

MIST ELIMINATION



The end of the Ice Age. Snow and ice protection.



Beating th

Cold conditions bring their own particular set of problems to the efficient operation of equipment and processes whether land-based, offshore or marine. In order to optimize the temperature and humidity on the inside, it's vital to achieve and maintain a constant, dependable supply of air from the outside – whatever the weather.

Traditionally the solution is to install louvers. They look as if they're doing the job – until you can no longer see them for the build up of ice. Yet there are ways of preventing that build up of snow and ice and the consequent plugging of air intakes. It's simply a question of knowing how.

The root of the problem

There may be disagreement on the precise number of words for different types of snow, but there is certainly a wide variety of conditions when the temperature is close to freezing. Moisture in the ambient air turns into ice. Ice expands and the aperture reduces in size, increasing both the air velocity and the subsequent cooling effect. This



results in even more ice being formed and the louvers becoming blocked. In extreme cases the build up of ice can reach 25 mm per hour and air intakes can block solid within half an hour. The end result is a reduction in the air volume getting through. This can result in loss of power output from turbines caused by air starvation and/or overheating; it also causes overloading of fans, poor air quality, downtime for processes, additional operating costs, delays and potential lost production.

Once the ice starts to build up, the result is inevitable. The ice reduces the face area of the inlets causing intake velocity to increase, the temperature to drop and more ice to form.



e elements



A problem made worse

Simply clearing the ice accumulation off the front of the louvers mechanically does not help. Besides being labour intensive and inefficient, it frequently leads to snow and ice entering the ducting system ending up in the filters and blocking them. Once plugged, filters must be thrown away. Snow in the ducts also leads to inaccessible pools of melt water bringing the problem of mildew and becoming potential breeding grounds for Legionella.



Conditions do not always have to be 'extreme' for extreme problems to arise. These images of totally ice-bound air intakes were taken in northern Germany in ambient conditions of around 0 °C.

Not one problem, several

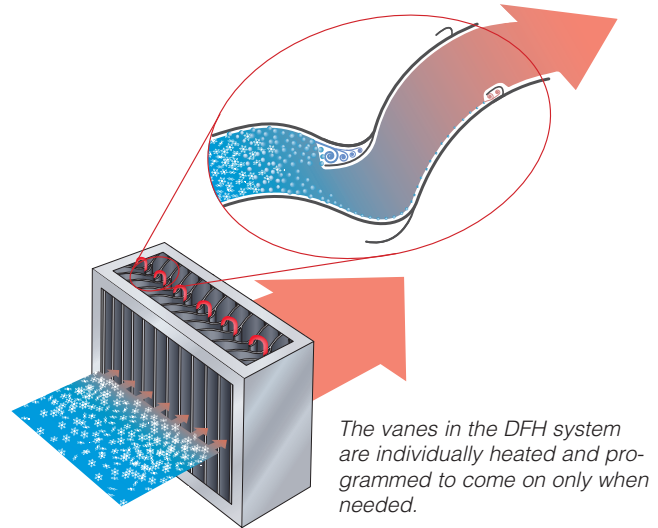
As the temperature changes, so too does the nature of the problem. Damp snow, sleet, moist air, dry snow, new snow, old snow – all present different challenges. Icing occurs most frequently between an ambient temperature of -5 °C and +5 °C and high levels of relative humidity, temperatures that are often associated with daytime to night-time fluctuations. Coupled with this are changes in wind velocity, and variations in wind direction that can result in the freeze-thaw seesawing that is hard to predict and that often causes moisture carry-over into the ducting.



Beating th

But there is a solution

Or, more accurately, there are solutions. Because ambient conditions vary greatly even at the same latitudes, it is essential that the combination of air intake and mist elimination is optimized to suit the needs of the process and machinery, and to accommodate the weather that is thrown at it. Munters has more than 40 years of experience in designing, perfecting and manufacturing mist elimination systems for use even in the most extreme conditions.



The vanes in the DFH system are individually heated and programmed to come on only when needed.

