



Star International
Worldwide marine and offshore services



RS-70 (R453A)

All-purpose, low GWP Drop-in replacement for R22 in air conditioning and refrigeration systems



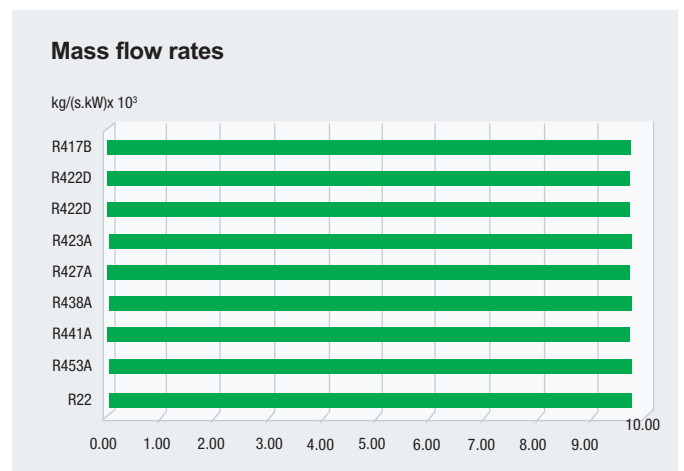
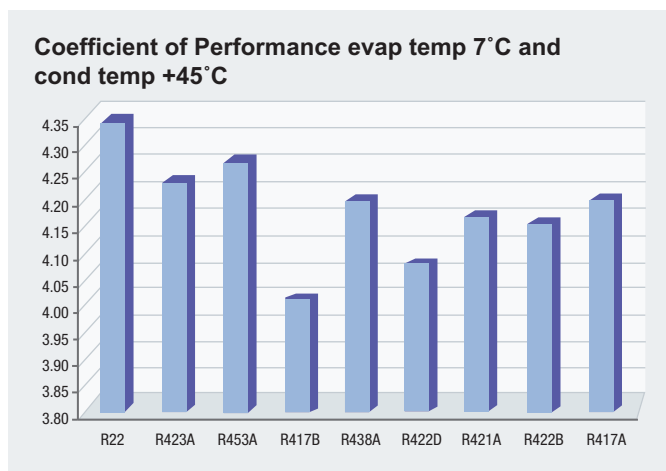
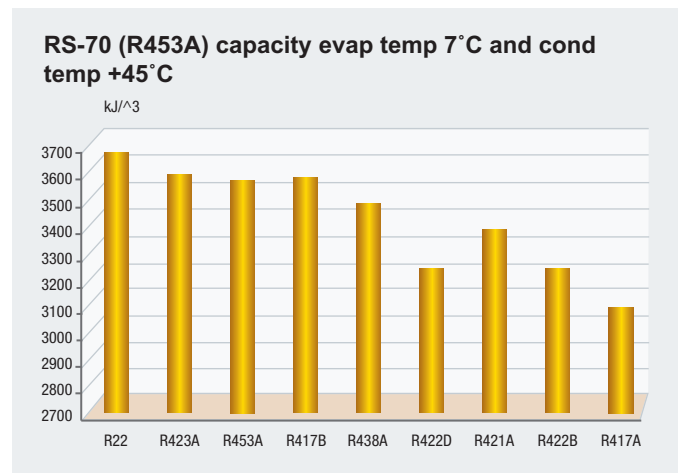
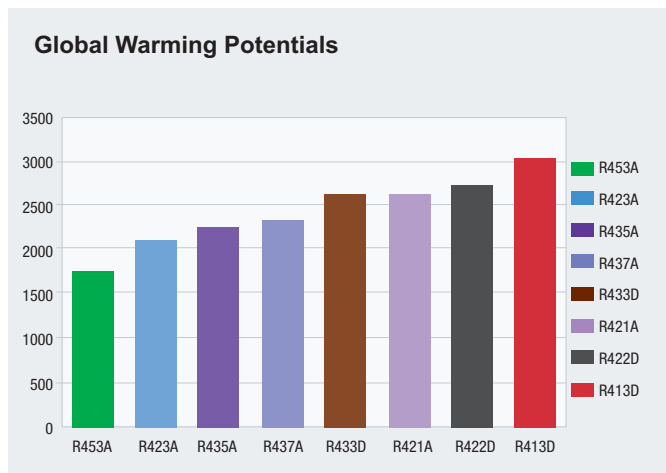
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RS-70 is a non-flammable replacement gas for R22 that has been designed to have the lowest possible Global Warming Potential (GWP).

With a similar cooling capacity and Coefficient of Performance (CoP) to R22, RS-70 can be used as a replacement in all air conditioning and refrigeration applications where R22 is used.

