

# RIGGING AND INSTALLATION INSTRUCTIONS



TSU-C/D for External Melt  
TSC-C/D for External Melt

ICE CHILLER® Thermal Storage Unit  
ICE CHILLER® Thermal Storage Coil only

The BAC equipment should be rigged and installed as outlined in this bulletin.





These procedures should be thoroughly reviewed prior to the rigging and operation to acquaint all personnel with the procedures to be followed and to assure that all necessary equipment will be available at the jobsite.

Be sure to have a copy of the unit certified drawing available for reference. If you do not have a copy of this drawing or if you need additional information about this unit, contact the local BAC Balticare representative. His name and phone number can be found on the BAC website: [www.BaltimoreAircoil.eu](http://www.BaltimoreAircoil.eu). The model type and serial number of your equipment are indicated on the unit nameplate.



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## About engineering and application practices

This bulletin only refers to the assembly of the unit. To ensure a proper operation, a correct integration of the unit in the overall installation is mandatory. For good engineering and application practices on layout, levelling, connecting pipework, etc..., please refer to our website: <http://www.baltimoreaircoil.eu/knowledge-center/application-information>.

## Shipping

BAC cooling equipment is factory assembled to assure uniform quality and minimum field assembly.

For the dimensions and weights of a specific unit or section, refer to the certified drawing.

## Inspection before Rigging

When the unit is delivered to the jobsite, it should be checked thoroughly to ensure all required items have been received and are free of any shipping damage prior to signing the bill of lading.

The following parts should be inspected:

- Exterior panels and covers
- Ice coils
- Sight tube and Ice Logic Ice Quantity controller (optional)
- Air pump
- Caulking material

The air pump and caulking material are shipped loose in a separate crate.

If shipping damage has occurred, this should be clearly indicated on the CMR.

## Unit Weights

Before rigging any BAC cooling equipment, the weight of each section should be verified on the unit certified drawing.

*Note: These weights are **approximate** only and should be confirmed by weighing **before lifting** when available hoisting capacity provides little margin for safety.*

Model TSU-C/D	Approx Shipping weight (kg)
TSU 95C	2550
TSU 115C	2780
TSU 120C	2860
TSU 145C	3270
TSU 170C	3670
TSU 200C	4220
TSU 225C	4630
TSU 185C	4040
TSU 230C	4630
TSU 270C	5170
TSU 310C	5940
TSU 350C	6490

Table 1: Approximate Shipping weights TSU-C/D

Model TSU-C/D	Approx Shipping weight (kg)
TSU 290C	5440
TSU 340C	6120
TSU 400C	7080
TSU 450C	7760
TSU 480C	8940
TSU 590C	10340
TSU 700C	11660
TSU 800C	13610
TSU 910C	14960
TSU 1050C	17190
TSU 790D	13790
TSU 940D	15470
TSU 1080D	17920
TSU 1220D	19550
TSU 1440D	22090

Table 1: Approximate Shipping weights TSU-C/D

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**Before an actual lift is undertaken, ensure no water, snow, ice or debris has collected in the sump or elsewhere in the unit. Such accumulations will add substantially to the equipment's lifting weight.**

Model	No° of Coils	Approx. Shipping Weight (kg)
TSC-95C	1	1065
TSC-115C	1	1205
TSC-120C	1	1315
TSC-145C	1	1500
TSC-170C	1	1635
TSC-200C	1	1950
TSC-225C	1	2135
TSC-185C	2	1065
TSC-230C	2	1205
TSC-270C	2	1340
TSC-310C	2	1590
TSC-350C	2	1725
TSC-290C	2	1500
TSC-340C	2	1635
TSC-400C	2	1950
TSC-450C	2	2135
TSC-480C	4	1365
TSC-590C	4	1545
TSC-700C	4	1680
TSC-800C	4	2000
TSC-910C	4	2180
TSC-1050C	6	1680
TSC-790D	4	2065
TSC-940D	4	2315
TSC-1080D	4	2720
TSC-1220D	4	2950
TSC-1440D	4	3310

Table 2: Approximate shipping weights TSC-C/D coil only



## Leveling

The unit must be level for proper operation and ease of piping. Support beams must also be level as shims should not be used between pan and support beams to level the unit.

