HARP INTERNATIONAL

Harp® 410A

Harp® 410A is a zero ozone depletion (ODP) hydrofluorocarbon (HFC) refrigerant blend. Harp® 410A is a binary blend of R32 and R125 (50%/50%) developed as a replacement refrigerant for air conditioning applications previously designed for HCFC R22. Due to both its higher refrigerating capacity and pressure, Harp® 410A should not be used as a retrofit refrigerant in existing R22 equipment.

APPLICATION

Harp® 410A is used in new residential and commercial air conditioning systems, heat pumps, dehumidifiers and small chillers. Harp® 410A can also be used in some medium temperature refrigeration applications.

PROPERTIES AND PERFORMANCE

Harp® 410A is a near-azeotropic HFC refrigerant blend that meets the industry's needs for many new air conditioning systems. Harp® 410A has an A1 safety rating from ASHRAE (lowest levels of toxicity and flammability), zero ozone depletion potential and a Global Warming Potential (GWP) of 2088.

Harp® 410A has both higher pressures and capacity than R22, requiring equipment and components specifically designed to accommodate the resulting higher system pressures and the lower mass flow rates. Typical operating pressures of a Harp® 410A system will be 50% to 60% higher than those in an R22 system at comparable operating conditions. Harp® 410A also has significantly higher volumetric refrigerating capacity than R22 under most operating conditions. This allows OEMs to manufacture equipment of similar capacity and efficiency to R22 in a smaller package.

LUBRICATION

Polyolester (POE) lubricants must be used with Harp® 410A since it is not miscible with mineral or alkyl benzene lubricants. New R410A equipment will be charged with the OEM recommended lubricant, ready to use with Harp® 410A.

CHARGING

Due to the zeotropic nature of the Harp® 410A blend, it should only be charged as liquid to prevent fractionation (changes in refrigerant composition due to vapour charging). Harp® 410A requires the use of manifold gauge sets, recovery machines, and cylinders specifically designed and rated for its higher pressures.

RETROFITTING

Due to the significantly higher operating pressures and capacities of Harp® 410A, it must never be used as a retrofit in existing R22 systems.

MATERIAL COMPATIBILITY

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

Harp International The Complete Worldwide Refrigerant Service
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Technical Data

Harp® 410A BASIC PROPERTIES

Chemical formula	R125: CHF_2CF_3 (50% by weight) R32: CH_2F_2 (50% by weight)	Boiling point at 1 atmosphere	-51.5°C
		Critical temperature	71.4°C
Molecular weight	72.6	Critical pressure	48.9 bar absolute
		Temperature glide	0.1K

Harp® 410A THERMODYNAMIC PROPERTIES

Pressure (bar)	Liquid Temperature (°C)	Vapour 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	-64.4	-64.3	1389.7	2.2	109.9	393.6	0.693	2.051
0.6	-61.2	-61.1	1380.0	2.6	114.2	395.3	0.713	2.039
0.7	-58.5	-58.4	1371.5	3.0	118.0	396.8	0.731	2.029
0.8	-56.0	-55.9	1363.9	3.3	121.4	398.1	0.747	2.021
0.9	-53.7	-53.7	1356.9	3.7	124.4	399.3	0.761	2.013
1.0	-51.7	-51.6	1350.5	4.1	127.2	400.4	0.773	2.007
1.013	**-51.5**	**-51.4**	**1349.7**	**4.2**	**127.6**	**400.5**	**0.775**	**2.006**
1.5	-43.4	-43.3	1324.1	6.0	138.6	404.6	0.824	1.981
2.0	-37.1	-37.0	1303.4	7.9	147.4	407.7	0.861	1.964
2.5	-31.9	-31.8	1286.1	9.8	154.7	410.2	0.892	1.950
3.0	-27.4	-27.4	1271.1	11.7	161.0	412.2	0.917	1.939
3.5	-23.5	-23.5	1257.6	13.6	166.6	413.9	0.940	1.930
4.0	-20.0	-20.0	1245.3	15.4	171.6	415.3	0.959	1.922
4.5	-16.9	-16.8	1233.9	17.3	176.2	416.6	0.977	1.915
5.0	-14.0	-13.9	1223.3	19.2	180.4	417.7	0.994	1.909
5.5	-11.3	-11.2	1213.4	21.1	184.4	418.8	1.009	1.903
6.0	-8.7	-8.6	1203.9	23.0	188.1	419.7	1.023	1.898
6.5	-6.4	-6.3	1194.9	24.9	191.6	420.5	1.036	1.893
7.0	-4.2	-4.1	1186.3	26.8	195.0	421.2	1.048	1.889
7.5	-2.0	-1.9	1178.1	28.7	198.1	421.9	1.060	1.885
8.0	0.0	0.1	1170.1	30.7	201.2	422.5	1.071	1.881
8.5	1.9	2.0	1162.4	32.6	204.1	423.1	1.081	1.877
9.0	3.7	3.8	1154.9	34.6	206.9	423.6	1.091	1.874
9.5	5.5	5.6	1147.6	36.5	209.6	424.1	1.101	1.870
10.0	7.2	7.3	1140.5	38.5	212.2	424.5	1.110	1.867
11.0	10.4	10.5	1126.8	42.5	217.3	425.3	1.127	1.861
12.0	13.3	13.5	1113.7	46.6	222.0	425.9	1.144	1.855
13.0	16.2	16.3	1101.1	50.8	226.5	426.4	1.159	1.850
14.0	18.8	18.9	1088.8	55.0	230.8	426.8	1.174	1.845
15.0	21.3	21.4	1076.9	59.3	234.9	427.1	1.187	1.840
16.0	23.7	23.8	1065.2	63.7	238.9	427.3	1.200	1.835
17.0	26.0	26.1	1053.8	68.1	242.7	427.5	1.213	1.831
18.0	28.1	28.3	1042.6	72.7	246.4	427.5	1.225	1.826
19.0	30.2	30.3	1031.6	77.3	250.0	427.5	1.237	1.822
20.0	32.2	32.3	1020.7	82.1	253.5	427.5	1.248	1.817
21.0	34.2	34.3	1009.9	87.0	256.9	427.3	1.259	1.813
22.0	36.0	36.1	999.2	91.9	260.3	427.1	1.269	1.809
23.0	37.8	37.9	988.6	97.0	263.5	426.9	1.279	1.804
24.0	39.6	39.7	978.0	102.3	266.7	426.5	1.289	1.800
25.0	41.3	41.4	967.5	107.7	269.9	426.2	1.299	1.796
26.0	42.9	43.0	957.0	113.2	273.0	425.7	1.308	1.792
27.0	44.5	44.6	946.4	118.9	276.0	425.2	1.318	1.787
28.0	46.0	46.1	935.8	124.8	279.1	424.7	1.327	1.783
29.0	47.5	47.6	925.2	130.8	282.0	424.1	1.336	1.779
30.0	49.0	49.1	914.5	137.1	285.0	423.4	1.345	1.774

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