Installation and Maintenance Instructions

Dual Discharge , Floor and Ceiling Mounted Coolers.

Health & Safety

Ensure that the following conditions are observed: -

1.) The electrical supply is suited to the equipment supplied.

2.) The cooler is suited to the refrigerant, temperature and pressure to which it will be applied.

3.) The cooler is installed to a high standard of electrical and refrigeration practice.

4.) The User is responsible for protection against over-pressurisation, including that caused by external fire. The maximum operating pressure is shown on the unit serial plate.

5.) For fluid 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.

6.) Avoid disconnection under pressure.

7.) It is the responsibility of the Refrigeration Contractor or End User to provide safe working platform to carry out routine Maintenance or Warranty repair. For further details refer to our Condition of Sales.

Upon Receipt

Check immediately for any signs of damage. In the event of any problems notify the carrier immediately and Coolers & Condensers Ltd within 48 hours. With regret an "unexamined" signature and delayed notification of damage is unacceptable.
The coil is delivered with a 2 Barg holding charge. This can be verified by accessing the schreader valve on the end of the connection stub. When the unit is delivered the internal pressure should be checked to ensure there are no leaks. If no pressure can be found then a comment should be made on the delivery note.

Pressure Testing:

All equipment has been tested to 1.43 x the maximum operating pressure (MOP). The information about these pressures can be found on the unit label. The equipment must not be subjected to pressures greater than these during testing of the system. If a higher system pressure test is required the unit must be isolated from the system to prevent damage. The MOP is taken as the condensing pressure of the refrigerant at 55°C.

Installation Instructions

The notes below should be read in conjunction with the following leaflets: -

Ceiling Mounted Coolers (CA Range)	-	CA.110
Floor Mounted Coolers (VA, WA, HA & UA)	-	VA.120
Dual Discharge Ceiling Mounted Coolers (DAS & DAQ)	-	DA.140

Location

Air movement. Coolers should be positioned to achieve the following criteria: -

a) Full air circulation through the cooler - coil air return face must not be obstructed.

b) No short circuiting of air which will lead to purely local air cooling.

c) Air discharge is arranged to provide the required air throw. (See air throw notes in leaflets CA.110 and VA.120).

Electric Defrost

Coil and tray heaters are arranged as a balanced 3 phase, star connected load and a 3 phase, four wire and earth supply is required. The cooler will have two electrical termination boxes of which one only (marked in the appropriate way) will require the electrical supply. This is normally at the opposite end to the refrigerant connections; the box at the opposite end is a collection box for the star point of the load and an internal link passes through the cooler to the main connection box. All terminal boxes are heavy duty to IP55.

Pump Down

It is essential that the cooler be pumped down thoroughly before defrost commences. Failure to do so can cause ice build-up on the coil during the defrost cycle.

Electric Defrost Termination

If on time termination, depending on cooler size, we suggest the initial period be set between 35 and 45 minutes.

If temperature termination care must be taken in positioning the thermostat bulb. In general this should be positioned where the last trace of frost disappears, usually on the external cooler finned face. Unfortunately a number of factors, cooler position relative to a door or produce, precise TEV setting etc. may cause identical coolers to frost differently (see maintenance notes). Termination bulbs should not be placed in the space immediately above a heater element.

Water Defrost

The water inlet and drain sizes given in the Cooler leaflet are generous but should not, in our view, be reduced. Success in water defrost lies in passing as much water over the cooler coil block as the cooler casing, extended trays etc and drain lines will absorb. Generous drain line slopes are essential. Some form of inlet flow adjustment is required and this should be increased to the maximum comfortable.

IMPORTANT - A reduced flow rate for a longer period simply does not work! The water distribution pattern may alter drastically, parts of the coil will clear, parts will build up ice ultimately threatening the life of the coil.

Hot Gas/Reverse Cycle Defrost

Generally a most trouble-free system so far as the cooler is concerned providing a good supply of gas can be maintained for the necessary time; generally this requires 2/3 to ½ the time required for electric defrost. Most important consideration is the matter of condensate removal since any tendency to log up liquid in the coil will cause severe problems. A good drain away downward initially from the cooler is essential and where condensate pipework has to rise this must be correctly sized.

Fixings

Cooler weights are given in the appropriate leaflet. All fixings are suitable for ½" bolts. On the Smaller ranges the hanger bars are rated at 200 kg per hanging point. On the larger coolers this is 500 kgs. Generally Coolers & Condensers Ltd expect its coolers to be handled and lifted using the forklift channels provided. These are fitted for transport only and should be removed once the cooler is in position. Please retain these lift channels in case they are required should the cooler be moved.

