

Cool50™

(ASHRAE R-424A)

Coolgas

refrigerants made simple™

Introduction

Cool50™ is a zero ozone depletion potential (ODP) refrigerant, which along with Cool55™ (ASHRAE R-434A), is designed to replace R-22 in air conditioning or refrigeration systems originally intended to be used with R-22. In a properly retrofitted R-22 system, Cool50™'s performance and operating conditions will be close to those of R-22.

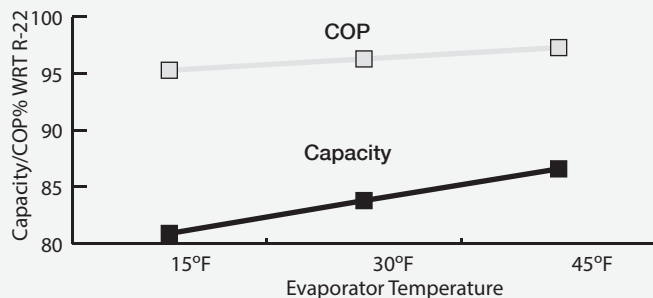
Cool50™ offers a number of features that make it an attractive and easy retrofit for many systems that need to replace R-22 with an alternative. These features include similar cooling capacity and efficiency, similar thermodynamic properties and good miscibility with the mineral and alkyl benzene oils typically used in R-22 systems.

Similar Operating Conditions

System controls, such as cut-in/cut-outs and thermal expansion valves (TXV), modify the behavior of a refrigeration or air conditioning system based on the pressure or temperature of the refrigerant in use. While some small differences are expected based on the use of a different refrigerant, they need to be relatively small so only minor or no modifications are needed. Dealing with large operating condition differences would require significant and labor intensive modifications to a system.

Cool50™ maintains similar mass flow rates, suction temperatures, and suction and discharge pressures. In addition, it exhibits a slightly lower compressor discharge temperature, especially at lower evaporator conditions, as compared to R-22. This helps with compressor durability and lubricant oil life.

Performance of Cool50™ with respect to R-22 vs. evaporator temp, at 105°F condenser and 10°F SC and SH. Standard cycle*.



Some of the benefits of Cool50™ are:

- Similar capacity and efficiency to that of R-22 in R-22 equipment
- Close operating conditions
- Lower compressor discharge temperatures
- Compatible with mineral and alkyl benzene oils in addition to POE oils
- Safe. Rated A1 by ASHRAE standard 34
- Similar thermodynamic properties to R-22

Similar Performance

R-22 equipment was designed and optimized to work with R-22. Its use with any other refrigerant implies that its performance will not be as optimized. Cool50™ has very similar capacities and efficiencies to those seen with R-22 in the same equipment making it particularly suitable for the application. As seen in the graphics, use of Cool50™ will preserve system performance compared to R-22 while providing for a simple retrofit.

No R-22 alternative will provide for an exact match, but Cool50™ comes close to that goal while keeping the retrofitting procedure simple.

Physical Properties

		Cool50™	R-22
Molecular Weight	--	108.4	86.5
ODP	--	0	0.055
Critical Pressure	psia	565.7	724
Critical Temperature	° F	184.4	204.8
Normal boiling point (at 1 atm)	° F	-39.5	-41.4
Glide	° R	5.5	0
Liq. Density at (77°F) 25°C	lb/ft ³	72.8	74.35
Vapor Density at (77°F) 25°C	lb/ft ³	3.5	2.76
Vapor Pressure at (77°F) 25°C	psia	145.9	151
Flammability Limits	--	none	none
Inhalation Exp Llimits (8 hr day/40 hr week)	ppm	1000	1000

Mineral Oil Compatibility

Most R-22 systems are used with either mineral or alkyl benzene lubricant oils, which unfortunately are not fully miscible with HFCs. Cool50™ uses a simple technique to help with this, the addition of a small amount of hydrocarbons (HC) to the main HFCs, to achieve a greater miscibility with these oils. This will ensure that most systems will be able to operate without the need for an oil change. However, for systems with questionable oil return or to maximize performance, an oil change to a POE oil may be recommended. Check with your system's manufacturer for specific recommendations.

