

DuPont™ ISCEON® REFRIGERANTS

CASE STUDY - SUPERMARKETS

Tesco select DuPont™ ISCEON® MO59 (R-417A) to replace R-22 in their UK stores



Tesco plc, the UK's largest retailer, has chosen ISCEON® MO59 (R-417A), the leading non-ozone depleting direct R-22 replacement for use in its UK stores and other facilities. Tesco are seeking to use environmentally acceptable and energy efficient refrigeration systems as part of their commitment to protecting the environment. ISCEON® MO59 has been selected to replace the HCFC refrigerant R-22 as part of their substantial investment programme to replace all ozone-depleting CFC and HCFC refrigerants, due to complete in 2005/6.

Energy efficient

ISCEON® MO59 (R-417A) belongs to the DuPont™ ISCEON® 9 Series refrigerant family of **zero ODP** CFC and HCFC replacements distributed in the UK by IDS Refrigeration Limited the leading supplier of energy efficient R22 direct replacements. Unlike other refrigerant blends, ISCEON® MO59 can, in the majority of the cases, be **used with existing lubricating oils**, does **not require significant modification** to the system and has demonstrated **great energy efficiency** in use leading to substantial cost savings for Tesco.

Extensive trials

As a first step, working in conjunction with some of the supermarket contractors, Tesco carried out extensive tests at a number of Tesco stores. **ISCEON® MO59 has been proven suitable in a wide range of refrigeration and air conditioning equipment** that operates on the HCFC refrigerant R-22. These include refrigeration and air conditioning applications such as low temperature freezer rooms and pack systems, high temperature cold rooms, roof top packaged reverse cycle heat pumps, split a/c systems as well as close control computer rooms in Head offices.

Further trials have been conducted with **ISCEON® MO79** (R422A) which has been specifically developed for low temperature applications and offers the additional benefit of a more than 20% lower GWP as well as **superior operating performance** compared to R-404A and R-507.

Numerous conversions

Since mid September 2003, **most of the remaining Tesco stores** on HCFCs have been converted to the non-ozone depleting ISCEON® refrigerant family including ISCEON® MO59 in R-22 equipment, ISCEON® MO79 in R-408A and R-402A equipment as well as ISCEON® MO49 (R-413A) in R-401A and R-409A equipment.

Encouraging results

The results of the trials show **energy savings of between 9 and 15%** with ISCEON® MO59 as well as **significantly lower discharge temperatures and pressures** than R-22 which is likely to prolong the running life of the compressor. Only minor adjustments had to be carried out including in some cases the adjustment of the expansion valve after conversion to obtain optimum operating conditions. It is also worthy of note that the converted equipment has continued to **work satisfactorily on ISCEON® MO59 during the extremely hot summer of 2003.**

AIR CONDITIONING

Rooftop heat pumps

Conversion of a reversible heat pump system, model type RHPE 125/2/90 with two identical refrigerant circuits each having Maneurop Scroll compressors running on 3 phase 420V, 50Hz supply. The unit was first logged when charged with R-22 and after a week converted to ISCEON® MO59 (R-417A). The existing mineral oil type continued to be used.

Average data	Unit	R-22 heating	R-417A Heating	R-22 Cooling	R-417A Cooling
Low pressure	Bar. g	4.0	3.39	4.68	3.89
High pressure	Bar. g	13.57	11.91	16.74	15.06
Indoor Coil Pipe Inlet	°C	80,7	54,5	12,6	2,8
Suction Line	°C	7,5	-1,1	14,1	2,7
Suction Superheat	°C	9,0	6,0	10,6	5,2
Subcooling	°C	7,5	2,4	9,0	2,8
Air On Indoor coil	°C	20,5	20,4	19,8	17,7
Air off Indoor coil	°C	25,3	25,1	16,3	14,6
Capacity	kW	34,8	34,1	25,4	22,5
Discharge temp.	°C	81,2	54,1	87,9	58,2
Compressor Power Input	kW	11,45	10,5	12,9	11,25
Amps/phase	Amps	21,1	19,3	21,8	17,8

REFRIGERATION

High temperature general purpose cold room

Conversion of a Frascold Condensing Unit with Foster evaporator. The oil was changed to Shell SD and minor adjustments were made to the expansion valve after conversion to obtain optimum operating conditions.

Average data	Unit	R-22	R-417A
Suction pressure	Bar. g	1.84	1.83
Discharge pressure	Bar. g	9.42	7.68
Liquid temp.	°C	16,08	17,81
Discharge temp.	°C	46,8	30,1
Air off temp.	°C	3,2	3,36
Air on temp.	°C	4,07	4,08
Evaporator in temp.	°C	-0,35	0,88
Evaporator out temp.	°C	2,32	1,02
Peak discharge temp.	°C	89,35	64,67
Peak liquid temp.	°C	22,1	23,43
Amps/phase	Amps	3,9	3,3
Run time in 24H	H	8,38	8,13
Ambient temp.	°C	6,3	6,94



Note this case study has been updated to reflect the new names now in use.

FREEZING

Frozen food cold room

Conversion of a low temperature frozen food / ice-cream cold room with a Frascold condensing unit and a Foster evaporator. The equipment was optimised on both refrigerants before conversion.

Average data	Unit	R-22	R-417A
Suction pressure	Bar. g	1.66	1.39
Suction temp.	°C	12,53	5,35
Discharge pressure	Bar. g	14.88	11.57
Liquid temp.	°C	18,52	19,82
Discharge temp.	°C	116	85
Superheat	K	9	3
Subcooling	K	10	11
Air off temp.	°C	-22,1	-21,22
Air on temp.	°C	-19,4	-18,75
Plant room temp.	°C	20,52	20,18
Sump temp.	°C	55,2	42,5
Evaporator in temp.	°C	-27,42	-27,4
Evaporator out temp.	°C	-21,95	-21,14
Peak discharge temp.	°C	136,9	94,2
Peak discharge pressure	Bar. g	15.50	12.05
Amps/phase	Amps	5,5	5
Run time in 24H	H	21,24	21,67
Average ambient	°C	12,8	11,44

ISCEON® MO79 (R422A)

Conversion of a 2 compressor low temperature frozen food plant providing cooling to freezer cabinets from HCFC R-408A to ISCEON® MO79 The thermostatic expansion valves were adjusted open by one turn to give satisfactory superheat.

Average data	Unit	R-408A	ISCEON® MO79
Suction pressure	Bar	1.0	0.4
Saturated liquid suction temp	°C	-29	-37
Suction temp.	°C	17.5	17.3
Discharge Pressure	Bar	15.1	13.8
Condensing temp	°C	35.0	30.8
Discharge temp.	°C	101.7	70.0
Peak condenser pressure/temp	Bar/°C	18.1/44.7	17.0/38.7
Peak discharge temp.	°C	115	102
Ambient temp (24 hr ave)	°C	19.2	18.6

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For further information about any of the DuPont™ ISCEON® 9 Series Refrigerants, please contact:

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