TECHNICAL DATA SHEET

R-1234ze(E)

Characteristics

R-1234ze refrigerant gas is an HFO. Like all HFO refrigerants, it does not damage the ozone layer. It has high thermal and chemical stability, low toxicity, and excellent compatibility with most materials.

R-1234ze is non-flammable according to ASHRAE standard 34 (ISO 817). However, it can ignite if mixed with pressurised air and exposed to strong ignition sources.
It is considered inert under storage and transport conditions, while in refrigeration or heat pump applications, it has a safety classification of **A2L** group **L2.**

Applications

R-1234ze can replace R-134a in chillers for industrial refrigeration and air conditioning.

Working and service conditions

- **R-1234ze is a single-component refrigerant, so it can be transferred in both liquid and gas phases.**
- As it is a single-component refrigerant, its glide is 0 Kelvin. In the event of significant leaks, the circuit can be refilled directly without the need to recover the remaining charge in the circuit.

Lubricants

It is miscible with synthetic polyester (POE) and polyalkylene glycol (PAG) oils, so it should always be used with these types of oils.

Environmental data

- R-1234ze does not contain chlorine, so its ODP (Ozone Depletion Potential) is equal to 0.
- For Europe, R-1234ze has a GWP (Global Warming Potential) of 1.37 based on the sixth assessment report adopted by the Intergovernmental Panel on Climate Change, in accordance with Annex II of the F-Gas Regulation 2024/573.
- In countries outside the European Union where the fourth assessment report adopted by the Intergovernmental Panel on Climate Change remains in force, a GWP of 7 is considered.
- Its bioaccumulation has been determined to be unlikely based on the n-octanol/water partition coefficient.
- Based on studies conducted to date, R-1234ze is considered to be a product with low toxicity to aquatic organisms, whether invertebrates, fish or algae.

Toxicity, safety and storage

R-1234ze is a substance with very low toxicity. R-1234ze containers should be stored in cool, well-ventilated areas away from heat sources. R-1234ze vapours are heavier than air and can cause suffocation by reducing the oxygen in the air you breathe. Protect yourself from sunlight and avoid exposing it to temperatures above 50 °C.

A unique feature of R-1234ze is that it is non-flammable when mixed with air at ambient temperatures below 30°C. It is therefore considered non-flammable for handling, storage and transport.

- Animal studies show that R-1234ze has no acute toxicity when ingested, inhaled or absorbed through the skin.
- Studies conducted to date also conclude that it is not a substance that causes respiratory or skin sensitisation.
- Studies conducted to date in animals have shown that R-1234ze does not produce teratogenic (reproductive), carcinogenic or mutagenic effects, and is therefore unlikely to pose a risk to humans.

Regarding safety and storage, it should be noted that:

- R-1234ze containers should be stored in cool, well-ventilated areas away from heat sources below 50 °C.
- R-1234ze vapours are heavier than air and therefore tend to accumulate near the ground.

Please refer to the R-1234ze Safety Data Sheet for further information on toxicity, safety, storage and transport studies.

Components

Chemical name	% by weight	CAS No.	EC No.	REACH registration number
Trans-1,3,3,3-Tetrafluoroprop-1-ene	≥99.5 - ≤100	29118-24-9	471-480-0	01-0000019758-54

Physical properties

Property	Units	R-1234ze(E)
Molecular weight	g/mol	114.04
Liquid density (at 25°C)	kg/l	1.163
Liquid density (at 0°C)	kg/l	1.240
Boiling point (at 1 atm)	°C	-18.98
Glide	K	0
Liquid viscosity (25°C)	cP	0.199
Vapour viscosity (25 °C)	cP	0.0123

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Property	Units	R-1234ze(E)
Vapour pressure (25ºC)	bar	6.826
Specific heat in liquid phase (25ºC)	kJ/kg·K	1.386
Specific heat in vapour phase (25ºC)	kJ/kg·K	0.889
Freezing point (1.013 bar)	°C	-104.53
Absolute critical pressure	bar	36.35
Critical density	kg/l	0.489
Critical temperature	°C	109.4
Heat of vaporisation at boiling point	kJ/kg	195.6
Vapour density at boiling point	kg/l	0.00547
Thermal conductivity in liquid phase (25ºC)	W/m·K	0.07420
Thermal conductivity in vapour phase (25 °C)	W/m·K	0.01359
ODP		0
GWP IPCC6 / IPCC4		1.37* / 7
Toxicity		No

* According to IPCC-AR6/CIE (Sixth Assessment Report of the Intergovernmental Panel on Climate Change), in accordance with Annex II of the F-Gas Regulation 2024/573.

