

Genetron® 507

Introduction

Genetron® 507 (an azeotrope of HFC-125 and HFC-143a) has been developed by Honeywell to serve as a long-term substitute for the refrigerant Genetron® 502. Genetron® 507 is an environmentally friendlier, non-ozone depleting azeotrope, and is an excellent refrigerant choice for low- and medium-temperature refrigeration applications.



Physical properties

Components:	Chemical name:	Molecular formula:	Weight %:
HFC-125	Pentafluoroethane	CHF ₂ CF ₃	50%
HFC-143a	1,1,1 Trifluoroethane	CH ₃ CF ₃	50%
Molecular weight			98.9
Boiling point ^v (°C)			-46.7
Critical temperature (°C)			70.9
Critical pressure (kPa)			3793.6
Critical volume (m ³ /kg)			0.002
Critical density (kg/m ³)			500
Vapour density at boiling point (kg/m ³)			5.569
Liquid density ⁱⁱⁱ (kg/m ³)			1046.93
Liquid heat capacity ⁱⁱⁱ (kJ/kg·°K)			1.44
Vapour heat capacity ⁱⁱⁱ vapour (kJ/kg·°K)			0.8778
Heat of vaporization at boiling point (kJ/kg)			200.49
Vapour pressure ⁱⁱⁱ (kPa)			1287.01
Liquid thermal conductivity ^{i,iii} (W/m·°K)			0.0633
Vapour thermal conductivity ^{i,iii} (W/m·°K)			0.0121
Liquid viscosity ^{i,iii} (μPa·sec)			184.2
Vapour viscosity ⁱⁱⁱ (μPa·sec)			12.30
Flammability limits in air (vol.%)			None ⁱⁱ
Ozone Depletion Potential (ODP-R11=1)			0

ⁱ Information based on estimated properties.

ⁱⁱ Flame limits measured using ASTM E681 with electrically activated kitchen ignition source per ASHRAE Standard 34.

ⁱⁱⁱ All measurements are at 25°C and 101.3 kPa unless otherwise noted.

^v at 101.3 kPa

Pressure/Temperature table

Temperature (°C)	Pressure (kPa)
-45.0	112
-40.0	141
-35.0	175
-30.0	216
-25.0	263
-20.0	318
-15.0	381
-10.0	454
-5.0	536
0.0	629
5.0	734
10.0	851
15.0	982
20.0	1127
25.0	1288
30.0	1465
35.0	1660
40.0	1874
45.0	2109
50.0	2365
55.0	2644
60.0	2950

Compatibility with plastics and elastomers

The table below is a summary of materials compatibility data resulting from tests performed by Honeywell and other worldwide industry organisations.

Since there are many different grades and formulations of these materials, we recommend that compatibility testing be performed on the specific grade of

materials under consideration when designing new systems. This data should be used only as a guide to the compatibility of materials with Genetron® 507. The rankings in the table should be used with caution since they are judgements based on limited samplings. Customers should consult with the manufacturer or conduct further independent testing.

Compatibility with plastics and elastomers

Material	Genetron® 507	Genetron® 507 Polyol Ester
Ethylene-Propylene Diene Terpolymer	S	S
Ethylene-Propylene copolymer	S	S
Chlorosulfonated Polyethylene	S	U
Polyisoprene	Su	U
Chlorinated Polyethylene	S	Us
Neoprene (Chloroprene)	S	Su
Epichlorohydrin	Su	Us
Polyvinylidene Fluoride and copolymer of Vinylidene Fluoride and Hexafluoropropylene	U	Us
Silicone	Us	Su
Polyurethane	Su	Su
Nitriles	Su	Su
H-NBR	Su	S
Butyl rubber	Su	S
Polysulfide	S	U
Nylon	S	Su
Polytetrafluoroethylene	S	S
PEEK	S	S
ABS	Su	U
Polypropylene	Su	Su
Polyphenylene Sulfide	Su	Su
Polyethylene Terephthalate	S	S
Polysulfone	S	S
Polyimide	S	Su
Polyetherimide	S	S
Polyphthalamide	Su	U
Polyamideimide	Su	S
Acetal	S	U
Phenolic	S	Su
Epoxy Laminate	S	S

U: Unsuitable

Us: Unsuitable with some exceptions

S: Suitable

Su: Suitable with some exceptions

Applications

In low- and medium-temperature commercial refrigeration, Genetron® 507 serves a wide range of applications including supermarket-display cases, transport refrigeration and ice machines. Genetron® 507 also may be used in a number of low- and medium-temperature industrial refrigeration applications, where it delivers a long-term high energy efficient solution to replace Genetron® 502 (CFC-502) and Genetron® 22 (HCFC-22).

