

# DUPONT™ ISCEON® MO99 – THE TRUSTED F-GAS COMPLIANT R-22 RETROFIT SOLUTION

The DuPont ISCEON® 9 Series refrigerants have been providing CFC and HCFC retrofit solutions for over 20 years and have kept pace with the changing legislation to provide simple and cost effective retrofit alternatives.



ISCEON® MO99 is the latest product in the range based on the tried and tested technology that has made the ISCEON® 9 Series the retrofit product of choice. Launched in 2008 ISCEON® MO99 has been used at a number of sites in the UK such as the BT Group Plc data centre West

London where 11 GEA Denco close control units were retrofitted by Temperature Control Ltd of Manchester. ISCEON® MO99 has proved particularly popular in USA where it is now the leading R-22 direct retrofit product used and has also become the recommended option for new R-22 retrofits within the EU as it has a GWP below the 2500 service ban limit contained within the revision of the EU F-Gas regulation due to come into force in 2015.

ISCEON® MO99 is a Zero ODP direct replacement for R-22 which in many cases can be used with the existing oil type with minimal equipment changes for a wide range of direct expansion applications, from air conditioning to low temperature refrigeration applications.

The following case histories show just a couple of the many retrofits that have taken place across the USA over the last few years.

## ISCEON® MO99 (R-438A) Refrigerant is a Perfect Match for Phoenix Heat

Kirk Buscho, North Valley Mechanical, in Phoenix Arizona, had been researching R-22 alternatives over two years. When considering options to replace R-22, Kirk indicated there were several factors that were most important to him. He said, "I wanted a refrigerant that would perform. I wanted something that was easy and to be able to take out the old refrigerant and add in the new refrigerant without a lot of hassle. Mineral oil compatibility is huge for residential A/C systems. I wanted a refrigerant that was not going to be too picky about how you treat it and that lends itself to be compatible with mineral oil. I was looking for a design and performance parameters that mimic R-22 so my techs don't get nervous about using an alternative."

In May 2012, Kirk decided to use ISCEON® MO99 (R-438A) to retrofit a residential package heat pump (2.5 ton Goettl HP 305J, 12 SEER) that had a leaking indoor coil. The coil was replaced and with regard to system changes required in an ISCEON® MO99 conversion, Kirk stated, "On a package or split system, we've found you only need to replace valve cores and caps, as they have elastomeric seals. There's no need to replace Teflon® or nylon rings." After replacing the seals, he changed the filter dryer, evacuated the system to 500 microns, and charged the unit with ISCEON® MO99 refrigerant, with a weight just under the original system specifications. After allowing the system to stabilize, he added approximately 200g more of refrigerant.



## Results

The day of the retrofit was hot, with an outdoor temperature of 41° C. Kirk felt this was the ultimate test for ISCEON® MO99. He explained, "The day of the retrofit was a good indicator, and subsequent days have been over 40° C as well with no problems with cooling performance. We've converted approximately 50 units to ISCEON® MO99 so far this year (2012). We haven't had any problems or call backs on any of them."

## DuPont™ ISCEON® MO99 Provides Superior Energy Performance Compared to R-407F after R-22 Supermarket Conversions

A major supermarket chain in the Southeastern United States has been working to implement a responsible refrigerant management plan to manage through the phase out of R-22. In order to understand the total cost of conversion to R-22 alternatives, they requested a study of energy consumption on the refrigeration racks at two of their stores. The study was designed to evaluate energy consumption before and after conversions of the store's low and medium temperature refrigeration racks from R-22 to ISCEON® MO99 (R-438A) in one store and R-22 to R-407F in another store. Conversions at both stores were performed by the same contractor, who was independently selected by the supermarket chain.

