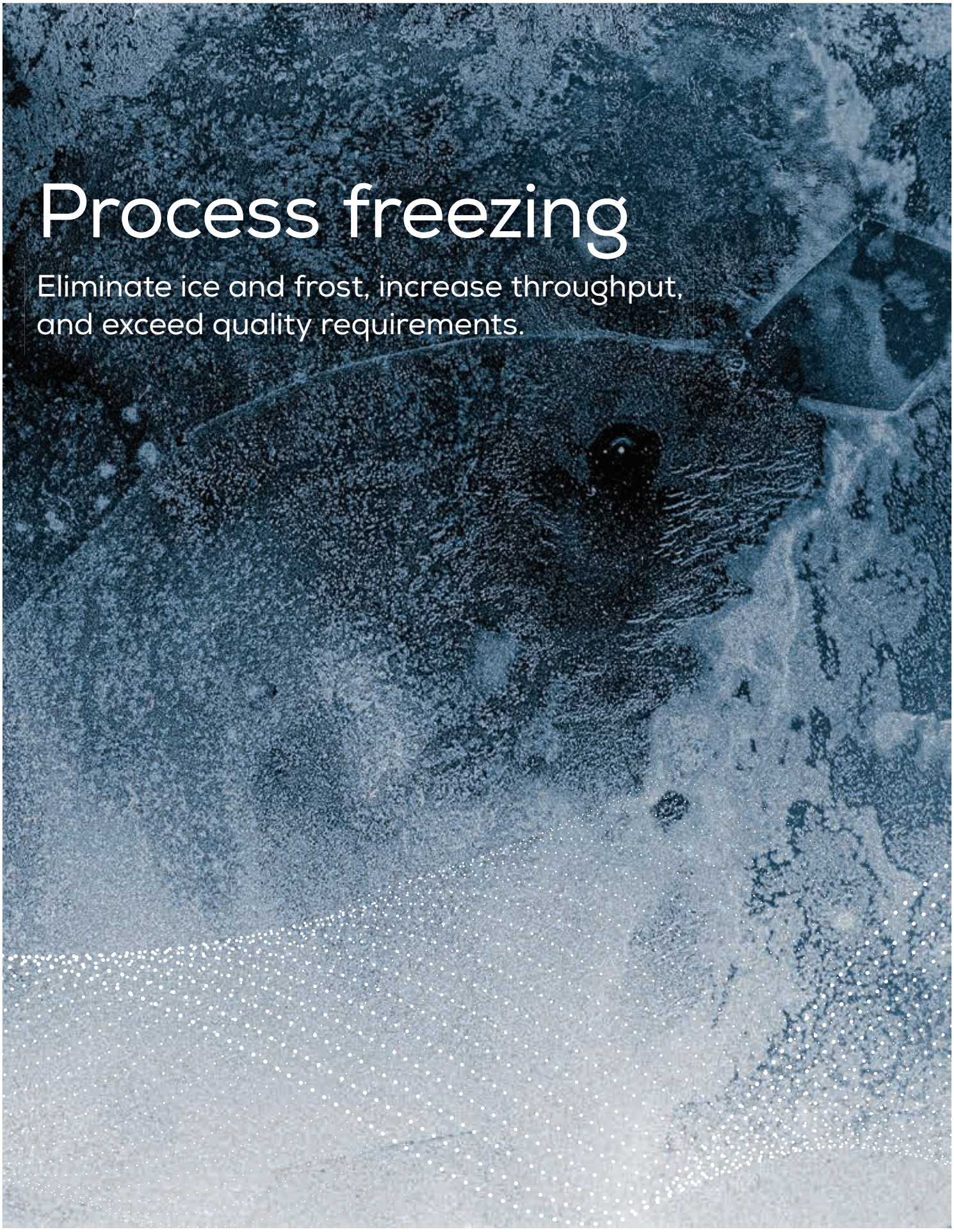
Munters



Process freezing

Eliminate ice and frost, increase throughput, and exceed quality requirements.