## Connecting Pipework

All piping external to BAC cooling equipment must be supported separately. In case the equipment is installed on vibration rails or springs, the piping must contain compensators to eliminate vibrations carried through the external pipework.

All connections in the external pipework (installed by others) must be leak free and tested accordingly. All piping external to BAC cooling equipment must be supported separately.

## Welding Pipework

Coils of ICE THERMAL STORAGE units are filled with a low inert gas at the factory before shipping, to ensure an optimal internal corrosion protection.

On site, the pressure needs to be released from the coil by opening the pressure relieve valve and removing the pipe caps.

For NH3 coils cut the threaded pipe-end and bevel for welding on site. Make sure to protect the unit against sparks from the cutting process with a suitable material. Next connect the pipework to the coil connections by welding.

## Purge Requirements

The installer of BAC equipment must ensure proper system purging of air prior to operation. Entrained air can obstruct the proper flow of glycol solution, resulting in higher operating pressures than design and reduced thermal storage capacity.

## Freeze Protection

These products must be protected against damage and/or reduced effectiveness due to possible uncontrolled freeze-up by mechanical and operational methods. Please refer to the BAC Product & Application Handbook or contact your local BAC Balticare representative for recommended protection alternatives.

## Safety Precautions

All electrical, mechanical and rotating machinery constitute a potential hazard, particularly for those not familiar with its design, construction and operation. Accordingly, adequate safeguards (including use of protective enclosures where necessary) should be taken with this equipment both to safeguard the public (including minors) from injury and to prevent damage to the equipment, its associated system and the premises.

If there is doubt about safe and proper rigging, installation, operation or maintenance procedures, contact the equipment manufacturer or his representative for advice.

When working on operating equipment, be aware that some parts may have an elevated temperature. Any operations on elevated level have to be executed with extra care to prevent accidents.

Air piping between air pump and TSU/TSC can have temperatures above 40°C. Insulate the piping if necessary to prevent personal injury.

### AUTHORIZED PERSONNEL

The operation, maintenance and repair of this equipment should be undertaken only by personnel authorized and qualified to do so. All such personnel should be thoroughly familiar with the equipment, the associated systems and controls and the procedures set forth in this and other relevant manuals. Proper care, procedures and tools must be used in handling, lifting, installing, operating and repairing this equipment to prevent personal injury and/or property damage.

### MECHANICAL SAFETY

Mechanical safety of the equipment is in accordance with the requirements of the EU machinery directive. Depending upon site conditions it also may be necessary to install items such as screens, ladders, safety cages, stairways, access platforms, handrails and toe boards for the safety and convenience of the authorized service and maintenance personnel. At no time this equipment should be operated without all, access cover panels and access doors in place. For more information consult your local BAC Balticare representative.

### ELECTRICAL SAFETY

Each motor associated with this equipment should be installed with a lockable disconnect switch located within the sight of the equipment. No service work should be performed on or near the motors or inside the equipment unless motors are electrically isolated.

### LIFTING

**Failure to use designated lifting points can result in a dropped load causing severe injury, death and/or property damage. Lifts must be performed by qualified riggers following BAC published Rigging Instructions and generally accepted lifting practices; The use of supplemental safety slings may also be required if the lift circumstances warrant its use, as determined by the rigging contractor.**

### LOCAL REGULATIONS

Installation and operation of cooling equipment may be subject of local regulations, such as establishment of risk analysis. Ensure regulatory requirements are consistently met.

## Warranties

Please refer to the Limitation of Warranties applicable to and in effect at the time of the sale/purchase of these products.



