



Opteon™ XP44

Refrigerant

Thermodynamic Properties of Opteon™ XP44 (R-452A) SI Units

Physical Properties

Molecular Weight	103.5 g/mole
Boiling Point at One Atmosphere	-47.0 °C
Critical Temperature	74.9 °C
Critical Pressure	4001.5 kPa
Critical Density	496.26 kg/m ³
Critical Volume	0.0020 m ³ /kg
Ozone Depletion Potential	0
Global Warming Potential (AR5)	1945
ASHRAE Standard 34 Safety Rating	A1

Units and Factors

t = temperature in °C
P = pressure in kiloPascals absolute (kPa [abs])
v_f = volume of saturated liquid in m³/kg
v_g = volume of saturated vapor in m³/kg
V = volume of superheated vapor in m³/kg
d_f = 1/v_f = density of saturated liquid in kg/m³
d_g = 1/v_g = density of saturated vapor in kg/m³
h_f = enthalpy of saturated liquid in kJ/kg
h_{fg} = enthalpy of vaporization in kJ/kg
h_g = enthalpy of saturated vapor in kJ/kg
H = enthalpy of superheated vapor in kJ/kg
s_f = entropy of saturated liquid in kJ/(kg) (K)
s_g = 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_f = 200 kJ/kg at 0°C

s_f = 1 kJ/kg·K at 0°C

This information is based on NIST Standard Database 23, Version 9.1 (Lemmon, E.W.; Huber, M.L.; McLinden, M.O.; REFPROP Reference Fluid Thermodynamic and Transport Properties - National Institute of Standards and Technology, 2013) using Chemours interaction parameters with R-1234yf.

