TECHNICAL DATA SHEET R-444A

Features

The refrigerant gas R-444A is a zeotropic, HFC+HFO blend. It is an alternative to R-1234yf for existing installations in the automotive sector. Like the entire HFC+HFO refrigerant family, it is ozone friendly. Its safety classification is A2L, i.e. it has low toxicity and is slightly flammable.

- It has an Atmospheric Warming Potential of less than 150, meeting the most stringent targets.
- It will work in any system using R-1234yf.
- R-444A is a chemically stable product, with a composition that remains within specifications from charging to recovery of air conditioning systems, with no known polymerisation reactions.
- Safety classification: A2L / Low toxicity - Slightly flammable.
- R-444A is a direct replacement for R-1234yf in automotive air conditioners. The same equipment, gauges and tools can be used when replacing R-1234yf with R-444A.
- It has an Ozone Depletion Potential (ODP) equal to 0.
- It has an Atmospheric Warming Potential (AWP) equal to 88.
- R-444A offers a higher cooling/heating capacity than R-1234yf in air conditioning systems. This will allow internal combustion engine vehicles to save fuel by reaching the setpoint temperature earlier. Electric vehicles can benefit from a longer range for the same reasons.
- The refrigerant charge for R-444A is the same as for R-1234yf.
- Any TEXA A/C charging station for R-1234yf is compatible and certified for use with R-444A.
- It is compatible with PAG and POE oils.

Applications

- R-444A is an alternative to R-1234yf either for new installations or as a direct drop-in replacement in existing automotive air conditioning installations.
- When charging with R-444A, all the R-1234yf must first be removed from the system with a recovery, recycling and recharging machine.
- The same system can achieve cooling capacity improvements in the order of 10% over R-1234yf.

Working and operating conditions

- **Because R-444A is a mixture, carry out the transfer in liquid phase.**
- Leak detectors (SAE J2913) designed and approved to detect leaks of R-134a or R-1234yf are also useful for R-444A. R-444A is slightly flammable, so leaks of this mixture should be treated in the same way as leaks of R-1234yf.

Lubricants

R-444A is designed to work with the same lubricants as R-1234ze, so there is no need to perform an oil change when the system is converted to R-444A. Should the system require additional lubrication, THUNDER® PAG or THUNDER® POE are recommended options.

Typically, automotive systems use PAG oils, although in some modern car types of POE oils may be used, in these cases use THUNDER® POE. Always check the original oil type of the equipment and use one from the THUNDER® range of the same type and viscosity.

Remember that the type of lubricant depends on the compressor and the requirements of the vehicle manufacturer.

Under no circumstances is the use of PAG oils and/or additives for R-134a recommended.

Environmental data

- R-444A contains no chlorine, so its ODP (Ozone Depleting Capacity) is equal to 0.
- R-444A has a GWP (Global Warming Potential) equal to 88, notably below 150.
- This product has no potential for bioaccumulation.
- It is also considered a product with low toxicity to aquatic organisms whether invertebrates, fish or algae.

Toxicity, safety and storage

R-444A is a very low toxicity product.

Animal studies of its components have shown that repeated exposure does not produce teratogenic (reproductive) effects. Moreover, it is unlikely to present a carcinogenic risk to man.

R-444A cylinders should be stored in cool, ventilated places below 50°C, away from open flames, sparks and heat sources. Avoid storage near the intake of air conditioning units, boilers or open drains.

Components

Chemical name	% by weight	CAS No	CE No
Trans-1.3.3.3-Tetrafluoroprop-1-ene (R-1234ze-E)	83	29118-24-9	471-480-0
Difluoromethane (R-32)	12	75-10-5	200-839-4
1.1-Difluoroetane (R-152a)	5	75-37-6	200-866-1

