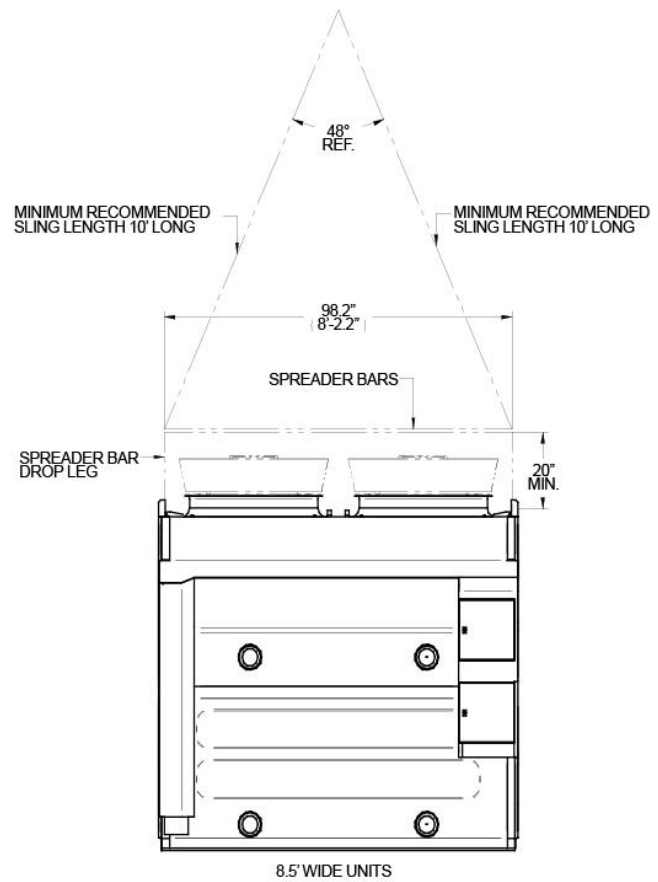
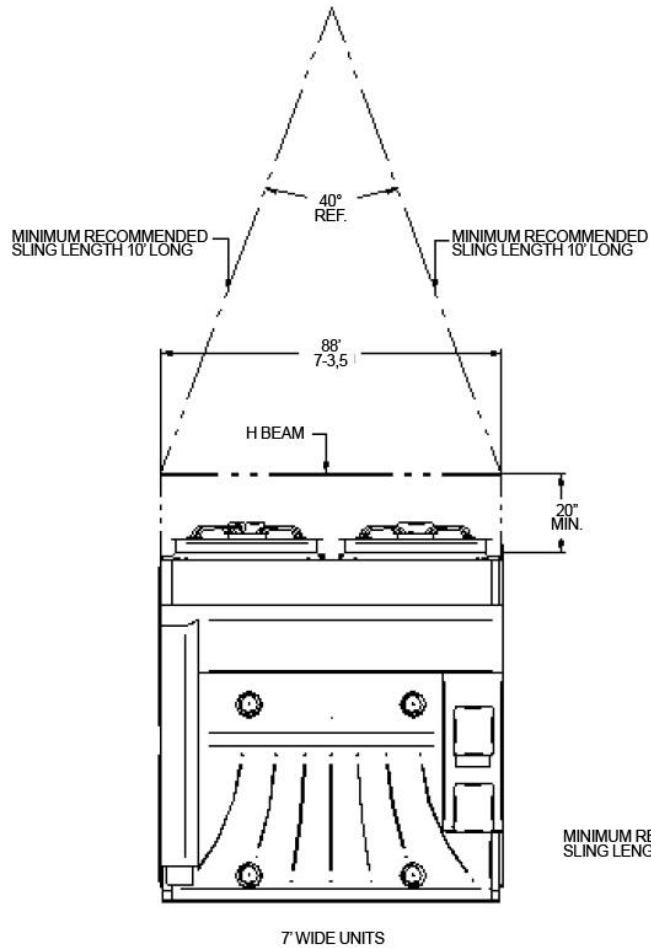
7' x 12' units must use H-shaped spreader beam

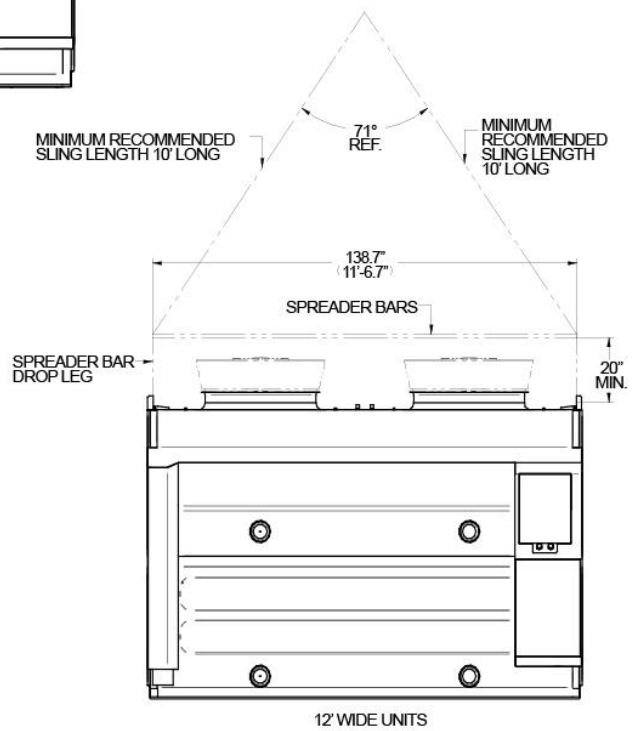
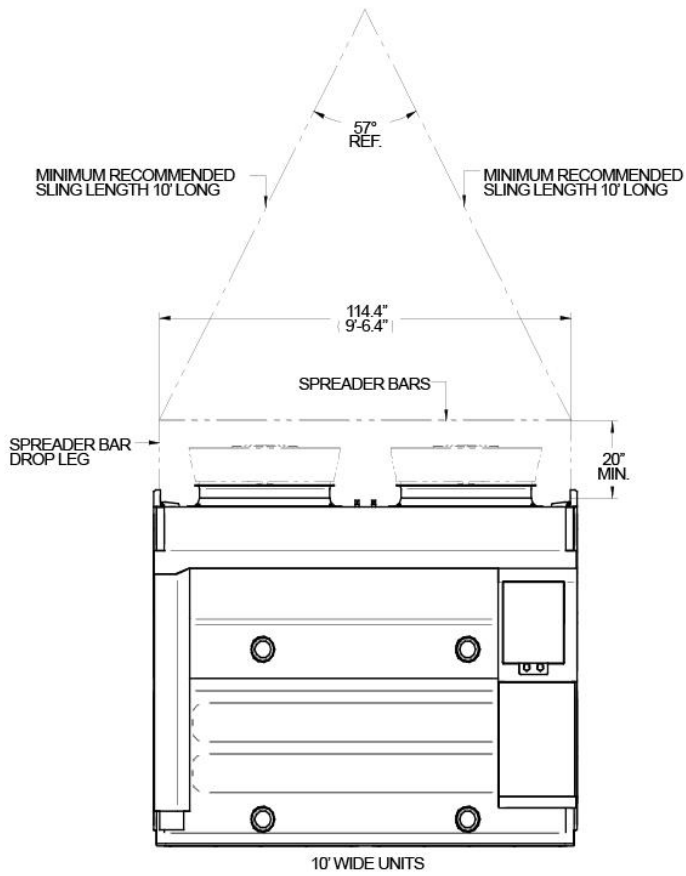


NOTICE

Refer to the submittal package for specific installation instructions.

Front view





NOTICE

Refer to the submittal package for specific installation instructions.

5.5 Offloading & assembly

Compare the data on the nameplate of the unit with the submittal information to verify the correct unit is received. Model nomenclature and electrical data should also be verified with original order.

NOTICE

Remove any loose parts which were shipped in the basin section of the unit prior to installation, when applicable.

5.5.1 Basin section

- Rig the basin section as outlined earlier.
- Slowly lift the basin section from the shipping support structure, move to the installation location and set on the support structure.

NOTICE

Care should be taken when lifting the basin section such that it is lifted level (with little or no tilt) to ensure the drain connection pipe does not come in contact with the ground or any objects in order to prevent damage.

