Сверхнизкотемпературное хранение

Описание

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эл.почта: tod@nt-rt.ru || сайт: https://teledoor.nt-rt.ru/

Forward-thinking and flexible frozen storage

Substances like organic material, enzymes, hormones, proteins and blood plasma are stored, transported and processed at very low temperatures between –40 °C and down to –160 °C in order to maintain their quality. Particularly durable and fail-safe technologies are required in this application, due to the value of these materials and their storage duration.

Many technologies are harmful to the environment because they use substances like coolants and machine oil, and contribute to global warming and water pollution. In addition, many commonly available systems are complex, reducing their fail-safe reliability. They are also not very energy efficient, because they use components with a limited part load capacity.

The solution

Our freezer storage rooms are optimised individually to meet your needs, and offer flexibility for use in temperature ranges from –20 °C to –160 °C depending on version. The turnkey solution is controlled by an S7 1200 (Siemens) and equipped with our tested, energy-efficient LEDs. The insulation is made of stable, efficient, low temperature insulation panels with reduced thermal bridges and PU foam, integrated vacuum panels and hook closures.

One unique highlight of our rooms is their oil-free cold air chiller, which cools using only the ambient air as the coolant for the temperature-controlled freezer storage rooms. A version with active cooling via R744 (CO_2) cooling with CO_2 sensors ensures dry ice is handled safely, and results in low moisture and heat input. We recommend using air-cooled water chillers with the natural coolant propane (R290) in combination with a free cooler as a heat sink. The entire system is turnkey, and comes from a single source.

The storage room is energy-efficient thanks to its optimal storage temperature, temperature tolerance, electrical installations, loading and unloading process, and specific surface. The latter is the ratio of surface area to storage volume. This ratio is particularly poor when multiple individual refrigerators are used to replace a single storage room, resulting in high operating costs. Doing so may require 10 x the energy of what a single, large chamber would use for exactly the same operation.

We took all of these factors into account. The temperature is continuously adjustable, meaning it always delivers the optimal temperature for your individual needs. The shape is optimised to provide the most storage space possible with a small external area. A true jack of all trades!

Overview of key advantages

Future-proof investment

Air is free of charge, unregulated and safe.

Fail-safe reliability

Proven technology – Made in Germany.
No outages due to liquid refrigerant in the compressor or low system pressure.
Low-wear technology.

Flexible

Easy to transport and install, usage temperature continuously adjustable from – 40 °C to – 90 °C (optional – 160 °C) without system modifications.

Much more efficient than refrigerators and standard storage rooms

Speed controlled, no evaporator, expander with energy recovery to the turbo unit, low spec. surface, vacuum insulation and air lock.

Safe for people and the environment

Natural refrigerant without high pressures, non-toxic and non-flammable.
0 GWP, 0 ODP, 0 TFA.

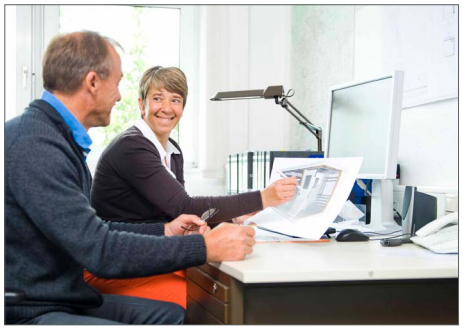
Low-maintenance & long-lasting

No leak testing,
air bearing compressor = no wear, no oil.
High-quality insulation.

Project execution

Planning, execution, and operation – We are here for you.

From an individual cold storage cell to climate-controlled wind channels, to an Antarctic research station.

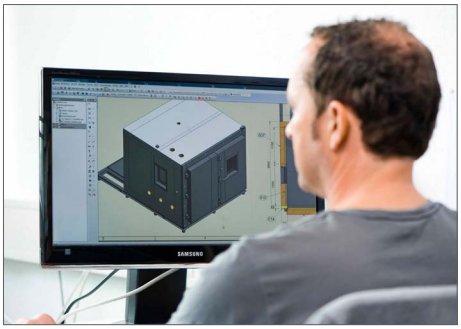


Consulting

We know that the foundation for a good final product is laid during the initial stages of the project. Because of this, our Sales and Design employees understand themselves not primarily as salespeople, but as consultants. We support you from beginning to end with our team, and are able to draw on many years of experience in all areas.

