

## Cooler Cleaning Recommendations : Issue 2 Jan 2015

### Dual Discharge, Floor and Ceiling Mounted Coolers.

#### Health & Safety

Coolers & Condensers Ltd. expects that any personnel involved with working on our equipment will be part of a supervised and experienced team. It is expected that all work will be carried out in accordance with the relevant safety directives, the Health and Safety at Work Act 1974 and any local requirements dictated by the place of installation. It is expected that this document be used as part of the method statement and risk assessment for any work to be carried out.

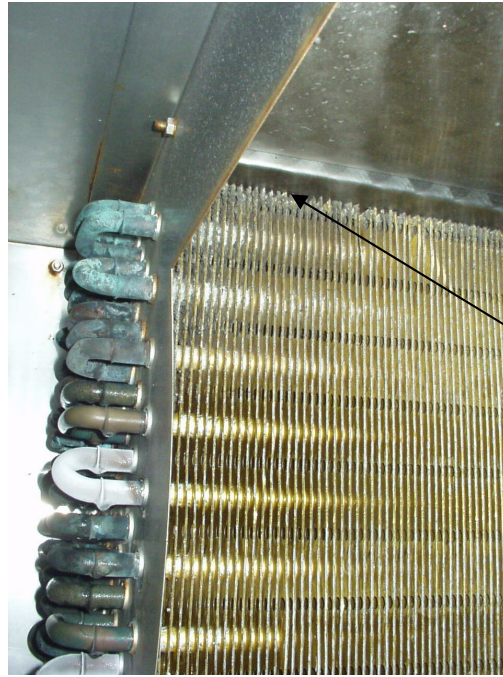
#### Cleanable Coolers

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 3-5 barg). 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 surfaces left with traces of high pH fluid will start corroding (inc. Stainless Steel!).

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, thus wash/rinse down is the only way of keeping corrosion to a minimum. For extremely corrosive environments, a fresh water wash down at the end of every shift on both sides of the coil is recommended.

When requested, units are fitted with hinged fan plates and access panels. These provide access to the cooler plenum and fans, and therefore the units **MUST BE ISOLATED** before these fan plates and panels are opened. There are no interlocks provided on the fan plates but fan isolators are provided nearby. Where access to under the coil is provided (via the hinged fan plates and/or access points via lift up baffles on the coil face), this enables a clear view under the coil together with 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, however, the less accessible areas are neglected. It is these neglected areas that corrode more readily as shown in fig 1 below.



Areas vulnerable to corrosion attack. Concentrate on a water wash down in these areas to remove cleaning chemicals.

Figure 1

The washing off of corrosive substances and the resultant fresh water wash down are the only real defence against corrosion. All materials used in coolers are exposed to a moist air stream containing corrosive chemicals, as such, even stainless steel will corrode if not cleaned and washed down thoroughly.

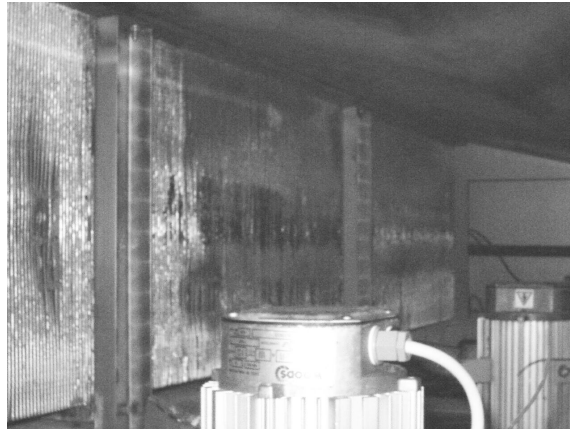
## Corrosion

If it is felt that the environment that the cooler will work in will have a harmful effect upon the cooler materials, 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.

It has been found that over time coolers are vulnerable to corrosion attack due to a number of factors as follows:-

1. Cleaning of produce in the room being cooled;
2. Cleaning of equipment in the room being cooled;
3. Chemicals given off by the product in the room being cooled;
4. Chemicals used as preservatives for the product being cooled;
5. Failure to remove cleaning chemicals with water from the coolers to prevent the build-up of harmful compound and chemicals on the heat transfer surface areas and return bends;
6. Unsuitable material and product combination.

Due to the complex nature of corrosion, it is impossible to create one material finish to suit every application. It is vital therefore, as previously mentioned, to alert at the design stage, any concerns over the material compatibility of the cooler and its working environment.



Inside Dual Discharge Cooler: Dark area shows where wash down is required.

## Cooler Cleaning Check List:

1. A cleaning procedure has been determined and the compatibility of the materials of the cooler and the cleaning agents has been verified.
2. The working environment is safe and all personnel are trained in the cleaning procedure and there is safe access to the cooler.
3. Electrical supply to the cooler is isolated (and locked off if possible).
4. The chemicals are applied in the correct manner and with the required level of dilution.
5. After the cooler surface has been washed with the chemicals, all residual traces should be washed off with fresh water so there are no chemical traces left and the pH level is back to pH7 (or as close to this as feasibly possible).
6. Ensure the inner less visible areas of the coil are given as much attention as the more visible areas.
7. Visually check for signs of corrosion inside and outside the cooler casing. Report any signs of corrosion to the engineering manager.

## CLEANING METHODS:

The type of cleaning method employed needs to be matched to the cooler design and the room requirements. An example of this is the use of high pressure washing lances, the force of the water jet is sufficient to blast the debris within the cooler into the air stream and around the room. Some end users have decided not to use pressure washers and have opted for lower pressure washing combined with a wiping action.

