



**BALTIMORE
AIRCOIL COMPANY**



S3000E Open Cooling Towers
XES3000E Open Cooling Tower

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. 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 representative. His name and phone number can be found on the www.BaltimoreAircoil.com. The model type and serial number of your equipment are indicated on the unit nameplate.

Recommended maintenance and monitoring programme

Checks and adjustments	Start-Up	Weekly	Monthly	Quarterly	Every 6 months	Annually	Shutdown
Hot water basin	X			X			
Nozzles	X			X			
Cold water basin and basin strainers	X			X			
Operating level and make-up	X		X				
Blow down	X		X				
Sump heater package	X				X		
Belt tension	X		X				
Drive alignment	X					X	
Locking collar	X						
Rotation of fan(s) and pump (s)	X						
Drive train	X				X		
Gear drive	X	X					
Variable frequency drive	X						
Motor voltage and current	X			X			
Unusual noise and/or vibration	X		X				

Inspections and monitoring	Start-Up	Weekly	Monthly	Quarterly	Every 6 months	Annually	Shutdown
General condition	X		X				
Heat transfer section and drift eliminators	X				X		
Combined inlet shields	X			X			
Hot water basin	X			X			
Spray nozzles	X			X			
Fan shaft & Axial fan	X			X			
Fan motor	X			X			

Inspections and monitoring	Start-Up	Weekly	Monthly	Quarterly	Every 6 months	Annually	Shutdown
Electric water level control package (option)	X				X		
Level or alarm switches				x			
TAB test (dip slides)	X	X					
Circulating water quality	X		X				
System overview	X					X	
Record keeping	as per event						

Lubrication	Start-Up	Weekly	Monthly	Quarterly	Every 6 months	Annually	Shutdown
Fan shaft bearings	X			X			X
Motor bearings*	X				X		
Adjustable motor base	X				X		X
Hinges & access doors bolts						X	
Gear drive	X				X		

* only for motors with grease fittings with typical frame size > 200L (>30 kW)

Cleaning procedures	Start-Up	Weekly	Monthly	Quarterly	Every 6 months	Annually	Shutdown
Mechanical cleaning	X					X	X
Disinfection**	(X)					(X)	(X)

** depends on applied code of practice

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 (see Cold weather operations in the appropriate Operating and Maintenance Instructions).
4. For units with belt drive, tension on new belts must be readjusted after the first 24 hours of operation and monthly thereafter.



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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. The unit models S3E/XES3E-1222-10x through S3E/XES3E-1424-14x are shipped in 2 sections (upper and lower) due to shipping height restrictions.

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



CAUTION

Do not cover units with PVC eliminators or fill with a plastic tarpaulin. Temperature increase due to sun radiation could deform the fill or eliminators.

Inspection before rigging

When the unit is delivered to the job site, 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:

- Sheaves and belts
- Gearbox
- Bearings
- Bearing supports
- Fan motor(s)
- Fan(s) and fan shaft(s)
- Wet deck surface with integral drift eliminators
- Water distribution system
- Strainers
- Float valve assembly
- Combined inlet shields
- Interior / exterior surfaces
- Miscellaneous items



An envelope with check-list is stored in a wooden no nail crate or a plastic container which is placed in the lower section. For safety reasons, access doors / panels may be sealed with bolts. The following table specifies which wrench is required to open them.

Wrench to open access door

17 mm

Required wrenches to open access door

The wooden no nail crate / plastic container also contains miscellaneous parts such as gasket, hardware and accessory items.

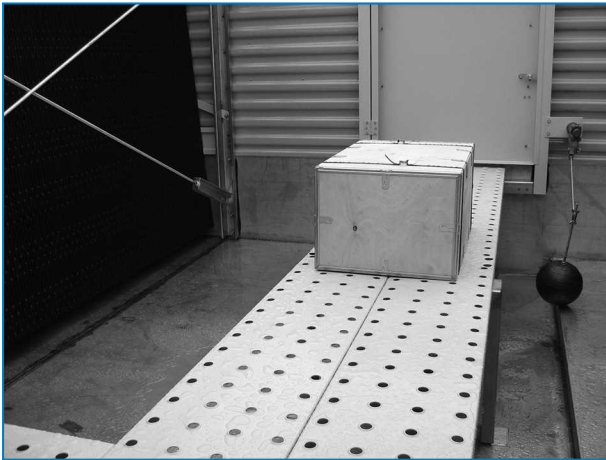
At temperatures below -10°C the butyl sealer tape might lose its flexibility. We recommend to store the sealer tape in a heated room before using it during rigging at freezing temperatures.



CAUTION

Be sure to remove all miscellaneous items from the pan before the unit is assembled.

The wooden box with the hardware is placed inside the unit or in the lower section of the unit. This box is fixed with straps to the internal walkway of the unit.



Hardware location

Unit weights

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



These weights are **approximate** 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 sump or elsewhere in or on the unit. Such accumulations will add substantially to the equipment's lifting weight.

In the event of extended lifts or where hazards exist, the lifting devices should be used in conjunction with safety slings placed under the unit.

Anchoring

The unit must be properly anchored in place.

Refer to the suggested support details on the certified drawing for locations of the mounting holes. Anchor bolts must be provided by others.

Holes suitable for 20 mm bolts are provided in the bottom flange of the lower section for bolting the unit to the support beams.

Leveling

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

Electrical connections

The units are delivered with a number of electrical components that need to be connected after rigging. For all electrical components, please refer to the specific wiring diagrams in the submittal package.

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.

