RSL
Refrigerant Solutions Limited

RS-24 (R426A)

COMPOSITION	%
HFC 134a	93
HFC 125	5.1
n-butane	1.3
Iso-pentane	0.6
Chemical name	1,1,1,2-tetrafluoroethane/ pentafluoroethane/ n-butane/ iso-pentane
Type	HFC blend
CFC replacement	R12
Temperature glide	<1°C
Drop-in or long term	Both
Lubricant	MO/AB/POE
ODP	Zero
Atmospheric lifetime	15 years
GWP 100 year ITH	1508

RS-24: PHYSICAL PROPERTIES

		RS-24	R12
Molecular weight		102.6	120.9
Boiling point (1 atm)	°C °F	-28.6(1) -19.5(1)	-29.8 -21.6
Temperature glide	°C	0.5	0
Critical temperature	°C °F	101.0 213.8	112.0 233.6
Critical pressure	kPa psia	4097 594	4116 597
Liquid density at 25°C	kg/m^3	1184	1311
Density of saturated vapour at 25°C	kg/m^3	30.9	37.3
Specific heat of liquid at 25°C	kJ/kg°C	1.45	1.00
Specific heat of vapour at 1 atm & 25 °C	kJ/kg°C	0.863	0.606
Vapour pressure at 25°C	kPa psia	707(1) 102.6(1)	643 93.3
Latent heat of vaporisation at boiling point	kJ/kg	218	165
Ozone Depletion Potential	ODP	0	1
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-24 is a non flammable blend of HFC 134a, HFC 125, n-butane and iso-pentane which has a zero ODP and is also compatible with both traditional and synthetic lubricants so that a retrofit is not required.

RS-24 is a "Drop-in" alternative for R12 which also provides a long term solution at the same time. It provides, therefore, a one change solution to the replacement of R12 at minimal expense. Because there is no need to use expensive and hygroscopic synthetic lubricants, the risk of moisture ingress into a refrigeration system is completely avoided. RS-24 has lower discharge temperatures than R12 thereby reducing degradability of the lubricant in the system.

APPLICATIONS

RS-24 can be used in all the main applications used where R12 is present including mobile air conditioning, hermetic and semi-hermetic compressor systems, cold stores, refrigerated transport, dairy chillers, vending machines, cellar cooling etc.

RS-24 is an excellent performance match for R12 providing a similar performance in almost every respect.

SERVICE WORK

Because it is a blend, it is recommended that RS-24 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-24 is straightforward to use as the procedure below outlines.

LUBRICANTS

RS-24 is compatible with both mineral and alkylbenzene oils found in R12 systems, and also with the synthetic oils POE and PAG. 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-24 is compatible with all materials commonly used in refrigeration systems previously charged with R12.

In general, materials which are compatible with R12 can be used with RS-24. 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 R12 for many years, replacement of some seals may be required due to the different composition of RS-24 which contains HFCs.

ENVIRONMENTAL DATA

None of the components of RS-24 contains chlorine so that it has no ability to deplete the ozone layer.

As with all hydrofluorocarbons (HFCs), RS-24 does have a direct global warming potential (GWP), but this is counterbalanced by the lower Total Equivalent Warming Impact (TEWI) of the system. RS-24 has a relatively short atmospheric lifetime of approximately 15 years which is at the lower end of the main HFCs available today and compares to over 100 years in the case of R12.

RETROFIT PROCEDURE

The retrofit procedure for replacing R12 with RS-24 (R426A) 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) Record baseline data to establish the normal operating conditions for the equipment.

(3) Recover R12 charge and weigh recovered amount of R12 to determine amount of RS-24 to add.

(4) RS-24 is compatible with MO/AB/POE/and PAG oils. If, however, the oil in the system is to be changed, it is not necessary to remove all of the existing oil in the system.

(5) Replace the filter/drier with new filter drier which is compatible with R134a.

(6) Evacuate the system and ***liquid charge*** with RS-24. Approximately 10% less RS-24 will be required than the R12 being replaced. Avoid overcharging the system.

(7) Start the system and check baseline data. Adjust the expansion device if required. If a low pressure control functions as a temperature control, check the space temperature and adjust if necessary.

Warning: It is highly recommended that the thermostatic expansion valve be checked and adjusted to compensate for small differences in the pressure temperature relationship of the replacement refrigerant when compared to the original refrigerant. Failure to check and adjust the valve could allow liquid refrigerant to enter the compressor and damage bearings and other compressor components.

(8) 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 9 below.

(9) 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 as charged with RS-24 (R426A) and type of oil used..

(12) On larger systems fitted with an oil level sight-glass, check oil level after several hours of operation and add oil if necessary.

NOTE: SYSTEMS WITH INHERENT POOR OIL RETURN, WITH UNUSUALLY LONG SUCTION LINES AND/OR LOW TEMPERATURE SYSTEMS, MAY HAVE IMPROVED RS-24 OIL RETURN CAPABILITIES WITH ALKYLBENZENE 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.