Construction

State-of-the-art software, automated processes, and optimised project execution are our motto. It is important that our design department participates in the project, and can react quickly and flexibly to customer changes. Employees work closely with our customer consultants and production management.



Manufacturing

CAD-supported work stations and CNC-controlled machines can be used to create your custom product quickly, with outstanding precision and high quality. We are able to draw on a large network of long-term partners in our purchasing area. All of these factors ensure the quality that makes products from Teledoor stand out.

Our engineering partner

The Refolution engineering firm can support you even with advance planning for your project. From complex requirements for setup, products, handling, or regulations: We will find the optimal solution for you. We focus on efficiency, durability, and safety for people and the environment. To do so, we only use natural coolants like air, CO_2 and propane. That means you are not subject to the F-Gases Regulation, ensuring operational reliability even beyond 2030.

REFOLUTION
SUSTAINABLE REFRIGERATION
SOLUTION

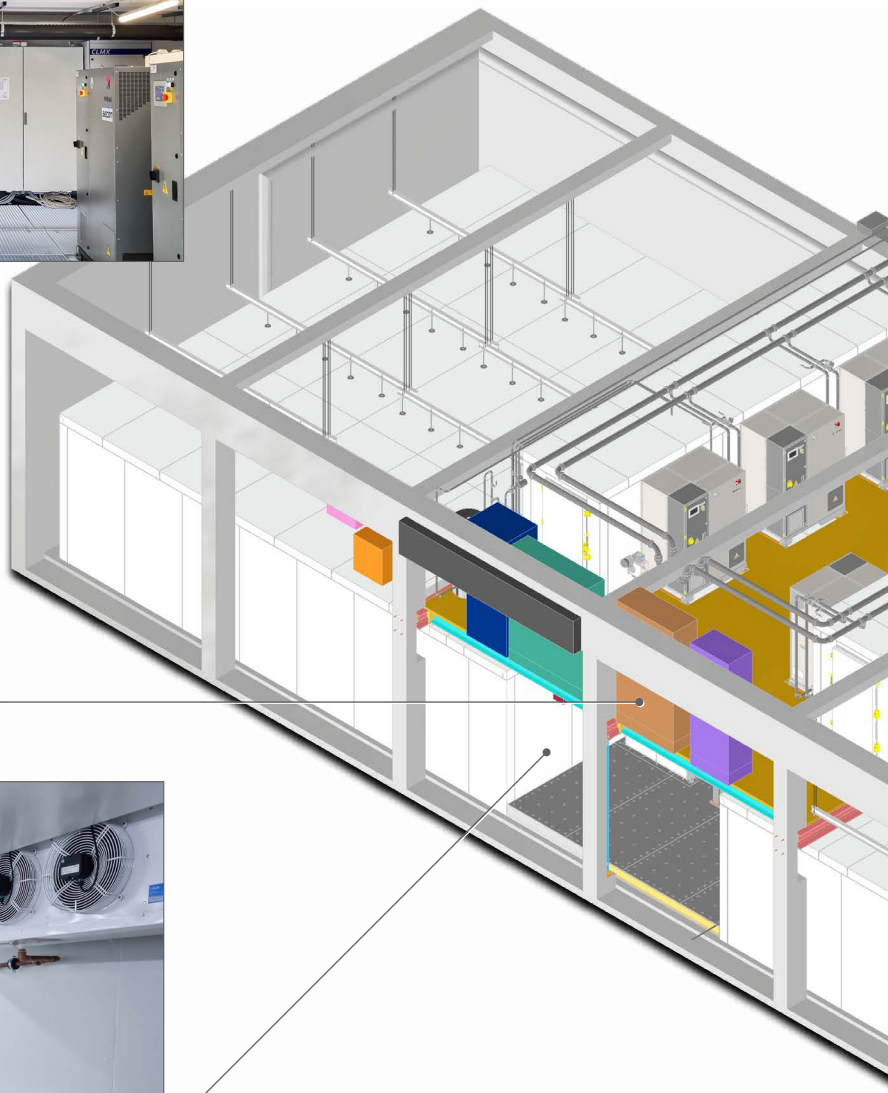
Technical overview

Example of a completed freezer storage room with 2 × 185 m³ usable volume with flexible temperature control from – 20 °C to – 90 °C.

