

R-448A (Solstice® N40)

Zeotropic blend (26 % R-32 - 26 % R-125 - 21 % R-134a -
20 % R-1234yf - 7 % R-1234ze)

Molecular weight (g/mol)	86.28
Melting point (°C)	N/A
Boiling point (at 1.013 bar)	-46.12
Temperature glide at 1.013 bar (K)	6.17
Critical temperature (°C)	83.7
Critical pressure (bar absolute)	46.84
Specific heat (liquid) at + 25°C (kJ/kg.K)	1.555
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K)	0.850
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar	1.141
Viscosity (liquid) at + 25°C in Centipoise (10 ⁻³ Pa.s)	0.139
Surface tension at + 25°C in dyne per centimetre (10 ⁻³ N/m)	6.63
Classification NF-EN 378	A1
GWP (IPCC 4)	1387

◆ Main applications

R-448A is a "non azeotropic" blend containing HFO refrigerants. It has been designed to replace R-404A in new and existing installations, for medium and low temperature commercial and industrial refrigeration applications. It is suitable for supermarkets and hypermarkets including centralised pack systems, chill and frozen cold stores, and refrigerated transport.

It can be used as a replacement for R-22 in some Dx applications, but must be in accordance with conversion guidelines.

◆ Commercial specifications

Composition: 26 % R-32 - 26 % R-125 - 21 % R-134a - 20 % R-1234yf - 7 % R-1234ze (±0.5 % -2 % / ±2 % -0.5 % / ±0.5 % -2 % / ±2 % -1 % / ±0.5 % -2 %).

Purity: ≥ 99.5 % weight.

Water content: ≤ 10 ppm weight.

TChlorine 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 application and the most suitable for your application.

◆ Regulation

The use and implementation of R-448A are governed by the European Regulation N° 517/2014.

The recovery of R-448A is mandatory under the European Regulation N° 517/2014.

(Refer to regulations enforced in each country).

