HFO blast chiller pioneer steps up tests

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UK: The ground-breaking UK refrigeration company which recently announced the launch of a blast chiller running on the HFO 1234ze, says it is also testing some "very interesting" HFO blends from Honeywell's new Solstice range of low GWP refrigerants.

Last month's announcement by Thetford-based foodservice equipment manufacturer Precision Refrigeration marked the first time one of the new HFO refrigerants had been successfully used in a blast chiller.

Explaining the background to Precision Refrigeration's work with 1234ze, chief refrigeration engineer Steve Goldsmith said "We decided that the safety issues around hydrocarbon outweighed the relatively small advantage in terms of the slightly lower GWP."

While hydrocarbons have a slightly lower GWP (3 versus 6 of 1234ze), ze is classified as non-flammable according to ASTM E-681, and by EU Test method A-11. However it is mildly flammable at temperatures higher than +30°C and is classified as A2L according to ASHRAE 34. Hydrocarbon refrigerants R290 and R1270 are classified as extremely flammable.

Precision has revealed that in its initial tests performance and energy consumption were found to be similar when the R1234ze was used as a direct replacement for R134a. However, to overcome the refrigerant's lower capacity, the blast chiller cabinet was redesigned, a larger compressor was fitted, the evaporator and condenser coils were redesigned and adjustments were made to the expansion valve.

"Possibly the most difficult modification was understanding how the fluid behaved in the heat exchangers," said Steve Goldsmith. "It really was trial and error to overcome the unusual pressure-drop issues we experienced," he added.

The company's perseverance, however, was rewarded: 1234ze runs at a lower discharge pressure, meaning less mechanical stress on the compressor; the optimised blast chiller outperformed R134a across a wide spectrum of ambient and load conditions and initial tests suggest that ze is more efficient than propane. In addition, 1234ze was shown to run particularly well in high ambients.

"As it stands we have a ze blast chiller on long term test in our labs under extreme ambient conditions, which is how we simulate lack of maintenance such as a blocked condenser or poor location of the unit," said Steve Goldsmith. "Another ze blast chiller has been on field trials with a selected customer for 8 months with no issues. Consequently we plan to include the ze blast chiller in our 2013 price list.

"We also have upright MPT602 and counter MCU211 refrigerators running with the ze refrigerant with selected customers. These systems are running as a direct replacement for R134a with only slight modifications made to the electrics to comply with BRA Guidelines. Energy consumption was originally monitored in our test labs over various ambient conditions and the results were very similar to R134a. Once again we found ze to run particularly well in higher ambient applications. So far the units have been trouble free and the customer is very happy with the performance of

the units, even commenting that he is impressed how the units maintain a very stable internal temperature."

Precision has also revealed that it is also testing some very interesting HFO blends from Honeywell Solstice range that are said to be showing better efficiencies than both conventional refrigerants and hydrocarbons. This has included tests on a three-door freezer counter cabinet, comparing Honeywell's low GWP HFO blends Solstice L40 and N40 against R404A and propane.