## General Notes

1. To simplify rigging and installation, units are shipped in one piece, so only one lift is required. It is important to follow the guidelines listed below when rigging these units.
2. Lifting devices have been provided for short lifts and final positioning. The table "Approximate shipping weights" on page 7 shows the location of the lifting devices for each tank size. For safety, it is recommended that for extended lifts or whenever hazards exist, safety slings are used in addition to the spreader beams.
3. Lifting and transportation of the equipment by means of lift trucks is not permitted, as this may result in serious damage of the tank bottom and the ice coils.
4. Spreader bars of the full width of the section must be used between the lifting cables to prevent damage to the section. For extended lifts or where hazards exist, it is recommended to use the lifting devices in conjunction with safety slings placed under the unit.

## Support requirements

### ON A LEVEL CONCRETE PAD

The unit should be continuously supported on a level concrete pad. After the unit is set into final position, the tank bottom should be sealed airtight all around to prevent condensation formation (see figure). The sealer is shipped loose with the unit, together with the air pump.

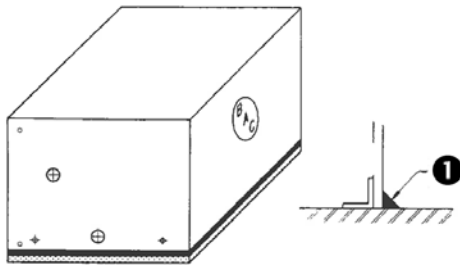


Figure 1: Unit continuously supported on a level concrete pad

1. Seal around base of tank

### ON 3 I-BEAMS

If continuous support is not possible, an alternative recommended support arrangement consists of 3 parallel I-beams extending the full length of the unit: 2 supporting beams should be located along the unit length and 1 beam should be located on the centreline of the unit. (see figure)

Each beam should be sized for 65% of the total operating weight. If a unit is installed on I-beams additional insulation of the tank bottom is necessary to avoid the formation of condensation.

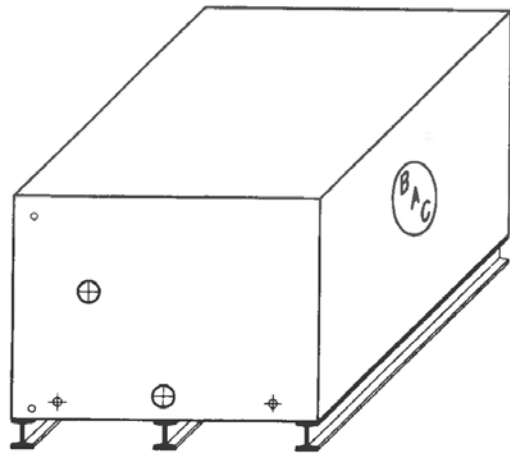


Figure 2: Installation on 3 I-beams

### ON A ROOF

For installation of the unit on a roof, additional field insulation between tank bottom and the roof is required to prevent condensation formation on the ceiling of the floor below (see figure). Recommended insulation material is a vapour tight cork layer.

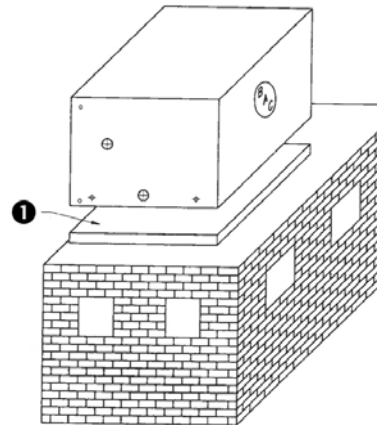


Figure 3: Installation on the roof

1. Cork layer



## Rigging method

### RECOMMENDED LIFTING METHOD TSU C/D

The recommended method of rigging the unit is shown in the figure.