Thermodynamic properties of R-448A - 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)	
0.028	-100	0.665	1.503	68.518	0.405	-93.3	6.213	0.161	346.470	1.985	277.952
0.043	-95	0.671	1.490	74.945	0.442	-88.35	4.095	0.244	349.487	1.959	274.542
0.065	-90	0.678	1.476	81.335	0.477	-83.41	2.774	0.360	352.519	1.936	271.185
0.097	-85	0.684	1.462	87.702	0.511	-78.46	1.927	0.519	355.562	1.914	267.860
0.139	-80	0.691	1.448	94.059	0.544	-73.51	1.368	0.731	358.610	1.895	264.551
0.196	-75	0.697	1.434	100.415	0.577	-68.56	0.992	1.008	361.658	1.877	261.243
0.271	-70	0.704	1.420	106.779	0.609	-63.61	0.733	1.365	364.699	1.861	257.921
0.368	-65	0.711	1.406	113.158	0.640	-58.65	0.550	1.817	367.729	1.847	254.571
0.491	-60	0.719	1.391	119.559	0.670	-53.7	0.420	2.382	370.742	1.834	251.183
0.645	-55	0.727	1.376	125.988	0.700	-48.75	0.325	3.078	373.732	1.821	247.744
0.836	-50	0.734	1.362	132.450	0.729	-43.79	0.255	3.926	376.694	1.810	244.244
1.013	-46.12	0.741	1.350	137.489	0.751	-39.95	0.213	4.703	378.968	1.802	241.479
1.069	-45	0.743	1.347	138.950	0.758	-38.84	0.202	4.949	379.621	1.800	240.671
1.351	-40	0.751	1.331	145.493	0.786	-33.89	0.162	6.171	382.509	1.791	237.016
1.688	-35	0.760	1.316	152.084	0.814	-28.94	0.131	7.619	385.351	1.782	233.266
2.087	-30	0.769	1.300	158.729	0.841	-23.99	0.107	9.321	388.141	1.775	229.412
2.556	-25	0.779	1.284	165.430	0.868	-19.04	0.088	11.309	390.872	1.767	225.442
3.102	-20	0.789	1.267	172.195	0.895	-14.1	0.073	13.617	393.538	1.761	221.343
3.733	-15	0.800	1.251	179.028	0.922	-9.16	0.061	16.282	396.130	1.754	217.102
4.457	-10	0.811	1.233	185.936	0.948	-4.22	0.052	19.347	398.641	1.748	212.705
5.282	-5	0.823	1.216	192.924	0.974	0.7	0.044	22.859	401.061	1.743	208.137
6.219	0	0.835	1.198	200.000	1.000	5.63	0.037	26.869	403.378	1.738	203.378
7.274	5	0.848	1.179	207.171	1.026	10.54	0.032	31.438	405.581	1.733	198.410
8.458	10	0.862	1.160	214.447	1.051	15.45	0.027	36.634	407.654	1.728	193.207
9.780	15	0.877	1.140	221.837	1.077	20.35	0.024	42.539	409.580	1.723	187.743
11.250	20	0.894	1.119	229.354	1.102	25.24	0.020	49.247	411.340	1.718	181.986
12.876	25	0.911	1.097	237.009	1.128	30.11	0.018	56.871	412.910	1.713	175.901
14.670	30	0.931	1.074	244.821	1.153	34.97	0.015	65.552	414.264	1.708	169.443
16.642	35	0.952	1.050	252.808	1.178	39.82	0.013	75.462	415.368	1.702	162.560
18.801	40	0.975	1.025	260.997	1.204	44.64	0.012	86.822	416.180	1.696	155.183
21.160	45	1.002	0.998	269.421	1.230	49.44	0.010	99.922	416.647	1.690	147.226
23.728	50	1.032	0.969	278.127	1.256	54.22	0.009	115.159	416.696	1.683	138.569
26.519	55	1.067	0.937	287.179	1.283	58.96	0.008	133.094	416.224	1.674	129.045
29.542	60	1.109	0.902	296.677	1.311	63.66	0.006	154.580	415.077	1.665	118.400
32.811	65	1.161	0.861	306.784	1.340	68.3	0.006	181.012	413.007	1.653	106.223
36.336	70	1.230	0.813	317.810	1.371	72.87	0.005	214.980	409.559	1.638	91.750
40.119	75	1.333	0.750	330.466	1.406	77.29	0.004	262.382	403.724	1.616	73.257
44.111	80	1.539	0.650	347.476	1.453	81.39	0.003	345.073	391.892	1.579	44.416

Thermodynamic properties of R-448A - (superheated vapour) - Volume (dm³/kg)

