Section 1, Health and Safety and General

Thank you for selecting C&C for this project. We have taken considerable care to ensure that these units provide you with the best possible performance and reliability. To realise this in practise, it's vital that units are installed correctly and maintained regularly. These instructions are important, and we ask that you take time to read them before commencing installation.

We fully understand that site conditions, equipment and expertise mean that adjustments, improvements may be required or desirable; however, it is strongly recommended that the installation procedure is followed as closely as possible. Any changes to the procedures should be documented and approved by qualified personnel.

1.1 Health and Safety

This concerns the hazards, which may be encountered when installing and maintaining this equipment. It is therefore important that these instructions are followed.

Before installation begins, ensure that:

a) The voltage, working fluid and the maximum working pressure stated on the product nameplate is suitable for the working environment.

b) The proposed mounting location and method is adequate to support the total operational weight of the unit. "Dry Weights" should be confirmed against the unit specification.

c) Installation and Maintenance personnel are suitably qualified to undertake the work.

d) Correct PPE (Personal Protective Equipment) are used; Sharp edges on casework and fins can cause cuts, therefore appropriate protective clothing / gloves should be worm.

e) The temperature of coils with coated fins does not exceed 150°C (e.g. during brazing) as toxic

f) The electrical supply is isolated and secured from accidental reconnection.

g) The user is responsible for protection against over pressurization including that caused by fire.

h) Avoid disconnection whilst the unit is under pressure.

i) The equipment is designed for use in a secure area with access limited to authorised personnel.

j) For dry air coolers it is the responsibility of the user to ensure that the fluid is suitable for the operational temperatures and that coil is protected from damage due to freezing.

1.2 Nameplate Data:

The Nameplate data contains information about the electrical supply and maximum operational pressure; these should be checked to ensure they match site condition.

1.3 General

Upon receipt, the units should be visually inspected, and the supplier notified (within seven days) of any damage or shortages.

Units are not portable and are designed for permanent installation only.

IMPORTANT: The Condenser is dispatched with a Nitrogen or Dry Air holding charge of between 1 and 2 Bars. On arrival at site, this should be released by depressing the Schrader valve situated on the header. If there is no internal pressure, then a comment to this effect should be made on the delivery note.

If the condenser is going to be stored or non-operational on site for a period exceeding 3 months, provision must be made to run fans for a minimum period of 2 hours each month.

Electrical terminals in control panels and motor mountings should be checked for security.

Section 2, Installation

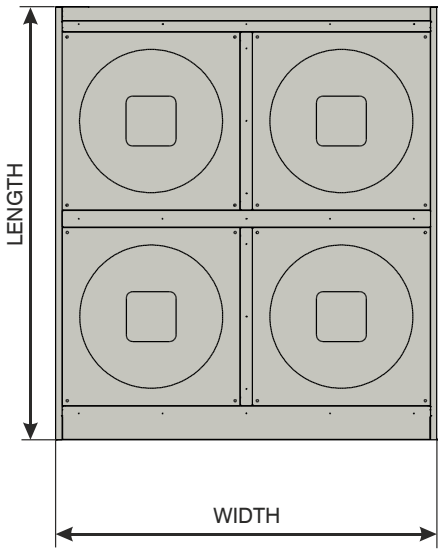
These instructions are for guidance only; they will need to be adjusted by the installer to suit site conditions and equipment. Best practice must always be used.
Fin surface should be protected, and the headers must never be used for lifting or moving the Condenser.

2.1 Location

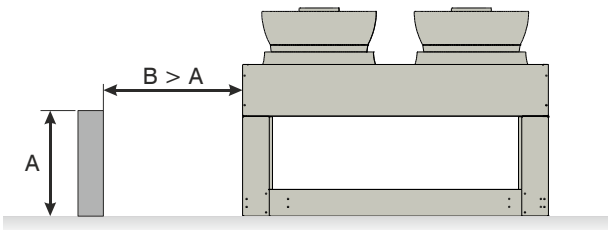
To ensure optimum performance, units should be positioned to give good uniform air distribution across the coil and minimise any air recirculation. Any warm air or corrosive discharges from other equipment must be kept well away from the Condenser, consideration should also be made for prevailing wind direction.

