

Azanechiller Installation Instructions

1.0 Receipt of Unit

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 packing note. Any damage or missing items must be indicated on the packing note, and Star Refrigeration Ltd must be informed of such.

2.0 Design Conformity

Star certify that the **Azanechiller** conforms with the following EC Directives:

- Machinery Directive (MD) 2006/42/EC
- Pressure Equipment Directive (PED) 2014/68/EU
- Pressure Equipment Regulations (PER) 2016
- Electromagnetic Compatibility Directive (EMC) 2014/30/EC
- Low Voltage Directive (LVD) 2014/35/ED
- Ecodesign Directive (ED) 2009/125/EC& 2015/1095

To comply with these directives appropriate national and harmonised standards have been applied. These are listed on the Declaration of Conformity, supplied within the Quality Dossier for each plant.

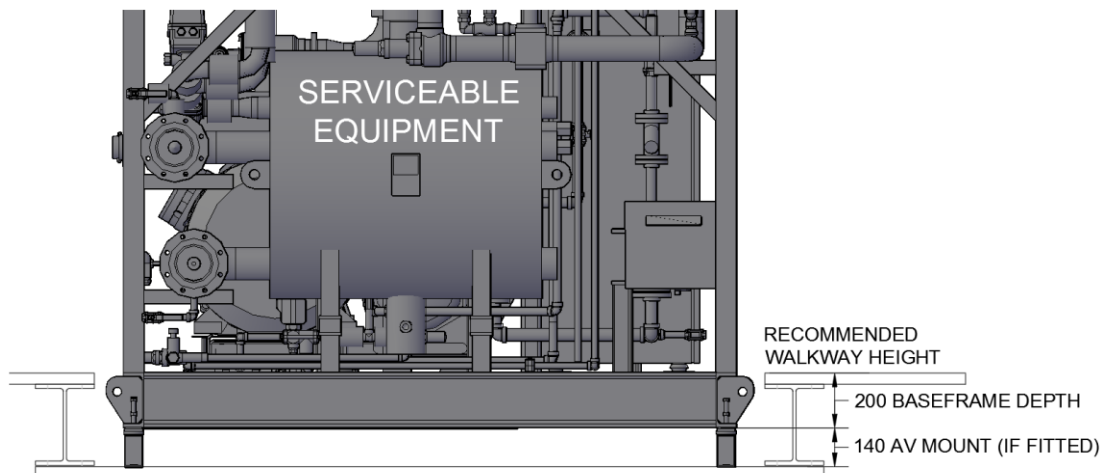
Before using the chiller, the recommendations set out in the Operating & Maintenance Manual must be read.

3.0 Chiller Positioning for Efficient Operation

3.1 Chiller Location

The unit must be located away from air vents into buildings. The unit must be placed in an area which only affords access to competent operators and technicians. Access to the unit by the general public must be prevented. The supporting base upon which the chiller will sit must be level (tolerance $\pm 10\text{mm}$ on both axes) and solid enough to support the chiller weight during normal operation.

If the chiller raised via steelwork or AV mounts, a suitable walkway/working platform should be considered to allow both personnel access for servicing and removal of equipment.



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3.2 Air-Flow Requirements

In order to operate efficiently, the condenser requires good air-flow onto the condenser fins.