Opteon™ XP44 (R-452A)
Saturation Properties - Temperature Table

Temp °C	Pressure [kPa]		Volume [m ³ /kg]		Density [kg/m ³]		Enthalpy [kJ/kg]			Entropy [kJ/kg-K]		Temp °C
	Liquid P _f	Vapor P _g	Liquid v _f	Vapor v _g	Liquid ρ _f	Vapor ρ _g	Liquid h _f	Latent h _{fg}	Vapor h _g	Liquid s _f	Vapor s _g	
-60	51.517	41.885	0.000689	0.3992	1451.3	2.505	126.0	200.7	326.7	0.697	1.647	-60
-59	54.462	44.349	0.000691	0.3784	1448.2	2.642	127.1	200.1	327.3	0.702	1.646	-59
-58	57.539	46.929	0.000692	0.3589	1445.0	2.786	128.3	199.6	327.9	0.708	1.644	-58
-57	60.755	49.629	0.000694	0.3406	1441.9	2.936	129.5	199.0	328.5	0.713	1.642	-57
-56	64.112	52.452	0.000695	0.3235	1438.7	3.092	130.6	198.4	329.1	0.718	1.641	-56
-55	67.615	55.403	0.000697	0.3073	1435.6	3.254	131.8	197.9	329.7	0.724	1.639	-55
-54	71.270	58.486	0.000698	0.2921	1432.4	3.423	133.0	197.3	330.3	0.729	1.638	-54
-53	75.080	61.705	0.000700	0.2778	1429.2	3.599	134.1	196.7	330.9	0.734	1.636	-53
-52	79.050	65.064	0.000701	0.2644	1426.0	3.783	135.3	196.2	331.5	0.740	1.635	-52
-51	83.185	68.568	0.000703	0.2517	1422.8	3.973	136.5	195.6	332.1	0.745	1.634	-51
-50	87.489	72.220	0.000704	0.2397	1419.6	4.171	137.7	195.0	332.7	0.750	1.632	-50
-49	91.968	76.027	0.000706	0.2285	1416.4	4.377	138.9	194.4	333.3	0.755	1.631	-49
-48	96.626	79.991	0.000708	0.2178	1413.2	4.591	140.0	193.8	333.9	0.761	1.630	-48
-47	101.469	84.119	0.000709	0.2078	1409.9	4.812	141.2	193.2	334.5	0.766	1.628	-47
-46	106.500	88.413	0.000711	0.1983	1406.7	5.043	142.4	192.6	335.1	0.771	1.627	-46
-45	111.726	92.880	0.000713	0.1893	1403.4	5.282	143.6	192.0	335.6	0.776	1.626	-45
-44	117.151	97.524	0.000714	0.1809	1400.2	5.529	144.8	191.5	336.2	0.782	1.625	-44
-43	122.781	102.350	0.000716	0.1728	1396.9	5.786	146.0	190.8	336.8	0.787	1.624	-43
-42	128.621	107.363	0.000718	0.1652	1393.6	6.052	147.2	190.2	337.4	0.792	1.623	-42
-41	134.676	112.567	0.000719	0.1580	1390.3	6.328	148.4	189.6	338.0	0.797	1.622	-41
-40	140.951	117.969	0.000721	0.1512	1387.0	6.613	149.6	189.0	338.6	0.802	1.621	-40
-39	147.452	123.572	0.000723	0.1447	1383.7	6.909	150.8	188.4	339.2	0.807	1.619	-39
-38	154.185	129.383	0.000724	0.1386	1380.3	7.215	152.0	187.8	339.8	0.812	1.618	-38
-37	161.155	135.407	0.000726	0.1328	1377.0	7.531	153.2	187.2	340.4	0.818	1.618	-37
-36	168.367	141.648	0.000728	0.1273	1373.6	7.858	154.4	186.5	341.0	0.823	1.617	-36
-35	175.827	148.113	0.000730	0.1220	1370.2	8.197	155.6	185.9	341.5	0.828	1.616	-35
-34	183.542	154.806	0.000732	0.1170	1366.8	8.547	156.8	185.3	342.1	0.833	1.615	-34
-33	191.515	161.734	0.000733	0.1123	1363.4	8.908	158.1	184.6	342.7	0.838	1.614	-33
-32	199.754	168.902	0.000735	0.1077	1360.0	9.281	159.3	184.0	343.3	0.843	1.613	-32
-31	208.265	176.315	0.000737	0.1034	1356.6	9.667	160.5	183.3	343.9	0.848	1.612	-31
-30	217.052	183.979	0.000739	0.0994	1353.2	10.065	161.7	182.7	344.4	0.853	1.611	-30
-29	226.122	191.901	0.000741	0.0955	1349.7	10.476	163.0	182.0	345.0	0.858	1.610	-29
-28	235.481	200.085	0.000743	0.0917	1346.2	10.900	164.2	181.4	345.6	0.863	1.610	-28
-27	245.135	208.538	0.000745	0.0882	1342.7	11.338	165.4	180.7	346.2	0.868	1.609	-27
-26	255.090	217.265	0.000747	0.0848	1339.2	11.789	166.7	180.1	346.7	0.873	1.608	-26
-25	265.353	226.273	0.000749	0.0816	1335.7	12.255	167.9	179.4	347.3	0.878	1.607	-25
-24	275.928	235.568	0.000751	0.0785	1332.2	12.734	169.2	178.7	347.9	0.883	1.607	-24
-23	286.823	245.156	0.000753	0.0756	1328.6	13.229	170.4	178.0	348.4	0.888	1.606	-23
-22	298.043	255.042	0.000755	0.0728	1325.1	13.739	171.7	177.3	349.0	0.893	1.605	-22
-21	309.596	265.234	0.000757	0.0701	1321.5	14.264	172.9	176.6	349.6	0.898	1.605	-21
-20	321.486	275.737	0.000759	0.0675	1317.9	14.805	174.2	175.9	350.1	0.903	1.604	-20
-19	333.721	286.558	0.000761	0.0651	1314.3	15.362	175.4	175.2	350.7	0.908	1.603	-19
-18	346.307	297.703	0.000763	0.0628	1310.6	15.936	176.7	174.5	351.2	0.913	1.603	-18
-17	359.251	309.179	0.000765	0.0605	1307.0	16.527	178.0	173.8	351.8	0.918	1.602	-17
-16	372.558	320.992	0.000767	0.0584	1303.3	17.135	179.2	173.1	352.3	0.922	1.602	-16
-15	386.235	333.149	0.000769	0.0563	1299.6	17.761	180.5	172.4	352.9	0.927	1.601	-15
-14	400.290	345.656	0.000772	0.0543	1295.9	18.405	181.8	171.7	353.4	0.932	1.601	-14
-13	414.728	358.520	0.000774	0.0524	1292.2	19.068	183.1	170.9	354.0	0.937	1.600	-13
-12	429.555	371.748	0.000776	0.0506	1288.4	19.750	184.3	170.2	354.5	0.942	1.599	-12
-11	444.780	385.347	0.000778	0.0489	1284.7	20.451	185.6	169.4	355.1	0.947	1.599	-11
-10	460.408	399.323	0.000781	0.0472	1280.9	21.172	186.9	168.7	355.6	0.952	1.598	-10
-9	476.445	413.684	0.000783	0.0456	1277.0	21.914	188.2	167.9	356.1	0.957	1.598	-9
-8	492.900	428.436	0.000785	0.0441	1273.2	22.676	189.5	167.2	356.7	0.961	1.597	-8
-7	509.778	443.586	0.000788	0.0426	1269.3	23.460	190.8	166.4	357.2	0.966	1.597	-7
-6	527.087	459.142	0.000790	0.0412	1265.5	24.266	192.1	165.6	357.7	0.971	1.596	-6
-5	544.832	475.111	0.000793	0.0398	1261.6	25.094	193.4	164.8	358.2	0.976	1.596	-5
-4	563.022	491.500	0.000795	0.0385	1257.6	25.945	194.7	164.0	358.8	0.981	1.596	-4

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Saturation Properties - Temperature Table

