
# A Guide to Conditioned Cold Stores

Creating efficient conditions in cold stores and freezer systems

Munters

Your Perfect Climate

# The cost of frost

Throughout the world, different cold stores have different configurations, but none can fully resolve a problem common to all cold store operators - FROST!

Water and ice create dangerous slippery conditions in the loading dock with ice building up around cold store entrances. Ice also builds up around the inside of the cold store, including the intake to the evaporator coils, the components critical for maintaining products at sub zero temperatures. This creates the need for constant defrosts and stretches the capability of the cooling capacity of your equipment, whilst using a great deal of energy.

Safety issues can arise when fog forms around door entrances, causing poor visibility. Snow accumulates on product, creating the potential for collapsing cases.

Ice and snow also build up on cold store ceilings and floors with the potential to fall on people, and form dangerous uneven floors for fork lift trucks carrying loads at speed. The reduced visibility from fog also increases loading times. While all these are a matter of concern, losing the cooling capacity is potentially the most costly.


* ask for details

# Unfreeze your profits

Constant need to gain access to the cold store from the loading docks allows the movement of warm, moist air into the dock area and the cold store itself. At the same time, cold air from the cold store moves into the loading area.

Munters IceDry System® alleviates this by dehumidifying the incoming air and removing high moisture levels which cause frost, thus reducing the build up of ice.

# The cause of the problem

As we all know, ice build up is caused when moist air enters the cold store. When it comes into contact with cold surfaces such as floors, walls and evaporator coils, the water vapour in the air condenses to form water and then freezes to form ice. In addition to the problems already highlighted, this process is highly energy inefficient, as illustrated by the following common situation.

The average condition over a year for outside air in the UK is a temperature of 10°C and a relative humidity (RH) of 80%. This air contains 6kg of water per kilogram of air. If air enters cold stores through the loading doors at rates of around 1000m³/h, then 173kg of water vapour enters the store every day.

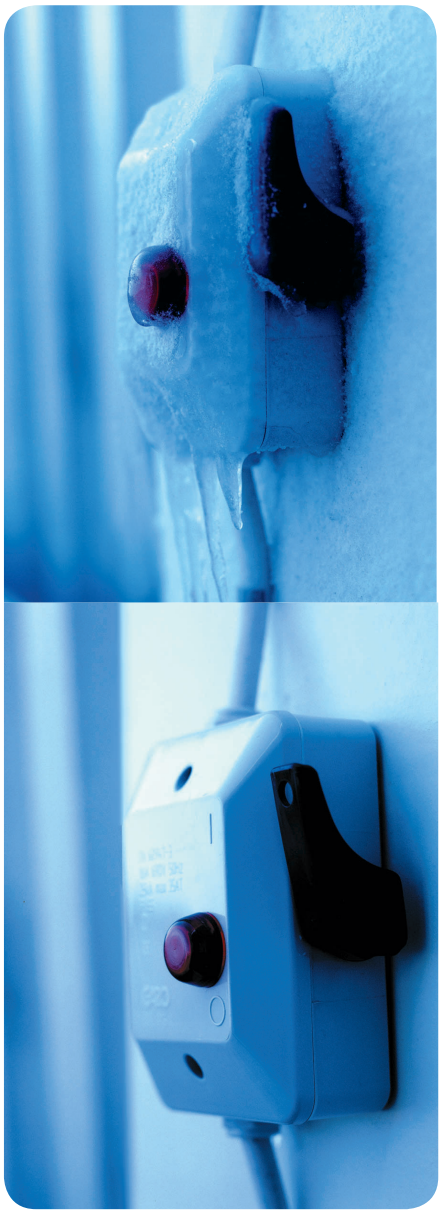
A substantial amount of potential ice!

Turning this water vapour into ice (latent cooling) uses energy from the cooling equipment simply to bring about the change of state from gas to solid, without contributing to the cooling of the store or product contained within. For example, where energy consumed for defrost is 255kW per day, and where the average Coefficient of Performance (COP) is 3, packback of a companys' investment in the IceDry® can be less than 3 years (variable depending on energy consumption).

At the same time, we can't stop the air getting into the cold store. Most cold stores are transit facilities and depend on a quick turnover for their very existence so there has to be a constant opening and closing of doors. Even when the doors are closed, air will be sucked into the store because of the negative pressure created by the temperature difference. The air of higher pressure will wish to reach equilibrium with the lower pressure air and will create an aggressive driving force.