The equipment outlet piping must be installed under the operating level of the equipment to prevent air suction and pump cavitation.

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.

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.

Bleed Line Installation

On all open cooling towers, install a bleed line with valve between the system circulating pump discharge riser and a convenient drain. Locate the bleed line in a portion of the riser piping that drains when the pump is off.



The bleed valve should always be open when the unit is in operation, unless the bleed rate is automatically controlled by a water treatment system.

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.

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 fan screens, access panels and access doors in place/closed and properly secured.

When the equipment is operated with a variable fan speed control device, steps must be taken to avoid operating at or near to the fan's «critical speed».

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 any more
- 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.

LOCATION

All cooling equipment should be located as far away as possible from occupied areas, open windows or air intakes to buildings.



CAUTION

Each unit should be located and positioned to prevent the introduction of discharge air into the ventilation systems of the building on which the unit is located or those of adjacent buildings.



For detailed recommendations on BAC equipment layout, please see the BAC Application Handbook EU-Edition, the BAC website: www.baltimoreaircoil.eu or contact your local BAC Representative.

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.

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S3000E XES3000E RIGGING

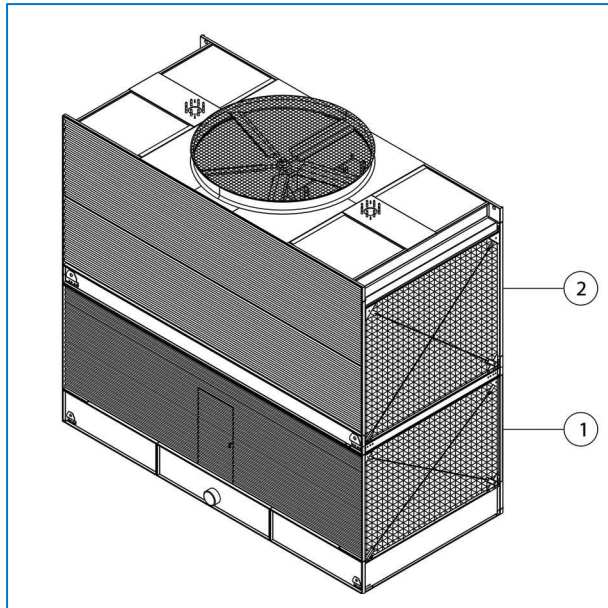
General Notes

1. Unless unit ships fully assembled, unit must be rigged one section at a time.
2. If the delivery consists of separate sections, do not assemble before lifting, as the lifting devices provided are not designed to support the weight of the entire assembly.
3. Spreader bars of the full width of the section must be used between the lifting cables to prevent damage to the section.
4. For extended lifts or where hazards exist, it is recommended to use the lifting devices in conjunction with safety slings placed under the unit.

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. .

5. Refer to the following table and figures for the recommended minimum size of the spreader bar (dimension "A") and the recommended vertical dimension "H" from the lifting device at the base of each unit or section to the spreader bar. The lifting devices can be moved to the alternative lifting device location shown in the following figures for final positioning of multi-cell units. Bolt holes have been provided to accommodate the lifting devices at this alternative location.
6. Units equipped with intake sound attenuation are installed as an integral part of the unit. The use of the alternative lifting device location requires the removal of the intake sound attenuation from the unit section.
7. Lifting devices have been provided on all sections. The tables below give the preferred method for rigging each section of a unit.

Rigging information



Unit sections

1. Lower section
2. Upper section

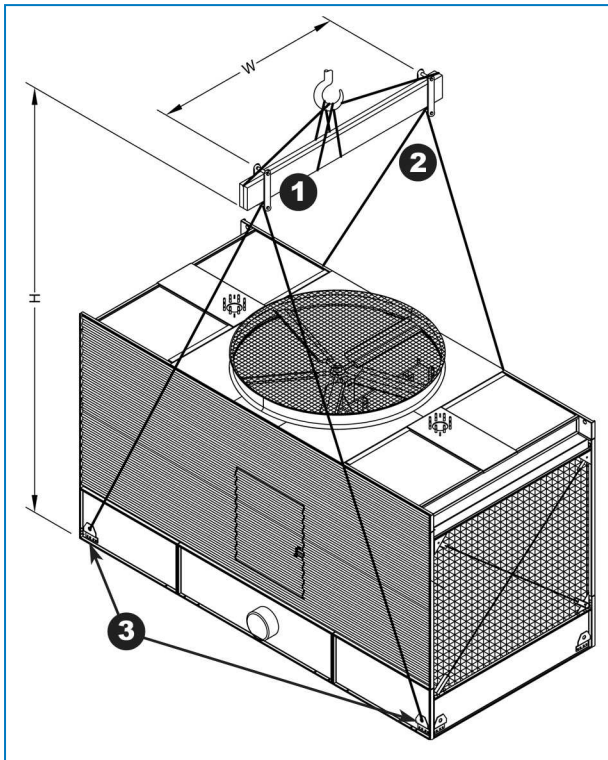
Model	Unit sections	N° Sections	Rigging method	Min. "H" (mm)	Min. "W" (mm)
S3E/XES3E-8518-xxx	FULLY ASSEMBLED	1	A	4580	2590
S3E/XES3E-1020-xxx	FULLY ASSEMBLED	1	A	5180	3050
S3E/XES3E-1222-06x, S3E/XES3E-1222-07x	FULLY ASSEMBLED	1	A	5490	3660
S3E/XES3E-1424-07x	FULLY ASSEMBLED	1	A	6100	4270
S3E/XES3E-1222-10x through S3E/XES3E-1222-14x	Upper section	1	A	5490	3660
	Lower section	1	B	5490	3660
S3E/XES3E-1424-12x through S3E/XES3E-1424-14	Upper section	1	A	6100	4270
	Lower section	1	B	6100	4270

