PROFROID

CLEANING GUIDE FOR OUTSIDE HEAT EXCHANGERS

CONDENSEURS / GASCOOLERS / DRYCOOLERS

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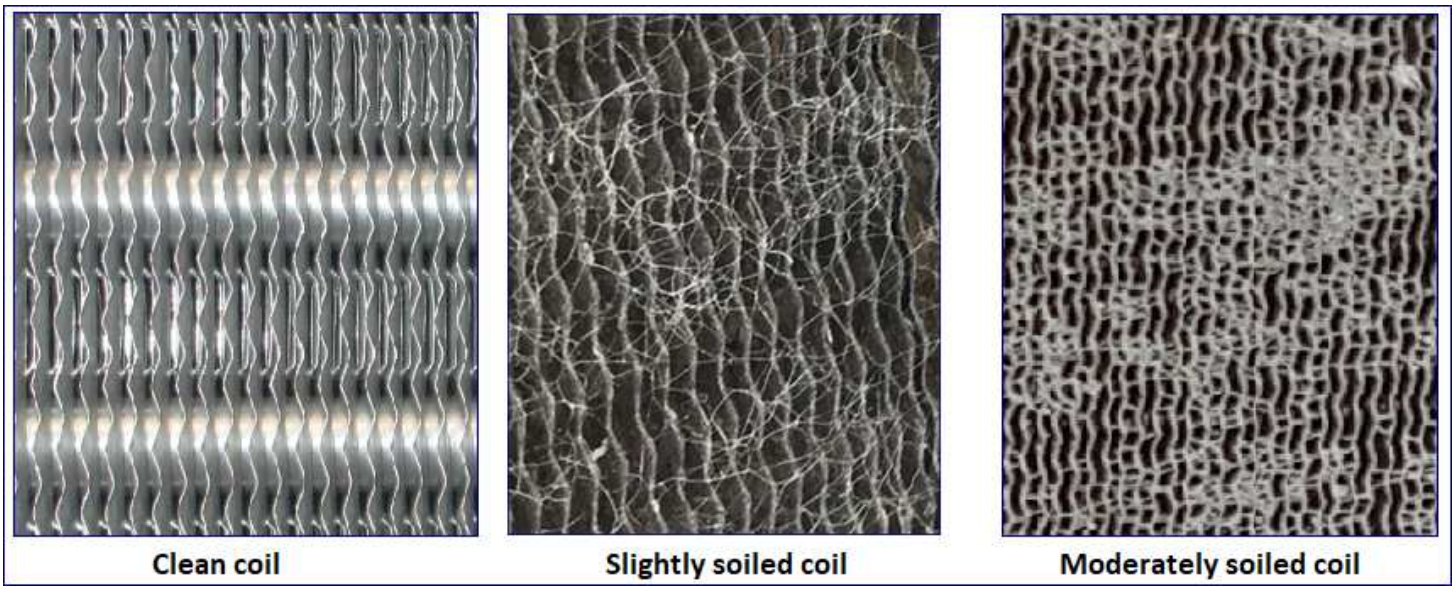
CLEANING GUIDE FOR OUTDOOR HEAT EXCHANGERS

1. GENERAL RULES

It is strongly recommended to regularly clean coil of the heat exchanger, at least once a year. Insufficiently maintained equipment will have a short life expectancy, compared with an identical equipment with regular routine maintenance.
An insufficiently maintained equipment exposed to an aggressive environment, may be quickly deteriorated, even if an appropriate protective treatment has been applied for the manufacturing of equipment.
The purpose of the cleaning is to get rid of all the hydroscopic crystals as well as deposits of all kinds.
Depending on the environmental and operating conditions, it may be necessary to increase the frequency of cleaning, particularly depending on:
- operating time of the fans
- quality of the surrounding air (proximity to sea, factories, relative humidity, ...)
- presence of adiabatic ramps

The frequency of the cleaning operations is mainly function of the conditions of use and of the amount of the deposits. That's why, it is recommended to regularly carry out a visual inspection of the exchanger in order to start a cleaning operation as soon as necessary.
A late cleaning :
- will take longer time to achieve
- will be more complex to achieve
- reduces the life expectancy of the exchanger

Below, 3 pictures of exchangers at different states of soiling (photos given as an indication).