The use of stainless steel in rooms where there is large chlorine content means that the stainless steel requires regular attention to prevent pit corrosion and discoloration. Its stable oxide layer protects the stainless steel; the main agent that undermines this oxide layer is chlorine. The chlorine attacks the stainless steels oxide coating and eventually breaks into the main substance of the material thus causing it to start rusting. To avoid this action, it is vital to prevent chlorides from accumulating on the stainless steel surfaces and to ensure the cleaning regime allows the stainless steel to renew its oxide coat. Any discoloration or accumulation of debris on a stainless steel surface is a potential site for corrosion, so any cleaning regime must remove the debris and the discoloration. The visual indication that the cleaning is successful is that the stainless steel surface is clean and shiny. A strong protective oxide layer on

stainless steel is totally clear and smooth. The use of high-pressure water and wiping actions is most beneficial to the creation of a good protective oxide layer on the stainless steel surface. Any wiping will allow a new oxide layer to form.

Stainless Steel is best protected by wiping and a wash down with fresh water, once finished, the surfaces of the coil and cooler casing should be as close to pH 7 as possible.

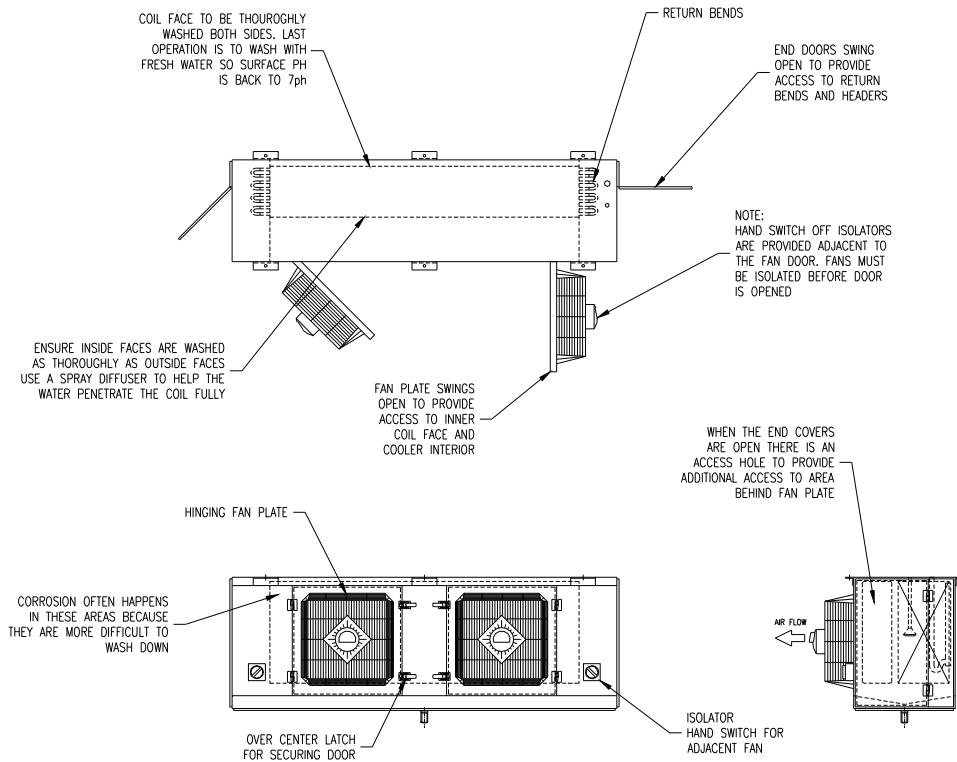
**CLEANING REGIME:**

Start by ensuring the cooler is switched off. Check there is no refrigeration taking place otherwise there is a risk of the coil freezing up. Before accessing the inside of the cooler casing, ensure all the fans are isolated. It is expected that any cleaning procedure will require close access to the cooler, therefore the requirements of the Health and Safety at Work Act 1974 should be observed.

Before spraying chemicals onto the coil it should be established if there is the potential for the cleaning agents to damage the materials of the coils. Therefore at the time when a cleaning procedure is set out, the cleaning fluids should be examined for corrosive agents. Please contact Coolers & Condensers Ltd. for advice on material compatibility.

Due to the large variety of cleaning fluids and product applications, Coolers & Condensers Ltd. cannot guarantee or endorse specific products for cleaning coolers. Generally it is recognised that there is the requirement to kill organisms and to prevent bacteria spread within our equipment, but if residues of these generally aggressive substances are left on the cooler surfaces the coil will rapidly deteriorate. It is most important to wash coolers down with fresh water after chemical cleaning procedures to remove traces of the cleaning products.

It is also found that in rooms where vegetables are washed, there is a very high risk of corrosion from the vapours given off by products such as spirit vinegar, citric acid and chloride washes. These types of procedure put any material in any cooler under severe attack. The only way to give good service life to the cooler is to select the most stable materials at the design stage and to wash the coil and return bend surfaces down regularly. In rooms where very aggressive chemicals are present this could mean a daily wash down of the cooler. It has been found that in factories with a thorough and regular wash down, the coil life is considerably longer than at the sites that don't. It must be remembered that every square millimetre of the coil is at threat from corrosion from substances either related to the products and processes in the room or to chemicals or biocides used for cleaning. Therefore, the main line of corrosion defence is the wash down with fresh water. All materials can be corroded over time because of the build up of corrosive substances.



Drawing Showing Cleanable aspects of CA cooler design

Coolers & Condensers Ltd  
 12 Brunel Way  
 Segensworth East Industrial Estate  
 Fareham  
 Hampshire  
 UK  
 PO15 5TX

Tel : 0044 (1489) 885533  
 Fax : 0044 (1489) 885280  
 e-mail : [info@coolers.co.uk](mailto:info@coolers.co.uk)