The DFH range of snow and droplet separators is designed to:

- Prevent ingress of snow and eliminate ice build-up
- Ensure required air volumes at all times
- Keep machinery running at optimal efficiency
- Maintain good air quality
- Cut maintenance and downtime costs
- Prevent filter destruction from plugging
- Reduce corrosion and protect downstream equipment



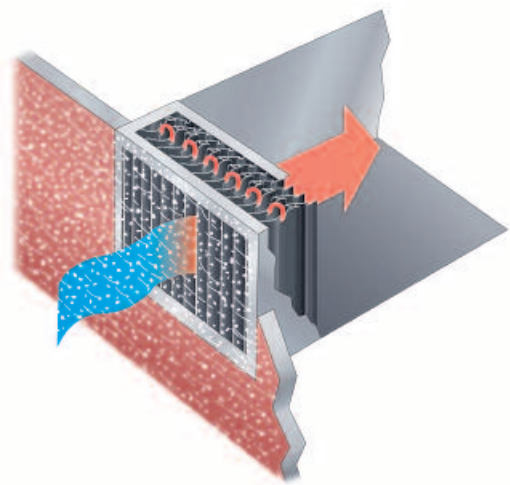
e elements

Snow and droplet separators from Munters address a wide range of low temperature applications where air intakes are also exposed to high levels of moisture in the form of rain, snow and spray. These may be land-based, offshore, coastal or marine. Intakes located close to the outlet from cooling towers, for example, are also susceptible to icing

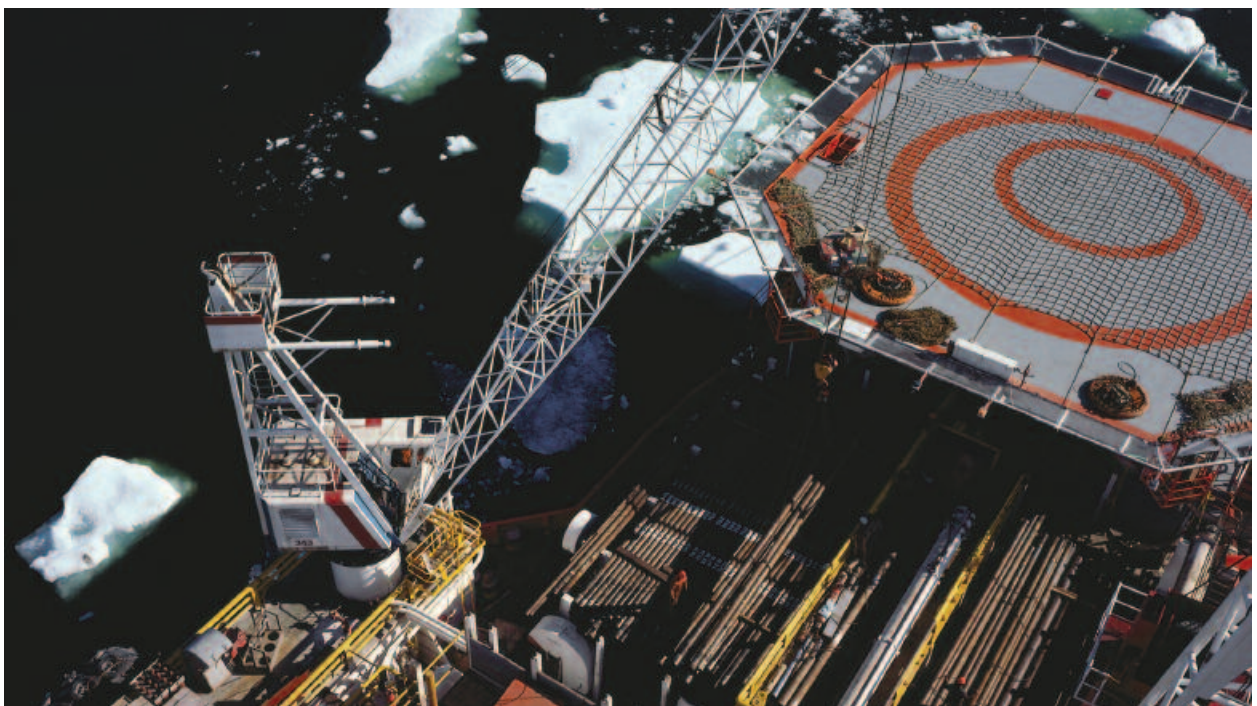
problems. What all these applications share is the vital need to protect processes and equipment at all times and whatever the weather. This is achieved by ensuring the free flow of air through the intakes and preventing icing or the ingress of snow and water

Heating when required

The DFH range features a heated separator and a control unit. It is flexible and designed for installation both in new locations and as a retrofit. Each individual vane of the separator is heated, controlled by the sensor only to come on when required. This prevents ice forming on the vanes even in ambient temperatures down to $-35\text{ }^{\circ}\text{C}$.



