

## **FORANE<sup>®</sup> 427A**

### **Retrofit of a medium temperature unit from R-22 to Forane<sup>®</sup> 427A at Casino**

In April 2007, the Géant Casino hypermarket branch of the Casino group carried out the retrofit of a medium temperature refrigeration unit from R-22 to Forane<sup>®</sup> 427A at its Gap store (Hautes-Alpes, France). This retrofit operation was carried out overnight by the company Alpes Réfrigération in cooperation with Climalife, one of the Forane<sup>®</sup> 427A distributors in France, and was completed with measurements being taken to check the performances of the installation running on Forane<sup>®</sup> 427A for comparison with those previously recorded with R-22.

The 450 kW retrofitted central unit provides direct expansion refrigeration for the vast majority of the display refrigerators and refrigerated cabinets in this 5000 m<sup>2</sup> hypermarket as well as the 26 cold rooms containing meat, fish, dairy products, etc.

#### **Description of the unit**

- 5 COPELAND semi-hermetic reciprocating compressors (reference D6DJ3400AWM/D,)
- FRIGA-BOHN air condenser (Model ECA 595 P10 06 P)
- ALFA LAVAL subcooler (Model 0376430H (D2-B23))
- Thermostatic expansion valve
- PROFROID evaporator (CAE 42674P type) in the instrumented cold room
- 1 CARLY filter drier per compressor
- Refrigerant charge: 500 kg
- Temperature set point in display refrigerators and cold rooms: 0 to 5°C



#### **Retrofit procedure**

A non-toxic, non-flammable and zero-ODP refrigerant, FORANE<sup>®</sup> 427A usually requires one oil drainage and its replacement with a POE lubricant. Optimal performance close to R-22 can be achieved without long and costly rinsing of the circuit thanks to a high tolerance to residual original oil in the system. However, in view of the size and complexity of the installation, the customer decided to rinse the circuit twice.

After ensuring that the R-22 equipment was in good condition, and measuring the performance of the installation with the initial R-22 charge, the retrofit took place in 7 steps:

- 1- Recovery of the entire original R-22 charge
- 2- Draining of the original alkylbenzene oil from the system (2 drainages and refills with POE oil had been carried out in the previous week while R-22 was still in place)
- 3- POE lubricant charge (40 L)
- 4- Replacement of the filter driers
- 5- Evacuation of the installation
- 6- Refill with FORANE<sup>®</sup> 427A
- 7- Re-start of the installation and performance measurement after running conditions had reached a steady state.

No modification of the installation was required. Thermostatic expansion valves were retained. Only a slight adjustment of the valves was necessary.

### Comparative data

Following the retrofit of the medium temperature refrigeration unit, the anticipated performances were reached very quickly with Forane<sup>®</sup> 427A:

- The temperature set point in the instrumented cold room was reached quickly and easily.
- For comparable suction temperature, the discharge temperature is over 10 °C below with Forane<sup>®</sup> 427A, which is very positive for the reliability of the installation.
- Volumetric liquid flow rate are comparable for both fluids. As pressure levels are comparable too, the existing expansion valves did not need replacing.
- Power consumption is 5% less with Forane<sup>®</sup> 427A.

These results are in full agreement with those obtained during previous retrofit operations monitored by Arkema (e.g. low temperature refrigeration units in supermarkets and in the pharmaceutical industry, medium temperature refrigeration units in the food industry, water chillers, etc.)

	Products	R-22	Forane <sup>®</sup> 427A
Date of measurements		22-mars-07	01-avr-07
Refrigerant charge	kg	500	500
Average evaporating temperature	°C	-9	-9
Average evaporating pressure	bar	3.7	3.5
Average condensing temperature	°C	34.2	33.5
Average condensing pressure	bar	13.3	13.4
Average suction temperature	°C	4.8	3.5
Average discharge temperature	°C	83	70
Average temperature in instrumented cold room	°C	4	3

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