

R-513A

Azeotropic blend (56 % R-1234yf – 44 % R-134a)

Molecular weight (g/mol)	108.43
Melting point (°C)	N/A
Boiling point (at 1.013 bar)	-29.58
Temperature glide at 1.013 bar (K)	0.1
Critical temperature (°C)	97.7
Critical pressure (bar absolute)	38.55
Specific heat (liquid) at + 25°C (kJ/kg.K)	1.412
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K)	0.881
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar	1.107
Viscosity (liquid) at + 25°C in Centipoise (10 ⁻³ Pa.s)	0.167
Surface tension at + 25°C in dyne per centimetre (10 ⁻³ N/m)	7.22
Classification NF-EN 378	A1
GWP (IPCC 4)	631

🔍 Main applications

R-513A (Opteon™ XP10) is a "near azeotropic" blend containing refrigerants from the hydrofluoro-olefin (HFO) family, designed to replace R134a in domestic, commercial and industrial refrigeration applications as well as in air conditioning, liquid cooling and PAC (heat pumps). It can be used in direct expansion and flood systems.

🔍 Commercial specifications

Composition: 56 % R-1234yf – 44 % R-134a (±1 % -0.2 % / ±1 % -0.2 %).
Purity: ≥ 99.5 % weight.
Water content: ≤ 10 ppm weight.
Chlorine ion test (silver nitrate test): negative.
Total Acidity (HCL): ≤ 1 ppm weight.
Non-condensable content (gas phase): ≤ 1.5 % volume.

🔍 Oils

Use a polyol ester (POE) oil.
Consult **Climalife** regarding the viscosity of the oil selected for your system and the most suitable for your application.

🔍 Regulation

The use and implementation of R-513A are governed by the European Regulation N° 517/2014.
The recovery of R-513A is mandatory under the European Regulation N° 517/2014.

(Refer to regulations enforced in each country).

Thermodynamic properties of R-513A - Saturated state

Absolute pressure P (bar)	LIQUID					VAPOUR					Latent heat Lv (kJ/kg)
	Bubble point t' (°C)	Volume v' (dm ³ /kg)	Density ρ' (kg/dm ³)	Enthalpy h' (kJ/kg)	Entropy s' (kJ/kg.K)	Dew point t" (°C)	Volume v" (m ³ /kg)	Density ρ" (kg/m ³)	Enthalpy h" (kJ/kg)	Entropy s" (kJ/kg.K)	
0.035	-85	0.684	1.463	98.120	0.557	-84.42	4.121	0.243	321.807	1.744	223.686
0.052	-80	0.690	1.450	103.648	0.586	-79.49	2.839	0.352	324.884	1.730	221.235
0.076	-75	0.696	1.437	109.225	0.614	-74.55	2.000	0.500	327.998	1.717	218.774
0.108	-70	0.702	1.424	114.852	0.642	-69.61	1.438	0.695	331.146	1.706	216.294
0.150	-65	0.709	1.411	120.531	0.670	-64.66	1.053	0.949	334.322	1.696	213.791
0.205	-60	0.716	1.397	126.266	0.697	-59.71	0.785	1.274	337.522	1.687	211.256
0.277	-55	0.723	1.384	132.056	0.724	-54.75	0.594	1.683	340.740	1.680	208.684
0.367	-50	0.730	1.370	137.905	0.750	-49.79	0.456	2.192	343.972	1.673	206.067
0.480	-45	0.737	1.356	143.813	0.776	-44.82	0.355	2.817	347.212	1.668	203.399
0.619	-40	0.745	1.342	149.783	0.802	-39.85	0.280	3.576	350.455	1.663	200.672
0.789	-35	0.753	1.328	155.816	0.828	-34.87	0.223	4.489	353.696	1.659	197.880
0.994	-30	0.761	1.314	161.915	0.853	-29.9	0.179	5.578	356.931	1.655	195.016
1.013	-29.58	0.762	1.313	162.428	0.855	-29.48	0.176	5.677	357.201	1.655	194.773
1.239	-25	0.770	1.299	168.081	0.878	-24.92	0.146	6.865	360.153	1.652	192.073
1.529	-20	0.779	1.284	174.316	0.903	-19.93	0.119	8.375	363.359	1.650	189.043
1.869	-15	0.788	1.269	180.623	0.927	-14.95	0.099	10.137	366.542	1.648	185.919
2.266	-10	0.798	1.254	187.004	0.952	-9.96	0.082	12.179	369.696	1.646	182.692
2.724	-5	0.808	1.238	193.462	0.976	-4.97	0.069	14.536	372.816	1.645	179.354
3.251	0	0.818	1.222	200.000	1.000	0.02	0.058	17.242	375.895	1.644	175.895
3.851	5	0.830	1.205	206.622	1.024	5.01	0.049	20.338	378.926	1.643	172.305
4.533	10	0.841	1.188	213.331	1.048	10.01	0.042	23.870	381.901	1.643	168.570
5.303	15	0.854	1.171	220.132	1.071	15.0	0.036	27.888	384.809	1.643	164.677
6.168	20	0.867	1.153	227.030	1.095	20.0	0.031	32.452	387.641	1.642	160.611
7.135	25	0.882	1.134	234.031	1.118	25.0	0.027	37.629	390.384	1.642	156.353
8.211	30	0.897	1.115	241.143	1.141	30.0	0.023	43.499	393.025	1.642	151.882
9.405	35	0.913	1.095	248.373	1.165	35.0	0.020	50.157	395.547	1.642	147.174
10.725	40	0.931	1.074	255.733	1.188	40.0	0.017	57.718	397.931	1.642	142.198
12.178	45	0.951	1.052	263.235	1.211	45.0	0.015	66.324	400.154	1.642	136.919
13.775	50	0.972	1.028	270.899	1.235	50.01	0.013	76.153	402.188	1.641	131.289
15.524	55	0.996	1.004	278.747	1.258	55.01	0.011	87.437	403.995	1.640	125.247
17.435	60	1.023	0.977	286.812	1.282	60.01	0.010	100.484	405.527	1.638	118.715
19.519	65	1.054	0.949	295.136	1.306	65.01	0.009	115.719	406.717	1.636	111.581
21.788	70	1.090	0.917	303.780	1.331	70.01	0.007	133.767	407.470	1.633	103.689
24.256	75	1.134	0.882	312.837	1.356	75.02	0.006	155.597	407.637	1.629	94.801
26.939	80	1.189	0.841	322.463	1.383	80.02	0.005	182.882	406.970	1.622	84.507
29.856	85	1.265	0.791	332.978	1.411	85.02	0.005	218.998	404.973	1.612	71.994
33.037	90	1.384	0.723	345.267	1.444	90.01	0.004	273.217	400.311	1.596	55.044

