



# Opteon™ XL20

## Refrigerant

### Thermodynamic Properties of Opteon™ XL20 (R-454C) SI Units

#### Physical Properties

Molecular Weight	90.8 g/mol
Boiling Point at One Atmosphere	-45.6 °C
Critical Temperature	85.7 °C
Critical Pressure	4318.8 kPa
Critical Density	461.6 kg/m <sup>3</sup>
Critical Volume	0.0022 m <sup>3</sup> /kg
Ozone Depletion Potential	0
Global Warming Potential AR4	148
ASHRAE Standard 34 Safety Rating	A2L

#### Units and Factors

t	= temperature in °C
P	= pressure in kiloPascals absolute (kPa [abs])
v <sub>f</sub>	= volume of saturated liquid in m <sup>3</sup> /kg
v <sub>g</sub>	= volume of saturated vapor in m <sup>3</sup> /kg
V	= volume of superheated vapor in m <sup>3</sup> /kg
d <sub>f</sub>	= 1/v <sub>f</sub> = density of saturated liquid in kg/m <sup>3</sup>
d <sub>g</sub>	= 1/v <sub>g</sub> = density of saturated vapor in kg/m <sup>3</sup>
h <sub>f</sub>	= enthalpy of saturated liquid in kJ/kg
h <sub>fg</sub>	= enthalpy of vaporization in kJ/kg
h <sub>g</sub>	= enthalpy of saturated vapor in kJ/kg
H	= enthalpy of superheated vapor in kJ/kg
s <sub>f</sub>	= entropy of saturated liquid in kJ/(kg) (K)
s <sub>g</sub>	= entropy of saturated vapor in kJ/(kg) (K)
S	= entropy of superheated vapor in kJ/(kg) (K)

One atmosphere = 101.325 kPa

Reference point for enthalpy and entropy:

h<sub>f</sub> = 200 kJ/kg at 0°C

s<sub>f</sub> = 1 kJ/kg·K at 0°C

This information is based on NIST Standard Database 23, Version 10 (Lemmon, E.W.; Huber, M.L.; McLinden, M.O.; REFPROP Reference Fluid Thermodynamic and Transport Properties - National Institute of Standards and Technology, 2013).

Opteon™ XL20 (R-454C)

Saturation Properties - Temperature Table

Temp °C	Pressure [kPa]		Volume [m <sup>3</sup> /kg]		Density [kg/m <sup>3</sup> ]		Enthalpy [kJ/kg]			Entropy [kJ/kg-K]		Temp °C
	Liquid P <sub>f</sub>	Vapor P <sub>g</sub>	Liquid v <sub>f</sub>	Vapor v <sub>g</sub>	Liquid d <sub>f</sub>	Vapor d <sub>g</sub>	Liquid h <sub>f</sub>	Latent h <sub>fg</sub>	Vapor h <sub>g</sub>	Liquid s <sub>f</sub>	Vapor s <sub>g</sub>	
-60	48.520	31.359	0.000760	0.6105	1316.2	1.638	120.9	231.3	352.3	0.676	1.782	-60
-59	51.249	33.259	0.000761	0.5779	1313.5	1.730	122.2	230.7	352.9	0.681	1.779	-59
-58	54.100	35.252	0.000763	0.5473	1310.8	1.827	123.4	230.1	353.5	0.687	1.777	-58
-57	57.076	37.341	0.000764	0.5186	1308.2	1.928	124.7	229.5	354.2	0.693	1.775	-57
-56	60.181	39.530	0.000766	0.4917	1305.5	2.034	125.9	228.9	354.8	0.699	1.773	-56
-55	63.419	41.821	0.000768	0.4665	1302.8	2.144	127.2	228.3	355.5	0.705	1.771	-55
-54	66.794	44.219	0.000769	0.4428	1300.0	2.258	128.4	227.7	356.1	0.710	1.769	-54
-53	70.310	46.726	0.000771	0.4206	1297.3	2.378	129.7	227.1	356.7	0.716	1.767	-53
-52	73.972	49.347	0.000772	0.3996	1294.6	2.502	130.9	226.4	357.4	0.722	1.765	-52
-51	77.783	52.085	0.000774	0.3799	1291.9	2.632	132.2	225.8	358.0	0.727	1.763	-51
-50	81.748	54.945	0.000776	0.3614	1289.1	2.767	133.5	225.2	358.7	0.733	1.761	-50
-49	85.871	57.929	0.000777	0.3440	1286.3	2.907	134.7	224.6	359.3	0.739	1.759	-49
-48	90.156	61.041	0.000779	0.3275	1283.6	3.053	136.0	223.9	359.9	0.744	1.757	-48
-47	94.608	64.287	0.000781	0.3120	1280.8	3.205	137.3	223.3	360.6	0.750	1.755	-47
-46	99.231	67.669	0.000782	0.2974	1278.0	3.363	138.5	222.7	361.2	0.756	1.754	-46
-45	104.030	71.192	0.000784	0.2836	1275.2	3.526	139.8	222.0	361.8	0.761	1.752	-45
-44	109.009	74.860	0.000786	0.2705	1272.4	3.696	141.1	221.4	362.5	0.767	1.750	-44
-43	114.173	78.678	0.000788	0.2582	1269.6	3.873	142.4	220.7	363.1	0.772	1.749	-43
-42	119.527	82.648	0.000789	0.2466	1266.8	4.056	143.7	220.1	363.8	0.778	1.747	-42
-41	125.075	86.777	0.000791	0.2355	1263.9	4.246	144.9	219.4	364.4	0.783	1.746	-41
-40	130.822	91.068	0.000793	0.2251	1261.1	4.442	146.2	218.8	365.0	0.789	1.744	-40
-39	136.773	95.526	0.000795	0.2152	1258.2	4.646	147.5	218.1	365.7	0.794	1.743	-39
-38	142.933	100.155	0.000797	0.2059	1255.3	4.858	148.8	217.5	366.3	0.800	1.741	-38
-37	149.306	104.960	0.000798	0.1970	1252.4	5.076	150.1	216.8	366.9	0.805	1.740	-37
-36	155.898	109.945	0.000800	0.1886	1249.6	5.303	151.4	216.2	367.5	0.811	1.738	-36
-35	162.714	115.116	0.000802	0.1806	1246.6	5.537	152.7	215.5	368.2	0.816	1.737	-35
-34	169.758	120.477	0.000804	0.1730	1243.7	5.780	154.0	214.8	368.8	0.822	1.736	-34
-33	177.036	126.032	0.000806	0.1658	1240.8	6.030	155.3	214.1	369.4	0.827	1.734	-33
-32	184.552	131.788	0.000808	0.1590	1237.9	6.290	156.6	213.5	370.1	0.832	1.733	-32
-31	192.313	137.748	0.000810	0.1525	1234.9	6.558	157.9	212.8	370.7	0.838	1.732	-31
-30	200.323	143.918	0.000812	0.1463	1231.9	6.835	159.2	212.1	371.3	0.843	1.731	-30
-29	208.587	150.303	0.000814	0.1404	1229.0	7.121	160.5	211.4	371.9	0.849	1.729	-29
-28	217.111	156.907	0.000816	0.1348	1226.0	7.416	161.8	210.7	372.5	0.854	1.728	-28
-27	225.900	163.737	0.000818	0.1295	1223.0	7.721	163.2	210.0	373.2	0.859	1.727	-27
-26	234.959	170.797	0.000820	0.1244	1220.0	8.036	164.5	209.3	373.8	0.865	1.726	-26
-25	244.295	178.093	0.000822	0.1196	1216.9	8.361	165.8	208.6	374.4	0.870	1.725	-25
-24	253.911	185.630	0.000824	0.1150	1213.9	8.696	167.1	207.9	375.0	0.875	1.724	-24
-23	263.814	193.413	0.000826	0.1106	1210.8	9.042	168.5	207.2	375.6	0.881	1.723	-23
-22	274.009	201.448	0.000828	0.1064	1207.8	9.398	169.8	206.4	376.2	0.886	1.722	-22
-21	284.502	209.740	0.000830	0.1024	1204.7	9.766	171.1	205.7	376.8	0.891	1.721	-21
-20	295.299	218.295	0.000832	0.0986	1201.6	10.144	172.5	205.0	377.4	0.896	1.720	-20
-19	306.404	227.119	0.000834	0.0949	1198.5	10.535	173.8	204.2	378.1	0.902	1.719	-19
-18	317.823	236.217	0.000837	0.0914	1195.4	10.937	175.2	203.5	378.7	0.907	1.718	-18
-17	329.563	245.596	0.000839	0.0881	1192.2	11.351	176.5	202.7	379.3	0.912	1.717	-17
-16	341.629	255.260	0.000841	0.0849	1189.1	11.778	177.9	202.0	379.9	0.917	1.716	-16
-15	354.026	265.215	0.000843	0.0819	1185.9	12.217	179.2	201.2	380.5	0.923	1.715	-15
-14	366.760	275.468	0.000846	0.0789	1182.7	12.669	180.6	200.5	381.1	0.928	1.714	-14
-13	379.838	286.025	0.000848	0.0761	1179.5	13.135	182.0	199.7	381.7	0.933	1.713	-13
-12	393.264	296.891	0.000850	0.0735	1176.3	13.613	183.3	198.9	382.2	0.938	1.712	-12
-11	407.045	308.073	0.000852	0.0709	1173.1	14.106	184.7	198.1	382.8	0.943	1.711	-11
-10	421.187	319.577	0.000855	0.0684	1169.8	14.613	186.1	197.4	383.4	0.949	1.711	-10
-9	435.695	331.408	0.000857	0.0661	1166.5	15.134	187.4	196.6	384.0	0.954	1.710	-9
-8	450.575	343.574	0.000860	0.0638	1163.3	15.671	188.8	195.8	384.6	0.959	1.709	-8
-7	465.834	356.080	0.000862	0.0616	1160.0	16.222	190.2	195.0	385.2	0.964	1.708	-7
-6	481.477	368.932	0.000865	0.0596	1156.6	16.789	191.6	194.2	385.7	0.969	1.708	-6
-5	497.510	382.138	0.000867	0.0576	1153.3	17.371	193.0	193.3	386.3	0.974	1.707	-5
-4	513.940	395.704	0.000870	0.0556	1149.9	17.970	194.4	192.5	386.9	0.979	1.706	-4

Opteon™ XL20 (R-454C)

