



**BALTIMORE
AIRCOIL COMPANY**



TSU-C-D ICE CHILLER® Thermal Storage Unit for external melt

RIGGING AND INSTALLATION INSTRUCTIONS





About rigging and installation

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 job site.

Recommended maintenance and monitoring programme

Inspections and monitoring	Start-Up	Monthly	Quarterly	Every 6 months	Annually	Shutdown
General condition	X	X				
Ice Chiller® tank	X				X	
Ice Chiller® water (1) - Quality - Level	X X			X X		
Ice thickness	X	X				
Coil	X					
Ice Logic™ Ice Quantity controller: - condition of sensor - conductivity of tank water	X X	X			X	
Air pump - Air filter replacement	X	X			X	
Refrigerant: - Glycol quality - NH ₃ purge oil				X X		
Air distribution piping	X					

Cleaning procedures	Start-Up	Monthly	Quarterly	Every 6 months	Annually	Shutdown
Mechanical cleaning - Air filter	X	X	X		X	X
Disinfection	X				X	X

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 installation should be inspected more frequently.

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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 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 equipment, the weight of each section should be verified on the unit certified drawing. Refer to the Rigging section for weight values.



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



CAUTION

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

Leveling

The unit must be level for proper operation and ease of piping.

When the unit is installed on a concrete slab, this one should have a levelness or maximum slope of 3 mm per 3 meter and the flatness should be no more than 4 mm over a 2 meter span.

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.

Suction pipe sizing should be done according to good practice, which may for larger flows require larger pipe diameters than the outlet connection. In such cases adapter pieces need to be installed.

Coil connections

Coils of BAC ice thermal storage units are filled with a low pressure inert gas at the factory before shipping, to ensure an optimal internal corrosion protection. It is recommended to check the overpressure every six months (connect a manometer to the valve).

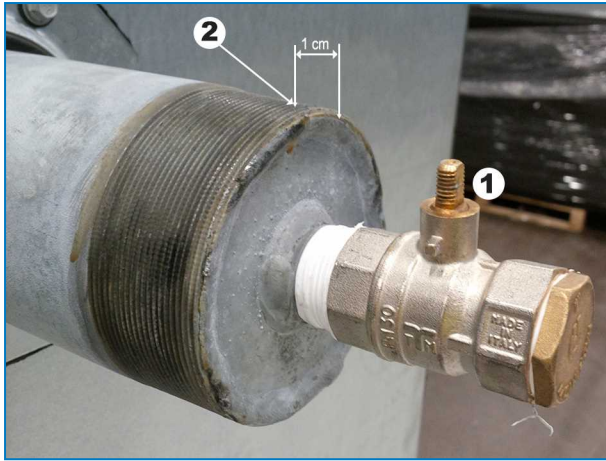
On site, the pressure needs to be released from the coil. Remove the plug first before opening the pressure relieve valve.

In case of threaded connections, clean up the thread prior to connecting it to the pipework.

Non-threaded connections must be bevelled on site before they can be welded.



Non-threaded coil connection with pressure release valve on ice thermal storage unit for direct refrigerant feed.



Threaded coil connection with pressure release valve on ice thermal storage unit for glycol execution.

1. Closed pressure release valve of upper coil connection.
2. After releasing the low pressure inert gas, cut coil connection here.



CAUTION

Once the coil is no longer protected by the inert gas, proper actions against corrosion must be taken on site.

Freeze protection

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

Safety precautions

All electrical, mechanical and rotating machinery constitutes 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-C/D 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, personal protective equipment, procedures and tools must be used in handling, lifting, installing, operating, maintaining and repairing this equipment to prevent personal injury and/or property damage. Personnel must use personal protective equipment where necessary (gloves, ear plugs, etc...)

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 bottom 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/closed and properly secured.

For more information consult your local BAC representative.

ELECTRICAL SAFETY

All electrical components associated with this equipment should be installed with a lockable disconnect switch located within sight of the equipment.

In the event of multiple components, these can be installed after a single disconnect switch but multiple switches or a combination thereof are also allowed.