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
-100	0.015	11477.954	11812.691	12147.028	12481.046	12814.806	13148.353	13481.725	13814.949	14148.049	14481.043	14813.947	15146.773	15479.532	15812.232	16144.882	16477.486	16810.051	17142.581	17475.080	17807.552	18139.999
-95	0.024	7220.992	7426.479	7631.638	7836.533	8041.214	8245.718	8450.074	8654.305	8858.430	9062.465	9266.421	9470.311	9674.141	9877.920	10081.655	10285.349	10489.000	10692.639	10896.240	11099.817	11303.372
-90	0.037	4690.780	4821.278	4951.503	5081.509	5211.335	5341.011	5470.561	5600.005	5729.355	5858.632	5987.839	6116.987	6246.084	6375.136	6504.148	6633.125	6762.071	6890.990	7019.884	7148.756	7277.609
-85	0.057	3136.672	3222.157	3307.411	3392.479	3477.394	3562.183	3646.863	3731.452	3815.962	3900.405	3984.788	4069.120	4153.406	4237.653	4321.865	4406.046	4490.199	4574.328	4658.435	4742.522	4826.591
-80	0.086	2153.166	2210.775	2268.188	2325.443	2382.567	2439.581	2496.502	2553.344	2610.111	2666.811	2723.444	2780.111	2836.888	2893.290	2949.741	3006.224	3062.683	3119.119	3175.535	3231.934	3288.317
-75	0.125	1513.584	1553.435	1593.115	1632.658	1672.089	1711.424	1750.679	1789.865	1828.991	1868.064	1907.092	1946.080	1985.032	2023.954	2062.847	2101.716	2140.562	2179.389	2218.197	2256.990	2295.768
-70	0.178	1087.190	1115.426	1143.513	1171.481	1199.351	1227.138	1254.854	1282.509	1310.112	1337.669	1365.185	1392.665	1420.115	1447.536	1474.932	1502.306	1529.660	1556.996	1584.315	1611.621	1638.912
-65	0.248	796.382	816.837	837.161	857.380	877.513	897.573	917.571	937.515	957.413	977.270	997.090	1016.879	1036.640	1056.376	1076.089	1095.782	1115.457	1135.116	1154.760	1174.391	1194.009
-60	0.339	593.865	608.989	623.999	638.915	653.755	668.531	683.252	697.925	712.556	727.151	741.714	756.248	770.757	785.243	799.709	814.157	828.588	843.005	857.408	871.799	886.179
-55	0.456	450.104	461.502	472.798	484.011	495.155	506.243	517.281	528.277	539.236	550.161	561.058	571.930	582.778	593.606	604.416	615.209	625.987	636.751	647.503	658.244	668.975
-50	0.603	346.238	354.980	363.631	372.208	380.724	389.188	397.609	405.991	414.340	422.659	430.952	439.222	447.471	455.702	463.916	472.115	480.300	488.472	496.634	504.785	512.927
-45	0.786	269.964	276.781	283.515	290.183	296.796	303.362	309.889	316.381	322.843	329.278	335.690	342.080	348.452	354.806	361.146	367.471	373.784	380.085	386.377	392.658	398.931
-40	1.010	213.107	218.504	223.827	229.089	234.301	239.472	244.607	249.710	254.786	259.837	264.867	269.877	274.871	279.848	284.812	289.763	294.702	299.631	304.550	309.461	314.363
-39.95	1.013	212.611	217.996	223.306	228.556	233.756	238.915	244.038	249.129	254.192	259.232	264.250	269.248	274.230	279.195	284.147	289.086	294.013	298.930	303.838	308.737	313.627
-35	1.283	170.130	174.465	178.731	182.943	187.110	191.239	195.335	199.402	203.444	207.464	211.464	215.446	219.412	223.364	227.304	231.231	235.148	239.055	242.953	246.843	250.726
-30	1.611	137.223	140.752	144.219	147.635	151.010	154.350	157.660	160.943	164.203	167.443	170.665	173.871	177.061	180.239	183.404	186.559	189.704	192.840	195.967	199.087	202.200
-25	2.000	111.725	114.634	117.486	120.291	123.059	125.794	128.501	131.184	133.846	136.489	139.115	141.726	144.323	146.908	149.482	152.045	154.600	157.146	159.685	162.216	164.741