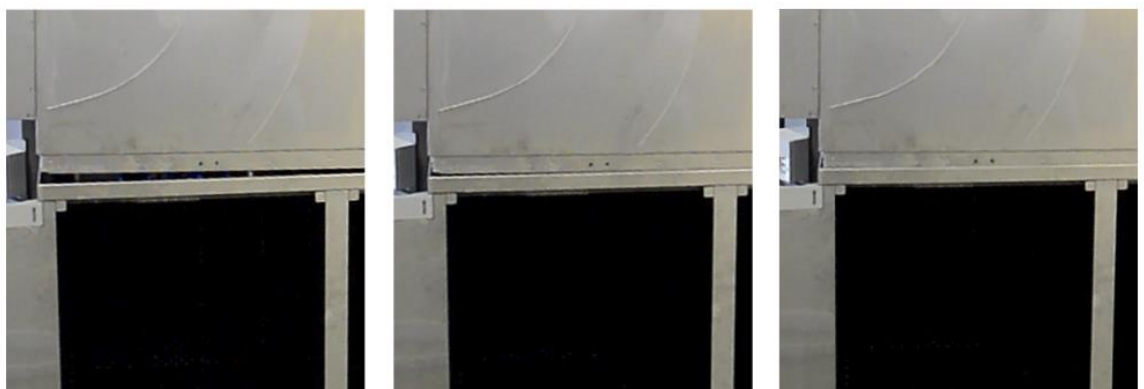
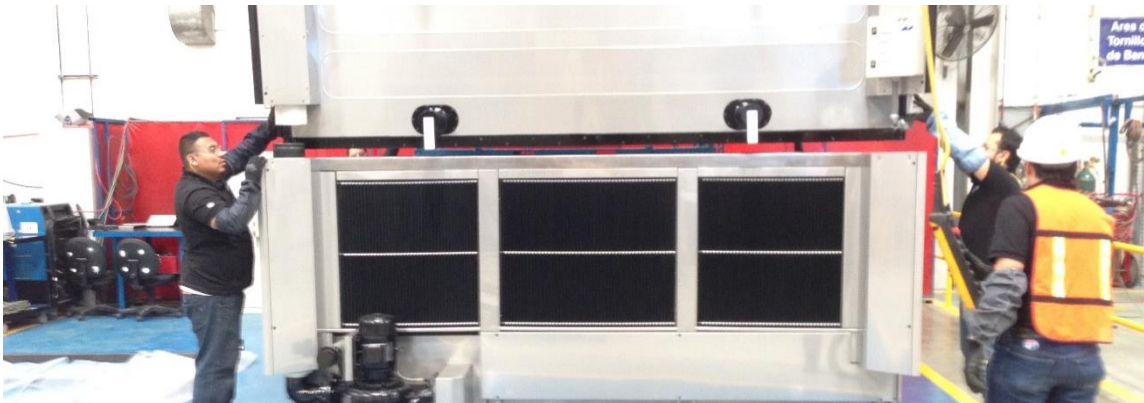
- Check the position of the basin on the support structure to ensure proper positioning and that it conforms to the information provided in section "5.3 Support structure" on page 16.
- Secure basin section of unit to the support structure with suitable $\frac{3}{4}$ " diameter bolts (not provided).
- Use ALL of the bolt holes to secure the unit to the support structure (for bolt hole locations, see Güntner unit certified drawing).
- Prevent stresses on the unit:
- Check that all mounting bolts are tightened equally to ensure balanced load distribution.
- See section "5.5.4 Riser Pipe Coupling Installation" on page 34 before rigging the upper casing section.

5.5.2 Upper casing section

- Rig the upper section as outlined earlier.
- Slowly lift the upper section and move to the installation location to fit the upper section on top of the basin section.



- Align the upper casing section with the basin section.



- Appropriately guiding the upper section safely into the recess and free from pinch points.

NOTICE

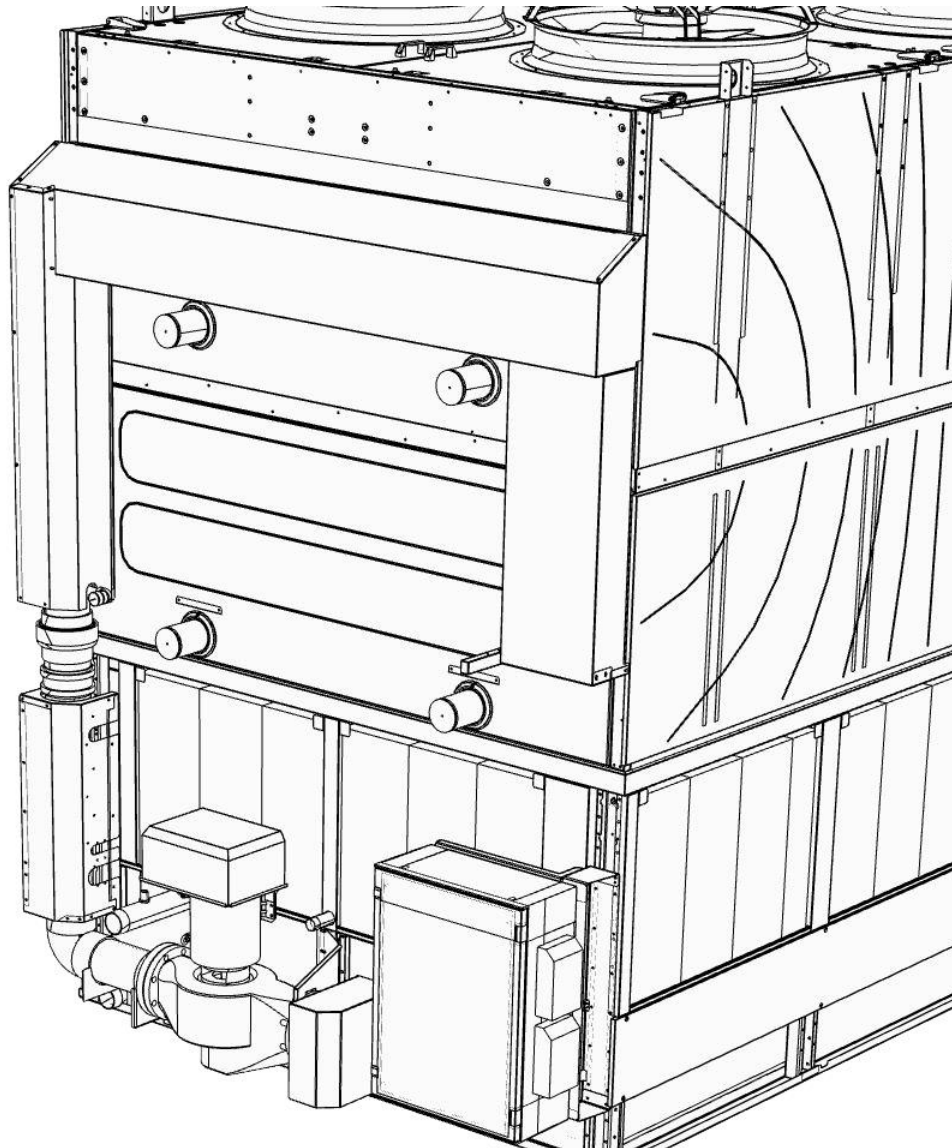
There is already a clearance “gap” designed between the PVC riser pipe in the basin section and upper section. Care should be taken when lifting the upper section such that it is lifted level (with little or no tilt) to ensure the PVC riser pipe does not come in contact with the ground, any objects, or the basin section in order to prevent damage.

5.5.3 Connection joint

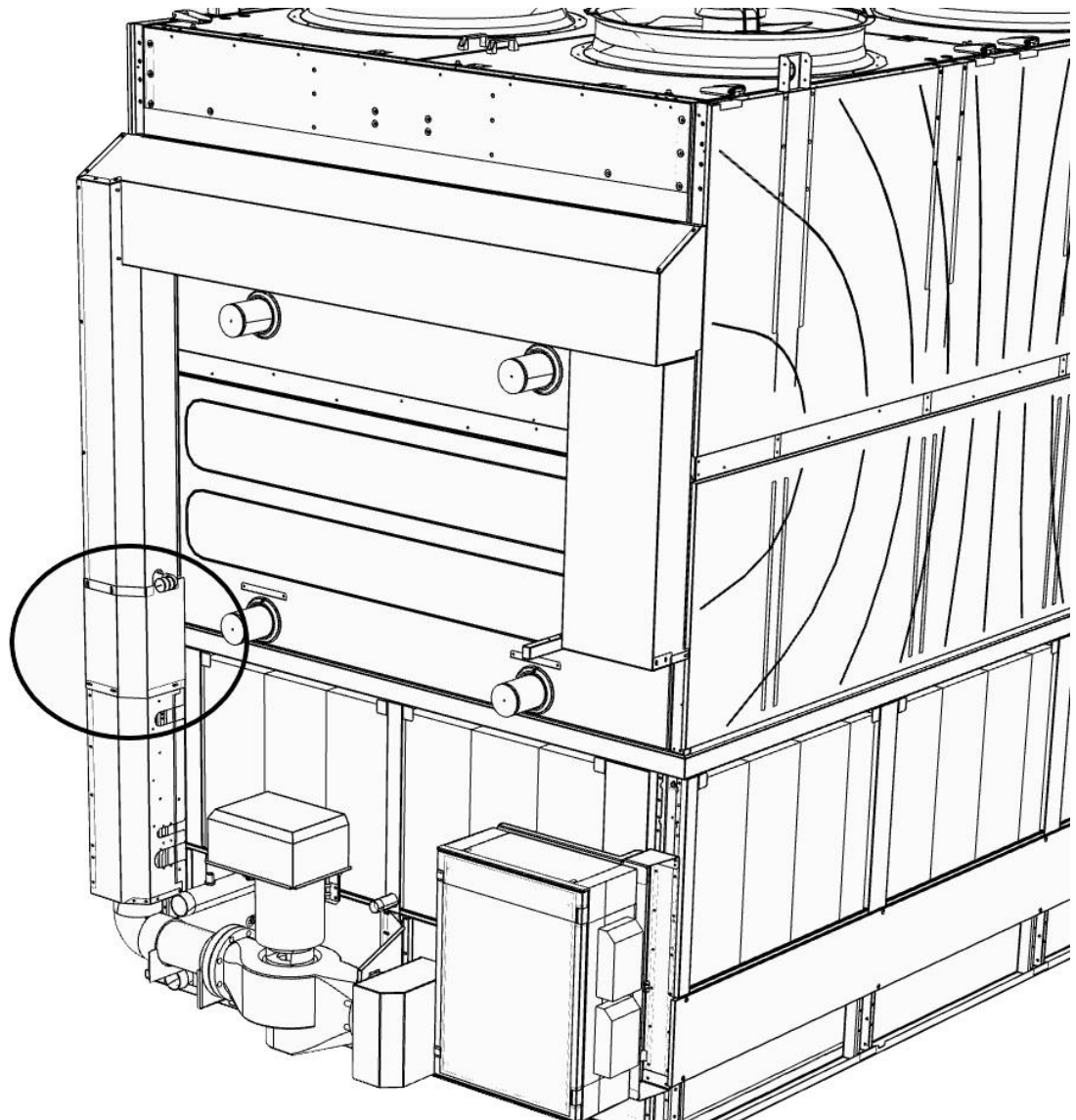
Bolt the upper casing section and the basin section together using the connection joint.