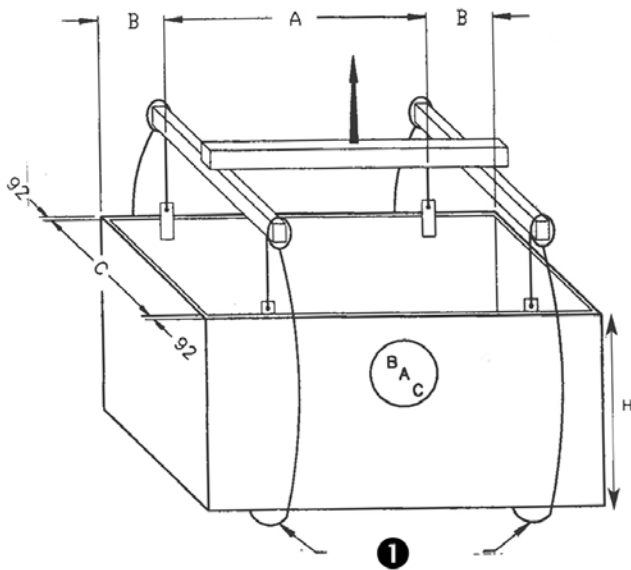


Figure 4: Recommended lifting method

**1. Safety slings**

TSU 95C - TSU 1050C: H= 2160 mm  
 TSU 790D – TSU 1440D: H= 2415 mm

**The lifting cables must be vertical in both planes as shown.**

**When lifting units as shown, some tank covers must be removed to provide access to the lifting ears. Ensure that the lifting cables do not damage the remaining covers.**

Three lifting beams are required. The lifting ears and tank are not designed to support the loads resulting from lifts employing less than 3 lifting beams as shown in hereunder.

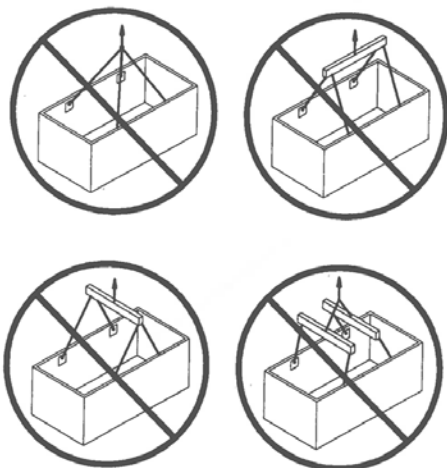


Figure 5: Lifting methods not permitted

Model TSU C/D	L x W Dimensions	Approx Shipping weight (kg)	A (mm)	B (mm)	C (mm)
TSU 95C	3073 x 1308	2550	1597	738	1124
TSU 115C	3683 x 1308	2780	2403	640	1124
TSU 120C	3073 x 1600	2860	1597	738	1416
TSU 145C	3683 x 1600	3270	2403	640	1416
TSU 170C	4293 x 1600	3670	2899	702	1416
TSU 200C	4877 x 1600	4220	3371	753	1416
TSU 225C	5486 x 1600	4630	3276	1105	1416
TSU 185C	3073 x 2400	4040	1597	738	2216
TSU 230C	3683 x 2400	4630	2403	640	2216
TSU 270C	4293 x 2400	5170	2889	702	2216
TSU 310C	4877 x 2400	5940	3371	753	2216
TSU 350C	5486 x 2400	6490	3276	1105	2216
TSU 290C	3683 x 2981	5440	2403	640	2797
TSU 340C	4293 x 2981	6120	2889	702	2797
TSU 400C	4877 x 2981	7080	3371	753	2797
TSU 450C	5486 x 2981	7760	3276	1105	2797
TSU 480C	6096 x 2981	8940	3430	1333	2797
TSU 590C	7290 x 2981	10340	4618	1336	2797
TSU 700C	85 x 29081	11660	5889	1310	2797
TSU 800C	9703 x 2981	13610	5941	1881	2797
TSU 910C	10922 x 2981	14960	6300	2311	2797
TSU 1050C	12725 x 2981	17190	6899	2913	2797
TSU 790D	7290 x 3581	13790	4618	1336	3397
TSU 940D	8509 x 3581	15470	5889	1310	3397
TSU 1080D	9703 x 3581	17920	5941	1881	3397
TSU 1220D	10922 x 3581	19550	6300	2311	3397
TSU 1440D	12725 x 3581	22090	6899	2913	3397