Turn off the entire unit, and secure the unit against unintentional power-on.
Comply with the site's specific safety instructions.

For heat exchangers with BLYGOLD® or HERESITE® coating, refer to the paragraph specific to each treatment.

If the fins are damaged, it is necessary to straighten them with an appropriate tool before starting a cleaning procedure.

Adiabatic system

Misuse of adiabatic systems can become an aggravating factor in heat exchanger soiling. As a reminder:

- Only PROFROID adiabatic supplied systems must be used on PROFROID exchangers. Any other system of misting, spraying or watering is prohibited
- The quality of the water must be regularly checked according to the criteria described in our Instruction and Operation Manual (IOM), see specific chapter of the manual. This verification must be recorded in the maintenance book of the installation.
- Direct spraying of the water on the heat exchanger is forbidden, refer to the rules for mounting the adiabatic systems, see specific chapter of the manual.

General safety recommendations

Whatever the method of cleaning, it is necessary to respect the following rules:

- The complete device must be switched off and secured against unintentional power-on.
- Secure the intervention area with visible markup.
- Prohibit the access of the secured area to any unauthorized person.
- Take note of the emergency numbers for the site.
- Check the adequacy of the energies delivered and the necessary tools.
- The motors of the fans must be protected against any splashing of water.
- When cleaning mechanically, it is forbidden to use "hard" objects: metal brush, screwdriver, ...
- It is mandatory to maintain a minimum distance between the cleaning devices and the heat exchanger. This distance is function of the clogging of the battery and the chosen cleaning method. See details in the chapters below.
- It is mandatory to start using the cleaning means (air or water) out of the heat exchanger before proceeding on the heat exchanger, then start cleaning at a distance greater than the recommended minimum distance, then move closer gradually.
- When using hot water, the maximum allowed temperature is 80 ° C.
- Whatever the chosen method, the cleaning must ensure the elimination of all the dirt.
- When using cleaning agents other than water, they must be compatible with all the elements of the exchanger and must not subsequently corrode the materials used for the manufacturing of the exchanger.
- It is mandatory to ensure that the cleaning agents used have no impact on the environment, either by using non-aggressive products or by collecting and treating the effluents resulting from the cleaning of the heat exchangers.
- Operators must wear the required individual security equipment required for this operation: gloves, glasses,… in accordance with the safety data sheets
- The safety sheets of the products must be visible to anyone near the place of intervention

2. LOW PRESSURE CLEANING – SLIGHTLY SOILED COILS

Turn off the entire unit, and secure the unit against unintentional power-on.
Comply with the site's specific safety instructions.