5.5.4 Riser pipe coupling installation

1. Align casing to basin then proceed with tightening the union nut.



2. Install cover with M6 x 20 (10x) screws and washers.



NOTICE

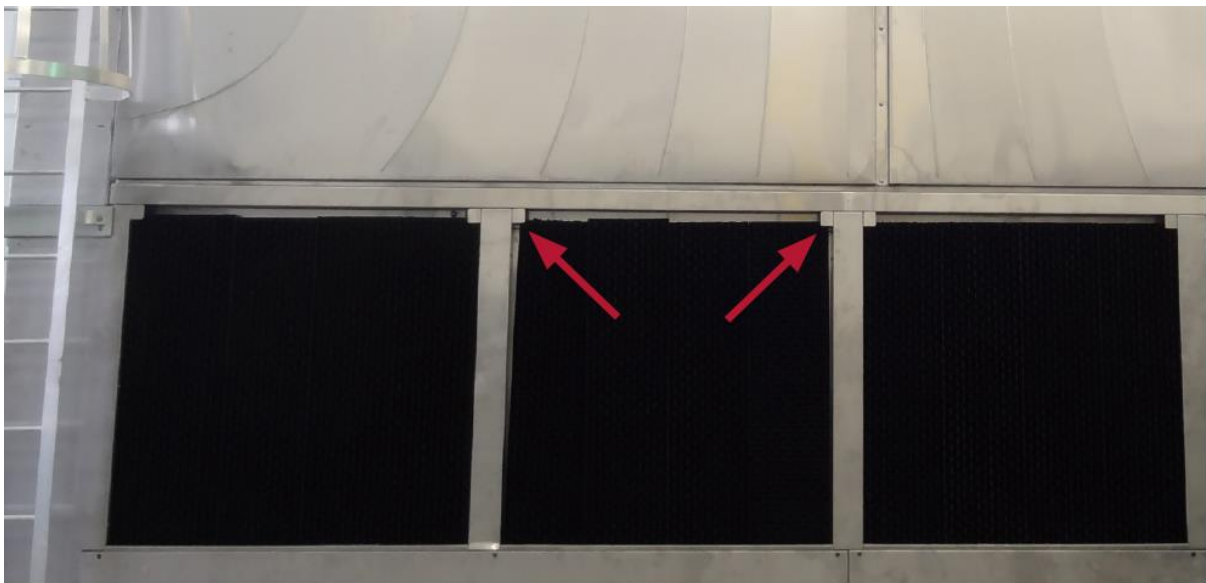
Refer to the submittal package for specific installation instructions.

5.5.5 Inlet louvers

- The narrower inlet louvers will fit into the inlet louver openings on the front and back of the unit
- The wider inlet louvers will fit into the inlet louver openings on the sides of the unit
- Inlet louvers should be positioned so that the louver pattern points downward into the basin section (see picture below)



- When the inlet louvers are installed, the top will be held in place by the inlet louver front supports (see picture below)



5.5.5 a Inlet louvers installation

1. Pick up the inlet louver by holding onto the louver pattern
2. Align the inlet louver to place the top end into the inlet louver space and slide it all the way up under the squared inlet louver front supports
3. While the inlet louver is slid as far up as it can go into the inlet louver opening, put the bottom of the inlet louver into place
4. Set the inlet louver down so that it rests in the bottom of the inlet louver opening

1.



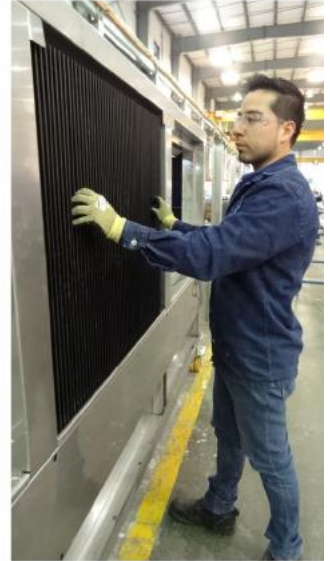
2.



3.



4.



5.5.5.b Inlet louvers removal

1. Grab the inlet louver pattern
2. Slide the inlet louver straight up to release the bottom of the inlet louver from the inlet louver opening
3. Pull the bottom of the inlet louver out to remove it
4. Slide the inlet louver down to release the top of the inlet louver from the inlet louver front supports

1.



2.



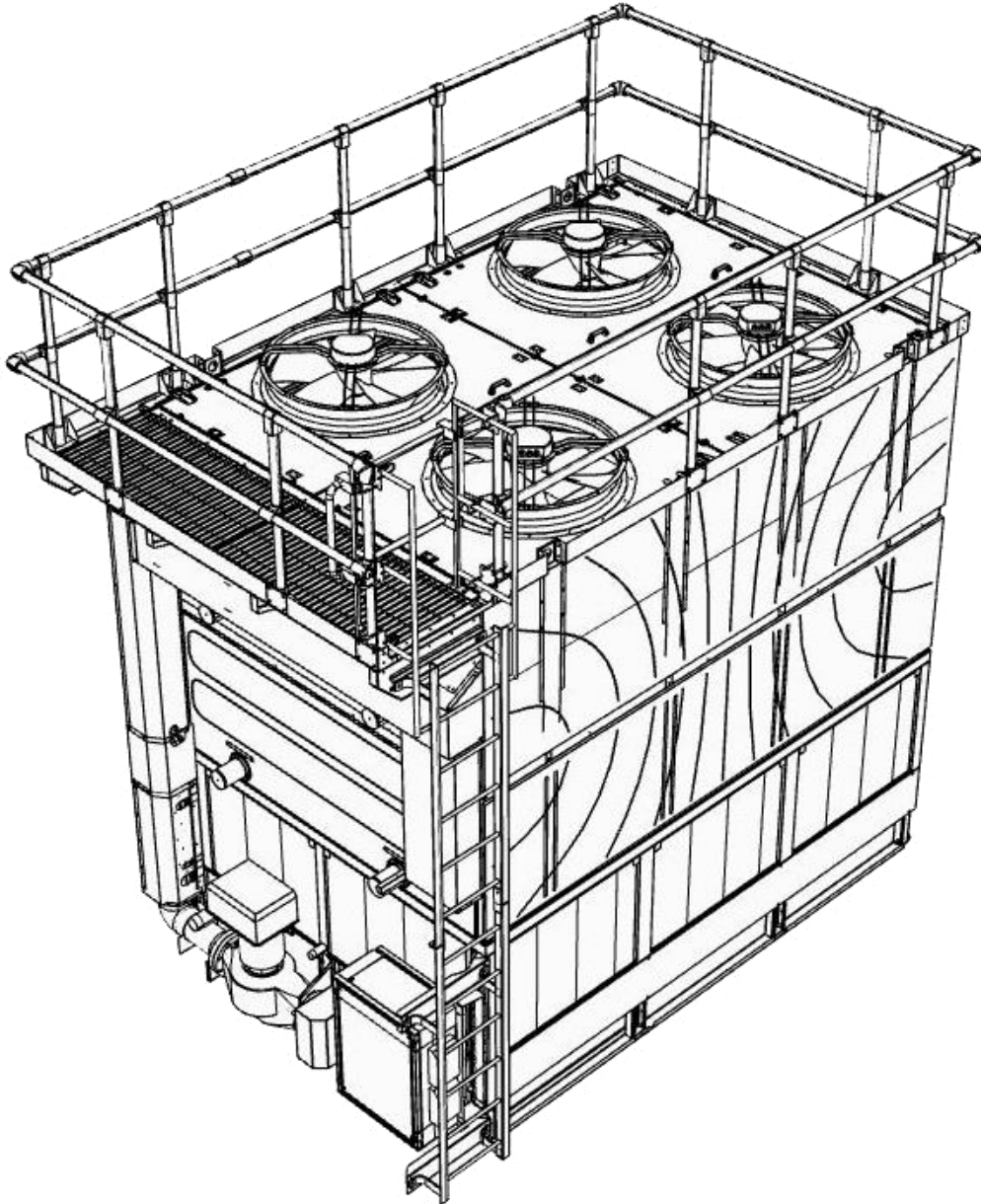
3.



4.



5.6 Ladder & external service walkway package



NOTICE

Refer to the submittal package for specific unit information.

5.6 Piping

All field piping external to the ECOSS unit must be supported and anchored separately. External loads must not be placed on the unit connections. Piping supports must not be anchored to any part of the cooler's panels and/or frame.

NOTICE

Failure to comply with this will result in damage to the ECOSS product and void all warranties.

Pressure or temperature sensors should be field installed at the appropriate location(s) within the system and in accordance with your local refrigerant guidelines for piping installation best practices.

When the equipment is mounted on vibration rails or springs, all connecting piping must incorporate compensators to eradicate any vibrations being carried through the connecting pipework to the ECOSS unit.

External water distribution piping must be heat traced and insulated when exposed to subfreezing ambient conditions.

Evaporative condenser refrigerant piping should be designed and installed in accordance with generally accepted condenser piping good engineering practice as per ASME B31.5 - Refrigerant Piping.

5.7 Storage

The unit is intended for outdoor use only. To protect the unit from damage due to the elements, the unit should be stored in a clean, dry location and away from areas with excessive traffic. The unit should be well ventilated at all times during storage.

Do not store the unit(s) for longer than necessary, and make sure the original packaging is kept intact. Do not remove the basin and / or the coil sections from their respective shipping support until basin section is mounted on support structure and upper casing is properly positioned and fastened to the basin section already mounted and fastened properly to the support structure.

During extended storage or downtime periods, the fans must be operated for at least 2 – 4 hours each month. At an absolute minimum the motors should be rotated a minimum of ten (10) revolutions per month.