At the UK average of 10°C, 80% RH, 6g/kg, air has a vapour pressure of 979Pa. In contrast, air in a store with common conditions of -30°C, 100% RH, 0.23g/kg has a vapour pressure of only 38Pa - this provides a driving force of 941Pa into the cold store, pulling the moist air into the cold store environment.

# Munters IceDry® solution

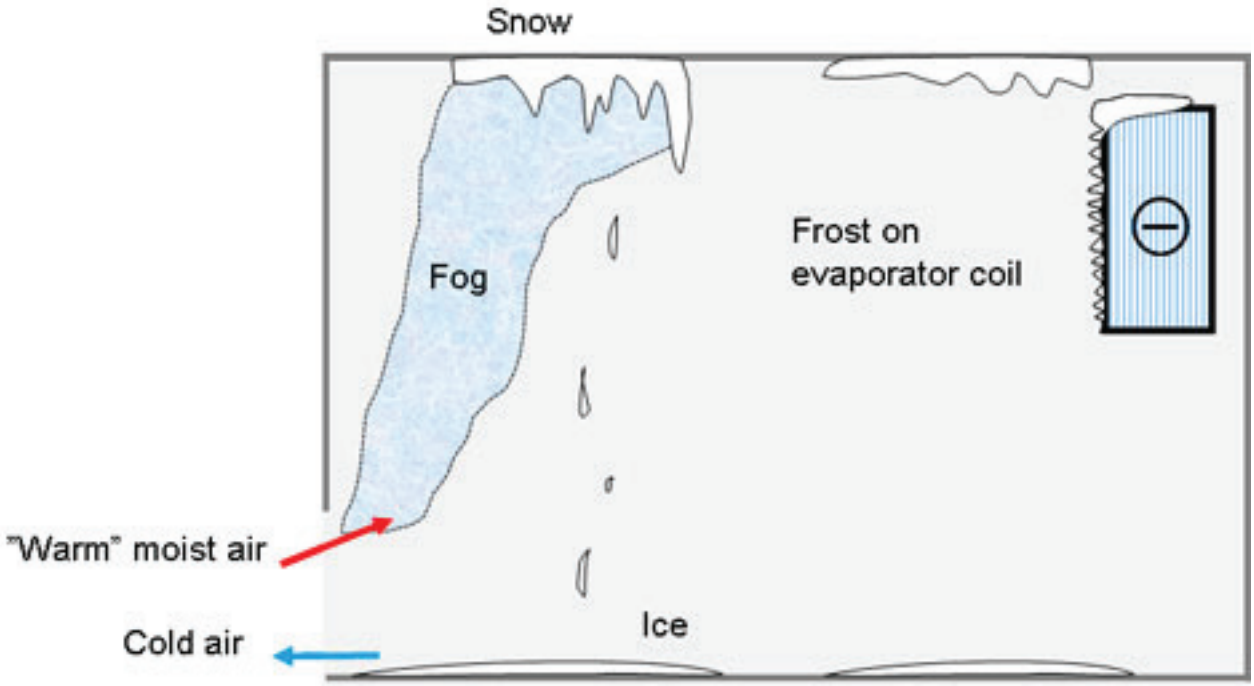


So if we can't stop the air getting in, the best thing to do is dry it before it gets into the cold store. Munters IceDry® desiccant dehumidification system gets to the root of the problem by removing the moisture in the air that forms ice.

Munters desiccant dehumidification approach is to do this at the point where the air is entering the cold store.

Most often, this would be at a loading bay door or in the airlock/ vestibule between the loading bay and the cold store. In removing moisture, the desiccant dehumidifier produces air at a low dew point close to or below the temperature of the cooling medium (Dew point is the temperature at which moisture will condense out of air). This means that condensation and icing up can be greatly reduced, or eliminated, depending on the design of the system.

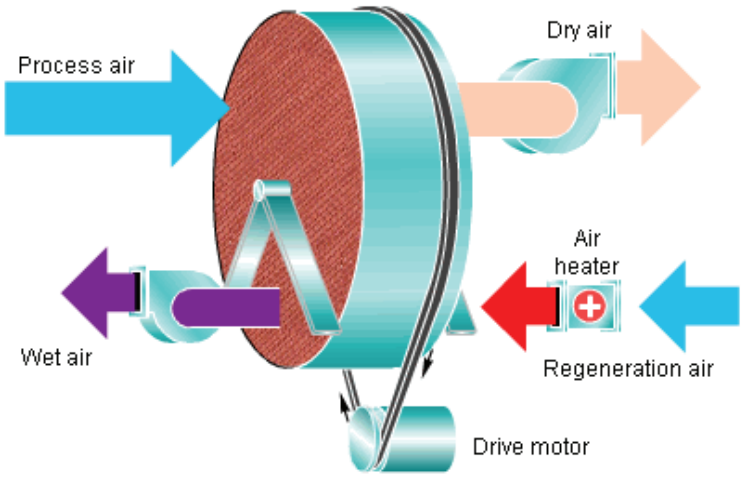
As 95% of the moist air infiltrates through truck doors, the solution is to capture the moist air, dehumidify it, and supply dry, low dew point air at the entry doors. This dry air is drawn into the cold store when the doors open and circulates freely across the floor to keep it dry.