Genetron® 507 is suitable for both new equipment and retrofitting existing Genetron® 502 commercial refrigeration systems. Generally, there will be few, if any, equipment design changes necessary to optimise the performance of Genetron® 507 in these applications.

Safety

Honeywell recommends reading the Material Safety Data sheet (MSDS) before using Genetron® 507.

Toxicity

Genetron® 507 can be safely used in all of its intended applications.

Leaks

If a large release of Genetron® 507 vapour occurs, the area should be evacuated immediately. Vapours may concentrate near the floor, displacing available oxygen. Once the area is evacuated, it must be ventilated using blowers or fans to circulate the air at floor-level.

Flammability

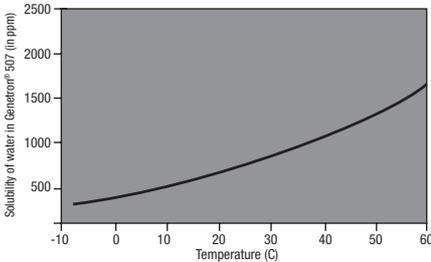
According to ASHRAE Standard 34, Genetron® 507 is classified in safety group A1, i.e., it is non-flammable at 1 atm. pressure (101.3 kPa) and 18°C.

Lubricants

Miscible lubricants such as POE oil should be used with Genetron® 507. Most compressor manufacturers are recommending specific polyol ester lubricants. Users should check with the equipment manufacturer for the recommended lubricants.

Solubility of water in Genetron® 507

The solubility of water in Genetron® 507 is shown in the graph below.



Environmental considerations

Genetron® 507 is a halogenated hydrocarbon. Treatment or disposal of wastes generated by use of this product may require special consideration, depending on the nature of the wastes and the means of discharge, treatment or disposal. For more information refer to the Environmental Data sheet supplement of the MSDS.

Leak detection

Use leak detectors for pinpointing leaks or for monitoring an entire room on a continual basis. Leak detection is important for refrigerant conservation, equipment protection and performance, reduction of emission and protection of those coming in contact with the system. Never use air to perform leak detection.

Retrofitting

Genetron® 507 vs. Blends

Where feasible, Genetron® 507 is the preferred retrofit replacement for Genetron® 502 in most OEM applications. In some cases, however, retrofitting with Genetron® 507 may be difficult because nearly all of the mineral oil in the system must be removed. For these instances, interim blends such as HP80 may be a suitable option. Service technicians should keep in mind that regulations restrict the use of HCFC-containing refrigerants and dictate the ultimate use of non-chlorine

containing refrigerants such as Genetron® 507 for servicing Genetron® 502 equipment.

Retrofit Lubricants

Genetron® 507 is not a "drop in" replacement for Genetron® 502. Mineral oils and alkylbenzene lubricants are immiscible with Genetron® 507 and must therefore be replaced with miscible lubricants such as POE oil. Consult the original equipment manufacturer for the recommended lubricant.

Storage and handling

Bulk and cylinder

Genetron® 507 cylinders must be clearly marked and kept in a cool, dry and properly ventilated storage area away from heat, flames, corrosive chemicals, fumes, explosives -- and be otherwise protected from damage. Under no circumstances should an empty cylinder be refilled with anything other than virgin product. Once empty, properly close the cylinder valve and replace the valve cap. Return empty cylinders to your Honeywell distributor.