No service work should be performed on or near electrical components unless adequate safety measures are taken. These include, but are not limited to the following:

- Isolate the component electrically
- Lock the isolation switch in order to prevent unintentional restart
- Measure that no electrical voltage is present anymore
- If parts of the installation remain energized, make sure to properly demarcate these in order to avoid confusion

Fan motor terminals and connections may have residual voltage after unit shut-down. Wait five minutes after disconnecting the voltage at all poles before opening the fan motor terminal box.

LIFTING



CAUTION

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 to local regulations, such as establishment of risk analysis. Ensure regulatory requirements are consistently met.



Non-walking surfaces

Access to and maintenance of any component needs to be performed in accordance with all local applicable laws and regulations. If the proper and required access means are not present, temporary structures need to be foreseen. Under no circumstance can one use parts of the unit, that are not designed as an access mean, unless measures can be taken to mitigate any risks that might occur from doing so.

Modifications by others

Whenever modifications or changes are made by others to the BAC equipment without written permission of BAC, the party who has done the modification becomes responsible for all consequences of this change and BAC declines all liability for the product.

Warranty

BAC will guarantee all products to be free from manufactured defects in materials and workmanship for a period of 24 months from the date of shipment. In the event of any such defect, BAC will repair or provide a replacement. For more details, please refer to the Limitation of Warranties applicable to and in effect at the time of the sale/purchase of these products. You can find these terms and conditions on the reverse side of your order acknowledgement form and your invoice.

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 & dimensions" shows the location of the lifting devices for each tank size.
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.
5. For extended lifts or where hazards exist, it is recommended to use the lifting devices in conjunction with safety slings placed under the unit.



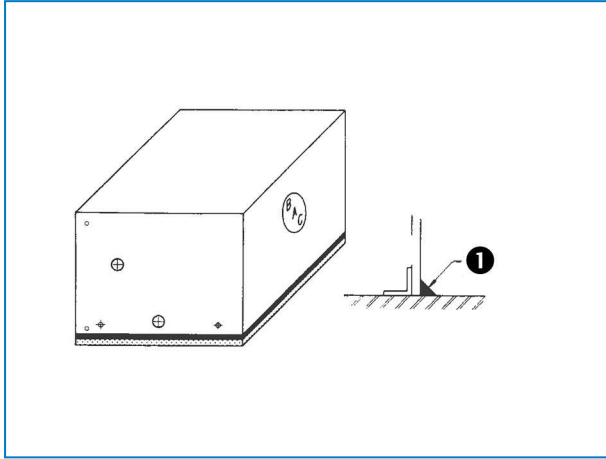
CAUTION

When the unit is installed, all metal parts created by drilling, fastening self tapping screws, grinding, welding or other mechanical works must be removed from the unit. If they remain on the unit (typically on the double break flanges) this could lead to corrosion and eventually coating damage.

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.



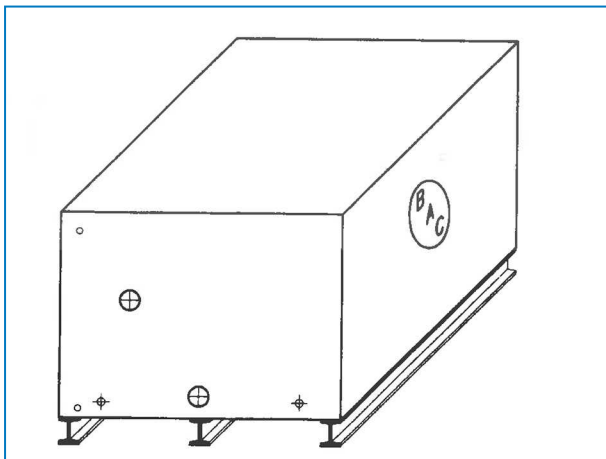
Unit continuously supported on a level concrete pad

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)