Ice build-up blocks the intakes causing air starvation. Snow ingress destroys the filters behind the air intakes. The Munters DFH range beats these elements and ensures adequate air volumes and snow protection.



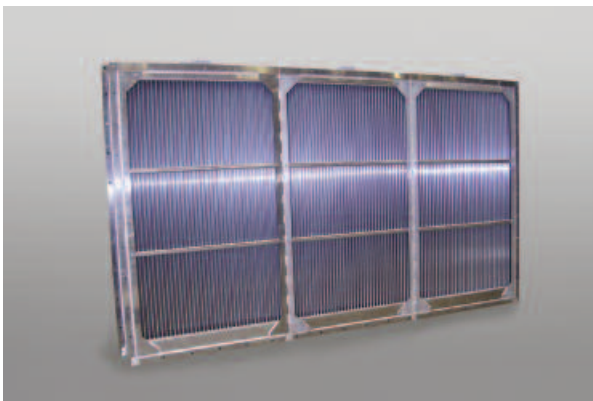
Ending th

As snow and ice particles gather on the vanes, they melt and are ducted through the heated drainage outlet. Unlike any other systems, the whole face of the separator is heated making the de-icing more efficient and also using less energy. All heating units and their control systems are corrosion-resistant and come with all relevant approvals for hazardous zones on request.

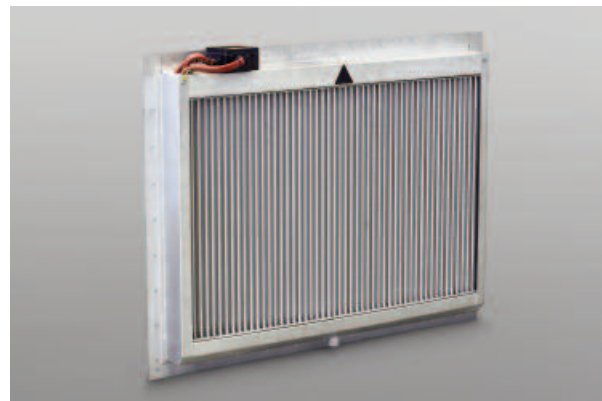
The control systems can be used to operate several units simultaneously. These are programmed to address the specific requirements of the location in question. Heating can be programmed to switch on according to variables in temperature and relative humidity. In this way local conditions can be catered for and adjustments also made from one location if, and as, the season progresses.



DFH units comprise mist eliminator, control units and drainage. They are suitable for newbuilds and for retrofit.



DFH- modular for assembly on site.



DFH – standard solution, Hazardous Area Zone 2.



DFH unit complemented with a filter.

**For more information
see DFH technical leaflet.**

ne Ice Age

Cold on the outside, dry and clear on the inside

Melted snow and ice are directed through drainage channels and drained outside the installation. Units are available in a choice of aluminium alloys and stainless steel.

DFH units prevent ice from building up on the air intakes and stop snow entering the

intakes and destroying the filters through plugging. They can be incorporated into any multiple stage configurations of mist eliminators and filters. Installation is flexible and they are easy to retrofit.

Efficient prevention of snow and ice on air intakes for:

- Ensuring adequate air supply for processes at all times
- Protecting processes and equipment
- Protecting filters from destruction through plugging
- Stopping build-up of bacteria and mould through melt water in ducts
- Reducing maintenance requirement
- Reducing corrosion
- Cutting downtime

Photo courtesy of the Swedish Coast Guard.



Damen Shipyard have built three large vessels for the Swedish Coast Guard in Romania equipped with Munters DFH units.



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