Cylinders of Genetron® 507 should be kept out of direct sunlight, especially in warm weather. Liquid Genetron® 507 expands significantly when heated, reducing the amount of vapour space left in the cylinder. Once the cylinder becomes liquid-full, any further rise in

temperature can cause it to burst, potentially resulting in severe personal injury. Never allow a cylinder to get warmer than 52°C.

Vessels, containers, transfer lines, pumps and other equipment used with Genetron® 507 should not be exposed to high-temperature sources (such as welding, brazing and open flames) until they have been thoroughly cleaned and found free of vapours or liquid. Cylinders must never be exposed to welding, brazing or open flames. Exposure to high temperatures can cause fire, explosion and decomposition of Genetron® 507. This may result in the formation of toxic or corrosive compounds.

When possible, maintenance or cleaning of equipment should be performed without entering the vessel. If a tank or any confined space must be entered, then formal confined space entry procedures must be followed. These procedures require that a fully qualified work team be used and a confined space entry form be completed and placed at the job site.

Performance data

	Genetron® 507	Genetron® 502
Evaporating pressure (kpag)	279.4	247.2
Condensing pressure (kpag)	1364.3	1217.6
Compression ratio	3.85	3.78
Compressor discharge temperature (°C)	33.5	37.3
Temperature of suction gas (°C)	-15	-15
Specific volume of suction vapour (m ³ /kg)	0.0510	0.05
Latent heat of vaporization (kJ/kg)	175.3	156.5
Net refrigeration effect (kJ/kg)	112.9	104.4
Coefficient of performance	4.25	4.35
Refrigerant circulated per kW (g/s)	8.85	9.58
Compressor suction gas volume per kW(L/s)	0.45	0.48
Liquid circulated	8.66	8.03

Available literature

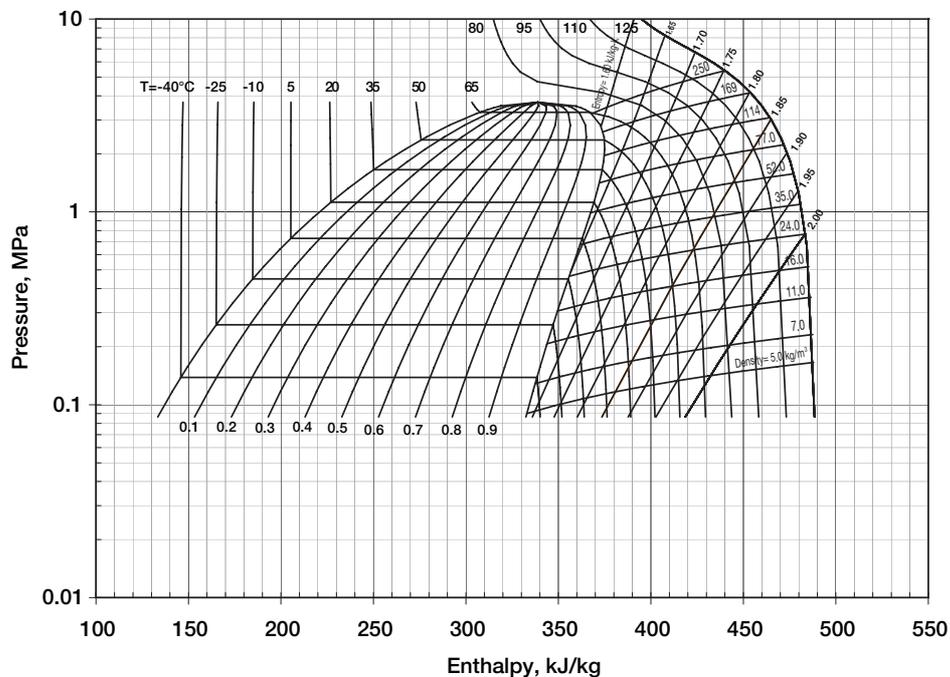
Honeywell has a wide range of literature available on topics including: retrofitting procedures, product specifications and product descriptions.

Please ask for Honeywell's software package containing Refrigerant Properties, Cycle Analysis and Pipe Sizing.

All literature and information can be found at: www.honeywellrefrigerants.com

Pressure-Enthalpy Diagram

Genetron® 507-SI



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