-20	2.459	91.747	94.173	96.578	98.978	101.373	103.769	106.179	108.606	111.054	113.527	116.024	118.549	121.099	123.672	126.269	128.889	131.531	134.194	136.879	139.586	142.316
-15	2.996	75.930	77.977	79.975	81.933	83.858	85.755	87.629	89.481	91.315	93.132	94.935	96.725	98.502	100.269	102.027	103.775	105.516	107.249	108.975	110.695	112.409
-10	3.619	63.286	65.032	66.731	68.393	70.024	71.629	73.212	74.775	76.321	77.851	79.367	80.871	82.364	83.847	85.321	86.787	88.244	89.695	91.140	92.578	94.012
-5	4.336	53.086	54.590	56.051	57.476	58.872	60.243	61.593	62.924	64.239	65.540	66.827	68.103	69.368	70.624	71.871	73.111	74.343	75.569	76.788	78.002	79.211
0	5.158	44.789	46.097	47.364	48.597	49.803	50.985	52.148	53.292	54.421	55.536	56.639	57.730	58.812	59.885	60.949	62.007	63.063	64.109	65.139	66.172	67.200
5	6.093	37.983	39.133	40.243	41.320	42.371	43.399	44.408	45.400	46.378	47.342	48.294	49.236	50.169	51.092	52.008	52.917	53.820	54.716	55.607	56.493	57.374
10	7.151	32.360	33.380	34.360	35.310	36.234	37.136	38.019	38.886	39.739	40.579	41.408	42.227	43.037	43.839	44.633	45.420	46.202	46.977	47.747	48.513	49.274
15	8.344	27.680	28.593	29.467	30.311	31.130	31.928	32.707	33.471	34.221	34.959	35.686	36.403	37.112	37.813	38.506	39.193	39.874	40.550	41.220	41.886	42.548
20	9.681	23.758	24.583	25.370	26.126	26.858	27.569	28.262	28.940	29.604	30.257	30.899	31.532	32.156	32.772	33.382	33.986	34.583	35.176	35.763	36.346	36.926
25	11.175	20.450	21.203	21.917	22.601	23.260	23.898	24.519	25.124	25.717	26.298	26.869	27.431	27.984	28.530	29.070	29.603	30.131	30.654	31.172	31.686	32.196
30	12.837	17.641	18.335	18.993	19.613	20.211	20.788	21.348	21.893	22.425	22.946	23.456	23.958	24.452	24.939	25.419	25.894	26.363	26.827	27.286	27.742	28.193
35	14.681	15.243	15.889	16.494	17.066	17.613	18.138	18.647	19.140	19.621	20.091	20.551	21.002	21.445	21.881	22.311	22.735	23.154	23.569	23.978	24.384	24.786
40	16.720	13.181	13.790	14.353	14.883	15.387	15.869	16.334	16.784	17.221	17.647	18.063	18.471	18.871	19.264	19.651	20.032	20.409	20.780	21.148	21.511	21.871
45	18.970	11.398	11.978	12.509	13.004	13.471	13.916	14.344	14.756	15.155	15.544	15.923	16.293	16.656	17.012	17.362	17.707	18.046	18.382	18.712	19.040	19.363
50	21.448	9.845	10.405	10.950	11.376	11.813	12.227	12.622	13.002	13.370	13.726	14.072	14.411	14.741	15.065	15.384	15.698	16.004	16.308	16.607	16.903	17.195
55	24.172	8.481	9.032	9.517	9.959	10.371	10.758	11.126	11.478	11.818	12.146	12.465	12.775	13.078	13.374	13.665	13.950	14.230	14.506	14.778	15.047	15.312
60	27.165	7.273	7.824	8.297	8.720	9.110	9.475	9.819	10.148	10.463	10.767	11.061	11.347	11.626	11.897	12.164	12.425	12.681	12.933	13.181	13.425	13.667
65	30.456	6.189	6.754	7.221	7.631	8.003	8.348	8.672	8.980	9.274	9.557	9.829	10.094	10.351	10.601	10.846	11.086	11.321	11.551	11.778	12.002	12.222
70	34.084	5.195	5.797	6.265	6.665	7.023	7.352	7.659	7.948	8.224	8.487	8.741	8.986	9.224	9.456	9.681	9.902	10.118	10.330	10.539	10.744	10.945
75	38.109	4.250	4.928	5.406	5.801	6.148	6.463	6.754	7.027	7.286	7.533	7.770	7.998	8.219	8.433	8.642	8.846	9.045	9.240	9.432	9.620	9.805
80	42.678	3.248	4.110	4.610	5.005	5.344	5.647	5.925	6.184	6.427	6.659	6.880	7.093	7.298	7.497	7.690	7.879	8.065	8.242	8.419	8.592	8.762

