

## ARKEMA'S FORANE<sup>®</sup> 427A CASE STUDY

CANADA REVENUE AGENCY, ONTARIO, CANADA



### 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 retrofit candidate for air conditioning and refrigeration applications. R-427A is an easy to use, non-ozone depleting HFC refrigerant, which, in addition to having comparable performance to R-22, has one of the lowest global warming potentials of any R-22 retrofit refrigerants available today.

R-427A was used by Airco Mechanical Services to retrofit an air conditioning system for the computer server room at the Canada Revenue Agency in Sudbury, Ontario. Airco services the HVACR industry in a wide variety of applications throughout the Northern Ontario area. Chip Richter, Airco President, learned of the R-427A refrigerant through TML Supply Ltd. Chip, who believes in being proactive, was looking for a good, all-around R-22 retrofit to help his customers through the industry's transition away from ozone depleting substances.

### Project:

Canada Revenue Agency

### Location:

Ontario, Canada

### Application:

Air Conditioning



### RETROFIT APPLICATION

The server room at the Canada Revenue Agency is cooled by two identical Liebert<sup>®</sup> System 3 air conditioning systems. One of the systems was retrofitted to R-427A so that a side-by-side comparison of system properties and performance could be made to R-22.

Each system utilizes two individual circuits, powered by Carlyle® reciprocating compressors. Reclaim systems were being used to capture high-side heat rejection for domestic water heating.

The retrofit was performed by Airco Mechanical Services, with Arkema's engineers on site for support. After recovering the R-22 charge, the compressor oil was drained and refilled with POE, the filter-drier was replaced as a standard maintenance practice, and the system was evacuated. Once the system was recharged with R-427A, the server room cooled down rapidly. No adjustments to the expansion valves, pressure controls, or other settings were required. The closeness of the operating characteristics of R-427A to R-22 was critical for this application, as the systems are run at fixed head pressures to maximize the effectiveness of the heat reclaim loops.

## RESULTS

The server room is operating normally, with no noticeable difference in cooling performance. Operating pressures of the systems were nearly identical for both refrigerants. A 40°F decrease in compressor discharge temperatures and noticeably lower compressor current draws were also observed after switching to R-427A. When asked about his impressions of R-427A, Chip Richter replied "I rate it a ten, and will absolutely recommend it to my other customers."

This retrofit is a good example of the success Arkema's customers have with Forane® 427A refrigerant. 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](http://www.Forane427A.com).**

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

The statements, technical information and recommendations contained herein are believed to be accurate as of the date hereof. Since the conditions and methods of use of the product and of the information referred to herein are beyond our control, Arkema expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information; NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE CONCERNING THE GOODS DESCRIBED OR THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be applicable when such product is used in combination with other materials or in any process. The user should thoroughly test any application before commercialization. Nothing contained herein constitutes a license to practice under any patent and it should not be construed as an inducement to infringe any patent and the user is advised to take appropriate steps to be sure that any proposed use of the product will not result in patent infringement.

The chemical, physical, and toxicological properties of these chemicals may not have been fully investigated. You must use due caution in handling of any such material and follow appropriate, good industrial hygiene and safety precautions to prevent human exposure. Carefully read and understand the information on the Material Safety Data Sheet (MSDS) before beginning work with the materials described in this brochure.

© 2009 ARKEMA INC. ALL RIGHTS RESERVED.  
 Forane® is a registered trademark of Arkema.  
 Liebert® is a registered trademark of Liebert Corp.  
 Carlyle® is a registered trademark of Carrier Corp.



Arkema Inc.  
 2000 Market Street  
 Philadelphia, PA 19103  
 1-800-558-5575  
 1-215-419-7000  
[www.arkemagroup.com](http://www.arkemagroup.com)

[www.forane.com](http://www.forane.com)