The chillers use a redundant design with N+1 redundancy and a backup power supply.

Operating panel with deadman switch

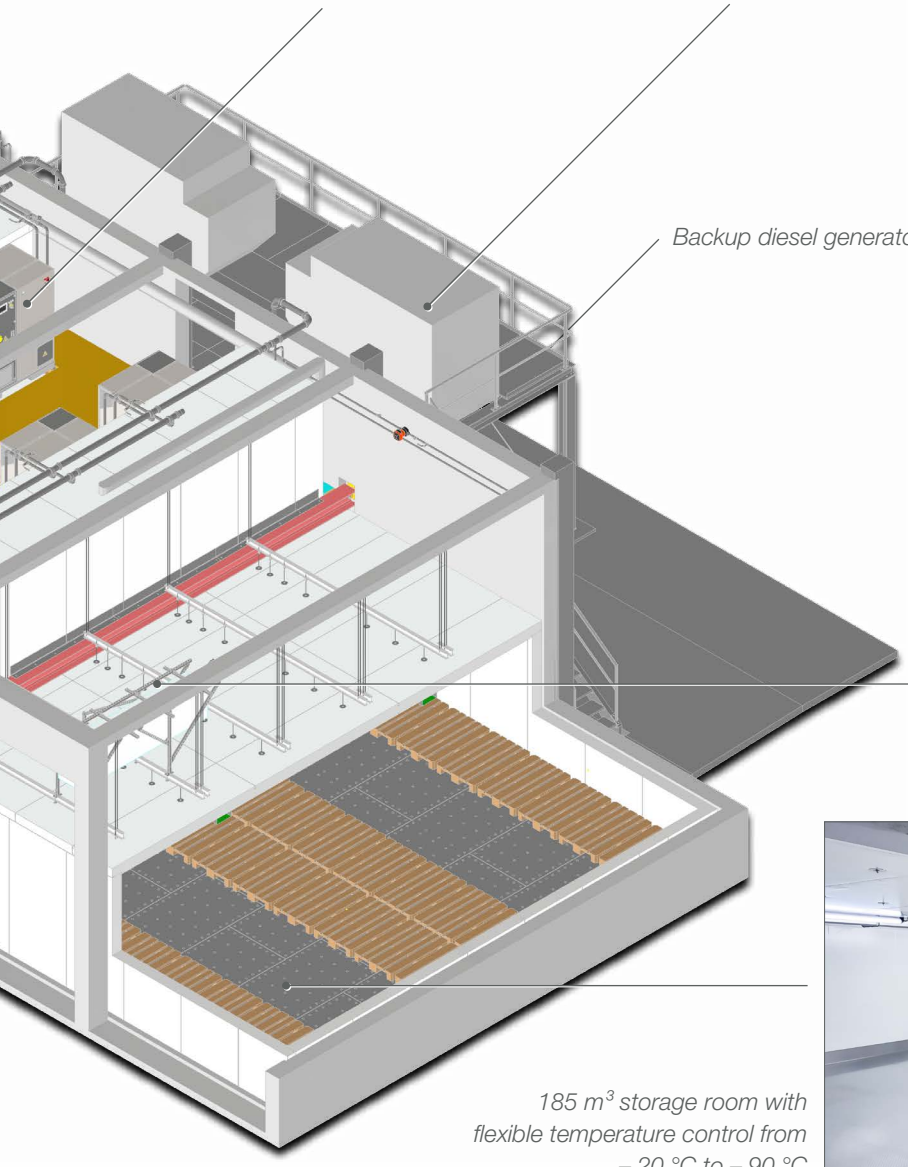
Switch cabinet with S7 controller



Lock with active – 20 °C cooling

Mirai Cold MC10 O/W chiller from Mirai Intex

Water chiller with R290 from Secon



Backup diesel generator

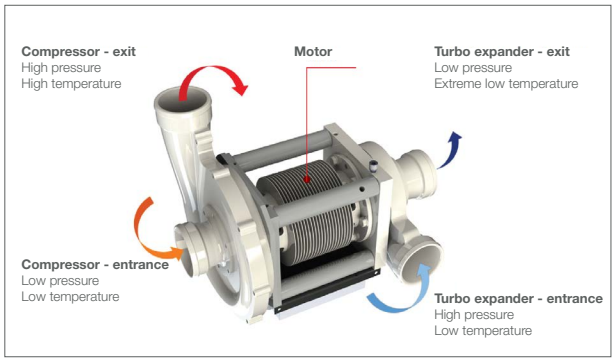
Machine room conditioning

185 m³ storage room with flexible temperature control from – 20 °C to – 90 °C

Refrigeration technology

Future-proof, high-availability, efficient, and safe for people and the environment

The oil-free cold air chiller with air bearings from Mirai Intex allows the entire system to use only air as the coolant, with a maximum overpressure of 1 bar. In contrast to compression refrigeration, the working principle is based on the recuperative Joule process (also called the Reversed Brayton Cycle), which is implemented using an almost wear-free turbo compressor-expander technology. The turbo compressor-expander unit uses air bearings and is mounted on a shaft with the motor.



Future-proof technology to meet your needs. Because air is used as the coolant, the refrigeration technology is not subject to the policy stipulations of the F-Gases Regulation or the Kigali Amendment to the Montreal Protocol.