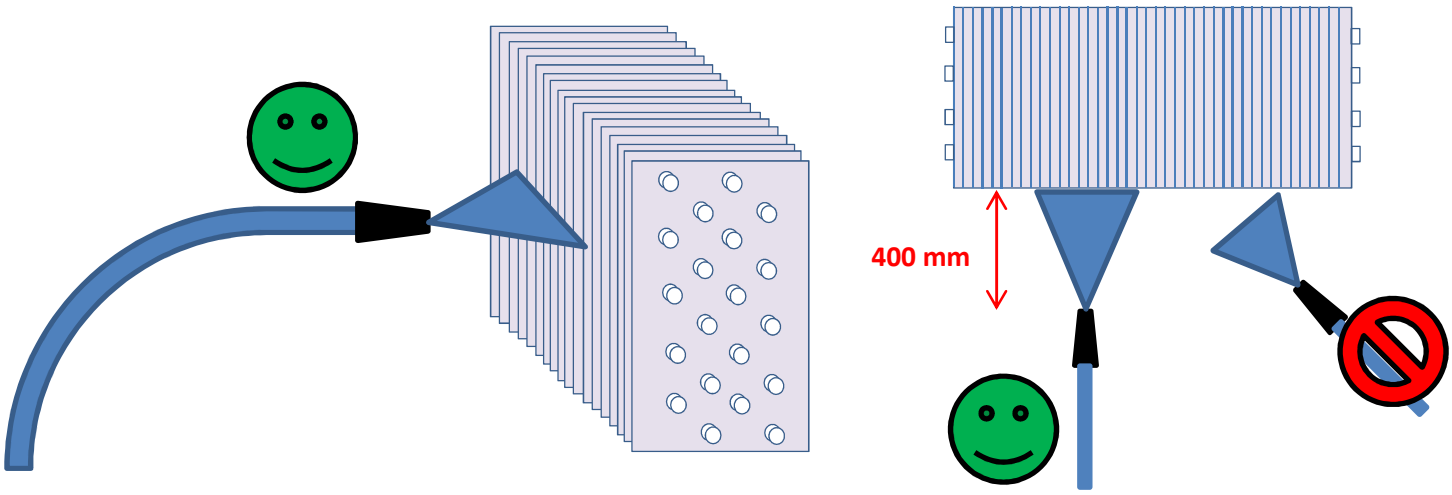
Dry air cleaning

For slightly soiled heat exchangers: dust, non-clogging dry residues, leaves,… it is preferable to carry out a "mechanical + compressed air" cleaning:

- Initially clean with a non-metallic brush (soft brush).
- Suck the front surfaces with a vacuum cleaner.
- Repeat this operation as necessary until you obtain a perfectly clean surface.
- Use dry air at a maximum pressure of 7 bar. Minimum distance to keep between the jet of compressed air and the battery = 150mm.
- Orient the compressed air perpendicularly to the exchanger. An angled position will cause the fins to fold.

Cleaning with clean water (low pressure)

- For slightly dirty coils, it is also possible to clean with clean water.
- Initially clean with a non-metallic brush (soft brush).
- Suck the front surfaces with a vacuum cleaner.
- After brushing and vacuuming, clean the coil with a jet of water (ideally flat jet). Use clear water at the pressure of the tap water network (3 bar max). Minimum distance to keep between the exchanger and the water jet = 400mmm.
- Repeat this operation as necessary until you obtain a perfectly clean surface.
- Orient the water jet perpendicularly to the exchanger. An angled position will cause the fins to fold.
- Make sure not to orient the jet towards the fans, it is mandatory to protect the fans against splashing water.
- When using cleaning agents other than water, choose a neutral pH fluid (pH = 7), and rinse with clean water. Be sure that:
    - these cleaning agents are compatible with all the elements of the exchanger and are not likely to corrode materials used for the manufacturing of the exchanger
    - these cleaning agents used have no impact on the environment, either by using non-aggressive products or by collecting and treating the effluents resulting from the cleaning of the heat exchangers