Depending on the installation layout the following distances for airflow should be provided with reference to the unit Length (L) and Width (W), greater distances are recommended when possible which will be beneficial to the airflow and unit performance.

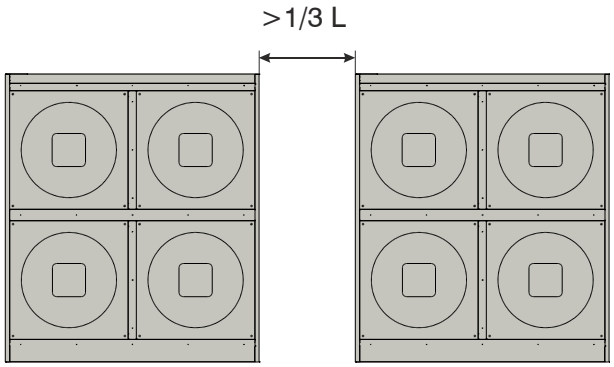
2.1.1 Single unit installation with no obstructions:
The unit may be located as required.



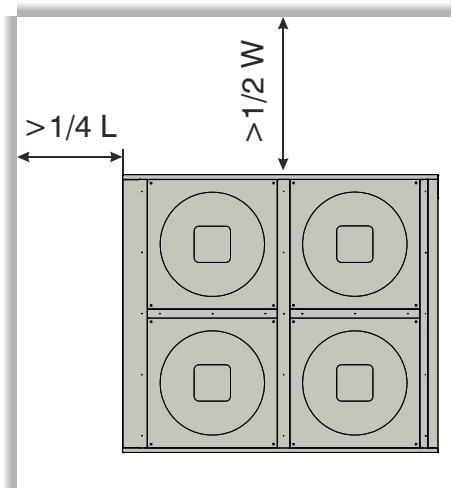
2.1.2 Parapet walls near the unit:
Gap to Wall > Wall Height



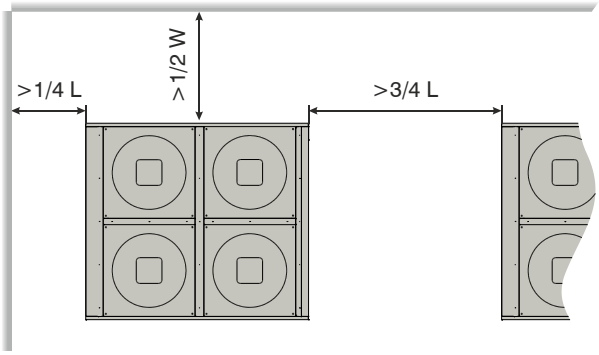
2.1.3 Multiple units installed side by side:
Gap between units >1/3 of Unit Length



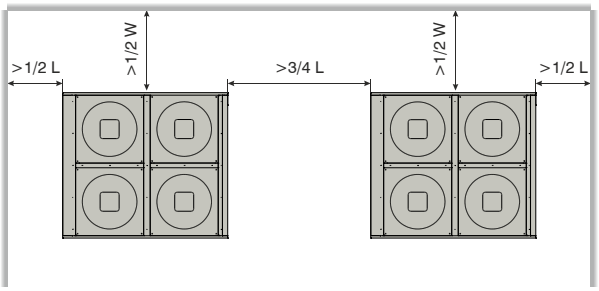
2.1.4 Installation with a wall on 1 side:
Gap to Side Wall >1/4 unit length



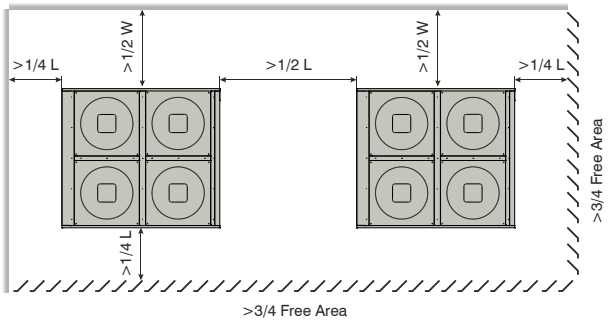
2.1.5 Installation with walls on 2 adjacent sides:
Gap to Side Wall >1/4 unit length
Gap to End Wall >1/2 unit width
Gap between units >1/2 of the unit length.