Physical properties

Property	Units	R-444A	R-1234yf
Molecular weight	g/mol	96.7	114.0
Liquid density (at 20ºC)	Kg/l	1.140	1.110
Liquid density (at 0ºC)	Kg/l	1.204	1.176
Boiling point (at 1 atm)	ºC	-34.3	-29.5
Glide	K	7	0
Absolute vapour pressure (at 20ºC)	bar	7.12	5.917
Freezing point (at 1.013 bar)	ºC	< -100	-150
Absolute critical pressure	bar	41.74	33.81
Critical temperature	ºC	102.8	94.7
Latent heat of vaporisation (ºC)	kJ/kg	233	180
Vapour density at boiling point	Kg/l	0.00403	0.00598
Thermal conductivity (liquid at 25 ºC)	W/m·K	ND	0.067
Thermal conductivity (vapour at 25 ºC)	W/m·K	ND	0.016
Safety classification	-	A2L	A2L
UFL (Upper Flammable Limit) ASHRAE 34 standard	% v/v	13.1	12.3
LFL (Low Flammable Limit) ASHRAE 34 standard	% v/v	8.2	6.2
ODP	-	0	0
GWP	T CO_2 eq	88*	0.501*
Toxicity	-	Baja	Baja

* According to the European Regulation 2024/573

Cylinders for R-444A

Cylinders for refillable R-444A must comply with the following specifications:

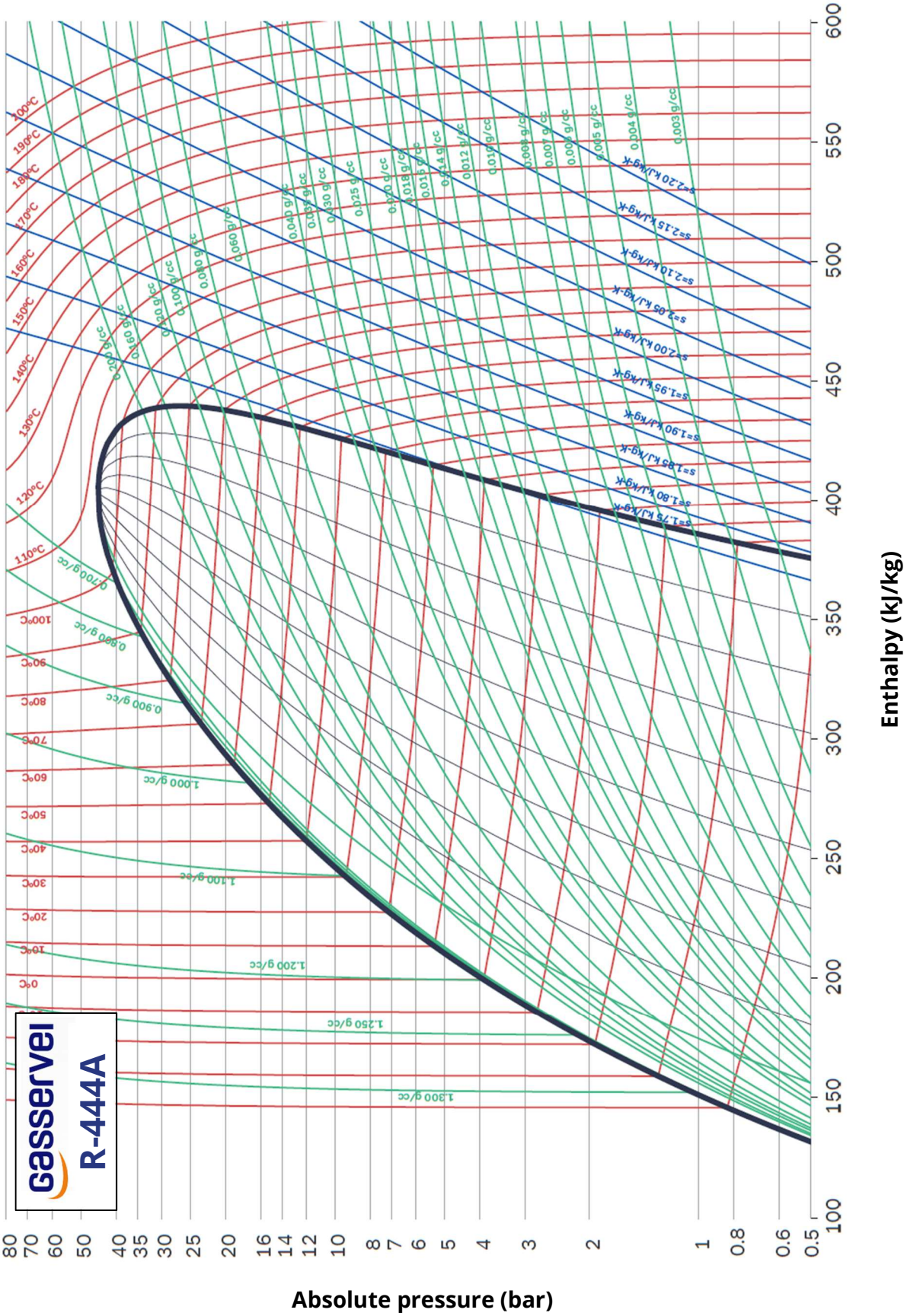
- Upper part of the cylinder in red colour.
- Left-hand thread.
- Minimum test pressure: 32 bar