# Munters desiccant rotor principle

The simple yet genius principle of our desiccant wheel was invented more than 50 years ago by Carl Munters. Two air systems pass simultaneously through the slowly rotating rotor - impregnated with a highly effective desiccant. One air stream is dehumidified to provide the necessary dry air, the other dries the rotor, exhausting the accumulated moisture externally.

Munters has developed individually conceptualised solutions for all production areas, from single machines to complete air dehumidification systems, in order to ensure disturbance-free production during the entire year.




At the heart of the Munters IceDry® solution is our state of the art Desiccant Rotor Technology which has the ability to absorb moisture from the air irrespective of the temperature, so it works equally well even at sub zero temperatures.

# IceDry - The smart solution

**Reduced frost and ice at cold store entrances:** This enables better access and ensures doors are able to close and operate more easily.

**Stock stored around entrance areas:** Will not suffer cases collapsing or be rejected because of ice and snow build up.

**Safer loading dock area and less slippery floors:** The increased visibility and grip achieved by reducing fog provides a better and safer working area for both people and fork trucks, so avoiding potentially expensive accident claims and lost man hours.

**Prevention of ice build up on evaporator coils:** Reducing the frequency and need for defrosting, giving potential savings on energy.

**Improved energy:** Having a dry and visible working area, with doors operating correctly, enables faster loading and unloading and reduces defrosts, which equates to more efficient refrigeration energy savings.

**Improved visibility:** Safer pedestrian and forklift manoeuvres plus effective use of barcode scanning devices.

**Stock can be consistently held at the correct temperature:** Preventing deterioration in the quality and rejection of product.

**Improved appearance:** Having a frost and ice-free working area with no fogging presents an improved appearance for visiting customers.

**Reduced maintenance costs:** Having less ice around means:-
1) a reduction in the costly work of repairing doors that have been lifted because of the ice.
2) no more chipping away ice from evaporator coils, walls and floors.
3) less collision damage caused by slippery floors.

# IceDry - Before and after


The frost free benefit of IceDry® ensures a rapid payback. The prevention of just one accident could pay for the system.


Improvements to the cold store operation and working environment have been noticed within 3 hours of switching on Munters IceDry® system.

# How problems are solved

### No slip-ups at KLM

The greatest concern for KLM Catering was the freezing snow and ice on the floor and ceiling. The cold store was difficult to maintain and required frequent defrosts, typically six times a day for one hour.

"The difference before and after the installation of IceDry® is like night and day" says Edo Cuiper, Technical Engineer, "The cold store rooms are clean and the floors are no longer slippery"

### Wagner frozen foods: The pizza baker and IceDry

Increasing stock rotation at Wagner frozen foods resulted in an increase of traffic to the cold store. This required opening more doors and caused a large build up of ice and frost.

After installing Munters IceDry® system, the periods between defrosts extended allowing for longer running.

# Key facts about Munters IceDry

Some key facts about Munters IceDry®

• Using Munters desiccant technology, IceDry® is the only dehumidifier available that can be placed inside the cold store.

• IceDry® has been specially designed to withstand the tough, cold environment within cold stores, ensuring the unit runs reliably and efficiently.

• Even when the doors are closed, IceDry® will still sublimate ice and snow inside the cold store, in comparison to an airlock, which is running during the logistic time.

• IceDry® is flexible - it will continue to work to reduce ice and snow build up throughout the day and night.

The IceDry 1400

# How problems are solved

**Ten year battle against ice and frost is over!**

Martin Olsson is Sweden's biggest supplier of food and drink to the catering trade. Real problems were being experienced with the formation of ice and frost in the cold store and in the two air locks. Munters solution was installing an IceDry® dehumidifier.