Table 3: Approximate Shipping weights TSU-C/D

### ROLLING INTO POSITION TSU C/D

As an alternative to lifting, the unit can be rolled into position. If rollers are used they should be placed under the unit and must exceed the unit width. The span between the rollers should not exceed 1 m.

### RECOMMENDED LIFTING METHOD TSC COILS ONLY

When lifting the coils, use the U-bolts provided on each corner. Hoisting cables should be at a minimum of 45° up to maximum vertically with the horizontal top line of the coil..

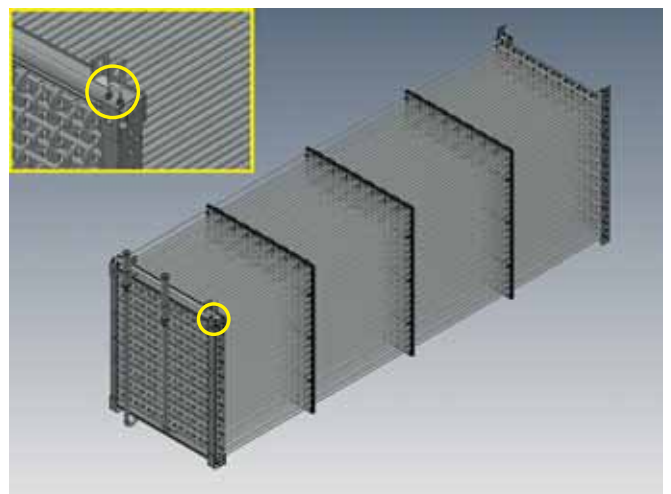


Figure 6: Lifting Method for TSC coil only

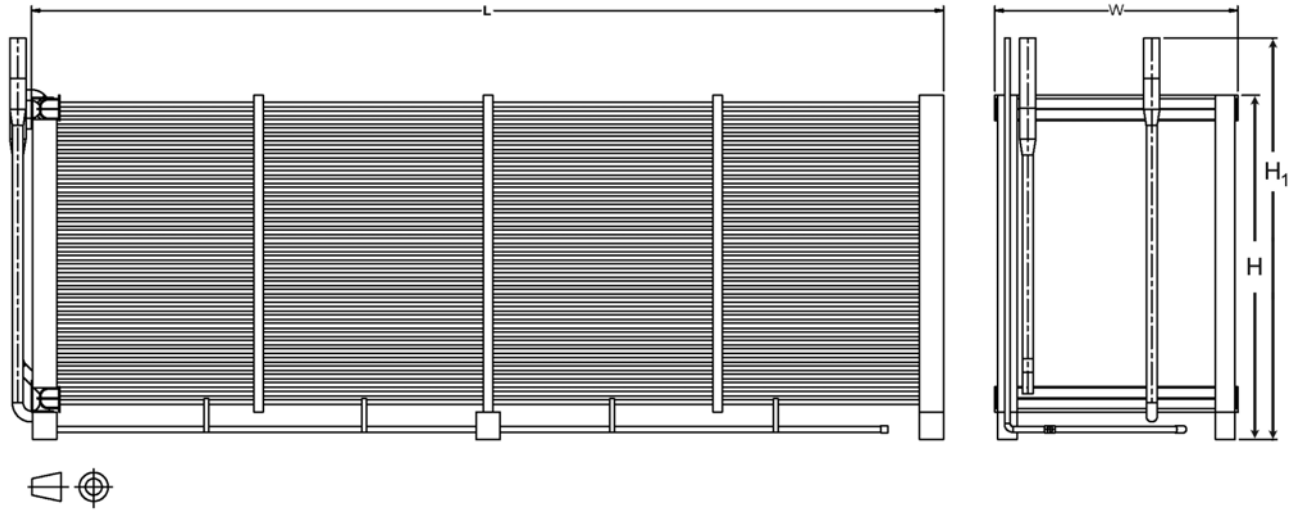


Figure 7: Rigging Dimensions for TSC coil only

Model	L (mm)	W (mm)	H (mm)	H1 (mm)
TSC-95C	2654	1055	1912	2260
TSC-115C	3258	1055		
TSC-120C	2654	1350		
TSC-145C	3258	1350		
TSC-170C	3861	1350		
TSC-200C	4464	1350		
TSC-225C	5070	1350		
TSC-185C	2654	1055	1912	2260
TSC-230C	3258			
TSC-270C	3861			
TSC-310C	4464			
TSC-350C	5070			
TSC-290C	3258	1350	1912	2260
TSC-340C	3861			
TSC-400C	4464			
TSC-450C	5070			
TSC-480C	2721	1350	1912	2260
TSC-590C	3327			
TSC-700C	3928			
TSC-800C	4534			
TSC-910C	5137			
TSC-1050C	4030			
TSC-790D	3327	1645	2102	2448
TSC-940D	3931			
TSC-1080D	4534			
TSC-1220D	5140			
TSC-1440D	6045			

Table 4: Approximate Dimensions TSC-C and TSC-D

## TSU-C/D piping

### WATER CONNECTIONS

Balancing valves must be installed on all water inlet connections to adjust the flow through each connection.

### COIL CONNECTIONS

Coils of ICE THERMAL STORAGE units are filled with a low inert gas at the factory before shipping, to ensure an optimal internal corrosion protection.

On site, the pressure needs to be released from the coil by opening the pressure relieve valve and removing the pipe caps.

