

Room at the top

Bespoke chiller specialist Klima-Therm has set a new benchmark with a world-first HFO chiller for Waitrose. **Andrew Gaved** reports

■ **High-performance chiller specialist Klima-Therm has carved a reputation for pushing the boundaries of air conditioning convention.**

Therefore it should not really come as a surprise to hear that it now claims to have successfully developed the world's first supermarket chiller with an HFO refrigerant.

There are surprises in store, however, such as the fact that the operator of the said chiller is Waitrose, generally presumed to be an unswerving advocate of natural refrigerants (in fairness, their stated policy is to be "HFC-free"); or the fact that the world-leading equipment has been manufactured by Geoclima with Frascold reciprocating compressors, rather than any other particular leading high-performance brands.

Perhaps the biggest surprise is that, on initial findings – and bearing in mind that it is very early days for the store trial in Bromley, south London – the chiller using HFO 1234ze refrigerant is running more efficiently than the hydrocarbon version that is currently Waitrose's favoured technology.

The trial, which Waitrose describes as "an energy assessment in a working store", comprises two air-cooled 180 kW machines, which provide chilled water as a condensing medium for the in-store integral cases, which use R1270 propene as refrigerant. Initial comparisons with a same-size store in Canterbury running identical systems, but using R290 propane, show a 22 per cent reduction in energy consumption.

"It is operating very well, especially when you remember that the rest of the system at Bromley is not optimised for HFOs," says Klima-Therm managing director Roberto Mallozzi.

"We are the missionaries of the industry"

Waitrose refrigeration engineer Jim Burnett agrees: "We believe the HFO solution shows great promise, as it combines good efficiency with very low global warming potential. This is obviously a highly desirable profile in a refrigerant. If the ongoing monitoring of energy continues to prove successful, we plan to include HFO-based chillers in our choice of refrigeration platforms [alongside hydrocarbons and trigeneration energy centres] for stores in the future."

Waitrose's Cooling Industry Award-winning refrigeration platform is currently founded on hydrocarbons, using water as the cooling medium in store and recovering and redistributing waste heat into the store. The team behind the HFO chiller also worked on a number of the retailer's hydrocarbon chillers, so they are familiar with the challenges.

Tests carried out by Frascold with its eight-cylinder reciprocating compressors running on HFO 1234ze indicate a loss of capacity of about 24 per cent compared with R134a. But, since the mean power absorbed is 27 per cent less, it gives an overall COP better than HFC across a range of applications and conditions.

Mr Mallozzi is confident about the benefits to the operator of the new gas. He says: "I think John Lewis's intention will be to retain a choice of refrigerants between HFOs and hydrocarbons [for new stores]. For instance, propane has a charge limit and HFOs have a low GWP of 6 and could be a more efficient option, in the right application. Then there are other restrictions on hydrocarbons, such as the fact that you can't install the equipment in basements.

"Then again there is the fact that the higher efficiency of HFOs will allow a bigger machine, if required. And the lower power means lower running costs, and thus lower carbon emissions."

Frascold's R&D team believe performance with HFOs can be significantly improved with optimisation, such as refinements to the valve plate design and reducing pressure losses through the compressor.

Giuseppe Galli, managing director of Frascold, says: "From a compressor engineering point of view, the properties and operating characteristics of HFOs are a very good match for traditional refrigerants, but obviously without the environmental penalty of high GWP HFCs."

Mr Mallozzi says: "Frascold was very helpful and accommodating and, whereas many manufacturers are slow to support new refrigerants, they have agreed to warranty the HFO compressor."

The chiller runs on Honeywell's Solstice 1234ze refrigerant, currently being ramped up for volume production in the US as a foam-blowing agent. According to Klima-Therm, the guarantee of volume from the foam-blowing customers provides advantages to the cooling customer, not least the fact that the price



Klima-Therm MD Roberto Mallozzi with sales director Tim Mitchell



is coming down steadily. "We are now buying it for about £30 a kilo, which is much better than it was before commercial production," notes Mr Mallozzi.

But, intriguingly, Klima-Therm sales director Tim Mitchell says there may yet be more efficient HFO options on the horizon. "The focus at the moment is on 1234ze, as the refrigerant is already available at commercial levels. But, in the longer term, we are also interested in the potential of HFO 1234yf, which has an even lower GWP and other potential benefits. This is one for the future, but it is in our sights," he says.

Calibre group aims for growth

Klima-Therm is part of the Wimbledon-based Calibre Group, which celebrated 20 years in business last month. As well as the bespoke chiller operation, the business comprises Next Controls, compressor remanufacturer LH-plc, and air conditioning designer Calibre Services

Roberto Mallozzi, who co-founded the group with Nick Segal, says the £21 million group businesses are complementary. He says: "We offer something of a turnkey operation. It stemmed from wanting to avoid the problems of co-ordinating subbies. We say that, when there is a horrible job, clients come to us, and when it's an easy job they go out to tender. We don't have a catalogue for our equipment; we build the solution round the project."

The jewel in Calibre's crown has been the Turbomiser chiller, a multi-Cooling Award winner, which has achieved the difficult task of adding value to the best-in-class efficiency of the oil-less Turbocor compressor, on which it is built.

"We are selling loads of Turbomisers, despite the recession," says Mr Mallozzi.

He is sufficiently confident of its abilities to make a bold claim. "Rising energy prices will establish the Turbomiser as the default chiller, thanks to its massive

HFO 1234ze compressor undergoing tests at Frascold's R&D laboratory

efficiency advantages," he says. It's not so bold a claim, he says, when you consider the potential effect of the Carbon Reduction Commitment on large firms' bottom line and the fact that these huge efficiency gains are complemented by the operating advantages of working with an oil-less compressor.

"Oil in the system is a nightmare and the cost of drying a system out in lost production can be tens of thousands," says Mr Mallozzi. "But, even if the Turbocor burns out, you just take it out and replace it"

Installation of the high-performance chiller has enabled the firm to achieve significant improvements for clients. The National Records Office in Kew, a client which is a heavy user of climate control, has achieved energy savings of 70 per cent over its predecessor. "The savings are mostly due to Turbocor running well at low temperatures," says Mr Mallozzi.

More low-temperature operation was required for Project Dart, a flagship data centre for Barclays Bank. Among its distinctive elements was an ice-making loop, installed for additional resilience in the face of power failure. "It proves that claims that the Turbocor can't do extremes are rubbish," says Mr Mitchell.

Data centres are an area in which the company is confident it can make serious headway. "It's a growth area, definitely, says Mr Mallozzi. "Their operating costs are high and the Turbomiser can do better things than the chillers they are used to. With adiabatic cooling, it could significantly reduce energy use."

He concedes that many a first-cost fixated building specifier needs educating about the life cycle advantages of the premium-cost Turbomiser.

He says: "We are the missionaries of the industry. We find there are two ways to the market with our technology, via the consultant or via the end-user. End-users appreciate the way it saves money, while consultants love it because it saves energy and shows their client how innovative they are."