Saturation Properties - Temperature Table

Temp °C	Pressure [kPa]		Volume [m <sup>3</sup> /kg]		Density [kg/m <sup>3</sup> ]		Enthalpy [kJ/kg]			Entropy [kJ/kg-K]		Temp °C
	Liquid P <sub>f</sub>	Vapor P <sub>g</sub>	Liquid v <sub>f</sub>	Vapor v <sub>g</sub>	Liquid d <sub>f</sub>	Vapor d <sub>g</sub>	Liquid h <sub>f</sub>	Latent h <sub>fg</sub>	Vapor h <sub>g</sub>	Liquid s <sub>f</sub>	Vapor s <sub>g</sub>	
-3	530.771	409.635	0.000872	0.0538	1146.6	18.586	195.8	191.7	387.5	0.985	1.705	-3
-2	548.011	423.940	0.000875	0.0520	1143.2	19.218	197.2	190.9	388.0	0.990	1.705	-2
-1	565.666	438.623	0.000877	0.0503	1139.7	19.868	198.6	190.0	388.6	0.995	1.704	-1
0	583.740	453.693	0.000880	0.0487	1136.3	20.536	200.0	189.2	389.2	1.000	1.703	0
1	602.242	469.156	0.000883	0.0471	1132.9	21.221	201.4	188.3	389.7	1.005	1.703	1
2	621.176	485.018	0.000885	0.0456	1129.4	21.925	202.8	187.4	390.3	1.010	1.702	2
3	640.548	501.287	0.000888	0.0442	1125.9	22.649	204.3	186.6	390.8	1.015	1.701	3
4	660.366	517.969	0.000891	0.0428	1122.4	23.392	205.7	185.7	391.4	1.020	1.701	4
5	680.635	535.072	0.000894	0.0414	1118.8	24.154	207.1	184.8	391.9	1.025	1.700	5
6	701.362	552.603	0.000897	0.0401	1115.2	24.937	208.6	183.9	392.5	1.031	1.699	6
7	722.552	570.568	0.000900	0.0388	1111.7	25.742	210.0	183.0	393.0	1.036	1.699	7
8	744.212	588.975	0.000902	0.0376	1108.0	26.567	211.4	182.1	393.5	1.041	1.698	8
9	766.349	607.831	0.000905	0.0365	1104.4	27.414	212.9	181.2	394.0	1.046	1.698	9
10	788.968	627.144	0.000908	0.0354	1100.7	28.284	214.3	180.2	394.6	1.051	1.697	10
11	812.075	646.921	0.000912	0.0343	1097.1	29.177	215.8	179.3	395.1	1.056	1.696	11
12	835.678	667.169	0.000915	0.0332	1093.3	30.094	217.3	178.4	395.6	1.061	1.696	12
13	859.783	687.896	0.000918	0.0322	1089.6	31.034	218.7	177.4	396.1	1.066	1.695	13
14	884.395	709.111	0.000921	0.0313	1085.8	32.000	220.2	176.4	396.6	1.071	1.695	14
15	909.522	730.819	0.000924	0.0303	1082.0	32.991	221.7	175.5	397.1	1.076	1.694	15
16	935.169	753.030	0.000927	0.0294	1078.2	34.008	223.2	174.5	397.6	1.081	1.693	16
17	961.343	775.751	0.000931	0.0285	1074.4	35.051	224.6	173.5	398.1	1.086	1.693	17
18	988.051	798.990	0.000934	0.0277	1070.5	36.122	226.1	172.5	398.6	1.091	1.692	18
19	1015.299	822.755	0.000938	0.0269	1066.6	37.222	227.6	171.5	399.1	1.096	1.692	19
20	1043.094	847.055	0.000941	0.0261	1062.6	38.350	229.1	170.4	399.6	1.101	1.691	20
21	1071.441	871.898	0.000945	0.0253	1058.7	39.508	230.6	169.4	400.0	1.106	1.691	21
22	1100.349	897.291	0.000948	0.0246	1054.7	40.696	232.1	168.4	400.5	1.111	1.690	22
23	1129.822	923.245	0.000952	0.0239	1050.6	41.916	233.7	167.3	401.0	1.117	1.690	23
24	1159.868	949.766	0.000956	0.0232	1046.6	43.168	235.2	166.2	401.4	1.122	1.689	24
25	1190.493	976.864	0.000959	0.0225	1042.4	44.453	236.7	165.2	401.9	1.127	1.688	25
26	1221.704	1004.548	0.000963	0.0218	1038.3	45.772	238.2	164.1	402.3	1.132	1.688	26
27	1253.508	1032.826	0.000967	0.0212	1034.1	47.127	239.8	163.0	402.7	1.137	1.687	27
28	1285.911	1061.708	0.000971	0.0206	1029.9	48.517	241.3	161.8	403.2	1.142	1.687	28
29	1318.919	1091.203	0.000975	0.0200	1025.6	49.945	242.9	160.7	403.6	1.147	1.686	29
30	1352.541	1121.320	0.000979	0.0195	1021.4	51.411	244.4	159.6	404.0	1.152	1.685	30
31	1386.781	1152.069	0.000983	0.0189	1017.0	52.916	246.0	158.4	404.4	1.157	1.685	31
32	1421.647	1183.459	0.000988	0.0184	1012.6	54.462	247.6	157.2	404.8	1.162	1.684	32
33	1457.146	1215.500	0.000992	0.0178	1008.2	56.050	249.2	156.0	405.2	1.167	1.684	33
34	1493.284	1248.202	0.000996	0.0173	1003.7	57.681	250.8	154.8	405.6	1.172	1.683	34
35	1530.069	1281.575	0.001001	0.0168	999.2	59.358	252.3	153.6	406.0	1.177	1.682	35
36	1567.506	1315.629	0.001005	0.0164	994.7	61.080	253.9	152.4	406.3	1.182	1.682	36
37	1605.603	1350.376	0.001010	0.0159	990.0	62.851	255.6	151.1	406.7	1.187	1.681	37
38	1644.367	1385.825	0.001015	0.0155	985.4	64.670	257.2	149.9	407.0	1.192	1.680	38
39	1683.804	1421.987	0.001020	0.0150	980.6	66.541	258.8	148.6	407.4	1.197	1.680	39
40	1723.921	1458.873	0.001025	0.0146	975.9	68.466	260.4	147.3	407.7	1.202	1.679	40
41	1764.725	1496.496	0.001030	0.0142	971.0	70.445	262.1	146.0	408.0	1.208	1.678	41
42	1806.223	1534.866	0.001035	0.0138	966.1	72.481	263.7	144.6	408.3	1.213	1.678	42
43	1848.422	1573.995	0.001040	0.0134	961.2	74.576	265.4	143.2	408.6	1.218	1.677	43
44	1891.328	1613.895	0.001046	0.0130	956.1	76.733	267.0	141.9	408.9	1.223	1.676	44
45	1934.949	1654.579	0.001051	0.0127	951.0	78.954	268.7	140.5	409.2	1.228	1.675	45
46	1979.291	1696.059	0.001057	0.0123	945.9	81.242	270.4	139.0	409.4	1.233	1.674	46
47	2024.361	1738.348	0.001063	0.0120	940.6	83.599	272.1	137.6	409.7	1.238	1.674	47
48	2070.165	1781.460	0.001069	0.0116	935.3	86.028	273.8	136.1	409.9	1.243	1.673	48
49	2116.711	1825.408	0.001075	0.0113	929.9	88.533	275.5	134.6	410.1	1.249	1.672	49
50	2164.006	1870.207	0.001082	0.0110	924.4	91.117	277.3	133.1	410.3	1.254	1.671	50
51	2212.056	1915.870	0.001088	0.0107	918.8	93.783	279.0	131.5	410.5	1.259	1.670	51
52	2260.867	1962.413	0.001095	0.0104	913.1	96.536	280.8	129.9	410.7	1.264	1.669	52
53	2310.447	2009.852	0.001102	0.0101	907.3	99.379	282.5	128.3	410.9	1.270	1.668	53

Opteon™ XL20 (R-454C)

Saturation Properties - Temperature Table

Temp °C	Pressure [kPa]		Volume [m <sup>3</sup> /kg]		Density [kg/m <sup>3</sup> ]		Enthalpy [kJ/kg]			Entropy [kJ/kg-K]		Temp °C
	Liquid P <sub>f</sub>	Vapor P <sub>g</sub>	Liquid v <sub>f</sub>	Vapor v <sub>g</sub>	Liquid d <sub>f</sub>	Vapor d <sub>g</sub>	Liquid h <sub>f</sub>	Latent h <sub>fg</sub>	Vapor h <sub>g</sub>	Liquid s <sub>f</sub>	Vapor s <sub>g</sub>	
54	2360.802	2058.202	0.001109	0.0098	901.4	102.318	284.3	126.7	411.0	1.275	1.667	54
55	2411.939	2107.480	0.001117	0.0095	895.4	105.357	286.1	125.0	411.1	1.280	1.666	55
56	2463.864	2157.704	0.001125	0.0092	889.2	108.501	287.9	123.3	411.2	1.286	1.665	56
57	2516.583	2208.891	0.001133	0.0089	883.0	111.757	289.7	121.6	411.3	1.291	1.664	57
58	2570.103	2261.060	0.001141	0.0087	876.6	115.131	291.6	119.8	411.4	1.296	1.662	58
59	2624.430	2314.231	0.001149	0.0084	870.1	118.629	293.4	118.0	411.4	1.302	1.661	59
60	2679.569	2368.425	0.001158	0.0082	863.4	122.260	295.3	116.1	411.4	1.307	1.660	60
61	2735.527	2423.663	0.001168	0.0079	856.5	126.031	297.2	114.2	411.4	1.313	1.658	61
62	2792.310	2479.969	0.001177	0.0077	849.5	129.953	299.1	112.2	411.4	1.318	1.657	62
63	2849.921	2537.367	0.001187	0.0075	842.3	134.036	301.1	110.2	411.3	1.324	1.656	63
64	2908.367	2595.882	0.001198	0.0072	834.9	138.291	303.1	108.1	411.2	1.329	1.654	64
65	2967.651	2655.544	0.001209	0.0070	827.4	142.731	305.0	106.0	411.1	1.335	1.652	65
66	3027.778	2716.381	0.001220	0.0068	819.5	147.371	307.1	103.8	410.9	1.341	1.651	66
67	3088.751	2778.426	0.001232	0.0066	811.5	152.228	309.1	101.6	410.7	1.347	1.649	67
68	3150.571	2841.715	0.001245	0.0064	803.2	157.321	311.2	99.2	410.4	1.353	1.647	68
69	3213.241	2906.285	0.001259	0.0061	794.6	162.673	313.3	96.8	410.1	1.358	1.645	69
70	3276.760	2972.178	0.001273	0.0059	785.6	168.308	315.4	94.3	409.8	1.365	1.643	70
71	3341.125	3039.442	0.001288	0.0057	776.4	174.256	317.6	91.8	409.4	1.371	1.640	71
72	3406.334	3108.130	0.001304	0.0055	766.7	180.553	319.9	89.1	408.9	1.377	1.638	72
73	3472.377	3178.300	0.001322	0.0053	756.6	187.242	322.2	86.2	408.4	1.383	1.635	73
74	3539.245	3250.022	0.001340	0.0051	746.1	194.374	324.5	83.3	407.8	1.390	1.632	74
75	3606.918	3323.374	0.001361	0.0050	734.9	202.011	326.9	80.2	407.1	1.396	1.629	75
76	3675.372	3398.450	0.001383	0.0048	723.1	210.233	329.4	76.9	406.3	1.403	1.626	76
77	3744.571	3475.365	0.001407	0.0046	710.6	219.142	332.0	73.4	405.4	1.410	1.622	77
78	3814.459	3554.258	0.001434	0.0044	697.2	228.869	334.7	69.7	404.4	1.418	1.618	78
79	3884.959	3635.309	0.001465	0.0042	682.6	239.595	337.5	65.7	403.2	1.426	1.614	79
80	3955.946	3718.757	0.001500	0.0040	666.6	251.574	340.5	61.3	401.8	1.434	1.609	80

# Opteon™ XL20 (R-454C)

## Superheated Vapor - Constant Pressure Tables

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	10			20			30			40			Temp °C
	-77.47                      -67.30                      -60.75                      -55.79												
	V	H	S	V	H	S	V	H	S	V	H	S	
	1.7767	341.1	1.830	0.9294	347.6	1.800	0.0007	99.2	0.570	0.0007	99.2	0.570	
-75	1.8000	342.8	1.839										-75
-70	1.8469	346.2	1.856										-70
-65	1.8937	349.7	1.873	0.9404	349.2	1.808							-65
-60	1.9404	353.3	1.890	0.9642	352.8	1.825	0.6387	352.3	1.786				-60
-55	1.9871	356.9	1.907	0.9879	356.5	1.842	0.6549	356.0	1.803	0.4883	355.5	1.775	-55
-50	2.0336	360.6	1.923	1.0116	360.2	1.859	0.6709	359.7	1.820	0.5005	359.3	1.792	-50
-45	2.0800	364.3	1.940	1.0351	363.9	1.875	0.6868	363.5	1.837	0.5126	363.1	1.809	-45
-40	2.1264	368.0	1.956	1.0586	367.7	1.891	0.7027	367.3	1.853	0.5247	366.9	1.826	-40
-35	2.1728	371.8	1.972	1.0821	371.5	1.908	0.7185	371.2	1.869	0.5367	370.8	1.842	-35
-30	2.2190	375.7	1.988	1.1055	375.4	1.924	0.7343	375.0	1.886	0.5487	374.7	1.858	-30
-25	2.2653	379.6	2.004	1.1288	379.3	1.940	0.7500	379.0	1.902	0.5606	378.7	1.874	-25
-20	2.3115	383.5	2.020	1.1521	383.2	1.955	0.7657	383.0	1.918	0.5724	382.7	1.890	-20
-15	2.3577	387.5	2.035	1.1754	387.2	1.971	0.7813	387.0	1.933	0.5843	386.7	1.906	-15
-10	2.4038	391.5	2.051	1.1987	391.3	1.987	0.7969	391.0	1.949	0.5961	390.8	1.922	-10
-5	2.4499	395.6	2.066	1.2219	395.4	2.002	0.8125	395.2	1.964	0.6078	394.9	1.937	-5
0	2.4960	399.7	2.081	1.2451	399.5	2.017	0.8281	399.3	1.980	0.6196	399.1	1.953	0
5	2.5421	403.9	2.097	1.2682	403.7	2.033	0.8436	403.5	1.995	0.6313	403.3	1.968	5
10	2.5881	408.1	2.112	1.2914	407.9	2.048	0.8591	407.8	2.010	0.6430	407.6	1.983	10
15	2.6342	412.4	2.127	1.3145	412.2	2.063	0.8746	412.0	2.025	0.6547	411.9	1.998	15
20	2.6802	416.7	2.142	1.3377	416.6	2.078	0.8901	416.4	2.040	0.6664	416.2	2.013	20
25	2.7262	421.1	2.156	1.3608	420.9	2.092	0.9056	420.8	2.055	0.6780	420.6	2.028	25
30	2.7722	425.5	2.171	1.3838	425.3	2.107	0.9211	425.2	2.070	0.6897	425.0	2.043	30
35	2.8182	430.0	2.186	1.4069	429.8	2.122	0.9365	429.7	2.084	0.7013	429.5	2.057	35
40	2.8641	434.5	2.200	1.4300	434.3	2.136	0.9520	434.2	2.099	0.7129	434.0	2.072	40
45	2.9101	439.0	2.214	1.4531	438.9	2.151	0.9674	438.7	2.113	0.7245	438.6	2.087	45
50	2.9560	443.6	2.229	1.4761	443.5	2.165	0.9828	443.3	2.128	0.7361	443.2	2.101	50
55	3.0020	448.2	2.243	1.4991	448.1	2.179	0.9982	448.0	2.142	0.7477	447.9	2.115	55
60	3.0479	452.9	2.257	1.5222	452.8	2.193	1.0136	452.7	2.156	0.7593	452.5	2.129	60
65	3.0938	457.6	2.271	1.5452	457.5	2.207	1.0290	457.4	2.170	0.7709	457.3	2.143	65
70	3.1397	462.4	2.285	1.5682	462.3	2.221	1.0444	462.2	2.184	0.7825	462.1	2.157	70

  