6. Operating instruction

6.1 Pre-start up inspection

6.1.1 General

- All ECOSS units must only be installed, operated, maintained and repaired by trained, experienced and qualified personnel
- Confirm the power supply matches the electrical rating indicated on the nameplate
- Prior to any work being undertaken, verify that the power is switched off and that the unit properly disconnected, locked out and tagged out!
- If the unit is mounted on vibration isolators or isolation rails the manufacturers' ratings must be checked prior to any loading or unloading of the unit
- Check to confirm that all safety interlocks are working and fully functional
- Confirm that the installation of the unit is in accordance with the guidelines laid out in the Location Layout section of this manual

- Confirm that a water treatment program has already been applied

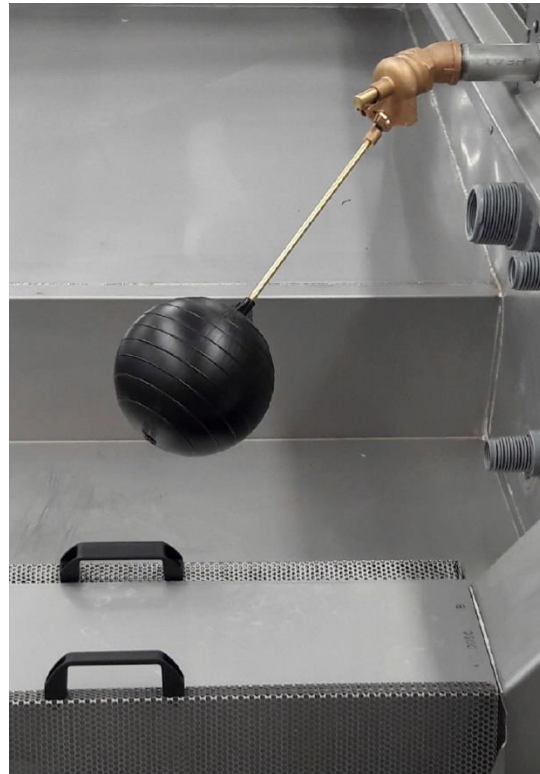
6.1.2 Cleaning

- Drain the cold water basin with the strainer in place to remove all dirt and sediment and flush with clean water to have the basin 100% clean and ready for operation
- Remove and clean the basin strainer – ensure that this is reinstalled correctly so as to not allow any bypass during operation
- Ensure that inlet louvers are free of any dirt, leaves and or / debris – pressure clean if required
- Inspect drift eliminators and confirm that they are free of any dirt, leaves and / or debris – pressure clean if required
- Ensure that all drift eliminators are firmly in place and correctly oriented
- Remove all dirt, leaves and / or debris from fan guards
- Inspect all water spray nozzles and clean if required

6.2 Start-up

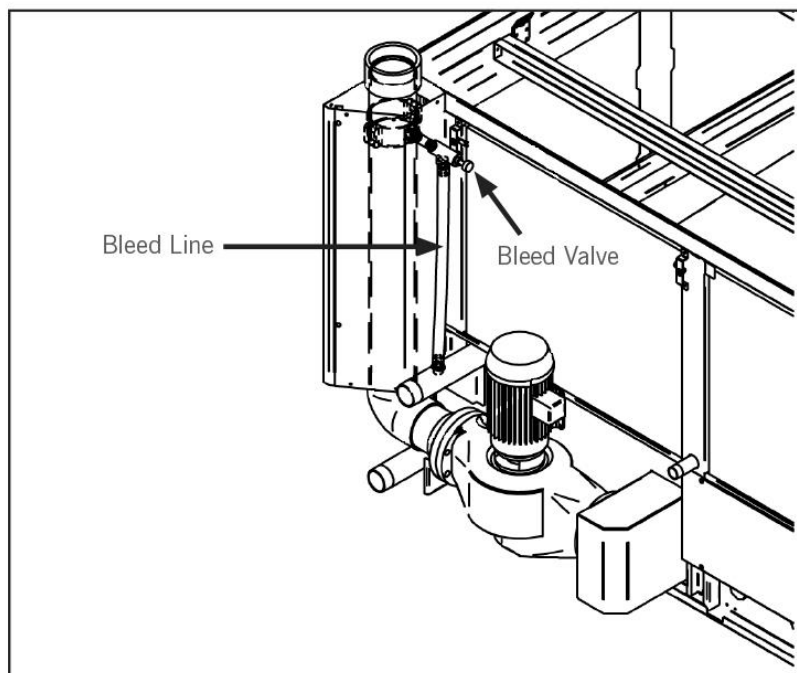
- Confirm that all impellers can rotate freely and are not obstructed in any way
- Ensure all electrical connections and terminals are tight
- Conduct a visual inspection of the entire unit and verify that there are no structural or component damages whatsoever
- Bump (jog) and verify the correct rotation of all fan motors and water distribution pump (when supplied)
- Confirm correct operation of mechanical float valve and that it is not obstructed in any way
- Fill the cold water basin with clean fresh water to the correct level via the make-up valve
- Ensure that the float valve is set to maintain the correct water level, monitor this level over the initial 24 hours of operation

The make-up water valve with armature and circular float for basin water level adjustment is delivered pre-assembled. Set the circular float height to a maximum water level of 14 1/4 inches above the lowest point in the basin before the water distribution pump is in operation. After the water distribution pump is in operation the water level should be set so that the maximum water level is no more than 15 1/2 inches



After the unit has been operational for a couple of hours record the voltage and amp draw on all three phases of the fan motors and water distribution pump. These currents must not exceed the nameplate(s) FLA ratings

Open the bleed valve located in the bleed line off the pump discharge and set according to the desired bleed rate (This may need to be set / verified by your qualified water treatment specialist)



- Confirm even water distribution over the plan area of the condenser coil from the water spray nozzles
- For remote sump applications and where the water distribution pump is not supplied by Güntner, a globe valve should be installed in the water pump discharge line and the water flow rate adjusted between 8-10 psig at the inlet of the supplied riser pipe to ensure sufficient water flow to all the water spray nozzles

NOTICE								
Remote sump ECOSS models GCHE	0709	0712	0718	0812	1012	1212	1018	1218
Required water flow (GPM) (See Note 1)	330	440	670	490	590	710	900	1100
Water inlet pressure (PSI) (See Note 2)	8 to 9	8 to 9	8 to 9	8 to 9	8 to 9	8 to 9	9 to 10	9 to 10
Water inlet pressure (H2O ft) (See Note 2)	18 to 21	18 to 21	18 to 21	18 to 21	18 to 21	18 to 21	21 to 23	21 to 23
Note 1: Water flow tolerance is +2%/-2%								
Note 2: Verified at the gage supplied with the unit in the pipe riser								

After 24 hours of operation;

- Check the water level within the cold water basin
- Adjust the water level control valve if required
- Check all water spray nozzles and confirm that each has a uniform, full spray pattern over the condenser coil
- Units which are subject to subfreezing climates must be adequately protected to protect against damage and / or reduced thermal performance. Mechanical (basin heaters) and operational controls must be utilized, and correctly set up, to prevent any freeze damage occurring to the unit

6.3 Cold weather operation

Typically the operation of evaporative cooled equipment at full load (or close to) conditions, will prevent the recirculating water from freezing. However, during periods of reduced load and especially when pumps and / or fan motors are shut down, freeze protection must be considered. When the ECOSS evaporative cooling equipment is going to be used in subfreezing ambient conditions the following items must be considered:

NOTICE
Note any instruction labels on the unit

- Unobstructed unit location / layout (Recirculated air entering the cooler will cause icing on the inlet louvers)
- Protection against water in basin from freezing – basin heaters are offered as an accessory
- All cold water basin heaters are designed to maintain a water temperature of 40°F [5°C] when the water distribution pump and fan motors are shut down
- When the equipment is run dry the cold water basin must be drained, even if basin heaters are installed
- During dry operation ensure that the drain line for the basin is left open to prevent the accumulation of rain water or snow
- All external water lines, the pump and external water distribution piping to the unit must be heat traced and insulated when operating at subfreezing conditions (access to riser piping will be via removable profile covers)

- The supply line for make-up water, overflow and drain lines must be heat traced and insulated
- All connections and / or accessories at or below the water level must be heat traced and insulated – such as an electronic water level controller
- For fluid coolers protection against the fluid from freezing within the coil – typically the use of glycol or alternate anti-freeze solutions must be considered.
- These solutions and the concentration thereof will have an impact on the thermal performance of the cooler, which should be considered when selecting the equipment
- Visual inspections and maintenance frequencies should be increased during subfreezing conditions
- All operating controls for freeze protection and capacity control should be checked on a regular basis during subfreezing operation

A remote sump is the best form of protection for subfreezing operating conditions to prevent freezing in the cold water basin during subfreezing ambient conditions, low load conditions or when running dry. The remote sump is located in an indoor heated environment and when the pump is not running the cold water basin and all associated water distribution piping will free drain by gravity.

NOTICE

Immersion basin heaters will not prevent the residual water within the pump and recirculated water piping from freezing. These components must be heat traced and insulated.

6.4 Extended shut-down

- When a unit(s) needs to be shut down for an extended period of time the following items should be undertaken;
- Disconnect, lock out and tag and electrical motors for fan(s) and pump(s)
- Drain the cold water basin and ensure that the make-up water line is shut-off
- Draining all water from the unit(s) will minimize the possible risk of biological contamination during the shut-down period
- Flush cold water basin and clean, with strainer(s) in place
- Clean and replace strainer(s)
- Drain all exposed water piping
- Leave cold water basin drain line open
- Heat trace and insulate all exposed piping, water distribution pump and piping up to overflow level

- Clean all dirt and debris from the exterior and interior of the unit(s)
- Clean and replace inlet louvers
- It is recommended to cover the fan discharge outlets to prevent the ingress of dirt and debris
- During periods of extended shut-down or prolonged storage all impellers must be rotated each month at least 10 revolutions

7 Electrical

7.1 Field wiring

The ECOSS unit is shipped with all motors pre-wired to individual terminals housed within a NEMA 4X enclosure. A Modbus communication cable from each EC motor is wired to the optional Güntner Motor Management (GMM) Controller housed within a NEMA 4X enclosure.

The water distribution pump is not factory wired.

Dependent on the electrical options selected will determine what field wiring is required. The selected motor power supply will need to be run to the unit. A power supply will be required for each motor in the event of a non-fused disconnect and Motor Starter Protectors (MSP's) not being selected. When a non-fused disconnect and MSP's are supplied one main power cable needs to be run to the non-fused disconnect.