Thermodynamic properties of R-448A - (superheated vapour) - Enthalpy (kJ/kg)

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
-100	0.015	342.413	345.534	348.696	351.901	355.148	358.439	361.774	365.151	368.572	372.037	375.545	379.096	382.690	386.327	390.007	393.730	397.496	401.305	405.156	409.050	412.986
-95	0.024	345.435	348.610	351.824	355.080	358.378	361.718	365.101	368.527	371.995	375.506	379.060	382.657	386.297	389.979	393.704	397.472	401.282	405.134	409.030	412.967	416.947
-90	0.037	348.479	351.709	354.978	358.286	361.636	365.026	368.458	371.932	375.449	379.007	382.608	386.251	389.937	393.664	397.435	401.247	405.102	408.999	412.938	416.919	420.942
-85	0.057	351.540	354.828	358.152	361.515	364.917	368.359	371.841	375.365	378.930	382.537	386.185	389.875	393.607	397.381	401.197	405.055	408.954	412.896	416.880	420.905	424.972
-80	0.086	354.613	357.961	361.343	364.761	368.217	371.712	375.246	378.820	382.435	386.091	389.788	393.526	397.305	401.126	404.988	408.891	412.837	416.823	420.852	424.921	429.033
-75	0.125	357.691	361.102	364.544	368.020	371.532	375.081	378.669	382.295	385.961	389.667	393.413	397.200	401.027	404.895	408.804	412.754	416.746	420.778	424.852	428.966	433.122
-70	0.178	360.770	364.247	367.751	371.287	374.857	378.463	382.105	385.785	389.503	393.260	397.057	400.893	404.769	408.686	412.643	416.640	420.678	424.757	428.876	433.037	437.238
-65	0.248	363.844	367.390	370.959	374.558	378.188	381.851	385.550	389.285	393.057	396.867	400.716	404.603	408.529	412.495	416.500	420.546	424.632	428.757	432.923	437.129	441.376
-60	0.339	366.907	370.525	374.163	377.826	381.519	385.243	389.000	392.792	396.619	400.483	404.385	408.324	412.302	416.318	420.373	424.468	428.602	432.775	436.988	441.241	445.534
-55	0.456	369.953	373.648	377.357	381.088	384.845	388.632	392.449	396.300	400.185	404.105	408.061	412.054	416.084	420.152	424.258	428.402	432.585	436.808	441.069	445.369	449.709
-50	0.603	372.978	376.752	380.536	384.338	388.163	392.014	395.894	399.805	403.749	407.727	411.739	415.787	419.871	423.991	428.150	432.345	436.579	440.851	445.161	449.510	453.897
-45	0.786	375.975	379.833	383.695	387.570	391.465	395.384	399.329	403.303	407.308	411.345	415.415	419.520	423.659	427.834	432.045	436.293	440.578	444.901	449.261	453.659	458.095
-40	1.010	378.939	382.884	386.828	390.781	394.749	398.738	402.750	406.790	410.857	414.956	419.085	423.248	427.444	431.675	435.941	440.242	444.580	448.954	453.365	457.814	462.299
-39.95	1.013	378.968	382.915	386.860	390.813	394.782	398.772	402.785	406.825	410.893	414.992	419.122	423.285	427.482	431.714	435.980	440.282	444.620	448.995	453.407	457.856	462.341
-35	1.283	381.864	385.902	389.931	393.964	398.008	402.070	406.152	410.259	414.392	418.554	422.745	426.967	431.222	435.510	439.832	444.189	448.580	453.007	457.471	461.970	466.506
-30	1.611	384.744	388.879	392.998	397.114	401.238	405.376	409.531	413.707	417.908	422.135	426.390	430.674	434.989	439.336	443.715	448.128	452.575	457.056	461.573	466.124	470.712
-25	2.000	387.574	391.810	396.023	400.227	404.434	408.650	412.881	417.130	421.400	425.695	430.015	434.363	438.741	443.148	447.587	452.057	456.561	461.098	465.668	470.273	474.913
-20	2.459	390.347	394.689	399.000	403.296	407.590	411.888	416.197	420.522	424.865	432.229	433.618	438.031	442.473	446.942	451.442	455.972	460.533	465.127	469.754	474.413	479.107
-15	2.996	393.057	397.511	401.924	406.316	410.700	415.084	419.475	423.878	428.296	432.733	437.192	441.674	446.181	450.715	455.277	459.868	464.489	469.141	473.825	478.541	483.289