## Project Details & Results

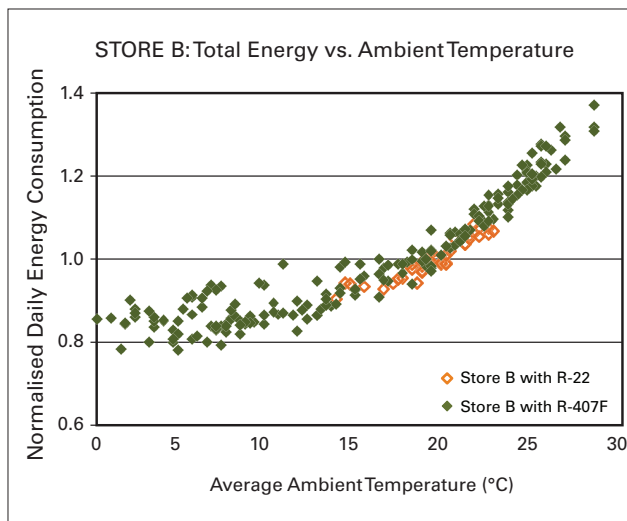
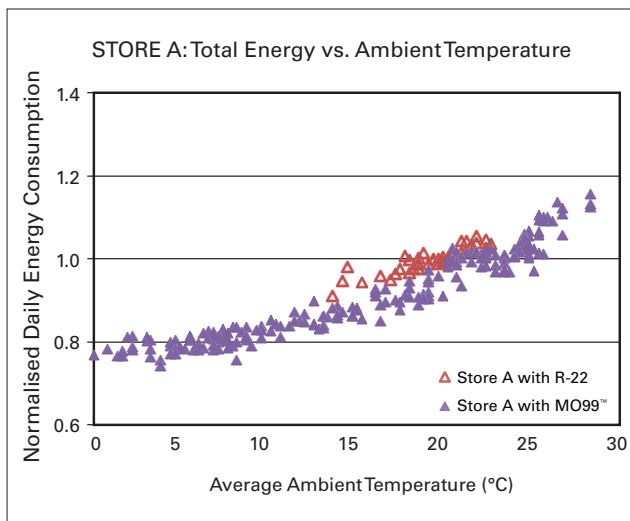


The two stores in the study were selected by the supermarket chain based on similar age and design, as well as their geographic proximity to each other, so that energy loads associated with outside weather conditions would be consistent between the stores. Energy consumption in kilowatt-hours (kWh) was monitored on the 3 individual racks at each store using Pace Scientific data loggers and Veris Industries power transducers. The energy consumption from each of the 3 racks was added together for the total energy consumption for each store resulting from the refrigeration system. Baseline energy data was logged while both stores were running on R-22 for 1.5 months, then each was converted and kWh were logged with the new refrigerant for over 6 months. Rack and case settings were not adjusted during this timeframe. Data from the loggers was downloaded and analysed by DuPont and reviewed with the supermarket.

The results of the energy study are shown in Figures 1 & 2. The retrofit of Store A (Figure 1), from R-22 to ISCEON® MO99, resulted in a lower total energy consumption, while the retrofit of Store B (Figure 2), from R-22 to R-407F, increased the total energy consumption. Since energy consumption is dependent on ambient temperature, it is important to compare refrigerant performance at equivalent ambient conditions in order to quantify a change in energy performance. For each store, all baseline R-22 energy data from days when the ambient temperatures were between 19-25°C was averaged. Post-conversion energy data, for days with same ambient conditions, was also averaged. The comparison of these two values yields a 4% energy reduction at Store A with ISCEON® MO99 and 3.9% energy increase at Store B with R407F.

## Conclusions

The data collected provides a clear trend for both stores across several months of operation and a broad ambient temperature range (2-31°C). Based on the total energy analysis, the retrofit of Store A from R-22 to ISCEON® MO99 led to a reduction in energy consumption, while the conversion of Store B from R-22 to R-407F led to an increase in overall energy consumption. When the ongoing energy consumption results are combined with the actual retrofit cost (~10% lower for ISCEON® MO99 store due to POE cost avoidance), the transition from R-22 to ISCEON® MO99 resulted in the lowest total cost of conversion.



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