Defrost the right way and your costs will melt away!

Ice forming on the evaporator is a reliable indicator of how well the defrosting function is working. If an uneven layer of ice forms and the ice is thicker in some places, the defrosting process should be checked and optimised as necessary.

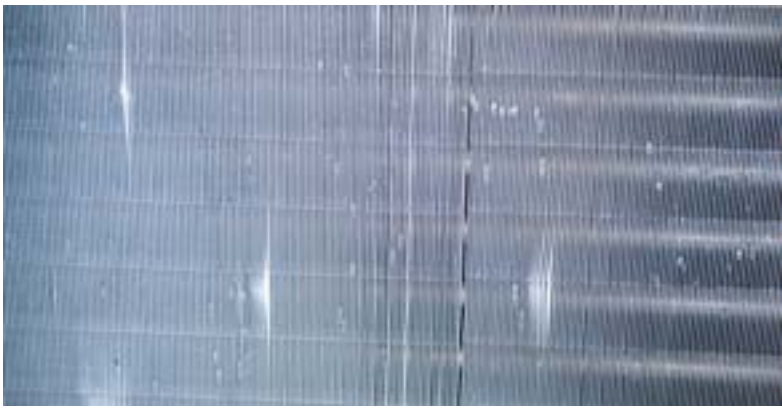
Action

If the defrosting function is adjusted correctly, the air-to-water heat pump will consume less energy.

Requirement

Ideally, the defrosting process should be checked and optimised when the outside temperature is around freezing point (minus 2 °C to plus 5 °C).

With optimally adjusted defrosting, you will save between CHF 500 and 1000 per year (depending on the size of the system).



What to do

The goal is to find the minimum defrosting temperature at which there is no longer any ice on the evaporator after the defrosting process. The best way to do this:

1. Determine the temperature of the evaporator fins
Initiate the defrosting process (the evaporator must be iced up). At the point in time when all the ice has melted away, measure the temperature on the fins.

2. Set the defrosting temperature and time
Set the temperature you measured (see step 1) as the new defrosting temperature on the defrosting thermostat. You must also set the maximum defrosting period (e.g. 25 minutes[1]). By doing this, you make sure that the defrosting process ends if the temperature is not reached.

3. Enter the drip-off time
Check the drip-off time and set it so that the remaining water can drip off the fan before the compressor and the fan switch on again (e.g. 3 minutes).

4. Restart the heat pump

Costs – effort

A service technician needs about 1 to 2 hours for the optimisation, which will cost between CHF 300 and 400.

Please note!

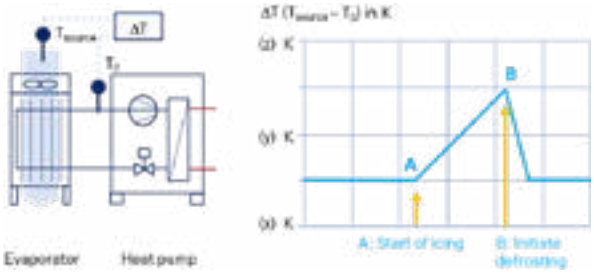
- The defrosting process is permanently programmed in the heat pump. Setting the defrosting temperatures correctly requires a certain amount of experience. Also, some controls are user-friendly while others are rather more complex to operate. In case of doubt, you can also have the service technician change the defrosting temperature.
- Check the defrosting function once every 3 to 5 years.

1 The time depends on the device and location.

Additional explanations

Optimum between icing and defrosting

An iced-up evaporator makes the heat transfer much worse, so the heat pump's seasonal performance factor also deteriorates. But if defrosting is performed too often, the energy consumed by defrosting will increase and the heat pump's seasonal performance factor will decrease. This makes it important to find the right setting that ensures the optimum balance between "icing" and "defrosting".



Different defrosting intervals

There are three ways of triggering the defrosting process:

1. Defrosting based on a fixed time interval

Example: At outside temperatures below 5 °C, defrosting takes place after 1 hour of operating time for a fixed period of 10 minutes – even if the evaporator is not frozen. This principle is simple, safe and reliable. On the other hand, it is poor in terms of energy efficiency because defrosting takes place even when it is not necessary.

2. Defrosting based on a fixed defrosting interval

Example: Defrosting takes place after 1 hour of operating time, but the defrosting process is not geared to a fixed time; instead, it only lasts as long as necessary. This variant is more energy-efficient than defrosting based on a fixed interval.

3. Demand-actuated defrosting

The defrosting intervals and times are variable, and are automatically adapted to the effective demand. A self-learning control system triggers defrosting at fixed intervals at the beginning of the heating period. In this case, the surface temperature of the evaporator is measured continuously and the duration until the evaporator is completely "ice-free" is determined. The next defrosting process is shortened or extended accordingly. This is a complex solution in terms of control technology, but it is definitely the most energy-efficient option.

The main defrosting methods

A: Reverse-cycle defrosting (for 80 per cent of systems)

With this method, the refrigeration circuit is reversed. The evaporator becomes a condenser and the heat causes the ice to melt. Defrosting settings:

A: Fixed time control: operating time of 1 hour, followed by defrosting for 10 minutes.

B: Time control with variable end: operating time of 1 hour, followed by defrosting for as long as necessary. Or: both operating time and defrosting are continuously redefined by the control (demand-led). Correct adjustment of the defrosting is somewhat more complex and time-consuming.

B: Hot gas bypass defrosting

The hot gas is fed to the evaporator directly downstream of the compressor, and it defrosts the evaporator. The operating time for hot gas bypass defrosting processes is 10 to 15 per cent of (overall) operating time, which is rather long. No heating operation is possible during this period (reduced output).

C: Natural defrosting (up to 5 °C)

Natural defrosting works up to an outside temperature of 5 °C. To do this, the heat pump is switched off and the fans continue to run. The ice melts away due to the "warm" ambient air. This is a highly energy-efficient solution.

D: Electrical defrosting

The evaporator is defrosted with an electrical insert. Simple – but not energy-efficient.

Additional information

- Guideline with measures to optimise refrigeration systems
- Heat pumps: planning – optimisation – operation – maintenance

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