Temp °C	Pressure [kPa]		Volume [m ³ /kg]		Density [kg/m ³]		Enthalpy [kJ/kg]			Entropy [kJ/kg-K]		Temp °C
	Liquid P _f	Vapor P _g	Liquid v _f	Vapor v _g	Liquid ρ _f	Vapor ρ _g	Liquid h _f	Latent h _{fg}	Vapor h _g	Liquid s _f	Vapor s _g	
-3	581.663	508.316	0.000798	0.0373	1253.7	26.820	196.0	163.3	359.3	0.986	1.595	-3
-2	600.762	525.567	0.000800	0.0361	1249.7	27.719	197.4	162.4	359.8	0.990	1.595	-2
-1	620.326	543.261	0.000803	0.0349	1245.7	28.643	198.7	161.6	360.3	0.995	1.594	-1
0	640.362	561.403	0.000805	0.0338	1241.6	29.592	200.0	160.8	360.8	1.000	1.594	0
1	660.877	580.004	0.000808	0.0327	1237.6	30.567	201.3	160.0	361.3	1.005	1.593	1
2	681.878	599.069	0.000811	0.0317	1233.5	31.568	202.7	159.2	361.8	1.010	1.593	2
3	703.373	618.606	0.000813	0.0307	1229.3	32.597	204.0	158.3	362.3	1.014	1.593	3
4	725.368	638.624	0.000816	0.0297	1225.2	33.654	205.3	157.5	362.8	1.019	1.592	4
5	747.870	659.130	0.000819	0.0288	1221.0	34.739	206.7	156.6	363.3	1.024	1.592	5
6	770.888	680.133	0.000822	0.0279	1216.8	35.854	208.0	155.7	363.8	1.029	1.591	6
7	794.427	701.640	0.000825	0.0270	1212.6	36.999	209.4	154.9	364.3	1.034	1.591	7
8	818.496	723.659	0.000828	0.0262	1208.3	38.176	210.8	154.0	364.7	1.038	1.591	8
9	843.102	746.199	0.000831	0.0254	1204.0	39.384	212.1	153.1	365.2	1.043	1.590	9
10	868.252	769.267	0.000834	0.0246	1199.6	40.624	213.5	152.2	365.7	1.048	1.590	10
11	893.953	792.873	0.000837	0.0239	1195.2	41.898	214.9	151.3	366.1	1.053	1.589	11
12	920.213	817.025	0.000840	0.0231	1190.8	43.207	216.3	150.3	366.6	1.057	1.589	12
13	947.040	841.731	0.000843	0.0224	1186.4	44.551	217.6	149.4	367.0	1.062	1.589	13
14	974.440	866.999	0.000846	0.0218	1181.9	45.932	219.0	148.5	367.5	1.067	1.588	14
15	1002.422	892.839	0.000849	0.0211	1177.3	47.350	220.4	147.5	367.9	1.072	1.588	15
16	1030.993	919.260	0.000853	0.0205	1172.8	48.807	221.8	146.5	368.4	1.076	1.587	16
17	1060.160	946.270	0.000856	0.0199	1168.2	50.303	223.2	145.6	368.8	1.081	1.587	17
18	1089.932	973.878	0.000859	0.0193	1163.5	51.841	224.6	144.6	369.2	1.086	1.587	18
19	1120.315	1002.094	0.000863	0.0187	1158.8	53.420	226.1	143.6	369.6	1.091	1.586	19
20	1151.318	1030.927	0.000866	0.0182	1154.1	55.043	227.5	142.6	370.0	1.096	1.586	20
21	1182.949	1060.386	0.000870	0.0176	1149.3	56.710	228.9	141.5	370.4	1.100	1.585	21
22	1215.214	1090.480	0.000874	0.0171	1144.4	58.424	230.3	140.5	370.8	1.105	1.585	22
23	1248.123	1121.220	0.000878	0.0166	1139.6	60.185	231.8	139.4	371.2	1.110	1.584	23
24	1281.683	1152.615	0.000881	0.0161	1134.6	61.995	233.2	138.4	371.6	1.115	1.584	24
25	1315.901	1184.675	0.000885	0.0157	1129.6	63.856	234.7	137.3	372.0	1.119	1.584	25
26	1350.786	1217.410	0.000889	0.0152	1124.6	65.769	236.1	136.2	372.3	1.124	1.583	26
27	1386.346	1250.830	0.000893	0.0148	1119.5	67.736	237.6	135.1	372.7	1.129	1.583	27
28	1422.588	1284.945	0.000897	0.0143	1114.4	69.760	239.1	134.0	373.0	1.134	1.582	28
29	1459.522	1319.767	0.000902	0.0139	1109.1	71.841	240.6	132.8	373.4	1.139	1.582	29
30	1497.154	1355.305	0.000906	0.0135	1103.9	73.982	242.0	131.7	373.7	1.143	1.581	30
31	1535.494	1391.570	0.000910	0.0131	1098.5	76.186	243.5	130.5	374.0	1.148	1.581	31
32	1574.549	1428.575	0.000915	0.0127	1093.1	78.454	245.0	129.3	374.3	1.153	1.580	32
33	1614.327	1466.329	0.000919	0.0124	1087.6	80.789	246.5	128.1	374.6	1.158	1.579	33
34	1654.838	1504.845	0.000924	0.0120	1082.1	83.194	248.1	126.9	374.9	1.163	1.579	34
35	1696.089	1544.133	0.000929	0.0117	1076.5	85.671	249.6	125.6	375.2	1.167	1.578	35
36	1738.089	1584.207	0.000934	0.0113	1070.8	88.223	251.1	124.4	375.5	1.172	1.578	36
37	1780.846	1625.078	0.000939	0.0110	1065.0	90.854	252.7	123.1	375.7	1.177	1.577	37
38	1824.369	1666.758	0.000944	0.0107	1059.1	93.566	254.2	121.8	376.0	1.182	1.576	38
39	1868.667	1709.261	0.000950	0.0104	1053.2	96.364	255.8	120.4	376.2	1.187	1.576	39
40	1913.748	1752.599	0.000955	0.0101	1047.1	99.251	257.4	119.1	376.4	1.192	1.575	40
41	1959.621	1796.786	0.000961	0.0098	1041.0	102.231	258.9	117.7	376.6	1.197	1.574	41
42	2006.295	1841.835	0.000966	0.0095	1034.7	105.308	260.5	116.3	376.8	1.202	1.573	42
43	2053.778	1887.762	0.000972	0.0092	1028.4	108.488	262.1	114.9	377.0	1.207	1.573	43
44	2102.080	1934.579	0.000979	0.0089	1021.9	111.776	263.8	113.4	377.2	1.212	1.572	44
45	2151.210	1982.303	0.000985	0.0087	1015.3	115.176	265.4	111.9	377.3	1.217	1.571	45
46	2201.176	2030.950	0.000992	0.0084	1008.6	118.696	267.0	110.4	377.4	1.222	1.570	46
47	2251.989	2080.534	0.000998	0.0082	1001.7	122.342	268.7	108.9	377.6	1.227	1.569	47
48	2303.657	2131.074	0.001005	0.0079	994.7	126.120	270.4	107.3	377.6	1.232	1.568	48
49	2356.189	2182.586	0.001013	0.0077	987.5	130.040	272.0	105.7	377.7	1.237	1.567	49
50	2409.595	2235.089	0.001020	0.0075	980.2	134.109	273.7	104.0	377.8	1.242	1.566	50
51	2463.885	2288.602	0.001028	0.0072	972.7	138.338	275.5	102.3	377.8	1.247	1.565	51
52	2519.068	2343.145	0.001036	0.0070	965.0	142.737	277.2	100.6	377.8	1.252	1.564	52
53	2575.153	2398.739	0.001045	0.0068	957.1	147.318	279.0	98.8	377.8	1.257	1.562	53

