

## Arkema's Forane<sup>®</sup> 427A Refrigerant – The Easy Retrofit™ Carrefour Argentina (low temperature)



### BACKGROUND

As the HVACR industry continues to move away from R-22 due to regulatory pressures, Arkema's Forane<sup>®</sup> 427A refrigerant (R-427A) has proven itself as an excellent, easy-to-use, non-ozone depleting HFC refrigerant for air conditioning, heat pump, and refrigeration applications. Forane<sup>®</sup> 427A refrigerant is a better match to R-22 than other retrofits over a wide range of applications, offering close capacity and pressures to R-22, with no oil change required in many installations.

In Argentina, in the area of supermarkets as well as others, measures have already been taken for equipment containing R-22 to consider retrofitting.

Carrefour Argentina, a French supermarket chain with more than 590 branches distributed throughout the country, contacted us to carry out the change of R22 in one of its Carrefour Express stores.

### RETROFIT APPLICATION

Carrefour Express decided to convert all of the stores' refrigeration systems from R-22 to Forane<sup>®</sup> 427A. This included case lineups operating at -25, +15, and +35°F, running off of 12 Copeland compressors on older Hill-Phoenix racks, divided among 3 suction groups with 2 receivers. The original compressor lubricant was alkylbenzene (AB), and the decision was made to use the same oil with Forane<sup>®</sup> 427A.

All the work was performed by Carrefour personnel and was supervised by in-house engineers. No system components were replaced during the retrofit, save the filter-driers. Except for the refrigerant and minor adjustments to the TXV set-points and other control settings to optimize system performance, the system remained essentially as it was before the retrofit.

**Project**  
Carrefour Express

**Location**  
Buenos Aires, Argentina

**Application**  
Low Temperature  
Refrigeration Equipment

**Refrigerant**  
Forane<sup>®</sup> 427A

**Lubricant**  
Mineral Oil



## RESULTS

After the application of Forane® 427A, the equipment quickly reached the desired operating parameters, with a big change in the discharge temperature of the compressor. In the medium and long term, this results in a longer compressor life and less oil degradation, which is very important when mineral lubricants are used without frequent changes. Currently, this equipment continues to reach excellent performance values.

NOTE: While it was decided to keep the system unchanged in regards to lubrication, with satisfactory results, in medium to large installations with important pipe runs, it is advisable to use oil separators, either a system using R-22 or a retrofit.

For answers to your refrigerant related questions or retrofit concerns, please contact Arkema's Technical Service Team at (800) 738-7695. More information on R-427A and our other retrofit solutions is available through our website, [www.r22retrofits.com](http://www.r22retrofits.com).

TABLE 1

FORANE® REFRIGERANT BASIC PROPERTY DATA	R-22	R-427A
Average Molecular Weight (g/mol)	86.5	90.4
Normal Boiling Point (NBP) (°F)	-41.5	-45.3
Latent Heat of Vaporization at NBP (BTU/lb)	100.6	101.8
Critical Temperature (°F)	205.1	185.6
Critical Pressure (psia)	723.7	637.0
Density of Saturated Vapor @ NBP (lb/ft³)	0.29	0.30
Density of Saturated Liquid @ NBP (lb/ft³)	74.3	70.5
Specific Heat of Saturated Vapor at NBP (BTU/lb °R)	0.14	0.19
Specific Heat of Saturated Liquid at 77°F (BTU/lb °R)	0.30	0.36
Ozone Depletion Potential (ODP) (CFC-11 = 1)	0.055	0
Global Warming Potential (GWP) (100-yr)	1,760	2,024
ASHRAE Safety Group Classification	A1	A1
Occupational Exposure Limits (8 hr time/wt. Avg.) (ppm)	1,000	1,000

TABLE 2

RETROFIT RESULTS	R-22	427A
Lubricant	Mineral Oil	Mineral Oil
Environment Temperature (°C)	12	14
Average Suction Pressure (psig)	6.5	6.2
Average Discharge Pressure (psig)	149	132
Average Discharge Temperature (°C)	89	76
Equipment Temperature (°C)	-20°C	-20°C
Consumption (A)	6	6

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