ABSOLUTE PRESSURE, kPa													
Temp °C	50			60			70			80			Temp °C
	-51.76                      -48.33                      -45.33                      -42.66												
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.3947	357.5	1.764	0.3328	359.7	1.758	0.0650	181.5	0.951	0.0008	131.3	0.723	
-50	0.3982	358.9	1.770										-50
-45	0.4081	362.7	1.787	0.3384	362.3	1.769	0.2886	361.9	1.754				-45
-40	0.4179	366.6	1.804	0.3467	366.2	1.786	0.2958	365.8	1.771	0.2576	365.4	1.757	-40
-35	0.4276	370.5	1.821	0.3549	370.1	1.803	0.3029	369.8	1.788	0.2639	369.4	1.774	-35
-30	0.4373	374.4	1.837	0.3630	374.1	1.819	0.3100	373.8	1.804	0.2702	373.4	1.791	-30
-25	0.4469	378.4	1.853	0.3711	378.1	1.836	0.3170	377.8	1.821	0.2764	377.5	1.807	-25
-20	0.4565	382.4	1.869	0.3792	382.1	1.852	0.3239	381.8	1.837	0.2825	381.6	1.824	-20
-15	0.4660	386.5	1.885	0.3872	386.2	1.868	0.3309	385.9	1.853	0.2886	385.7	1.840	-15
-10	0.4755	390.6	1.901	0.3952	390.3	1.883	0.3378	390.1	1.869	0.2947	389.8	1.856	-10
-5	0.4850	394.7	1.916	0.4031	394.5	1.899	0.3446	394.2	1.884	0.3008	394.0	1.871	-5
0	0.4945	398.9	1.932	0.4111	398.7	1.915	0.3515	398.4	1.900	0.3068	398.2	1.887	0
5	0.5039	403.1	1.947	0.4190	402.9	1.930	0.3583	402.7	1.915	0.3128	402.5	1.902	5
10	0.5133	407.4	1.962	0.4269	407.2	1.945	0.3651	407.0	1.930	0.3188	406.8	1.918	10
15	0.5227	411.7	1.977	0.4347	411.5	1.960	0.3719	411.3	1.946	0.3248	411.1	1.933	15
20	0.5321	416.0	1.992	0.4426	415.9	1.975	0.3787	415.7	1.961	0.3307	415.5	1.948	20
25	0.5415	420.4	2.007	0.4504	420.3	1.990	0.3854	420.1	1.976	0.3367	419.9	1.963	25
30	0.5508	424.9	2.022	0.4583	424.7	2.005	0.3922	424.6	1.990	0.3426	424.4	1.978	30
35	0.5602	429.4	2.037	0.4661	429.2	2.020	0.3989	429.1	2.005	0.3485	428.9	1.993	35
40	0.5695	433.9	2.051	0.4739	433.7	2.034	0.4056	433.6	2.020	0.3544	433.4	2.007	40
45	0.5788	438.5	2.066	0.4817	438.3	2.049	0.4123	438.2	2.034	0.3603	438.0	2.022	45
50	0.5881	443.1	2.080	0.4895	442.9	2.063	0.4190	442.8	2.049	0.3661	442.7	2.036	50
55	0.5974	447.7	2.094	0.4973	447.6	2.077	0.4257	447.5	2.063	0.3720	447.3	2.051	55
60	0.6067	452.4	2.109	0.5050	452.3	2.092	0.4324	452.2	2.077	0.3779	452.0	2.065	60
65	0.6160	457.2	2.123	0.5128	457.0	2.106	0.4390	456.9	2.091	0.3837	456.8	2.079	65
70	0.6253	461.9	2.137	0.5205	461.8	2.120	0.4457	461.7	2.106	0.3896	461.6	2.093	70
75	0.6346	466.8	2.151	0.5283	466.7	2.134	0.4524	466.5	2.119	0.3954	466.4	2.107	75
80	0.6439	471.6	2.165	0.5360	471.5	2.148	0.4590	471.4	2.133	0.4013	471.3	2.121	80
85	0.6531	476.5	2.178	0.5438	476.4	2.162	0.4657	476.3	2.147	0.4071	476.2	2.135	85
90	0.6624	481.5	2.192	0.5515	481.4	2.175	0.4723	481.3	2.161	0.4129	481.2	2.149	90
95	0.6716	486.5	2.206	0.5592	486.4	2.189	0.4790	486.3	2.175	0.4187	486.2	2.162	95

**Opteon™ XL20 (R-454C)**  
**Superheated Vapor - Constant Pressure Tables**

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	90			100			101.325			110			Temp °C
	-40.25			-38.03			-37.75			-35.99			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.2276	364.9	1.744	0.2062	366.3	1.741	0.1378	293.1	1.427	0.0916	251.0	1.243	
-40	0.2279	365.1	1.745										-40
-35	0.2336	369.1	1.762	0.2093	368.7	1.752	0.2064	368.7	1.750	0.1894	368.4	1.742	-35
-30	0.2392	373.1	1.779	0.2144	372.8	1.768	0.2115	372.7	1.767	0.1941	372.5	1.759	-30
-25	0.2448	377.2	1.796	0.2195	376.9	1.785	0.2165	376.8	1.784	0.1988	376.6	1.775	-25
-20	0.2503	381.3	1.812	0.2245	381.0	1.802	0.2215	381.0	1.800	0.2034	380.7	1.792	-20
-15	0.2558	385.4	1.828	0.2295	385.1	1.818	0.2264	385.1	1.816	0.2080	384.9	1.808	-15
-10	0.2612	389.6	1.844	0.2344	389.3	1.834	0.2313	389.3	1.833	0.2125	389.1	1.824	-10
-5	0.2666	393.8	1.860	0.2393	393.5	1.850	0.2361	393.5	1.848	0.2170	393.3	1.840	-5
0	0.2720	398.0	1.876	0.2442	397.8	1.865	0.2410	397.8	1.864	0.2215	397.6	1.856	0
5	0.2774	402.3	1.891	0.2491	402.1	1.881	0.2458	402.0	1.880	0.2259	401.9	1.872	5
10	0.2828	406.6	1.906	0.2539	406.4	1.896	0.2506	406.4	1.895	0.2304	406.2	1.887	10
15	0.2881	410.9	1.922	0.2588	410.8	1.912	0.2553	410.7	1.910	0.2348	410.6	1.902	15
20	0.2934	415.3	1.937	0.2636	415.2	1.927	0.2601	415.1	1.925	0.2392	415.0	1.918	20
25	0.2987	419.8	1.952	0.2684	419.6	1.942	0.2648	419.6	1.940	0.2435	419.4	1.933	25
30	0.3040	424.2	1.967	0.2731	424.1	1.957	0.2695	424.0	1.955	0.2479	423.9	1.948	30
35	0.3093	428.7	1.981	0.2779	428.6	1.971	0.2742	428.6	1.970	0.2522	428.4	1.962	35
40	0.3145	433.3	1.996	0.2827	433.2	1.986	0.2789	433.1	1.985	0.2566	433.0	1.977	40
45	0.3198	437.9	2.011	0.2874	437.8	2.001	0.2836	437.7	1.999	0.2609	437.6	1.992	45
50	0.3250	442.5	2.025	0.2921	442.4	2.015	0.2883	442.4	2.014	0.2652	442.3	2.006	50
55	0.3303	447.2	2.039	0.2969	447.1	2.030	0.2929	447.1	2.028	0.2695	446.9	2.021	55
60	0.3355	451.9	2.054	0.3016	451.8	2.044	0.2976	451.8	2.043	0.2738	451.7	2.035	60
65	0.3407	456.7	2.068	0.3063	456.6	2.058	0.3022	456.5	2.057	0.2781	456.4	2.049	65
70	0.3459	461.5	2.082	0.3110	461.4	2.072	0.3069	461.4	2.071	0.2824	461.3	2.063	70
75	0.3511	466.3	2.096	0.3157	466.2	2.086	0.3115	466.2	2.085	0.2867	466.1	2.077	75
80	0.3563	471.2	2.110	0.3204	471.1	2.100	0.3162	471.1	2.099	0.2910	471.0	2.091	80
85	0.3615	476.1	2.124	0.3251	476.0	2.114	0.3208	476.0	2.113	0.2953	475.9	2.105	85
90	0.3667	481.1	2.138	0.3298	481.0	2.128	0.3254	481.0	2.126	0.2995	480.9	2.119	90
95	0.3719	486.1	2.151	0.3344	486.0	2.141	0.3300	486.0	2.140	0.3038	485.9	2.132	95
100	0.3771	491.1	2.165	0.3391	491.0	2.155	0.3346	491.0	2.154	0.3080	490.9	2.146	100
105	0.3823	496.2	2.178	0.3438	496.1	2.169	0.3392	496.1	2.167	0.3123	496.0	2.160	105

  

ABSOLUTE PRESSURE, kPa													
Temp °C	120			130			140			150			Temp °C
	-34.09			-32.31			-30.63			-29.05			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1737	368.7	1.736	0.1611	369.9	1.733	0.0862	275.8	1.336	0.0563	238.3	1.177	
-30	0.1772	372.1	1.750	0.1629	371.8	1.741	0.1507	371.4	1.733				-30
-25	0.1816	376.3	1.767	0.1670	375.9	1.758	0.1544	375.6	1.751	0.1436	375.3	1.743	-25
-20	0.1858	380.4	1.783	0.1709	380.1	1.775	0.1582	379.8	1.767	0.1471	379.5	1.760	-20
-15	0.1900	384.6	1.800	0.1749	384.3	1.791	0.1619	384.1	1.784	0.1506	383.8	1.777	-15
-10	0.1942	388.8	1.816	0.1788	388.6	1.808	0.1655	388.3	1.800	0.1540	388.1	1.793	-10
-5	0.1984	393.1	1.832	0.1826	392.8	1.824	0.1691	392.6	1.816	0.1574	392.3	1.809	-5
0	0.2025	397.3	1.847	0.1865	397.1	1.840	0.1727	396.9	1.832	0.1608	396.7	1.825	0
5	0.2066	401.6	1.863	0.1903	401.4	1.855	0.1763	401.2	1.848	0.1641	401.0	1.841	5
10	0.2107	406.0	1.879	0.1941	405.8	1.871	0.1798	405.6	1.863	0.1675	405.4	1.857	10
15	0.2148	410.4	1.894	0.1978	410.2	1.886	0.1833	410.0	1.879	0.1708	409.8	1.872	15
20	0.2188	414.8	1.909	0.2016	414.6	1.901	0.1868	414.4	1.894	0.1740	414.3	1.887	20
25	0.2228	419.2	1.924	0.2053	419.1	1.916	0.1903	418.9	1.909	0.1773	418.7	1.903	25
30	0.2269	423.7	1.939	0.2091	423.6	1.931	0.1938	423.4	1.924	0.1806	423.3	1.918	30
35	0.2309	428.3	1.954	0.2128	428.1	1.946	0.1973	428.0	1.939	0.1838	427.8	1.932	35
40	0.2349	432.9	1.969	0.2165	432.7	1.961	0.2007	432.6	1.954	0.1870	432.4	1.947	40
45	0.2388	437.5	1.983	0.2202	437.3	1.976	0.2041	437.2	1.969	0.1903	437.0	1.962	45
50	0.2428	442.1	1.998	0.2238	442.0	1.990	0.2076	441.8	1.983	0.1935	441.7	1.977	50
55	0.2468	446.8	2.012	0.2275	446.7	2.005	0.2110	446.6	1.998	0.1967	446.4	1.991	55
60	0.2507	451.5	2.027	0.2312	451.4	2.019	0.2144	451.3	2.012	0.1999	451.2	2.005	60
65	0.2547	456.3	2.041	0.2348	456.2	2.033	0.2178	456.1	2.026	0.2030	456.0	2.020	65
70	0.2586	461.1	2.055	0.2385	461.0	2.047	0.2212	460.9	2.040	0.2062	460.8	2.034	70
75	0.2625	466.0	2.069	0.2421	465.9	2.061	0.2246	465.8	2.054	0.2094	465.7	2.048	75
80	0.2665	470.9	2.083	0.2457	470.8	2.075	0.2280	470.7	2.068	0.2126	470.6	2.062	80
85	0.2704	475.8	2.097	0.2494	475.7	2.089	0.2313	475.6	2.082	0.2157	475.5	2.076	85
90	0.2743	480.8	2.111	0.2530	480.7	2.103	0.2347	480.6	2.096	0.2189	480.5	2.090	90
95	0.2782	485.8	2.124	0.2566	485.7	2.117	0.2381	485.6	2.110	0.2220	485.5	2.103	95
100	0.2821	490.9	2.138	0.2602	490.8	2.130	0.2415	490.7	2.123	0.2252	490.6	2.117	100
105	0.2860	495.9	2.151	0.2638	495.9	2.144	0.2448	495.8	2.137	0.2283	495.7	2.131	105
110	0.2899	501.1	2.165	0.2675	501.0	2.157	0.2482	500.9	2.151	0.2315	500.8	2.144	110
115	0.2938	506.2	2.178	0.2711	506.2	2.171	0.2515	506.1	2.164	0.2346	506.0	2.157	115