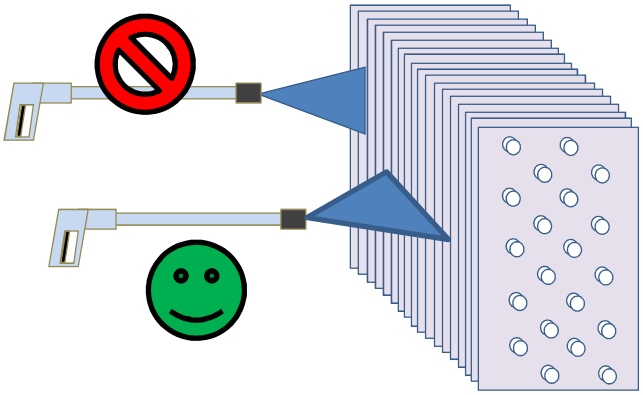


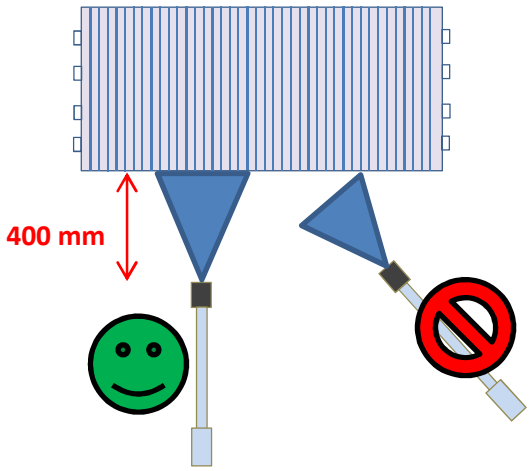
3. HIGH PRESSURE CLEANING – MODERATELY SOILED COILS

Turn off the entire unit, and secure the unit against unintentional power-on.
Comply with the site's specific safety instructions.

Cleaning with a water pressure washer

For moderately soiled heat exchangers: wet or oily dust, residues with little clogging,… it is possible to use a pressure washer.
- Choose a nozzle to obtain a flat jet (25°)
- Before proceeding on the heat exchangers, it is recommended to activate the hose outside of the heat exchangers, then start the cleaning at a distance greater than the minimum distance allowed. Use a pressure washer with a maximum pressure of 110 bar. Minimum distance to keep between the hose and the exchanger = 400 mm
- Orient the flat jet facing the fins and perpendicularly to the heat exchanger. An angled position will cause the fins to fold. A parallel position will have the effect of spreading the fins.
- Make sure not to orient the jet towards the fans, it is mandatory to protect the fans against splashing water.
- Repeat this operation as necessary until you obtain a perfectly clean surface.
- When using cleaning agents other than water, choose a neutral pH fluid (pH = 7), and rinse with clean water. Be sure that:
    - these cleaning agents are compatible with all the elements of the exchanger and are not likely to corrode materials used for the manufacturing of the exchanger
    - these cleaning agents used have no impact on the environment, either by using non-aggressive products or by collecting and treating the effluents resulting from the cleaning of the batteries





4. HEAT EXCHANGERS WITH BLYGOLD® COATING

Turn off the entire unit, and secure the unit against unintentional power-on.
Comply with the site's specific safety instructions.

For maintenance on heat exchangers coated with Blygold® treatment, please refer to Blygold® COIL CLEAN procedure attached below.

It is an obligation to respect the distance and water pressure indicated in previous chapter (110bars maximum @ 400mm minimum) as well as the spraying instructions described in chapter 3 - HIGH PRESSURE CLEANING – SLIGHTLY SOILED COILS

COIL CLEAN PROCEDURE

CLEANING PROCEDURE

HOT / COLD COIL, CONDENSER, AIR EVAPORATOR

0. Take note of the SEC procedure
1. Take necessary measures for environment protection
2. Disassembling of the elements blocking the access on the 2 sides of the coil if necessary
3. Brushing of frontal surfaces from top to bottom: flexible brush
4. Brushing of frontal surfaces from top to bottom: vacuum cleaner
5. Rectification of the wings if necessary
6. Sprinkling of a water solution + BLYGOLD COIL CLEAN at 10% in both sides of the coil in low pressure and at a temperature of 80°C maximum
7. After 15 minutes, rinsing with cold clear water in high pressure (120 bars maximum at ambient temperature)
8. Repeat this operation until the fin surface is perfectly clean and is degreased (test with the white rag)
9. If after this operation impurities remain, the BRITE procedure applies
10. If a decontamination operation is required, the DEC procedure applies
11. Reassembly of the possibly dismounted elements
12. Cleaning of the working areas
13. Evacuation of the solid effluents and liquids
14. Signature of the delivery note by the customer or his representant
15. A call report will be dispatched if required

BLYGOLD COIL CLEAN : detergent with neutral pH

Nota : Never use a basic detergent.
In case of use of an acid solution, please refer to the BRITE PROCEDURE

5. HEAT EXCHANGERS WITH HERESITE® COATING

Turn off the entire unit, and secure the unit against unintentional power-on.
Comply with the site's specific safety instructions.

