

Case study

Recipharm Germany

Future-proof pharmaceutical cryogenic storage using air as refrigerant.



Photo credit: Refolution Industriekälte GmbH

Key information

Client: Recipharm, Wasserburger Arzneimittelwerk GmbH

Supplier: Refolution Industriekälte GmbH

Type of facility: Cryogenic storage

System start-up: 2021

Discover how German pharmaceutical company Recipharm embraced natural refrigerants to achieve ultra-low temperature storage for sensitive pharmaceutical products. By using ambient air as refrigerant, Recipharm has reinforced its commitment to reducing its carbon footprint showing that sustainability and performance can go hand in hand.

The deep freeze storage facility, designed by Germany-based engineering office Refolution, meets the highest safety and reliability standards for pharmaceutical storage: precise temperature control (± 0.5 K); high efficiency & homogeneity even at partial loads; temperature flexibility and low maintenance. And: the refrigeration technology is in line with political frameworks as the F-Gas-Regulation and the Kigali Amendment.

Requirements

Amid the COVID-19 pandemic, Recipharm required an ultra-low temperature storage solution for sensitive pharmaceutical products. The solution needed to be not only rapid to implement but also sustainable, aligning with the company's commitment to a low carbon footprint and energy efficiency. Key specifications included:

- Storage capacity for 80 pallets at -70°C .
- High energy efficiency, environmentally friendly, halogen-free refrigerants with GWP 0.
- Reliable operation with precise temperature control (± 0.5 K) and homogeneity (2 K).
- Flexibility to accommodate a temperature range from -90°C to -20°C .
- Low maintenance, oil-free, and vibration-free technology.

Solution

Recipharm's deep-freeze storage solution was realized through Refolution using Mirai Intex technology. This advanced system employs air as the refrigerant, leveraging the recuperative Joule process for high reliability and environmental safety.

Key Benefits and Features:

- **Sustainability and Low Carbon Impact:** Utilizing air as a refrigerant eliminates the need for halogenated compounds, achieving a Global Warming Potential (GWP) of 0 and ensuring compliance with environmental regulations. Air has no harmful impact on human health or the environment.
- **Exceptional Efficiency and Flexibility:** The system offers high part-load efficiency with speed-controlled turbo compressors via an open cycle with no evaporator with delta T and heat load through fans and defrost. The facility supports temperature ranges from -90°C to -20°C , adapting to diverse storage needs.

- **Precise and Reliable Storage:** The system maintains tight temperature control (± 0.5 K) and homogeneity (2 K), ensuring optimal conditions for sensitive pharmaceuticals.
- **Ample Capacity and Redundancy:** The storage facility includes two rooms with 185 m³ and 85 m², accommodating up to 80 pallets. Redundant Mirai Intex MC10 O/W machines guarantee uninterrupted operation.
- **Innovative Design:** Self-sufficient R290 (propane) chillers and a cold brine system reduce heat input, ensuring efficient operation even under partial loads.

By exclusively utilizing natural refrigerants, Recipharm's deep-freeze storage facility is environmentally friendly, future-proof, and a benchmark in cryogenic storage solutions.

Technical data

Cooling capacity: from 18 kW to 1 kW

Refrigerant charge: Air, the ambient air inside the storage room is the refrigerant

Evaporating temperature: No phase change – open joule process

Condensing temperature: Cold water loop on +10°C

Main components:

- 3 Mirai Intex MC10 O/W oil-free cold air chillers with N+1 redundancy
- Self-sufficient cooling water systems with 2 redundant R290 STRATOS chillers from Secon

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