Occasionally customers may prefer to lift the cooler the ceiling using a turfing method where the cooler is pulled up to the ceiling using the four corner hanging points. It expected that this lifting method is to be carried out by an experienced lifting team and provision should be made in the case of a wire failure. The corner hangers will hold a load in the order of 800-1000 kg's but this will impose permanent damage to the cooler casing. Coolers & Condensers Ltd recommend that the cooler be followed up by a lifting platform to support the cooler if a problem should arise during the lift. The Standard CE 106 (2295 kg's) is the largest cooler to be lifted by this method. If a lift is required on special or heavier coolers then provision must be allowed in the design with this specific issued addressed (please contact our sales team).

Drainage

Drain lines must have adequate fall and be trapped. In low temperature applications drains must have either an internal or external heat source and should be insulated.
MOST IMPORTANT! The heater tape, if external, must provide heating right up to the cooler casing.

Refrigeration Connections

Should be made in accordance with good refrigeration practice. Pipework must be adequately supported to prevent vibration or external load on the cooler headers etc. . Any vibration in the connecting pipe work can result in leaks on the coil.

Cooler Circuiting

The cooler internal circuit, refrigerant connections and liquid distributor will be designed to suit the following information which we request at the time of order: -

- Design temperature
- Refrigerant (DX, pump circulation, flooded etc)
- Design evaporating temperature
- Single or multi-stage compression
- Will suction line heat exchanger be fitted?
- Degree of liquid sub-cooling

A liquid distributor will be fitted on DX systems, which will require an externally equalised TEV.

Electrical Connections

Must be made in accordance with IEE Regulation and good electrical practice. Standard cooler fans are suitable for 380/420V, 3 phase, 50HZ electrical supply and 3 phase, 3 wire and earth connections are required. For fan motor full load, starting currents and recommend overload settings refer to the appropriate cooler leaflet.

Fan peripheral heaters are supplied on low temperature installation where aerofoil or duct axial fans are used and on autodampers on horizontal airflow (see leaflet for heater wattage). The heaters are suitable for 230 volt, 1 phase supply and these are suitable for either permanent connection or for linking the cooler defrost. Each heater is wired to an adjacent terminal box. Whilst the heater is more than adequate to prevent icing during defrost if the peripheral heater is linked to the defrost, the system should ensure that the fans operate, if only briefly, once the defrost is completed to expel any condensate from the fan casing.

Multi-section coolers (2 inlet, 2 outlet connections etc) can be a problem because of differing heights of condensate outlets. Please contact Coolers & Condensers Ltd at the design stage, particularly where large coolers are involved.

Finally pressure limitation during defrost may need care. A cooler which cycles on and off high pressure during defrost may not clear properly. Fluctuation in pressure may lead to liquid loading in the lowest circuits and subsequent ice build-up.

Changing Heater Elements:

If the situation should arise where a heater element need to be changed it should be ensured that the heaters are cold and the power is disconnected from the electric defrost elements (or peripheral heaters). It is assumed that whoever is responsible for changing the elements is working in a safe manner and the power is prevented from being applied until the work is finished and checked.

To remove an element from the coil the spade terminals will need to be disconnected from either end. This will result in the destruction of the heat shrink sleeve, this should be replaced after the new element is fitted. Once the spade terminals have been removed the two spring clips should be taken off either end., these again will require replacement when fitting the new element. The heater can then be withdrawn from either end to suit the site access. If the element has burst it will require a twist and pull action to remove it.

The replacement element can then be re-inserted into the coil, the spring clips fitted and the wiring made good.

The **Tray Heaters** are held to the underside of the drainpan skin. This area is accessed by removing covers on the ceiling mounted ranges, floor mounted coolers do not have the bottom covers and access is direct. The tray heaters are held to the skin with bolt on heater clamps/retainers. To remove the element the clamps can be partial released (do not remove) and the heater can be taken out side ways from the retainer. Tray elements also have spring clips at either end the new elements must have these to prevent the heater creeping. When replacing the tray elements please make sure the element is touching the tray skin, but do not tighten the element hard against the tray surface. The ideal tension is so the element can be twisted by fingers whilst still touching the drainpan skin. Please note again that the spring clips at either end must be replaced to hold the element

Liquid Line Sight Glass

On DX systems we feel the installation of a sight glass immediately before the TEV is worthwhile. In the event of plant problems confirmation of a clear glass prior to the valve is essential before any worthwhile investigation at the cooler can be made.

Maintenance Instructions

IMPORTANT

The cooler should be isolated from the all electrical supplies during any maintenance operations.

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 build up of condensation to drain away. The frequency of plug removal will be dictated by environmental conditions, a record should thus be kept.