2.1.6 Installation with walls on 3 sides, (1 side fully open):
Gap to Side Wall >1/2 unit length
Gap to End Wall >1/2 unit width
Gap between units >3/4 of the unit length



2.1.7 Installation within Acoustic Screens & Louvered Enclosures:
Ensure the free area of any Screen exceeds 3/4 of the overall screen area.
The Screen height must not be greater than the height of the condenser fan discharge.
Special attention must be paid to ensure free air movement is achieved without air re-circulation.



2.2 Lifting & Positioning

Care must be taken during transporting, storage and installation to prevent damage to the Condenser.

Appropriate equipment must be used to un-load and locate the Condenser, which conforms to the relevant national standards. Ensure that the Centre of Gravity is considered when lifting. If strops are used, spreader bars must also be used to protect casework. The Condenser must be kept level during all lifting operation.

Condensers are provided with lift channels; these are designed for use with a forklift or as strop locators.
When forklifting, forks must protrude at least 150mm past the unit.

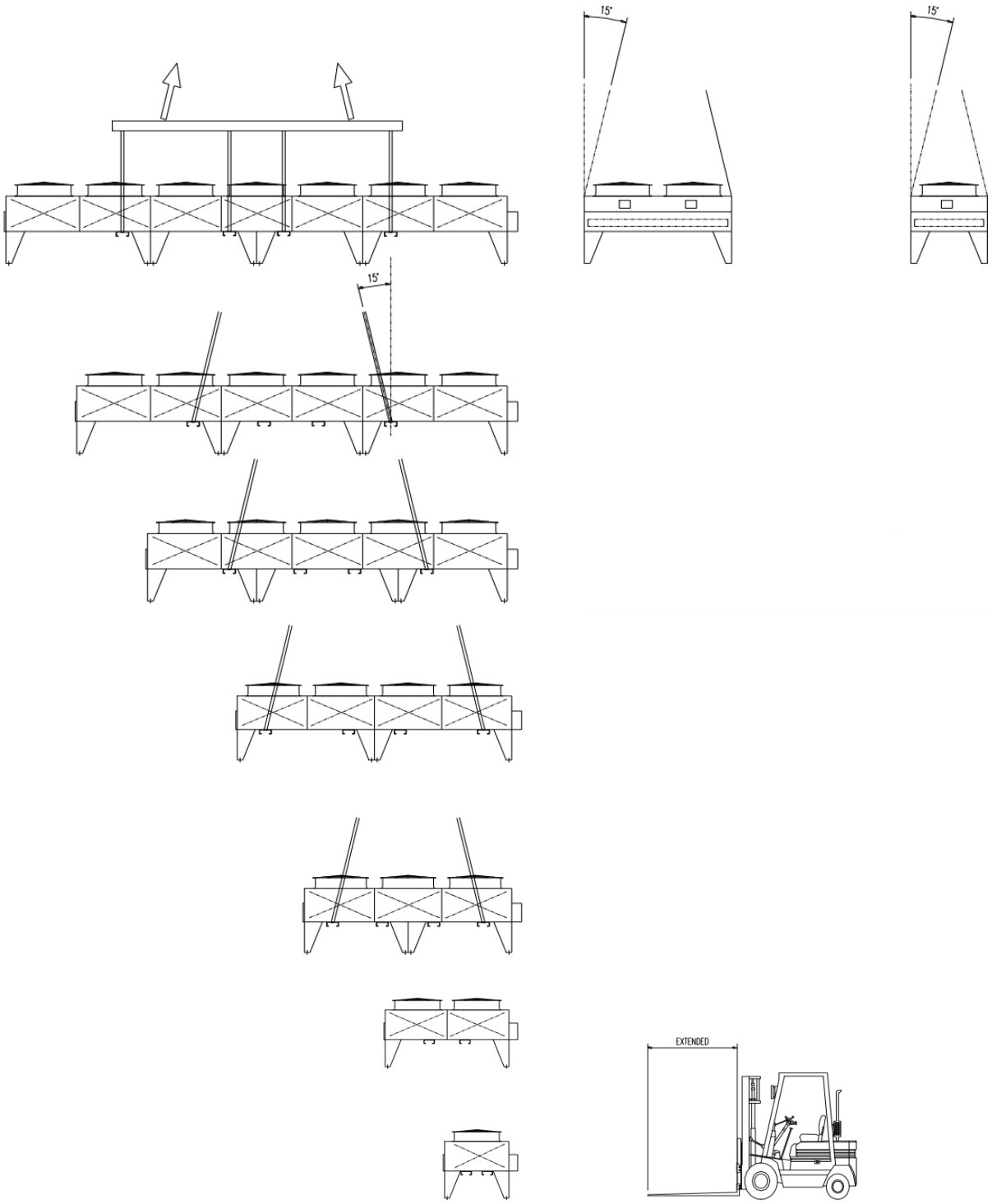
Please take care to protect casework from damage and never lift on coil surface, headers or pipework.