NOTICE

Refer to the submittal package for each unit supplied to verify all electrical field wiring requirements.

All wiring must be undertaken by qualified personnel in accordance with national and local electrical codes and standards.

7.2 Electrical data

7.2.1 Water distribution pump

The water distribution pump is not factory wired and will require field wiring.

NOTICE

VFD's should not be used on water distribution pump motors. Failure to comply with this will result in reduced cooler performance due to insufficient wetting of the coil bundle. Design water flow over the coil bundle is required at all times, especially with regard to capacity control.

NOTICE

Specific installation information is available on our website or upon request.

7.2.2 Basin heaters

Basin heaters are copper, through the wall immersion heater elements with an integral thermostat. Wiring, disconnects, contactors and overload protection are by others. A Motor Starter Protector (MSP) can be supplied for each heater element to provide overload protection, short circuit protection and a manual on / off switch for each element. A main non-fused disconnect and contactors can also be provided to energize heater elements.

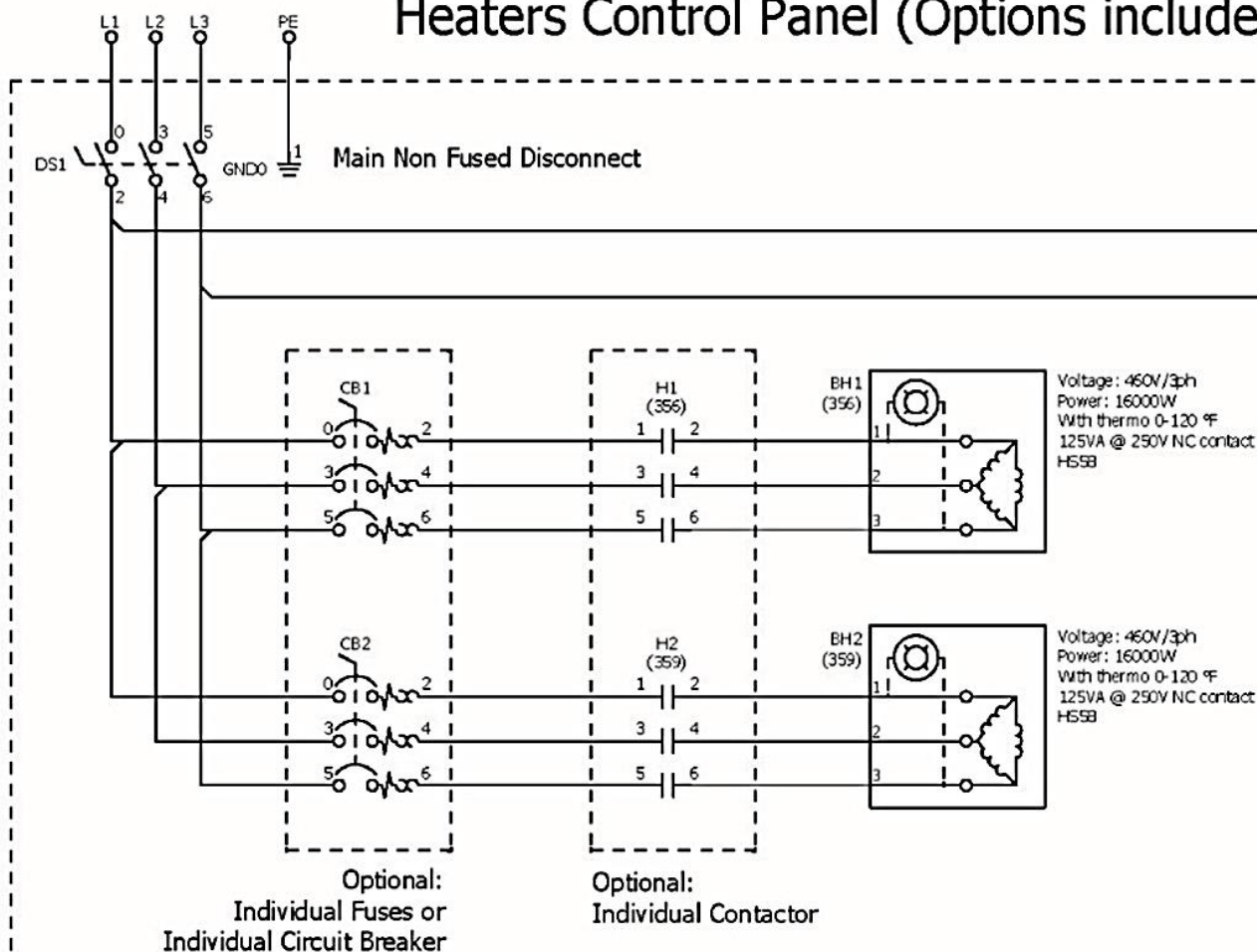
7.2.2.a Basin heaters - generic schematic

NOTICE
Refers you to possible damage to property.

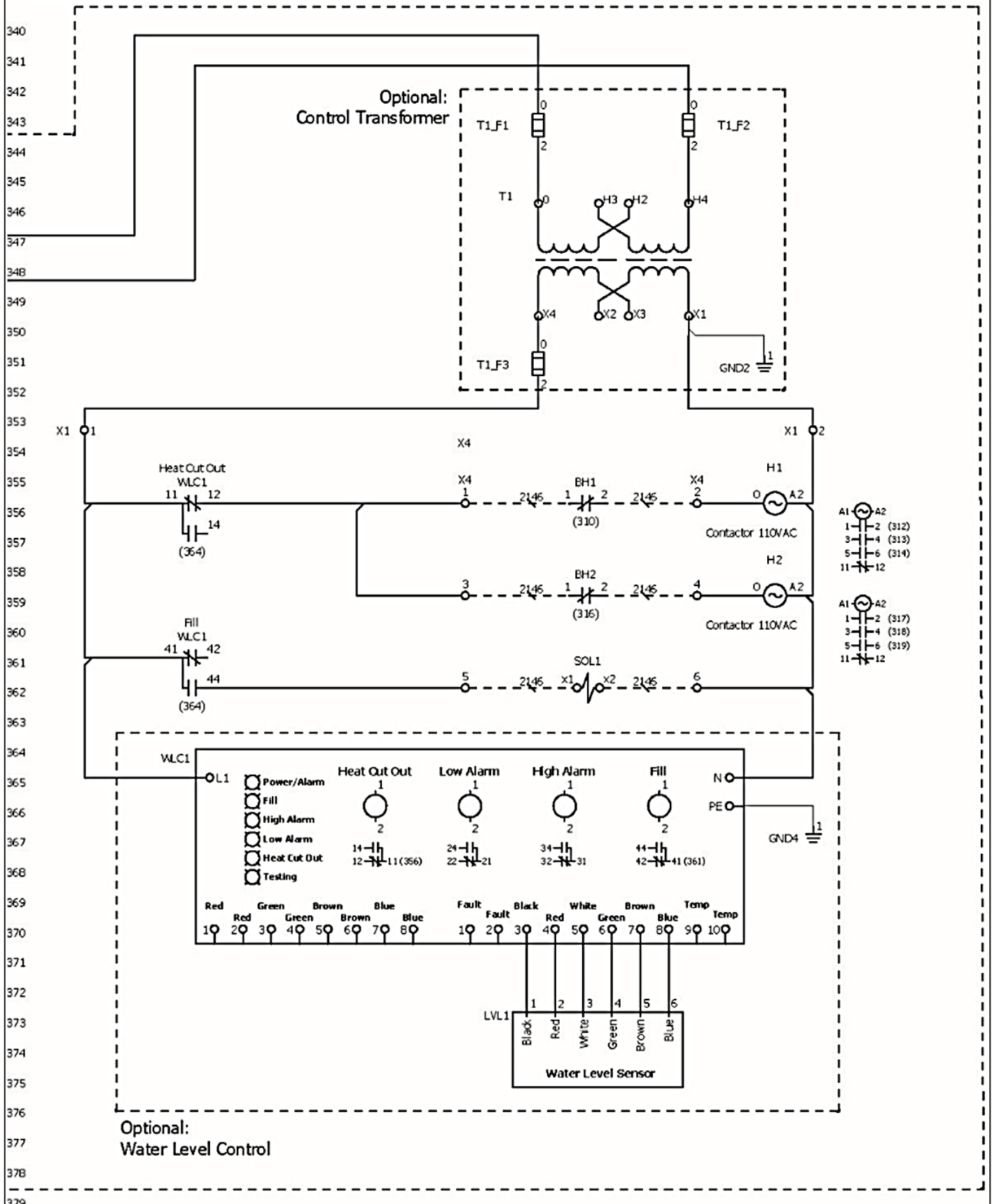
Incoming Power

Customer Power Supply

Heaters Control Panel (Options included)



Heaters Control Panel (Options included) (Continued)



7.3 Electronic water level controller

A conductance type electronic level control package is provided with probes located in a PVC standpipe external to the basin and with a prewired control panel mounted on the unit. Suitable for 115V/1Ph/60Hz.

7.4 Electrical enclosures

All electrical enclosures are NEMA 4X constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water and hose directed water); that provides an additional level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure. NEMA 4X is equivalent to IP66 protection classification. As standard the enclosures are of FRP construction but stainless steel enclosure is optional.

7.5 Fan motors

NOTICE

Specific operation and maintenance information is available on our website or upon request.

NOTICE

See the pages below for generic schematics for EC Motors.

7.5.1 EC motors

A Güntner Motor Management (GMM) Controller is included as standard on all models supplied with EC motors. The GMM is supplied with either a pressure or temperature transducer which will require field placement. This functionality will allow the GMM to automatically control the primary cell fan motors in accordance with the system and ambient conditions. Alternatively the GMM can be supplied with a 0 – 10Vdc or 4 – 20mA signal from the PLC and operate in a slave mode according to system requirements. This will allow for the motors to receive a 0 – 10Vdc and function automatically accordingly. Alternatively the motors can be controlled via a communication protocol such as Modbus or Profibus.

