



# RS-52 (R428A)

COMPOSITION	%
HFC 125	77.5
HFC 143a	20.0
R600a	1.9
R290	0.6
HCFC replacement	R22, 502 & interim blends
Temperature glide	Approximately 0.8°C
Drop-in or long term	Both
Lubricant	MO/AB/POE
ODP	Zero
Atmospheric lifetime	37 years
GWP 100 year ITH	3600

## RS-52: PHYSICAL PROPERTIES

		RS-52	R502
Molecular weight		107.5	111.6
Temperature glide °C		0.5	0.2
Boiling point (1 atm)	°C	-46.7 <sup>(1)</sup>	-45.4
	°F	-52.1 <sup>(1)</sup>	-49.7
Critical temperature	°C	70.8	82.2
	°F	159.5	180.0
Critical pressure	bara	38.1	40.7
	psia	552	59.1
Liquid density at 25°C	kg/m <sup>3</sup>	1053	1217
Density of saturated vapour at 25°C	kg/m <sup>3</sup>	70.2	62.2
Specific heat of liquid at 25°C	kJ/kg°C	1.52	1.25
Specific heat of vapour at 1 atm & 25°C	kJ/kg°C		0.706
Vapour pressure at 25°C	bara	12.68 <sup>(1)</sup>	11.5
	psia	183.9 <sup>(1)</sup>	167
Latent heat of vaporisation at boiling point	kJ/kg	189.2 (1)	173
Ozone Depletion Potential	ODP	0	0.33
Flammability limit in air (1 atm)	vol%	None	None
Inhalation exposure (8 hr day & 40 hr week)	ppm	1000	1000

(1) Bubble point

## **TYPE AND DESCRIPTION**

RS-52 is a non flammable near azeotropic refrigerant which has a zero ODP and is also compatible with both traditional and synthetic lubricants so that a retrofit is not required.

RS-52 can be used as a "Drop-in" replacement for R22, R502 and interim blends containing HCFCs which are now subject to a phase out timetable. The use of RS-52 avoids the need for an expensive and often technically unsatisfactory retrofit involving a change of lubricant and alterations to some of the hardware in the system.

## **APPLICATIONS**

RS-52 can be used in most applications where R502 and interim replacement blends are currently used including but not restricted to supermarket display cases, ice machines, cold storage, transportation of foodstuffs etc.. RS-52 can also replace R22 in systems which are rated for R502. Conversion to RS-52 is a simple and straight forward process (as shown below). RS-52 provides a long term solution at low cost to the problem of replacing Ozone Depleting Substances.

## **SERVICE WORK**

Because it is a blend, it is recommended that RS-52 be charged into systems in the *liquid* as opposed to the gaseous phase.

Since in most cases there is no need to change the existing lubricant, RS-52 is straightforward to use as the procedure below outlines.

## **LUBRICANTS**

RS-52 is compatible with both mineral and alkylbenzene oils found in R502 systems, and also with the polyol ester lubricants.. Therefore, in most cases there is no need to change the lubricant although compressor manufacturers' recommendations regarding lubricity should be followed. However, in systems with extensive & complex piping configurations, or a large volume of liquid in the receiver, POE may need to be added.

## **MATERIALS COMPATIBILITY**

RS-52 is compatible with all materials commonly used in refrigeration systems previously charged with R22 or R502.

In general, materials which are compatible with R22 and R502 can be used with RS-52. It is recommended to check equipment manufacturer's retrofit literature and obtain recommendations from equipment manufacturers with regard to materials' compatibility. In older systems which have been operating on R22 for many years, replacement of some seals may be required due to the different composition of RS-52 which contains HFCs.

## **ENVIRONMENTAL DATA**

None of the components of RS-52 contains chlorine so that it has no ability to deplete the ozone layer.

As with all hydrofluorocarbons (HFCs), RS-52 does have a direct global warming potential (GWP), but this is counterbalanced by the lower Total Equivalent Warming Impact (TEWI) of the system.

## **RETROFIT PROCEDURE**

The retrofit procedure for replacing R22 or R502 and/or interim blends with RS-52 is as follows:

- (1) Ensure the right equipment is available, eg recovery unit and cylinders, container for recovered lubricant, vacuum pump, weighing scales, replacement drier etc.
- (2) Record baseline data to establish the normal operating conditions for the equipment.
- (3) Weigh recovered amount of R22 or R502 or interim blend to determine amount of RS-52 to add.
- (4) Record the amount of oil removed from the compressor since this quantity will need to be recharged.
- (5) Charge the compressor with lubricant. If in doubt, consult the compressor manufacturer.
- (6) Replace the filter/drier.
- (7) Having evacuated the system to a full vacuum, **liquid charge** with RS-52 using about 10% less charge than R22 or R502. Add more RS-52 as required. Systems equipped with a liquid line sight-glass should be charged until sight-glass shows full.
- (8) Start the system and adjust the expansion device as required.
- (8) Avoid overcharging the system.
- (9) Carefully monitor the oil level in the compressor & add more oil if required to maintain the correct level. If the oil level does not stabilise & is erratic, some of the oil should be removed from the system & replaced with POE. Adopt the procedure in 10 below.

- (10) In systems where oil return could be an area of potential concern, eg containing a liquid receiver, flooded evaporators or long & complex pipelines, the replacement of up to 25% of the oil charge with a POE is recommended starting with an initial 10% followed by increments of 5% until the oil level stabilises & returns to normal.
- (10) Check system thoroughly for leaks.
- (11) Clearly label system RS-52 (R428A).

**NOTE: SYSTEMS WITH INHERENT POOR OIL RETURN, OFTEN WITH UNUSUALLY LONG SUCTION LINES AND/OR LOW TEMPERATURE SYSTEMS, MAY HAVE IMPROVED RS-52 OIL RETURN CAPABILITIES WITH ALKYL BENZENE OR POLYOL ESTER OILS.**

### **RS SERIES OF REFRIGERANTS PRESSURE/TEMPERATURE CHARTS**

RS Series Pressure/Temperature charts indicate both liquid bubble point and vapour dew point of the RS Series Refrigerant.

**Liquid Bubble Point:** this is the temperature which the liquid refrigerant will begin to vaporize at the given pressure. Below this temperature the liquid refrigerant will be sub-cooled.

**Vapour Dew Point:** this is the temperature at which refrigerant vapour will begin to condense at the given pressure. Above this temperature the refrigerant vapour will be superheated.

#### **Evaporator Vapour Superheat:**

To determine evaporator superheat, measure the suction line temperature at the outlet pipe of the evaporator and measure the suction pressure at the outlet pipe of the evaporator. Using the Pressure/Temperature chart, determine the vapour dew point for the measured suction pressure. Subtract the determined dew point from the actual temperature and this difference is the evaporator superheat.

#### **Condenser Liquid Sub-Cooling:**

To determine condenser sub-cooling, measure the temperature of the outlet pipe of the condenser and measure the condenser pressure at the outlet pipe of the condenser. Using the Pressure/Temperature chart, determine the liquid bubble point for the measured condenser pressure. Subtract the measured temperature from the determined bubble point and this difference is the condenser liquid sub-cooling.

**Note:** with the RS Series of low glide blends, the average evaporating and condenser temperatures will be mid point between the bubble and dew point temperature.