



Features and uses

R-23 is an azeotropic HFC refrigerant with a zero ozone depletion potential for use in new equipment that works at very low temperatures (around -60 to -100 °C). It is also an indirect substitute (retrofit) for R-13 and R-503.

It has great thermal and chemical stability, low toxicity and is not flammable. It is also highly compatible with the majority of materials. Its safety classification is **A1 group L1**.

It is miscible with polyolester oils (POE) so it should always be used with these kinds of synthetic oils. It is not miscible with traditional R-13 and R-503 oils (mineral and alkylbenzene).

R-23 is used only in cascade systems, at evaporation temperatures between -60 and -100 °C and condensation temperatures between -10 and -40 °C. Its thermodynamic properties are very similar to R-13.

Applications:

- Industrial refrigeration plants (e.g. gas separation and chemical processing).
- Pharmaceutical production plants.
- Medical purposes (e.g. blood banks).
- Material testing.
- Cryomats and cryostats.
- High vacuum.

Using the same refrigerant charge with R-23 as with R-13 and R-503 requires a larger expansion tank. It is therefore recommended to charge R-23 initially using the same static pressure used for R-13 and R-503. The optimum charge will be approximately 10-20% lower in weight than for R-13 and R-503.

Toxicity and storage

R-23 is a substance with a very low toxicity. Prolonged exposure may lead to heart arrhythmia and could cause sudden death. High atmospheric concentrations could cause anaesthetic effects and asphyxiation. R-23 vapours are heavier than the air, so tend to accumulate near the floor.

R-23 cylinders should be stored in a cool and well-ventilated place, away from heat sources.

Components

Chemical Name	% By weight	CAS N °	EC N °
Trifluoromethane (R-23)	100	75-46-7	200-872-4



Physical properties

PHYSICAL PROPERTIES	UNITS	R-23
Molecular weight	(g/mol)	70
Boiling point (at 1,013 bar)	(°C)	-82.03
Freezing point	(°C)	-155.1
Critical temperature	(°C)	25.9
Critical pressure	(bar)	48.3
Density (25°C y 1,013 bar)	(Kg/m ³)	2.9
Vapour pressure (25°C)	(bar abs)	47.054
Solubility in water (25°C)	(g/l)	0.838
Auto-ignition temperature	(°C)	765
Temperature glide	(°C)	0
Flammability		No
ODP	-	0
GWP	-	14800 *

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

Pressure / temperature table

TEMP. (°C)	ABSOLUTE PRESSURE (bar)		DENSITY (Kg/m ³)		ENTHALPY (kJ/Kg)	
	BUBBLE	DEW	BUBBLE	DEW	BUBBLE	DEW
-80	1.137	1.137	1437.9	5.1955	87.104	324.81
-75	1.4955	1.4955	1418.6	6.7226	93.346	326.84
-70	1.9370	1.9370	1398.9	8.5821	99.641	328.79
-65	2.4737	2.4737	1378.7	10.824	106.00	330.65
-60	3.1188	3.1188	1358.1	13.503	112.43	332.40
-55	3.8859	3.8859	1337	16.682	118.93	334.02
-50	4.7892	4.7892	1315.3	20.43	125.53	335.52
-45	5.8439	5.8439	1292.9	24.83	132.22	336.86
-40	7.0653	7.0653	1269.7	29.972	139.02	338.04
-35	8.4697	8.4697	1245.6	35.969	145.95	339.04
-30	10.074	10.074	1220.5	42.95	153.03	339.82
-25	11.895	11.895	1194.2	51.079	160.26	340.36
-20	13.953	13.953	1166.6	60.556	167.68	340.62
-15	16.265	16.265	1137.2	71.639	175.32	340.55
-10	18.853	18.853	1105.9	84.672	183.21	340.09
-5	21.739	21.739	1072.1	100.12	191.42	339.16
0	24.947	24.947	1035.1	118.67	200.00	337.64
5	28.503	28.503	993.88	141.34	209.08	335.36
10	32.438	32.438	946.75	169.87	218.84	332.01
15	36.791	36.791	890.35	207.58	229.64	327.06
20	41.61	41.61	816.43	262.79	242.36	319.17
25	46.986	46.986	680.09	379.91	261.94	301.55

Mollier Diagram

