

Cooling of process media And processes in the chemical industry

2-stage NH₃-refrigeration system for cooling dichloromethane to -42° C

High availability and short maintenance and inspection intervals, alongside the highest safety standards, are often required in refrigeration systems for the chemical industry.

To meet these requirements, ARCTOS collaborates with you to develop a plant concept and carries out an individual system design.



REQUIREMENTS

The two-stage refrigeration system was developed and manufactured for a chemical industry company in an industrial park according to the described requirements. The goal was to cool dichloromethane to -42° C in two separate refrigeration circuits.

In order to achieve the required evaporation temperature of -44° C and to avoid a complex cascade system, the NH₃ system was designed to operate in a vacuum range (approx. 0.6 bar(a)).

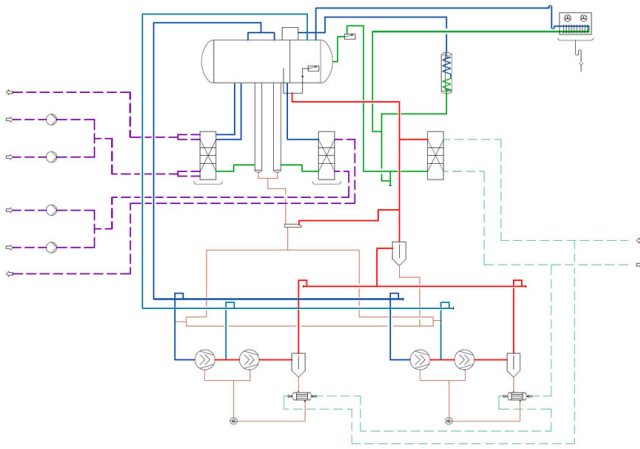
This necessitates certain structural measures, which had to be carefully considered during the system design.

R&I DIAGRAM

The flow diagram shown below illustrates the schematic layout of the refrigeration system. To achieve the low evaporation temperature, the NH₃ screw compressors are designed in a two-stage configuration.

TECHNICAL DATA

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| Refrigerant: | NH ₃ (R717) |
| Refrigerant amount: | max. 500 kg |
| Cooling capacity Q₀: | 540 kW |
| Maximum allowable operating pressure: | 12.5 / 18.0 / 20.0 bar (ND / MD / HD) |
| Evaporation temperature: | -44° C |
| Cooling medium: | Dichloromethane (Methylene chloride) |
| Cooling medium inlet t₁: | -39° C |
| Cooling medium outlet t₂: | -42° C |
| Condensation temperature: | +38° C |
| Cooling medium: | Water |
| Water inlet t₃: | +28° C |
| Water outlet t₄: | +35° C |
| Compressor type: | Tandem screw compressors, 2-stage |



The ND and HD levels are integrated into a single unit and feature an ECO intermediate feed for additional energy efficiency.

The refrigeration system is an NH₃ system with two redundant refrigerant compressors, based on availability, each with separate 500V electric motors, operated with variable frequency drives (VFD).

The implementation of the control cabinets for the main drives with VFDs in 500V was part of the tasks, as well as the planning and execution of the piping on the dichloromethane side.

The system was built on a steel base frame in Sörup to minimize the assembly effort at the customer's site.

The piping for the dichloromethane circuit was also fabricated in Sörup.

MANUFACTURING STANDARDS

Every system that leaves the Sörup plant or is constructed on-site undergoes an individual inspection according to Directive 2014/68/EU (Pressure Equipment Directive) and is marked with the CE label.

Furthermore, ARCTOS is a specialist company according to WHG, implementing the AwSV and with its own quality management system. To ensure the quality and safety standards of many clients, ARCTOS has voluntarily qualified according to SCC** (Safety Certificate Contractors).

If required, a conformity assessment for the refrigeration system with the European ATEX Directive 2014/34/EU is possible.



Cooling of Process Media

Do you have any questions or comments? We are happy to assist you:

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