Humidity control is essential in process freezing

High volume, fast-paced production systems in continuous operation make up the majority of process freezing operations. Uncontrolled humidity in food production facilities can cause expensive and unproductive interruption because of the need to defrost evaporators and remove ice from conveyors, floors and walls.

Desiccant dehumidification removes moisture from the air before it can form frost and ice on equipment. With ice build-up and defrost cycles significantly reduced, process freezing operations can run smoothly and at high speeds year round, regardless of season.

Desiccant dehumidification for blast and spiral freezers

A blast or spiral freezer is a critical component in most frozen food production processes. One of the largest challenges to maintaining performance of blast or spiral freezers is frost build up in the freezer and on evaporator coils. A Munters desiccant dehumidification system can provide dry air to blast and spiral freezers with the following benefits:

- Significantly reduce or eliminate frost on freezer cooling coils to minimize or eliminate defrost cycles, resulting in improved freezer cooling performance. Evaporator coils with minimal frost have higher cooling capacity. This allows more consistent and higher product flows through the freezer because the cooling coils can cool more effectively and efficiently.
- Significantly reduce or eliminate frost at the freezer inlets, outlets, and conveyors. This insures higher food quality by eliminating product damage caused by contact with frost or damage by conveyor malfunction due to frost build up.
- Eliminate the need for employees to remove frost manually or by complete freezer shutdown and defrosting with a heat source. This can significantly improve productivity and reduce the chances for workers to be injured due to slipping or falling.

Moisture infiltration and dew point control

The principal design concerns for food freezers are quantifying the moisture infiltration and determining the appropriate control dew point.

If the installation is already in place, the designers job is as simple as taking surface temperature readings on the walls, floor, and conveyor supports where ice formation must be at a minimum. The control dew point will be slightly below that surface temperature.

In some cases, the temperature is so low that it would be economically impractical to maintain the dew point low enough to prevent all ice formation. It may be necessary to determine what temperature is economically feasible and assume there will be some ice formation, but at a much reduced rate.

The lower the dew point, the more efficient the refrigeration system becomes. The result is less frost on ceilings and conveyors. By removing the moisture at its source – before entering the cold space – the system will operate more efficiently

Determine the loads

Moisture loads come from air infiltrating through doors and conveyor openings, as well as, evaporation from the product.

Infiltration air

Factory or outside air entering the space carries the largest moisture load. Air enters as a door is opened, or continuously through openings around conveyors. In both cases, it is important to reduce this load to a minimum through the use of entry tunnels and vestibules. Additionally, door openings inside on the freezer should be limited to minimum.

Product moisture

Water vapor from the product is relatively easy to quantify by simply weighing the product entering and exiting the freezer. The difference in weight is largely moisture. If the product is wrapped before freezing, this load will be close to zero.

The Munters solution

Munters dehumidifiers have a desiccant wheel that rotates slowly between two primary airstreams, process and reactivation. In the process airstream water vapor is removed as it passes through the desiccant wheel. This dehumidified air is then delivered to a manufacturing process or space. The wheel then rotates into the reactivation sector where a heated airstream is passed through the wheel. The desiccant wheel releases the water vapor to this airstream.

In contrast to cooling, the desiccant process becomes more efficient as the temperature of the air decreases. Munters units have no difficulty producing air dew points of -30°F and lower. This allows you to create dry, wintertime moisture conditions during the summer.

Since the Munters unit removes moisture from the air to levels below the evaporator's temperature, it no longer freezes on cold surfaces in the room, which means refrigeration equipment operates more efficiently, with fewer evaporator defrost cycles, fewer conveyor jams due to ice build-up and safer, less slippery floors. Munters has spent decades improving and optimizing the desiccant dehumidification process including patenting technologies like PowerPurge® which significantly reduces reactivation energy requirements and post cooling requirements

Types of process freezers

No vestibule

Frequently a spiral freezer or blast freezer is built without a vestibule. While vestibules are often impossible to install for space reasons, conveyor tunnels are essential to minimizing icing inside the freezer. Figure 1 explains the system graphically. Air is taken from the ambient plant (or outside air if the plant has a negative pressure), processed through the dehumidifier and supplied to the conveyor tunnels. The air should be enough to maintain a minimum of 100 FPM air velocity for the conveyor openings.

