Arctos Industriekälte AG

Schulstraße 33
D-24966 Sörup
Tel. +49 (0) 4635 / 29282-0
Fax +49 (0) 4635 / 29282-20
www.arctos-ag.com

Humboldtstraße 25a
D-21509 Glinde
Tel. +49 (0) 40 / 3099787-0
Fax +49 (0) 40 / 3099787-10
www.arctos-ag.com

Job Report
High capacity flexibility using ice water cooling

NH₃ refrigeration with ice banks

The food industry (dairies, breweries, meat processing) and also the chemical industry often need considerable peak cooling at short notice.
Using ice water systems, we can achieve this flexibility even when the cooling requirements vary considerably during the course of the day.

By means of accumulated ice it is possible to attain ice water temperatures of about $+1^{\circ}$C. The use of electrical night time tariffs in combination with an optimized control system can save costs.
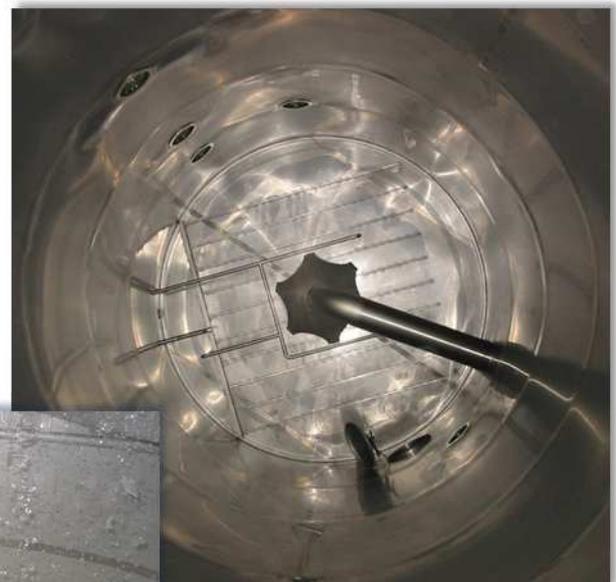
Further advantages of this system are the small amount of refrigerant and the comparatively low installed cooling capacity needed.

Kälteträger: Wasser
Heat transfer medium: water
The high heat capacity of ice water achieves high cooling capacity in a short time.
Because of the physical qualities of water, there are limits: the cooled goods can only be cooled to nearly 0°C.


Interior view of the ice water silo before starting operation and during operation.

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Example ice film generator:

The NH_3 refrigeration system cools ice water which for the production process. The ice water, cooled to +1°C, is stored in a 140 000 l tank. The entire refrigeration system is installed in a noise absorbing 40 ft sea container.

The ice generator produces ice by circulating refrigerant in evaporator plates after which the ice is stored in the ice container. After the melting process, the microprocessor controlled refrigeration system automatically starts recharging the ice tank.
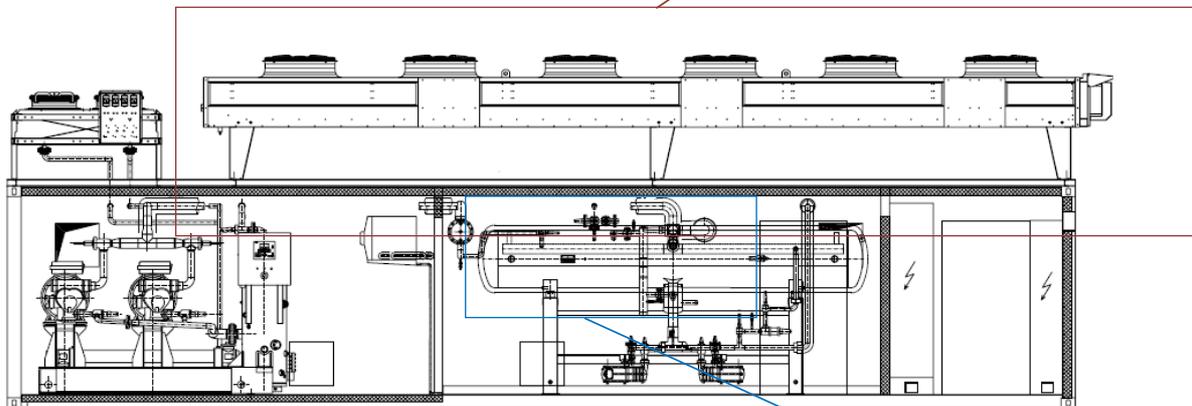
Technical data

Refrigerant	NH_3 (R717)
Refrigerant charge	350 kg
NH_3 evaporating temperature	-10°C
NH_3 condensing temperature	+43°C
Cooling capacity Q_0	280 kW
Heat transfer medium	cold water
Heat transfer medium temperature	0.4^{o}C – 1°C
Ice container storage capacity	4300 kWh
Main components	
Duo screw compressor unit	Grasso DD-5A
Ice water silo ice maker	BUCO ice generator
NH_3 evaporator	BUCOdelot BEE
NH_3 condenser air-cooled	Thermofin 080