One of the most common causes of malfunctions of refrigeration technology is compressor damage, caused by the penetration of liquid refrigerant into the compressor or insufficient lubrication, for instance due to displaced oil or wear. In addition, in cascaded ultra low temperature refrigeration applications, multiple compressor circuits have to work at the same time. Our technology involves no phase changes, no oil, and offers almost wear-free operation thanks to the air bearings. That means our technology provides **high fail-safe reliability.**

Our partner Refolution has completed a thorough investigation of the energy efficiency of refrigeration technology, and has proven that cold air refrigeration technology in the – 80 °C range is one of the most efficient technologies available. Combined with the air lock and outstanding insulation, **our solution offers unbeatable efficiency.**

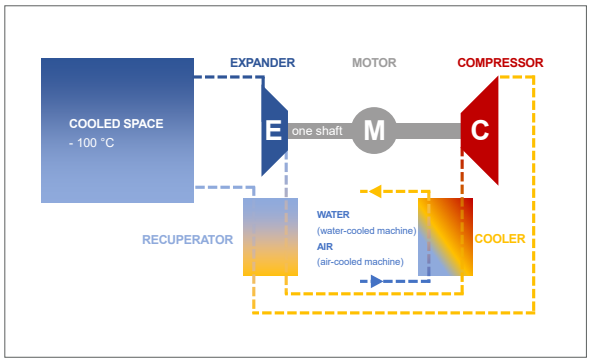
Air is an absolutely natural refrigerant, and is non-toxic, non-flammable, and poses no health hazards or environmental hazards. That makes our solution the **safest option for refrigerated storage.**

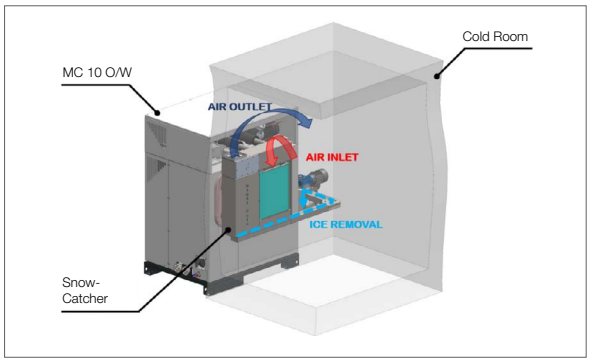
Use in our cold storage rooms (ULT storage)

Air cooled chillers with an open design are used in our ultra low temperature storage rooms. These suction the air with ice crystals and dirt, then clean it using two redundant filters in the “Snow Catcher”, chill it, and then blast the cooled air back into the refrigerated room. This ensures a very homogeneous temperature distribution, which can have up to a 20 K lower dew point than the indoor air thanks to the chilled supply air. This creates an especially dry atmosphere for product storage.