Vestibule system

When space allows, the vestibule system may be all that is required to minimize moisture in the process freezer. It has the advantages of low cost and simplicity in installation. Figure 2 explains the system graphically. Air is taken from the vestibule, processed through the dehumidifier and returned to the vestibule area just in front of the freezer conveyor entrance. This ensures that any air that infiltrates into the freezer is dry air with a moisture level below the temperature of the evaporators. The dehumidifier can be switched on by a condensation controller, set to maintain the air at a specific dew point.

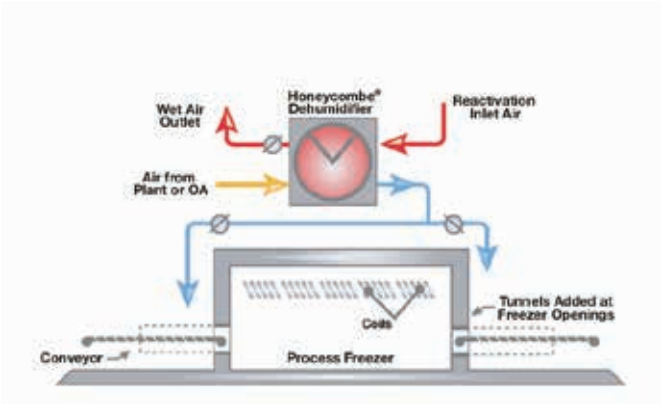


Figure 1. No vestibule

Makeup air system with tunnels

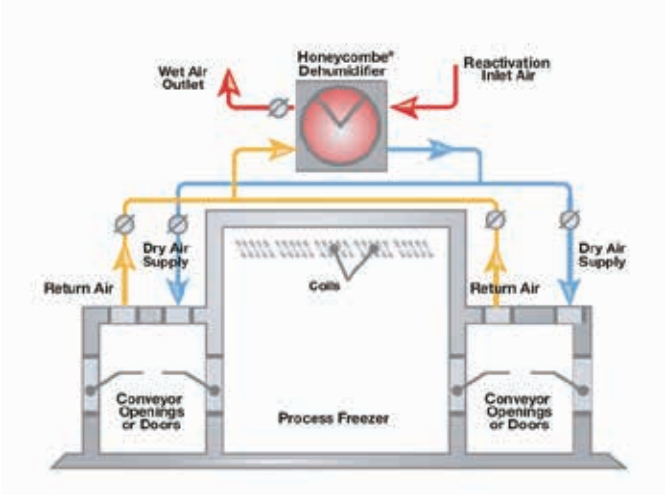


Figure 2. Vestibule system

Air system with vestibule

Conventional systems cannot efficiently remove moisture

Process freezing systems are designed to remove sensible heat from a product rapidly and efficiently. However, they are not designed to efficiently remove latent heat – moisture – from the air inside the freezing chamber.

While cooling coils can be automatically defrosted, ice on conveyors and floors must be removed manually, causing production to slow down or stop. Additionally, the defrosting of coils adds a heat load to the freezer and takes the coil off line, which can impact the freezers ability to keep cold temperatures. Also, the cooling capacity of the evaporator coil is reduced significantly as the coil builds up frost, so the amount of product cooling is reduced. This means that product cooling rates can vary with coil frost, yielding uneven production quality and throughput.

For some freezers, the need for a defrost cycle causes production to stop or slow down due to loss in capacity, resulting in expensive and unnecessary delays.

To reduce icing, the moisture in the air must be reduced. Refrigeration systems lack the cooling capacity to produce low air dew points when humidity is high. The coils freeze with condensed moisture before a low dew point can be achieved. Also, when you use an evaporator coil to remove moisture, it discharges air at saturation which means that it does not have the ability to absorb any additional product or infiltration moisture.