# Opteon™ XL20 (R-454C)

## Superheated Vapor - Constant Pressure Tables

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	160			170			180			190			Temp °C
	-27.54			-26.11			-24.74			-23.43			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1324	372.8	1.728	0.1250	373.7	1.726	0.0767	297.3	1.412	0.0567	266.8	1.285	
-25	0.1341	375.0	1.736	0.1257	374.7	1.730							-25
-20	0.1374	379.2	1.753	0.1289	378.9	1.747	0.1213	378.6	1.741	0.1145	378.3	1.735	-20
-15	0.1407	383.5	1.770	0.1320	383.2	1.764	0.1242	382.9	1.758	0.1173	382.7	1.752	-15
-10	0.1440	387.8	1.786	0.1351	387.5	1.780	0.1272	387.3	1.774	0.1201	387.0	1.769	-10
-5	0.1472	392.1	1.803	0.1381	391.9	1.796	0.1301	391.6	1.791	0.1229	391.4	1.785	-5
0	0.1503	396.4	1.819	0.1411	396.2	1.813	0.1329	396.0	1.807	0.1256	395.7	1.801	0
5	0.1535	400.8	1.835	0.1441	400.6	1.828	0.1358	400.4	1.823	0.1283	400.1	1.817	5
10	0.1566	405.2	1.850	0.1471	405.0	1.844	0.1386	404.8	1.838	0.1310	404.6	1.833	10
15	0.1598	409.6	1.866	0.1500	409.4	1.860	0.1414	409.2	1.854	0.1337	409.0	1.848	15
20	0.1628	414.1	1.881	0.1530	413.9	1.875	0.1442	413.7	1.869	0.1363	413.5	1.864	20
25	0.1659	418.6	1.896	0.1559	418.4	1.890	0.1469	418.2	1.885	0.1390	418.0	1.879	25
30	0.1690	423.1	1.911	0.1588	422.9	1.905	0.1497	422.8	1.900	0.1416	422.6	1.894	30
35	0.1720	427.7	1.926	0.1617	427.5	1.920	0.1524	427.3	1.915	0.1442	427.2	1.909	35
40	0.1751	432.3	1.941	0.1645	432.1	1.935	0.1552	432.0	1.930	0.1468	431.8	1.924	40
45	0.1781	436.9	1.956	0.1674	436.8	1.950	0.1579	436.6	1.944	0.1493	436.5	1.939	45
50	0.1811	441.6	1.970	0.1702	441.4	1.964	0.1606	441.3	1.959	0.1519	441.2	1.954	50
55	0.1841	446.3	1.985	0.1731	446.2	1.979	0.1633	446.0	1.973	0.1545	445.9	1.968	55
60	0.1871	451.0	1.999	0.1759	450.9	1.993	0.1659	450.8	1.988	0.1570	450.7	1.983	60
65	0.1901	455.8	2.013	0.1788	455.7	2.008	0.1686	455.6	2.002	0.1596	455.5	1.997	65
70	0.1931	460.7	2.028	0.1816	460.6	2.022	0.1713	460.4	2.016	0.1621	460.3	2.011	70
75	0.1961	465.5	2.042	0.1844	465.4	2.036	0.1740	465.3	2.030	0.1646	465.2	2.025	75
80	0.1991	470.5	2.056	0.1872	470.3	2.050	0.1766	470.2	2.044	0.1672	470.1	2.039	80
85	0.2021	475.4	2.070	0.1900	475.3	2.064	0.1793	475.2	2.058	0.1697	475.1	2.053	85
90	0.2050	480.4	2.083	0.1928	480.3	2.078	0.1819	480.2	2.072	0.1722	480.1	2.067	90
95	0.2080	485.4	2.097	0.1956	485.3	2.091	0.1846	485.2	2.086	0.1747	485.1	2.081	95
100	0.2109	490.5	2.111	0.1984	490.4	2.105	0.1872	490.3	2.100	0.1772	490.2	2.095	100
105	0.2139	495.6	2.124	0.2012	495.5	2.119	0.1898	495.4	2.113	0.1797	495.3	2.108	105
110	0.2168	500.7	2.138	0.2039	500.6	2.132	0.1925	500.5	2.127	0.1822	500.4	2.122	110
115	0.2198	505.9	2.151	0.2067	505.8	2.146	0.1951	505.7	2.140	0.1847	505.6	2.135	115
120	0.2227	511.1	2.165	0.2095	511.0	2.159	0.1977	510.9	2.154	0.1872	510.8	2.149	120

  

ABSOLUTE PRESSURE, kPa													
Temp °C	200			210			220			230			Temp °C
	-22.18			-20.97			-19.80			-18.68			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1071	376.1	1.722	0.1023	376.9	1.721	0.0682	312.2	1.460	0.0536	285.9	1.353	
-20	0.1083	378.0	1.729	0.1028	377.7	1.724							-20
-15	0.1111	382.4	1.746	0.1054	382.1	1.741	0.1003	381.8	1.736	0.0956	381.5	1.731	-15
-10	0.1138	386.7	1.763	0.1080	386.5	1.758	0.1028	386.2	1.753	0.0980	385.9	1.748	-10
-5	0.1164	391.1	1.780	0.1105	390.9	1.774	0.1052	390.6	1.769	0.1003	390.4	1.765	-5
0	0.1190	395.5	1.796	0.1131	395.3	1.791	0.1076	395.0	1.786	0.1027	394.8	1.781	0
5	0.1216	399.9	1.812	0.1155	399.7	1.807	0.1100	399.5	1.802	0.1050	399.3	1.797	5
10	0.1242	404.4	1.828	0.1180	404.2	1.823	0.1124	404.0	1.818	0.1072	403.7	1.813	10
15	0.1267	408.8	1.843	0.1204	408.6	1.838	0.1147	408.4	1.834	0.1095	408.3	1.829	15
20	0.1293	413.3	1.859	0.1229	413.2	1.854	0.1170	413.0	1.849	0.1117	412.8	1.845	20
25	0.1318	417.9	1.874	0.1253	417.7	1.869	0.1193	417.5	1.864	0.1139	417.3	1.860	25
30	0.1343	422.4	1.889	0.1276	422.3	1.884	0.1216	422.1	1.880	0.1161	421.9	1.875	30
35	0.1367	427.0	1.904	0.1300	426.9	1.899	0.1239	426.7	1.895	0.1183	426.5	1.890	35
40	0.1392	431.7	1.919	0.1324	431.5	1.914	0.1262	431.4	1.910	0.1205	431.2	1.905	40
45	0.1417	436.3	1.934	0.1347	436.2	1.929	0.1284	436.0	1.925	0.1227	435.9	1.920	45
50	0.1441	441.0	1.949	0.1371	440.9	1.944	0.1307	440.7	1.939	0.1248	440.6	1.935	50
55	0.1466	445.8	1.963	0.1394	445.6	1.958	0.1329	445.5	1.954	0.1269	445.4	1.950	55
60	0.1490	450.5	1.978	0.1417	450.4	1.973	0.1351	450.3	1.968	0.1291	450.2	1.964	60
65	0.1514	455.4	1.992	0.1440	455.2	1.987	0.1373	455.1	1.983	0.1312	455.0	1.978	65
70	0.1538	460.2	2.006	0.1463	460.1	2.001	0.1395	460.0	1.997	0.1333	459.8	1.993	70
75	0.1562	465.1	2.020	0.1486	465.0	2.016	0.1417	464.9	2.011	0.1354	464.7	2.007	75
80	0.1586	470.0	2.034	0.1509	469.9	2.030	0.1439	469.8	2.025	0.1375	469.7	2.021	80
85	0.1610	475.0	2.048	0.1532	474.9	2.044	0.1461	474.8	2.039	0.1396	474.7	2.035	85
90	0.1634	480.0	2.062	0.1555	479.9	2.058	0.1483	479.8	2.053	0.1417	479.7	2.049	90
95	0.1658	485.0	2.076	0.1578	484.9	2.071	0.1505	484.8	2.067	0.1438	484.7	2.063	95
100	0.1682	490.1	2.090	0.1601	490.0	2.085	0.1527	489.9	2.081	0.1459	489.8	2.076	100
105	0.1706	495.2	2.103	0.1623	495.1	2.099	0.1548	495.0	2.094	0.1480	494.9	2.090	105
110	0.1730	500.4	2.117	0.1646	500.3	2.112	0.1570	500.2	2.108	0.1501	500.1	2.104	110
115	0.1753	505.5	2.130	0.1669	505.5	2.126	0.1592	505.4	2.121	0.1521	505.3	2.117	115
120	0.1777	510.8	2.144	0.1691	510.7	2.139	0.1613	510.6	2.135	0.1542	510.5	2.130	120
125	0.1801	516.0	2.157	0.1714	516.0	2.152	0.1635	515.9	2.148	0.1563	515.8	2.144	125



**Opteon™ XL20 (R-454C)**  
**Superheated Vapor - Constant Pressure Tables**

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	240			250			260			270			Temp °C
	-17.59			-16.54			-15.52			-14.53			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0901	378.9	1.717	0.0866	379.5	1.716	0.0611	323.2	1.494	0.0499	300.0	1.400	
-15	0.0913	381.2	1.726	0.0873	380.9	1.722	0.0837	380.6	1.717				-15
-10	0.0936	385.7	1.743	0.0896	385.4	1.739	0.0858	385.1	1.734	0.0824	384.8	1.730	-10
-5	0.0959	390.1	1.760	0.0918	389.9	1.756	0.0880	389.6	1.751	0.0845	389.3	1.747	-5
0	0.0981	394.6	1.777	0.0939	394.3	1.772	0.0901	394.1	1.768	0.0865	393.9	1.764	0
5	0.1003	399.0	1.793	0.0961	398.8	1.788	0.0922	398.6	1.784	0.0885	398.4	1.780	5
10	0.1025	403.5	1.809	0.0982	403.3	1.804	0.0942	403.1	1.800	0.0905	402.9	1.796	10
15	0.1047	408.1	1.825	0.1003	407.9	1.820	0.0962	407.7	1.816	0.0925	407.5	1.812	15
20	0.1069	412.6	1.840	0.1024	412.4	1.836	0.0982	412.2	1.832	0.0944	412.0	1.828	20
25	0.1090	417.2	1.856	0.1044	417.0	1.851	0.1002	416.8	1.847	0.0963	416.6	1.844	25
30	0.1111	421.8	1.871	0.1065	421.6	1.867	0.1022	421.4	1.863	0.0982	421.3	1.859	30
35	0.1132	426.4	1.886	0.1085	426.2	1.882	0.1041	426.1	1.878	0.1001	425.9	1.874	35
40	0.1153	431.0	1.901	0.1105	430.9	1.897	0.1061	430.7	1.893	0.1020	430.6	1.889	40
45	0.1174	435.7	1.916	0.1125	435.6	1.912	0.1080	435.4	1.908	0.1039	435.3	1.904	45
50	0.1194	440.5	1.931	0.1145	440.3	1.927	0.1099	440.2	1.923	0.1057	440.0	1.919	50
55	0.1215	445.2	1.945	0.1165	445.1	1.941	0.1119	445.0	1.937	0.1076	444.8	1.934	55
60	0.1236	450.0	1.960	0.1185	449.9	1.956	0.1138	449.8	1.952	0.1094	449.6	1.948	60
65	0.1256	454.9	1.974	0.1204	454.7	1.970	0.1157	454.6	1.966	0.1112	454.5	1.963	65
70	0.1276	459.7	1.989	0.1224	459.6	1.985	0.1176	459.5	1.981	0.1131	459.4	1.977	70
75	0.1297	464.6	2.003	0.1243	464.5	1.999	0.1194	464.4	1.995	0.1149	464.3	1.991	75
80	0.1317	469.6	2.017	0.1263	469.5	2.013	0.1213	469.4	2.009	0.1167	469.2	2.005	80
85	0.1337	474.6	2.031	0.1282	474.4	2.027	0.1232	474.3	2.023	0.1185	474.2	2.019	85
90	0.1357	479.6	2.045	0.1302	479.5	2.041	0.1250	479.4	2.037	0.1203	479.3	2.033	90
95	0.1377	484.6	2.059	0.1321	484.5	2.055	0.1269	484.4	2.051	0.1221	484.3	2.047	95
100	0.1397	489.7	2.072	0.1340	489.6	2.068	0.1288	489.5	2.065	0.1239	489.4	2.061	100
105	0.1417	494.8	2.086	0.1359	494.7	2.082	0.1306	494.7	2.078	0.1257	494.6	2.075	105
110	0.1437	500.0	2.099	0.1379	499.9	2.096	0.1325	499.8	2.092	0.1275	499.7	2.088	110
115	0.1457	505.2	2.113	0.1398	505.1	2.109	0.1343	505.0	2.105	0.1292	504.9	2.102	115
120	0.1477	510.4	2.126	0.1417	510.4	2.122	0.1362	510.3	2.119	0.1310	510.2	2.115	120
125	0.1497	515.7	2.140	0.1436	515.6	2.136	0.1380	515.5	2.132	0.1328	515.5	2.128	125
130	0.1517	521.0	2.153	0.1455	520.9	2.149	0.1398	520.9	2.145	0.1346	520.8	2.142	130

  