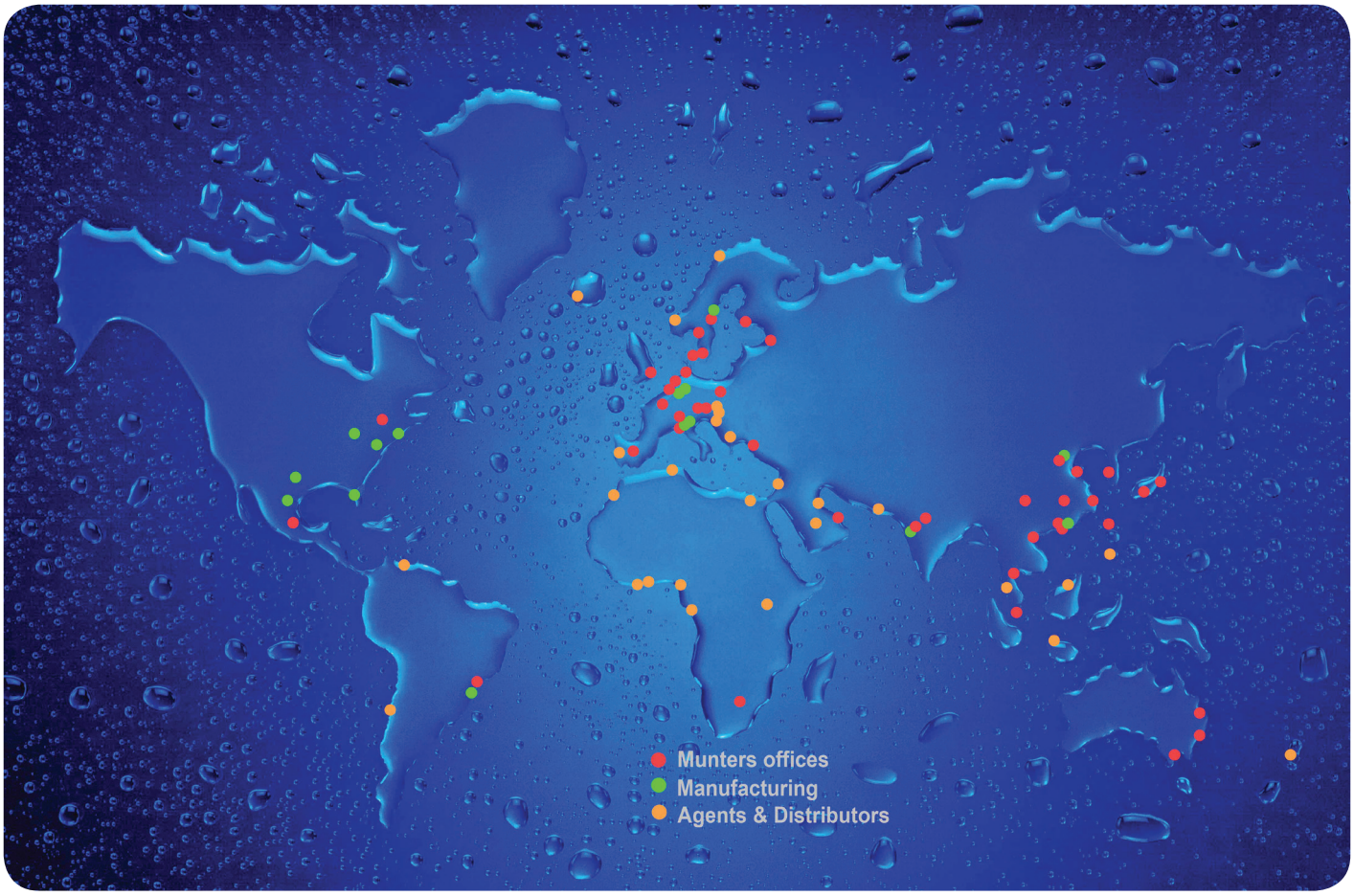
"Soon it was completely free of ice and frost. It has made a real change. The 10 year battle against the ice is finally over"

**Problems in small cold and chill rooms**

In smaller cold stores used by laboratories, catering facilities and restaurants, the naturally high relative atmospheric humidity is often the cause of problems.

The solution is to tackle the problem at its source, which is exactly what the Munters systems do.

Whatever your application, Munters will have the solution!




## An international name, where the customer comes first.

Munters, part of Nordic Capital, has offices in 30 countries and over 3,000 employees in many branches around the world. We are global leaders in energy efficient air treatment for comfort, process and environmental protection. Munters shares ideas within its international network, giving the Group an outstanding reputation as a reliable, fast-acting and customer-orientated expert in air conditioning. Munters philosophy of customer satisfaction is central to our decision-making. When developing and manufacturing our systems, we see happy customers as our number one target. And this is what our employees strive to ensure every day.

For more information on Munters, please visit www.munters.com

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