



**Star International**  
Worldwide marine and offshore services



## **RS-50 (R442A)**

A high efficiency, low Global Warming Potential (GWP) drop-in gas for refrigeration and air conditioning systems



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[www.star-international.co.uk](http://www.star-international.co.uk)

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RS-50 is a drop-in replacement for R404A, R507 and R22 in refrigeration applications that can be used in new and existing installations with little to no hardware alterations. RS-50 is suitable for commercial and industrial use where R404A is commonly found, including; cold stores, freezers and refrigerated transport.

### RS-50 delivers key benefits to operators, including:

- F-Gas compliance until 2030
- ASHRAE A1 and Standard 34 approved (non-flammable and low toxicity)
- A GWP of 1888 – over 50% lower than R404A
- Zero Ozone Depletion Potential (ODP)
- Greater energy efficiency than R404A
- Suitability for Original Equipment Manufacturer (OEM) and retrofit applications
- The highest Coefficient of Performance (COP) of all available R404A alternatives
- Compatibility with MO, AB and POE lubricants
- The same compression ratio as R22
- Effective in high and low temperature applications

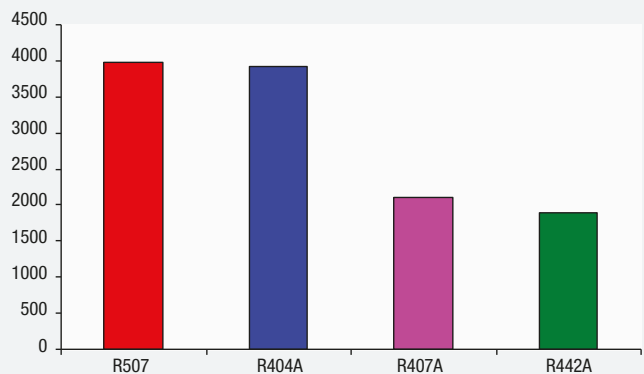
### RS-50 as a drop-in for R404A and R507

RS-50 can be used to replace R404A in both new and existing equipment. Mass flow of RS-50 is lower than R404A and R507 so that reducing the opening of the expansion device may be required. No changes to other hardware are necessary. A significant increase in energy efficiency compared to R404A and R507 can be expected. Users will achieve a lower carbon footprint due to the lower direct GWP of the refrigerant and its inherent higher efficiency.

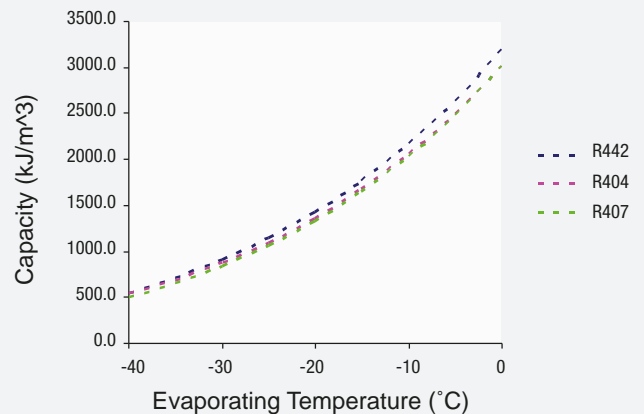
### RS-50 as a drop-in for R22 in refrigerant systems

RS-50 is a non-ozone depleting and non-flammable replacement for R22 in medium and low temperature refrigeration applications. The efficiency and cooling capacity of RS-50 provides a close match for R22 in overall system performance. Flow rate is identical to R22 which avoids the need to change or alter existing pipework. When replacing R22 with RS-50, the lubricant should be replaced with a polyol ester oil.