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	Liquid p _f	Vapor p _g	Liquid v _f	Vapor v _g	Liquid d _f	Vapor d _g	Liquid h _f	Latent h _{fg}	Vapor h _g	Liquid s _f	Vapor s _g	
54	2632.152	2455.407	0.001054	0.0066	949.0	152.095	280.7	97.0	377.7	1.263	1.561	54
55	2690.071	2513.172	0.001063	0.0064	940.7	157.082	282.5	95.1	377.6	1.268	1.560	55
56	2748.922	2572.060	0.001073	0.0062	932.1	162.297	284.4	93.2	377.5	1.273	1.558	56
57	2808.713	2632.102	0.001083	0.0060	923.2	167.760	286.2	91.2	377.4	1.279	1.557	57
58	2869.454	2693.322	0.001094	0.0058	914.1	173.493	288.1	89.1	377.2	1.284	1.555	58
59	2931.154	2755.754	0.001106	0.0056	904.6	179.522	290.0	87.0	377.0	1.290	1.553	59
60	2993.820	2819.433	0.001118	0.0054	894.7	185.878	291.9	84.7	376.7	1.295	1.551	60
61	3057.460	2884.399	0.001131	0.0052	884.4	192.596	293.9	82.4	376.4	1.301	1.549	61
62	3122.081	2950.694	0.001145	0.0050	873.6	199.720	295.9	80.0	376.0	1.307	1.547	62
63	3187.687	3018.367	0.001160	0.0048	862.3	207.300	298.0	77.5	375.5	1.313	1.545	63
64	3254.281	3087.474	0.001176	0.0046	850.4	215.402	300.1	74.9	375.0	1.319	1.542	64
65	3321.862	3158.079	0.001194	0.0045	837.8	224.103	302.3	72.1	374.4	1.325	1.540	65
66	3390.422	3230.256	0.001213	0.0043	824.3	233.506	304.6	69.1	373.7	1.332	1.537	66
67	3459.947	3304.098	0.001235	0.0041	809.8	243.741	307.0	66.0	372.9	1.338	1.533	67
68	3530.410	3379.717	0.001259	0.0039	794.1	254.985	309.4	62.5	372.0	1.345	1.530	68
69	3601.759	3457.260	0.001287	0.0037	776.7	267.487	312.0	58.8	370.8	1.353	1.526	69
70	3673.906	3536.921	0.001321	0.0036	757.3	281.610	314.8	54.7	369.5	1.361	1.521	70