We suggest the following should be checked at regular intervals: -

1.) Fans and motors, for free operation (check tip clearance), correct rotation and undue vibration.

2.) Cooler fastenings, motor mounts, impellor grub screw fixings.
3.) Electric wiring.
4.) Incoming refrigeration piping for any sign of chafe or wear on cooler casing.
5.) Cooler coil block ends for any signs of leaks (oil etc).
6.) Fin for accumulation of dirt, debris or minor damage. Minor fin damage can be combed out.
7.) Drainpans and drain lines for signs of blockage or ice build-up.
8.) Casing for minor damage. Plasticol may be touched up with matching paint but it is, of course, a galvanised sheet below the external finish. Plasticol is up to 6 times the thickness of conventional spray finish, and sheet steel suffers from none of the problems commonly associated with a normal decorative coat. Its use as outside cladding of so many cold stores and industrial buildings speaks for itself.

Electric Defrost

Should ice form on the coil we suggest the following procedure:

1.) Commence manual defrost and check each heater using 'Clip-on' ammeter (a phase amperage check at the control panel is not accurate enough). Replace any inoperative heaters (see special note) and remove ice from coil using extended defrost. Ice removal can be accelerated by covering fan apertures and exposed fin faces by polythene sheeting etc.

2.) Assuming all heaters are operational and the coil is now clear operate the cooler for sufficient time to accumulate a generous frost load (a loaded one which holds the heat and provides a greater 'washing' effect).

Cleanable Coolers

Cleanable coolers are provided with access points to enable cleaning. The design of the coolers is such to reduce the places where dirt and bacteria could collect. The cleaning can be performed by either wiping or by pressure washing (Between 3-5barg). When using any type of chemical cleaner it is vital that the cooler is washed down with fresh clean water to reduce the pH levels. Generally cleaning fluids can have a pH in the order of 12, this must be reduced to as close to pH 7 as is practical after cleaning. This includes removing any over spray from return bends and surfaces that may not have been directly washed (especially fans although avoid direct blasting with high pressure water as this may penetrate the motor drain holes). Any surface left with traces of high pH fluid will start corroding (inc. Stainless Steel!). Cleaning fluids can be found that are non-conductive (non-ionic), these have the benefit of not acting as an electrolyte when in contact with dissimilar metals. Whilst it is very difficult the assess the long term effect of cleaning fluids on a job by job basis, the basic rules are to avoid leaving residue cleaning fluids on the surfaces of the heat exchanger and to make sure the pH level is as near neutral as possible after cleaning.

As such Coolers & Condensers Ltd cannot recommend a specific cleaning regime or period of cleaning, this is to be decided by the management of the final user and to be appropriate to the type of product in the room. The most important issue apart from the reduction of bacteria within the casing is the corrosion potential and wash down is

the only way of keeping corrosion at a minimum. For extremely corrosive environments a fresh water wash down at the end of every shift on both sides of the coil is recommend

Sometimes fan plates are hinged to provide access to the cooler plenum and fans MUST BE ISOLATED before these doors are open. There are no interlocks provided on the door but a fan isolator is provided nearby. Access to under the coil is provided on above 0°C room coils, a lift up baffle on the coil face enables a clear view under the coil and limited cleaning access. Whilst every effort is made at the factory to ensure all sharp edges are removed personnel are recommend to wear safety gloves when cleaning under the coil due the number of fins and metal edges in that area.

It has been found on many sites that there may be regular washing of the more easily exposed finned areas, but the less accessible area are neglected. It is these neglected areas that corrode more readily. It has also been seen that coolers can be exposed to aggressive cleaning substance because of over spray from the cleaning of other items within the same room, if the fans are left running whilst there is over spray fluids will be deposited onto the finned surfaces. The washing off of corrosive substances and the resultant fresh water wash down are the only real defence against corrosion. All materials used in evaporators that are exposed to a moist air stream containing corrosive chemicals (even stainless steel) will be corroded if not cleaned and washed down.

Corrosion

If it is felt that the environment that the cooler will work in will have harmful effect upon the materials of the cooler it is vital that the information is given to Coolers & Condensers Ltd at the quote stage so provision in the selection of materials can be made.

Recommendation for use of Stainless Steel Tube Coolers with Water/Glycol

1.) The water should be from a sealed system charged with distilled (and therefore de-ionised) water.
2.) The Ph level should be maintained between 8 and 10, if necessary by use of sodium carbonate.
3.) A total loss water system could cause serious problems since water quality cannot be assured. We therefore cannot recommend this type of system with stainless steel coils.
4.) The corrosion inhibitors normally present in glycol are inappropriate for stainless steel.

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