Glide

R-22 is a single component refrigerant, which of course has no glide at the heat exchangers. Most of the so called "easy retrofit" refrigerants have a large glide that makes them unsuitable for many applications, in particular systems with flooded evaporators. Be careful with data regarding glide, since its value depends on several factors including condenser and evaporator temperatures and there is no standard condition for reporting it.

Cool50™'s glide is just 5.5°F (compared to R-407A's at almost 9°F). If the application requires the retrofit of a system with a flooded evaporator, Coolgas recommends the use of our Cool55™ blend that has a very small glide and is suitable for use with flooded evaporators.

Safety

Cool50™ has been assigned a rating of A1 by ASHRAE indicating that it is considered to be non-flammable and non-toxic, just like R-22. However, only qualified and trained technicians should handle this and any other refrigerant. Consult Cool50™'s MSDS on our web site for more safety information.

Contact us

If you are ready to begin retrofitting and would like to try Cool50™ (or our other retrofit, Cool55™) for yourself, please contact us at Coolgas for pricing information. If you still have questions, please send us an email to askgus@coolgas.com and a member of our technical staff will contact you to assist you.

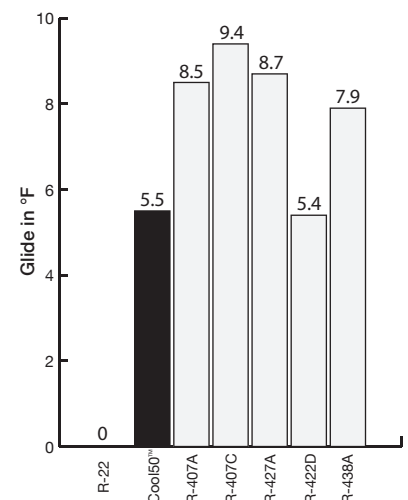
Pressure/Temperature Saturation Data*

Temperature		Pressure		
in °F	in °C	R-22	R-424A	
			Liq.	Vap.
-40	-40	0.6	0.4	7.3
-35	-37.2	2.6	1.8	3.9
-30	-34.4	4.9	4.0	0.1
-25	-31.7	7.4	6.4	2.0
-20	-28.9	10.2	9.1	4.2
-15	-26.1	13.2	12.0	6.8
-10	-23.3	16.5	15.1	9.5
-5	-20.6	20.1	18.6	12.5
0	-17.8	24	22.3	15.8
5	-15	28.3	26.4	19.5
10	-12.2	32.8	30.8	23.4
15	-9.4	37.8	35.6	27.7
20	-6.7	43.1	40.7	32.3
25	-3.9	48.8	46.2	37.3
30	-1.1	55	52.1	42.7
35	1.7	61.5	58.4	48.6
40	4.4	68.6	65.2	54.8
45	7.2	76.1	72.5	61.6
50	10	84.1	80.2	68.8
55	12.8	92.6	88.4	76.5
60	15.6	101.6	97.2	84.7
65	18.3	111.3	106.5	93.5
70	21.1	121.4	116.4	102.9
75	23.9	132.2	126.8	112.8
80	26.7	143.6	137.9	123.4
85	29.4	155.7	149.6	134.6
90	32.2	168.4	162.0	146.5
95	35	181.8	175.0	159.1
100	37.8	195.9	188.8	172.4
105	40.6	210.8	203.2	186.5
110	43.3	226.4	218.5	201.3
115	46.1	242.8	234.5	217.0
120	48.9	260	251.3	233.6
125	51.7	278	268.9	251.0
130	54.4	296.9	287.5	269.3
135	57.2	316.7	306.9	288.6
140	60	337.4	327.2	308.9
145	62.8	359	348.5	330.3
150	65.6	381.7	370.8	352.8

Pressures are in psig, except for the red numerals which are in inches of Hg below 1 ATM

*Data Generated using CycleD and REFPROP by NIST

Glide Comparison



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