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/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
	-81.92 °C			-72.01 °C			-65.63 °C			-60.80 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	1.5230	313.5	1.696	0.7966	319.4	1.671	0.5453	323.3	1.658	0.4168	326.2	1.649	
-80	1.5388	314.7	1.702										-80
-75	1.5799	318.0	1.718										-75
-70	1.6210	321.2	1.735	0.8050	320.8	1.677							-70
-65	1.6619	324.5	1.751	0.8259	324.1	1.694	0.5471	323.7	1.660				-65
-60	1.7028	327.9	1.767	0.8466	327.5	1.710	0.5612	327.1	1.676	0.4185	326.8	1.651	-60
-55	1.7436	331.3	1.783	0.8674	331.0	1.726	0.5753	330.6	1.692	0.4292	330.2	1.668	-55
-50	1.7843	334.7	1.798	0.8880	334.4	1.741	0.5892	334.1	1.708	0.4398	333.8	1.684	-50
-45	1.8249	338.2	1.814	0.9086	337.9	1.757	0.6031	337.6	1.723	0.4504	337.3	1.699	-45
-40	1.8656	341.8	1.829	0.9292	341.5	1.772	0.6170	341.2	1.739	0.4609	340.9	1.715	-40
-35	1.9062	345.3	1.844	0.9497	345.1	1.788	0.6308	344.8	1.754	0.4714	344.6	1.730	-35
-30	1.9467	349.0	1.859	0.9701	348.7	1.803	0.6446	348.5	1.769	0.4818	348.2	1.746	-30
-25	1.9872	352.6	1.874	0.9906	352.4	1.818	0.6583	352.2	1.784	0.4922	351.9	1.761	-25
-20	2.0277	356.3	1.889	1.0110	356.1	1.833	0.6721	355.9	1.799	0.5026	355.7	1.776	-20
-15	2.0682	360.1	1.904	1.0314	359.9	1.847	0.6857	359.7	1.814	0.5129	359.5	1.790	-15
-10	2.1086	363.9	1.918	1.0517	363.7	1.862	0.6994	363.5	1.829	0.5232	363.3	1.805	-10
-5	2.1490	367.7	1.933	1.0720	367.5	1.876	0.7130	367.4	1.843	0.5335	367.2	1.820	-5
0	2.1894	371.6	1.947	1.0924	371.4	1.891	0.7267	371.3	1.858	0.5438	371.1	1.834	0
5	2.2298	375.5	1.961	1.1127	375.4	1.905	0.7403	375.2	1.872	0.5541	375.0	1.848	5
10	2.2701	379.5	1.975	1.1329	379.3	1.919	0.7539	379.2	1.886	0.5643	379.0	1.863	10
15	2.3105	383.5	1.989	1.1532	383.4	1.933	0.7675	383.2	1.900	0.5746	383.1	1.877	15
20	2.3508	387.6	2.003	1.1735	387.4	1.947	0.7810	387.3	1.914	0.5848	387.1	1.891	20
25	2.3912	391.7	2.017	1.1937	391.5	1.961	0.7946	391.4	1.928	0.5950	391.3	1.905	25
30	2.4315	395.8	2.031	1.2140	395.7	1.975	0.8081	395.5	1.942	0.6052	395.4	1.919	30
35	2.4718	400.0	2.045	1.2342	399.9	1.989	0.8216	399.7	1.956	0.6154	399.6	1.932	35
40	2.5121	404.2	2.058	1.2544	404.1	2.002	0.8352	404.0	1.969	0.6256	403.8	1.946	40
45	2.5524	408.5	2.072	1.2746	408.3	2.016	0.8487	408.2	1.983	0.6357	408.1	1.959	45
50	2.5927	412.8	2.085	1.2948	412.6	2.029	0.8622	412.5	1.996	0.6459	412.4	1.973	50
55	2.6329	417.1	2.098	1.3150	417.0	2.042	0.8757	416.9	2.010	0.6560	416.8	1.986	55
60	2.6732	421.5	2.112	1.3352	421.4	2.056	0.8892	421.3	2.023	0.6662	421.2	2.000	60
65	2.7135	425.9	2.125	1.3554	425.8	2.069	0.9027	425.7	2.036	0.6763	425.6	2.013	65

