

Case study

Schwarz IT Data Center Cooling with Ammonia Heat Pumps

A reliable cooling solution provided by a combination of natural and mechanical cooling



Photo credit: Schwarz IT

Since 2018, the Schwarz IT Data Center DC 10, located in Ostermiething, Austria, operates both energy-efficient and highly reliable based on a combination of natural and mechanical cooling. With its resource-conserving design, the data center achieves a Power Usage Effectiveness (PUE) of just 1.1. and was awarded a Gold Certificate by the Austrian Sustainable Building Council (ÖGNI). While natural cooling with river water is a key part of the system's eco-sustainability, four GEA BluAstrum ammonia chillers ensure the required uninterrupted cooling capacity.

Key information

Client: Schwarz IT Data Center GmbH, Germany

Supplier: GEA

Type of facility: Data center

Refrigerant: Ammonia

System start-up: 2018

Requirements

The Schwarz IT Data Center DC 10 was designed with the goal of achieving both exceptional energy efficiency and maximum operational reliability. A key requirement was a cooling system that could support a minimum availability of 99.98% (TSI Level 3 extended) while maintaining a low environmental impact. To align with the company's sustainability targets, the solution needed to rely on natural resources where possible and avoid the use of fluorinated refrigerants. At the same time, the system had to be fully redundant to ensure uninterrupted cooling, even in the event of high river water levels, maintenance, or power outages. Compliance with strict building and environmental standards, including eligibility for sustainability certifications, was also a critical part of the planning process.

Solution

To meet these requirements, Schwarz IT Data Center GmbH implemented an innovative hybrid cooling system. Primary cooling is provided by river water from the nearby Salzach River - a sustainable method made possible by the site's history as a former coal plant location. In colder months, river water is also used for heating offices through heat pumps. To ensure non-stop cooling capacity, and also that permissible temperatures for water returned to the river are met four GEA BluAstrum ammonia chillers serve as the mechanical backup system. These units provide up to 875 kW of cooling each, using natural refrigerant ammonia (R-717), known for its zero ozone depletion potential (ODP) and zero global warming potential (GWP).

The system includes two independent power supplies, redundant bus lines, and intelligent building management, ensuring fail-safe operation even during power or water supply interruptions.

Key benefits and features

- **Ultra-efficient operation** with a PUE of 1.1
- **Eco-friendly design** using ammonia as a natural refrigerant (GWP = 0, ODP = 0) complementing cooling by river water
- **High system reliability** through redundancy and backup capacity
- **Recognition for sustainability**, including Austrian Sustainable Building Council (ÖGNI) Gold Certification
- **Innovative use of local natural resources** to reduce carbon footprint
- **Future-proof technology** with a focus on long-term environmental and operational performance

Technical data

Cooling capacity: 875 kW per unit

Refrigerant charge: 45 kg per unit

Evaporating temperature: 16°C

Condensing temperature: 25-27°C

Main components:

- 4 GEA BluAstrum 800 (W) ammonia chillers

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