FRAMACOLD
Refrigerant & Conversion Solutions

Auchan Bordeaux Conversion of R404A Plant to RS-50 (R442A)

The company and its aims

Auchan, a leader in retail distribution, is extremely concerned about its CO_2 footprint. The company is, therefore, being proactive in optimising its existing facilities. To address the introduction of the R404A regulation in 2020, Auchan wishes to pre-empt this deadline by replacing this fluid in its installations.

The requirements for the choice of fluids to be tested are:

A GWP under 2500
- **Compatibility with the existing installations at a lower cost.**
- **Compatibility and a good performance with the existing oils.**
- **No loss of refrigeration capacity.**
- **Energy savings in order to reduce annual consumption.**

Didier Pla, refrigeration facilities manager at Auchan Meriadeck has delegated the choice of proposing the best solution to its service provider, the company MCI represented by Lionel Michot, manager of this site. The analysis of the RS-50 fluid concludes:

- it is non-flammable
- it is more effective
- has a GWP of a half compared to that of the R404A.

The National Technical Department chosen to test this refrigerant on installation no 2 in this store.

Description of the installation

PLANT PROFROID type CR55H6F50ZCA
Evaporation: feeds 83 glass displays
Year: 2002
Refrigerant fluid R404A 500kg
Compressors: 5 BITZER semi hermetic
BSE55 Anti-surge liquid trap
POE oil (EAL22CC) with separator.
Condenser 2 PROFROID C7AH

✓ Rapid cooling unit converted from R404A to RS-50
✓ 30% increase in energy performance
✓ Meets regulation in 2020
✓ Reduction in direct & indirect carbon footprint.

Carrying out the conversion

L Michot supervised the conversion to RS-50 carried out in November 2014:

✓ recovery of the R404A charge,
✓ emptying the POE oil replaced by the same type.
✓ replacement of the desiccant cartridges and oil filters.
✓ Charging the equivalent RS-50 mass to R404A.
✓ Closing systems expansion valves by 40%.
✓ Modification of the floating LP setting by resetting the DIGITEL controllers using data from the RS-50 thermodynamic tables.

1st FINDING:
The plant works satisfactorily without any problem when using RS-50.
The advantage for Auchan is the enormous and immediate energy saving generated by this fluid which we estimate to be 30%.

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Auchan Mériadeck

RS-50 R442A

Result of the Conversion

L. Michot states:
"This is a drop-in conversion, without changing either the oil type or main equipment. Conversely, as the mass flow rate of RS-50 is less than 40% that of R404A, the expansion valves had to be closed and their outlet changed. We turned on the variable controls and the floating LP, to modify the setting by -15 to -10°C. No change of lubricant type was necessary. After a month of operating, we recovered 80 litres of oil from the installation's evaporator, despite a lower fluid speed.

RS-50 improves oil yield more in relation to R404A. The heat exchangers, therefore, have much better heat transfer, which reduces the operating time of the compressors.

The discharge temperature measured on plant 1 for R404A is very close to that of RS-50.

But the greatest benefit for the client is daily energy savings. Thanks to the modifications made, we see a -65% drop in electrical consumption. We estimate that the change to RS-50 improves yield by 30% compared to R404A."

The conversion process is simple and the results have been impressive as shown in the initial findings indicated here.

In the warmer season we will make further measurements, but we are now planning to convert the other main plant to RS-50. "

This confirms the in-depth tests carried out on RS-50 by the Polytechnic University of Barcelona.

Experience of AUCHAN Meriadeck

Didier Pla states:
''The investment in the conversion to RS-50 of the installation initially operating on R404A is a major element in our overall strategy of reducing our carbon footprint for existing installations.
We wish to be at the forefront of limiting greenhouse gases, which is now on 3 levels:

- ✓ The greatest equivalent CO_2 emissions are leakages of refrigerant. Our facilities are permanently checked by the "DNI" level detection system. Consequently, we can have 79% less leaks and intervene before goods are lost.
- ✓ The second CO_2 emission, which once the leakages have been controlled with the DNI, becomes the greatest emission of CO_2, is the consumption of energy from our refrigeration plants. Here, we were not expecting 30% of savings as a sole result of changing the fluid to RS-50.
- ✓ The third equivalent CO_2 emission is the GWP from the fluid, Here the GWP from RS-50 is 52% less than R404A. This should be taken into account in the event of a leakage. Thanks to the DNI we can minimise leaks.

In conclusion, thanks to the energy savings obtained by RS-50, the return on investment is rapid. This is, therefore, the first time that we can both make savings and pre-empting the regulations on refrigerants. We will, therefore, make our investment sustainable and can make an immediate and concrete gesture towards the environment. "

Operating comparison over 24 hours:
On 09/02/2015 with RS-50.
On 10/02/2013 with R404A.

Refrigerant	R404A	RS-50
Date	10/02/2013	09/02/2015
Average outside temperature	9.4°C	6.7°C
Average HP reading	38.5°C	19.1°C
Average LP reading	-15.6°C	-10.5°C
kW/h consumed in 24h	2067	565
Evaporator overheating	8°C	6°C
Discharge temperature	45°C	48°C
Adjustment of the regulator	Name:	<40%
Oil level	Correct	Correct (-80L)
Refrigerant load	500kg	500kg

Note:
In France, where nuclear power is the major source of electrical energy, refrigerant leakages are the greatest contribution to global warming from refrigeration installations.

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RS-50 R442A

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