ABSOLUTE PRESSURE, kPa													
Temp °C	280			290			300			310			Temp °C
	-13.57			-12.63			-11.72			-10.83			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0777	381.3	1.714	0.0751	381.9	1.713	0.0553	331.9	1.518	0.0463	310.9	1.435	
-10	0.0792	384.6	1.726	0.0762	384.3	1.722	0.0734	384.0	1.718	0.0708	383.7	1.714	-10
-5	0.0812	389.1	1.743	0.0782	388.8	1.739	0.0753	388.6	1.735	0.0727	388.3	1.732	-5
0	0.0832	393.6	1.760	0.0801	393.4	1.756	0.0772	393.1	1.752	0.0745	392.9	1.748	0
5	0.0851	398.1	1.776	0.0820	397.9	1.772	0.0790	397.7	1.769	0.0763	397.5	1.765	5
10	0.0871	402.7	1.792	0.0838	402.5	1.789	0.0809	402.3	1.785	0.0781	402.1	1.781	10
15	0.0890	407.3	1.808	0.0857	407.1	1.805	0.0827	406.9	1.801	0.0798	406.7	1.798	15
20	0.0908	411.8	1.824	0.0875	411.7	1.821	0.0844	411.5	1.817	0.0815	411.3	1.813	20
25	0.0927	416.5	1.840	0.0893	416.3	1.836	0.0862	416.1	1.833	0.0832	415.9	1.829	25
30	0.0946	421.1	1.855	0.0911	420.9	1.852	0.0879	420.7	1.848	0.0849	420.6	1.845	30
35	0.0964	425.7	1.870	0.0929	425.6	1.867	0.0897	425.4	1.863	0.0866	425.3	1.860	35
40	0.0982	430.4	1.886	0.0947	430.3	1.882	0.0914	430.1	1.879	0.0883	430.0	1.875	40
45	0.1000	435.2	1.900	0.0964	435.0	1.897	0.0931	434.9	1.894	0.0899	434.7	1.890	45
50	0.1018	439.9	1.915	0.0982	439.8	1.912	0.0948	439.6	1.908	0.0916	439.5	1.905	50
55	0.1036	444.7	1.930	0.0999	444.6	1.927	0.0964	444.4	1.923	0.0932	444.3	1.920	55
60	0.1054	449.5	1.945	0.1016	449.4	1.941	0.0981	449.3	1.938	0.0948	449.1	1.934	60
65	0.1072	454.4	1.959	0.1033	454.2	1.956	0.0998	454.1	1.952	0.0964	454.0	1.949	65
70	0.1089	459.3	1.973	0.1050	459.1	1.970	0.1014	459.0	1.967	0.0980	458.9	1.963	70
75	0.1107	464.2	1.988	0.1067	464.1	1.984	0.1031	463.9	1.981	0.0996	463.8	1.978	75
80	0.1124	469.1	2.002	0.1084	469.0	1.998	0.1047	468.9	1.995	0.1012	468.8	1.992	80
85	0.1142	474.1	2.016	0.1101	474.0	2.012	0.1064	473.9	2.009	0.1028	473.8	2.006	85
90	0.1159	479.2	2.030	0.1118	479.1	2.026	0.1080	479.0	2.023	0.1044	478.8	2.020	90
95	0.1176	484.2	2.044	0.1135	484.1	2.040	0.1096	484.0	2.037	0.1060	483.9	2.034	95
100	0.1194	489.3	2.057	0.1152	489.2	2.054	0.1112	489.1	2.051	0.1076	489.0	2.048	100
105	0.1211	494.5	2.071	0.1168	494.4	2.068	0.1129	494.3	2.064	0.1091	494.2	2.061	105
110	0.1228	499.6	2.085	0.1185	499.5	2.081	0.1145	499.5	2.078	0.1107	499.4	2.075	110
115	0.1245	504.9	2.098	0.1202	504.8	2.095	0.1161	504.7	2.092	0.1123	504.6	2.088	115
120	0.1263	510.1	2.112	0.1218	510.0	2.108	0.1177	509.9	2.105	0.1138	509.8	2.102	120
125	0.1280	515.4	2.125	0.1235	515.3	2.122	0.1193	515.2	2.118	0.1154	515.1	2.115	125
130	0.1297	520.7	2.138	0.1251	520.6	2.135	0.1209	520.5	2.132	0.1169	520.5	2.128	130
135	0.1314	526.0	2.151	0.1268	526.0	2.148	0.1225	525.9	2.145	0.1185	525.8	2.142	135



**Opteon™ XL20 (R-454C)**  
**Superheated Vapor - Constant Pressure Tables**

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	320			330			340			350			Temp °C
	-9.96			-9.12			-8.29			-7.48			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0683	383.4	1.711	0.0663	383.9	1.710	0.0504	399.0	1.537	0.0431	319.8	1.463	
-5	0.0702	388.0	1.728	0.0678	387.8	1.724	0.0656	387.5	1.721	0.0635	387.2	1.717	-5
0	0.0719	392.6	1.745	0.0696	392.4	1.741	0.0673	392.1	1.738	0.0652	391.9	1.735	0
5	0.0737	397.2	1.762	0.0713	397.0	1.758	0.0690	396.8	1.755	0.0668	396.5	1.751	5
10	0.0754	401.8	1.778	0.0730	401.6	1.775	0.0706	401.4	1.771	0.0685	401.2	1.768	10
15	0.0771	406.4	1.794	0.0746	406.2	1.791	0.0723	406.0	1.788	0.0700	405.8	1.784	15
20	0.0788	411.1	1.810	0.0763	410.9	1.807	0.0739	410.7	1.804	0.0716	410.5	1.800	20
25	0.0805	415.7	1.826	0.0779	415.5	1.823	0.0755	415.4	1.819	0.0731	415.2	1.816	25
30	0.0821	420.4	1.841	0.0795	420.2	1.838	0.0770	420.1	1.835	0.0747	419.9	1.832	30
35	0.0838	425.1	1.857	0.0811	424.9	1.853	0.0786	424.8	1.850	0.0762	424.6	1.847	35
40	0.0854	429.8	1.872	0.0827	429.7	1.869	0.0801	429.5	1.866	0.0777	429.3	1.863	40
45	0.0870	434.6	1.887	0.0842	434.4	1.884	0.0816	434.3	1.881	0.0792	434.1	1.878	45
50	0.0886	439.3	1.902	0.0858	439.2	1.899	0.0831	439.1	1.896	0.0806	438.9	1.893	50
55	0.0902	444.2	1.917	0.0873	444.0	1.913	0.0846	443.9	1.910	0.0821	443.7	1.907	55
60	0.0917	449.0	1.931	0.0889	448.9	1.928	0.0861	448.7	1.925	0.0836	448.6	1.922	60
65	0.0933	453.9	1.946	0.0904	453.7	1.943	0.0876	453.6	1.940	0.0850	453.5	1.937	65
70	0.0949	458.8	1.960	0.0919	458.7	1.957	0.0891	458.5	1.954	0.0865	458.4	1.951	70
75	0.0964	463.7	1.974	0.0934	463.6	1.971	0.0906	463.5	1.968	0.0879	463.4	1.966	75
80	0.0980	468.7	1.989	0.0949	468.6	1.986	0.0920	468.5	1.983	0.0893	468.4	1.980	80
85	0.0995	473.7	2.003	0.0964	473.6	2.000	0.0935	473.5	1.997	0.0907	473.4	1.994	85
90	0.1011	478.7	2.017	0.0979	478.6	2.014	0.0949	478.5	2.011	0.0921	478.4	2.008	90
95	0.1026	483.8	2.031	0.0994	483.7	2.028	0.0964	483.6	2.025	0.0936	483.5	2.022	95
100	0.1041	488.9	2.044	0.1009	488.8	2.041	0.0978	488.7	2.038	0.0950	488.7	2.036	100
105	0.1056	494.1	2.058	0.1024	494.0	2.055	0.0993	493.9	2.052	0.0964	493.8	2.049	105
110	0.1072	499.3	2.072	0.1038	499.2	2.069	0.1007	499.1	2.066	0.0978	499.0	2.063	110
115	0.1087	504.5	2.085	0.1053	504.4	2.082	0.1021	504.3	2.079	0.0991	504.2	2.077	115
120	0.1102	509.8	2.099	0.1068	509.7	2.096	0.1036	509.6	2.093	0.1005	509.5	2.090	120
125	0.1117	515.0	2.112	0.1082	515.0	2.109	0.1050	514.9	2.106	0.1019	514.8	2.103	125
130	0.1132	520.4	2.125	0.1097	520.3	2.122	0.1064	520.2	2.120	0.1033	520.1	2.117	130
135	0.1147	525.7	2.139	0.1112	525.7	2.136	0.1078	525.6	2.133	0.1047	525.5	2.130	135
140	0.1162	531.1	2.152	0.1126	531.1	2.149	0.1092	531.0	2.146	0.1061	530.9	2.143	140

  

ABSOLUTE PRESSURE, kPa													
Temp °C	360			370			380			390			Temp °C
	-6.69			-5.92			-5.16			-4.42			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0610	385.3	1.708	0.0594	385.8	1.707	0.0463	344.9	1.552	0.0401	327.2	1.484	
-5	0.0616	386.9	1.714	0.0597	386.7	1.711	0.0579	386.4	1.707				-5
0	0.0632	391.6	1.731	0.0613	391.4	1.728	0.0595	391.1	1.725	0.0578	390.9	1.722	0
5	0.0648	396.3	1.748	0.0629	396.1	1.745	0.0611	395.8	1.742	0.0593	395.6	1.739	5
10	0.0664	401.0	1.765	0.0644	400.7	1.762	0.0626	400.5	1.759	0.0608	400.3	1.756	10
15	0.0679	405.6	1.781	0.0659	405.4	1.778	0.0641	405.2	1.775	0.0623	405.0	1.772	15
20	0.0695	410.3	1.797	0.0674	410.1	1.794	0.0655	409.9	1.791	0.0637	409.7	1.788	20
25	0.0710	415.0	1.813	0.0689	414.8	1.810	0.0670	414.6	1.807	0.0651	414.4	1.804	25
30	0.0725	419.7	1.829	0.0704	419.5	1.826	0.0684	419.4	1.823	0.0665	419.2	1.820	30
35	0.0739	424.4	1.844	0.0718	424.3	1.841	0.0698	424.1	1.839	0.0679	423.9	1.836	35
40	0.0754	429.2	1.860	0.0732	429.0	1.857	0.0712	428.9	1.854	0.0693	428.7	1.851	40
45	0.0769	434.0	1.875	0.0747	433.8	1.872	0.0726	433.7	1.869	0.0706	433.5	1.866	45
50	0.0783	438.8	1.890	0.0761	438.6	1.887	0.0740	438.5	1.884	0.0720	438.3	1.881	50
55	0.0797	443.6	1.905	0.0775	443.5	1.902	0.0753	443.3	1.899	0.0733	443.2	1.896	55
60	0.0811	448.5	1.919	0.0788	448.3	1.917	0.0767	448.2	1.914	0.0746	448.1	1.911	60
65	0.0826	453.4	1.934	0.0802	453.2	1.931	0.0780	453.1	1.928	0.0759	453.0	1.926	65
70	0.0840	458.3	1.948	0.0816	458.2	1.946	0.0794	458.1	1.943	0.0772	457.9	1.940	70
75	0.0853	463.3	1.963	0.0830	463.1	1.960	0.0807	463.0	1.957	0.0785	462.9	1.955	75
80	0.0867	468.2	1.977	0.0843	468.1	1.974	0.0820	468.0	1.972	0.0798	467.9	1.969	80
85	0.0881	473.3	1.991	0.0857	473.2	1.988	0.0833	473.1	1.986	0.0811	472.9	1.983	85
90	0.0895	478.3	2.005	0.0870	478.2	2.002	0.0846	478.1	2.000	0.0824	478.0	1.997	90
95	0.0909	483.4	2.019	0.0883	483.3	2.016	0.0859	483.2	2.014	0.0837	483.1	2.011	95
100	0.0922	488.6	2.033	0.0897	488.5	2.030	0.0872	488.4	2.028	0.0849	488.3	2.025	100
105	0.0936	493.7	2.047	0.0910	493.6	2.044	0.0885	493.5	2.041	0.0862	493.4	2.039	105
110	0.0950	498.9	2.060	0.0923	498.8	2.058	0.0898	498.7	2.055	0.0875	498.6	2.052	110
115	0.0963	504.1	2.074	0.0937	504.1	2.071	0.0911	504.0	2.069	0.0887	503.9	2.066	115
120	0.0977	509.4	2.087	0.0950	509.3	2.085	0.0924	509.2	2.082	0.0900	509.2	2.080	120
125	0.0990	514.7	2.101	0.0963	514.6	2.098	0.0937	514.5	2.095	0.0912	514.5	2.093	125
130	0.1004	520.1	2.114	0.0976	520.0	2.111	0.0950	519.9	2.109	0.0925	519.8	2.106	130
135	0.1017	525.4	2.127	0.0989	525.3	2.125	0.0962	525.3	2.122	0.0937	525.2	2.120	135
140	0.1031	530.8	2.140	0.1002	530.8	2.138	0.0975	530.7	2.135	0.0950	530.6	2.133	140