Once in position it is important to ensure that all the legs are touching the ground and they support an even load. Failure to do this could result in the casing twisting, risking leaks in the coil.

1. In most cases units can be lifted using strops retained in the forklift channels. The center forklift channels can be repositioned from the center position to an outer position. These channels are held to the unit with M8 fixings. There are outer and inner positions. It is advised that the channels are moved to the outer fixings to ensure the web strops will not slide during an extended lift.

2. Spreader beams should be used on the heavier condensers to prevent buckling or damage to the finish of casework.
3. Extended forks are required to lift double width fan condensers without tipping, or risk of contact of the forks with the coil surface, forks must extend 150mm past the unit.
4. Strop angles should be 15 – 20° Max. It is the responsibility of the customer to ensure all Health and Safety Issues are observed with regards to lifting methods and the quality of lifting equipment.

2.3 Lifting & Positioning Continued - Stropping and Forklifting guide



2.4 Connecting Pipework

It is essential that the discharge and liquid are properly supported and DO NOT rely on the coil headers for support; we recommend the fitting of discharge line vibration isolators. Vibration in the connecting pipe work can result in leaks on the coil.

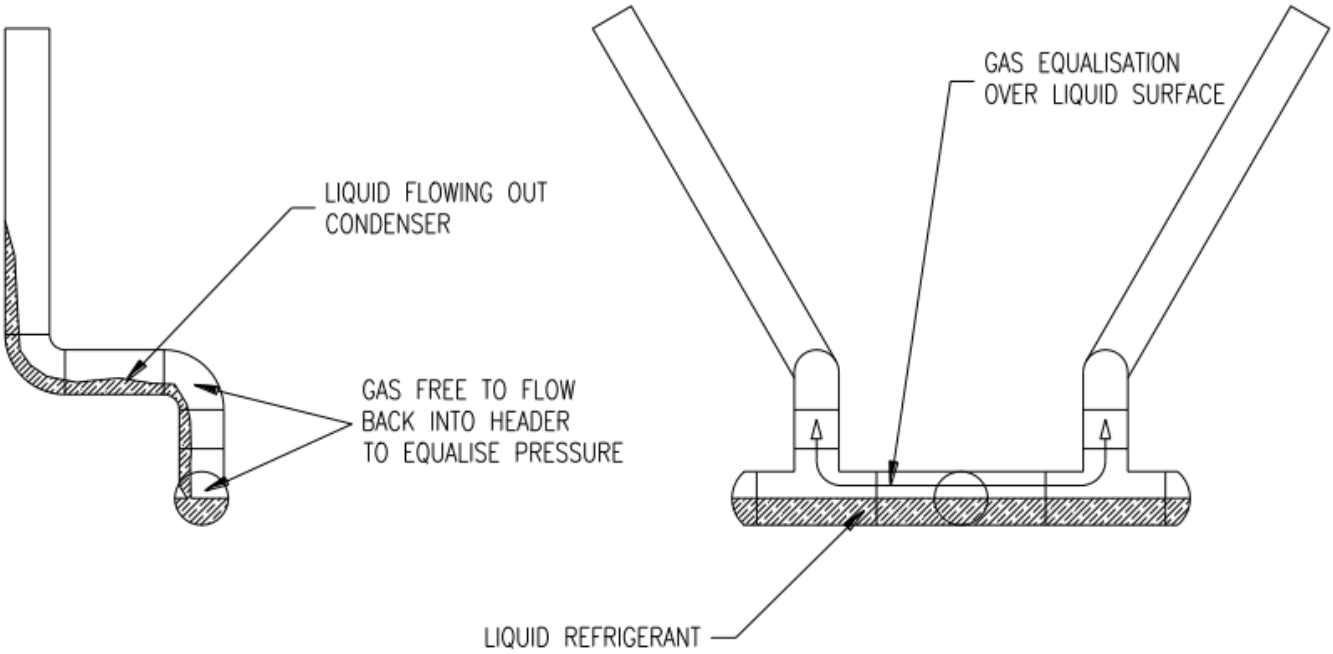
Check every 6 months that there is no line vibration and that there is no movement in the support brackets. The connection stubs are not capable of supporting any load; they should not be used as a ladder for accessing the top of the unit.