-10	3.619	395.694	400.266	404.788	409.281	413.760	418.233	422.710	427.194	431.690	436.203	440.734	445.286	449.862	454.462	459.088	463.742	468.425	473.137	477.879	482.652	487.456
-5	4.336	398.252	402.949	407.585	412.184	416.762	421.330	425.895	430.464	435.042	439.633	444.239	448.865	453.510	458.179	462.872	467.591	472.336	477.110	481.912	486.744	491.605
0	5.158	400.721	405.500	410.307	415.019	419.701	424.367	429.025	433.684	438.346	443.019	447.703	452.404	457.123	461.862	466.624	471.409	476.220	481.056	485.920	490.812	495.733
5	6.093	403.089	408.060	412.946	417.776	422.569	427.339	432.096	436.847	441.598	446.355	451.122	455.901	460.695	465.508	470.340	475.194	480.071	484.973	489.901	494.854	499.836
10	7.151	405.343	410.468	415.492	420.449	425.359	430.239	435.099	439.948	444.792	449.638	454.489	459.350	464.223	469.111	474.017	478.942	483.888	488.857	493.849	498.867	503.910
15	8.344	407.469	412.760	417.934	423.027	428.063	433.060	438.029	442.981	447.923	452.861	457.801	462.744	467.701	472.668	477.649	482.648	487.665	492.703	497.763	502.846	507.953
20	9.681	409.448	414.924	420.261	425.502	430.673	435.793	440.879	445.939	450.984	456.019	461.052	466.086	471.125	476.173	481.234	486.308	491.399	496.509	501.638	506.788	511.961
25	11.175	411.258	416.941	422.459	427.861	433.177	438.432	443.640	448.816	453.969	459.107	464.236	469.353	474.461	479.562	484.676	489.819	495.087	500.270	505.470	510.690	515.930
30	12.837	412.876	418.794	424.514	430.092	435.567	440.965	446.306	451.604	456.871	462.117	467.349	472.572	477.793	483.015	488.242	493.477	498.723	503.982	509.257	514.548	519.858
35	14.681	414.271	420.460	426.407	432.181	437.829	443.383	448.866	454.295	459.684	465.044	470.383	475.708	481.026	486.340	491.656	496.976	502.304	507.643	512.994	518.359	523.741
40	16.720	415.404	421.913	428.118	434.112	439.950	445.674	451.310	456.880	462.399	467.880	473.332	478.765	484.184	489.595	495.004	500.413	505.826	511.246	516.677	522.119	527.574
45	18.970	416.228	423.119	429.624	435.864	441.915	447.824	453.627	459.348	465.006	470.616	476.189	481.735	487.261	492.774	498.279	503.781	509.283	514.789	520.301	525.823	531.355
50	21.448	416.676	424.036	430.893	437.416	443.704	449.819	455.804	461.689	467.497	473.245	478.946	484.612	490.251	495.871	501.477	507.076	512.670	518.265	523.863	529.466	535.078
55	24.172	416.657	424.611	431.889	438.740	445.297	451.641	457.826	463.889	469.858	475.754	481.592	487.385	493.144	498.876	504.590	510.290	515.981	521.668	527.355	533.044	538.739
60	27.165	416.035	424.771	432.565	439.800	446.664	453.265	459.672	465.931	472.076	478.131	484.116	490.045	495.930	501.782	507.608	513.415	519.208	524.992	530.771	536.550	542.330
65	30.456	414.591	424.412	432.555	440.550	447.771	454.664	461.318	467.793	474.129	480.358	486.501	492.576	498.596	504.575	510.520	516.439	522.333	528.215	534.101	539.973	545.842
70	34.084	411.928	423.380	432.669	440.926	448.566	455.794	462.727	469.443	475.991	482.408	488.722	494.954	501.121	507.234	513.306	519.344	525.357	531.350	537.329	543.299	549.262
75	38.109	407.180	421.414	431.854	440.817	448.961	456.581	463.835	470.822	477.606	484.233	490.735	497.139	503.463	509.723	515.931	522.097	528.231	534.338	540.426	546.499	552.561
80	42.678	397.386	417.894	430.037	439.941	448.724	456.824	464.462	471.769	478.828	485.695	492.413	499.010	505.511	511.934	518.294	524.602	530.866	537.101	543.307	549.492	555.662