As such the following operating modes are possible with EC motors;

1. Automatic control via the internal set point of the GMM (Temperature or Pressure control point)
2. Automatic control via external analog input (0 – 10Vdc)
3. Automatic control via communication protocol (Modbus, Profibus)
4. Slave mode via external analog input (0 – 10Vdc)
5. Slave mode via external communication protocol (Modbus, Profibus)

7.5.2 EC Motors - generic schematic:

NOTICE

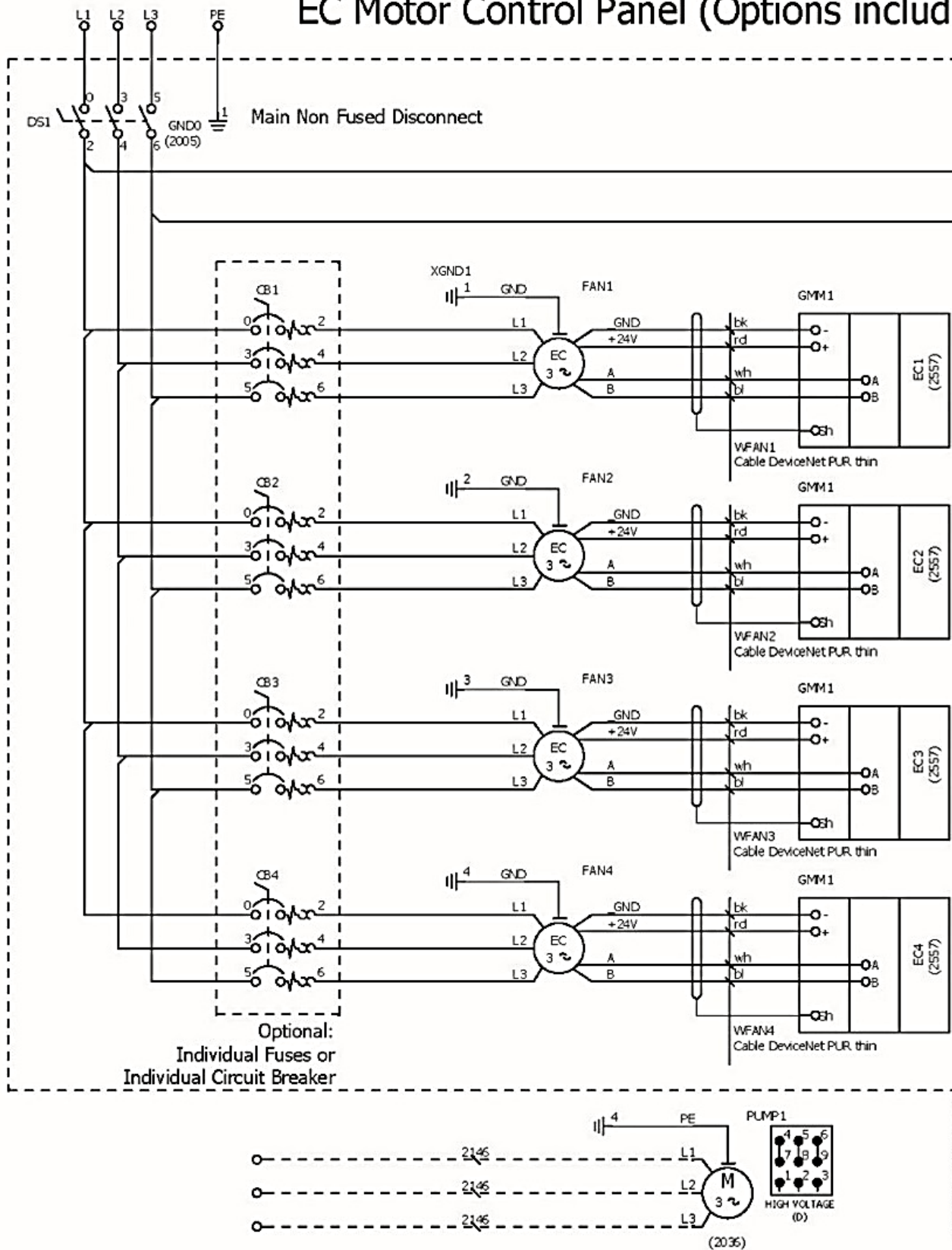
Refer to the submittal package for specific unit information.

Electrical schematic for EC Motors (Generic)

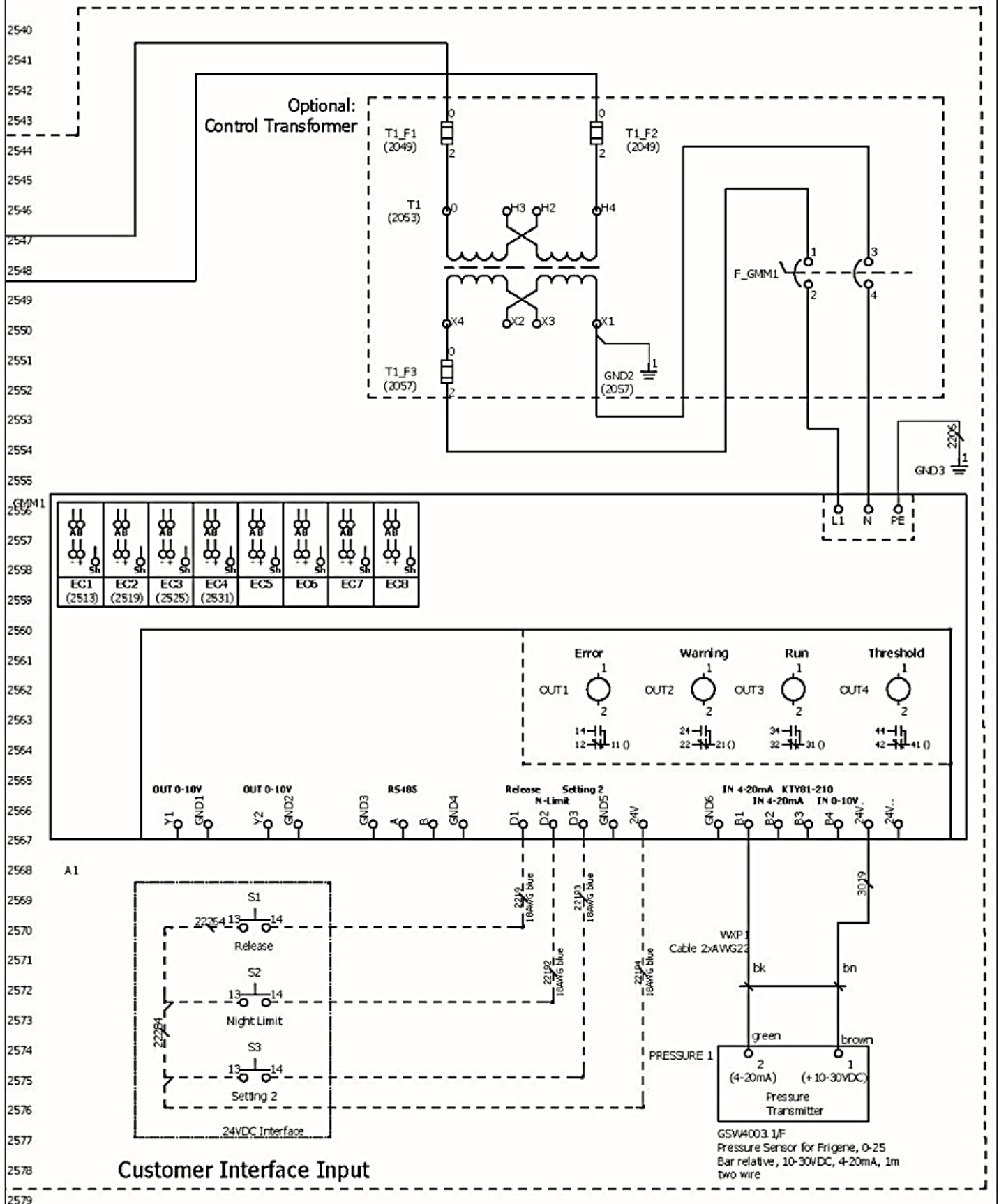
Incoming Power

Customer Power Supply

EC Motor Control Panel (Options included)



EC Motor Control Panel (Options included) (Continued)



7.6 Capacity control

7.6.1 Normal operation

Essentially the only choices available for capacity control are either fan cycling or variable speed (frequency) (VFD) drive technology. The EC motor option incorporates fan speed control within the motor's electronic controller without the need for any "external" VFD's. Fan cycling will require the use of contactors, controlled via a feed from either the PLC or a pressure / temperature sensor. Fan cycling is not recommended for evaporative units due to the elevated power input requirements associated with fan cycling versus variable fan speed technology. When cycling individual fan(s) off and on there exists the possibility that moist air could condense and freeze on the impellers and / or fan orifices of the motor(s) which is (are) not running. As such during these low ambient conditions all fan motors must be cycled to prevent extended idle times for each motor. The fan cycling option is therefore not recommended by Güntner.

Automatic control of the motors via an internal set point on the GMM, external analogue input (0 – 10Vdc) or external communication protocol (Modbus, Profibus) is the most energy efficient option available, and is the methodology recommended by Güntner.

7.6.2 Cold weather operation

When operating the ECOSS unit at low ambient temperatures above freezing, the control logic will be the same as for summer operation. The water distribution pump should run continuously during operation and as either the leaving fluid temperature (for closed circuit units) or condensing temperature (for evaporative condensers) decreases or increases the fan motor speed should be decreased or increased respectively.

However, when ambient conditions drop below freezing additional precautionary measures are required to prevent the potential for damage to the equipment from ice formation.

NOTICE

Refers you to possible damage to property.

While spring and fall daytime ambient temperatures may be above freezing there is always the possibility that night time temperatures can drop below freezing. Operators of this equipment MUST take this into consideration.

