



Case Story

Ammonia Conversion for Cold Storage Facility is Simple with Flexline™

Consumer retail stores are looking for tried-and-true ideas to thrive in turbulent economic times. That's why a major 190-store retail chain based in the Midwest switched to a proven refrigeration solution for one of its distribution centers -- an environmentally friendly ammonia system that uses Danfoss ICF Flexline™ valve stations.

"Ammonia is still the refrigerant of choice for large cold storage facilities," says Tom Cooper, president of Refrigeration Concepts, Inc., (RCI) Comstock Park, Michigan. "It is a naturally occurring gas that is environmentally friendly with an ozone depletion potential (ODP) and a global warming potential (GWP) of zero. Ammonia also has good thermodynamic properties that make it very energy efficient. And thanks to its long history, our industry knows how to handle it safely."

Looking into the future, the retail chain made a pro-active switch to a more environmental friendly refrigerant than the refrigerant they were using.

"Ammonia has a better coefficient of performance (COP) than typically installed halocarbon refrigerants," explains Cooper. "That makes it an efficient choice for a wide variety of temperatures and applications -- like refrigerated dock doors and blast freezers."

Cooper's challenge was to convert a 75,000-square-foot cold storage facility in Lansing Michigan requiring -10 degree F refrigeration for frozen meats and vegetables from HCFC-22 to ammonia utilizing existing penthouses and maintain temperatures during the process of demo and reconstruction.

Responsible for designing and installing the entire refrigeration system -- from compressors to condensing and evaporator coils -- Cooper's crew had to use some ingenuity because the project schedule was tight.

ICF drive trains speed up ammonia conversion

To pull off the conversion, Cooper relied on the Danfoss Flexline™ valve platform technology to save time.

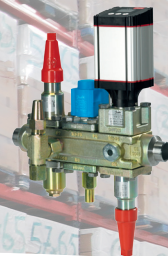
"Over the years, we have installed hundreds of Danfoss valve trains in food processing and cold storage applications," says Cooper. "It is much faster and better than the traditional method of fabricating valve trains."

Cooper notes that valve trains, or stations, are used in ammonia systems to control the circulation of refrigerant in the system. The valves open and

80%

less installation time

Just two welds for fast and efficient installation



close to regulate the flow of refrigerant from compressors to heat exchangers to evaporator coils to condensers.

A typical valve train may contain five or six components, including control valves, stop valves, and pressure sensors. Using the traditional method, Cooper would need to order the components, unpack, assemble and weld each valve into piping, and then ship the finished valve train to the job. Since each valve requires two welds, that could involve up to 10 welds or more per valve train.

The project involved about seven complete and unique valve trains, five in the food storage area and two on the dock. That would have added up to more than 70 welds. Combined with unboxing, cleaning, assembling components, weld maps, labeling and leak checking, at least four hours of work would be required for each conventional valve train, eating up precious days in the production schedule.

"There is a lot of welding and integration of large numbers of valves and sensors from multiple suppliers when you fabricate a valve train from scratch," says Cooper. "We've found the Danfoss Flexline valve platform is much faster and better."

Flexline is the name of the technology platform developed by Danfoss to facilitate valve train fabrication from start to finish. Cooper used two Flexline configurations. The ICV Flexline™ family consists of Danfoss ICM motorized valves and ICS piloted controlled servo valves. In contrast, the ICF Flexline station offers the flexibility of a single valve body with multiple port openings. This allows different components to be specified and installed at the factory to build the required configuration.

"Both Flexline platforms are based on one common valve body to offer outstanding flexibility," says Cooper. "That lets us replace a string of valves with just one valve station."

More innovation cuts valve train installation down to 45 minutes

An ICV Flexline valve stations employ Danfoss ICM motor controlled servo valves and ICS pilot controlled servo valves.

"The ICM is a direct operated motor valve that regulates the refrigerant expansion process in liquid lines and controls pressure or temperature in dry and wet suction lines and hot gas lines," explains Cooper. "A stepper motor opens or closes the valve based on level signals from the control system."

The ICS servo valve is a compact, servo operated control valve. Up to three pilot valves can be connected to an ICS valve to regulate pressure, temperature and ON/OFF functions within the refrigerant system.

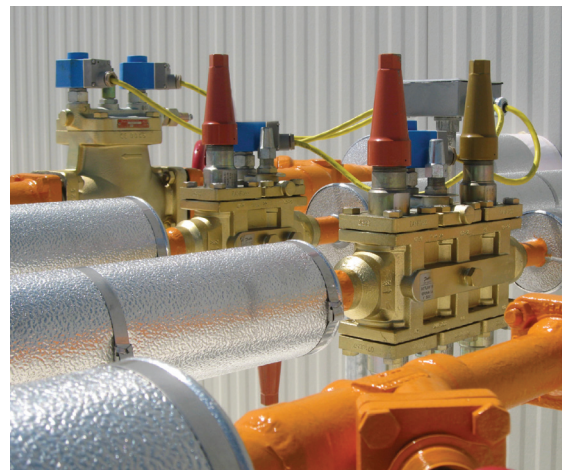
Both ICM and ICS valves use fully hermetic couplings to reduce the leakage risk and ensure a safe and environmentally friendly installation. Up to six valves can be mounted in any combination on an ICF valve body.

Looking at the ICF Flexline design, this valve train is a multi-port valve body that is about a foot long. It uses a modular design that accepts a variety of ready-made inserts that are simply pushed into the precision-machined opening to accomplish the desired function. Function modules that can be mounted on an ICF body include: stop valves, strainers, solenoid valves, check valves, combination stop/check valves, and motorized or hand expansion valves.

Along with the ICM and ICS valves, Cooper also used Danfoss SVA stop valves that feature an engineered valve cone designed to ensure perfect closing. He also employed Danfoss AKS 4100U liquid level sensors that use proven Time Domain Reflectometry (TDR) technology to measure the liquid level of ammonia in vessels, accumulators, receivers, and silos.

After the components were specified, the valve stations were delivered from Danfoss, ready to be installed with just two welds for piping on either end -- a tremendous time savings for the project.

"These are weld-in-line valve trains," he emphasized. "This eliminates the need for flanges and gaskets, which have a tendency to leak. When you consider the reduced total welds



and less leak potential by eliminating gaskets, ICF valve trains are well worth it."

Thanks to the modular design, installing an ICF valve train takes about 45 minutes, compared to nearly five hours per conventional valve train.

Compact size combines with speed and reliability

Cooper also appreciates the ICF and ICV Flexline platform's compact size. "Traditional valve trains require more welding. They also take up a lot more space because the pipe spans are longer between each valve. To support fabricated control stations that are spread out with more welds, a conventional valve train is about four feet long. A Danfoss Flexline valve train is much more compact, which saves a lot of space in the plant and reduces the amount of refrigerant in the line."

For Cooper, going with the Flexline solution proved to be a smart move in terms of labor and space savings, fewer leak points and superior performance.

"ICF valve trains helped helped us meet a demanding schedule -- and the performance demands of an ammonia application. They are operating flawlessly. There is nothing like it in our industry. This is the kind of track record that gives a greenlight to cold storage facility owners who want to move to ammonia refrigerant."

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