**Opteon™ XL20 (R-454C)**  
**Superheated Vapor - Constant Pressure Tables**

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	400			425			450			475			Temp °C
	-3.69			-1.93			-0.24			1.37			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0551	387.1	1.706	0.0519	388.1	1.705	0.0283	303.1	1.387	0.0182	266.5	1.249	
0	0.0562	390.6	1.719	0.0525	389.9	1.711	0.0492	389.3	1.704				0
5	0.0577	395.3	1.736	0.0539	394.7	1.729	0.0505	394.1	1.722	0.0475	393.5	1.715	5
10	0.0591	400.1	1.753	0.0553	399.5	1.746	0.0519	398.9	1.739	0.0488	398.3	1.733	10
15	0.0606	404.8	1.769	0.0567	404.3	1.762	0.0532	403.7	1.756	0.0501	403.2	1.749	15
20	0.0620	409.5	1.786	0.0580	409.0	1.779	0.0545	408.5	1.772	0.0513	408.0	1.766	20
25	0.0634	414.3	1.802	0.0593	413.8	1.795	0.0557	413.3	1.789	0.0525	412.8	1.782	25
30	0.0647	419.0	1.817	0.0606	418.6	1.811	0.0570	418.1	1.805	0.0537	417.7	1.798	30
35	0.0661	423.8	1.833	0.0619	423.3	1.827	0.0582	422.9	1.820	0.0549	422.5	1.814	35
40	0.0674	428.6	1.848	0.0632	428.2	1.842	0.0594	427.7	1.836	0.0561	427.3	1.830	40
45	0.0687	433.4	1.864	0.0644	433.0	1.857	0.0606	432.6	1.851	0.0572	432.2	1.845	45
50	0.0701	438.2	1.879	0.0657	437.8	1.872	0.0618	437.5	1.866	0.0583	437.1	1.861	50
55	0.0714	443.1	1.894	0.0669	442.7	1.887	0.0630	442.4	1.881	0.0595	442.0	1.876	55
60	0.0727	447.9	1.909	0.0682	447.6	1.902	0.0642	447.3	1.896	0.0606	446.9	1.891	60
65	0.0739	452.9	1.923	0.0694	452.5	1.917	0.0653	452.2	1.911	0.0617	451.9	1.905	65
70	0.0752	457.8	1.938	0.0706	457.5	1.931	0.0665	457.2	1.926	0.0628	456.9	1.920	70
75	0.0765	462.8	1.952	0.0718	462.5	1.946	0.0676	462.2	1.940	0.0639	461.9	1.935	75
80	0.0777	467.8	1.966	0.0730	467.5	1.960	0.0688	467.2	1.954	0.0650	466.9	1.949	80
85	0.0790	472.8	1.981	0.0742	472.6	1.974	0.0699	472.3	1.969	0.0660	472.0	1.963	85
90	0.0803	477.9	1.995	0.0754	477.7	1.989	0.0710	477.4	1.983	0.0671	477.1	1.977	90
95	0.0815	483.0	2.009	0.0765	482.8	2.003	0.0721	482.5	1.997	0.0682	482.3	1.991	95
100	0.0827	488.2	2.022	0.0777	487.9	2.016	0.0732	487.7	2.011	0.0692	487.4	2.005	100
105	0.0840	493.3	2.036	0.0789	493.1	2.030	0.0744	492.9	2.025	0.0703	492.6	2.019	105
110	0.0852	498.6	2.050	0.0801	498.3	2.044	0.0755	498.1	2.038	0.0714	497.9	2.033	110
115	0.0864	503.8	2.064	0.0812	503.6	2.058	0.0766	503.4	2.052	0.0724	503.1	2.047	115
120	0.0877	509.1	2.077	0.0824	508.9	2.071	0.0777	508.6	2.065	0.0735	508.4	2.060	120
125	0.0889	514.4	2.090	0.0835	514.2	2.085	0.0788	514.0	2.079	0.0745	513.8	2.074	125
130	0.0901	519.7	2.104	0.0847	519.5	2.098	0.0799	519.3	2.092	0.0755	519.1	2.087	130
135	0.0913	525.1	2.117	0.0858	524.9	2.111	0.0809	524.7	2.106	0.0766	524.5	2.100	135
140	0.0925	530.5	2.130	0.0870	530.3	2.124	0.0820	530.1	2.119	0.0776	529.9	2.114	140
145	0.0938	536.0	2.143	0.0881	535.8	2.137	0.0831	535.6	2.132	0.0786	535.4	2.127	145

  

ABSOLUTE PRESSURE, kPa													
Temp °C	500			525			550			575			Temp °C
	2.92			4.41			5.85			7.24			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0443	390.8	1.701	0.0422	391.6	1.700	0.0256	319.8	1.438	0.0183	289.0	1.324	
5	0.0448	392.8	1.709	0.0423	392.2	1.703							5
10	0.0460	397.7	1.726	0.0435	397.1	1.720	0.0413	396.5	1.714	0.0392	395.9	1.709	10
15	0.0473	402.6	1.743	0.0447	402.1	1.737	0.0424	401.5	1.732	0.0403	400.9	1.726	15
20	0.0485	407.5	1.760	0.0459	407.0	1.754	0.0435	406.4	1.749	0.0414	405.9	1.743	20
25	0.0496	412.3	1.777	0.0470	411.9	1.771	0.0446	411.4	1.765	0.0424	410.9	1.760	25
30	0.0508	417.2	1.793	0.0481	416.7	1.787	0.0457	416.3	1.782	0.0435	415.8	1.776	30
35	0.0519	422.1	1.809	0.0492	421.6	1.803	0.0468	421.2	1.798	0.0445	420.7	1.793	35
40	0.0530	426.9	1.824	0.0503	426.5	1.819	0.0478	426.1	1.814	0.0455	425.7	1.809	40
45	0.0541	431.8	1.840	0.0513	431.4	1.834	0.0488	431.0	1.829	0.0465	430.6	1.824	45
50	0.0552	436.7	1.855	0.0524	436.4	1.850	0.0498	436.0	1.845	0.0475	435.6	1.840	50
55	0.0563	441.7	1.870	0.0534	441.3	1.865	0.0508	440.9	1.860	0.0484	440.6	1.855	55
60	0.0574	446.6	1.885	0.0545	446.3	1.880	0.0518	445.9	1.875	0.0494	445.6	1.870	60
65	0.0584	451.6	1.900	0.0555	451.3	1.895	0.0528	450.9	1.890	0.0503	450.6	1.885	65
70	0.0595	456.6	1.915	0.0565	456.3	1.910	0.0538	456.0	1.905	0.0513	455.6	1.900	70
75	0.0605	461.6	1.929	0.0575	461.3	1.924	0.0547	461.0	1.919	0.0522	460.7	1.915	75
80	0.0616	466.7	1.944	0.0585	466.4	1.939	0.0557	466.1	1.934	0.0531	465.8	1.929	80
85	0.0626	471.7	1.958	0.0595	471.5	1.953	0.0566	471.2	1.948	0.0540	470.9	1.943	85
90	0.0636	476.9	1.972	0.0604	476.6	1.967	0.0576	476.3	1.962	0.0549	476.1	1.958	90
95	0.0646	482.0	1.986	0.0614	481.8	1.981	0.0585	481.5	1.976	0.0558	481.2	1.972	95
100	0.0656	487.2	2.000	0.0624	486.9	1.995	0.0594	486.7	1.990	0.0567	486.4	1.986	100
105	0.0667	492.4	2.014	0.0634	492.2	2.009	0.0604	491.9	2.004	0.0576	491.7	2.000	105
110	0.0677	497.6	2.028	0.0643	497.4	2.023	0.0613	497.2	2.018	0.0585	496.9	2.014	110
115	0.0687	502.9	2.041	0.0653	502.7	2.037	0.0622	502.5	2.032	0.0594	502.2	2.027	115
120	0.0697	508.2	2.055	0.0662	508.0	2.050	0.0631	507.8	2.045	0.0603	507.6	2.041	120
125	0.0707	513.5	2.069	0.0672	513.3	2.064	0.0640	513.1	2.059	0.0611	512.9	2.055	125
130	0.0716	518.9	2.082	0.0681	518.7	2.077	0.0649	518.5	2.072	0.0620	518.3	2.068	130
135	0.0726	524.3	2.095	0.0691	524.1	2.090	0.0658	523.9	2.086	0.0629	523.7	2.081	135
140	0.0736	529.8	2.108	0.0700	529.6	2.104	0.0667	529.4	2.099	0.0637	529.2	2.095	140
145	0.0746	535.2	2.122	0.0710	535.0	2.117	0.0676	534.9	2.112	0.0646	534.7	2.108	145
150	0.0756	540.7	2.135	0.0719	540.5	2.130	0.0685	540.4	2.125	0.0655	540.2	2.121	150

**Opteon™ XL20 (R-454C)**  
**Superheated Vapor - Constant Pressure Tables**

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	600			625			650			675			Temp °C
	8.59			9.89			11.15			12.38			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0370	393.8	1.698	0.0355	394.5	1.697	0.0231	332.2	1.474	0.0175	305.2	1.376	
10	0.0373	395.3	1.703	0.0355	394.6	1.697							10
15	0.0384	400.3	1.721	0.0366	399.7	1.715	0.0349	399.1	1.710	0.0334	398.5	1.705	15
20	0.0394	405.4	1.738	0.0376	404.8	1.733	0.0359	404.3	1.728	0.0344	403.7	1.723	20
25	0.0404	410.3	1.755	0.0386	409.8	1.750	0.0369	409.3	1.745	0.0353	408.8	1.740	25
30	0.0415	415.3	1.771	0.0396	414.8	1.766	0.0379	414.4	1.762	0.0363	413.9	1.757	30
35	0.0424	420.3	1.788	0.0405	419.8	1.783	0.0388	419.4	1.778	0.0372	418.9	1.774	35
40	0.0434	425.3	1.804	0.0415	424.8	1.799	0.0397	424.4	1.794	0.0381	424.0	1.790	40
45	0.0444	430.2	1.819	0.0424	429.8	1.815	0.0406	429.4	1.810	0.0389	429.0	1.806	45
50	0.0453	435.2	1.835	0.0433	434.8	1.830	0.0415	434.5	1.826	0.0398	434.1	1.822	50
55	0.0462	440.2	1.850	0.0442	439.9	1.846	0.0424	439.5	1.841	0.0407	439.1	1.837	55
60	0.0472	445.2	1.865	0.0451	444.9	1.861	0.0432	444.5	1.857	0.0415	444.2	1.852	60
65	0.0481	450.3	1.880	0.0460	449.9	1.876	0.0441	449.6	1.872	0.0423	449.3	1.868	65
70	0.0490	455.3	1.895	0.0469	455.0	1.891	0.0449	454.7	1.887	0.0431	454.4	1.882	70
75	0.0499	460.4	1.910	0.0477	460.1	1.906	0.0458	459.8	1.901	0.0440	459.5	1.897	75
80	0.0508	465.5	1.925	0.0486	465.2	1.920	0.0466	464.9	1.916	0.0448	464.6	1.912	80
85	0.0516	470.6	1.939	0.0494	470.4	1.935	0.0474	470.1	1.930	0.0456	469.8	1.926	85
90	0.0525	475.8	1.953	0.0503	475.5	1.949	0.0482	475.3	1.945	0.0463	475.0	1.941	90
95	0.0534	481.0	1.967	0.0511	480.7	1.963	0.0491	480.5	1.959	0.0471	480.2	1.955	95
100	0.0542	486.2	1.981	0.0520	485.9	1.977	0.0499	485.7	1.973	0.0479	485.4	1.969	100
105	0.0551	491.4	1.995	0.0528	491.2	1.991	0.0507	490.9	1.987	0.0487	490.7	1.983	105
110	0.0560	496.7	2.009	0.0536	496.5	2.005	0.0515	496.2	2.001	0.0495	496.0	1.997	110
115	0.0568	502.0	2.023	0.0544	501.8	2.019	0.0522	501.6	2.015	0.0502	501.3	2.011	115
120	0.0577	507.3	2.037	0.0552	507.1	2.033	0.0530	506.9	2.029	0.0510	506.7	2.025	120
125	0.0585	512.7	2.050	0.0561	512.5	2.046	0.0538	512.3	2.042	0.0517	512.1	2.038	125
130	0.0593	518.1	2.064	0.0569	517.9	2.060	0.0546	517.7	2.056	0.0525	517.5	2.052	130
135	0.0602	523.5	2.077	0.0577	523.3	2.073	0.0554	523.1	2.069	0.0532	522.9	2.065	135
140	0.0610	529.0	2.090	0.0585	528.8	2.086	0.0561	528.6	2.082	0.0540	528.4	2.079	140
145	0.0618	534.5	2.104	0.0593	534.3	2.100	0.0569	534.1	2.096	0.0547	533.9	2.092	145
150	0.0627	540.0	2.117	0.0601	539.8	2.113	0.0577	539.6	2.109	0.0555	539.5	2.105	150
155	0.0635	545.6	2.130	0.0609	545.4	2.126	0.0585	545.2	2.122	0.0562	545.0	2.118	155