Cylinders for R-1234ze(E)

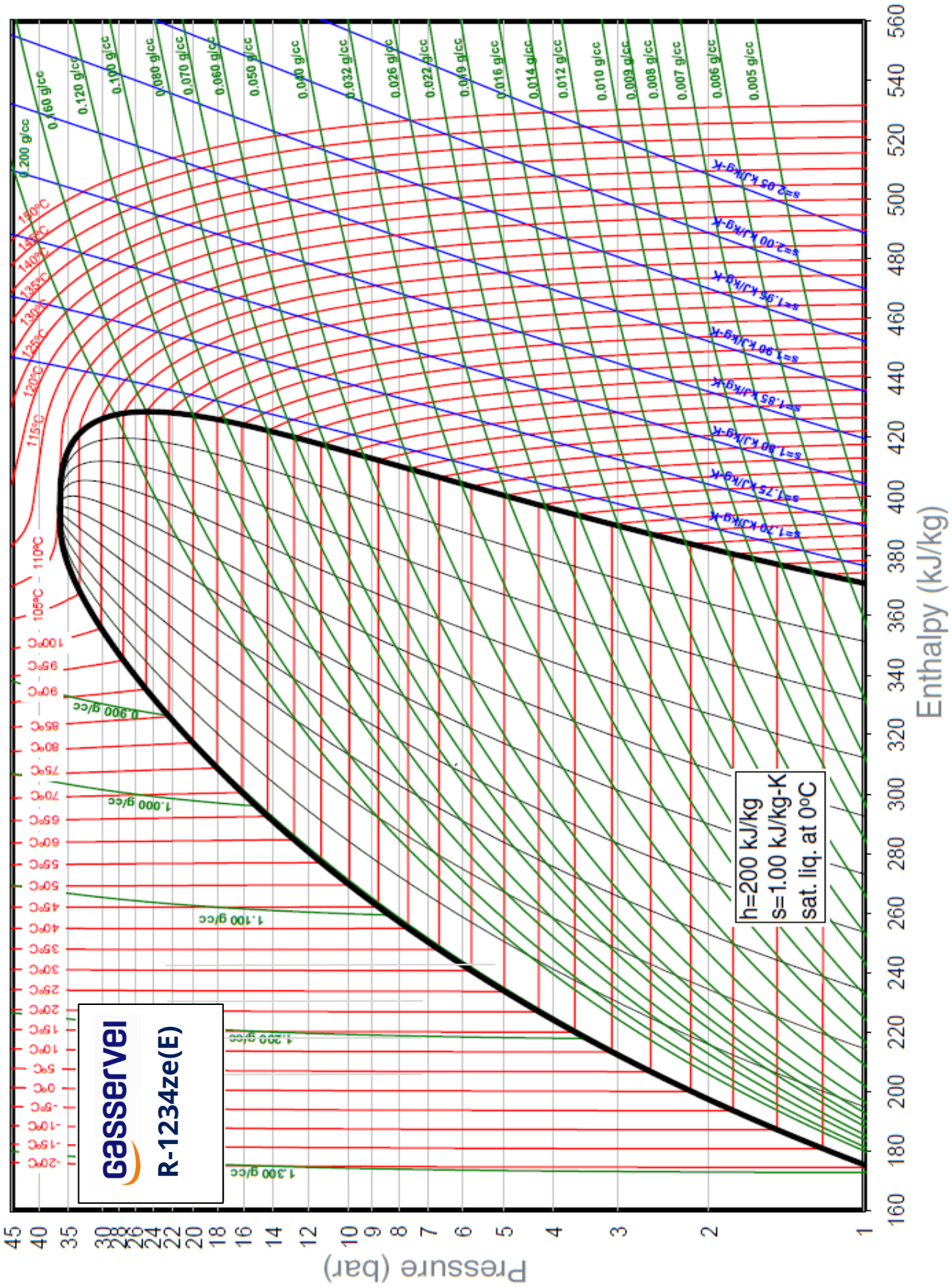
In Europe, containers for R-1234ze(E) must be refillable in accordance with F-gas Regulation 2024/573 and must comply with the following specifications:

- Green cap.
- Right-hand thread.
- Minimum test pressure: 15 bar

Pressure/temperature tables

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
-50	0.21	0.21	1,375	1.30	136.20	348.81	0.7429	1.6956
-45	0.28	0.28	1.362	1.71	142.42	352.37	0.7704	1.6907
–40	0.37	0.37	1.350	2.21	148.66	355.94	0.7975	1.6865
–35	0.48	0.48	1.336	2.81	154.94	359.51	0.8241	1.6831
–30	0.61	0.61	1.323	3.55	161.25	363.09	0.8503	1.6803
–25	0.77	0.77	1.310	4.43	167.60	366.65	0.8761	1.6782
–20	0.97	0.97	1.296	5.47	173.99	370.20	0.9015	1.6766
–15	1.20	1.20	1.283	6.70	180.72	373.74	0.9266	1.6754
–10	1.47	1.47	1.269	8.13	186.90	377.25	0.9513	1.6747
–5	1.79	1.79	1.255	9.79	193.42	380.73	0.9758	1.6743
0	2.17	2.17	1.240	11.71	200.00	384.18	1	1.6743
5	2.59	2.59	1.225	13.92	206.63	387.59	1.0239	1.6745
10	3.08	3.08	1.210	16.45	213.32	390.96	1.0476	1.6750
15	3.64	3.64	1.195	19.33	220.08	394.27	1.0711	1.6756
20	4.27	4.27	1.179	22.61	226.90	397.53	1.0944	1.6765
25	4.99	4.99	1.163	26.32	233.80	400.72	1.1175	1.6774
30	5.78	5.78	1.146	30.52	240.78	403.83	1.1405	1.6784
35	6.67	6.67	1.129	35.27	247.84	406.87	1.1634	1.6794
40	7.66	7.66	1.112	40.64	255.00	409.80	1.1861	1.6805
45	8.76	8.76	1.093	46.69	262.27	412.63	1.2088	1.6815
50	9.97	9.97	1,074	53.54	269.64	415.33	1.2315	1.6823
55	11.30	11.30	1.054	61.29	277.14	417.88	1.2541	1.6830
60	12.77	12.77	1.033	70.08	284.78	420.26	1.2768	1.6835
65	14.36	14.36	1.010	80.09	292.58	422.45	1.2996	1.6836
70	16.11	16.11	986	91.56	300.56	424.40	1.3225	1.6834
75	18.01	18.01	961	104.80	308.74	426.07	1.3456	1.6826
80	20.08	20.08	933	120.23	317.19	427.38	1.3691	1.6811
85	22.32	22.32	902	138.48	325.95	428.25	1.3930	1.6787
90	24.76	24.76	867	160.57	335.12	428.52	1.4177	1.6749
95	27.40	27.40	827	188.22	344.89	427.93	1.4435	1.6691
100	30.26	30.26	777	225.01	355.59	425.95	1.4715	1.6600
105	33.38	33.38	708	281.02	368.23	421.12	1.5040	1.6438

Ph chart


Pressure (bar)
Enthalpy (kJ/kg)
gasservei
R-1234ze(E)
h=200 kJ/kg
s=1.00 kJ/kg-K
sat. liq. at 0°C

Material compatibility

Material	C	PC	NC
HNBR	X		
Neoprene	X		
Polyester		X	
Nylon	X		
Epoxy	X		
Polyamide	X		
Silicone rubber	X		
EPDM	X		
Neoprene	X		
Silicone	X		
Butyl rubber		X	
PVDF			X
VDF			X
HFP			X

C = Compatible PC = Somewhat Compatible NC = Not Compatible