Rigging method

Rigging method for upper section



Rigging Method A



One-section cell or upper section for two-section cells

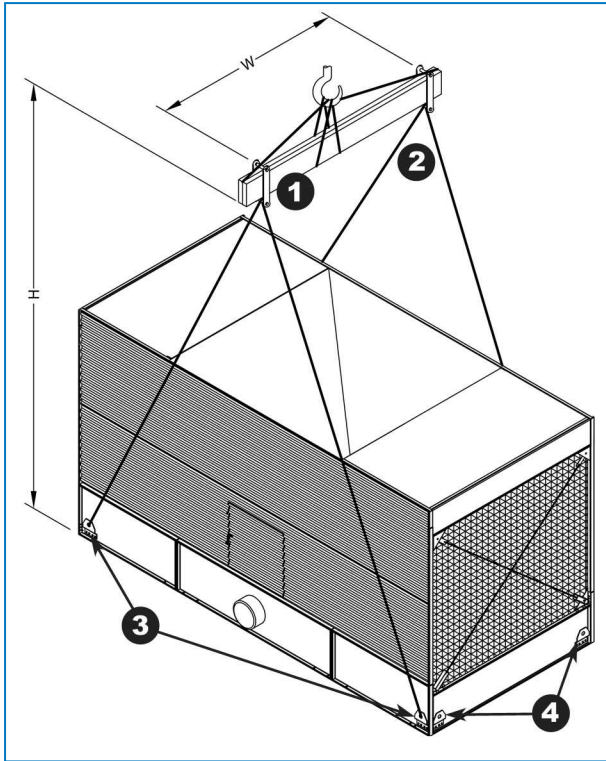
1. Spreader bar
2. Lifting cable
3. Lifting device for this section only



Above figure shows the proper rigging of either a S3000E that ships in one section or the top section of a S3000E that ships in two sections.

Rigging method for lower section

Rigging Method B



Bottom section of two-section cells

1. Spreader bar
2. Lifting cable
3. Lifting device for this section only. **DO NOT USE** for final positioning of assembled cell
4. Lifting device Location. **MUST BE USED** for final positioning of multi-cells



The above figure shows the proper rigging of the lower section of a two-section unit, in addition to the location of bolt holes, which accommodate the lifting devices at alternative locations. It is necessary to move the lifting devices to these alternative locations for final positioning of multi-cell units.



CAUTION

For multi-cell executions remove securing bolts of both access doors of the unit before rigging.

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S3000E XES3000E SECTION ASSEMBLY

Method

On the lower section are 4 locations to position the upper section on the typical rigging guide/bracket

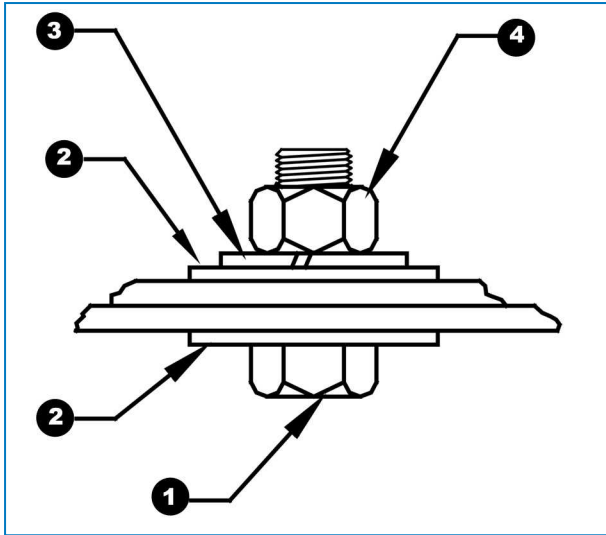


1. Rigging guide/bracket of upper section



2. Rigging guide/bracket of lower section

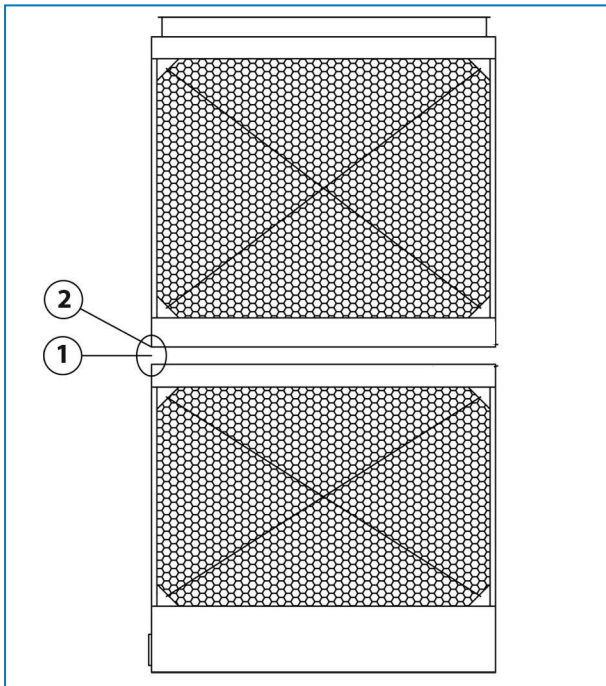
Secure the upper section to the lower section utilizing typical bolting technique as shown in figure below, using the internal rigging guide/brackets with bolt holes.



