



## Types and properties of fluorocarbons BACK ←

	H F C						HFC mixed refrigerant			HCFC				Mixed refrigerant with CFC	C F C		
Product name	HFC-23	HFC-32	HFC-125	HFC-134a	HFC-143a	HFC-152a	R-404A	R-407C	R-410A	HCFC-22	HCFC-123	HCFC-141b	HCFC-142b	R-502	R-11	R-12	R-113
Component	HFC-23	HFC-32	HFC-125	HFC-134a	HFC-143a	HFC-152a	HFC-125/143a/134a	HFC-32/125/134a	HFC-32/125	HCFC-22	HCFC-123	HCFC-141b	HCFC-142b	HCFC-22/ CFC-115 (Azeotropic blend)	CFC-11	CFC-12	CFC-113
Chemical Formula	CHF <sub>3</sub>	CH <sub>2</sub> F <sub>2</sub>	CHF <sub>2</sub> CF <sub>3</sub>	CH <sub>2</sub> FCF <sub>3</sub>	CH <sub>3</sub> CF <sub>3</sub>	CH <sub>3</sub> CHF <sub>2</sub>	①	②	③	CHClF <sub>2</sub>	CHCl <sub>2</sub> CF <sub>3</sub>	CH <sub>3</sub> CCl <sub>2</sub> F	CH <sub>3</sub> CClF <sub>2</sub>	④	CCl <sub>3</sub> F	CCl <sub>2</sub> F <sub>2</sub>	CCl <sub>2</sub> FCClF <sub>2</sub>
Molar Mass	70.0	52.0	120.0	102.0	84.0	66.05	97.6	86.2	72.6	86.5	152.9	117.0	100.5	111.6	137.4	120.9	187.4
Boiling Point (°C)	-82.0	-51.7	-48.5	-26.2	-47.3	-25.0	-46.8	-43.6	-51.6	-40.8	27.7	32.2	-9.3	-45.3	23.7	-29.8	47.7
Critical Temperature (°C)	25.9	78.4	66.3	101.2	73.1	113.5	72.0	85.6	71.5	96.2	183.7	204.2	137.2	82.2	198.1	111.8	214.4
Critical Pressure (MPa)	4.82	5.83	3.63	4.07	3.81	4.49	3.72	4.61	4.92	4.99	3.67	4.25	4.12	4.07	4.41	4.12	3.46
Saturated Vapor Pressure (20°C) (MPa)	4.20	1.48	1.21	0.57	1.11	0.51	1.25	1.19	1.66	1.04	0.09	0.08	0.34	1.15	0.11	0.65	0.04
Latent Heat of Vaporization (at boiling point) (kJ/kg)	243	384	161	216	231	318	207	250	275	233	170	213	233	172	181	166	144
Thermal Conductivity (25°C) Saturated liquid (mW/m²K)	55	135	52	82	67	105	68	86	80	87	76	94	86	65	84	70	73
Thermal Conductivity (25°C) Normal Pressure Vapor (mW/m²K)	14	12	13	13	14	13	14	13	13	11	9	10	11	11	8	10	8
Range of Flammability (vol% in air)	Non-combustible	13.6~28.4	Non-combustible	Non-combustible	8.1~21.0	4.0~19.6	Non-combustible	Non-combustible	Non-combustible	Non-combustible	Non-combustible	6.5~15.5	7.8~16.8	Non-combustible	Non-combustible	Non-combustible	Non-combustible
Flash Point (°C)	-	-	-	-	-	-	-	-	-	-	None	None	-	-	None	-	None

Ozone Depletion Potential <sup>⑤</sup>	0	0	0	0	0	0	0	0	0	0.055	0.02	0.11	0.065	(0.33)	1.0*	1.0*	0.8*
Global Warming Potential <sup>⑦</sup>	11700	650	2800	1300	3800	140	3300	1500	1700	1700	93	630	2000	560	4000	8500	5000
Allowable Exposure Limit (ppm) <sup>⑧</sup>	1000 *6	1000 *3	1000 *3	1000 *3	1000 *3	1000 *3	See specific component.	See specific component.	See specific component.	1000 *1	50 *3	500 *3	1000 *4	1000 for all components*2	1000 *1	500 *1	500 *1
Acute Inhalation toxicity LC50(%) (4 hour Rat)	>20	>76 (ALC)	>80 (ALC)	>50 (ALC)	>54	>6.4 (ALC)	See specific component.	See specific component.	See specific component.	22	3.2	6.2	12.8 (ALC)	HCFC-22 22 CFC-115 >80 (ALC)	2.62	62 (ALC)	5.25
Existing Chemical Substance Number ( Japan )	2-47	2-3705	2-3713	2-3585	2-3584	2-86	See specific component.	See specific component.	See specific component.	2-93	2-97	2-3682	2-100	2-93/2-87	2-2365	2-50	2-95
CAS Number	75-46-7	75-10-5	354-33-6	420-46-2	420-46-2	75-37-6	354-33-6 420-46-2 811-97-2	75-10-5 54-33-6 811-97-2	75-10-5 354-33-6	75-45-6	306-83-2	1717-00-6	75-68-3	75-45-6 76-15-3	75-69-4	75-71-8	76-13-1
EINECS Number	2008724	2008394	2065578	2123770	2069965	2008661	2065578 2069965 2123770	2008394 2065578 2123770	2008394 2065578	2008719	2061903	4040801	2008918	2008719 2009382	2008923	2008939	2009361

① CHF<sub>2</sub>CF<sub>3</sub>/CH<sub>3</sub>CF<sub>3</sub>/CH<sub>2</sub>FCF<sub>3</sub>(44/52/4mass%)

② CH<sub>2</sub>F<sub>2</sub>/CHF<sub>2</sub>CF<sub>3</sub>/CH<sub>2</sub>FCF<sub>3</sub>(23/25/52mass%)

③ CH<sub>2</sub>F<sub>2</sub>/CHF<sub>2</sub>CF<sub>3</sub>(50/50mass%)

④ CHClF<sub>2</sub>/CClF<sub>2</sub>CF<sub>3</sub>(48.8/51.2mass%)

⑤ Cited in Fire Prevention law because it is a liquid at atmospheric pressure and ambient temperature.

⑥ Figures based on December 1991 announcement by AFEAS. However, figures marked with \* specified in the Montreal Protocol. Figures in ( ) are estimates.

⑦ Global warming coefficient is expressed for an integrated time of 100 years based on IPCC 1995. Mixed refrigerants are computed based on this.

⑧ Threshold Limit Value:  
 \*1 Recommended by the Japan Society for Occupational Health  
 \*2 TLV-TWA of ACGIH  
 \*3 WEEL-TWA of AIHA  
 \*4 MAK-TWA of the Deutsche Forschungs-Gemeinschaft  
 \*5 Tentative figure of some PAFT members  
 \*6 Tentative figure according to simplified tests

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