RS-70 delivers key benefits to operators, including:

- Full Gas compliance until 2030
- The lowest GWP of all available R22 drop-in replacements
- ASHRAE A1 and Standard 34 approval (non-flammable and low toxicity)
- Zero Ozone Depletion Potential (ODP)
- No hardware changes required for retrofitting
- Compatibility with MO, AB and POE lubricants
- Compatibility with fixed and adjustable setting systems
- Similar discharge pressure to R22 and lower than R407C, R407A, R407F, R422D, R417B, R427A
- Suitability for air conditioning and both commercial and industrial refrigeration; chillers, cold stores, refrigerated transport



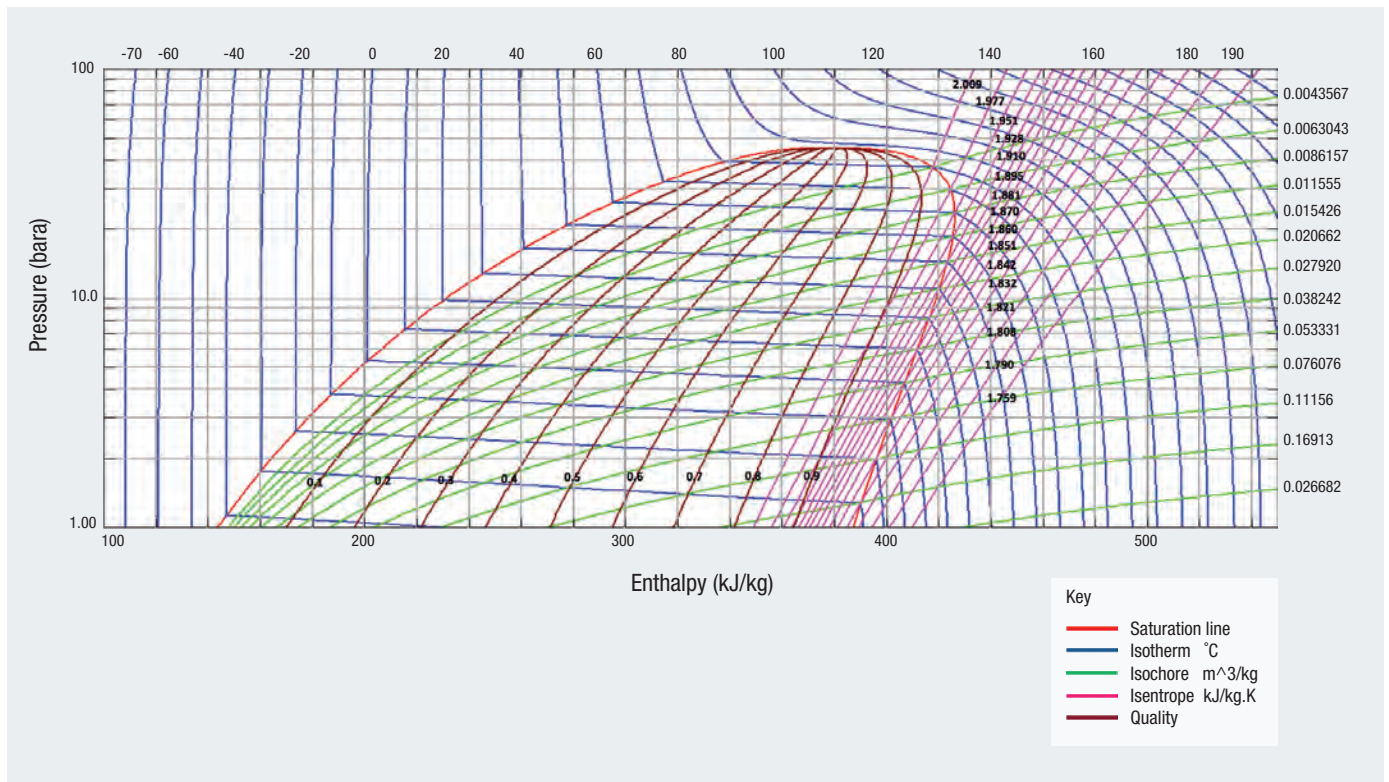
Servicing

Because RS-70 is a blend, it should be charged into the system in the liquid as opposed to vapour form. There is no need to make any hardware changes when converting from R22 to RS-70 and it can be used with expansion devices having a fixed orifice or adjustable setting.

Future-proof RS Series refrigerants

The phase-out of high GWP gases in coming years is going to pose numerous risks to operators. Prices for legacy gases are on the rise and availability is also going to drop significantly as the phase out progresses. Risks to the environment from high GWP and ODP gases, as well as risks to safety posed by flammable and toxic refrigerants must also be considered. By choosing RS Series gases, operators can avoid these issues, whilst futureproofing refrigeration and air conditioning systems for the next decade.

