Marstair A2L System Match Installation

Co-op Kibworth

By David Sowden FInstR
Technical Marketing Specialist
The Chemours Company

Opteon™

Chemours™

The co-operative
Central England Co-operative

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REFRIGERATION AND SPECIALIST AIR CONDITIONING

Introduction

Marstair were approached to provide an A2L (Opteon™ XL20) solution for cold room systems at Co-op Kibworth using the award-winning A2LSysteMatch solution.

Four condensing units SMC+ 20, SMC+ 30, SMC+45 and SMC+ 80 were selected and installed coupled with MWMT125B, MWMT125E, WBMT130B and MBLT230C evaporators as a comparison to a split CO_2 transcritical condensing unit system with individual evaporators.

Marstair's unique design maintains the low side charge level to a minimum and below the required LFL for the space.

An evaluation of performance and cost was carried out and can be found in the following report.

Executive Summary

It is now well known that the pressure on refrigerant supply due to F-Gas regulations and the drive to reduce carbon dioxide equivalents (CO_2eq) will require systems to be designed with Low Global Warming Potential (LGWP) refrigerants in mind. Failure to do so will result in quota levels severely limiting the amount of refrigerant available for new installs and maintenance, as High GWP refrigerants will consume a disproportionate amount of quota, and consequently will be very expensive.

The current plan is to further reduce quota by 69% from the 2015 baseline in 2024.

Add to this the possibility of

- An even larger cut to quota in 2024 as proposed by the F-Gas review
- The expected exponential increase in Heat Pump installations in the UK and EU
- The inclusion of Metered Dose Inhalers requirements into the quota

and it becomes clear that our industry has to rapidly adopt LGWP solutions.

Global events in 2022 have added further pressure on the choice of available refrigerants both through the cost and supply of energy and Actual Global Warming (GWA) impact of the energy consumed when considering the percentage of fossil fuels used to generate this power.

Lower GWP refrigerants are therefore a recognized and important alternative to HFC's and "Natural" refrigerants when considered as a Holistic solution to the pressures on our industry.

Objective of case study

To demonstrate the benefits of a careful balance of refrigerant and GWP versus Actual impact (GWA) on the environment. Demonstrate savings to be made in terms of OpEx and CapEx.
In this case, Opteon™ XL20 (R-454C GWP 148) was chosen as the closest comparison in terms of performance to the legacy refrigerant CO_2.

Major Findings

21% reduction in cost
SysteMatch combined with Opteon™ XL20 R-454C significantly offset rising energy costs.

44% reduction CapEx
A2L SysteMatch can be installed and commissioned with minimal additional training and at much lower cost than an equivalent CO_2 system.

81% reduction in volume
Marstair's unique design allows the refrigerant charge to be kept within 20% of LFL for even the smallest of cold rooms, whilst meeting EN378:2016 requirements.

25% reduction
Energy savings over a 20-year lifetime and CapEx make SysteMatch with Opteon™ XL20 R-454C a cost-effective solution in the face of increasing energy costs.

31% reduction in TCO_2
The Low GWP of Opteon™ XL20 R-454C (148) combined with reductions in Actual GW from the energy used to run the plant contributes to significant savings in TCO_2 Equivalent*.

*Based on a 3% leakage Rate and emissions factor of 0.21233

Contractor Comment

"It's amazing how TEV has managed to design a system with such a low charge/total GWP in the event of a total loss of refrigerant. We selected R454C due to the lower glide and hopefully larger ambient window. The equipment has been operational for several months and is performing to specification, we have checked the operation and with air on temperatures hitting near +40 °C (July 22) the cold rooms are holding design temperature!"

Luke Collins. Oak Refrigeration Ltd

Customer Reaction

"The Co-op are delighted that their store at Kibworth has been future-proofed with low-GWP refrigeration systems that save energy, capital cost whilst also reducing system emissions. When compared to CO_2, the four A2LsysteMatch systems will save an incredible >25% across a 20-year Total Cost of Ownership!"

Acknowledgements

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