ABSOLUTE PRESSURE, kPa													
Temp °C	700			725			750			775			Temp °C
	13.57			14.73			15.86			16.97			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0317	396.4	1.695	0.0306	397.0	1.694	0.0209	341.8	1.500	0.0165	317.6	1.414	
15	0.0319	397.9	1.700	0.0306	397.3	1.695							15
20	0.0329	403.1	1.718	0.0316	402.5	1.713	0.0303	401.9	1.709	0.0291	401.3	1.704	20
25	0.0339	408.3	1.735	0.0325	407.7	1.731	0.0312	407.2	1.726	0.0300	406.6	1.722	25
30	0.0348	413.4	1.752	0.0334	412.9	1.748	0.0321	412.4	1.744	0.0309	411.9	1.739	30
35	0.0357	418.5	1.769	0.0343	418.0	1.765	0.0329	417.5	1.760	0.0317	417.1	1.756	35
40	0.0365	423.5	1.785	0.0351	423.1	1.781	0.0338	422.7	1.777	0.0325	422.2	1.773	40
45	0.0374	428.6	1.801	0.0359	428.2	1.797	0.0346	427.8	1.793	0.0333	427.4	1.789	45
50	0.0382	433.7	1.817	0.0368	433.3	1.813	0.0354	432.9	1.809	0.0341	432.5	1.805	50
55	0.0391	438.8	1.833	0.0376	438.4	1.829	0.0362	438.0	1.825	0.0349	437.6	1.821	55
60	0.0399	443.8	1.848	0.0384	443.5	1.844	0.0369	443.1	1.840	0.0356	442.8	1.837	60
65	0.0407	448.9	1.863	0.0391	448.6	1.859	0.0377	448.3	1.856	0.0364	447.9	1.852	65
70	0.0415	454.1	1.878	0.0399	453.7	1.875	0.0385	453.4	1.871	0.0371	453.1	1.867	70
75	0.0423	459.2	1.893	0.0407	458.9	1.889	0.0392	458.6	1.886	0.0378	458.3	1.882	75
80	0.0430	464.3	1.908	0.0414	464.0	1.904	0.0399	463.7	1.900	0.0386	463.4	1.897	80
85	0.0438	469.5	1.923	0.0422	469.2	1.919	0.0407	468.9	1.915	0.0393	468.7	1.911	85
90	0.0446	474.7	1.937	0.0429	474.4	1.933	0.0414	474.2	1.930	0.0400	473.9	1.926	90
95	0.0453	479.9	1.951	0.0437	479.7	1.948	0.0421	479.4	1.944	0.0407	479.1	1.940	95
100	0.0461	485.2	1.965	0.0444	484.9	1.962	0.0428	484.7	1.958	0.0414	484.4	1.955	100
105	0.0468	490.5	1.979	0.0451	490.2	1.976	0.0435	490.0	1.972	0.0421	489.7	1.969	105
110	0.0476	495.8	1.993	0.0459	495.5	1.990	0.0442	495.3	1.986	0.0427	495.1	1.983	110
115	0.0483	501.1	2.007	0.0466	500.9	2.004	0.0449	500.6	2.000	0.0434	500.4	1.997	115
120	0.0491	506.5	2.021	0.0473	506.2	2.017	0.0456	506.0	2.014	0.0441	505.8	2.010	120
125	0.0498	511.9	2.035	0.0480	511.6	2.031	0.0463	511.4	2.027	0.0448	511.2	2.024	125
130	0.0505	517.3	2.048	0.0487	517.1	2.045	0.0470	516.9	2.041	0.0454	516.7	2.038	130
135	0.0513	522.7	2.062	0.0494	522.5	2.058	0.0477	522.3	2.055	0.0461	522.1	2.051	135
140	0.0520	528.2	2.075	0.0501	528.0	2.071	0.0484	527.8	2.068	0.0468	527.6	2.065	140
145	0.0527	533.7	2.088	0.0508	533.5	2.085	0.0491	533.3	2.081	0.0474	533.2	2.078	145
150	0.0534	539.3	2.101	0.0515	539.1	2.098	0.0497	538.9	2.094	0.0481	538.7	2.091	150
155	0.0541	544.8	2.114	0.0522	544.7	2.111	0.0504	544.5	2.108	0.0487	544.3	2.104	155
160	0.0549	550.4	2.127	0.0529	550.3	2.124	0.0511	550.1	2.121	0.0494	549.9	2.117	160

**Opteon™ XL20 (R-454C)**  
**Superheated Vapor - Constant Pressure Tables**

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	800			900			1000			1100			Temp °C
	18.04			22.11			25.84			29.29			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0276	398.6	1.692	0.0245	400.6	1.690	0.0009	226.2	1.091	0.0009	226.2	1.091	
20	0.0280	400.7	1.700										20
25	0.0289	406.1	1.718	0.0250	403.8	1.701							25
30	0.0297	411.3	1.735	0.0258	409.2	1.719	0.0226	406.9	1.704	0.0200	404.5	1.689	30
35	0.0305	416.6	1.752	0.0266	414.6	1.737	0.0233	412.5	1.722	0.0207	410.3	1.707	35
40	0.0313	421.8	1.769	0.0273	419.9	1.754	0.0240	418.0	1.739	0.0214	416.0	1.726	40
45	0.0321	426.9	1.785	0.0280	425.2	1.770	0.0247	423.4	1.756	0.0220	421.5	1.743	45
50	0.0329	432.1	1.801	0.0287	430.5	1.787	0.0254	428.8	1.773	0.0227	427.0	1.760	50
55	0.0336	437.3	1.817	0.0294	435.7	1.803	0.0261	434.1	1.790	0.0233	432.5	1.777	55
60	0.0344	442.4	1.833	0.0301	440.9	1.819	0.0267	439.4	1.806	0.0239	437.9	1.794	60
65	0.0351	447.6	1.848	0.0308	446.2	1.834	0.0273	444.8	1.822	0.0245	443.3	1.810	65
70	0.0358	452.8	1.863	0.0314	451.4	1.850	0.0279	450.1	1.837	0.0250	448.7	1.825	70
75	0.0365	457.9	1.878	0.0321	456.7	1.865	0.0285	455.4	1.853	0.0256	454.1	1.841	75
80	0.0372	463.1	1.893	0.0327	461.9	1.880	0.0291	460.7	1.868	0.0262	459.4	1.856	80
85	0.0379	468.4	1.908	0.0334	467.2	1.895	0.0297	466.0	1.883	0.0267	464.8	1.872	85
90	0.0386	473.6	1.923	0.0340	472.5	1.909	0.0303	471.4	1.898	0.0272	470.2	1.886	90
95	0.0393	478.9	1.937	0.0346	477.8	1.924	0.0309	476.7	1.912	0.0278	475.6	1.901	95
100	0.0400	484.2	1.951	0.0352	483.1	1.938	0.0314	482.1	1.927	0.0283	481.0	1.916	100
105	0.0407	489.5	1.965	0.0358	488.5	1.953	0.0320	487.5	1.941	0.0288	486.5	1.930	105
110	0.0413	494.8	1.979	0.0364	493.9	1.967	0.0325	492.9	1.955	0.0293	491.9	1.945	110
115	0.0420	500.2	1.993	0.0370	499.3	1.981	0.0331	498.3	1.969	0.0298	497.4	1.959	115
120	0.0426	505.6	2.007	0.0376	504.7	1.995	0.0336	503.8	1.983	0.0303	502.9	1.973	120
125	0.0433	511.0	2.021	0.0382	510.1	2.008	0.0342	509.3	1.997	0.0308	508.4	1.987	125
130	0.0439	516.4	2.034	0.0388	515.6	2.022	0.0347	514.8	2.011	0.0313	513.9	2.001	130
135	0.0446	521.9	2.048	0.0394	521.1	2.036	0.0352	520.3	2.025	0.0318	519.5	2.014	135
140	0.0452	527.4	2.061	0.0400	526.6	2.049	0.0358	525.9	2.038	0.0323	525.1	2.028	140
145	0.0459	533.0	2.075	0.0405	532.2	2.062	0.0363	531.4	2.051	0.0328	530.7	2.041	145
150	0.0465	538.5	2.088	0.0411	537.8	2.076	0.0368	537.0	2.065	0.0333	536.3	2.055	150
155	0.0471	544.1	2.101	0.0417	543.4	2.089	0.0373	542.7	2.078	0.0338	542.0	2.068	155
160	0.0478	549.7	2.114	0.0423	549.0	2.102	0.0379	548.3	2.091	0.0342	547.6	2.081	160
165	0.0484	555.4	2.127	0.0428	554.7	2.115	0.0384	554.0	2.104	0.0347	553.4	2.094	165

  

ABSOLUTE PRESSURE, kPa													
Temp °C	1200			1300			1400			1500			Temp °C
	32.52			35.54			38.39			41.09			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0181	405.0	1.684	0.0166	406.2	1.682	0.0035	275.2	1.252	0.0010	248.4	1.164	
35	0.0184	408.0	1.694										35
40	0.0191	413.8	1.712	0.0172	411.6	1.699	0.0155	409.2	1.687				40
45	0.0197	419.6	1.731	0.0178	417.5	1.718	0.0161	415.3	1.706	0.0146	413.0	1.694	45
50	0.0204	425.2	1.748	0.0184	423.3	1.736	0.0167	421.3	1.725	0.0152	419.2	1.713	50
55	0.0210	430.8	1.765	0.0190	429.0	1.754	0.0173	427.2	1.743	0.0158	425.3	1.732	55
60	0.0215	436.3	1.782	0.0195	434.7	1.771	0.0178	433.0	1.760	0.0163	431.2	1.750	60
65	0.0221	441.8	1.798	0.0201	440.3	1.788	0.0183	438.7	1.777	0.0168	437.0	1.767	65
70	0.0226	447.3	1.814	0.0206	445.8	1.804	0.0188	444.3	1.794	0.0173	442.8	1.784	70
75	0.0232	452.7	1.830	0.0211	451.3	1.820	0.0193	449.9	1.810	0.0178	448.5	1.801	75
80	0.0237	458.2	1.846	0.0216	456.9	1.836	0.0198	455.5	1.826	0.0182	454.2	1.817	80
85	0.0242	463.6	1.861	0.0221	462.4	1.851	0.0203	461.1	1.842	0.0187	459.8	1.833	85
90	0.0247	469.1	1.876	0.0226	467.9	1.866	0.0207	466.7	1.857	0.0191	465.4	1.848	90
95	0.0252	474.5	1.891	0.0230	473.4	1.881	0.0212	472.2	1.872	0.0195	471.1	1.864	95
100	0.0257	480.0	1.906	0.0235	478.9	1.896	0.0216	477.8	1.887	0.0200	476.7	1.879	100
105	0.0262	485.4	1.920	0.0240	484.4	1.911	0.0220	483.3	1.902	0.0204	482.3	1.894	105
110	0.0267	490.9	1.935	0.0244	489.9	1.925	0.0225	488.9	1.917	0.0208	487.9	1.908	110
115	0.0271	496.4	1.949	0.0249	495.5	1.940	0.0229	494.5	1.931	0.0212	493.5	1.923	115
120	0.0276	502.0	1.963	0.0253	501.0	1.954	0.0233	500.1	1.946	0.0216	499.2	1.937	120
125	0.0281	507.5	1.977	0.0257	506.6	1.968	0.0237	505.7	1.960	0.0220	504.8	1.952	125
130	0.0285	513.1	1.991	0.0262	512.2	1.982	0.0241	511.3	1.974	0.0224	510.5	1.966	130
135	0.0290	518.7	2.005	0.0266	517.8	1.996	0.0245	517.0	1.988	0.0228	516.1	1.980	135
140	0.0295	524.3	2.018	0.0270	523.5	2.010	0.0249	522.6	2.001	0.0231	521.8	1.994	140
145	0.0299	529.9	2.032	0.0274	529.1	2.023	0.0253	528.3	2.015	0.0235	527.5	2.007	145
150	0.0304	535.5	2.045	0.0279	534.8	2.037	0.0257	534.0	2.029	0.0239	533.3	2.021	150
155	0.0308	541.2	2.059	0.0283	540.5	2.050	0.0261	539.8	2.042	0.0243	539.0	2.035	155
160	0.0312	546.9	2.072	0.0287	546.2	2.064	0.0265	545.5	2.055	0.0246	544.8	2.048	160
165	0.0317	552.7	2.085	0.0291	552.0	2.077	0.0269	551.3	2.069	0.0250	550.6	2.061	165
170	0.0321	558.4	2.098	0.0295	557.7	2.090	0.0273	557.1	2.082	0.0254	556.4	2.074	170
175	0.0326	564.2	2.111	0.0299	563.5	2.103	0.0277	562.9	2.095	0.0257	562.2	2.088	175
180	0.0330	570.0	2.124	0.0303	569.4	2.116	0.0281	568.7	2.108	0.0261	568.1	2.101	180

