

ARKEMA'S FORANE® 427A CASE STUDY SHERM'S THUNDERBIRD MARKETS IN ROSEBURG, OREGON



BACKGROUND

As the refrigeration industry continues to move away from R-22 due to regulatory pressure, Arkema's Forane® 427A has positioned itself as an excellent replacement candidate in low and medium temperature refrigeration applications, such as supermarket refrigeration. Forane® 427A is an easy to use non-toxic, non-flammable and non-ozone depleting HFC refrigerant. In addition to having comparable performance to R-22, Forane® 427A has one of the lower global warming potentials of any R-22 refrigerant retrofits available on the market today.

A good example of a Forane® 427A application was a supermarket retrofit completed at SHERM'S Thunderbird Markets in Roseburg, Oregon. Thunderbird Markets' maintenance manager, Frank Bartyzal, was introduced to Forane® 427A by their wholesaler, Refrigeration Supplies Distributor (RSD). Frank was interested in Forane® 427A due to its ability to closely match R-22's capacity and efficiency while reducing compressor discharge temperatures.

Project:

SHERM'S Thunderbird Markets

Manager:

Frank Bartyzal

Location:

Roseburg, OR

Application:

Retrofitted three racks each supported by three to four semi-hermetic compressors



FORANE® REFRIGERANT BASIC PROPERTY DATA		
	R-427A	R-22
Average Molecular Weight (g/mol)	90.4	86.5
Normal Boiling Point (NBP) (°F)	-44.8	-41.3
Latent Heat of Vaporization at NBP (BTU/lb)	102.0	100.5
Critical Temp (°F)	185.6	204.8
Critical Pressure (psia)	637.1	722.3
Density of Saturated Vapor @ NBP (lb/ft³)	0.30	0.29
Density of Saturated Liquid at 77°F (lb/ft³)	71.9	74.5
Specific Heat of Saturated Vapor at NBP (BTU/lb °R)	0.18	0.14
Specific Heat of Saturated Liquid at 77°F (BTU/lb °R)	0.38	0.30
Ozone Depletion Potential (ODP) (CFC-11=1.0)	0	0.055
ASHRAE Safety Group Classification	A1	A1
Occupational Exposure Limits (8 hr time/wt. Avg.) (ppm)	1,000	1,000
Global Warming Potential (GWP)	1,830	1,500

RETROFIT APPLICATION

Sherm's Thunderbird retrofitted three racks, each supported by three to four semi-hermetic compressors rated from 22 to 30 HP. There is a low temperature rack for ice cream cases (-25°F evaporator, -10°F case temp), another low temperature rack for frozen food cases (-15°F evaporator, 0°F case temp), and one medium-temperature rack for deli cases and store heat reclaim (20°F evaporator, 38°F case temp). Their overall initial charge was about 2,400 lbs.

The retrofit was led by SHERM's Thunderbird's contractor, B&B Refrigeration, with Arkema's Technical Service on site for support.

Retrofits to Forane® 427A require no change out of expansion valves or other major components. The filter driers were replaced as standard procedure. The oil was changed to a polyolester (POE) from a mineral oil due to a system re-vamp. *Overall, a change to POE oil may not be required for Forane® 427A if the system has an oil separator and the oil circulation rate is acceptable; if the system does not have an oil separator, a portion of the mineral oil may need to be changed to POE.* On this retrofit, no components were

MEDIUM TEMPERATURE RACK (4 COMPRESSORS) IN °F		
	R-22	R-427A
Avg Case Temp	38	38
Discharge Pressure	180	180
Suction Pressure	42	36
Avg Discharge Temp	175	160
Avg Suction Temp	39	37

	COMPRESSOR OPERATING COST	
	R-22	R-427A
Kw/Hour	29.2	27.1
Total Monthly Cost (assuming \$0.06/Kw)	\$1,262	\$1,171
7% Reduction in Operating Cost		

replaced and the original TXVs were kept and adjusted to optimize the system. Not changing TXVs was an important factor to Frank Bartyzal in selecting Forane® 427A.

RESULTS

As seen in the table above, the retrofit was a success with case temperatures maintained at the desired set levels while reducing compressor discharge temperatures. In addition, the retrofit to Forane® 427A actually reduced the total operating energy costs of the racks by an average 7%. After moving to Forane® 427A, the system has been operating well and there have been no major problems with this changeover. According to Frank Bartyzal, he "would recommend it to others." Subsequently, he also converted his Medford, Oregon market to Forane® 427A.

This retrofit is a good example of the success Arkema's customers have with Forane® 427A. If you have questions regarding your refrigerant plans, please contact Arkema to allow our technical service team the opportunity to assist with the R-22 transition. **Our technical service hotline is (800) 738-7695. More information can be found on our website, www.Forane427A.com.**

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