Pipework must be sized to suit site application and not simply matched to the condenser connection size. All materials used must be clean and refrigeration quality.

Where a separate sub-cooling section is provided, the liquid receiver needs to be installed between the condenser and sub-cooling sections. If no sub-cooling section is provided, a trap must be provided before liquid pipework rises.

It is most important that the outlets of condensers are able to drain freely (Ref.: ASHRAE Handbook Refrigeration: System Practices for Ammonia & System Practices for Halocarbon Refrigerants).

On “V” bank units and horizontal air flow coils the condensate falling to the bottom of the outlet header should be able to allow gas to pass back into the header (sewer flow) to allow equalisation between the two commonly connected coil banks. If for any reason the pipe work cannot allow gas to flow freely from one coil to another equalisation lines should be used.



When piping up to a twin coil condenser it is most important to observe the above principal. A lack of good drainage will cause liquid to back up in the condenser coil giving substantial reduction in capacity.

2.5 Pressure Testing:

Condensers are factory tested to 1.43 times the maximum operating pressure (MOP) stated on nameplate. Any subsequent strength test of the condenser must not be greater than 1.3 times MOP. If a higher system pressure test is required, the unit must be isolated from the system.

2.6 Evacuation

To prevent moisture related problems, the complete system should be evacuated to below 1 torr.

2.7 Electrical Connections

The installing electrical contractor is responsible for ensure that connecting cable is correctly sized, cable is supported and connection to terminal box are fit for purpose and do not compromise the terminal box's IP rating.

Depending on the unit specification Condensers and Gas Cooler fans may be wired back to terminal boxes located at header end of unit. Condensers and Gas Coolers may also be supplied with flying leads, please check the specific wiring diagrams applicable to your order.

In all cases, when local fan isolators are provided, these isolate the mains power but may not isolate the low voltage control signal feeds.

Wiring diagrams are supplied separately with each unit, please ensure these are followed in the first instance

2.8 AC & Industrial Motors

Motors are fitted with a drain hole in each end cover, and in the terminal box. The motor drain hole should be at the lowest point of the motor when it is installed. Plugs that cover the drain holes should be either removed entirely if condensation is liable to occur due to large variations in operating temperature or removed periodically to allow any general buildup of condensation to drain away. The frequency of plug removal will be dictated by environmental conditions, a record should thus be kept.

Fan motors have bearings sealed for life and should require no attention other than checking that the supply cable is properly secure and that there is no undue noise or rise in motor current. If the unit is left for some while between installation and commissioning it is advisable to run the fan periodically to keep the motor windings free of condensation and to keep the grease spread evenly within the bearings.

Impellers should be examined for any sign of corrosion, particularly on leading edges and touched up if necessary. The securing grub screws should be checked for tightness. Whilst the fans are running confirm that the airflow has not been accidentally reversed at any time, and that there is no impeller out of balance.

Should this be the case contact Coolers and Condensers for advice. Always that all mounting bolts securing the motor and fan mounting arms to the condenser casing are secure.

2.9 EC Fan Specific Information

It is important that the EC fans are switched on and off via the control circuit and not by opening and closing the 3ph power. The EC fan contains electronics that are powered from the main power supply. If the fan contactors are switched off the fan will show a power failure alarm.

When the fan power is energised there will be slight delay before fan start up.