Thermodynamic properties of R-513A - (superheated vapour) - Entropy (kJ/kg.K)

Sat. Temp. °C	Sat. Pressure bar	Superheat (°C)																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
-85	0.033	1.746	1.763	1.779	1.796	1.813	1.829	1.845	1.861	1.877	1.893	1.909	1.924	1.940	1.955	1.971	1.986	2.001	2.016	2.031	2.046	2.060
-80	0.050	1.731	1.748	1.765	1.781	1.797	1.814	1.830	1.846	1.862	1.877	1.893	1.909	1.924	1.939	1.955	1.970	1.985	2.000	2.014	2.029	2.044
-75	0.073	1.718	1.735	1.751	1.768	1.784	1.800	1.816	1.832	1.848	1.864	1.879	1.895	1.910	1.925	1.940	1.955	1.970	1.985	2.000	2.015	2.029
-70	0.105	1.707	1.723	1.740	1.756	1.772	1.788	1.804	1.820	1.836	1.851	1.867	1.882	1.898	1.913	1.928	1.943	1.957	1.972	1.987	2.001	2.016
-65	0.147	1.697	1.713	1.730	1.746	1.762	1.778	1.794	1.810	1.825	1.841	1.856	1.871	1.887	1.902	1.917	1.931	1.946	1.961	1.975	1.990	2.004
-60	0.202	1.688	1.704	1.721	1.737	1.753	1.769	1.785	1.800	1.816	1.831	1.847	1.862	1.877	1.892	1.907	1.921	1.936	1.951	1.965	1.980	1.994
-55	0.273	1.680	1.697	1.713	1.729	1.745	1.761	1.777	1.792	1.808	1.823	1.838	1.853	1.868	1.883	1.898	1.913	1.927	1.942	1.956	1.971	1.985
-50	0.363	1.674	1.690	1.706	1.722	1.738	1.754	1.770	1.785	1.800	1.816	1.831	1.846	1.861	1.876	1.890	1.905	1.920	1.934	1.949	1.963	1.977
-45	0.475	1.668	1.684	1.700	1.716	1.732	1.748	1.764	1.779	1.794	1.810	1.825	1.840	1.854	1.869	1.884	1.899	1.913	1.927	1.942	1.956	1.970
-40	0.615	1.663	1.679	1.695	1.711	1.727	1.743	1.758	1.774	1.789	1.804	1.819	1.834	1.849	1.864	1.878	1.893	1.907	1.922	1.936	1.950	1.964
-35	0.784	1.659	1.675	1.691	1.707	1.723	1.738	1.754	1.769	1.785	1.800	1.815	1.830	1.844	1.859	1.874	1.888	1.902	1.917	1.931	1.945	1.959
-30	0.989	1.655	1.671	1.688	1.703	1.719	1.735	1.750	1.766	1.781	1.796	1.811	1.826	1.840	1.855	1.869	1.884	1.898	1.912	1.927	1.941	1.955
-29.48	1.013	1.655	1.671	1.687	1.703	1.719	1.735	1.750	1.765	1.780	1.796	1.810	1.825	1.840	1.855	1.869	1.883	1.898	1.912	1.926	1.940	1.954
-25	1.234	1.652	1.668	1.685	1.701	1.716	1.732	1.747	1.763	1.778	1.793	1.808	1.822	1.837	1.852	1.866	1.880	1.895	1.909	1.923	1.937	1.951
-20	1.525	1.650	1.666	1.682	1.698	1.714	1.729	1.745	1.760	1.775	1.790	1.805	1.820	1.834	1.849	1.863	1.878	1.892	1.906	1.920	1.934	1.948
-15	1.865	1.648	1.664	1.680	1.696	1.712	1.728	1.743	1.758	1.773	1.788	1.803	1.818	1.832	1.847	1.861	1.875	1.890	1.904	1.918	1.932	1.945
-10	2.262	1.646	1.663	1.679	1.695	1.711	1.726	1.741	1.757	1.772	1.787	1.802	1.816	1.831	1.845	1.860	1.874	1.888	1.902	1.916	1.930	1.944
-5	2.721	1.645	1.661	1.678	1.694	1.709	1.725	1.740	1.756	1.771	1.786	1.800	1.815	1.830	1.844	1.858	1.873	1.887	1.901	1.915	1.928	1.942
