HARP INTERNATIONAL

Harp® 407C

Harp® 407C is a zero ozone depletion (ODP) hydrofluorocarbon (HFC) refrigerant blend. Harp® 407C is a ternary blend of R32, R125 and R134a (23%/25%/52%). It has been formulated to closely match the properties of HCFC R22. It is widely used in new equipment that would have previously used R22 and can with specific modifications be retrofitted into exiting R22 equipment.

APPLICATION

Harp® 407C applications include residential and commercial air conditioning systems, direct expansion fluid chillers and some commercial refrigeration systems. Since Harp® 407C has similar properties to R22, it is possible (with modifications) to use it in existing R22 systems. It should not be used in systems with a flooded evaporator.

PROPERTIES AND PERFORMANCE

Harp® 407C is designed to meet the needs of many new and existing air conditioning and refrigeration systems. Harp® 407C is a zeotropic HFC refrigerant blend rated A1 by ASHRAE (lowest levels of toxicity and flammability), having zero ozone depletion potential and a Global Warming Potential of 1774.

LUBRICATION

POE lubricants must be used with Harp® 407C since it is not miscible with mineral or alkyl benzene lubricants found in most R22 systems. When retrofitting, a lubricant flushing procedure is necessary to reduce the original oil content below 5%. New R407C equipment will be charged with the OEM recommended lubricant, ready to use with Harp® 407C.

CHARGING

Due to the zeotropic nature of Harp® 407C, it should be charged as a liquid to prevent fractionation (changes in refrigerant composition due to vapour charging). In situations where vapour is normally charged into a system, a valve should be installed in the charging line to flash the liquid to vapour while charging.

RETROFITTING

Harp® 407C can be used to retrofit existing R22 systems in positive displacement, direct expansion refrigeration, and air conditioning equipment. R407C should not be used in centrifugal chillers or other equipment that uses a flooded evaporator, due to its high temperature glide.

MATERIAL COMPATIBILITY

Whenever retrofitting air-conditioning or refrigeration systems, compatibility of system materials must always be taken into consideration. Items such as elastomers, hoses, and filter-driers respond differently to different refrigerants and oils. For these reasons, before performing any refrigerant retrofit, Harp International recommends contacting the OEM for specific recommendations.

Harp International The Complete Worldwide Refrigerant Service
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Technical Data

HARP® 407C BASIC PROPERTIES

Chemical formula	R32: CH_2F_2 (23% by weight)	Boiling point at 1 atm.	-43.6°C
	R125: CHF_2CF_3 (25% by weight)	Temperature glide at 1 atm.	7.0 K
	R134a: CH_2FCF_3 (52% by weight)	Critical temperature	86.0°C
Molecular weight	86.2	Critical pressure	46.3 bar absolute