EC fans should have the 3ph power permanently on, and the fan operation controlled using the 0-10V DC signal or Modbus control system.
0V = fan stop.
10V = Fan speed 100%

The minimum fan run time should be 1hr per month. It is advised that should there be a high amount of standby time, i.e. the fans are mostly not running, that the fans should have at least 1 x 3hr solid run every 3 months to ensure the motor dries out and the bearings are lubricated.

All work carried on the fans and electrical connections needs to be undertaken by experienced engineers and if in any doubt over the procedure please contact Coolers and Condensers Ltd.

During commissioning always check wiring is secure and that all terminal boxes remain waterproof, and that any fuses/overloads are correctly selected and set, and that motor current draw is correct to the motor name plate.

Section 3, INITIAL STARTING

Before running units for the first time, check that all electrical covers are secure, fan guard fixings are secure, fans rotate freely, and all lifting channels / loose items used during installation have been removed.
Check the supply voltage to the unit matches both the unit nameplate and fan motor name plates.
Check phasing of 3 phase supplies is in the correct rotation order, L1, L2 & L3.
AC motors will run in the incorrect direction if the phase rotation is incorrect.

Section 4, MAINTENANCE

4.1 Maintenance Checks

It is considered good practise that records be kept of all maintenance / cleaning process undertaken (dates and by whom).

The following routine maintenance is required, every 12 months or more frequently if site condition dictates check:

Security of fixings, especially fan motor mountings.
Pipeline for damage and leaks.
Fan(s) rotate freely and there is no abnormal vibration.
Electrical connections for security of attachment.
Check all external surfaces annually for any corrosion or peeling. Clean any affected area thoroughly with a wire brush, apply a coat of zinc primer and retouch with a suitable finishing paint.

Clean the fins, guards and general casework. Care must be taken when cleaning the fins to prevent damage. A soft brush and mild detergent solution is recommended.

4.2 Coil Cleaning

Clean coils will last longer and perform better. The cleaning process set out below must be carried out at least once every year in lightly polluted areas, more frequently where site conditions dictate. Failure to keep coils surface clean will void the guarantee.

Cleaning Process

Equipment and Consumables required: Soft brush, Low-pressure washer, Refa Detergent coil cleaner or similar approved cleaning agent.

a) Remove debris or dust build-up from coil face using a soft bush.

b) Apply coil cleaner with either a soft brush or low-pressure hand spray from the top face of the coil, only use approved coil cleaning solutions, always follow the Coil Cleaner instructions including the correct dilution with clean water as required.

c) Rinse detergent from coil with clean water and note the condition of coil,

Refer to the C&C Website Document “Cooler-Cleaning” for further advice.

Any pollutants that can’t be removed by this process or damage to the coil surface should be notified to C&C who will advise on correct course of action.

4.3 Unit Maintenance – Component Replacement

In the event of component failure requiring replacement, all parts must be sourced from C&C to the same specification or current equivalent.

Any actions required to replace components must be Risk Assessed in compliance with this document, the site operator, company / persons undertaking the work, and current Health and Safety legislation
A specific Risk Assessment and Method Statement (RAMS) must be completed considering all relevant risks pertinent to the unit being worked on and the environment it is installed in, to the satisfaction of all parties involved.

RAMS should include all risks anticipated such as, but not limited to, the risks below :-

a) Accessing the work area
b) Use of any tools
c) Working at Height
d) Manual Handling
e) Working on and in proximity to High Pressure Systems
f) Electrical Hazards
g) Mechanical Hazards
h) Inclement Weather
i) Lone Working
j) Mechanical Lifting

Coolers and Condensers Ltd. do not accept liability for any injury or risk associated with component replacement undertaken by others.

Section 5, Invalidation of Warranty

Coolers & Condensers Ltd. accept no liability in accordance with the standard terms and conditions of sale for loss or damage arising as a result of:

1. Incorrect installation, setup and commissioning of any equipment contravening these I&M Instructions.
2. Additional equipment added by, and not limited to, OEM's, Customers, End users, which is not part of the unit as supplied by Coolers & Condensers Ltd.
3. Modification to the equipment outside of its original intended application.
4. Repair or replacement of items using parts not supplied by Coolers & Condensers Ltd.
5. Adverse operation due to site construction and layout, including localised ambient conditions at the point of installation.

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