

## Sustainable cooling solutions:

# Lower GWP refrigerant and Continuous Leak Detection in a French hypermarket

### CATEGORY:

Commercial Refrigeration

### THE CONTEXT:

In order to anticipate the consequences of the F-Gas regulation and to reduce its carbon footprint, the French hypermarket Carrefour "2 vallées" in Givors, France, installed a DNI smart-level leak detection system and retrofitted its R-404A refrigeration system to R-448A, a refrigerant with a lower global warming potential (GWP) than R-404A. The hypermarket opened 40 years ago and is one of the Group's three largest stores in the Lyon region. Remodelled in 2011 when Carrefour converted a number of its hypermarkets to Carrefour Planet stores to better meet its customers' needs, the hypermarket now has more than 400 employees and a surface area of 12,000 m<sup>2</sup>. Its refrigerated display shelves and refrigeration units are powered by 3 central units that were originally designed to run on R-404A.

### SUSTAINABLE COOLING SOLUTION:

- Retrofit to refrigerant R-448A (GWP: 1387), a non-flammable alternative to R-404A with lower energy consumption, especially in medium temperature applications (up to -10%):
  - A central unit for chilled cold storage, featuring six semi-hermetic Bitzer 6F-40 compressors and originally charged with 1300kg of R-404A refrigerant (GWP = 3922).
  - A central unit for Low Temperature refrigeration with four compressors and originally charged with 350kg of R-404A.
  - A proofing cabinet with three ZP30 Copeland scroll compressors, originally charged with 70kg of R-404A.
- Installation of three Matelex DNI Smart Level detectors to permanently monitor the three plants in terms of refrigerant leaks and energy performance. The DNI is able to learn the normal operation of the installations and as soon as an abnormal behaviour is identified, an alarm is triggered. Once a leak detected, its details are directly sent via Sentinelle, The DNI online management interface, to alert the store manager. The latter will receive a warning with information about which central unit is affected, an estimate of the leakage rate, its value expressed as tonnes of CO<sub>2</sub> equivalent and even web alerts on Sentinelle to optimize the installation settings.

**BENEFITS:**

- By changing the refrigerant to R-448A, the lifetime of the installation was extended, while reducing the global warming potential of the refrigerant by 68%.
- Going one step further, the installation of intelligent level sensors ensures that the installation is leak-proof, with very early leak detection thanks to the reactivity provided by the detection algorithm. Refrigerant savings of up to 79% can be expected compared to conventional leak detection through periodic inspections.
- Real-time monitoring will also make it possible to identify other anomalies than only refrigerant leaks and thus improve the performance and COP of the installations, leading to energy savings.

Facility running on R-448A	Chilled central unit	Sub-zero rack	Proofing cabinet
Cooling capacity	420 kW	65 kW	18 kW
Condensing capacity	631 kW	162 kW	32.3 kW
Compressors	6 Bitzer 6F40	4 Bitzer 6F40	3 Copeland ZP30
Quantity of refrigerant	1407 kg	360 kg	70 kg
Quantity and type of oil	60 litres of POE 32	30 litres of POE 32	10 litres of POE 32
Evaporation/condensation temp.	-12/45 °C	-37/45 °C	-12/45 °C

**TOPIC:**

- Energy Efficiency
- Refrigerants
- Service & Maintenance

**GENERAL INFORMATION**

**NAME OF THE COMPANY:**  
CLIMALIFE

**CONTACT PERSONS:**  
Marion Lazzarotto



**HYPERLINK TO LEARN MORE ABOUT SUSTAINABLE COOLING AND HEATING SOLUTIONS:**

<https://climalife.dehon.com/the-environment-a-key-consideration-at-givors-carrefour-hypermarket-in-france>