JOB REPORT

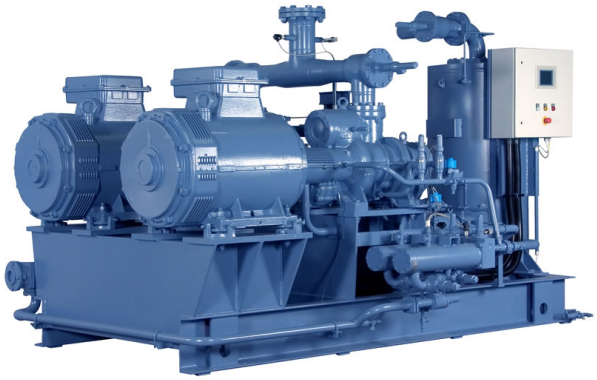
Automobile Manufacturer Relies on refrigeration from Arctos

NH_3 Refrigeration System for Conditioning an Automotive Test Bench

To study the effects of various climate conditions on different automobile types, roller test benches are exposed to air at different temperatures.

In the NH_3 refrigeration system built by ARCTOS Industriekälte AG, a Therminol-D12 brine circuit ensures the desired cooling or heating of the air in the wind tunnel through heat exchangers.

At low air temperatures, the refrigeration system is used to cool the Therminol-D12 to the target temperature.



REQUIREMENTS

Due to the varying climate conditions to be simulated, the refrigeration system is required to cover a wide temperature range. To meet these conditions, the evaporation temperature of the refrigeration system is adjustable from +7° C to -41° C, enabling brine temperatures from +10° C to -38° C.

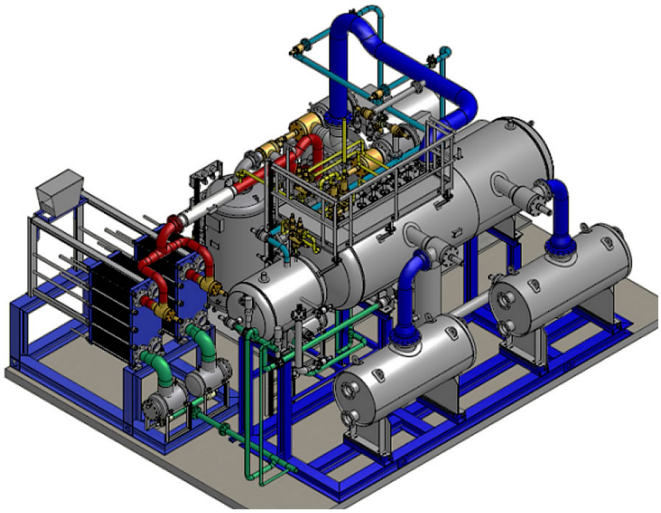
COMPRESSOR TYPE: DUO PACK

To ensure this high level of flexibility, a GEA Grasso Duo-Pack screw compressor unit is used. This unit combines two screw compressors on a single frame.

This design reduces installation and construction effort, as both compressors share components such as the oil separator, oil pump, oil filter, and fittings.

TECHNICAL DATA

Refrigerant	NH_3 (R717)
Refrigerant quantity	1,700 kg
Cooling capacity Q_0	2x 884 kW
Maximum allowable operating pressure	22 / 25 / 25 bar (LP / MP / HP)
Evaporation temperature	-41° C to +7° C
Condensation temperature	+35° C +20° C (winter)
Coolant	Therminol-D12
Coolant inlet t_1	-38° C
Coolant outlet t_2	+10° C
Compressor manufacturer and type	1 x Grasso screw compressor SPduo type WD-5A
Motor drive power	2x 450 kW
COP value	1.96 (t_0 = -41° C, t_c = +35° C)



3D layout of the refrigeration system

Operation with frequency converters

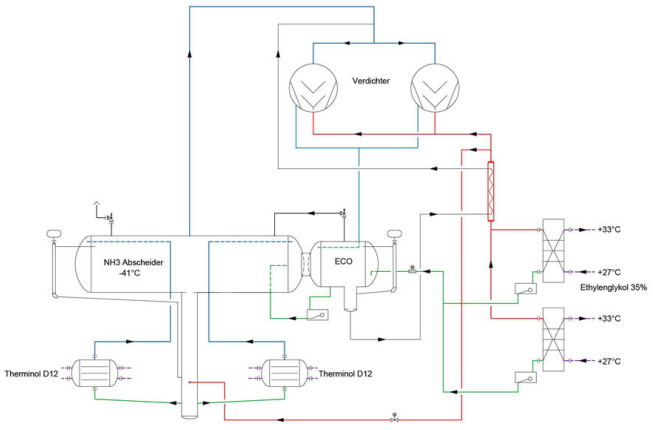
The use of frequency converters allows for good partial load behavior of the two screw compressors. Since the efficiency of compressors decreases under partial load, the two individual Duo-Pack compressors provide an additional energy advantage over a single compressor when low cooling capacities are required.

REFRIGERANT NH_3

The refrigerant ammonia (R717) provides manageable conditions for the applied temperature range and achieves high efficiency in the cooling process. The refrigeration system operates in a single-stage process with an open economizer. This further increases the system's efficiency. Depending on the operating point, a cooling capacity of 884 kW (t_0 = -41° C) to 3,235 kW (t_0 = +7° C) can be achieved.

CONTROL

The creation of the compressor control system was carried out by ARCTOS Industriekälte AG through the corresponding EMSR specialist department and tailored to the process. The control system enables flexible operation and a customer-specific soft-start operation for the compressors and the wind tunnel.



Schematic Layout of the Refrigeration System

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

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