ABSOLUTE PRESSURE, kPa													
Temp °C	50			60			70			80			Temp °C
	-56.87 °C			-53.52 °C			-50.60 °C			-48.00 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.3383	328.6	1.642	0.2852	330.6	1.637	0.2469	332.3	1.633	0.2178	333.9	1.630	
-55	0.3415	329.9	1.648										-55
-50	0.3502	333.4	1.664	0.2904	333.1	1.649	0.2476	332.8	1.635				-50
-45	0.3587	337.0	1.680	0.2976	336.7	1.665	0.2539	336.4	1.651	0.2212	336.1	1.639	-45
-40	0.3672	340.6	1.696	0.3048	340.4	1.680	0.2602	340.1	1.667	0.2267	339.8	1.655	-40
-35	0.3757	344.3	1.712	0.3119	344.0	1.696	0.2663	343.8	1.683	0.2322	343.5	1.671	-35
-30	0.3841	348.0	1.727	0.3190	347.7	1.711	0.2725	347.5	1.698	0.2376	347.2	1.687	-30
-25	0.3925	351.7	1.742	0.3261	351.5	1.727	0.2786	351.2	1.714	0.2430	351.0	1.702	-25
-20	0.4009	355.5	1.757	0.3331	355.3	1.742	0.2847	355.0	1.729	0.2483	354.8	1.717	-20
-15	0.4092	359.3	1.772	0.3401	359.1	1.757	0.2907	358.9	1.744	0.2537	358.7	1.732	-15
-10	0.4176	363.1	1.787	0.3471	362.9	1.771	0.2967	362.7	1.759	0.2590	362.5	1.747	-10
-5	0.4258	367.0	1.801	0.3540	366.8	1.786	0.3027	366.6	1.773	0.2643	366.5	1.762	-5
0	0.4341	370.9	1.816	0.3610	370.8	1.801	0.3087	370.6	1.788	0.2695	370.4	1.777	0
5	0.4424	374.9	1.830	0.3679	374.7	1.815	0.3147	374.6	1.802	0.2748	374.4	1.791	5
10	0.4506	378.9	1.844	0.3748	378.7	1.829	0.3206	378.6	1.817	0.2800	378.4	1.805	10
15	0.4588	382.9	1.859	0.3817	382.8	1.844	0.3266	382.6	1.831	0.2852	382.5	1.820	15
20	0.4670	387.0	1.873	0.3885	386.9	1.858	0.3325	386.7	1.845	0.2904	386.6	1.834	20
25	0.4752	391.1	1.887	0.3954	391.0	1.872	0.3384	390.9	1.859	0.2956	390.7	1.848	25
30	0.4834	395.3	1.900	0.4023	395.2	1.885	0.3443	395.0	1.873	0.3008	394.9	1.862	30
35	0.4916	399.5	1.914	0.4091	399.4	1.899	0.3502	399.2	1.887	0.3060	399.1	1.875	35
40	0.4998	403.7	1.928	0.4159	403.6	1.913	0.3560	403.5	1.900	0.3111	403.4	1.889	40
45	0.5079	408.0	1.941	0.4228	407.9	1.926	0.3619	407.8	1.914	0.3163	407.7	1.903	45
50	0.5161	412.3	1.955	0.4296	412.2	1.940	0.3678	412.1	1.927	0.3214	412.0	1.916	50
55	0.5243	416.7	1.968	0.4364	416.6	1.953	0.3736	416.5	1.941	0.3266	416.4	1.930	55
60	0.5324	421.1	1.981	0.4432	421.0	1.967	0.3795	420.9	1.954	0.3317	420.8	1.943	60
65	0.5405	425.5	1.995	0.4500	425.4	1.980	0.3853	425.3	1.967	0.3368	425.2	1.956	65
70	0.5487	430.0	2.008	0.4568	429.9	1.993	0.3912	429.8	1.980	0.3419	429.7	1.969	70
75	0.5568	434.5	2.021	0.4636	434.4	2.006	0.3970	434.3	1.993	0.3470	434.2	1.983	75
80	0.5649	439.1	2.034	0.4704	439.0	2.019	0.4028	438.9	2.006	0.3522	438.8	1.996	80
85	0.5730	443.6	2.047	0.4771	443.6	2.032	0.4086	443.5	2.019	0.3573	443.4	2.009	85
90	0.5811	448.3	2.060	0.4839	448.2	2.045	0.4145	448.1	2.032	0.3624	448.0	2.021	90

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/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
	-45.64 °C			-43.48 °C			-43.21 °C			-41.49 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1950	335.3	1.627	0.1766	336.5	1.624	0.1745	336.7	1.624	0.1615	337.7	1.622	
-45	0.1957	335.7	1.629										-45
-40	0.2006	339.5	1.645	0.1798	339.2	1.636	0.1773	339.1	1.634	0.1627	338.9	1.627	-40
-35	0.2056	343.2	1.661	0.1843	342.9	1.652	0.1818	342.9	1.650	0.1669	342.6	1.643	-35
-30	0.2104	347.0	1.677	0.1887	346.7	1.667	0.1862	346.7	1.666	0.1709	346.5	1.659	-30
-25	0.2153	350.8	1.692	0.1931	350.5	1.683	0.1905	350.5	1.682	0.1750	350.3	1.674	-25
-20	0.2201	354.6	1.707	0.1975	354.4	1.698	0.1948	354.3	1.697	0.1790	354.1	1.690	-20
-15	0.2249	358.4	1.722	0.2018	358.2	1.713	0.1991	358.2	1.712	0.1829	358.0	1.705	-15
-10	0.2296	362.3	1.737	0.2061	362.1	1.728	0.2034	362.1	1.727	0.1869	361.9	1.720	-10
-5	0.2343	366.3	1.752	0.2104	366.1	1.743	0.2076	366.1	1.742	0.1908	365.9	1.735	-5
0	0.2390	370.2	1.767	0.2147	370.1	1.758	0.2118	370.0	1.757	0.1947	369.9	1.750	0
5	0.2437	374.2	1.781	0.2189	374.1	1.772	0.2160	374.0	1.771	0.1986	373.9	1.764	5
10	0.2484	378.3	1.796	0.2231	378.1	1.787	0.2202	378.1	1.786	0.2024	377.9	1.779	10
15	0.2531	382.3	1.810	0.2273	382.2	1.801	0.2243	382.2	1.800	0.2063	382.0	1.793	15
20	0.2577	386.4	1.824	0.2315	386.3	1.815	0.2285	386.3	1.814	0.2101	386.2	1.807	20
25	0.2623	390.6	1.838	0.2357	390.5	1.829	0.2326	390.4	1.828	0.2140	390.3	1.821	25
30	0.2670	394.8	1.852	0.2399	394.6	1.843	0.2367	394.6	1.842	0.2178	394.5	1.835	30
35	0.2716	399.0	1.866	0.2441	398.9	1.857	0.2408	398.9	1.856	0.2216	398.7	1.849	35
40	0.2762	403.3	1.879	0.2482	403.1	1.871	0.2449	403.1	1.870	0.2254	403.0	1.863	40
45	0.2808	407.6	1.893	0.2524	407.4	1.884	0.2490	407.4	1.883	0.2291	407.3	1.876	45
50	0.2854	411.9	1.907	0.2565	411.8	1.898	0.2531	411.8	1.897	0.2329	411.7	1.890	50
55	0.2899	416.3	1.920	0.2607	416.2	1.911	0.2572	416.2	1.910	0.2367	416.1	1.903	55
60	0.2945	420.7	1.933	0.2648	420.6	1.925	0.2613	420.6	1.924	0.2405	420.5	1.917	60
65	0.2991	425.1	1.947	0.2689	425.0	1.938	0.2654	425.0	1.937	0.2442	424.9	1.930	65
70	0.3036	429.6	1.960	0.2730	429.5	1.951	0.2694	429.5	1.950	0.2480	429.4	1.943	70
75	0.3082	434.1	1.973	0.2771	434.1	1.964	0.2735	434.0	1.963	0.2517	434.0	1.956	75
80	0.3128	438.7	1.986	0.2812	438.6	1.977	0.2775	438.6	1.976	0.2554	438.5	1.969	80
85	0.3173	443.3	1.999	0.2853	443.2	1.990	0.2816	443.2	1.989	0.2592	443.1	1.982	85
90	0.3218	448.0	2.012	0.2894	447.9	2.003	0.2856	447.9	2.002	0.2629	447.8	1.995	90
95	0.3264	452.6	2.025	0.2935	452.5	2.016	0.2897	452.5	2.015	0.2666	452.5	2.008	95
100	0.3309	457.3	2.037	0.2976	457.3	2.029	0.2937	457.2	2.028	0.2704	457.2	2.021	100

