



Low Temperature Refrigeration

PACKAGED REFRIGERATION SYSTEMS FOR COLD-ROOMS

Ultra-Low Temperature Tuna Storage

by J.D. Wasir, P.E., KoolJet Posted: October 1, 2009

When a seafood distribution center in Toronto needed an ultra low temperature storage facility for imported tuna, the company turned to KoolJet Refrigeration Systems in Tillsonburg, Ontario, Canada. The seafood company needed an 11,000 ft³ storage room capable of maintaining a constant temperature of -76°F (-60°C), and it believed KoolJet's Dual-Kool technology was the best fit for its requirements.

The technology consists of two completely independent refrigeration systems, each driven by its own compressor and built into a common refrigeration unit. Refrigerant from one circuit never enters the other circuit. A two-stage electronic thermostat controls each circuit individually. When full cooling power is required, both systems operate to produce the maximum cooling capacity. However, only one refrigeration circuit is needed to maintain the room temperature. According to KoolJet, this design can reduce operating costs by as much as 30 percent compared to systems that have only one circuit. While the seafood company was impressed with the system's efficiency, its primary concern was reliability. Tuna is highly temperature sensitive and is an expensive product. A freezer failure would be costly. The dual-circuit system would provide a redundancy that was imperative to ensuring a healthy bottom line. The company decided to move forward on the investment.

To minimize temperature drops due to air infiltration, the freezer was built inside another cold room that would be maintained at -20°F (-29°C). Prefabricated 6"- thick polyurethane panels insulate all six sides of the ultra low-temperature unit. The condensing unit is mounted on the roof of the building and piped into the indoor evaporating unit, which is suspended from the freezer ceiling.

Finding evaporator fans and motors capable of operating in ultra low temperatures proved challenging. After contacting a number of fan suppliers, the KoolJet engineer finally found aluminum-cast fans with a practical low-temperature limit of minus 70°F (-57°C) – close enough for him to work with. By designing a heater system for the fan motors, the engineer was able to drop the low-temperature limit of the fans so that they would operate reliably in the tuna freezer. Another set of coil heaters was used to aid coil defrosting.

The new freezer was installed and commissioned in February 2009 and has maintained the required temperature of -76°F without a problem. Although details regarding energy consumption aren't yet available, KoolJet is confident that the design is reducing operating costs for the seafood company.

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