

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

Giorgio Mushroom Company, Temple, PA



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.

Giorgio Mushroom Company is a very large mushroom producer in Temple, PA. They have been in the business since 1928, growing and packaging a variety of mushrooms. Mushroom growing is a science with many critical variables, from mixing the correct proportion of compost to maintaining a strict temperature range so that the mushrooms can thrive in a healthy environment. Giorgio maintains hundreds of grow houses, each requiring its own air-conditioning system. Heat generated from the composting necessitates air conditioning of these grow houses year-round. The grow houses typically use custom modified package air-conditioning units, where the systems are exposed to extreme environmental conditions.

Outside ambient temperatures in Temple, PA, can exceed 100°F in the summer and go below -10°F in the winter. The inside temperature must be maintained below 60°F.

RETROFIT APPLICATION

In 2011, Giorgio's engineering team started seeking a more environmentally friendly refrigerant. Care had to be taken, as the systems do not have the extra capacity, especially on high ambient days, and had to be similar to R-22 in efficiency. After careful review and testing, Forane[®] 427A was the only refrigerant that could perform like R-22 in this environment. They changed the oil to POE in some systems, while other systems remained on mineral oil.

RESULTS

Forane[®] 427A refrigerant performed like R-22 in both high ambient conditions and low ambient weather. The engineering team continues to retrofit R-22 systems needing maintenance, extending the life of the systems. In some cases Forane[®] 427A refrigerant is delivering lower supply air temperature while consuming the same amount of power.

Project

Giorgio Mushroom Company

Location

Temple, PA

Application

Industrial Air Conditioning (AC) – Extreme Ambients

Refrigerant

Forane[®] 427A (R-427A)

Lubricant

Mineral Oil (MO) and POE



RESULTS (CONT.)

These systems again illustrate the performance of Forane® 427A refrigerant in harsh conditions where R-22 was the only refrigerant that was used. Forane® 427A refrigerant offers similar performance to R-22, at a reduced cost, without the environmental concern of ozone depletion. A comparison can be seen in Table 1.

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/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

RETROFIT RESULTS: 10-T PACKAGED UNIT	R-22	R-427A
Amp Draw (amp)	30.3	30.4
Suction Pressure (psig)	52	49
Inside Room Temperature (°F)	60	57
Ambient Temperature (°F)	52	52
Temp Difference Across Evaporator (°R)	9.3	10.7

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