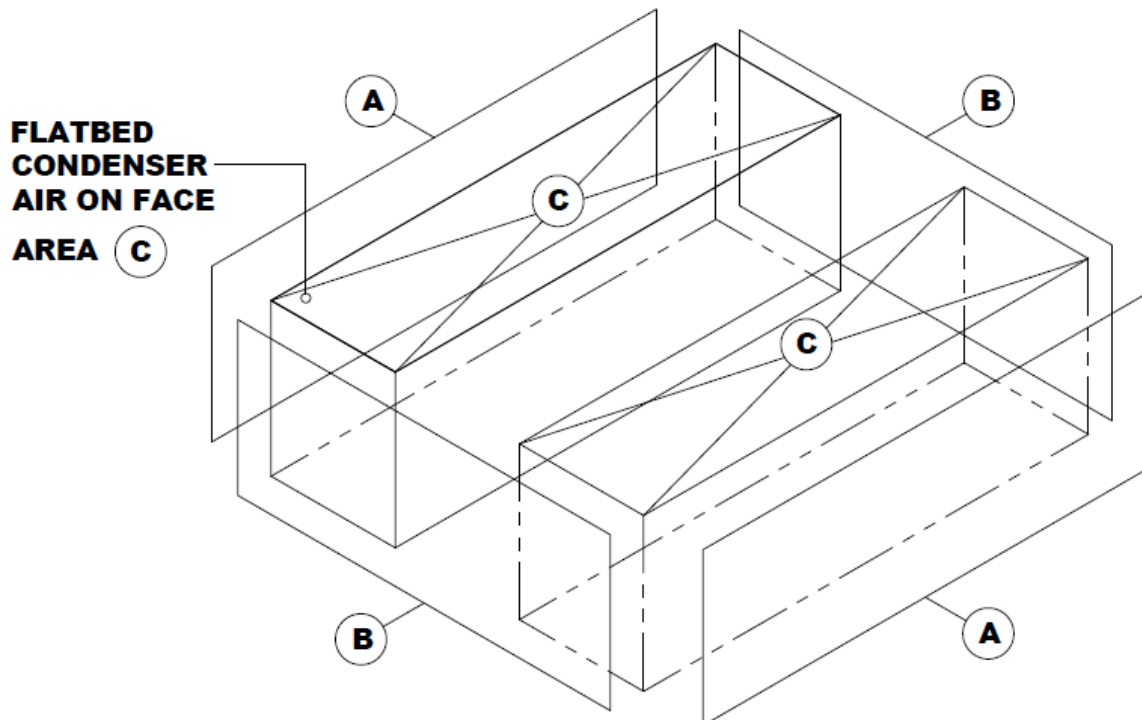
The area available for fresh air to reach the condenser fins (with horizontal and vertically upward flow only) must be greater than or equal to the air on face area of all condensers drawing air from this space.

The combined area (free area between the condensers at the ends) must be at least equal to the combined total condenser air on face area.

In all cases the area above the condenser fans, from where air could be drawn down into the fins, must not be included in the calculation.

If the air flow requirements are almost met then bridging plates must be mounted between the condensers to stop warm air from the fans recirculating back onto the condenser. This will help ensure performance of the chillers.

If the free area available is far less than that which is required, then the condensers must be raised or an alternative location must be found for the condensers.



$$\text{TOTAL AREA "A"} + \text{TOTAL AREA "B"} \geq \text{TOTAL AREA "C"}$$

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3.3 Handling & Lifting

The following is intended as guidance only; all lifting and positioning should be assessed on an individual basis and must be carried out by qualified experts. The chillers are designed for overhead lifting. To ensure that all lifting and handling operations are carried out safely, the following precautions must be implemented:

- The only safe lifting method for the chiller is to use the permanent lifting lugs attached to the baseframe – these must be used for all lifting operations. Do not use any other lifting points on the unit.
- On de-commissioning or moving an old chiller the condition of the lifting lugs and the baseframe must be inspected and checked by a professional engineer if there are any signs of corrosion
- Lifting must not be carried out with equipment that is inadequate or not in perfect working order.
- Do not tilt the chiller more than 15° during handling.
- Before handling, check that all the removable panels are fastened tightly and the access door is properly closed.
- **Use spreader bars to keep the lifting cables or chains clear of the chiller.**
- Do not use fork-lifts to lift the unit from below.
- If overhead lifting equipment is not available, the chiller may be moved on rollers.
- Ensure that lifting equipment is suitable for the weight of the chiller stated on the Diagram of Connections drawing (section 11 of this manual).

