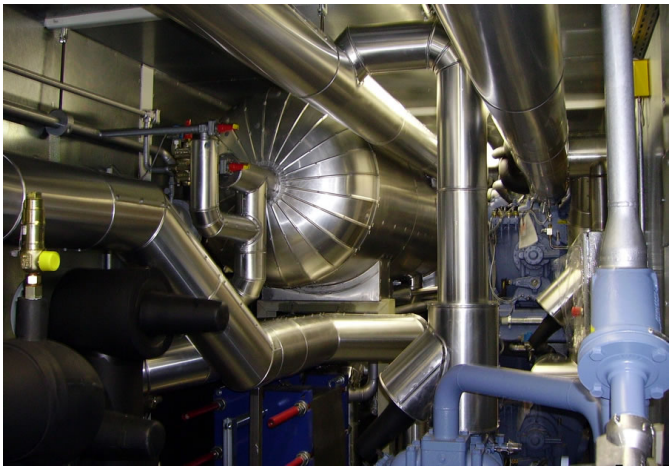
Mobile Brine Cooling System
Special Container Refrigeration System for Ground Freezing

Mobile brine cooling system in a special container, designed as a CO_2 / NH_3 cascade refrigeration system and equipped with piston compressor units.



To avoid the problem of infiltrating groundwater in deep construction projects, ground freezing of underground areas is often used.

ARCTOS offers the possibility to freeze the soil around or above the construction site with its ground freezing units. The ice shield protects the construction site from groundwater infiltration during the construction period and provides static reinforcement.

Special Container with Ground Freezing Unit

The mobile brine cooling system is installed in a special container and equipped as a cascade refrigeration system with piston compressor units.

The refrigerants used are NH_3 in the lower and CO_2 in the upper cascade stage. The CO_2 / NH_3 cascade refrigeration system is used for cooling a brine ($CaCl_2$, 30%).

This is used for freezing the ground (frozen mass), including for the creation of tunnel boring cross sections.

The chosen design as a cascade refrigeration system was selected to allow for deeper cooling if necessary. However, a different coolant carrier is required for this. The cooling limit for TYFOXIT F 50 is -50 °C, compared to approximately -45 °C for 30% $CaCl_2$.

Ground Freezing

From a pilot tunnel drilled specifically for this purpose (see above), the refrigerant, cooled to -45 °C, is directed to the ground freezing location with the help of freezing lance units (see below).

Once a calculated volume of soil has been frozen, construction work can begin.

During this process, the above-ground refrigeration system continuously continues to freeze the ground.

After the work is completed, a concrete shield, for example, protects the underground cavity (e.g., tunnel, shaft).

Why a Cascade Refrigeration System?

The cascade refrigeration system is often used when low temperatures need to be generated economically.

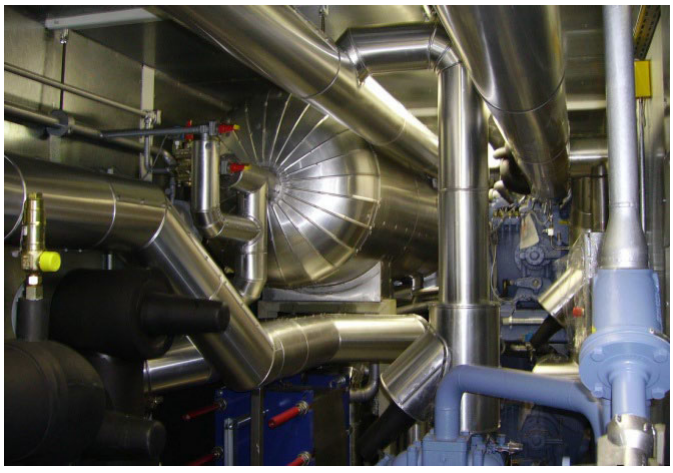
In this setup, a low-temperature refrigerant (e.g., CO_2) is used in the lower cascade stage's cycle.

The evaporator of this stage acts as the condenser for the upper cascade stage, which contains a different refrigerant (e.g., NH_3).

Thanks to the well-matched evaporation and condensation properties, low temperatures and favorable pressure conditions for the compressors can be achieved.

Technical Data of the Cascade Refrigeration System

Refrigerant:	NH_3 (R717) / CO_2 (R744)
Refrigerant Quantity:	Max 100 kg NH_3 / max. 200 kg CO_2
Cooling Capacity Q_o:	275 kW
Brine Inlet t_{S1}:	-33° C
Brine Inlet t_{S2}:	-38° C
Brine Flow:	57.3 m³/h
Cooling Medium:	Water/Air
Water Inlet t_{S3}:	+27° C
Water Outlet t_{S4}:	+31° C
Compressor Manufacturer:	GEA Grasso
Compressor Type:	Piston Compressor
Machine Container:	40'-Container for the brine cooling unit, pumps, and electrical control panel / switchgear room



Special Container Refrigeration System for Ground Freezing

Go Deep with ARCTOS

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

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