For NH3 coils cut the threaded pipe-end and bevel for welding on site. Make sure to protect the unit against sparks from the cutting process with a suitable material. Next connect the pipework to the coil connections by welding.

1. If coils are supplied filled with nitrogen, the nitrogen pressure should be relieved through the supplied relief valve before removing the cap.
2. If units remain on site for a long period without being installed, coils must be kept closed to avoid condensation and corrosion.

### REFRIGERANT CONNECTIONS ON SITE

All connections in the external pipework (installed by others) must be leak free and tested accordingly. All piping external to BAC cooling equipment must be supported separately.

### PURGE REQUIREMENTS

The installer of BAC equipment must ensure proper system purging of air prior to operation. Entrained air can obstruct the proper flow of glycol solution, resulting in higher operating pressures than design and reduced thermal storage capacity.



## Air pump installation

The standard BAC delivery consists of a centrifugal air pump (with an inlet air filter), a threaded adaptor and a flexible discharge sleeve to be connected to the customer provided air piping. A non-return valve is shipped loose with the air pump for field installation.

After the unit has been rigged into position, the air pump can be installed. The recommended air piping is shown in the figure: the air supply is taken from the ambient air. The air pump is to be mounted on a clean, dry and vibration free surface which is flat and will support the unit. Special pads are not required.

The mounting surface should be levelled and the pumps must be securely bolted in place. It is recommended that, in case of outdoor installation, the air pump is installed under a shelter. The air pump should be located within 6 meters of the air distribution inlet piping. If a more remote location of the air pump is required, consult your local BAC representative.

