

# Cold storage warehouse improves efficiency with ammonia/pumped CO<sub>2</sub> system

## Result

- Ammonia / CO<sub>2</sub> brine system
- Dual slide valve efficiency avoids \$100,000 of variable frequency drives
- 1000 tons of efficient ammonia refrigeration
- Pumped liquid CO<sub>2</sub> secondary refrigerant
- Non-ozone depleting refrigerant with zero global warming impact
- Vilter™ single screw compressor with ammonia refrigerant achieves increased performance
- 15% higher efficiency than comparable technologies
- Designed for 20 years service without costly maintenance

## Application

Pumped liquid CO<sub>2</sub> secondary system refrigerated by ammonia for 240,000 square foot product and dairy cold storage warehouse.



## Customer

With annual sales of over \$11 billion and over 65,000 employees, METRO INC. is a leader in the food and pharmaceutical sectors in Québec and Ontario, where it operates a network of more than 600 food stores as well as over 250 drugstores.

Dessau is one of the largest engineering-construction firms in Canada, operating throughout the country and around the world. Dessau employs over 5,000 talented individuals for small-, medium- and large-scale projects worldwide.

## Challenge

Metro believes that it has a duty to respect and protect the environment and has been working for fifteen years to continuously improve its environmental record. Each year the company conducts environmental audits of all Quebec and Ontario warehouses. Metro needed to expand its main cold storage distribution warehouse to support growing retail operations, and approached Dessau to implement an efficient and safe refrigeration system.

The project team developed a proposal to install a dual-temperature low-charge ammonia package refrigeration system, without the need for HFC refrigerants. The natural ammonia refrigerant and Vilter screw compressors are isolated from the warehouse and only cooled CO<sub>2</sub> brine is pumped into the cold storage space. To maximize part load efficiency and to keep costs to a minimum, the team approached Emerson to find an efficient compressor solution that would not require costly variable frequency drives.

## Solution

A Vilter package is constructed with a plate and frame chiller and four Vilter screw compressors. This makes the entire package smaller than a shell and tube system, so the compact size simplifies installation and reduces the footprint, saving space. Moreover, the Vilter single screw Paralex™ slide valves ensure optimum part load performance, to match any fluctuations in refrigeration load thereby saving energy and money without the need for expensive inverter drives and their inherent electrical issues. This combination improves part load performance, saving energy and money. These packaged screw compressor systems with ammonia refrigerant are durable, economical, and safe. With an amount of ammonia of about 0.12 kg/ kW, the secondary circuit meets the crucial requirement to minimize the total amount of ammonia used on site.

Low charge ammonia refrigeration systems such as that applied at Metro are gaining popularity for large-capacity cooling applications in the 75-750 kW range. The low ammonia refrigerant charge also improves safety and reduces certification costs.

[Emerson.com/Vilter](http://Emerson.com/Vilter)

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Single screw compressors benefit from balanced forces around the main rotor. Balanced axial and radial forces offset one another so that, effectively, the only net force on the main rotor of the single screw compressor is gravity. The low bearing loads result in long compressor life and high reliability. Vilter is able to offer a fifteen year bearing warranty. As a result, operators can greatly reduce maintenance costs by avoiding costly bearing replacements and downtime events.

The unit is equipped with Vilter VISSION 20/20 microprocessors with process temperature controls. The controls are designed to regulate the starting, stopping, and capacity control. The dual slide design on the Vilter single screw compressor offers the highest level of flexibility and performance optimization for screw compressors. This design actually has two slides per compression side of the gas end. The two slides are commonly referred to as the capacity slide and the volume slide. The capacity slide moves from positions of 20% to 100% of flow while continuously operating at the ideal compression ratio throughout the part-load range. This allows the compressor to match the system flow requirements and makes cooling low-cost and efficient.

## Resources

Learn more about the Vilter VSS single screw compressor at: [Emerson.com/Vilter](http://Emerson.com/Vilter)