Pressure/temperature tables

Temperature	Absolute Pressure		Density		Enthalpy		Entropy	
ºC	Bubble bar	Dew bar	Liquid Kg/m³	Vapour Kg/m³	Liquid kJ/Kg	Vapour kJ/Kg	Liquid kJ/Kg·K	Vapour kJ/Kg·K
-40	0.84	0.47	1.318	2.4	146.2	376.1	0.79	1.79
-38	0.92	0.52	1.312	2.6	148.9	377.5	0.80	1.79
-36	1.00	0.58	1.307	2.9	151.5	378.9	0.81	1.79
-34	1.09	0.64	1.302	3.2	154.1	380.3	0.82	1.78
-32	1.19	0.70	1.296	3.5	156.8	381.7	0.83	1.78
-30	1.29	0.78	1.291	3.8	159.4	383.1	0.84	1.78
-28	1.41	0.85	1.285	4.2	162.1	384.5	0.85	1.78
-26	1.52	0.94	1.280	4.6	164.7	385.8	0.87	1.78
-24	1.65	1.03	1.274	5.0	167.4	387.2	0.88	1.77
-22	1.79	1.12	1.268	5.4	170.1	388.6	0.89	1.77
-20	1.93	1.23	1.263	5.9	172.7	390.0	0.90	1.77
-18	2.08	1.34	1.257	6.4	175.4	391.3	0.91	1.77
-16	2.24	1.46	1.251	6.9	178.1	392.7	0.92	1.77
-14	2.41	1.58	1.246	7.5	180.8	394.0	0.93	1.76
-12	2.59	1.72	1.240	8.1	183.5	395.4	0.94	1.76
-10	2.78	1.86	1.234	8.7	186.3	396.7	0.95	1.76
-8	2.98	2.01	1.228	9.4	189.0	398.0	0.96	1.76
-6	3.20	2.17	1.222	10.1	191.7	399.4	0.97	1.76
-4	3.42	2,.35	1.216	10.9	194.5	400.7	0.98	1.76
-2	3.65	2.53	1.210	11.7	197.2	402.0	0.99	1.76
0	3.90	2.72	1.204	12.6	200.0	403.3	1.00	1.76
2	4.16	2.93	1.198	13.5	202.8	404.6	1.01	1.75
4	4.43	3.14	1.192	14.4	205.6	405.9	1.02	1.75

Temperature	Absolute Pressure		Density		Enthalpy		Entropy	
°C	Bubble bar	Dew bar	Liquid Kg/m³	Vapour Kg/m³	Liquid kJ/Kg	Vapour kJ/Kg	Liquid kJ/Kg·K	Vapour kJ/Kg·K
6	4.72	3.37	1.186	15.5	208.4	407.2	1.03	1.75
8	5.02	3.61	1.179	16.5	211.2	408.4	1.04	1.75
10	5.33	3.87	1.173	17.6	214.0	409.7	1.05	1.75
12	5.66	4.14	1.166	18.8	216.8	410.9	1.06	1.75
14	6.00	4.43	1.160	20.1	219.7	412.2	1.07	1.75
16	6.36	4.71	1.153	21.4	222.6	413.4	1.08	1.75
18	6.73	5.02	1.147	22.8	225.4	414.6	1.09	1.75
20	7.12	5.35	1.140	24.2	228.3	415.8	1.10	1.75
22	7.53	5.69	1.133	25.7	231.2	417.0	1.11	1.75
24	7.95	6.05	1.126	27.4	234.1	418.2	1.12	1.75
26	8.39	6.43	1.120	29.0	237.1	419.3	1.13	1.75
28	8.85	6.82	1.112	30.8	240.0	420.5	1.14	1.75
30	9.32	7.23	1.105	32.7	243.0	421.6	1.15	1.74
32	9.82	7.66	1.098	34.6	246.0	422.7	1.16	1.74
34	10.33	8.11	1.091	36.7	249.0	423.8	1.17	1.74
36	10.86	8.57	1.083	38.9	252.0	424.9	1.18	1.74
38	11.42	9.06	1.076	41.1	255.0	425.9	1.19	1.74
40	11.99	9.57	1.068	43.5	258.1	426.9	1.20	1.74
42	12.58	10.10	1.060	46.0	261.1	428.0	1.21	1.74
44	13.20	10.65	1.052	48.7	264.2	428.9	1.22	1.74
46	13.83	11.23	1.044	51.4	267.4	429.9	1.22	1.74
48	14.49	11.83	1.036	54.3	270.5	430.8	1.23	1.74
50	15.17	12.45	1.028	57.4	273.7	431.8	1.24	1.74
52	15.88	13.09	1.019	60.6	276.9	432.6	1.25	1.74
54	16.61	13.77	1.010	64.0	280.1	433.5	1.26	1.74
56	17.36	14.46	1.001	67.5	283.3	434.3	1.27	1.74
58	18.13	15.19	992	71.3	286.6	435.1	1.28	1.74
60	18.93	15.94	983	75.2	289.9	435.9	1.29	1.74