Thermodynamic properties of R-448A - (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
-100	0.015	2.025	2.042	2.060	2.077	2.094	2.111	2.128	2.144	2.160	2.176	2.192	2.208	2.224	2.239	2.254	2.270	2.285	2.299	2.314	2.329	2.343
-95	0.024	1.995	2.012	2.030	2.047	2.064	2.080	2.097	2.113	2.129	2.145	2.161	2.176	2.192	2.207	2.222	2.237	2.252	2.267	2.282	2.296	2.311
-90	0.037	1.968	1.985	2.002	2.019	2.036	2.052	2.069	2.085	2.101	2.116	2.132	2.147	2.163	2.178	2.193	2.208	2.223	2.237	2.252	2.266	2.281
-85	0.057	1.943	1.960	1.977	1.994	2.011	2.027	2.043	2.059	2.075	2.091	2.106	2.121	2.137	2.152	2.167	2.181	2.196	2.211	2.225	2.239	2.254
-80	0.086	1.921	1.938	1.955	1.971	1.988	2.004	2.020	2.036	2.052	2.067	2.082	2.098	2.113	2.128	2.143	2.157	2.172	2.186	2.201	2.215	2.229
-75	0.125	1.901	1.918	1.934	1.951	1.967	1.983	1.999	2.015	2.030	2.046	2.061	2.076	2.091	2.106	2.121	2.135	2.150	2.164	2.178	2.193	2.207
-70	0.178	1.882	1.899	1.916	1.932	1.949	1.965	1.980	1.996	2.011	2.027	2.042	2.057	2.072	2.086	2.101	2.116	2.130	2.144	2.158	2.172	2.186
-65	0.248	1.866	1.883	1.899	1.915	1.932	1.947	1.963	1.979	1.994	2.009	2.024	2.039	2.054	2.069	2.083	2.098	2.112	2.126	2.140	2.154	2.168
-60	0.339	1.851	1.867	1.884	1.900	1.916	1.932	1.948	1.963	1.978	1.993	2.008	2.023	2.038	2.053	2.067	2.081	2.096	2.110	2.124	2.138	2.151
-55	0.456	1.837	1.854	1.870	1.886	1.902	1.918	1.934	1.949	1.964	1.979	1.994	2.009	2.023	2.038	2.052	2.067	2.081	2.095	2.109	2.122	2.136
-50	0.603	1.824	1.841	1.858	1.874	1.890	1.905	1.921	1.936	1.951	1.966	1.981	1.996	2.010	2.025	2.039	2.053	2.067	2.081	2.095	2.109	2.123
-45	0.786	1.813	1.830	1.846	1.862	1.878	1.894	1.909	1.924	1.939	1.954	1.969	1.984	1.998	2.013	2.027	2.041	2.055	2.069	2.083	2.096	2.110
-40	1.010	1.803	1.819	1.836	1.852	1.868	1.883	1.899	1.914	1.929	1.944	1.958	1.973	1.987	2.002	2.016	2.030	2.044	2.058	2.072	2.085	2.099
-39.95	1.013	1.802	1.819	1.836	1.852	1.867	1.883	1.898	1.914	1.929	1.944	1.958	1.973	1.987	2.002	2.016	2.030	2.044	2.058	2.071	2.085	2.099
-35	1.283	1.793	1.810	1.826	1.842	1.858	1.874	1.889	1.904	1.919	1.934	1.949	1.963	1.978	1.992	2.006	2.020	2.034	2.048	2.061	2.075	2.089
-30	1.611	1.784	1.801	1.817	1.834	1.849	1.865	1.880	1.895	1.910	1.925	1.940	1.954	1.969	1.983	1.997	2.011	2.025	2.039	2.052	2.066	2.079
-25	2.000	1.776	1.793	1.809	1.826	1.841	1.857	1.872	1.887	1.902	1.917	1.932	1.946	1.961	1.975	1.989	2.003	2.017	2.030	2.044	2.057	2.071
-20	2.459	1.769	1.786	1.802	1.818	1.834	1.850	1.865	1.880	1.895	1.910	1.925	1.939	1.953	1.967	1.982	1.995	2.009	2.023	2.036	2.050	2.063
-15	2.996	1.762	1.779	1.795	1.812	1.828	1.843	1.859	1.874	1.889	1.903	1.918	1.932	1.947	1.961	1.975	1.989	2.003	2.016	2.030	2.043	2.057
