Kryon® HFO 1234yf

The ideal Low Global Warming Potential refrigerant for mobile air conditioning

HFO 1234yf has been developed at Buffalo Research Laboratory by Honeywell Fluorochemicals with the aim of replacing R134a in motor vehicle air conditioning.
Its thermodynamic characteristics make HFO 1234yf very similar to R134a in performance, energetic efficiency and working pressures.
By using Kryon® HFO 1234yf automobile manufacturers have been able to adapt easily systems working with R-134a, and achieve similar performance, sometimes even better; moreover Kryon® HFO 1234yf was successfully introduced by leading manufacturers of latest generation chiller with high performance. Even compared to carbon dioxide - CO_2, HFO 1234yf boasts a better energetic efficiency and a lower contribution to the total greenhouse effect (Direct Effect – Indirect Effect). Its limited Direct Greenhouse Effect (GWP <1 Kg/CO_2) makes HFO 1234yf the best possible solution from an environmental point of view. With its energetic efficiency, HFO 1234yf is the best solution for motor vehicle air conditioning.

Physical Properties	UM	Kryon® HFO1234yf
Chemical Formula	-	CF_3-CF=CH_2
Environmental Classification	-	HFO
Molecular Weight	gr/grmole	114,04
Saturated Vapour Temperature @ 1,013 bar	°C	-29,19
Temperature Glide @ 1,013 bar	K	0,00
Density of Liquid @ 25°C	kg/m³	1.091,90
Density of Saturated Vapour @ 1,013 bar	kg/m³	6,05
Pressure of Saturation (Saturated Liquid) @ 25°C Pressure of Saturation (Saturated Liquid) @ 50°C	bar_rel bar_rel	5,81 12,01
Critical Temperature Critical Pressure Critical Density	°C bar_rel kg/m³	94,70 32,81 475,55
Heat of Evaporation @ 1,013 bar	kJ/Kg	180,09
Specific Entropy of Liquid @ 25°C Specific Entropy of Vapour @ 25°C	kJ/Kg*°C kJ/Kg*°C	0,26 0,74
CP/CV Ratio @ 25°C - 1,013 bar_ass		1,13
ODP	(R11 = 1)	0
OEL/PEL	ppm(v/v)	500
RCL/IDLH	ppm(v/v)	16.000
Atmosferic Life Time	Years	0,03 (c.a.)
GWP - IPCC rev. 4 (IPCC rev. 5)	(CO_2 = 1)	4 (1)
ASHRAE Standard 34 Safety Rating		A2L
Lower Flammability Limit	%	6,50
Classification according to Directive 97/23/CE PED	Group	1
AIT	°C	405,00

Applications

Kryon® HFO 1234yf is used in air conditioner of new car models and, similarly to HFO1234ze belonging to the same family, also in high performance chillers.
Retrofitting R-134a to HFO 1234yf, is not possible, since HFO 1234yf is slightly flammable.

Performance

- Cooling power similar to R-134a.
- Energetic efficiency similar to R-134a.
- Working pressures similar to R-134a.
- Low Global Warming Potential: LGWP <1 kg CO_2.
- Low pressure refrigerant.
- Mild flammability (ASHRAE classification = A2L).

Recommended Lubricants

Kryon® HFO 1234yf is compatible with POE oils and PAG oils.

Packaging

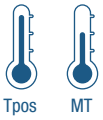
Item Code	Gas Q.ty Kg	Container	Capacity Lt	Pressure	Valve	Sales Unit	N° Pieces per Pack	N° Cylinders per Pallets	GWP per Pack (TonCO_2 eq.)
F-GF-HFOYF-13LT	10	Cylinder	13	42 bar	W 21,8 x 1/14" LH	KG	1	30	0,010
F-GF-HFOYF-10K-EITA	10	Cylinder	13	42 bar	½" - 16 ACME LH	NR	1	30	0,010
F-GF-HFOYF-6LT	5	Cylinder	6	42 bar	W 21,8 x 1/14" LH	KG	1	45	0,005
F-GF-HFOYF-5K-EXITA	5	Smartbox	6,4	42 bar	½" - 16 ACME LH	NR	1	45	0,005
F-GF-HFOYF-3LT	3	Cylinder	3,1	42 bar	Quick Coupling HP - J639	KG	1	60	0,003
F-GF-MI-HFOYF-3,1LT	3	Smartbox	3,1	42 bar	Quick Coupling HP - J639	NR	1	60	0,003

