

# DuPont™ ISCEON® REFRIGERANTS

## CASE STUDY- ISCEON® MO29 (R422D)

### Carrier Water Chiller

#### Conversion of a Carrier Dx water chiller from R22 to ISCEON® MO29.

As long ago as 2003 the customer had an environmental target to replace ozone depleting chemicals on site such as R22 as soon as possible. ISCEON® MO29 was already in use in close control air conditioning applications on the site and it was decided to evaluate ISCEON® MO29 in some of the water chillers and in particular this type of water chiller.

The monitoring concluded that ISCEON® MO29 was an extremely close match to R-22 under the conditions of operation. The cooling capacity, at both moderate and high load, was virtually identical to R-22 and the compressor current draw was between 12 to 30% lower with ISCEON® MO29 than with R-22 indicating a very significant reduction in power consumption.

<b>System:</b>
<b>Carrier Water Chiller Model 06E-6275 610E</b>
Twin circuit with total charge of R-22 49kg (2 x 24.5 kg)
2 x 3 cylinder reciprocating compressor, displacement 106m <sup>3</sup> .h <sup>-1</sup> , 32.6 kW.
Air-cooled condenser
Year of manufacture 1988
Water set point 8°C.

The chiller is serviced by a three cylinder 32.5kW compressor with a fan assisted air-cooled condenser. Cooling of the chilled water is performed in a shell and tube direct expansion evaporator.

The system conversion was carried out without any engineering modifications or a change of lubricant type. An equivalent charge of ISCEON® MO29 was used for this trial.

In this study the system was not optimised through any adjustment to the expansion valve to evaluate ISCEON® MO29 as an exact direct replacement for R-22. When other systems were converted the recommendation to adjust the expansion valve setting to optimise performance was followed.

For any conversion it is recommended that the DuPont conversion guidelines are followed.

## Comparison of running conditions on R-22 and ISCEON® MO29

Table 1.

Moderate loading

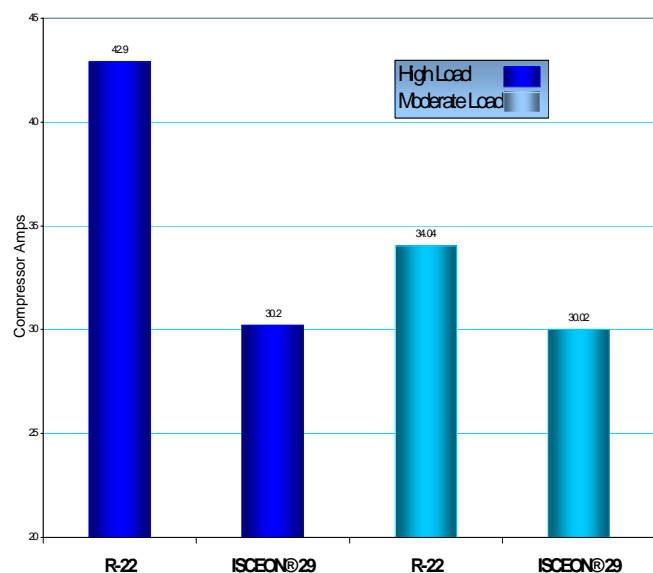
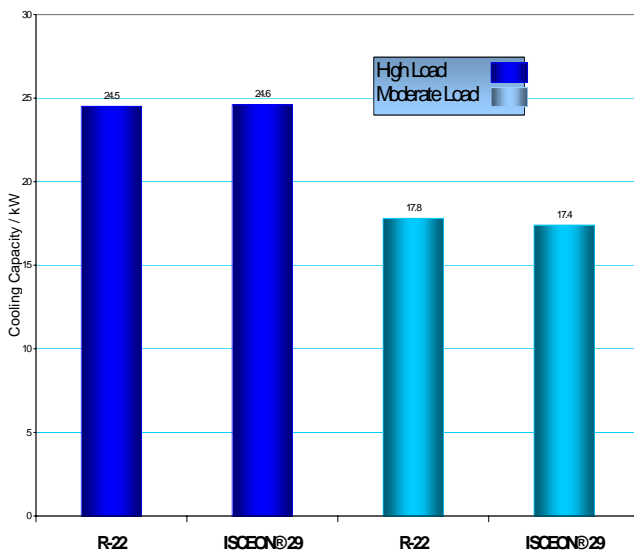
Table 2.

High loading

Property	Unit	R-22	ISCEON® MO29	Property	Unit	R-22	ISCEON® MO29
Suction Pressure	bar.g	4.17	3.79	Suction Pressure	bar.g	4.00	3.72
Evaporating Temperature	°C	1.7	-0.3	Evaporating Temperature	°C	0.7	-0.7
Discharge Pressure	bar.g	13.66	14.14	Discharge Pressure	bar.g	15.59	15.17
Condensing Temperature	°C	37.9	37	Condensing Temperature	°C	42.8	39.6
Suction Super Heat	K	7.3	6.6	Suction Super Heat	K	8.0	7.4
Compressor Discharge Temperature	°C	73.0	54.8	Compressor Discharge Temperature	°C	80.9	54.8
Liquid Line Sub-cooling	K	8.3	9.3	Liquid Line Sub-cooling	K	9.0	11.5
Compressor Amps	A	34.04	30.02	Compressor Amps	A	42.9	30.1
Water on Temperature	°C	10.0	9.8	Water on Temperature	°C	11.0	11.05
Water off Temperature	°C	8.3	8.1	Water off Temperature	°C	8.6	8.7

**Chart 1** Comparison of Cooling capacity

**Chart 2** Comparison of compressor amps



## ISCEON® MO29 compared with R-22:

- Cooling capacity is virtually identical to R-22.
- The compressor current drawn is between 12-30% lower, depending on the compressor load.
- Lower energy consumption can be expected to result.
- Compressor discharge temperatures are reduced by 18K on average.
- Superheat is slightly lower (<1K), but well within acceptable limits.
- Sub-cooling shows a slight increase which may be a benefit to the system performance.
- Suction and condensing pressures are very similar under comparable loads.

### Conclusions:

ISCEON® MO29 proved an extremely close match to R-22 in this application, meeting the system requirements but with a lower current drawn, indicating a worthwhile potential energy saving. The conversion from R-22 to ISCEON® MO29 enabled the customer to replace Ozone Depleting Substances ahead of legislation and without the need for major capital expenditure on new equipment.

By virtue of a reduction in power consumed ISCEON® MO29 has also aided a reduction in CO<sub>2</sub> emissions as required by the Kyoto Protocol and allowed this customer to reduce their CO<sub>2</sub> footprint.

Other Water Chillers of various makes on this site have since been converted to ISCEON® MO29.

**Note;** This case study was originally produced in 2003 and the conversion to ISCEON® MO29 was carried out prior to this refrigerant becoming part of the DuPont™ ISCEON® 9 Series refrigerant family

Please consult our website [www.idsrefrigeration.co.uk](http://www.idsrefrigeration.co.uk) for further product information and conversion guidelines.

The information contained in this document is given in good faith based on our current knowledge. We guarantee that our products comply with our sales specifications. This information must on no account be used as a substitute for necessary prior tests, which alone can ensure that a product is suitable for a given use.