Going underground with ARCTOS

CO_2/NH_3-soil-freezing-container refrigerant system

Nowadays, the construction projects are not only growing in height, but also going deeper and deeper. However, these underground construction works are often impeded by penetrating groundwater.
With its freezer units, ARCTOS Industriekälte AG offers the possibility of freezing the soil around or above the construction site. The ice sheet protects the construction site against the ingress of groundwater during the construction work and secures it statically.

From a specially for this purpose drilled pilot tunnel the freezing lances guide the up to -50°C cold brine to the place of freezing. After the freezing of a calculated volume of earth, the construction work can begin. During the work, the above-ground refrigeration system continues to freeze the earth continuously. After completion of the construction works, e.g. a concrete shield secures the underground cavity (e.g., tunnel, shaft).

refrigerant:	NH_3 (R717) / CO_2 (R744)
filling capacity:	max. 100 kg NH_3 / max. 200 kg CO_2
refrigeration capacity:	275 kW
coolant:	CaCl2, 30 %
bringe inlet /-outlet:	t_{S1} -33°C / t_{S2} -38°C
condensation:	water/air | t_{S3} +27°C / t_{S4} +31°C
technique:	WITT 2-chamber surge drum GEA-Grasso piston compressor 40'-container for pumps, cooling unit & cabinet

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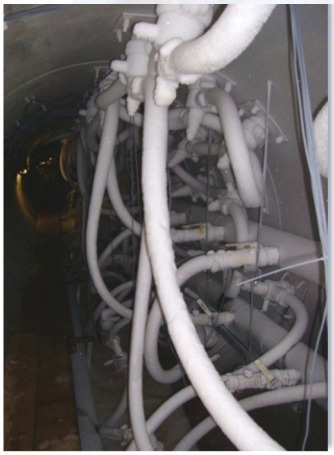
Special container with soil freezing unit

The mobile brine cooling system is installed in a special container as a cascade refrigeration system and equipped with a WITT 2-chamber surge drum and piston compressor units.
The refrigerants are NH_3 in the upper and CO_2 in the lower cascade stage. The cascade refrigeration ystem is used to cool the brine for freezing the soil (i.a. for crosscut production of tunnel tubes).
For this purpose, either TYFOXIT F 50 with a cooling limit of -50°C or 30% CaCl2 down to -45°C is used as the brine.

Why a cascade refrigeration system?

The cascade refrigeration system is often used when low temperatures must be generated economically.
Here, a cryogenic refrigerant (e.g., CO_2) is used in the lower cascade cycle. The condenser of this cycle serves as the evaporator for the upper cascade cycle containing another refrigerant (e.g., NH_3). Due to the good co-ordinated evaporation and condensing properties, low temperatures and good pressure ratios for the compressors can be achieved.



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MITGLIED DES: eurammon refrigerants delivered by mother nature

Forschungsrat Kältetechnik