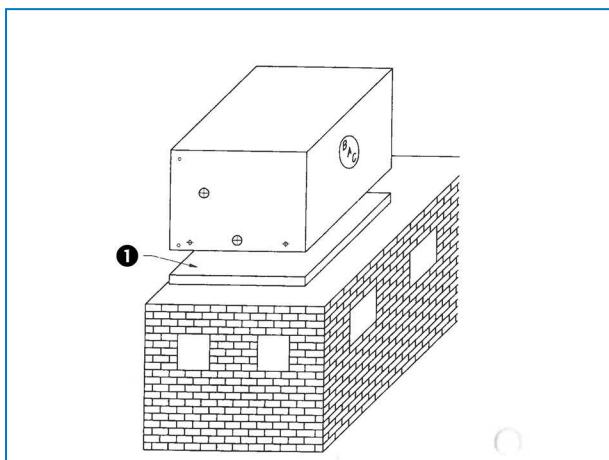
Each beam should be sized for 65% of the total operating weight. If a unit is installed on I-beams additional insulation of the tank bottom is necessary to avoid the formation of condensation.



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.



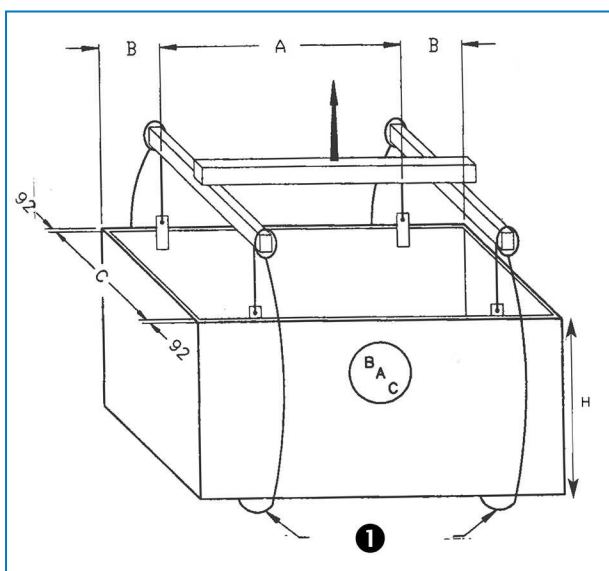
Installation on the roof

1. Cork layer

Rigging method

RECOMMENDED LIFTING METHOD

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



Recommended lifting method

1. Safety slings

TSU 95C - TSU 1050C: H= 2160 mm

TSU 790D – TSU 1440D: H= 2415 mm



CAUTION

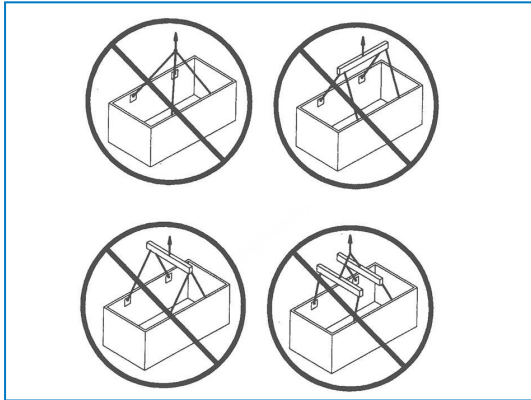
The lifting cables must be vertical in both planes as shown.



CAUTION

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.



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	2620	1597	738	1124
TSU 115C	3683 x 1308	2860	2403	640	1124
TSU 120C	3073 x 1605	2935	1597	738	1416
TSU 145C	3683 x 1605	3355	2403	640	1416
TSU 170C	4293 x 1605	3955	2899	702	1416
TSU 200C	4877 x 1605	4330	3371	753	1416
TSU 225C	5486 x 1605	4745	3276	1105	1416
TSU 185C	3073 x 2400	4130	1597	738	2216
TSU 230C	3683 x 2400	4730	2403	640	2216
TSU 270C	4293 x 2400	5285	2889	702	2216
TSU 310C	4877 x 2400	6065	3371	753	2216
TSU 350C	5486 x 2400	6620	3276	1105	2216