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4.0 Secondary Fluid Connections and Requirements for Efficient Operation

The chiller is supplied with PN16 flanges to connect up to the client's secondary fluid circuit. To maintain efficient chiller operation and to protect the chiller from damage, the following requirements must be met:

- Water quality should must meet the following, as specified by the evaporator manufacturer:

General recommendation for water quality when AISI 316L plate material is used in +20° C.		
Variable	Unit	Recommended quality limits for water for AISI 316L
Hydrogen ion concentration	pH	6-9
Alkalinity (as CaO3)	mg/l	< 300
Chloride	mg/l	< 500 mg/l at 25°C < 200 mg/l at 50°C < 60 mg/l at 80°C 0 mg/l, when T > 100°C
Sulphate	mg/l	< 100
KMnO4 - consumption	mg/kg	< 20
Aluminium	mg/l	< 0,3
Iron (Fe)	mg/l	< 0,3
Manganese	mg/l	< 0,1
Sodium + Potassium	mg/l	< 200
Conductivity	mS/m	< 200
Calcium	mg/l	< 20

- The fluid flowrate and temperature requirements stated in the plant specification section of the Operating & Maintenance Manual must be maintained in order for the chiller to provide the desired cooling.
- Should the water be particularly dirty or aggressive, an intermediate heat exchanger must be placed between the aggressive media and the chiller.
- The connecting pipes must be adequately supported so as not to weigh on the unit.

The following must be installed in the secondary fluid circuit:

- Air vent valves to be fitted at the highest points of the circuit.
- Flow switch to be fitted at outlet of unit. This must be fitted into the side of a horizontal, straight section of pipe of length at least equal to 8 times the pipe diameter with 5 straight diameters upstream and 3 straight diameters downstream. The flow switch must be calibrated at commissioning to allow at least the minimum required flow to the chiller.
- One shut-off valve each at inlet and outlet of the chiller.
- Where the chiller is used in noise sensitive buildings and where the chiller is mounted on anti-vibration mounts, vibration joints at inlet and outlet of the chiller is required, to be fitted horizontally. Site pipework should also be installed in an arrangement capable of accommodating movement of the chiller on its anti-vibration spring mounts.
- Important** - pipework should be either cleaned and thoroughly inspected before piping up to the **Azanechiller** or a mechanical filter with a maximum mesh size of 1mm must be fitted as close as possible to the chiller inlet. If the pipework is flushed clean, a temporary strainer is to be fitted to the fluid inlet.
- A drain valve at the lowest point of the circuit.

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5.0 Electrical Installation

5.1 Electricity Supply

The specifications of the mains supply must comply with the standards EN 60204-1 and be sufficient for the absorption requirements of the unit. The mains supply voltage must correspond to the rated value $\pm 10\%$, with a maximum phase difference of 3%. Refer to local regulations.

5.2 Power Connections

- Install a circuit breaker device, not included with the chiller, in the supply line of the switchboard feeding the chiller in compliance with the regulations in force.
- Supply chiller unit control panel with a cable with an appropriate diameter for unit absorption. The control circuit is shunted off the power circuit from inside the switchboard.
- Do not touch hot and/or sharp surfaces. It is forbidden to lay electric cables in positions that have not been specifically identified.
- If the secondary refrigerant fluid is water without an appropriately strong glycol mix or other freezing point suppressant the trace heating power supply must never be disconnected if the ambient temperature could fall below 0°C, except during maintenance operations, or when the water circuit has been isolated and drained, in order to guarantee operation of any trace heating on the heat exchanger.

5.3 Control Circuit Interlocking

In order for the guarantee to be valid:

- Connect the calibrated flow switch to the specific terminals of the control circuit (if not included in the standard supply).
- Connect the auxiliary pump contacts to the chiller enable circuit of the control circuit.