-10	3.619	1.755	1.773	1.789	1.806	1.821	1.837	1.853	1.868	1.883	1.897	1.912	1.926	1.941	1.955	1.969	1.983	1.996	2.010	2.024	2.037	2.050
-5	4.336	1.749	1.767	1.783	1.800	1.816	1.832	1.847	1.862	1.877	1.892	1.907	1.921	1.935	1.949	1.963	1.977	1.991	2.005	2.018	2.031	2.045
0	5.158	1.744	1.761	1.778	1.795	1.811	1.826	1.842	1.857	1.872	1.887	1.902	1.916	1.930	1.944	1.958	1.972	1.986	2.000	2.013	2.026	2.040
5	6.093	1.738	1.756	1.773	1.790	1.806	1.822	1.837	1.853	1.868	1.883	1.897	1.912	1.926	1.940	1.954	1.968	1.982	1.995	2.009	2.022	2.035
10	7.151	1.733	1.751	1.768	1.785	1.801	1.817	1.833	1.848	1.863	1.878	1.893	1.908	1.922	1.936	1.950	1.964	1.978	1.991	2.005	2.018	2.031
15	8.344	1.728	1.746	1.764	1.781	1.797	1.813	1.829	1.844	1.860	1.875	1.889	1.904	1.918	1.932	1.946	1.960	1.974	1.987	2.001	2.014	2.028
20	9.681	1.723	1.742	1.759	1.776	1.793	1.809	1.825	1.841	1.856	1.871	1.886	1.900	1.915	1.929	1.943	1.957	1.971	1.984	1.998	2.011	2.024
25	11.175	1.718	1.737	1.755	1.772	1.789	1.806	1.822	1.837	1.853	1.868	1.883	1.897	1.912	1.926	1.940	1.954	1.968	1.981	1.995	2.008	2.021
30	12.837	1.713	1.732	1.751	1.768	1.785	1.802	1.818	1.834	1.849	1.865	1.880	1.894	1.909	1.923	1.937	1.951	1.965	1.978	1.992	2.005	2.019
35	14.681	1.708	1.728	1.746	1.764	1.782	1.799	1.815	1.831	1.846	1.862	1.877	1.891	1.906	1.920	1.934	1.948	1.962	1.976	1.989	2.003	2.016
40	16.720	1.702	1.723	1.742	1.760	1.778	1.795	1.812	1.828	1.843	1.859	1.874	1.889	1.903	1.918	1.932	1.946	1.960	1.974	1.987	2.001	2.014
45	18.970	1.696	1.717	1.737	1.756	1.774	1.792	1.808	1.825	1.841	1.856	1.871	1.886	1.901	1.916	1.930	1.944	1.958	1.972	1.985	1.999	2.012
50	21.448	1.689	1.712	1.732	1.752	1.770	1.788	1.805	1.822	1.838	1.853	1.869	1.884	1.899	1.913	1.928	1.942	1.956	1.970	1.983	1.997	2.010
55	24.172	1.681	1.705	1.727	1.747	1.766	1.784	1.802	1.818	1.835	1.851	1.866	1.881	1.896	1.911	1.926	1.940	1.954	1.968	1.981	1.995	2.008
60	27.165	1.672	1.698	1.721	1.742	1.762	1.780	1.798	1.815	1.832	1.848	1.864	1.879	1.894	1.909	1.923	1.938	1.952	1.966	1.979	1.993	2.006
65	30.456	1.661	1.690	1.715	1.737	1.757	1.776	1.794	1.812	1.829	1.845	1.861	1.876	1.892	1.907	1.921	1.936	1.950	1.964	1.978	1.991	2.005
70	34.084	1.648	1.681	1.707	1.730	1.752	1.771	1.790	1.808	1.825	1.842	1.858	1.874	1.889	1.904	1.919	1.934	1.948	1.962	1.976	1.990	2.003
75	38.109	1.628	1.669	1.698	1.723	1.746	1.766	1.785	1.804	1.821	1.838	1.855	1.871	1.886	1.902	1.916	1.931	1.946	1.960	1.974	1.987	2.001
80	42.678	1.596	1.653	1.687	1.714	1.738	1.759	1.779	1.798	1.816	1.834	1.851	1.867	1.883	1.898	1.913	1.928	1.943	1.957	1.971	1.985	1.999