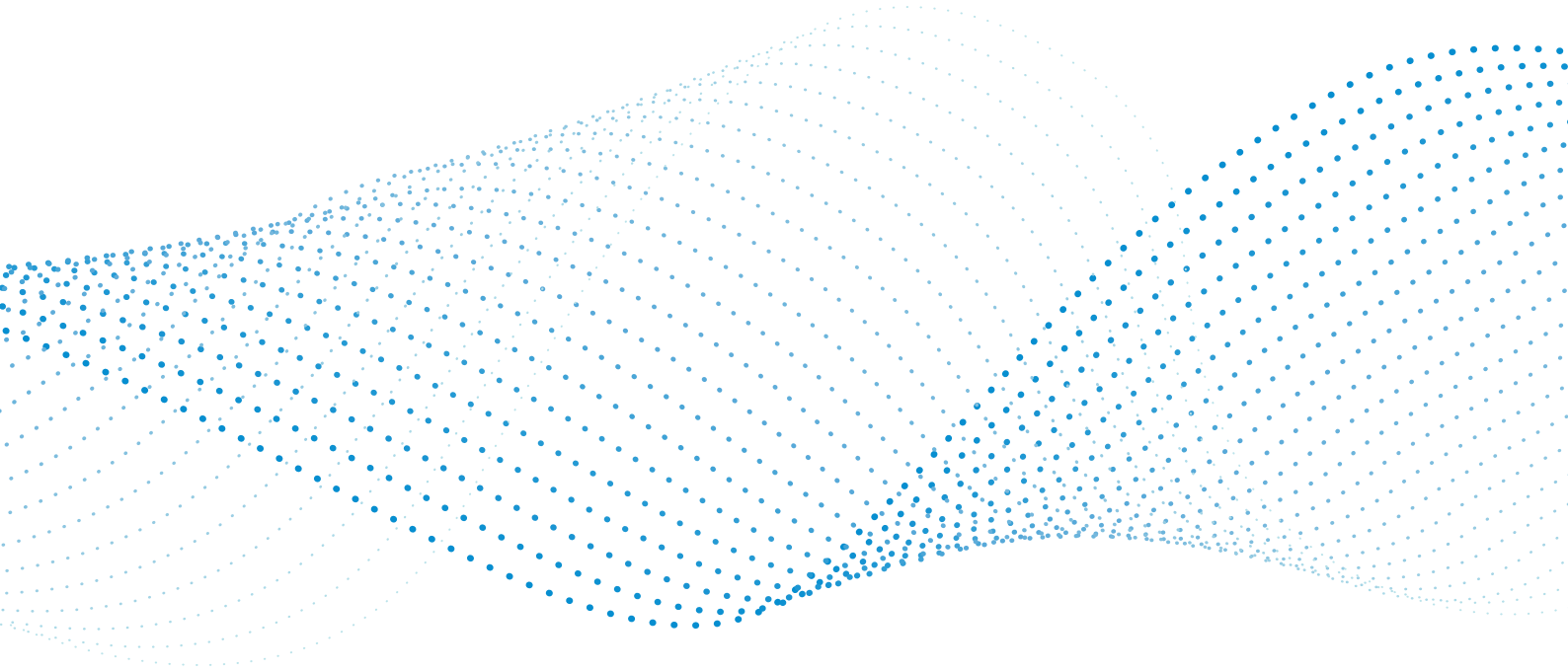
Munters Service portfolio

With Munters as your service partner, your air treatment equipment will receive the attention, care and maintenance needed to reach its maximum life expectancy. Throughout each phase of the equipment life cycle, the knowledge and expertise of Munters Service will insure optimal operation, minimum energy consumption, and extension of the life of your investment.

Our range of services available through our global network of Munters Service Engineers and Technicians include:

Munters IceDry

- Comprehensive installation and start-up services
- PrimaCaire™ (extended warranty) agreement
- Flexible ServiceCaire™ maintenance agreements to fit your specific needs
- Performance checks and optimization
- Numerous upgrade options for substantial energy savings and improved performance



Munters is a global leader in energy-efficient air treatment and climate solutions. Using innovative technologies, Munters creates the perfect climate for customers in a wide range of industries.

Munters has been defining the future of air treatment since 1955. Today, around 4,000 employees carry out manufacturing and sales in more than 30 countries.

For more information, please visit www.munters.com

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