

## FORANE<sup>®</sup> FX 100 (R-427A\*)

### THE CONVERSION FROM R-22 TO FORANE<sup>®</sup> FX 100 (R-427A\*) IN A SUPERMARKET

The company CREA successfully carried out the replacement of R-22 by FORANE<sup>®</sup> FX 100 (R-427A\*) in a medium temperature refrigeration unit and in a low temperature refrigeration unit in a TUTT OK supermarket in Italy.

The conversion took place during summer 2004 in close cooperation with SAPIO/COPRAM who distributes FORANE<sup>®</sup> refrigerants in Italy. Very satisfactory operating conditions were immediately reached and perfectly fulfilled the customer's requirements during the last 2 years.

#### **Units description**

Medium temperature unit:

- 3 reciprocating semi-hermetic Copeland compressors
- total cooling capacity: 8.8 kW
- refrigerant charge: 76 kg
- air cooled condenser
- supermarket refrigeration load: 5 display cases and 2 cold rooms (0 to +8°C)

Low temperature unit:

- 2 reciprocating semi-hermetic Copeland compressors
- total cooling capacity: 5.9 kW
- refrigerant charge: 36 kg
- air cooled condenser
- supermarket refrigeration load: 3 display cases and 1 cold room (-20 to -23°C)



#### **Retrofit procedure**

Non-toxic, non-flammable and zero ODP refrigerant, FORANE<sup>®</sup> FX 100 (R-427A\*) only requires one oil draining and its replacement by 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. Oil return is fully satisfactory with up to 10-15% of residual mineral or alkylbenzene oil.

After ensuring that the R-22 equipment was in a good state and having measured the performance of the installation with the initial R-22 charge the retrofit subsequently took place in 7 steps:

- 1- Recovery of the whole of the original R-22 charge
- 2- Draining of the mineral oil from the system
- 3- POE lubricant charge without rinsing step (Planetelf ACD 32)
- 4- Change of the filter drier
- 5- Evacuation of the installation
- 6- Recharge with FORANE<sup>®</sup> FX 100 (R-427A\*)
- 7- Re-start of the installation and performance measurement after running conditions had reached a steady state

\*R-427A : pending ASHRAE public review and approval

No modification of the installation was required. Thermostatic expansion valves were retained. Only a slight adjustment of the valve on the low temperature circuit was necessary.

The retrofit operation was completed in only 8 hours and had no impact on the cold chain.

### Comparative data

Parameters		Medium temperature unit		Low temperature unit	
		R-22	FORANE® FX 100 (R-427A*)	R-22	FORANE® FX 100 (R-427A*)
Evaporating temperature	°C	-15.2	-13.5	-32.6	-30.1
Condensing temperature	°C	32.0	35.8	37.2	33.6
Suction temperature	°C	14.6	13.3	11.9	4.7
Suction pressure	bar	2.9	3.0	1.5	1.5
Discharge temperature	°C	81.2	76.5	88.0	67.8
Discharge pressure	bar	12.5	13.9	14.6	13.1
Cold room blown air temp.	°C	1.7	1.1	-8.9	-14.3
Compressor input power	kW	11.6	13.9	14.1	12.7
Residual mineral oil	%	-	15%	-	5%

During these field tests, very satisfactory running conditions were reached immediately and the performance of the installation continues to satisfy the customer's requirements after more than 2 years of service, particularly during summer periods:

- the required temperature levels were reached easily and still remain stable
- the discharge temperatures are much lower with FORANE® FX 100 (R-427A\*) which will increase the lifetime of the equipment
- the oil return is good despite a high residual mineral oil level
- the energy consumption is equivalent or lower

FORANE® FX 100 (R-427A\*) consequently fully satisfies the requirements of the European regulations while enabling existing equipment to continue to perform well without the need for any long and costly plant modifications.

The versatility of FORANE® FX 100 (R-427A\*) is also appreciated as it can be used to retrofit low temperature refrigeration equipment as well as air-conditioning installations, resulting in only one retrofit refrigerant for all R-22 units.

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ARKEMA  
4/8 cours Michelet  
92800 Puteaux - France  
www.arkema.com

[www.forane.com](http://www.forane.com) / [info.forane@arkema.com](mailto:info.forane@arkema.com)