Typical bolting technique

1. Bolt
2. Flatwasher
3. Lockwasher
4. Nut

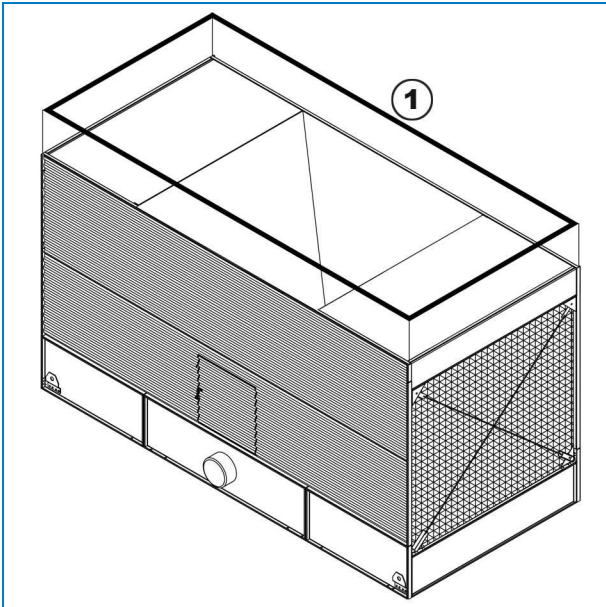
Models S3E/XES3E-1222-10x to S3E/XES3E-1222-14 and S3E/XES3E-1424-12x to S3E/XES3E-1424-14x



S3000 section assembly

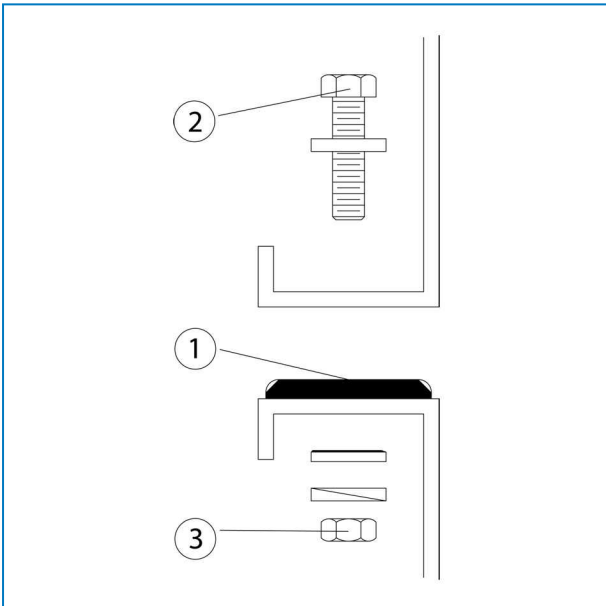
1. Factory installed foam sealer tape
2. 12 mm bolt & flatwasher

First, position the lower section on the unit supports and bolt in place. Wipe down the upper flanges to remove dust, dirt or moisture that may have accumulated during shipment and storage. Install foam sealer supplied with the unit, as illustrated in the figures below.



Installation of foam sealer around top of section

1. Apply foam sealer tape around the periphery of the section



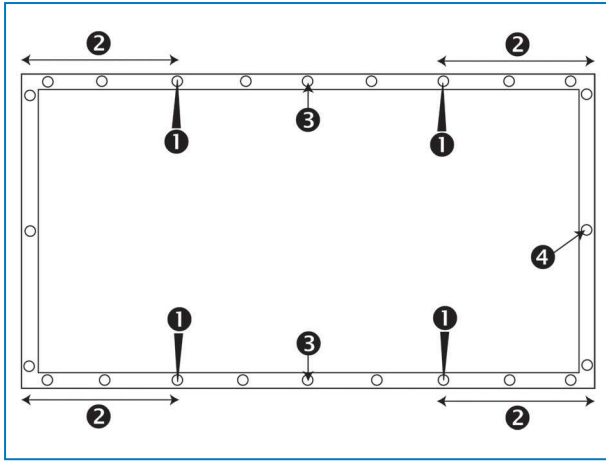
Installation of tape sealer for S3000 units

1. Foam sealer tape
2. 12 mm bolt & flatwasher
3. Sealing washer & nut

2. Remove the skid from the middle section. Lift the middle section and position it over the lower section so that the flanges of the section are about 50 mm above the lower section. Do not let the section swing and damage the sealer.

Use at least four drift pins (see figure) in the fastening holes located on the long sides of the sections to align the top section to the bottom section. To avoid incorrect alignment, refer to the below drawing for the position of the fastening holes to be used. Use additional drift pins in the middle of the unit if required, to align long panels. (See figure "Usage of drift pin to align the screw holes")

Make sure all holes from upper section and lower section are properly aligned before lowering the top section completely to the bottom section.



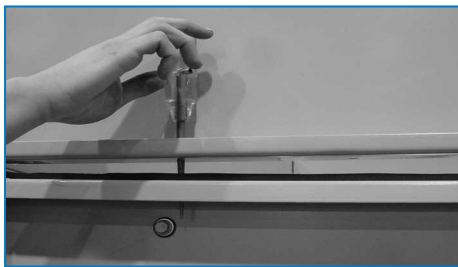
Position of the fastening holes to be used.

1. Drift pin position
2. The distance between the fastening hole in which the drift pin is inserted and the corner should be at least 30cm
3. Usage of additional drift pin for long sides
4. Fastening hole



CAUTION

When lowering a section, ensure nothing can be trapped between the upper and lower flanges.



