



RS-70 (R-453A)

R E F R I G E R A N T S E R V I C E S I N C .

COMPOSITION

HFC-134a	
HF -125	
HFC-32	
HFC-227ea	
R-600 n-butane	
R-601a isopentane	
Chemical name	1,1,1,2-tetrafluoroethane/pentafluoroethane/ difluoromethane/ 1,1,1,2,3,3,3,-heptafluoropropane/n-butane/ isopentane
Type	HFC blend
HCFC Replacement	R22
Temperature glide	Approximately 4°C
Drop-in or long term	Both
Lubricant	MO/AB/POE
ODP	Zero
Atmospheric lifetime	16 years
GWP 100 year ITH	1761
500 year ITH	545



TYPE and DESCRIPTION

RS-70 is a non flammable blend which has a zero ODP and is also compatible with both traditional and synthetic lubricants. RS-70 is a suitable replacement for R22 in both refrigeration and air conditioning applications, at low and high temperatures. With its low GWP relative to other refrigerants, RS-70 is an excellent replacement for R22 for use in a wide range of applications. RS-70 can be used as a "Drop-in" replacement for R22 in systems which contain both a fixed orifice or an expansion device. Because there is no need to use expensive and hygroscopic synthetic lubricants, the risk of moisture ingress into a refrigerant system is completely avoided.

APPLICATIONS

RS-70 is suitable for use in the main applications normally occupied by R22 including commercial air conditioning, cold stores, supermarkets, dairy chillers, refrigerated transport, cellar cooling and others. RS-70 is equally suitable to replace R22 in low & high temperature applications.

LUBRICANTS

RS-70 is compatible with both mineral and alkylbenzene oils found in R22 systems, and also with the polyol ester lubricants. Therefore, there is no need to change the lubricant although compressor manufacturers recommendations regarding lubricity should be followed

RS-70 (R-453A) PHYSICAL PROPERTIES

	RS-70	R22
Molecular weight	105.3	86.5
Boiling point (1 atm)	°C -42.5 ⁽¹⁾	-40.8
	°F -44.5 ⁽¹⁾	-41.4
Temperature glide	°C 4	0
Critical temperature	°C 87.5	96.1
	°F 189.6	204.8
Critical pressure	bara 45.7	49.9
	psia 663	724
Liquid density at 25°C	kg/m ³ 1132	1191
Density of saturated vapour at 25°C	kg/m ³ 42.1	44.2
Heat capacity of liquid at 25°C	kJ/kg°C 1.52	1.26
Ratio of gas heat capacities c _p /c _v (k)	1.137	1.185
Vapour pressure at 25°C	bara 11.3 ⁽¹⁾	10.4
	psia 164 ⁽¹⁾	151
Latent heat of vaporisation at Boiling point	kJ/kg 256 ⁽¹⁾	234
Ozone depletion potential	ODP 0	0.6
Flammability limit in air (1 atm)	vol% None	None
Inhalation exposure (8 hr day & 40 hr week)	ppm 1000	1000

(1) Bubble point

MATERIALS COMPATIBILITY

RS-70 is compatible with all materials commonly used in refrigeration systems previously charged with R22

In general, materials which are compatible with R22 can be used with RS-70. It is recommended to check equipment manufacturer's retrofit literature and obtain recommendations from equipment manufacturers with regard to materials' compatibility

ENVIRONMENTAL DATA

None of the components of RS-70 contains chlorine so that it has no ability to deplete the ozone layer. As with all hydrofluorocarbons (HFCs), RS-70 does have a direct global warming potential (GWP), but this is counterbalanced by its lower Total Equivalent Warning Impact (TEWI).

EVAPORATOR SUPERHEAT

To determine evaporator superheat, measure the suction line temperature and the suction line pressure at the outlet 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 measured and this difference is the evaporator superheat.

CONDENSER SUB-COOLING

To determine condenser sub-cooling, measure the temperature and the 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 actual temperature measured from the determined bubble point this difference is the condenser sub-cooling.

RETROFIT PROCEDURE

The retrofit procedure for replacing R22 with RS-70 is as follows:

- (1) If possible collect baseline data before conversion. Suction and discharge pressures can be converted to temperature using an R-22 pressure temperature conversion chart. Once the average evaporating and condensing temperatures have been determined they can be compared to the same temperatures after conversion
- (2) Compressor oil levels and refrigerant charge should be recorded.
- (3) Recover the R-22
- (4) RS-70 (R-453A) is compatible with MO, AB and POE oils.
NOTE: If POE oil is used to replace MO or AB oils in the system, it is recommended that o-ring seals be replaced before starting the system.
- (5) Evacuate the system and charge with RS-70 (R-453A) to 90% of the original R-22 charge.
NOTE: Remove RS-70 refrigerant from the cylinder in liquid form to prevent fractionation.
- (6) Start the system and check and compare the baseline data, adjust thermostatic expansion valves as needed to the manufacturers recommended settings. Adjust all pressure controls to equivalent RS-70 (R453A) values. If fitted, adjust evaporator and/or condensor pressure regulator valves to maintain desired temperatures.
- (7) Check system charge and add refrigerant if needed to match original charge levels. If the system is fitted with a liquid line sight-glass, charge to a full glass (small amounts of bubbles in the glass may be normal with refrigerant blends). If the equipment manufacturer recommends charging R22 by evaporator superheat or liquid sub-cooling, use the same amount of superheat or sub-cooling for RS-70. Avoid overcharging.
- (8) Compare new data with baseline data and confirm that evaporating and condensing temperatures are similar to the original R-22 temperatures. Carefully monitor the oil level in the compressor and add more oil if required to maintain the correct level. If the oil level does not stabilise and is erratic, some of the oil should be removed from the system and 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, 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 and returns to normal.
- (10) Check system thoroughly for leaks.
- (11) Clearly label the system as charged with RS-70 (R-453A).

NOTE: Systems with inherent poor oil return, often with unusually long suction lines and/or low temperature systems, may have improved RS-70 oil return capabilities with Alkylbenzene or polyol ester oils.