Model TSU C/D	L x W Dimensions	Approx Shipping weight (kg)	A (mm)	B (mm)	C (mm)
TSU 290C	3683 x 2982	5600	2403	640	2797
TSU 340C	4293 x 2982	6245	2889	702	2797
TSU 400C	4877 x 2982	7210	3371	753	2797
TSU 450C	5486 x 2982	7900	3276	1105	2797
TSU 480C	6096 x 2982	9090	3430	1333	2797
TSU 590C	7290 x 2982	10515	4618	1336	2797
TSU 700C	8509 x 2982	11850	5889	1310	2797
TSU 800C	9703 x 2982	13820	5941	1881	2797
TSU 910C	10922 x 2982	15205	6300	2311	2797
TSU 1050C	12725 x 2982	17455	6899	2913	2797
TSU 790D	7290 x 3582	13975	4618	1336	3397
TSU 940D	8509 x 3582	15680	5889	1310	3397
TSU 1080D	9703 x 3582	18150	5941	1881	3397
TSU 1220D	10922 x 3582	19800	6300	2311	3397
TSU 1440D	12725 x 3582	22370	6899	2913	3397

Approximate shipping weights and dimensions

ROLLING INTO POSITION

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.

Piping

WATER CONNECTIONS

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

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.

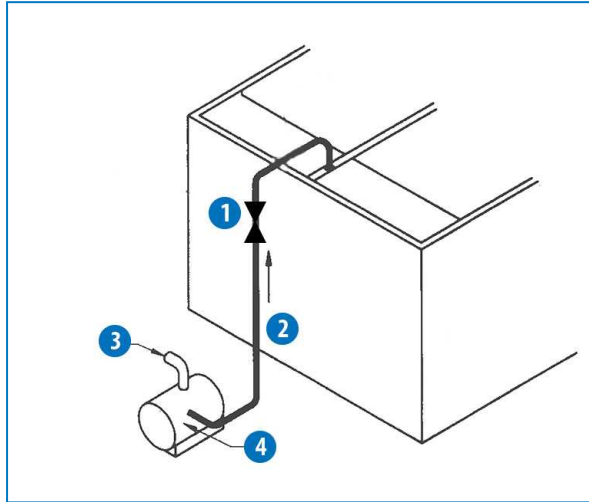
PURGE REQUIREMENTS

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 in the vertical raiser pipe.

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.



Recommended air pump piping arrangement

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



TSU-C-D INSPECTION PRIOR TO START-UP

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 programme") 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.

Assistance

BAC has established a specialized total care company called Balticare. The BAC Balticare offering involves all elements required to ensure a safe and efficient operation of your evaporative cooling products.

For more details, contact your local BAC representative for further information and specific assistance at www.BaltimoreAircoil.eu

More information

REFERENCE LITERATURE

- Eurovent 9-5 (6) Recommended Code of Practice to keep your Cooling System efficient and safe. Eurovent/Cecomaf, 2002, 30p.
- Guide des Bonnes Pratiques, Legionella et Tours Aéroréfrigérantes. Ministères de l'Emploi et de la Solidarité, Ministère de l'Economie des Finances et de l'Industrie, Ministère de l'Environnement, Juin 2001, 54p.
- Voorkom Legionellose. Ministerie van de Vlaamse Gemeenschap. December 2002, 77p.
- Legionnaires' Disease. The Control of Legionella Bacteria in Water Systems. Health & Safety Commission. 2000, 62p.
- Hygienische Anforderungen an raumluftechnische Anlagen. VDI 6022.

INTERESTING WEBSITES

- www.BaltimoreAircoil.eu
- www.BACservice.eu
- www.eurovent-certification.com
- www.ewgli.org
- www.ashrae.org
- www.uniclima.org
- www.aicvf.org
- www.hse.gov.uk

ORIGINAL DOCUMENTATION



This manual is originally made in English. Translations are provided for your convenience. In the event of discrepancies, the English original text shall prevail over the translation.



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COOLING TOWERS

CLOSED CIRCUIT COOLING TOWERS

ICE THERMAL STORAGE

EVAPORATIVE CONDENSERS

HYBRID PRODUCTS

PARTS, EQUIPMENTS & SERVICES

BLUE by nature
GREEN at heart



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