ABSOLUTE PRESSURE, kPa													
Temp °C	120			130			140			150			Temp °C
	-39.63 °C			-37.90 °C			-36.26 °C			-34.71 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1488	338.8	1.620	0.1380	339.8	1.618	0.1287	340.8	1.617	0.1205	341.7	1.615	
-35	0.1523	342.4	1.635	0.1401	342.1	1.628	0.1295	341.8	1.621				-35
-30	0.1561	346.2	1.651	0.1436	345.9	1.644	0.1328	345.7	1.637	0.1235	345.4	1.631	-30
-25	0.1599	350.0	1.667	0.1471	349.8	1.660	0.1361	349.5	1.653	0.1266	349.3	1.647	-25
-20	0.1636	353.9	1.682	0.1505	353.7	1.675	0.1393	353.4	1.668	0.1296	353.2	1.662	-20
-15	0.1672	357.8	1.697	0.1539	357.6	1.690	0.1425	357.4	1.684	0.1326	357.2	1.678	-15
-10	0.1709	361.7	1.713	0.1573	361.5	1.706	0.1457	361.3	1.699	0.1356	361.1	1.693	-10
-5	0.1745	365.7	1.727	0.1607	365.5	1.720	0.1488	365.3	1.714	0.1385	365.1	1.708	-5
0	0.1781	369.7	1.742	0.1640	369.5	1.735	0.1519	369.3	1.729	0.1415	369.2	1.723	0
5	0.1817	373.7	1.757	0.1673	373.6	1.750	0.1550	373.4	1.744	0.1444	373.2	1.738	5
10	0.1852	377.8	1.771	0.1706	377.6	1.764	0.1581	377.5	1.758	0.1473	377.3	1.752	10
15	0.1888	381.9	1.786	0.1739	381.7	1.779	0.1612	381.6	1.772	0.1502	381.4	1.767	15
20	0.1923	386.0	1.800	0.1772	385.9	1.793	0.1642	385.7	1.787	0.1530	385.6	1.781	20
25	0.1958	390.2	1.814	0.1805	390.0	1.807	0.1673	389.9	1.801	0.1559	389.8	1.795	25
30	0.1993	394.4	1.828	0.1837	394.3	1.821	0.1703	394.1	1.815	0.1587	394.0	1.809	30
35	0.2028	398.6	1.842	0.1869	398.5	1.835	0.1733	398.4	1.829	0.1615	398.3	1.823	35
40	0.2063	402.9	1.856	0.1902	402.8	1.849	0.1763	402.7	1.843	0.1644	402.5	1.837	40
45	0.2098	407.2	1.869	0.1934	407.1	1.863	0.1794	407.0	1.856	0.1672	406.9	1.851	45
50	0.2133	411.6	1.883	0.1966	411.5	1.876	0.1823	411.3	1.870	0.1700	411.2	1.864	50
55	0.2167	416.0	1.896	0.1998	415.9	1.890	0.1853	415.7	1.883	0.1728	415.6	1.878	55
60	0.2202	420.4	1.910	0.2030	420.3	1.903	0.1883	420.2	1.897	0.1756	420.1	1.891	60
65	0.2236	424.8	1.923	0.2062	424.7	1.916	0.1913	424.7	1.910	0.1784	424.6	1.904	65
70	0.2271	429.3	1.936	0.2094	429.3	1.930	0.1943	429.2	1.923	0.1811	429.1	1.918	70
75	0.2305	433.9	1.949	0.2126	433.8	1.943	0.1972	433.7	1.937	0.1839	433.6	1.931	75
80	0.2340	438.5	1.962	0.2158	438.4	1.956	0.2002	438.3	1.950	0.1867	438.2	1.944	80
85	0.2374	443.1	1.975	0.2189	443.0	1.969	0.2031	442.9	1.963	0.1894	442.8	1.957	85
90	0.2408	447.7	1.988	0.2221	447.6	1.982	0.2061	447.5	1.975	0.1922	447.5	1.970	90
95	0.2442	452.4	2.001	0.2253	452.3	1.994	0.2090	452.2	1.988	0.1950	452.2	1.983	95
100	0.2477	457.1	2.014	0.2285	457.0	2.007	0.2120	457.0	2.001	0.1977	456.9	1.995	100
105	0.2511	461.9	2.026	0.2316	461.8	2.020	0.2149	461.7	2.014	0.2005	461.6	2.008	105
110	0.2545	466.6	2.039	0.2348	466.6	2.032	0.2179	466.5	2.026	0.2032	466.4	2.021	110

