

RS-53(R470A)



DESCRIPTION	
Type	HFC blend
HFC replacement	R410A
Drop-in or long term	Both
Lubricant	POE
ODP	Zero
GWP 100 year ITH	909
500 year ITH	306

RS-53: PHYSICAL PROPERTIES

		RS-53 ₍₂₎	R410A ₍₂₎
Molecular Mass		84.43	72.6
Boiling point (1 atm) ⁽¹⁾	°C	-62.5	-51.4
	°F	-80.4	-60.5
Critical Temperature	°C	88.7	71.3
	°F	191.7	160.4
Critical Pressure	bara	55.91	49.00
	psia	810.9	710.6
Liquid Density (25 °C) ⁽¹⁾	kg/m ³	1088	1059
Density of saturated vapour (25 °C) ⁽¹⁾	kg/m ³	61.99	64.87
Latent Heat of Vaporisation at boiling point ⁽³⁾	kJ/kg	267.3	273
Heat capacity constant volume Cv (25 °C & 1bara)	kJ/kg.K	0.749	0.7000
Heat capacity constant pressure Cp (25 °C & 1bara)	kJ/kg.K	0.854	0.823
Cp/Cv (25 °C & 1 bara)		1.141	1.1755
Vapour Pressure (25 °C) ⁽¹⁾	bara	18.40	16.57
	psia	266.9	240.4
Vapour Viscosity (25 °C & 1 bara)	cP	0.0130	0.0133
Liquid Viscosity (25 °C) ⁽¹⁾	cP	0.135	0.118
Liquid Thermal Conductivity (25 °C)	W/m.K	0.0828	0.0892
Surface Tension (25 °C) ⁽¹⁾	N/m	0.00592	0.00521
Specific heat of liquid (25 °C) ⁽¹⁾	kJ/kg.K	1.59	1.71
Ozone Depletion Potential	ODP	0	0
Global warming potential AR5	GWP	909	1924
Flammability limit in air (1 atm)	vol%	none	none
Inhalation exposure (8 hour day & 40 hour week)	ppm	1000	1000

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- (1) Bubble point
- (2) RS-51 refrigerant properties obtained from NIST's REFPROP v10 program.
- (3) Difference between bubble point liquid enthalpy and dew point vapour enthalpy at 1 atm.

TYPE AND DESCRIPTION

RS-53 is a non-flammable, non-toxic, zero ODP blend which is a low GWP replacement for R410A. RS-53 is a blend of R125, CO₂, R32, R227ea, R134a, R1234ze.

APPLICATIONS

RS-53 is the only retrofit option for R410A with a GWP less than one half that of R410A. RS-53 can also be used in new equipment and has the major advantage of being non-flammable.

SERVICE WORK

Because it is a blend, it is essential that RS-53 be charged into systems in the *liquid* as opposed to the gaseous phase.

Since there is no need to change the existing lubricant, RS-53 is straightforward to use as the procedure below outlines.

LUBRICANTS

RS-53 is fully compatible with polyol ester (POE) which are commonly used with R410A.

MATERIALS COMPATIBILITY

RS-53 is compatible with all materials commonly used in systems that were designed and charged with R410A.

ENVIRONMENTAL DATA

None of the components of RS-53 contains chlorine so that it has no ability to deplete the ozone layer.

RS-53 does have a direct global warming potential (GWP), but this is less than one half of the R410A it replaces.

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RETROFIT PROCEDURE

The retrofit procedure for replacing R410A with RS-53 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) Check the manufacturer's specifications for the unit to find the recommended R410A charge in order to determine the amount of RS-53 to add. (See 5 below.)
- (4) Replace the filter/drier.
- (5) Having evacuated the system, initially *liquid charge* the unit with the same weight of RS-53 as R410A specified by the manufacturer.
- (6) Switch on the unit and monitor any sight glasses fitted, the suction line pressure and temperature, and the discharge temperature.
- (7) No adjustment to the TX valve setting should be necessary. However, it is recommended that the discharge temperature should be measured and, if necessary, the expansion valve adjusted so that the temperature is 5⁰C to 10⁰C higher than the discharge temperature of R410A.
- (8) Check system thoroughly for leaks.
- (9) Clearly label system RS-53 (R470A).