One key component of the system is the Snow Catcher installed inside the cold room, which suctions the air and blows it back into the room. The Snow Catcher is an integral part of the machinery, and its primary function is filtering ice crystals out of the air. Controlled by differential pressure measurement, the ice collected in the Snow Catcher is blown off by a compressed air device, then outfed from the refrigerated room using a conveyor unit (in solid state). This offers important advantages in comparison to conventional systems (with evaporators installed in the room):

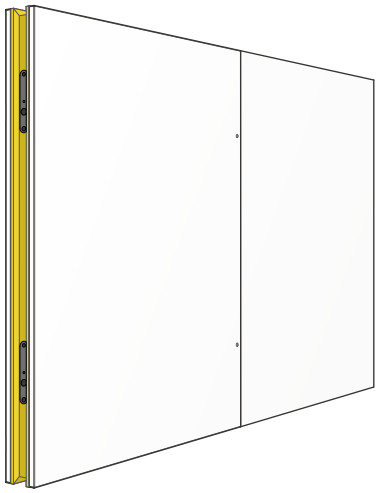
- Significantly lower refrigeration requirements, since there is no heat input into the cold room (no heat input from fan drives or fan heating ring, and above all no energy for defrosting)
- Low dew point in the refrigerated room, since the air is highly supercooled
- Continuous de-icing of the refrigerated room, without creating hot spots





Insulation technology

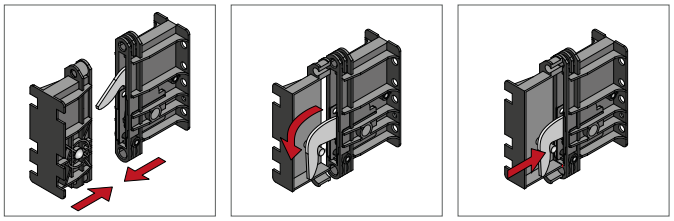
Teledoor has been manufacturing refrigerated cells and freezer cells for over thirty years, and has developed countless solutions for a wide range of different areas. The company's standard cells are continuously optimised and adjusted to growing requirements. And if customers have specialised requirements, Teledoor can develop custom solutions to meet their exact needs.



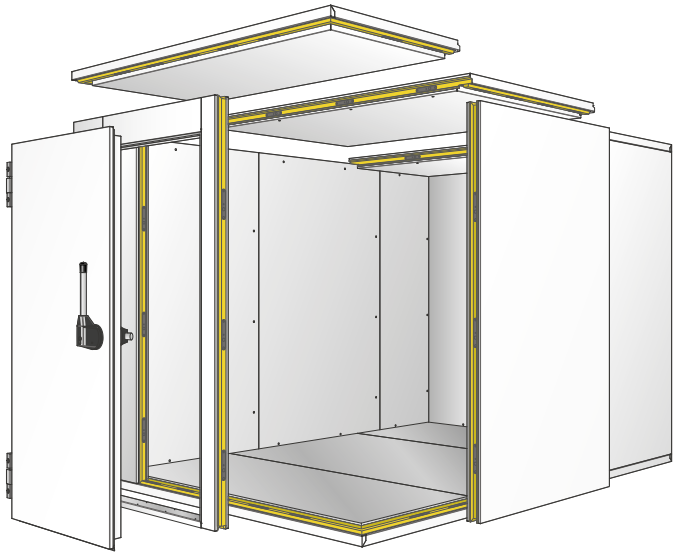
Insulating elements

Sandwich elements fully filled with rigid polyurethane foam in insulation thicknesses of up to 200 mm.

Fully foamed hook bolt locks firmly connect the elements together.



This simple, yet proven and highly flexible principle allows for the design and construction of cells in almost any size or shape, for a broad range of applications.



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