TECHNICAL
DATA SHEET

R-32

Features and uses

R-32 refrigerant gas is a pure HFC, with zero impact on the ozone layer and low global warming potential, used in its pure form in new small air-conditioning and refrigeration equipment as well as having being commonly used as a component in various HFC mixtures.

R-32 is suitable for new equipment specifically designed for R-32, in applications that used to use R-410A.

Its GWP of 675 is within the acceptable limits for refrigerant gases used in new equipment (splits) with a load less than 3 kg, put on the market from 01/01/2025, in compliance with European Regulation (EC) No. 517/2014.

Some of its main characteristics are:

- It is a more energetically efficient refrigerant than R-410A and has a GWP of 675, which is 68% lower than R-410A.
- Its refrigeration capacity is similar to that of R-22 and R-502.
- The equipment requires less refrigerant charge compared to R-410A.
- Same tubing and POE oils as R-410A.
- Safety classification: A2L, low toxicity and low flammability.

Applications

- Initially used in some new air-conditioning equipment, it is also starting to be considered as an alternative at low temperatures.
- It has been used as a component in well-known industry HFC mixtures such as R-407C, R-410A, R-442A (RS-50), R-407F, R-453A (RS-70), etc.
- R-32 is classified as “flammable” and is therefore not a refrigerant designed for refits of R-410A.

Conditions for service and work

Given that R-32 is a pure refrigerant, it can be transferred in both the liquid phase and gas phase.

As it is a pure refrigerant, it has no temperature glide. In the event of a leak, the equipment can be filled directly without the need to recover the remaining refrigerant in the circuit.

Lubricants

R-32 is compatible with polyester oils. In air-conditioning applications, the same oils used with R-410A will be valid for R-32.

NB: According to a US study by the Air-conditioning and Refrigeration Technology Institute, Inc., published in 1993, it was observed that R-32 was not miscible in all concentrations of synthetic POE oils from temperatures below -10°C. This point must be taken into account for mixtures developed for working at low refrigeration temperatures.

Environmental Information

R-32 is free from chlorine, and therefore has an ODP (ozone depletion potential) of 0.
RS-32 has a **low** potential for directly affecting global warming, thereby reducing CO2 emissions in the event of direct leakage.

Safety

R-32 is listed as "mildly flammable" according to ASHRAE 34 and the ISO 817, standard and it would only ignite if its concentration were between the lower and upper flammability limits:

	Lower flammability limit	Upper flammability limit
R-32 concentration	13,3%	29,3%

CERI + Kayak Japan 2011

R-32 is classified as A2L (Group L2), i.e., low flammability as the combustion speed is rather low and it is non-toxic.

Toxicity and storage

R-32 is a substance with very little toxicity. The LC50 4-hour inhalation rate in rats is 1,107,000 mg/m3 (OECD 403) and the NOEL in relation to heart problems is approximately 735,000 mg/m3 in dogs. R-32 containers should be stored in cool, well-ventilated areas, away from open flames, sparks and heat sources. Avoid exposure to direct sunlight and accumulation of static discharges. Keep away from food, drink and animal feed.

Components

Chemical name	% by weight	EC No.	CAS No.	REACH Registration No.
Difluoromethane R-32	100	200-839-4	75-10-5	01-2119471312-47-XXXX

Physical properties

PHYSICAL PROPERTIES	UNITS	R-32
Formula		CH_2F_2
Molecular weight		52.024
Liquid density (25°C)	kg/l	0.9588
Boiling point (1 atm)	°C	-51.7
Liquid viscosity (20°C)	cP	0.121
Vapour viscosity (20°C)	cP	0.01238
Surface tension (20°C)	mN/m	7.0
Vapour pressure (25°C)	bar	16.897
Specific heat of liquid (25°C)	kJ/kg.K	1.884
Specific heat of vapour (25°C)	kJ/kg.K	0.82633
Freezing point	°C	-136
Critical temperature	°C	78.35
Critical pressure	bar	58.16
Critical density	kg/l	0.429756
Heat of vaporisation at boiling point (25°C)	kJ/kg	270.22
Vapour density (Air=1)		186
Vapour pressure at 20°C	mmHg	10319
Vapour density at 20°C	g/ml	0.98
Limits of combustion (High)	% v/v	31.0 ASTM 681-85
Limits of combustion (Low)	% v/v	14.0 ASTM 681-85
Solubility of R32 in water at 25°C	log	0.21
COP		95
Flammability		A2L
ODP		0
GWP		675 *
Toxicity		No

*According to IPPCC-AR4/CIE (Fourth Assessment Report of the Intergovernmental Panel on Climate Change) -2007.

Containers for R-32

Refillable containers for R-32 must meet the following specifications:

- Upper part of container red in colour (flammable).
- Left screw thread (an adaptor is required to connect to the charge hoses).
- Minimum pressure test: 48 bar.