RS-70 (R453A) pressure-enthalpy chart



RS-70 comparative data - Air Conditioning

Evap +7°C and Cond +45°C)		R22	R417A	R422D	R424A	R434A	R417B	R438A	RS-70	R407C	R427A	R421A	R422B
Discharge pressure	bar	17.29	15.86	18.11	16.14	19.55	19.54	17.83	17.66	18.63	17.96	16.84	16.94
Discharge temp	°C	78.80	61.20	60.10	61.20	59.70	59.00	65.10	70.50	72.30	77.3	61.3	60.9
Capacity	kJ/m ³	3639	3058	3366	3100	3570	3546	3456	3533	3727	3557	3211	3212
% of R22			84.0	92.5	85.2	98.1	97.4	95.0	97.1	102.4	97.7	88.2	88.3
COP		4.34	4.20	4.08	4.19	2.79	4.01	4.19	4.27	4.25	4.23	4.17	4.15
Compression ratio		2.78	2.94	2.86	2.94	4.02	2.81	2.93	2.97	2.95	2.94	2.94	2.91
Glide (evaporator)	K	0.00	2.70	2.50	3.00	1.40	1.80	3.30	4.70	4.60	4.20	3.00	2.90
Flow rate	kg/(s.kW)x10 ³	6.18	7.96	8.90	8.12	9.10	9.67	7.41	6.27	6.16	6.57	8.49	8.39
GWP			2346	2729	2440	3245	3027	2264	1765	1774	2138	2631	2526

RS Series refrigerant distribution network

Star International, in partnership with Refrigerant Solutions Ltd has established a global distribution network for the RS Series of refrigerants. We can deliver to ports worldwide, providing a reliable and timely service to marine operators.



View our interactive map, including every port Star International services worldwide:
<https://bit.ly/2y2yGsx>

RS-70 (R453A) physical properties

Property		RS-70(2)	R22
Molecular Mass		88.8	86.5
Boiling point (1 atm) (1)	°C	- 42.2	- 40.8
	°F	- 44.0	- 41.5
Temperature glide (4)	K	4.2	0.0
Critical temperature	°C	88.8	96.1
	°F	191.8	205.1
Critical pressure	bara	45.26	49.90
	psia	656.5	724
Liquid density (25°C) (1)	kg/m ³	1136	1191
Density of saturated vapour (25°C) (1)	kg/m ³	41.69	44.23
Latent heat of vaporisation at boiling point (3)	kJ/kg	243.3	233.8
Heat capacity constant volume Cv (25 0C and 1bara)	kJ/kg.K	0.7457	0.5587
Heat capacity constant pressure Cp (25 0C and 1bara)	kJ/kg.K	0.8480	0.6619
Cp/Cv (25°C and 1 bara)		1.137	1.185
Vapour pressure (25°C) (1)	bara	11.53	10.44
	psia	167.2	151.4
Vapour viscosity (25°C and 1 bara)	cP	0.0122	0.0126
Liquid viscosity (25°C) (1)	cP	0.1572	0.164
Liquid thermal cconductivity (25°C)	W/m.K	0.0833	0.0835
Surface tension (25°C) (1)	N/m	0.00723	0.00808
Specific heat of liquid (25°C) (1)	kJ/kg.K	1.5209	1.2568
Ozone Depletion Potential	ODP	0	0.06
Flammability limit in air (1 atm)	vol%	none	none
Inhalation exposure (8 hour day and 40 hour week)	ppm	1000	1000
GWP AR4		1765	1810

Notes:

- (1) Bubble point
- (2) RS-70 refrigerant properties obtained from NIST's REFPROP program.
- (3) Difference between bubble point liquid enthalpy and dew point vapour enthalpy at 1 atm.
- (4) Evaporator temperature glide calculated using NIST CYCLE D in accordance with high evaporating condition specified in Standard EN 12900:2005 Section 7 Table 2 assuming 100% compressor and motor efficiencies.

Key products and services:

- Refrigeration gases, products and services
- Firefighting equipment and services
- High pressure jet washers
- Chemical products
- Calibration gases
- Medical equipment
- Marine safety equipment
- Narwhal RIBs
- LSA liferaft service and repair
- Welding equipment
- Water purifiers
- Filters



Star International

Head Office: Star House, Turbine Business Park,
Turbine Road, Birkenhead, Merseyside CH41 9BA
United Kingdom

Tel: +44 (0) 1244 504500

Fax: +44 (0) 1244 504509

Email: enquiries@star-international.co.uk

Web: www.star-international.co.uk