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6.0 Safety Precautions

6.1 General Hazards

- This chiller contains ammonia (R717) which is a toxic gas and is potentially explosive. Maintenance and service work must only be carried out by trained personnel who hold the appropriate ammonia handling certificate.
- Site personnel should be informed of the chiller location and that it contains ammonia. If a person suspects an ammonia leak, they should highlight this as per site procedures and site emergency response plan.
- The mains power supply must correspond to the specifications indicated on the control panel door.
- The unit must be destined solely for the use for which it was designed. The manufacturer shall not be under any obligations whatsoever for uses differing from the specified use.
- Pressure relief line must be installed pointing upwards, away from building air intakes and with a suitable rubber pipe guard or other means of determining valve has lifted.
- Switch off the unit in the event of a breakdown or faulty operation.
- Do not supply the heat exchangers with any liquids except water, glycol or an approved alternative. Never exceed the maximum allowable pressure of the secondary fluid circuit indicated on the Diagram of Connections (section 11 of this manual).
- The machine packaging can be dangerous. Keep out of the reach of children.
- The operator or other un-trained staff must limit him/herself to the controls of the unit only; the only panel that can be opened by him/her is the one that accesses the PLC Human Machine Interface (HMI) – no other must be touched.
- Do not use your hands to check possible pressure leaks.
- Always use tools that are in good condition; ensure familiarity with the instructions before putting them into practice.
- All tools, electrical cables or loose objects must be removed before closing and starting the unit again.
- The machine must not be installed in an explosive atmosphere.
- The machine must not be installed in environments with electromagnetic fields exceeding those envisaged by the Electromagnetic Compatibility Directive 89/339.
- The door should not be allowed to swing free in windy conditions or if the chiller is operating.

6.2 Control System Hazards

- Make sure that the instructions have been fully understood before carrying out any work on the control panel.
- Start the unit only after having made sure that the power supply cable has been perfectly connected to the chiller's electrical panel and tested.
- Do not reset the manual reset alarms without first having identified and removed the cause.

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6.3 Mechanical Hazards

- Install the unit according to the instructions set out in this manual.
- The maintenance schedule in the Operating & Maintenance Manual must be adhered to.
- Do not touch the condenser fins without first having put on protective gloves.
- Do not remove the fan guards while the chiller's electrical panel isolator is switched on.
- Make sure that fan guards are fitted correctly before putting power onto the chiller.

6.4 Electrical Hazards

- Connect the unit to the mains electricity supply.
- Disable the unit from the mains using the electrical panel isolator before opening the control panel.
- Check that the unit has been grounded (earthed) correctly before starting it.
- Make sure all the electrical connections are firmly tightened and check the connecting cables, paying special attention to the state of insulation; replace all cables that are clearly worn and damaged.
- Periodically check the cables that are inside the panel.
- Check that all the circuit breakers are switched ON.
- Do not use cables with inadequate sections nor extension cord connections, even for very short periods or emergencies.

6.5 Other Hazards

- Connect up the utilities to the unit following the indications set out in this manual and on the panelling of the unit itself.
- Check all connections for wear and tear. These parts must be safely guided, supported and anchored. Make sure all the connections are correctly tightened.
- If a part needs to be dismantled, make sure it is correctly re-assembled before starting the unit.
- Do not touch the compressor delivery piping, the compressor and any other piping or component placed inside the unit without first having put on protective gloves.
- Keep at hand a fire extinguisher suitable for electrical appliances. Check it and have it serviced as recommended on the instructions plate.
- Do not store flammable liquids near the unit.
- Weld only with empty pipes; do not bring flames or other sources of heat near pipes containing refrigerating liquid.
- Do not bend or hit pipes containing pressurised fluids.
- Ammonia has a pungent smell. All air inlets to any building near the chiller must be moved or the unit should be relocated. For further guidance please contact Star Refrigeration.

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6.6 Condenser Fan Isolation

Groups of condenser fans can be isolated at the MPCBs in the panel. If isolation is required all MPCBs must be padlocked in the off position.

A grey tab on the underside of the black switch can be pulled down. This reveals a hole through which a padlock can be placed to lock the MPCB in the off position. This can be seen on the photo of MPCBs – one showing the tab concealed, and one with the tab pulled down.

Note: If the chiller is required to run when one of the fans has faulted, the following steps should be followed:

- Isolate all fans at the MPCBs in the panel.
- Disconnect the fan on fault at the panel terminals.
- The opening should be covered over for the non-running fan(s) to prevent air getting drawn through in the wrong direction.
- The fans that have not faulted can then be made live again.