GeneralGas

Applications

GWP

ODP



Temperature

LEGEND

Low GWP
Medium GWP
High GWP

Zero ODP
Low ODP
Medium ODP

Tpos MT BT BBT

Thermodynamic Properties of Kryon® HFO 1234yf

Temperature	Vapour Pressure	Density		Enthalpy		Entropy	
		Saturated Liquid	Saturated Vapour	Saturated Liquid	Saturated Vapour	Saturated Liquid	Saturated Vapour
°C	bar_rel	kg/m³	kg/m³	KJ/kg	KJ/kg	KJ/kg*K	KJ/kg*K
-50	-0,64	1.318,40	2,35	-23,79	166,43	-0,102	0,751
-48	-0,60	1.313,20	2,60	-21,53	167,77	-0,092	0,749
-46	-0,55	1.307,90	2,87	-19,25	169,11	-0,082	0,748
-44	-0,50	1.302,60	3,15	-16,97	170,46	-0,072	0,746
-42	-0,45	1.297,20	3,46	-14,67	171,81	-0,062	0,745
-40	-0,39	1.291,90	3,79	-12,36	173,15	-,0052	0,744
-38	-0,33	1.286,50	4,15	-10,03	174,50	-0,042	0,743
-36	-0,26	1.281,00	4,54	-7,70	175,85	-0,032	0,742
-34	-0,19	1.275,60	4,95	-5,35	177,20	-0,022	0,741
-32	-0,11	1.270,10	5,39	-2,99	178,55	-0,012	0,741
-30	-0,02	1.264,50	5,86	-0,61	179,90	-0,003	0,740
-28	0,07	1.259,00	6,36	1,77	181,25	0,007	0,739
-26	0,16	1.253,40	6,89	4,17	182,59	0,017	0,739
-24	0,27	1.247,70	7,46	6,58	183,94	0,027	0,738
-22	0,38	1.242,00	8,07	9,01	185,28	0,036	0,738
-20	0,50	1.236,30	8,71	11,45	186,63	0,046	0,738
-18	0,62	1.230,50	9,39	13,90	187,97	0,056	0,738
-16	0,75	1.224,70	10,12	16,36	189,30	0,065	0,738
-14	0,90	1.218,80	10,89	18,84	190,64	0,075	0,738
-12	1,05	1.212,90	11,70	21,33	191,97	0,084	0,738
-10	1,20	1.207,00	12,56	23,84	193,30	0,094	0,738
-8	1,37	1.200,90	13,47	26,36	194,62	0,103	0,738
-6	1,55	1.194,90	14,43	28,89	195,94	0,113	0,738
-4	1,74	1.188,70	15,45	31,44	197,25	0,122	0,738
-2	1,94	1.182,50	16,52	34,00	198,56	0,132	0,739
0	2,15	1.176,30	17,65	36,58	199,87	0,141	0,739
2	2,36	1.170,00	18,84	39,17	201,16	0,150	0,739
4	2,60	1.163,60	20,09	41,77	202,45	0,160	0,740
6	2,84	1.157,20	21,41	44,39	203,74	0,169	0,740
8	3,09	1.150,60	22,80	47,03	205,01	0,178	0,740
10	3,36	1.144,00	24,27	49,68	206,28	0,188	0,741
12	3,64	1.137,40	25,81	52,35	207,54	0,197	0,741
14	3,94	1.130,60	27,43	55,03	208,79	0,206	0,742
16	4,25	1.123,80	29,13	57,73	210,02	0,215	0,742
18	4,57	1.116,90	30,92	60,44	211,25	0,225	0,743
20	4,90	1.109,90	32,80	63,17	212,47	0,234	0,743
22	5,26	1.102,80	34,77	65,92	213,67	0,243	0,744
24	5,62	1.095,50	36,85	68,69	214,85	0,252	0,744
26	6,01	1.088,20	39,03	71,47	216,03	0,262	0,745
28	6,41	1.080,80	41,32	74,27	217,19	0,271	0,745
30	6,82	1.073,30	43,73	77,09	218,33	0,280	0,746
32	7,26	1.065,70	46,26	79,93	219,45	0,289	0,747
34	7,71	1.057,90	48,92	81,79	220,56	0,298	0,747
36	8,18	1.050,00	51,72	85,66	221,64	0,307	0,748
38	8,66	1.042,00	54,66	88,56	222,70	0,317	0,748
40	9,17	1.033,80	57,75	91,48	223,75	0,326	0,748
42	9,70	1.025,50	61,01	94,42	224,76	0,335	0,749
44	10,24	1.017,00	64,66	97,38	225,75	0,344	0,749
46	10,81	1.008,30	68,05	100,37	226,72	0,354	0,750
48	11,40	999,44	71,86	103,39	227,65	0,363	0,750
50	12,01	990,38	75,88	106,43	228,56	0,372	0,750
52	12,64	981,10	80,13	109,50	229,43	0,381	0,750
54	13,30	971,59	84,62	112,60	230,26	0,391	0,750
56	13,98	961,80	89,37	115,73	231,05	0,400	0,750
58	14,68	951,73	94,41	118,90	231,80	0,409	0,750
60	15,41	941,34	99,75	122,10	232,51	0,419	0,750
62	16,16	930,60	105,44	125,35	233,16	0,428	0,750
64	16,94	919,46	111,50	128,63	233,76	0,438	0,750
66	17,74	907,89	117,96	131,97	234,29	0,447	0,749
68	18,57	895,83	124,89	135,36	234,76	0,457	0,749
70	19,43	883,23	132,33	138,80	235,15	0,467	0,748