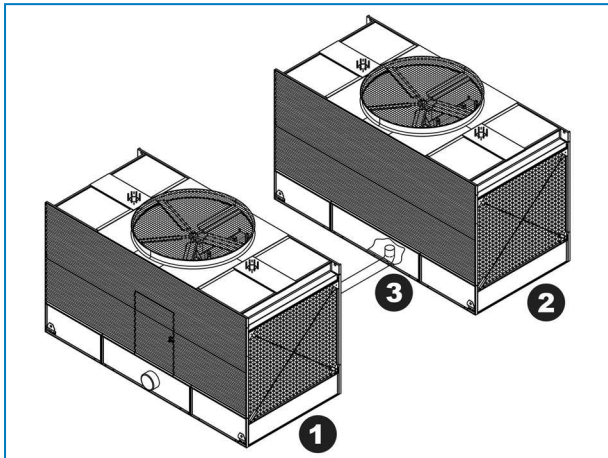
Usage of drift pin to align the screw holes

3. Match marks must line up as shown in above figure.
4. Bolt in place as illustrated in above figure, using a sealing washer under each nut to prevent water leakage. There are eight (8) bolts (four on each side) that are used to attach the top and bottom sections.
5. On multi-cell installations, it is suggested that cells subsequent to the first, have the top and bottom sections assembled on the support foundation, adjacent to the final mounting location. This will allow space for securing the top and bottom sections and removal of the lifting cables. The subsequent cell(s) may then be moved to its final position using the lifting devices in their alternate locations. Refer to the section "Assembly of Multi-Cell Towers" hereafter for details.
6. All multi-cell units have the cell number on each section as well as match marks to show how the cells should be mated.

Assembly of multiple-cell units

Assembly of multiple-cell units with equalizing connections

Multiple cell installations usually employ equalizing connections to equalize the water level in the sump of each cell.



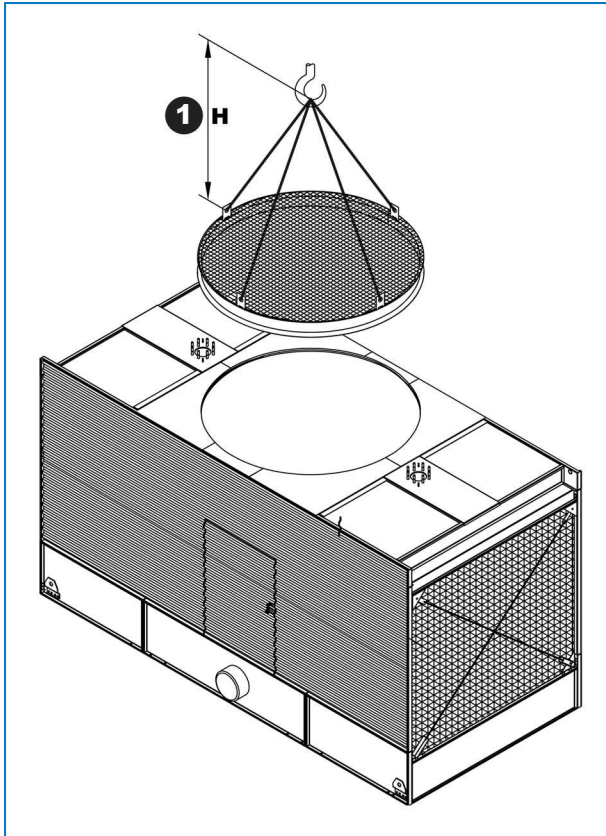
Assembly of multiple cells with equalizing connections

1. Cell 1
2. Cell 2
3. Equalizing connection in bottom

Installation of fan cowl

Due to height limitations on truck shipments, the fan cowl with fan guards installed, may ship unmounted. The fan cowl must be placed and installed as shown in the figure below. The procedure is as follows:

1. Lift fan cowl by means of the 2 lifting ears and place on unit.
2. Bolt fan cowl together with unit, using 9 mm flatwashers and locknuts.
3. The minimum height must be 2200 mm.



Install fan cowl on unit



CAUTION

Ensure that the fan cowl is properly installed prior to commencing operation!