The ECOSS EC (Electronically Commutated) motors offer the best solution for fan motor speed control. All EC motors are provided with a GMM (Güntner Motor Management) controller which will modulate the motor speeds dependent on the leaving fluid temperature or condensation temperature setpoint. It is also possible to provide a 0 – 10V or 4 – 20mA feed to the controller to regulate motor speed. With this controller, one per cell, all motors will change speed collectively.

NOTICE

Varying the recirculated water flow rate across the heat exchange coil is not suggested as a means of capacity control in low load or low ambient conditions.

8 Maintenance requirements

8.1 Inspection and maintenance frequencies

Recommended Inspection and Maintenance Frequencies					
	Start-Up	Monthly	Quarterly	Annually	Shut-down
Inspect and Clean as Required					
Inspect general condition of unit(s)	x	x			x
Clean basin strainer	x	x			x
Clean and flush cold water basin	x		x		x
Drain cold water basin and all water piping					x
Flush water distribution system	x		x		
Inspect water spray nozzles and confirm uniform distribution	x		x		
Inspect inlet louvers	x	x			x
Inspect bleed rate and adjust if required	x	x			
Check operating level of water in basin and adjust if necessary	x	x			
Inspect drift eliminators	x		x		
Inspect coil				x	x
Inspect fan guards for any dirt or debris	x	x			x
Clean exterior of unit	x		x		
Test water quality to ensure no biological contamination	x	x	x	x	
Confirm water treatment specialist has a fixed program in place	x	x	x	x	
Inspect Mechanical Components as Required					
Inspect fan motors and impellers for any noise or vibration	x		x		
Confirm correct rotation of impellers	x	x			
Confirm impeller(s) rotates freely and has no obstructions	x		x		
Confirm correct rotation of water distribution pump	x		x		
Check all motor amperages against nameplate amps (FLA)	x		x		
Check all voltages	x		x		
Inspect all electrical junction boxes for loose wiring and / or moisture	x	x			x
Options and Accessories					
Inspect basin heater thermostat operation and set point	x		x		
Inspect for scale build up on basin heater elements			x		x
Inspect electronic water level controller and clean probe ends			x		x
Clean internal portion of stand pipe	x		x		x
Inspect and clean water make-up solenoid valve	x		x		x
Inspect all electrical junction boxes for loose wiring and / or moisture	x		x		x
Check that the purge valve is free of any obstructions		x		x	
Maintenance Frequencies are suggested for "typical" installations. Aggressive or severe environmental conditions could require maintenance frequencies to be increased. Industrial and/or chemical fumes, salt, dust and any unusual airborne contaminants will be absorbed into the recirculated water system which could form solutions and deposits and be harmful to the unit.					

8.2 Detailed description of maintenance requirements

8.2.1 Inlet louver removal

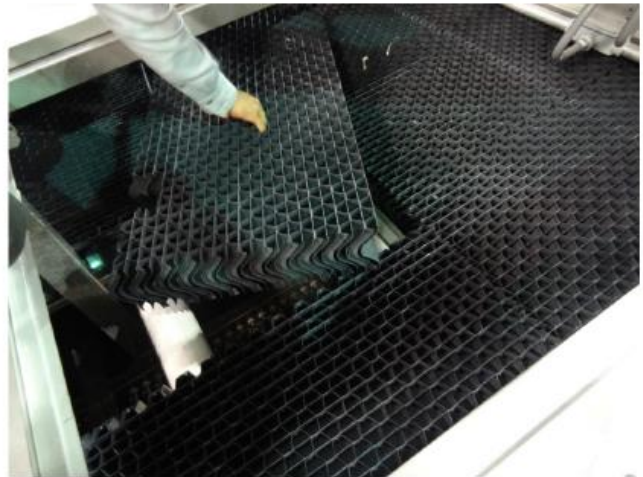
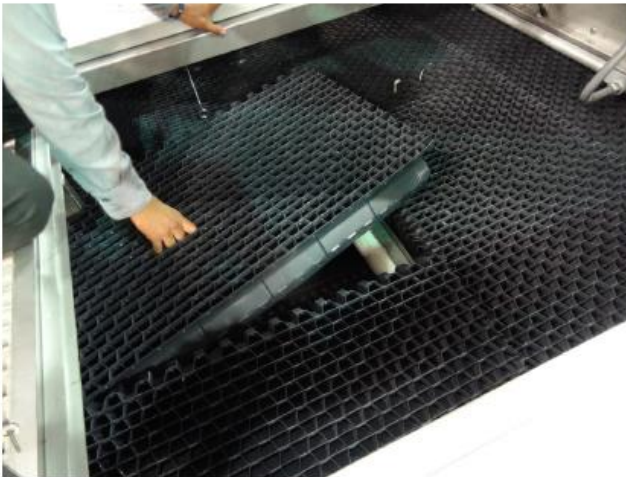
Refer to in section "5.5.5.b Inlet Louvers Removal" on page 37 for instructions on how to remove the inlet louvers in order to access the cold water basin and basin strainer.

8.2.2 Drift eliminators removal / nozzle cleaning - inspection

Drift eliminators can be accessed from the internal walkway at the top of the unit.



Grab the drift eliminator pattern and pull up so that the edge towards the center of the opening below the hinged fans comes out first.



After the drift eliminator(s) are removed the spray headers and water spray nozzles can be found attached to the bottom of the PVC pipe(s).



Inspect the water spray nozzles for debris.



8.2.3 Cold water basin:

The cold water basin is a fully welded stainless steel 304L construction. The basin should be inspected regularly to ensure cleanliness. Remove all debris from the basin and any accumulation on the strainers. When required the basin should be completely drained, thoroughly cleaned and flushed with fresh clean water to remove any sediment which may accumulate within the lower portions of the basin. During this process the strainers must be left in place to prevent any carry-over of this sediment into the piping system and thereby being redistributed within the system. Only after the basin has been flushed clean, should the strainers be removed, cleaned and replaced ensuring a tight fit between strainers and basin to prevent any debris bypassing the strainers. Once complete the basin must be refilled with clean water.

During operation the water level within the cold water basin will vary dependent on the thermal load, evaporation rate and the bleed rate. Inspect the water level on a regular basis and re-adjust the float valve when required to maintain the water level at the recommended operating level of 14 1/4" from the base of the depressed basin. When the water distribution pump is turned off the water level within the basin should be 17" from the base of the depressed basin before energizing the pump.

The water make-up supply pressure should be between 15 and 50 psig at all times to ensure correct operation of the make-up valve.

It is recommended that a pressure regulating valve be installed in the water make-up supply line when conditions exist where the water supply pressure is greater than 50 psig.

The ECOSS unit is supplied with a mechanical make-up valve, as standard, or an electronic water level controller, as an option.

The electronic water level controller includes a factory assembled standpipe incorporating electrodes which are factory set at pre-determined lengths to maintain the required water level. When required, these electrodes should be removed from the stand pipe and cleaned to prevent the buildup of any scale accumulation and/or biological growth. The internal section of the standpipe should be cleaned of any dirt or sludge accumulation. Fittings are supplied in order to accomplish this.

The electronic water level controller includes low and high level alarm output functions and a low water level basin heater(s) cut off function for added protection.

8.2.4 Stainless steel casing and panels:

During normal operation stainless steel is naturally self-passivating and as such does not require any field passivation. However, in order to maintain the corrosion resistance, stainless steel should be cleaned on a regular basis. This also serves to maintain the aesthetics of the stainless steel surfaces. While most dirt and soiling can easily be removed from the stainless steel surfaces simply by wiping with a clean cloth, with mild detergent and warm water, more stubborn dirt can be removed with the addition of a mild dose of vinegar. In all instances these surfaces must be rinsed with warm water and wiped clean with a clean dry cloth after cleaning. There are numerous commercial stainless steel wipes and solvents available which can also be used to clean these stainless steel surfaces. (Follow the instructions provided with these commercial products)

NOTICE

Chlorides or chlorine based cleaning solutions e.g. bleach or hydrochloric acid must NEVER be used to clean stainless steel surfaces.

8.2.5 Water distribution system:

The water distribution piping is made of polyvinyl chloride (PVC) which is corrosion resistant, and requires no protection against rust or degradation. The water distribution header is an arrangement made of hydraulic polyvinyl chloride (PVC), and requires no corrosion protection, but will require maintenance such as cleaning or flushing when required to remove any sludge accumulations and retard any biological growth.

The drift eliminators are constructed from heavy duty PVC, are UV and corrosion resistant and aerodynamically optimized to ensure zero moisture carryover from the saturated discharge airstream.

NOTICE

Prior to any inspection(s) and / or maintenance of the water distribution system ensure that all fan motors are shut off, locked out and tagged out. The water distribution pump must be left running in order to thoroughly inspect and evaluate the effectiveness of the water distribution system.

Removal of the drift eliminator section(s) will provide access to the water spray nozzles and allow for a clear view of the water spray distribution pattern from each nozzle. The spray pattern from the nozzles should be uniform and it should also be validated that the entire plan area of the heat exchange coil is being wetted. Any nozzles which do not produce a 360° spray pattern should be removed and cleaned. An excessive sludge buildup in the spray branches and / or nozzles should be further investigated. This could be due to the strainers not inserted correctly, or being damaged.

When required drift eliminators can be cleaned with a pressure washer, however do not use high pressure or steam to clean the drift eliminators.

When required, inlet louvers can be cleaned with a pressure washer, however do not use high pressure or steam to clean the drift eliminators.

NOTICE

High pressure water or steam must never be used to clean the PVC components within the ECOSS unit e.g. drift eliminators, inlet louvers, water distribution piping and the spray nozzles. High pressure or steam must never be directed at motors. The motors should be suitably wrapped if any (high) pressure cleaning is applied to the ECOSS unit.

NOTICE

Before performing any maintenance, adjustment(s) or inspection of the electrical and mechanical components, make certain that all power has been switched off, locked out and tagged out.