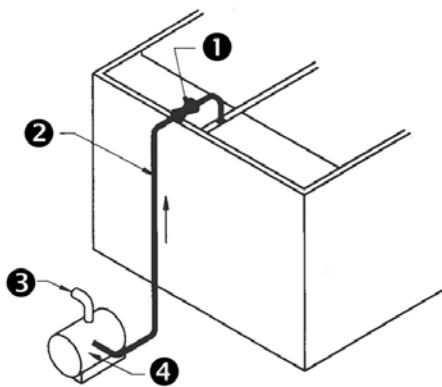


Figure 8: Recommended air pump piping arrangement

1. Non-return valve
2. Steel pipe for initial 3m; then PVC for remainder of air supply (by others)
3. Filter
4. Air pump

## Installation for TSC coils only

Whenever TSC coils are to be installed in a concrete tank the following components are provided together with the coils:

- The Ice Logic ice thickness controller: sensors are installed on the coil, control box is shipped loose, wiring to be done on site.
- The air pump: shipped loose
- Air piping: mounted underneath the coils
- Coil supports: with sufficient height to elevate the coils above the tank bottom in order to provide space underneath for water distribution piping supplied by other
- Hold down channels and covers are required to prevent the coils from floating when completely loaded with ice. These channels and covers on top of a concrete tank are not part of BAC's standard supply.

Contact your BAC representative if assistance is required for the design of these components.

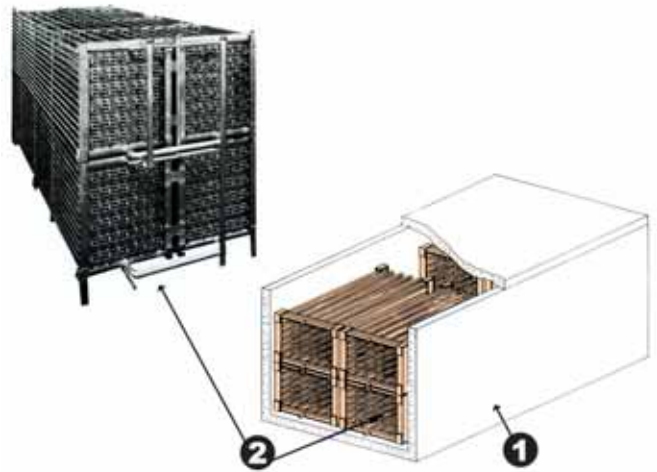


Figure 9: Ice Chiller Thermal Storage coils only - TSC C/D

1. Concrete Tank
2. Ice Chiller Thermal Storage Coils



## General

Prior to start-up, the following services, which are described in detail in the Operating and Maintenance Manual (see Table Recommended Maintenance and Monitoring Schedule- Start-up) must be performed.

Proper start-up procedures and scheduled periodic maintenance will prolong the life of the equipment and ensure trouble-free performance for which the unit is designed.











## Schedule

Type of Action	Action	Start-Up	Monthly	Every Six Months	Annually	Shutdown
<b>Inspections and Monitoring</b>	General condition	X	X			
	ICE CHILLER <sup>®</sup> Tank	X			X	
	ICE CHILLER <sup>®</sup> Water <sup>(1)</sup> - Quality - Level	X X		X X		
	Ice Thickness	X	X			
	Coil	X				
	ICE LOGIC <sup>™</sup> Ice Quantity controller : - condition of sensor - conductivity of tank water	X X		X		
	Air Pump - Air Filter Replacement	X	X		X	
	Refrigerant: - Glycol quality - NH <sub>3</sub> purge oil				X X	
	Air Distribution Piping	X				
<b>Cleaning procedures</b>	Mechanical cleaning - Air filter	X	X		X	X
	Disinfection	X			X	X

Table 5: Recommended Maintenance & Monitoring Schedule

**Notes:**

1. Water Treatment and auxiliary equipment integrated in the cooling system may require additions to the table above. Contact suppliers for recommended actions and their required frequency.
2. Recommended service intervals are for typical installations. Different environmental conditions may dictate more frequent servicing.
3. When operating in ambient temperatures below freezing, the unit should be inspected more frequently.

Model: .....

Serialnumber: .....



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