

## **Job Report**

### **ARCTOS innovative solution Facilitates building construction**

#### **NH<sub>3</sub> soil freezing units with screw compressors**

In underground building sites there is a frequent problem with ground water which impedes or even prevents underground works. Solutions are necessary to permit work in spite of this problem.

Soil freezing is the answer.

Soil freezing freezes the soil at a safe distance around or above the construction site (underground shaft or tunnel). The frozen soil has a stabilising and sealing effect against ground water. When frozen, the soil can be excavated with special construction machinery and sealed off with concrete or steel sections. On completion, the soil is thawed and the concrete or steel shielding prevents the groundwater from penetration and safeguards the structure of the building.

Soil freezing enables building projects which could not be realised in the past or where costly liquid nitrogen freezing was applied for a long time.



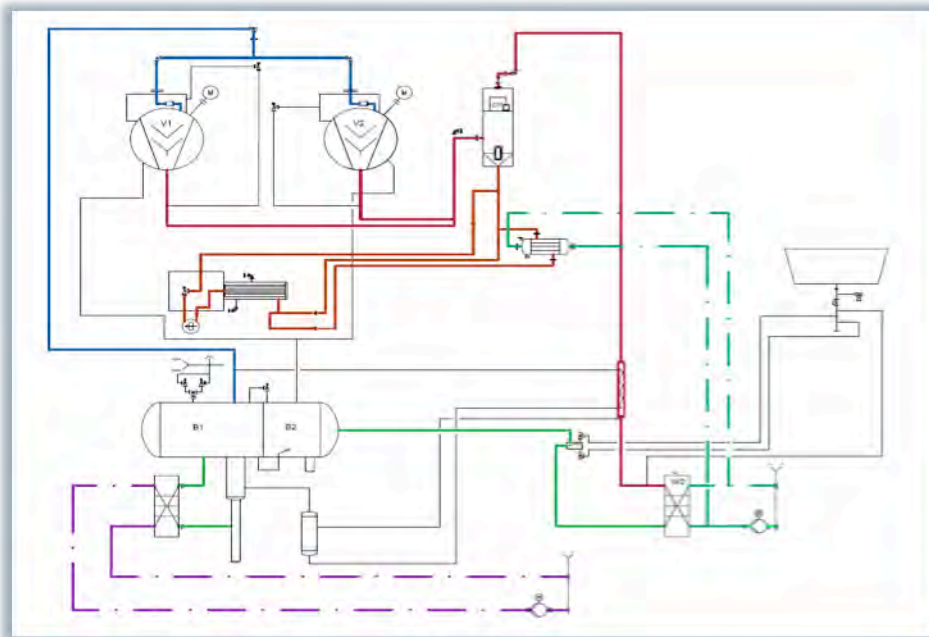
Frozen soil (white) surrounding a tunnel which has been opened under protection of the ice shield in order to be connected with an underground railway station.

#### **Method of freezing**

An over ground refrigeration system supplies the injection channels, which are drilled deep into the soil that is to be frozen, with brine or heat transfer medium.

By means of the freezing lances a fixed area of the soil is point-frozen. Within or under this ice shield the construction work can be executed safely and without groundwater penetration.





## Example NH<sub>3</sub> soil freezing units with screw compressors

NH<sub>3</sub> soil freezing units are utilised in the construction of underground tunnels, stations or building shaft projects and to safeguard excavations.

The over ground NH<sub>3</sub> refrigeration systems cool a brine refrigerant (e.g. CaCl<sub>2</sub> which freezes the soil for excavating cross connections between tunnel arms.

The brine is cooled down to approx -30°C and freezes the soil around the drilled freezing lances enabling construction work to proceed without risk of structural damage.

ARCTOS can supply refrigeration units for temperatures down to -45°C.

### Technical data

Refrigerant	NH <sub>3</sub> (R717)
Refrigerant charge	max. 150 kg
Cooling capacity Q <sub>0</sub>	370 kW
Heat transfer medium	CaCl <sub>2</sub> , 30 %
Brine inlet temperature t <sub>S1</sub>	-30°C
Brine outlet temperature t <sub>S2</sub>	-35°C
Brine flow V <sub>S</sub>	67 m <sup>3</sup> /h
Heat rejection medium	water
Water inlet temperature t <sub>S3</sub>	+26°C
Water outlet temperature t <sub>S4</sub>	+31°C
Compressor manufacturer	GEA Grasso
Compressor type	screw compressor
Machine container	30 ft container housing the brine chiller, pumps and control panel.