Thermodynamic properties

Obtained through the REFPROP program

TEMP. °C	Pressure Absolute [bar]	Density Liquid [kg/m3]	Density Vapour [kg/m3]	Enthalpy Liquid [kJ/kg]	Enthalpy Vapour [kJ/kg]	Entropy Liquid [kJ/K·kg]	Entropy Vapour [kJ/K·kg]
-50	1.1014	1208.40	3.2316	117.22	497.27	0.6683	2.3714
-48	1.2163	1202.80	3.5477	120.40	498.26	0.6824	2.3607
-46	1.3405	1197.20	3.8877	123.60	499.23	0.6965	2.3502
-44	1.4745	1191.50	4.2530	126.80	500.17	0.7105	2.3399
-42	1.6188	1185.90	4.6450	130.01	501.11	0.7244	2.3298
-40	1.7741	1180.20	5.0651	133.23	502.02	0.7382	2.3200
-38	1.9409	1174.40	5.5147	136.45	502,91	0.7519	2.3103
-36	2.1197	1168.60	5.9952	139.69	503.78	0.7655	2.3008
-34	2.3111	1162.80	6.5084	142.93	504.63	0.7791	2.2916
-32	2.5159	1156.90	7.0557	146.18	505.47	0.7926	2.2824
-30	2.7344	1151.00	7.6389	149.45	506.27	0.8060	2.2735
-28	2.9675	1145.00	8.2598	152.72	507.06	0.8193	2.2647
-26	3.2157	1138.90	8.9201	156.01	507.83	0.8326	2.2561
-24	3.4796	1132.90	9.6218	159.31	508.57	0.8458	2.2476
-22	3.7600	1126.70	10.3670	162.62	509.28	0.8589	2.2392
-20	4.0575	1120.60	11.1570	165.94	509.97	0.8720	2.2310
-18	4.3728	1114.30	11.9950	169.28	510.64	0.8850	2.2229
-16	4.7067	1108.00	12.8830	172.63	511.28	0.8979	2.2149
-14	5.0597	1101.70	13.8230	175.99	511.89	0.9109	2.2070
-12	5.4327	1095.20	14.8180	179.37	512.47	0.9237	2.1992
-10	5.8263	1088.80	15.8700	182.76	513.02	0.9365	2.1915
-8	6.2414	1082.20	16.9820	186.18	513.54	0.9493	2.1839
-6	6.6786	1075.60	18.1570	189.60	514.03	0.9620	2.1764
-4	7.1388	1068.90	19.3980	193.05	514.49	0.9747	2.1690
-2	7.6226	1062.10	20.7080	196.52	514.91	0.9874	2.1616
0	8.1310	1055.30	22.0910	200.00	515.30	1.0000	2.1543
2	8.6647	1048.30	23.5500	203.50	515.65	1.0126	2.1471
4	9.2245	1041.30	25.0900	207.03	515.96	1.0252	2.1399
6	9.8113	1034.20	26.7140	210.58	516.24	1.0377	2.1327

WARNING!!!
Pressures are absolute; 1 must remain to obtain manometric pressure

Thermodynamic properties

Obtained through the REFPROP program

TEMP. °C	Pressure Absolute [bar]	Density Liquid [kg/m3]	Density Vapour [kg/m3]	Enthalpy Liquid [kJ/kg]	Enthalpy Vapour [kJ/kg]	Entropy Liquid [kJ/K·kg]	Entropy Vapour [kJ/K·kg]
8	10.4260	1027.00	28.4260	214.15	516.47	1.0503	2.1256
10	11.0690	1019.70	30.2320	217.74	516.66	1.0628	2.1185
12	11.7420	1012.20	32.1370	221.36	516.80	1.0753	2.1114
14	12.4450	1004.70	34.1450	225.01	516.90	1.0878	2.1043
16	13.1790	997.06	36.2640	228.68	516.95	1.1003	2.0972
18	13.9460	989.28	38.4980	232.39	516.95	1.1128	2.0902
20	14.7460	981.38	40.8560	236.12	516.90	1.1253	2.0831
22	15.5790	973.34	43.3440	239.89	516.79	1.1378	2.0760
24	16.4480	965.16	45.9710	243.69	516.62	1.1503	2.0688
26	17.3530	956.82	48.7450	247.53	516.39	1.1629	2.0616
28	18.2950	948.31	51.6760	251.40	516.09	1.1755	2.0544
30	19.2750	939.62	54.7760	255.32	515.72	1.1881	2.0471
32	20.2940	930.75	58.0560	259.28	515.29	1.2007	2.0397
34	21.3530	921.67	61.5300	263.28	514.77	1.2134	2.0322
36	22.4540	912.37	65.2110	267.34	514.17	1.2262	2.0246
38	23.5970	902.83	69.1180	271. 5	513.49	1.2391	2.0169
40	24.7830	893.04	73.2680	275.61	512.71	1.2520	2.0091
42	26.0140	882.96	77.6840	279.84	511.82	1.2650	2.0011
44	27.2920	872.58	82.3890	284.13	510.83	1.2781	1.9929
46	28.6160	861.86	87.4120	288.50	509.72	1.2914	1.9845
48	29.9890	850.77	92.7860	292.95	508.48	1.3048	1.9759
50	31.4120	839.26	985.500	297.49	507.10	1.3183	1.9670
52	32.8870	827.28	104.7500	302.12	505.57	1.3321	1.9578
54	34.4150	814.78	111.4400	306.87	503.86	1.3461	1.9482
56	35.9970	801.68	118.6900	311.74	501.95	1.3603	1.9382
58	37.6350	787.90	126.5800	316.75	499.82	1.3749	1.9277
60	39.3320	773.31	135.2100	321.93	497.44	1.3898	1.9166

WARNING!!!
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Mollier Diagram