

Case study

RefoBlast Vienna: Propane-Based Rapid Plasma Freezing

Compact, future-proof plasma freezing and cold storage with R290



Photo credit: Refolution Industriekälte GmbH

Key information

Client: Plasma center, Austria

Supplier: Refolution Industriekälte GmbH, Teledoor Melle Isoliertechnik GmbH

Type of facility: Rapid plasma freezing and integrated cold storage

System start-up: 2025

The RefoBlast Vienna installation demonstrates that pharmaceutical-grade rapid plasma freezing can be achieved with natural refrigerants - without the complexity of conventional large-scale refrigeration systems.

Bridging the gap between underperforming compact freezers and complex CO₂ plants, the project provides plasma centres with a practical alternative that combines high freezing performance, natural refrigerant technology, modular scalability and an integrated cold-chain concept.

The installed solution combines two RefoBlast rapid freezers with a dedicated cold storage cell, creating a seamless process from loading plasma bags or bottles through rapid freezing to controlled low-temperature storage. Following successful testing, qualification and validation for industrial plasma used in pharmaceutical production, the facility entered regular operation in 2025. The project demonstrates that R290 (propane) refrigeration can meet the demanding performance, reliability and regulatory requirements of pharmaceutical plasma processing while providing a compact, operator-friendly and future-proof solution.

Requirements

A plasma center in Austria required a high-performance, compact and service-friendly solution for the rapid freezing and subsequent storage of blood plasma. The system had to be suitable for a pharmaceutical environment, support validated operation and avoid dependence on synthetic refrigerants with long-term regulatory uncertainty.

The following objectives had to be met:

- Rapidly and reproducibly freeze blood plasma to a core temperature of $\leq -25\text{ °C}$ before storage.
- Provide sufficient freezing capacity for a high-throughput plasma center while maintaining a compact system footprint.
- Support validated pharmaceutical processes using a refrigerant concept that is future-proof with respect to the F-Gas phase-down and potential PFAS restrictions.
- Avoid cooling water requirements in the standard configuration and allow integration into an existing building.
- Provide a robust and service-friendly system that can be maintained without dependence on complex large-plant service infrastructure.
- Plan rapid freezing, transfer, storage, interfaces and service as one integrated cold-chain concept rather than as separate standalone systems.

Solution

Reolution, in collaboration with Teledoor, developed the RefoBlast concept as a modular rapid-freezing platform for blood plasma bags and bottles. Each RefoBlast unit contains two independent freezing chambers, each equipped with its own R290 refrigeration unit, high-efficiency fan and product loading system. The freezing process is based on low room temperature and forced air circulation to remove heat from the product quickly and evenly.

For the project, two RefoBlast units were installed together with a dedicated cold storage cell. This configuration creates a compact, scalable and integrated cold chain: plasma is rapidly frozen under controlled conditions before being transferred over short distances to the adjacent cold storage cell.

The refrigeration concept uses propane (R290) in small, hermetically sealed circuits with a maximum charge of 150 g per refrigerant circuit. The air-cooled standard design requires no cooling water; the installation room only needs suitable ventilation or temperature control to dissipate the heat rejected by the refrigeration units.

Key Benefits and Features:

- **Future-proof refrigerant strategy:** R290 eliminates synthetic F-gases and provides long-term regulatory compliance for pharmaceutical operators.
- **Validated process performance:** Rapid freezing to a core temperature of $\leq -25^{\circ}\text{C}$ supports plasma quality, and pharmaceutical process requirements.
- **Modular scalability:** Capacity can be expanded simply by adding RefoBlast units, without major infrastructure changes.
- **Integrated cold chain:** Rapid freezing and cold storage are designed as one coordinated process, minimizing product handling and transfer distances.
- **Easy maintenance:** Plug-and-play refrigeration modules simplify servicing, reduce downtime and allow off-site repair..
- **Simple installation:** The air-cooled design avoids cooling water infrastructure and facilitates integration into existing buildings

Technical data

Refrigerant charge: R290 (propane), max. 150 g per hermetic refrigerant circuit

Main components:

- 2 x RefoBlast rapid freezers plus a cold storage cell using the same natural refrigeration approach

Special features:

- Freezing principle: Forced air circulation / blast-freezing
- Freezing modules: Two independent freezing chambers per RefoBlast unit, each with its own refrigeration unit
- Temperature range: 0 °C to -35 °C in the freezing modules
- Product target: Core temperature ≤ -25 °C for plasma bags and bottles
- Standard batch: 30 plasma bags of 850 ml per freezing module within ≤ 4 hours; scalable by operating multiple modules and units
- Airflow: 2,500 m³/h per freezing chamber
- Refrigerant charge: R290 (propane), max. 150 g per refrigerant circuit
- Electrical supply: 400 V / 50 Hz
- Service concept: Plug-and-play main components; refrigeration unit, fan and display can be replaced as modules

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