Global Warming Potentials



Refrigerant capacities



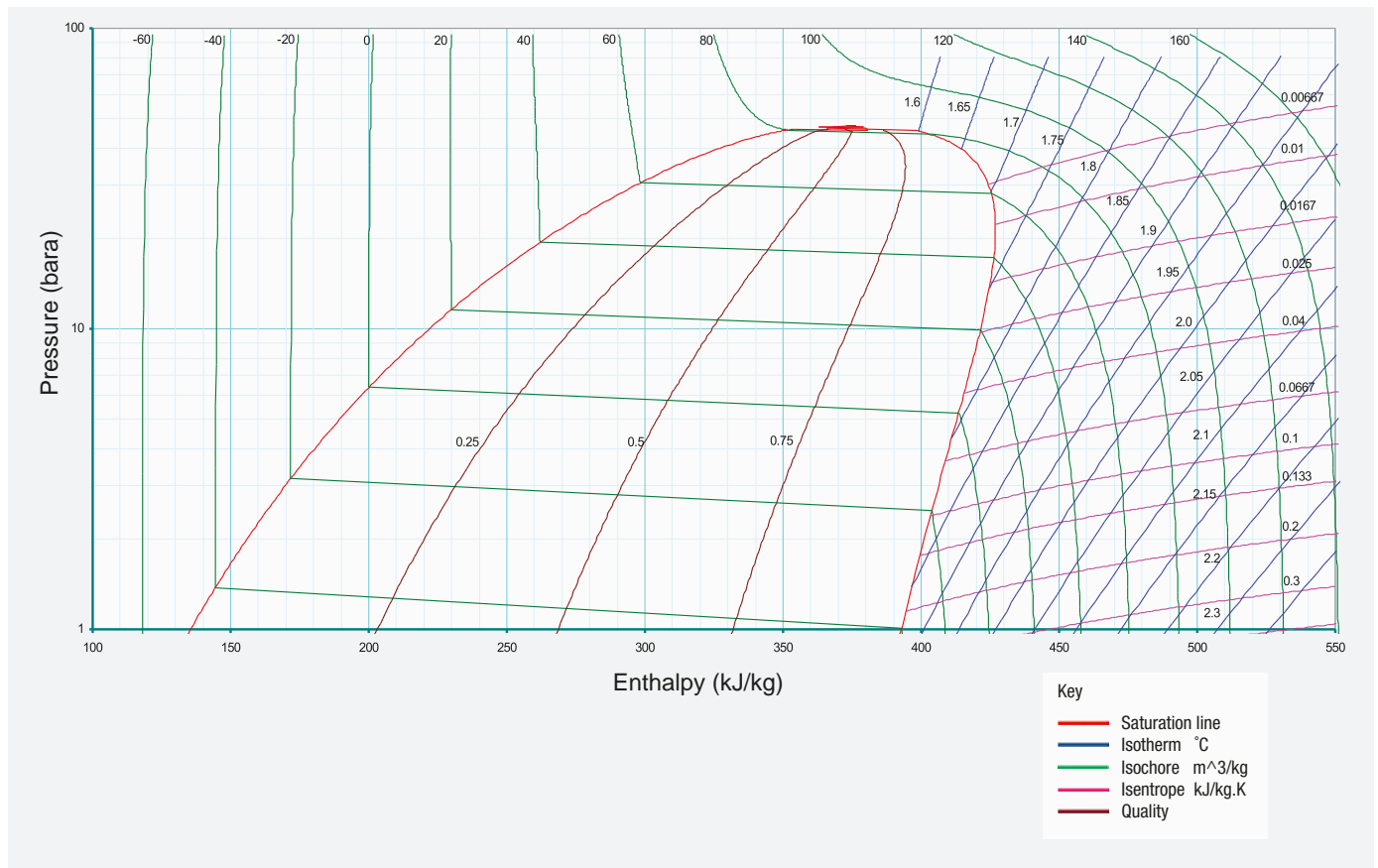
## Servicing

Because RS-50 is a blend, it should be charged into the system in the liquid as opposed to vapour form. There is no need to make hardware changes when converting from R404A to RS-50 other than reducing the opening of the expansion device. Because RS-50 has a similar flow rate to R22, there is no need to adjust or change the expansion device during a retrofit.

## Futureproof 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-50 (R442A) pressure-enthalpy chart



## Refrigeration RS-50

-35°C evap +35°C cond		R22	R502	HP62 R404A	AZ-50 R507	RS-50 R442A	Klea 60 R407A	Performax LT R407F
Discharge pressure	Bara	14.07	15.30	16.73	17.16	16.80	15.94	16.67
Discharge temp	°C	156.0	99.0	89.0	89.0	132.0	119.0	132.0
Capacity	kJ/m <sup>3</sup>	622	648	643	660	657	606	650
COP		1.27	1.23	1.17	1.17	1.23	1.23	1.23
Compression ratio		11.4	10.2	10.5	10.6	12.6	12.9	12.7
Glide (evaporator)	K	0	0	0.5	0	4.6	4.2	4.4
Flow rate	kg/s*10 <sup>^2</sup>	6.27	10.05	9.33	9.67	6.27	7.01	6.25
GWP IPCC 2007 AR4		1810	5630	3922	3985	1888	2107	1825

## 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.



## RS-50 (R442A) physical properties

Property		RS-50	R404A	R22
Molecular weight		81.8	97.6	86.5
Boiling point (1 atm)	°C	-46.5 <sup>(1)</sup>	-46.2 <sup>(1)</sup>	-40.8 <sup>(1)</sup>
	°F	-51.6 <sup>(1)</sup>	-51.2 <sup>(1)</sup>	-41.5 <sup>(1)</sup>
Temperature glide	K	4.6	0.5	0
Critical temperature	°C	82.4	72.1	96.1
	°F	180.3	161.7	205.1
Critical pressure	bara	47.6	37.3	49.9
	psia	690	541	724
Liquid density (25°C)	kg/m <sup>3</sup>	1108	1044	1191
Density of saturated vapour (25°C)	kg/m <sup>3</sup>	47.7	65.3	44.2
Latent heat of vaporisation at boiling point	kJ/kg	266 <sup>(1)</sup>	200 <sup>(1)</sup>	234
Cv (25°C and 1bara)	kJ/kg.k	0.727	0.784	0.559
Cp (25°C and 1bara)	kJ/kg.k	0.838	0.877	0.662
Cp/Cv (25°C and 1 bara)		1.152	1.118	1.185
Vapour pressure (25°C)	bara	13.3 <sup>(1)</sup>	12.6 <sup>(1)</sup>	10.4
	psia	192 <sup>(1)</sup>	182 <sup>(1)</sup>	151
Vapour viscosity (25°C and 1 bara)	cP	0.0126	0.0120	0.0126
Liquid viscosity (25°C)	cP	0.141	0.128	0.164
Liquid thermal conductivity (25°C)	W/m.K	0.0857	0.0636	0.0835
Surface tension (25°C)	N/m	0.00661	0.00455	0.00808
Specific heat of liquid (25°C)	kJ/kg.K	1.58	1.54	1.26
Ozone depletion potential	ODP	0	0	0.055
Flammability limit in air (1 atm)	vol%	none	none	none
Inhalation exposure (8 hour day and 40 hour week) ppm		1000	1000	1000

<sup>(1)</sup> Bubble point

### Key products and services:

- Marine chemicals
- Refrigeration and air conditioning
- Firefighting equipment and services
- Marine safety equipment
- LSA liferaft service and repair
- EndoSan wide-spectrum disinfectant
- Marine fuel testing and treatment
- Instrument calibration
- Marine gas detectors
- First aid and medical gases
- Jet washers
- Lorry loader and quayside services
- Narwhal Rigid Inflatable boats
- Welding equipment and services



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