

Safe and Efficient Cascade Refrigeration for Exotic Fruits

SUPERMAX[®] Plate & Frame HEs perform multiple duties, saving space and weight, as well as refrigerants. High efficiency and safety are the result.

Tranter has supplied engineered components for an NH₃-CO₂ cascade refrigerating system serving a new distribution center built by Hillfresh International, a fruit, vegetable and exotics importer. The company brings in top quality products from throughout the world, focusing on supermarkets, exporters, wholesalers, and processing and food service companies. The Hillfresh distribution center in Barendrecht, Netherlands, has a cold storage area of 123,785 sq. ft (11,500 m²), divided into 21 cold storage units.

The cascade system

An NH₃-CO₂ cascade refrigeration system has ammonia and CO₂ sides. The selection of a cascade refrigeration system brings with it much higher pressures than normally found in conventional ammonia refrigeration systems. Ammonia refrigeration is employed to condense the CO₂, which has an extremely high heat of vaporization; hence its attractiveness as a refrigerant for large quantities of valuable and delicate specialty foods. However, on the CO₂ side, a backup or emergency CO₂ cooler must be incorporated to maintain pressure rise within acceptable limits.

Plate HE benefits

A prime factor in the Hillfresh technology selection was the attainment of the highest environmental and safety standards. Tranter's scope of supply included an ammonia separator, two NH₃-CO₂ cascade heat exchangers, a CO₂ vessel and emergency CO₂ coolers. The core of the Tranter cascade system is three SUPERMAX[®] Shell & Plate Heat Exchangers. This unit was selected for the duties because of its small footprint and light weight, its suitability at high pressure and low temperatures and its high heat transfer rates that reduce the hold up volume of potentially hazardous refrigerants.

The NH₃-CO₂ cascade system as supplied by Tranter reduces the consumption of ammonia by almost 90%, thereby improving safety and making the system more environmentally friendly than conventional refrigerating solutions. The ammonia side is also kept completely separate



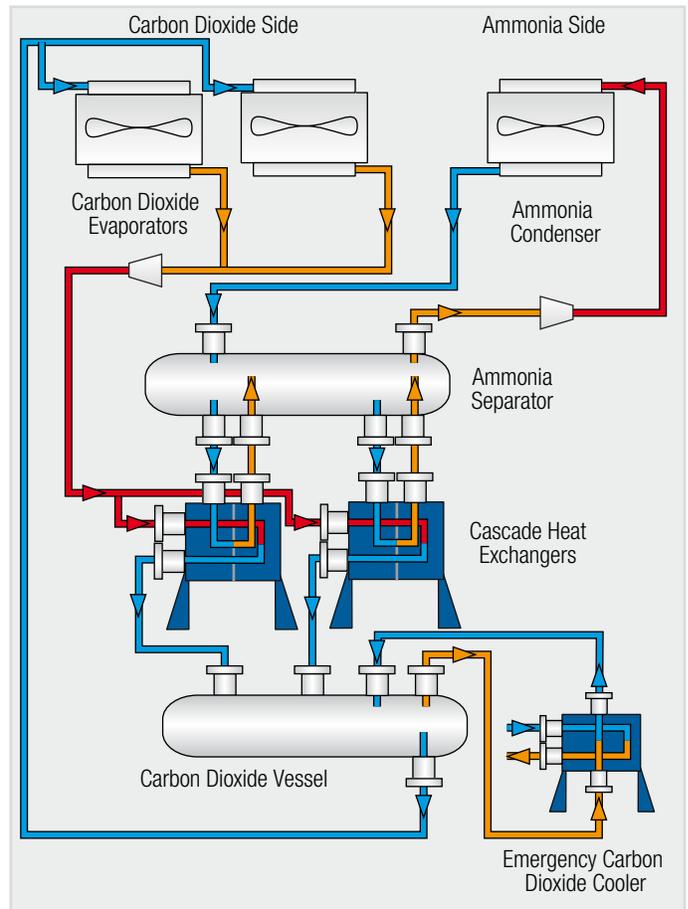
The SUPERMAX[®] Shell & Plate exchanger offers high efficiency in a small-footprint and lightweight package.

from the cooling area, which reduces the risk of exposure to employees.

In addition to reducing costs by operating more efficiently with a lower volume of refrigerants, the compact system was less expensive to build and install.



From top: NH₃ separator, two SUPERMAX NH₃-CO₂ cascade HEs and CO₂ vessel with SUPERMAX cooler.



Basics of the NH₃-CO₂ cascade refrigerating system, with SUPERMAX cascade heat exchangers and CO₂ cooler.

SUPERMAX® cascade heat exchanger duty

Number	2	
Model	PW75	
Heat Exchanged, BTU (kW)	3,071,000 (900)	
Channel	Plate side	Shell side
Medium	CO ₂	NH ₃
Pressure, psi (bar)	-15/580 (-1/40)	-15/230 (-1/16)
Temperature, °F (°C)	-4/122 (-20/50)	-4/122 (-20/50)
Length, in. (mm)	236 (6000)	
Width, in. (mm)	126 (3200)	
Height, in. (mm)	227 (5770)	
Weight, lb (kg)	33 (14.8)	

SUPERMAX emergency cooler duty

Number	1
Model	PW17
Heat Exchanged, BTU (kW)	34,120 (10)

SUPERMAX Model SPW general specifications

Temperature, °F (°C)	
Carbon Steel	-58 to 660 (-50 to +350)
SS And Higher Alloys	-328 to 1650 (-200 to +900)
Plate Material	316L SS, 316Ti SS, AL-6XN SS, 904L SS, Nickel 201, Monel 400, B265 Gr1 Titanium, Hastelloy® C-22
Pressure, psi (bar)	230/360/580 max. 1450 (16/25/40 max. 100)



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