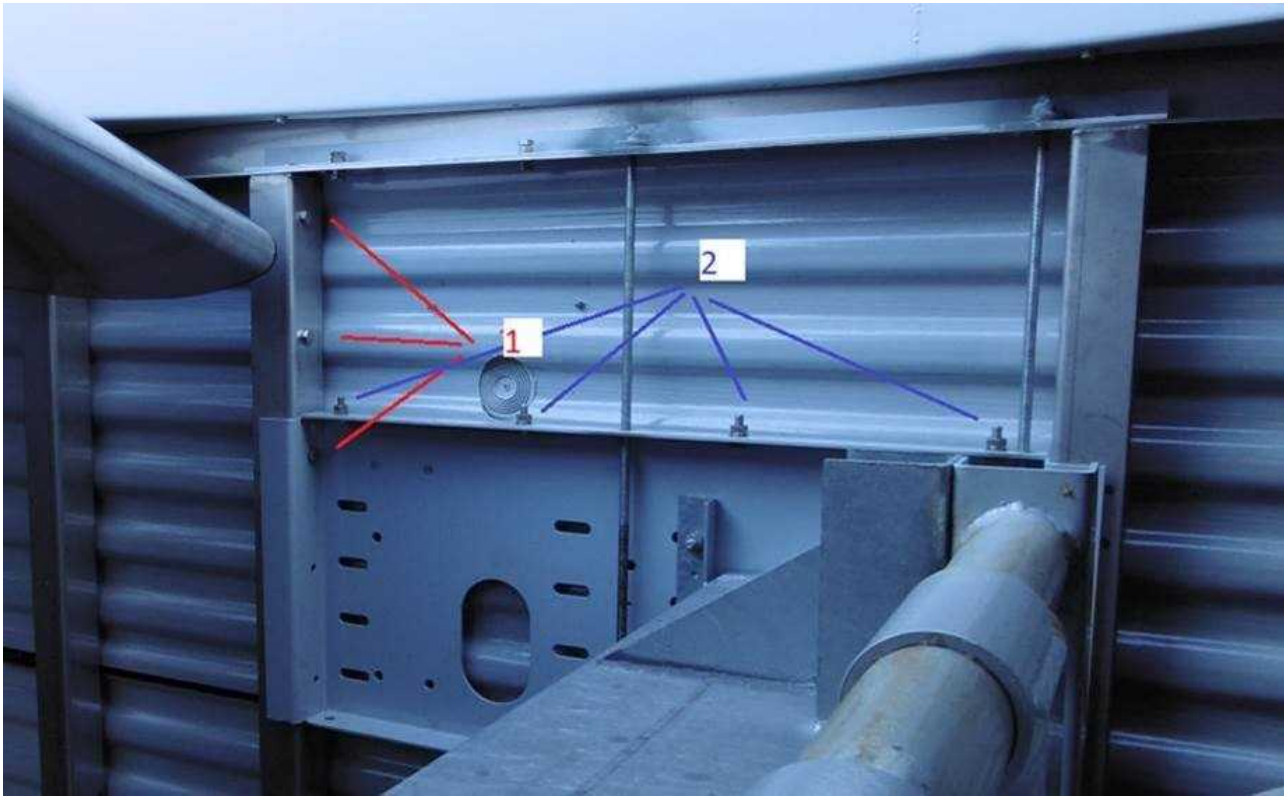
Installation of Whisper Quiet fans (belt & gear drive)

To limit the shipping dimensions of some models with Whisper Quiet fans (recognizable in the nomenclature by the '/AH' at the end), the fan motor assembly is lowered into the casing. The models this applies to are:

- S3E-xxxx-06x/AH
- S3E-xxxx-07x/AH
- S3E-xxxx-14x/AH

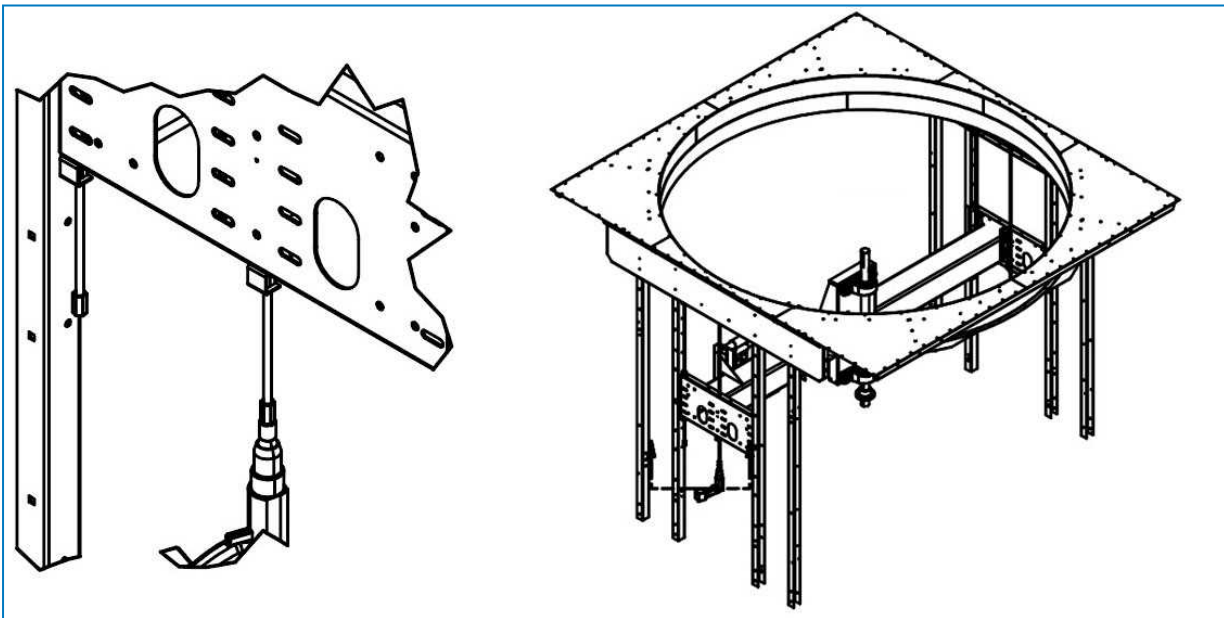
This assembly must be raised to its operating position after installing the fan cowl.