**Opteon™ XL20 (R-454C)**  
**Superheated Vapor - Constant Pressure Tables**

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	1600			1700			1800			2000			Temp °C
	43.65			46.09			48.42			52.79			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0132	408.8	1.676	0.0123	409.5	1.674	0.0041	305.9	1.346	0.0010	266.3	1.220	
45	0.0133	410.6	1.682										45
50	0.0139	417.1	1.702	0.0127	414.7	1.691	0.0117	412.2	1.679				50
55	0.0145	423.3	1.721	0.0133	421.2	1.711	0.0122	419.0	1.700	0.0104	414.1	1.678	55
60	0.0150	429.4	1.740	0.0138	427.5	1.730	0.0127	425.5	1.720	0.0109	421.1	1.700	60
65	0.0155	435.3	1.757	0.0143	433.6	1.748	0.0132	431.7	1.738	0.0114	427.8	1.719	65
70	0.0159	441.2	1.775	0.0148	439.6	1.765	0.0137	437.9	1.756	0.0119	434.3	1.738	70
75	0.0164	447.0	1.791	0.0152	445.5	1.782	0.0141	443.9	1.774	0.0123	440.6	1.757	75
80	0.0169	452.8	1.808	0.0156	451.3	1.799	0.0146	449.9	1.791	0.0127	446.8	1.774	80
85	0.0173	458.5	1.824	0.0161	457.1	1.815	0.0150	455.8	1.807	0.0131	452.9	1.792	85
90	0.0177	464.2	1.840	0.0165	462.9	1.831	0.0154	461.6	1.824	0.0135	458.9	1.808	90
95	0.0181	469.9	1.855	0.0169	468.7	1.847	0.0157	467.4	1.839	0.0138	464.9	1.825	95
100	0.0185	475.5	1.871	0.0173	474.4	1.863	0.0161	473.2	1.855	0.0142	470.8	1.841	100
105	0.0189	481.2	1.886	0.0176	480.1	1.878	0.0165	479.0	1.870	0.0145	476.7	1.856	105
110	0.0193	486.9	1.900	0.0180	485.8	1.893	0.0169	484.7	1.886	0.0149	482.6	1.872	110
115	0.0197	492.5	1.915	0.0184	491.5	1.908	0.0172	490.5	1.900	0.0152	488.4	1.887	115
120	0.0201	498.2	1.930	0.0187	497.2	1.922	0.0176	496.3	1.915	0.0156	494.3	1.902	120
125	0.0205	503.9	1.944	0.0191	502.9	1.937	0.0179	502.0	1.930	0.0159	500.1	1.917	125
130	0.0208	509.6	1.958	0.0195	508.7	1.951	0.0183	507.8	1.944	0.0162	505.9	1.931	130
135	0.0212	515.3	1.972	0.0198	514.4	1.965	0.0186	513.5	1.958	0.0165	511.8	1.945	135
140	0.0216	521.0	1.986	0.0202	520.2	1.979	0.0189	519.3	1.972	0.0168	517.6	1.960	140
145	0.0219	526.7	2.000	0.0205	525.9	1.993	0.0193	525.1	1.986	0.0171	523.5	1.974	145
150	0.0223	532.5	2.014	0.0208	531.7	2.007	0.0196	530.9	2.000	0.0174	529.4	1.988	150
155	0.0226	538.3	2.027	0.0212	537.5	2.020	0.0199	536.8	2.014	0.0177	535.2	2.002	155
160	0.0230	544.1	2.041	0.0215	543.3	2.034	0.0202	542.6	2.027	0.0180	541.1	2.015	160
165	0.0233	549.9	2.054	0.0218	549.2	2.047	0.0205	548.5	2.041	0.0183	547.0	2.029	165
170	0.0237	555.7	2.067	0.0222	555.0	2.061	0.0208	554.3	2.054	0.0186	553.0	2.042	170
175	0.0240	561.6	2.081	0.0225	560.9	2.074	0.0212	560.2	2.067	0.0189	558.9	2.056	175
180	0.0244	567.5	2.094	0.0228	566.8	2.087	0.0215	566.2	2.081	0.0192	564.9	2.069	180
185	0.0247	573.4	2.107	0.0231	572.7	2.100	0.0218	572.1	2.094	0.0194	570.8	2.082	185
190	0.0250	579.3	2.119	0.0235	578.7	2.113	0.0221	578.1	2.107	0.0197	576.8	2.095	190

  

ABSOLUTE PRESSURE, kPa													
Temp °C	2000			2100			2200			2300			Temp °C
	54.85			56.83			58.73			60.57			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0095	411.1	1.666	0.0090	411.3	1.664	0.0037	328.4	1.410	0.0012	287.6	1.285	
55	0.0096	411.3	1.667										55
60	0.0101	418.8	1.689	0.0093	416.2	1.679	0.0086	413.5	1.668				60
65	0.0106	425.7	1.710	0.0099	423.5	1.700	0.0092	421.2	1.691	0.0085	418.6	1.681	65
70	0.0111	432.4	1.730	0.0103	430.4	1.721	0.0096	428.4	1.712	0.0090	426.2	1.703	70
75	0.0115	438.9	1.748	0.0108	437.1	1.740	0.0101	435.2	1.732	0.0094	433.3	1.723	75
80	0.0119	445.2	1.766	0.0112	443.6	1.758	0.0105	441.9	1.751	0.0099	440.1	1.743	80
85	0.0123	451.4	1.784	0.0115	449.9	1.776	0.0109	448.3	1.769	0.0102	446.7	1.761	85
90	0.0127	457.5	1.801	0.0119	456.1	1.793	0.0112	454.7	1.786	0.0106	453.2	1.779	90
95	0.0130	463.6	1.817	0.0123	462.2	1.810	0.0116	460.9	1.803	0.0109	459.5	1.796	95
100	0.0134	469.6	1.834	0.0126	468.3	1.827	0.0119	467.0	1.820	0.0113	465.7	1.813	100
105	0.0137	475.5	1.849	0.0129	474.3	1.843	0.0122	473.1	1.836	0.0116	471.9	1.830	105
110	0.0140	481.5	1.865	0.0133	480.3	1.858	0.0126	479.2	1.852	0.0119	478.0	1.846	110
115	0.0144	487.4	1.880	0.0136	486.3	1.874	0.0129	485.2	1.868	0.0122	484.1	1.862	115
120	0.0147	493.3	1.895	0.0139	492.2	1.889	0.0132	491.2	1.883	0.0125	490.2	1.877	120
125	0.0150	499.1	1.910	0.0142	498.2	1.904	0.0135	497.2	1.898	0.0128	496.2	1.892	125
130	0.0153	505.0	1.925	0.0145	504.1	1.919	0.0138	503.1	1.913	0.0131	502.2	1.907	130
135	0.0156	510.9	1.939	0.0148	510.0	1.933	0.0141	509.1	1.928	0.0134	508.2	1.922	135
140	0.0159	516.8	1.954	0.0151	515.9	1.948	0.0143	515.0	1.942	0.0136	514.2	1.937	140
145	0.0162	522.7	1.968	0.0154	521.8	1.962	0.0146	521.0	1.957	0.0139	520.2	1.951	145
150	0.0165	528.6	1.982	0.0157	527.8	1.976	0.0149	527.0	1.971	0.0142	526.1	1.965	150
155	0.0168	534.5	1.996	0.0159	533.7	1.990	0.0152	532.9	1.985	0.0144	532.1	1.979	155
160	0.0171	540.4	2.009	0.0162	539.6	2.004	0.0154	538.9	1.999	0.0147	538.1	1.993	160
165	0.0173	546.3	2.023	0.0165	545.6	2.018	0.0157	544.9	2.012	0.0150	544.1	2.007	165
170	0.0176	552.3	2.037	0.0167	551.6	2.031	0.0159	550.9	2.026	0.0152	550.2	2.021	170
175	0.0179	558.2	2.050	0.0170	557.5	2.045	0.0162	556.9	2.039	0.0155	556.2	2.034	175
180	0.0182	564.2	2.063	0.0173	563.5	2.058	0.0165	562.9	2.053	0.0157	562.2	2.048	180
185	0.0184	570.2	2.076	0.0175	569.6	2.071	0.0167	568.9	2.066	0.0160	568.3	2.061	185
190	0.0187	576.2	2.089	0.0178	575.6	2.084	0.0170	575.0	2.079	0.0162	574.4	2.074	190
195	0.0190	582.3	2.102	0.0181	581.7	2.097	0.0172	581.1	2.092	0.0164	580.4	2.087	195
200	0.0193	588.3	2.115	0.0183	587.7	2.110	0.0175	587.1	2.105	0.0167	586.6	2.100	200

**Opteon™ XL20 (R-454C)**  
**Superheated Vapor - Constant Pressure Tables**

V = Volume in m<sup>3</sup>/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

Temp °C	ABSOLUTE PRESSURE, kPa												Temp °C
	2500			3000			3500			4000			
	62.35			70.42			77.32			265.08			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0076	411.3	1.657	0.0059	409.6	1.642	0.0012	298.0	1.312	0.0011	297.0	1.308	
65	0.0079	415.9	1.670										65
70	0.0084	423.9	1.693										70
75	0.0089	431.2	1.715	0.0064	419.0	1.669							75
80	0.0093	438.3	1.735	0.0069	427.7	1.694	0.0049	412.7	1.643				80
85	0.0097	445.0	1.754	0.0073	435.7	1.716	0.0054	423.7	1.674				85
90	0.0100	451.6	1.772	0.0076	443.2	1.737	0.0059	433.0	1.699				90
95	0.0104	458.1	1.790	0.0080	450.4	1.756	0.0062	441.3	1.722				95
100	0.0107	464.4	1.807	0.0083	457.3	1.775	0.0066	449.2	1.743				100
105	0.0110	470.7	1.823	0.0086	464.0	1.793	0.0069	456.6	1.763				105
110	0.0113	476.9	1.840	0.0089	470.6	1.810	0.0072	463.8	1.782				110
115	0.0116	483.0	1.856	0.0092	477.2	1.827	0.0074	470.8	1.800				115
120	0.0119	489.1	1.871	0.0095	483.6	1.844	0.0077	477.7	1.818				120
125	0.0122	495.2	1.887	0.0097	489.9	1.860	0.0080	484.4	1.835				125
130	0.0125	501.2	1.902	0.0100	496.3	1.876	0.0082	491.0	1.851				130
135	0.0127	507.3	1.917	0.0102	502.5	1.891	0.0084	497.5	1.867				135
140	0.0130	513.3	1.931	0.0105	508.8	1.906	0.0086	504.0	1.883				140
145	0.0133	519.3	1.946	0.0107	515.0	1.921	0.0089	510.5	1.899				145
150	0.0135	525.3	1.960	0.0109	521.2	1.936	0.0091	516.9	1.914				150
155	0.0138	531.4	1.974	0.0112	527.3	1.950	0.0093	523.2	1.929				155
160	0.0140	537.4	1.988	0.0114	533.5	1.965	0.0095	529.6	1.944				160
165	0.0143	543.4	2.002	0.0116	539.7	1.979	0.0097	535.9	1.958				165
170	0.0145	549.5	2.016	0.0118	545.9	1.993	0.0099	542.2	1.972				170
175	0.0148	555.5	2.029	0.0120	552.0	2.007	0.0101	548.5	1.987				175
180	0.0150	561.6	2.043	0.0123	558.2	2.021	0.0103	554.8	2.001				180
185	0.0153	567.6	2.056	0.0125	564.4	2.034	0.0105	561.1	2.014				185
190	0.0155	573.7	2.069	0.0127	570.6	2.048	0.0107	567.4	2.028				190
195	0.0157	579.8	2.083	0.0129	576.8	2.061	0.0108	573.7	2.042				195
200	0.0160	586.0	2.096	0.0131	583.0	2.074	0.0110	580.0	2.055				200
205	0.0162	592.1	2.108	0.0133	589.2	2.087	0.0112	586.3	2.068				205
210	0.0164	598.3	2.121	0.0135	595.5	2.100	0.0114	592.6	2.081				210
215	0.0166	604.4	2.134	0.0137	601.7	2.113	0.0115	599.0	2.095				215
220	0.0169	610.6	2.147	0.0139	608.0	2.126	0.0117	605.3	2.107				220
225	0.0171	616.8	2.159	0.0141	614.3	2.138	0.0119	611.7	2.120				225
230	0.0173	623.1	2.172	0.0142	620.6	2.151	0.0121	618.0	2.133				230
235	0.0175	629.3	2.184	0.0144	626.9	2.163	0.0122	624.4	2.146				235
240	0.0178	635.6	2.196	0.0146	633.2	2.176	0.0124	630.8	2.158				240
245	0.0180	641.9	2.208	0.0148	639.6	2.188	0.0126	637.2	2.171				245
250	0.0182	648.2	2.221	0.0150	645.9	2.200	0.0127	643.7	2.183				250
255	0.0184	654.5	2.233	0.0152	652.3	2.213	0.0129	650.1	2.195				255
260	0.0186	660.9	2.245	0.0154	658.7	2.225	0.0131	656.6	2.207				260
265	0.0188	667.3	2.256	0.0156	665.1	2.237	0.0132	663.0	2.219				265
270	0.0190	673.7	2.268	0.0157	671.6	2.249	0.0134	669.5	2.231	0.0116	667.5	2.216	270
275	0.0193	680.1	2.280	0.0159	678.1	2.260	0.0135	676.0	2.243	0.0118	674.0	2.228	275
280	0.0195	686.5	2.292	0.0161	684.5	2.272	0.0137	682.6	2.255	0.0119	680.6	2.240	280
285	0.0197	693.0	2.303	0.0163	691.0	2.284	0.0139	689.1	2.267	0.0120	687.2	2.252	285
290	0.0199	699.4	2.315	0.0165	697.5	2.296	0.0140	695.7	2.279	0.0122	693.8	2.264	290
295	0.0201	705.9	2.326	0.0166	704.1	2.307	0.0142	702.2	2.290	0.0123	700.4	2.275	295
300	0.0203	712.5	2.338	0.0168	710.6	2.319	0.0143	708.8	2.302	0.0125	707.1	2.287	300
305	0.0205	719.0	2.349	0.0170	717.2	2.330	0.0145	715.5	2.313	0.0126	713.7	2.299	305
310	0.0207	725.5	2.360	0.0172	723.8	2.341	0.0146	722.1	2.325	0.0127	720.4	2.310	310

---

For more information on the Opteon™ family of refrigerants, or other refrigerants products, visit [opteon.com](http://opteon.com) or call (800) 235-7882.

The information set forth herein is furnished free of charge and based on technical data that Chemours believes to be reliable. It is intended for use by persons having technical skill, at their own risk. Because conditions of use are outside our control, Chemours makes no warranties, expressed or implied, and assumes no liability in connection with any use of this information. Nothing herein is to be taken as a license to operate under, or a recommendation to infringe, any patents or patent applications.

© 2023 The Chemours Company FC, LLC. Opteon™ and any associated logos are trademarks or copyrights of The Chemours Company FC, LLC. Chemours™ and the Chemours Logo are trademarks of The Chemours Company.

C-XL20THP-SI (12/23)