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Increased quantity of milk at lower costs for refrigeration

A milk-processing company in a Brazilian town in the south of the country modernised a part of the central cold air supply system and, at the same time, doubled the quantity of milk powder and cheese processed daily to 2,000 tonnes by changing over to another cooling system. Two thermowave plate heat exchangers are key components in the cooling process.

The company refrigerates about 610 m³ of water per hour around the clock. Thousands of litres of raw milk delivered every day are used to produce milk powder, curd cheese, cheese and other fresh dairy products – either pasteurised or in UHT quality. About 2,000 tonnes of dairy products are produced per day.

Before the increase in production capacities, cold water was provided for the production by an ice bank. 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, the natural refrigerant ammonia (R717) 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



Overview

Business line:	Industrial Refrigeration
Application:	Cooling of foodstuffs/room cooling
Country/city:	Brazil/Três de Maio
Fluid:	NH ₃ / water/glycol mixture
Product:	thermowave TL 650

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from the NH₃ system for safety reasons. All the cold consumers of the plant are supplied by a cold water circuit (water/glycol mixture) instead; and a thermowave plate heat exchanger was added to the plant.

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 m³/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).

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 % 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 m². The existing ice bank serves as emergency cooler only.

This way, the milk production is supplied with cold water around the clock in a reliable way and in line with demand.