8.2.6 Water distribution pump

Pressure readings from the pump discharge should be recorded at the time of startup and used, if required, for future reference. When a remote sump is provided for the unit the pressure at the inlet to the supplied water pipe riser should be between 6 - 8 psig.

Electrical data; voltage and amperage readings should be recorded and verified against original installation data.

Inspect the pump(s) on a regular basis for leaks, rectify if required.

The pump and pump motor should be inspected, lubricated and maintained in accordance with the manufacturers' recommendations. (Available upon request.)

8.2.7 EC Motors

EC motors are essentially maintenance free.

Before connecting the power supply, ensure that the supply voltage matches the operating voltage of the motor(s). Ensure that the terminal box on the motor is tightly secured and sealed and all cable glands are properly tightened. Condensate discharge holes should always be open, ensure that these are not clogged with any debris, clean if required.

No lubrication of bearings is required. Bearings are sealed and will last the life of the motor.

9. Water quality and water treatment guidelines

NOTICE

It is strongly recommended to consult with a water treatment service company with full service capabilities before installation.

9.1 Bleed or blow down rate:

The thermodynamics behind evaporative cooling is such that a portion of the recirculated water passing over the heat exchange surface evaporates as it absorbs the heat from the fluid being cooled. This process provides the primary cooling effect. The heat is rejected into the atmosphere as relatively warm saturated air discharged through the fan section. However, only pure water will evaporate which implies that any impurities within the make-up water will remain within the recirculated water system. Dependent on the location it is also possible that airborne impurities are absorbed into the recirculating water system. The impurities and any airborne contaminants (dissolved solids) therefore remain in the water system and if not effectively controlled can lead to sludge accumulations, biological growth, scale, fouling and corrosion as they increase in concentration within the water distribution system. In order to prevent these dissolved solids from over concentrating a portion of the recirculating water system must be drained from the system as a bleed, or blow down. The concentration level of these dissolved solids is referred to as the cycles of concentration within the water distribution system.

Cycles of Concentration =	$\frac{\text{Water Conductivity [in the evaporative unit]}}{\text{Makeup Water Conductivity}}$
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As can be determined from this equation the cycles of concentration reflect the degree to which the dissolved solids in the makeup water are allowed to concentrate in the recirculating water system. The higher this ratio, the more the dissolved solids in the makeup water are allowed to concentrate in the water system, and the lower the bleed rate. To reduce the cycles of concentration makeup water must be added to the recirculated water system. However, in order to add water to the system, an equal amount must be removed from the system. This is what is referred to as the bleed or blow down. As such, regulating the bleed rate will therefore maintain a specific cycle of concentration. A regulating valve is located on the discharge side of the water pump on all ECOSS units. An automatic conductivity controller is recommended to maximize the efficiency of the water usage and reduce water wastage.

The cycles of concentration equation above can be expressed in terms of water flow by the following equation:

Cycles of Concentration	=	MU / BD
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MU = Total makeup water, which is the sum of evaporation + bleed (gpm)

BD = Bleed flow rate (gpm)

MU in this equation can be replaced with the value (E + BD), where E is the evaporation rate and can therefore be rearranged to yield the following relationship:

$$BD = E / (\text{Cycles of Concentration} - 1)$$

The evaporation rate will always be dependent on the location (wet bulb temperature) and the heat load.

There are two methods to control the blow down / bleed rate:

Constant Blow Down – manually setting the bleed regulating valve at the pump discharge, based on periodic analysis of the concentration of dissolved solids (water hardness), at peak loads. This a simple method, but due to the blow down being constant, the loss of water and water treatment chemicals is high, expensive and certainly not efficient.

Controlled Blow Down – Using Güntner's GCC (Güntner Conductivity Controller), which monitors the dissolved solids (water hardness) as indicated by its conductivity. Automated control minimizes water and chemical waste, and is the preferred method. When selecting the GCC, the components are supplied by the factory. Güntner default configures the controller for the proper range and should only be changed to maintain the desired concentration by a qualified water treatment specialist.

9.2 Water treatment guidelines:

Water related problems that typically occur in an evaporative condenser or closed circuit cooler can be broadly classified as:

- Scale Deposits
- Corrosion
- Microbiological Fouling

Scale deposits are a serious concern in evaporative heat transfer products. When dissolved solids become overly concentrated, an adherent deposit termed "scale" will form on the tubes of the heat exchanger, severely impacting the thermal performance of the heat exchanger. Evaporative cooled deposits may also include dust scrubbed from the air, corrosion byproducts and microbiological contaminants (slime). Regardless of the source, the end result is reduced thermal performance, increased operating costs and eventually, equipment failure.

Corrosion in water is usually an electrochemical reaction initiated by the presence of naturally occurring impurities in water or microbiological growth. Corrosion is the destructive reaction of a metal with its immediate environment, resulting in metal loss and ultimately equipment failure. Metal corrosion occurs as a result of galvanic action at a negatively charged pole, or site on the metal surface. Both anodes and cathodes can be created on metal surfaces due to impurities in the metal, localized stress, metal grain size or composition differences. The difference in charges between anodes and cathodes creates an electrical potential between them which results in an electrical charge flowing from anodes to cathodes, using the surrounding water was a conductor. General corrosion is wide spread and normally caused by impurities in the metal or characteristics of the metal or its environment that results in an overall fouling of the metal surface. Localized corrosion results from stress or localized environment.

Having a consistent maintenance program in place and maintaining the equipment in a clean state all ascribe to the longevity of ECOSS units.

Microbiological fouling results from bacteria, fungi, zooplankton and algae introduced into the system through makeup water or filtered from the air. Fouling results when these microorganisms grow in open systems rich in oxygen and form slime on the surfaces of the equipment. Slime is an aggregate of both biological and non-biological materials. The best method of controlling biological fouling in evaporative units is to keep them clean. At least twice during the cooling season, the unit should be drained, scrubbed clean and allowed to dry fully before refilling.

Thereafter, a chemical treatment will complete the process. Uncontrolled microbiological fouling can cause major corrosion and deposit problems in evaporative units. Microbials in condenser water systems can become resistant to a single method of treatment, therefore it is recommended that both oxidizing and non-oxidizing types of chemical treatment be used, either blended together or in alternating treatment patterns, as indicated by periodic water test results. The key to a successful biological treatment program is maintaining adequate chemical treatment levels at all times via continuous feed of antimicrobials in the water distribution system.

Legionella thrives in water temperatures between 68°F (20°C) and 122°F (50°C), with optimum growth occurring between 95°F (35°C) and 115°F (46°C). Low pH and high levels of aquatic growth enhance bacteria growth. Water temperatures above 140°F (60°C) will kill the bacteria.

The typical operating temperature(s) of evaporative units range from 85 - 100°F, which makes the equipment an ideal habitat for Legionella. The major mechanism for infection by Legionella is via the inhalation of aerosolized water droplets or particles containing the bacteria. Evaporative coolers' spray nozzles introduce aerosolized water droplets and therefore represent prime mechanisms for infecting humans. Drinking water with the bacteria in it will not cause disease, nor can the disease be passed by human-to-human contact.

⚠ WARNING

Evaporative units should be tested for Legionella within the water distribution system. This testing must be specific for Legionella. "Total bacteria" testing, promoted by some water treatment companies is inadequate since there is no correlation between total bacteria and Legionella concentrations. It is recommended that these tests are done once per annum as a minimum, however, twice per annum is recommended.

As such a water treatment program, undertaken by a water treatment service company with full service capabilities, is a mandatory requirement for all ECOSS units, and must be included in the maintenance schedule. The water treatment program must be compatible with the unit's materials construction. In systems with mixed metallurgy, the water treatment expert must devise a program to ensure adequate protection for all components within the recirculated water loop. A system with a remote sump and carbon steel interconnecting piping coupled to the stainless steel heat exchanger is an example of mixed metallurgy.

It is recommended that the water treatment service company has sufficient expertise and experience to completely address all aspects of water related issues. The proposed approach to water treatment should incorporate proven technology. This does not exclude new technologies, products or methods, but does mean that the company should be able to demonstrate that their proposed technology has been successfully applied at other locations with similar water treatment conditions and requirements.

It is also recommended, at least twice a year, to send water samples from the units to an independent laboratory for analysis and compare the results with the most recent monthly reports provided by the water treatment company.

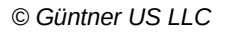
The water treatment program for ECOSS units is integral to water and energy efficiency. Effective water treatment will also ensure the longevity of the ECOSS units.

NOTICE

Failure to comply with the water guidelines as laid out above will void all warranties.

Disclaimer: The Water treatment and water quality guidelines presented here has been compiled from sources believed to be reliable. No guarantee is implied or expressly stated here and the data given is intended as a guideline only.

Water Quality Guidelines (316L Stainless Steel Tubes)	
Property	Recommended Value
Total Bacteria (cfu/ml)	< 1,000
pH (@ 90°F)	6.0 - 9.0
Chlorides as Cl ⁻	< 400 ppm (max. Cl)
Sulfates as SO ₄ ²⁻	< 500 ppm
Silica	< 150 ppm
Hardness as CaCO ₃	< 500 ppm
Alkalinity as CaCO ₃	< 600 ppm (as CaCO ₃)
Total Dissolved Solids (TDS)	< 1,500 ppm
Total Suspended Solids	< 40 ppm
Conductivity	< 3,000
Free Chlorine	<2.0 ppm
NOTES: 1) The water quality guidelines listed above are for clean surfaces. Proper and periodic equipment maintenance is required to prevent tube fouling, surface deposit(s), scale, microbial deposit(s), etc. which in turn can reduce the range of the guidelines provided above. 2) Water distribution nozzles are to be kept clean at all times to ensure complete wetting of the coil. Failure to do so will result in warranty being voided. 3) Only Non - Chlorinated Biocides should be used for biological control 4) Anaerobic dip slide: Sessile bacteria sampling must be conducted along with bulk water (planktonic) sampling	



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