THE IMPORTANCE OF DEFROSTING

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Cooling and heating systems consume large amounts of energy. This makes them significant contributors to climate change, as the energy is often derived from fossil fuels.
However, the amount of energy spent on cooling and heating is often larger than it needs to be due to inefficient defrost management of the systems.

WHY IS DEFROST NEEDED?

Refrigeration systems accumulate ice on their evaporator coils when in operation. Over time, this buildup blocks the airflow and lowers the efficiency of the system by insulating the coils, reducing their ability to transfer heat. An ice layer of just 1.5 to 2mm can reduce the heat transfer by 5-15% (with fin spacing of 7mm). Reduced heat-transfer efficiency means more energy is needed to achieve the same amount of cooling.

Defrosting eliminates the ice buildup, ensuring efficient heat transfer and maintaining the capacity of the system. The downside is that defrost cycles disrupt the normal cooling process. The disruption can lead to a surge of energy being needed to reach the desired temperature once the defrost cycle ends. In other words, they are costly to perform when looking at your energy expenditure.

Traditionally, evaporator defrosts have been initiated based on fixed time schedules, often a specific number of defrosts per day/week, regardless of whether a defrost was needed or not.

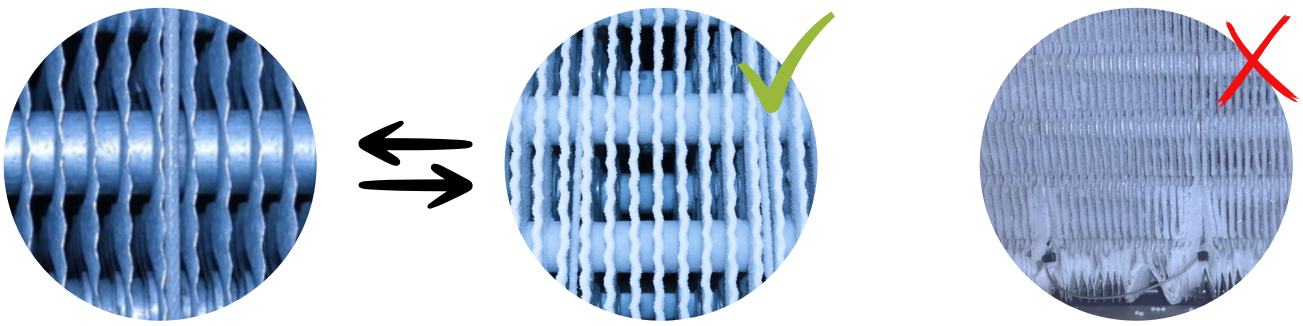
The length of the defrost periods were often scheduled to ensure that all evaporators, including those furthest away from the system's compressor, were properly defrosted. However, this approach means that evaporators closer to the compressor will defrost for longer periods than needed.

This increases not only the energy usage, but also the risk of workplace accidents, as excessive defrost can cause condensation, which then drips to the floor potentially creating dangerous ice formations

Local climate variations, like the colder less humid conditions that are typical during winter months in many parts of the world, also reduces the ice buildup. This means fewer defrosts are needed and regular adjustments of the defrost schedules are required to ensure efficiency.

DEFROST ON DEMAND

There is however a more efficient management approach available, namely a sensor that precisely measures the thickness of the ice buildup. The sensor is installed between the fins in the evaporator, sending a signal to the system controller when it is time for a defrost. This eliminates superfluous cycles, providing defrost on demand when necessary, and only when necessary. It also signals when the defrost cycle has completed its job, so it doesn't carry on longer than needed.



Danish manufacturer HB Products has developed this sensor, called the HBDF. It is installed between the evaporator fins where the frost accumulates. In cold stores, the HBDF sensor can reduce the number of defrost cycles by 50-70% on a yearly basis, when compared to a traditional timer-based approach. With adjustment, the sensor can also be installed in heat pumps.

One of HB Products' customers is Arla Food, a multinational cooperative dairy, and they are very pleased with the HBDF

> "We have reduced defrost cycles from 7 times per day to just 1, so this has definitely had a positive impact on electricity consumption."
>
> -Morten Asferg, Chief Engineer Global Facility,
> Arla Foods on the installation of the HBDF sensor.

Such a significant reduction of the number of defrost cycles can lead to energy savings up to 40%, no small thing in times with very high energy prices. It can also be an important contributor for cold storage operators, and other companies, aiming to achieve net zero in their operations and/or other climate goals.

Use our free calculator to determine your savings based on your own data.

Access Free Calculator

If you have any questions, our technical team is here to help. You can contact them at info@hbproducts.dk

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