RSL
Refrigerant Solutions Limited

RS-20

COMPOSITION	%
CO2	5
HFO1234ze	86
HFC227ea	9
Type	HFO/HFC blend
Drop-in or long term	Both
Lubricant	POE/PAG
GWP 100 year ITH AR4	291

RS-20: PHYSICAL PROPERTIES

		RS-20(1)	R134a
Molecular weight		108.2	102
Boiling point (1 atm) (2)	°C °F	-34.09 -29.37	-26.07 -14.93
Temperature glide (3)	°C	4.5	0
Critical temperature	°C °F	107.4 225.3	101.1 213.9
Critical pressure	bara psia	43.51 631.1	40.06 581
Liquid density at 25°C (4)	kg/m^3	1175	1207
Density of saturated vapour at 25°C (5)	kg/m^3	28.27	32.35
Specific heat of liquid at 25°C (4)	kJ/kg°C	1.391	1.425
Specific heat of vapour at 1 atm & 25 °C	kJ/kg°C	0.863	0.606
Vapour pressure at 25°C (4)	bara psia	7.517 109.0	6.654 96.5
Latent heat of vaporisation at boiling point(5)	kJ/kg	229.4	217
Global Warming Potential (GWP) AR4	GWP	291	1430
Flammability limit in air (1 atm)	vol%	None	None
Inhalation exposure (8 hr day & 40 hr week)	ppm	1000	1000

(1) RS-20 refrigerant properties obtained from NIST's REFPROP program.
(2) Boiling point at 1 atm (mean of bubble and dew points).
(3) Typical evaporator temperature glide from a Rankine cycle calculation.
Midpoints:

45 ^{0}C condensing, 7 ^{0}C evaporating with 0.5 bar pressure drop; compressor isentropic efficiency: 0.7.
(4) Mean of bubble and dew points at 25 ^{0}C . Property calculations on the midpoint liquid and vapour phase compositions as appropriate.
(5) Difference between bubble point liquid enthalpy and dew point vapour enthalpy at 1 atm.

TYPE AND DESCRIPTION

RS-20 is a non-flammable blend of CO2, HFO1234ze & HFC227ea which has a zero ODP and a much lower GWP than R134a. RS-20 is also compatible with the synthetic lubricants commonly used with R134a.

MOBILE AIR CONDITIONING (MAC)

Non-flammable RS-20 is the answer to a pressing problem. Millions of vehicles in the EU have R134a in their a/c units, but servicing is increasingly difficult as regulations progressively restrict the supply of high GWP (1430) R134a. R1234yf, the very low GWP refrigerant is approved for new vehicles, but is flammable (A2L) so cannot be used for retrofit.

RS-20 has a GWP less than 300 under IPCC AR4, less than half the GWPs of R513A and R513B that have been developed as lower GWP replacements for R134a. Tests show that RS-20 is an excellent replacement for R134a in MAC with very similar performance to R134a and slightly higher cooling capacity.

RS-20 will also be increasingly required in other territories as they follow the EU lead in limiting the availability of R134a.

SERVICE WORK

Because it is a blend, it is recommended that RS-20 be charged into systems in the ***liquid*** as opposed to the gaseous phase.

Since there is no need to change the existing lubricant, RS-20 is straightforward to use as the procedure below outlines.

LUBRICANTS

RS-20 is compatible with the synthetic oils POE and PAG. Therefore, there is no need to change the existing lubricant in the system operating with R134a.

MATERIALS COMPATIBILITY

RS-20 is compatible with all materials commonly used in refrigeration systems previously charged with R134a

ENVIRONMENTAL DATA

None of the components of RS-20 contains chlorine so that it has no ability to deplete the ozone layer.

RS-20 has a GWP of 291 which is 80% less than R134a.

RETROFIT PROCEDURE

The retrofit procedure for replacing R134a with RS-20 in MAC is as follows:

(1) Ensure the right equipment is available, e.g. recovery unit and cylinders, container for recovered lubricant, vacuum pump, weighing scales, replacement drier etc.

(2) RS-20 is compatible with POE and PAG oils, so that there is no need to change the lubricant in the system.

(3) Replace the filter/drier with a new R134a filter drier.

(4) Evacuate the system and ***liquid charge*** with RS-20. Charge the same amount of RS-20 as R134a marked on the system. Avoid overcharging the system.

(5) Check system thoroughly for leaks.

(7) Clearly label system as charged with RS-20. Remove any R124a labels.