Step 1: Prepare for raising fan assembly

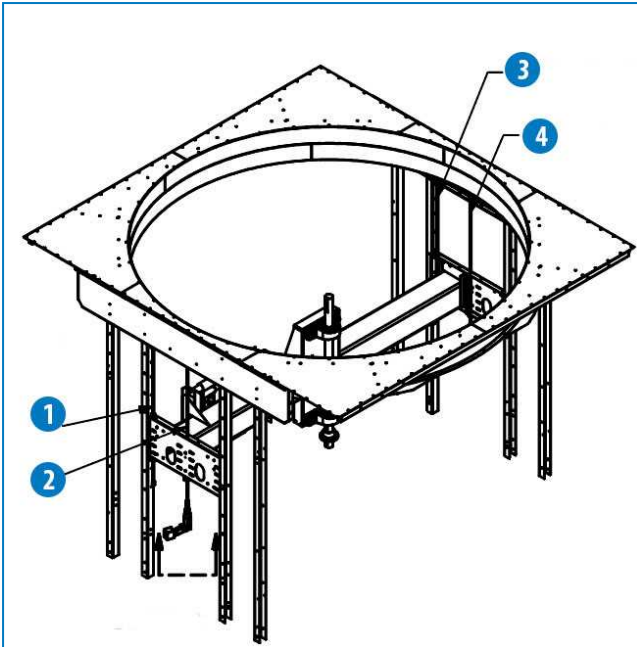


The bolts marked with position 1 and position 2 must be removed on both sides.

Step 2: Raise fan assembly

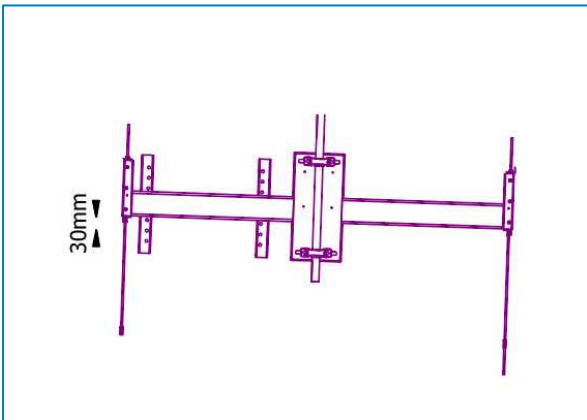


Use drill to rotate the threaded rods. Drill specification: 1000 Watt at 1100 rpm.



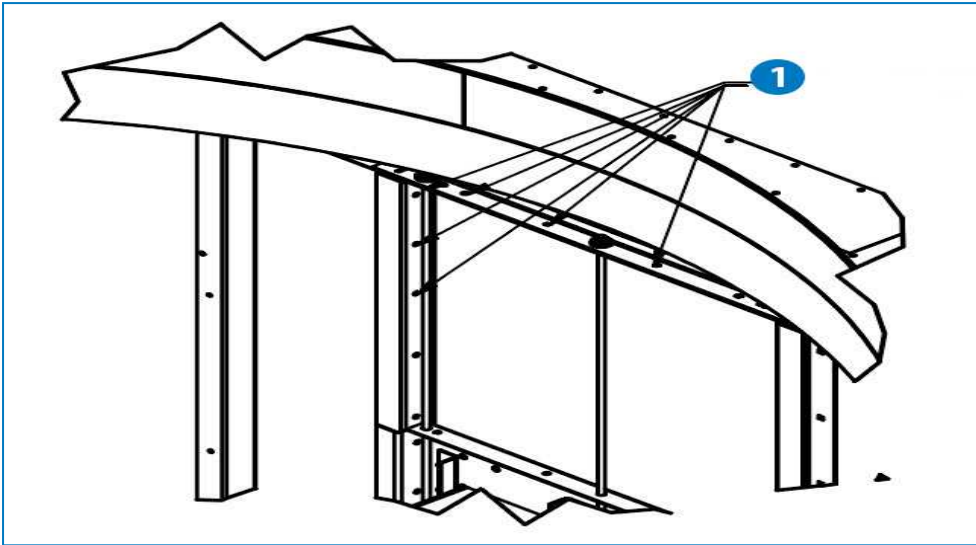
1. Rod bracket 1
2. Rod bracket 2
3. Rod bracket 3
4. Rod bracket 4

1. Rotate threaded rods counter clockwise to raise fan assembly.
2. Supporting rod brackets 1 and 2 should be at the same level before turning rods at the other side.
3. Maximum height difference between both sides is 30 mm.



4. Rod brackets 3 and 4 should be at the same level before turning rods at the other side.

Step 3: Secure fan assembly in final position



1. Fasten with (10) M10 bolts at both sides

The 3 holes on each side will align and you need to put up the 3 bolts each side back on the same position, but now holding the mechanical equipment in place.



CAUTION

Make sure you raise slowly and almost simultaneously to keep the mechanical equipment straight in the unit during lifting.

Step 4: Remove strap holding the fan blades in position

Step 5: Airbreather must be connected on site (only gear drive)



Airbreather on gearbox



Airbreather on fan deck



Connecting line

General

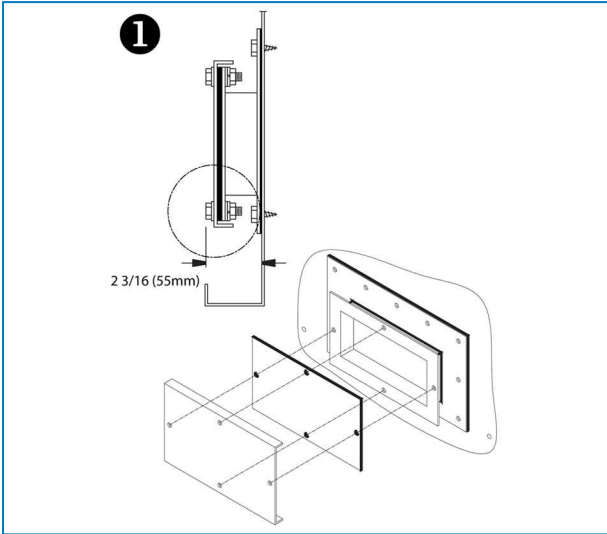
1. All required installation instructions for optional accessories are stored in the wooden no nail crate / plastic container which is placed in the lower section. See "Inspection Before Rigging" on page 1 - picture "Hardware Location".
2. Optional intake and/or discharge sound attenuators can be fitted.
3. The platform, ladder and railing is packed on a separate skid. The assembly hardware is packed in a plastic container and strapped to the platform, ladder or railing itself.



