

**thermowave**  
PHE for process and industry

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## Increased quantity of milk at lower costs for refrigeration

A milk-processing company in the Brazilian town of Três de Maio modernised a part of the central cold air supply system and, at the same time, tripled the quantity of milk processed daily to 1,400,000 litres by changing from two-shift to three-shift operation. Two thermowave plate heat exchangers are key components in the cooling process.

The company in Três de Maio processes about 610 m<sup>3</sup> of milk per hour around the clock. Half of the 1,400,000 litres of raw milk delivered every day are used to produce milk powder in three shifts. About 700,000 litres of raw milk are used by the milk plant to produce fresh milk, curd cheese, cheese and other fresh dairy products – either pasteurised or in UHT quality. About 2,000 tonnes of dairy products are produced per month.

Before the increase in production capacities, cold air was provided for the production and storage rooms by a combination of an ice bank and plate heat exchangers. The capacity of this arrangement used to be lower than the capacity of the current arrangement and also had an unsatisfying energy footprint.

In the company's machine room in Três de Maio, the natural refrigerant ammonia (R711) is used for generating primary cold. Four compressors offer a capacity of 5,925 kW.

The production, storage, office and social rooms are strictly separated from the NH<sub>3</sub> system for safety reasons. All the cold consumers of the plant are supplied by a cold water circuit (water/glycol mixture) instead.

### Solid and energy-efficient

Two solid and energy-efficient thermowave plate heat exchangers of type TL0650 KCKL-2500 form the hydraulic interface between ammonia and the water/glycol mixture. The cold ammonia (evaporating temperature -1 °C) is piped through the thermowave heat exchangers via pressure vessel and cools down the water/glycol mixture from 10 °C to 1.5 °C. The maximum flow rate of both plate heat exchangers is 610 m<sup>3</sup>/h; the flow rate is, however, reduced at partial load operation.

thermowave optimised the well-proven counterflow principle applied for the heat transfer between liquid media by using a particular shape of the individual plates and stainless, austenitic chromium-nickel steel with high corrosion resistance and easy formability (AISI-304).



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The heat transfer was realised on the smallest footprint possible (twice 2.500 x 730 mm) and it allows for energy savings of about 25 per cent in the machine room. The entire heat transfer capacity of both plate heat exchangers is about 5,900 kW and takes place on a total heat exchanger surface of 310 m<sup>2</sup>. The existing ice bank serves as emergency cooler only.

This way, the milk production in Três de Maio is supplied with cold air around the clock in a reliable way and in line with demand.

#### Overview:

Business line:	Industrial Refrigeration
Application:	Cooling of foodstuffs
Country/city:	Brazil/Três de Maio
Fluid:	NH <sub>3</sub> and water/glycol mixture
Product:	thermowave TL 650 Frost Frio Pressure Vessel SCLH - 9E

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