Ph Chart



Questions & Answers about R-444A

Can R-444A be used in vehicles designed for R-1234yf?
Yes, R-444A is a direct replacement for vehicles using R-1234yf. No system changes are necessary.

Yes, but what does R-444A contain?
R-444A is a mixture of HFOs with a small proportion of HFCs consisting of 83% R-1234ze-E, 12% R-32 and 5% R-152a.

Is R-444A non-flammable and non-toxic?
R-444A has an A2L safety classification, so it is a low-toxic but slightly flammable product, as is R-1234yf.

What is the main advantage of R-444A?
R-444A is the direct replacement for R-1234yf for the automotive sector, with a low Atmospheric Heating Potential (<150) with a high chemical stability that **avoids polymerization problems**.

Is it necessary to use an adapter as a dedicated connector for R-444A?
No. Adapters for R-1234yf will be used. Use approved connectors. It is recommended to place a label indicating that it is R-444A.

Will R-444A work in electric vehicles?
Yes, R-444A will work in a wide variety of electric vehicles currently equipped with R-1234yf. R-444A refrigerant has undergone extensive testing both in the laboratory and in cars, consistently demonstrating its potential to offer higher performance and efficiency than R-1234yf. Improved efficiency can help to increase the driving range of electric vehicles.

Is there a solution for vehicles with R-134a?
Yes, both RS-20 (R-480A) and R-456A are direct substitutes for vehicles with the same safety classification as R-134a.

Is there a difference between recharging with R-444A and R-1234yf?
No. Recharging with either refrigerant should never be done, as this does not allow the total amount of refrigerant charge in the vehicle to be measured. The gas contained in the vehicle system must be drained and recovered, to be recharged with the same amount as it should contain with R-1234yf. Charge R-444A according to the conversion guidelines.
Remember that it is mandatory to comply with applicable laws and regulations when servicing air conditioning systems.

What is the technical guide for switching from R-1234yf to R-444A?
The procedure for conversion from R-1234yf to R-444A is simple. The details of the different procedures can be found in the conversion guidelines.

What should be done with the oil that comes out with the (recovered) charge of R-1234yf?
If the oil is known and in good condition it can be reused with R-444A. If the oil in the system is unknown and for safety, it is recommended that any oil be recovered and discarded and replaced with THUNDER® PAG or POE. Check with the manufacturer for recommended oil type and viscosity.

What to do in case of leakage?
Equipment can be refilled in the event of a leak.

Can the same leak detection devices be used as with R-1234yf?
Laek detectors (SAE J2913) designed and approved to detect leaks of R-134a or R-1234yf are also useful for R-44A. R-444A is slightly flammable, so leaks of this mixture should be treated in the same way as leaks of R-1234yf.

What is the overall performance of R-444A compared to R-1234yf?
Although it is true that the system can absorb a little more power in the compressor, initially R-444A is able to cool faster. In the final balance, the overall performance of R-444A is higher than that of R-1234yf.