0	3.248	1.644	1.661	1.677	1.693	1.709	1.724	1.740	1.755	1.770	1.785	1.800	1.814	1.829	1.843	1.858	1.872	1.886	1.900	1.914	1.928	1.941
5	3.850	1.643	1.660	1.676	1.693	1.708	1.724	1.740	1.755	1.770	1.785	1.800	1.814	1.829	1.843	1.857	1.871	1.886	1.899	1.913	1.927	1.941
10	4.532	1.643	1.660	1.676	1.692	1.708	1.724	1.740	1.755	1.770	1.785	1.800	1.814	1.829	1.843	1.857	1.871	1.885	1.899	1.913	1.927	1.940
15	5.303	1.643	1.660	1.676	1.693	1.709	1.724	1.740	1.755	1.770	1.785	1.800	1.815	1.829	1.843	1.858	1.872	1.886	1.900	1.913	1.927	1.941
20	6.168	1.642	1.660	1.676	1.693	1.709	1.725	1.740	1.756	1.771	1.786	1.801	1.815	1.830	1.844	1.858	1.872	1.886	1.900	1.914	1.928	1.941
25	7.135	1.642	1.660	1.677	1.693	1.709	1.725	1.741	1.756	1.772	1.787	1.801	1.816	1.830	1.845	1.859	1.873	1.887	1.901	1.915	1.928	1.942
30	8.211	1.642	1.660	1.677	1.694	1.710	1.726	1.742	1.757	1.773	1.788	1.802	1.817	1.832	1.846	1.860	1.874	1.888	1.902	1.916	1.929	1.943
35	9.405	1.642	1.660	1.678	1.694	1.711	1.727	1.743	1.758	1.774	1.789	1.804	1.818	1.833	1.847	1.861	1.875	1.889	1.903	1.917	1.931	1.944
40	10.724	1.642	1.660	1.678	1.695	1.712	1.728	1.744	1.759	1.775	1.790	1.805	1.820	1.834	1.849	1.863	1.877	1.891	1.905	1.918	1.932	1.946
45	12.177	1.642	1.660	1.678	1.696	1.713	1.729	1.745	1.761	1.776	1.791	1.806	1.821	1.836	1.850	1.864	1.878	1.892	1.906	1.920	1.934	1.947
50	13.773	1.641	1.660	1.679	1.696	1.713	1.730	1.746	1.762	1.778	1.793	1.808	1.823	1.837	1.852	1.866	1.880	1.894	1.908	1.922	1.935	1.949
55	15.521	1.640	1.660	1.679	1.697	1.714	1.731	1.747	1.763	1.779	1.794	1.809	1.824	1.839	1.854	1.868	1.882	1.896	1.910	1.924	1.937	1.951
60	17.431	1.638	1.659	1.679	1.697	1.715	1.732	1.748	1.765	1.780	1.796	1.811	1.826	1.841	1.855	1.870	1.884	1.898	1.912	1.926	1.939	1.953
65	19.513	1.636	1.658	1.678	1.697	1.715	1.733	1.750	1.766	1.782	1.797	1.813	1.828	1.843	1.857	1.872	1.886	1.900	1.914	1.928	1.941	1.955
70	21.781	1.633	1.657	1.678	1.697	1.716	1.733	1.750	1.767	1.783	1.799	1.814	1.830	1.844	1.859	1.874	1.888	1.902	1.916	1.930	1.943	1.957
75	24.248	1.629	1.654	1.677	1.697	1.716	1.734	1.751	1.768	1.784	1.800	1.816	1.831	1.846	1.861	1.876	1.890	1.904	1.918	1.932	1.946	1.959
80	26.929	1.622	1.651	1.675	1.696	1.716	1.734	1.752	1.769	1.786	1.802	1.818	1.833	1.848	1.863	1.878	1.892	1.906	1.920	1.934	1.948	1.961
85	29.846	1.612	1.647	1.673	1.695	1.715	1.734	1.753	1.770	1.787	1.803	1.819	1.835	1.850	1.865	1.879	1.894	1.908	1.922	1.936	1.950	1.964
90	33.028	1.596	1.641	1.669	1.693	1.714	1.734	1.753	1.771	1.788	1.804	1.820	1.836	1.851	1.866	1.881	1.896	1.910	1.924	1.938	1.952	1.966