

Arkema's Forane[®] 427A Refrigerant – The Easy Retrofit™

Creative Minds Early Learning Center, Lowell, MA



BACKGROUND

As the HVACR industry continues to move away from R-22 due to regulatory pressures, Arkema's Forane[®] 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[®] 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.

Forane[®] 427A refrigerant was recently used to retrofit half of the ten 2.5 ton air-conditioning units for Creative Minds daycare in Lowell, MA, without a lubricant change. Creative Minds cares for infants through school age children, providing a safe and stimulating learning environment. The new Creative Minds owner needed to open within a short time period with a limited budget after their AC units were vandalized with the line sets and stem valves stolen.

Amerikool Mechanical Service, based out of Lowell, MA, since 1993, performed the service. Amerikool's contractor, Andrew Dow, had tried

other R-22 retrofits, and none of them seemed to work as well as R-22. This is a challenging system, with the condensers in a low air flow area, with long line sets up to 75 feet. Amerikool offered a solution to repair all 10 systems, with half retrofitted to Forane[®] 427A refrigerant to reduce the cost associated with the lost refrigerant. Given the similarity of Forane[®] 427A to R-22 in air conditioning applications, it seemed like a natural fit.

RETROFIT APPLICATION

Amerikool performed the retrofit with Arkema's technical service personnel on site for support. Five of the 10 units were converted to Arkema's Forane[®] 427A refrigerant, with the other five units remaining on R-22. The existing mineral oil was not changed or replaced. The filter-drier and Schrader valve caps and cores were replaced, per standard maintenance procedures. A deep vacuum was drawn on the system before recharging with Forane[®] 427A refrigerant. Charge weight of the new refrigerant was optimized, and readings were taken to compare to R-22's system performance. See Table 1 for comparison. (See back page)

Project

Creative Minds Early Learning Center

Location

Lowell, MA

Application

Air Conditioning (AC)

Refrigerant

Forane[®] 427A (R-427A)

Lubricant

Mineral Oil (MO)



RESULTS

The units on Forane® 427A refrigerant are performing as well as the R-22 units, with 5 psi lower on the suction side and approximately 10 psi higher on the discharge despite the challenging air flow limitations. Amerikool reported the customer is happy with the system retrofit, keeping the children in a comfortable environment with air differential temps at 18°F at 9°F ambient temperatures. His retrofit is a good example of the success Arkema's customers have when using mineral oil with Forane® 427A refrigerant.

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.

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/ft ³)	0.29	0.30
Density of Saturated Liquid @ NBP (lb/ft ³)	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

RETROFIT RESULTS	R-22	R-427A
Charge (lb)	7.1	6.8
Expansion Device	Fixed Orifice	Fixed Orifice
Ambient Temperature (°F)	79	79
Suction Pressure (psig)	72.2	64.0
Suction Temperature (°F)	56.4	49.7
Discharge Pressure (psig)	184.0	194.8
Discharge Temperature (°F)	82.9	83.9
Superheat (°R)	16.3	9.4
Subcooling (°R)	13.4	9.1
Air Temperature Supply Duct (°F)	71.1	71.0
Air Differential at Evaporator (°R)	49.5	49.9

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Technical Service Team: 800-738-7695

forane-us.com

Arkema Inc. (Americas)
900 First Avenue
King of Prussia, PA 19406
Tel.: +1 610 205 7000
Fax: +1 610 205 7497
arkema-americas.com

ARKEMA
INNOVATIVE CHEMISTRY

Headquarters: Arkema France
420, rue d'Estienne d'Orves
92705 Colombes Cedex - France
Tel.: +33 (0)1 49 00 80 80
Fax: +33 (0)1 49 00 83 96
arkema.com