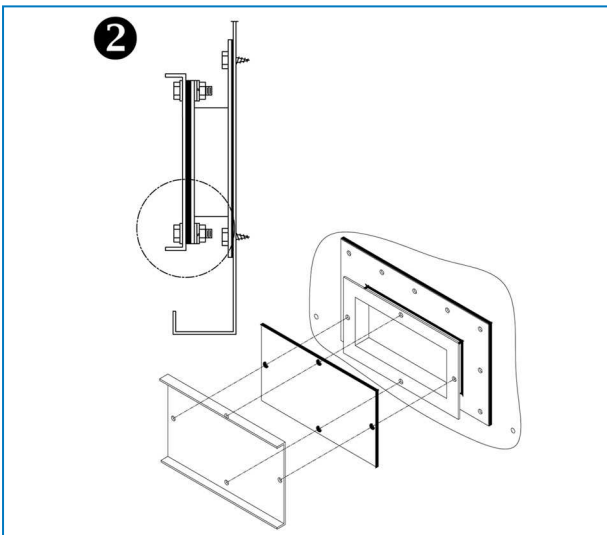
Hardware location for platform, ladder & railing

Clean out port

Due to transport width limits, the cover flanges of the clean out port are mounted with flanges towards the inside (1). On site, the cover can be placed with flanges to the outside for easy access to hardware (2).



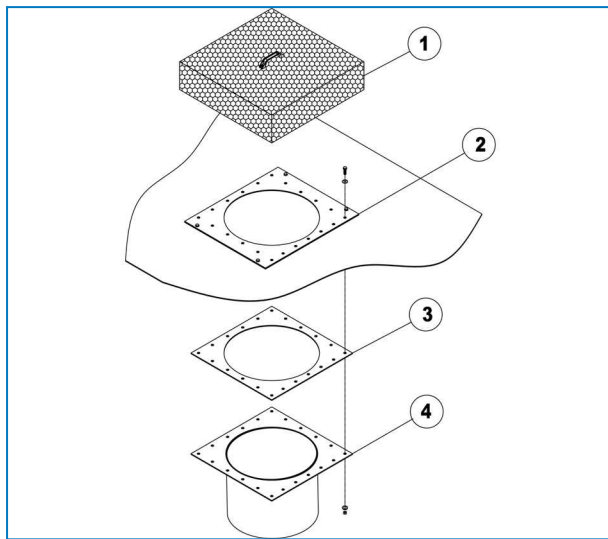
Clean out port cover mounted for transport



Final installation of clean out port cover

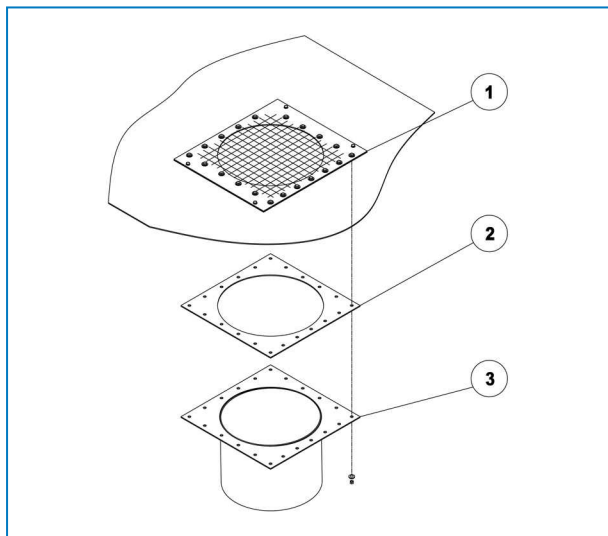
Optional bottom connection

To install the optional bottom connection, follow the instructions according to the following figure(s).



Installation of optional water outlet connection in bottom

1. Sump strainer
2. Back-up plate
3. Rubber gasket
4. Water-out connection



Installation of optional remote sump connection in bottom

1. Back-up plate with screen
2. Rubber gasket
3. Remote sump connection

Optional flanges on side-outlets

For units as of 3 m and wider, flanges on side outlet connections are shipped loose and have to be installed on site.



S3000E

XES3000E

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.



S3000E

XES3000E

FURTHER ASSISTANCE & INFORMATION

The service expert for BAC equipment

We offer tailored services and solution for BAC cooling towers and equipment.

- Original spare parts and fill -for an efficient, safe and year round reliable operation.
- Service solutions - preventive maintenance, repairs, refurbishments, cleaning and disinfection for reliable trouble-free operation.
- Upgrades and new technologies - save up energy and improve maintenance by upgrading your system.
- Water treatment solutions - equipment for controlling corrosion scaling and proliferation of bacteria.

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

Baltimore Aircoil Company	www.BaltimoreAircoil.com
BAC Service website	www.BACservice.eu
Eurovent	www.eurovent-certification.com
European Working Group on Legionella Infections (EWGLI)	EWGLI
ASHRAE	www.ashrae.org
Uniclîma	www.uniclîma.fr
Association des Ingénieurs et techniciens en Climatique, Ventilation et Froid	www.aicvf.org
Health and Safety Executive	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

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