



Opteon™ XP40

Refrigerant (R-449A)

Waitrose Supermarkets transitions R-404A refrigeration systems to low GWP Opteon™ XP40 refrigerant and gains up to 9% energy savings



Background

Waitrose, a British supermarket chain with over 346 shops ranging from large supermarkets to service station forecourts, was looking for a way to dramatically decrease its carbon footprint. In 2010, Waitrose published its Carbon Plan, which clearly documented the business' approach to reducing emissions. The indirect and direct emissions from the refrigeration systems in its shops are a very significant contributor, making this area a prime target for improvement.

In addition to Waitrose's internal plans, on 1st January 2015, the European F-Gas regulation (EU 517/2014) came into force, which from 2020 will ban the use of refrigerants with a GWP of 2500 or more, e.g. R-404A and R-507A, in all new equipment and for service in systems with a charge >40T CO₂e (>10.2kg of R-404A).





The Chemours Company (“Chemours”) is supporting Waitrose Supermarkets in its transition from R-404A refrigeration systems to low GWP (Global Warming Potential) Opteon™ XP40 refrigerant.

By retrofitting the refrigeration systems in one of its stores in Devon from R-404A to Opteon™ XP40, Waitrose gained up to 9% energy savings, providing the business with a significant opportunity to lower its CO₂e emissions and help to achieve the targets set out in its Carbon Plan. This project is also the first major commercial roll out in the UK of HFO (Hydro-fluoro-olefin) based blend technology for replacement of R-404A in existing equipment.

Opteon™ XP40 Refrigerant

In October 2014, Chemours commercially launched the Opteon™ low GWP portfolio of refrigerants to help meet increasingly stringent global HFC regulations while maintaining and even improving performance compared to incumbent products.

Opteon™ XP40 (R-449A), the company's flagship low GWP refrigerant, was introduced as an ideal replacement for R-404A. Opteon™ XP40 is a HFO based blend with a GWP of just 1397, which is well below the GWP threshold stated in the F-Gas regulation¹. Major compressor manufacturers have now approved Opteon™ XP40 for use as a R-404A replacement and XP40 can be found in their compressor selection software. The performance of Opteon™ XP40 is very similar to R-404A with a significant reduction in power consumption under a wide range of operating conditions, making it an ideal candidate for retrofitting existing R-404A systems.

Opteon™ XP40 Properties

ASHRAE Number	R-449A
Lubricant	POE
Boiling Point	-46.0 °C (-50.7 °F)
Safety Classification	A1
Temperature Glide	~4 K (~7 °R)

¹ Global Warming Potential; Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report as specified in EU 517/2014.

Refrigeration System and Conversion to Opteon™ XP40 (R-449A)

The decision was taken to retrofit a typical Waitrose store in Holsworthy, Devon, from R-404A to Opteon™ XP40. The refrigeration system consisted of two high temperature packs and one low temperature pack, all of which were manufactured by Space Cooling Systems in 2004 and all packs use Copeland Scroll compressors. The low temperature pack was connected to six in-store cabinets and one cold store. The high temperature packs were connected to a total of 18 cabinets and three refrigerated counters in the store and three cold rooms for storage.



Operation and Energy Performance

The energy consumption of the refrigeration systems was measured for two weeks before the retrofit and then for three weeks after the retrofit had been completed. ColdService (part of the EPTA Group) was chosen to perform the retrofit and the first retrofit took place overnight on the 12th July 2015. The other two packs were retrofitted on consecutive nights, without causing any disruption to the trading floor during the store's opening hours. The Opteon™ XP40 retrofit guidelines were followed and no components or oil changes were required, making the retrofit very fast and straightforward.

Analysis of the energy consumption data was performed by Emerson Climate Technologies, Retail Solutions, which revealed that at equivalent ambient temperatures during the monitoring period, the high temperature systems' energy consumption was reduced by 8.7%. For the low temperature system, the energy consumption was reduced by 3.0%. For the total refrigeration system, this equates to a reduction in energy consumption of 6.6%.

Conclusion

"No component changes, no oil changes and similar system operating parameters made the retrofit very straightforward and fast once the R-404A had been recovered. The good cooling performance and lower energy consumption makes Opteon™ XP40 an ideal retrofit option for R-404A systems," said Paul Blanch, Senior Manager, Emerson Climate Technologies, Retail Solutions.

The reduction in energy consumption and the 64% reduction in the GWP of Opteon™ XP40 compared to R-404A offer a significant opportunity for Waitrose to lower its CO₂e emissions and help to achieve the target set out in its Carbon Plan.

Danny Ryan, Refrigeration Manager, Waitrose, who is leading the overall project commented: "Reducing our CO₂e emissions is a key target and so retrofitting existing R-404A systems with a lower GWP refrigerant is a key part of our strategy. Opteon™ XP40 has helped achieve this by not only reducing the direct emissions of the refrigerant, but also by reducing the energy consumption of the systems."

For more information on the Opteon™ family of refrigerants or other refrigerants products visit opteon.com

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