HARP® 407C THERMODYNAMIC PROPERTIES

Absolute Pressure (bar)	Bubble Temperature (°C)	Dew Temperature (°C)	Liquid Density (kg/m³)	Vapour Density (kg/m³)	Liquid Enthalpy (kJ/kg)	Vapour Density (kJ/kg)	Liquid Entropy (kJ/kg.K)	Vapour Entropy (kJ/kg.K)
0.5	-57.3	-50.1	1422.0	2.4	123.7	382.6	0.786	1.966
0.6	-54.0	-46.8	1412.0	2.8	128.0	384.6	0.806	1.958
0.7	-51.0	-43.9	1403.2	3.3	131.8	386.3	0.823	1.951
0.8	-48.4	-41.3	1395.3	3.7	135.2	387.8	0.838	1.945
0.9	-46.1	-39.0	1388.2	4.1	138.3	389.2	0.852	1.940
1.0	-43.9	-36.9	1381.6	4.6	141.2	390.4	0.864	1.936
1.013	**-43.6**	**-36.6**	**1380.7**	**4.6**	**141.5**	**390.6**	**0.866**	**1.935**
1.5	-35.1	-28.3	1354.3	6.7	152.8	395.4	0.914	1.919
2.0	-28.4	-21.7	1333.0	8.8	161.7	399.1	0.951	1.908
2.5	-22.9	-16.3	1315.1	10.9	169.1	402.0	0.980	1.899
3.0	-18.2	-11.7	1299.5	13.0	175.6	404.5	1.006	1.892
3.5	-14.0	-7.6	1285.5	15.1	181.2	406.6	1.028	1.887
4.0	-10.3	-4.0	1272.8	17.2	186.4	408.4	1.047	1.882
4.5	-7.0	-0.7	1261.1	19.2	191.1	410.0	1.065	1.878
5.0	-3.9	2.4	1250.1	21.3	195.4	411.5	1.081	1.874
5.5	-1.0	5.2	1239.8	23.4	199.5	412.8	1.096	1.871
6.0	1.7	7.8	1230.0	25.5	203.3	414.0	1.109	1.868
6.5	4.2	10.2	1220.7	27.7	206.9	415.1	1.122	1.865
7.0	6.6	12.6	1211.7	29.8	210.3	416.1	1.134	1.863
7.5	8.9	14.8	1203.1	31.9	213.6	417.0	1.146	1.860
8.0	11.0	16.9	1194.9	34.1	216.7	417.9	1.157	1.858
8.5	13.0	18.8	1186.8	36.3	219.7	418.7	1.167	1.856
9.0	15.0	20.7	1179.1	38.5	222.6	419.4	1.177	1.854
9.5	16.9	22.6	1171.5	40.7	225.3	420.1	1.187	1.852
10.0	18.7	24.3	1164.1	42.9	228.0	420.7	1.196	1.850
11.0	22.1	27.6	1149.9	47.4	233.2	421.9	1.213	1.846
12.0	25.3	30.7	1136.2	51.9	238.0	422.9	1.229	1.843
13.0	28.3	33.6	1123.0	56.6	242.7	423.7	1.244	1.840
14.0	31.1	36.4	1110.2	61.3	247.1	424.5	1.258	1.836
15.0	33.8	39.0	1097.7	66.1	251.3	425.1	1.272	1.833
16.0	36.4	41.4	1085.5	71.1	255.4	425.6	1.285	1.831
17.0	38.8	43.8	1073.5	76.1	259.4	426.1	1.297	1.828
18.0	41.2	46.0	1061.7	81.2	263.2	426.5	1.309	1.825
19.0	43.4	48.2	1050.0	86.5	266.9	426.7	1.321	1.822
20.0	45.6	50.3	1038.5	91.8	270.5	426.9	1.332	1.819
21.0	47.7	52.2	1027.1	97.3	274.0	427.1	1.343	1.816
22.0	49.7	54.2	1015.7	103.0	277.5	427.1	1.353	1.813
23.0	51.6	56.0	1004.4	108.8	280.9	427.1	1.363	1.810
24.0	53.5	57.8	993.1	114.8	284.2	427.1	1.373	1.808
25.0	55.3	59.5	981.8	120.9	287.4	426.9	1.383	1.805
26.0	57.1	61.2	970.5	127.3	290.7	426.7	1.392	1.801
27.0	58.8	62.8	959.0	133.8	293.8	426.4	1.401	1.798
28.0	60.5	64.4	947.5	140.6	297.0	426.1	1.410	1.795
29.0	62.1	65.9	935.9	147.6	300.1	425.6	1.419	1.792
30.0	63.7	67.4	924.1	154.9	303.2	425.1	1.428	1.788
31.0	65.3	68.8	912.1	162.5	306.2	424.6	1.437	1.785
32.0	66.8	70.3	899.9	170.5	309.3	423.9	1.446	1.781
33.0	68.3	71.6	887.4	178.8	312.3	423.2	1.454	1.777
34.0	69.7	72.9	874.6	187.5	315.4	422.3	1.463	1.773
35.0	71.2	74.2	861.3	196.7	318.5	421.4	1.472	1.769

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