For maintenance on heat exchangers coated with HERESITE® treatment, please refer to SAKAPHEN® INSTRUCTION TECHNIQUE INS/TEC/18 procedure attached below.

It is an obligation to respect the distance and water pressure indicated in previous chapter (3 bar maximum @ 400mm minimum) as well as the spraying instructions described in chapter 2 - LOW PRESSURE CLEANING – SLIGHTLY SOILED COILS

15) MAINTENANCE OF COATED COILS

Heresite is used to assure the protection of materials against a corrosion connected to the aggressiveness of the gas effluents and the liquid condensats by resulting.

IMPORTANT : to diffuse with the user customers :

The maintenance of coated coils Heresite does not put any major problem. The frequency of the operations of cleaning is a function essentially of conditions of use and importance of spots or deposits.

15.1. Regular and classic maintenance to guarantee a good return

15.1. Spots

The fat dusts risking to seal or to reduce the return on the coil, can be eliminated by means of a jet of warm water with suited pressure, function of the nature of fins, their thickness. Only mechanical resistance of fins should be considered.

15.2. Deposits

The deposits of mineral or organic salts can be eliminated with basic or acid diluted solutions or possibly with addition of solvent.
Heresite Coating supports indeed the corrosive action of solutions of PH slightly acid or basic, solvents being also without action.

In conclusion, washes with solutions suited under pressure of some bars are to make every time when necessities being allowed well that frequent washes are preferable rather than to wait for the accumulation of crystallized or compact deposits, difficult to eliminate.

15.2. Specific maintenance in some industries

Besides a regular and classic maintenance being the object of § 15.1. It is necessary in certain conditions of use to proceed to specific maintenances bound generally to special sanitary conditions compulsory for this type of in particular food industry.

It is proceeded to cleanings with products corresponding to the entailing imperatives of the chemical constraints of order totally different from those met in the normal conditions of functioning, it why Hérésite was applied.

These products can be without incidence on Heresite coating, under reserve of their composition and use of compatible concentrations, but imply an effective rinsing eliminating any track of used product.

Often, it is about foaming products badly eliminated residues of which can determine concentrations being able to lead to the degradation of coating.

Elimination with certainty of any track of froth is made all the more difficult as these equipments often contain ventilators forbidding the visualization of the works of cleaning. Every order in this sense have to be so communicated to the user.

The used products of cleaning having an action "anti-bactérienne" can be 2 orders, either strongly basic, or strongly acid.

The guide of chemical resistances joined being the object of the § 16 of the present technical instruction, stated the very wide sample group of the resistance of Hérésite P 413 to the vapors of organic or mineral origin, but stipulates in a formal way conditions very limited in which Hérésite risks to be degraded according to concentrations.

But, products intended for these specific maintenances are, or:

- ✓ in pH very strongly acid constituted essentially with mineral acids, nitric and phosphorique, with extremely acid pH of 1.6 in a solution of 10 %
- ✓ in pH strongly basic in base of dioxide of carbon or soda hypochlorite or chlorite of sodium, and of méthyl amine with strongly basic pH from 13 to concentrated solution, and from 12 to 10 %, that is even strongly diluted, what is not always respected during the operations of cleaning.

It is so essential to take care of that dilutions are insured well and the rinsing completes so that similar treatment, when products of replacement are not possible, is operated with a rigorous follow-up, knowing that we can not accept of responsibility if this clause was not considered.