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/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
	-33.25 °C			-31.85 °C			-30.52 °C			-29.24 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1134	342.6	1.614	0.1071	343.4	1.613	0.1014	344.1	1.612	0.0964	344.9	1.611	
-30	0.1153	345.1	1.625	0.1081	344.8	1.619	0.1017	344.5	1.613				-30
-25	0.1182	349.0	1.641	0.1109	348.8	1.635	0.1044	348.5	1.630	0.0985	348.3	1.624	-25
-20	0.1211	353.0	1.656	0.1136	352.7	1.651	0.1070	352.5	1.645	0.1010	352.3	1.640	-20
-15	0.1240	356.9	1.672	0.1163	356.7	1.666	0.1095	356.5	1.661	0.1035	356.3	1.656	-15
-10	0.1268	360.9	1.687	0.1190	360.7	1.682	0.1121	360.5	1.676	0.1059	360.3	1.672	-10
-5	0.1296	364.9	1.702	0.1216	364.7	1.697	0.1146	364.6	1.692	0.1083	364.4	1.687	-5
0	0.1323	369.0	1.717	0.1243	368.8	1.712	0.1171	368.6	1.707	0.1106	368.4	1.702	0
5	0.1351	373.0	1.732	0.1268	372.9	1.727	0.1195	372.7	1.722	0.1130	372.5	1.717	5
10	0.1378	377.1	1.746	0.1294	377.0	1.741	0.1220	376.8	1.736	0.1153	376.7	1.731	10
15	0.1405	381.3	1.761	0.1320	381.1	1.756	0.1244	381.0	1.751	0.1177	380.8	1.746	15
20	0.1432	385.4	1.775	0.1345	385.3	1.770	0.1268	385.1	1.765	0.1200	385.0	1.760	20
25	0.1459	389.6	1.789	0.1371	389.5	1.784	0.1293	389.4	1.779	0.1222	389.2	1.775	25
30	0.1486	393.9	1.804	0.1396	393.7	1.798	0.1316	393.6	1.793	0.1245	393.5	1.789	30
35	0.1512	398.1	1.817	0.1421	398.0	1.812	0.1340	397.9	1.807	0.1268	397.7	1.803	35
40	0.1539	402.4	1.831	0.1446	402.3	1.826	0.1364	402.2	1.821	0.1291	402.1	1.817	40
45	0.1565	406.8	1.845	0.1471	406.6	1.840	0.1388	406.5	1.835	0.1313	406.4	1.830	45
50	0.1592	411.1	1.859	0.1496	411.0	1.854	0.1411	410.9	1.849	0.1335	410.8	1.844	50
55	0.1618	415.5	1.872	0.1521	415.4	1.867	0.1435	415.3	1.862	0.1358	415.2	1.858	55
60	0.1644	420.0	1.886	0.1546	419.9	1.881	0.1458	419.8	1.876	0.1380	419.7	1.871	60
65	0.1670	424.5	1.899	0.1570	424.4	1.894	0.1482	424.3	1.889	0.1402	424.2	1.885	65
70	0.1696	429.0	1.912	0.1595	428.9	1.907	0.1505	428.8	1.902	0.1424	428.7	1.898	70
75	0.1723	433.5	1.925	0.1620	433.4	1.920	0.1528	433.3	1.916	0.1447	433.2	1.911	75
80	0.1749	438.1	1.938	0.1644	438.0	1.933	0.1552	437.9	1.929	0.1469	437.8	1.924	80
85	0.1775	442.7	1.951	0.1669	442.6	1.946	0.1575	442.6	1.942	0.1491	442.5	1.937	85
90	0.1800	447.4	1.964	0.1693	447.3	1.959	0.1598	447.2	1.955	0.1513	447.1	1.950	90
95	0.1826	452.1	1.977	0.1718	452.0	1.972	0.1621	451.9	1.967	0.1534	451.8	1.963	95
100	0.1852	456.8	1.990	0.1742	456.7	1.985	0.1644	456.7	1.980	0.1556	456.6	1.976	100
105	0.1878	461.6	2.003	0.1766	461.5	1.998	0.1667	461.4	1.993	0.1578	461.3	1.988	105
110	0.1904	466.4	2.015	0.1791	466.3	2.010	0.1690	466.2	2.006	0.1600	466.1	2.001	110
115	0.1930	471.2	2.028	0.1815	471.1	2.023	0.1713	471.1	2.018	0.1622	471.0	2.014	115

ABSOLUTE PRESSURE, kPa													
Temp °C	200			210			220			230			Temp °C
	-28.01 °C			-26.83 °C			-25.69 °C			-24.60 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0918	345.6	1.610	0.0876	346.3	1.609	0.0838	346.9	1.608	0.0803	347.5	1.607	
-25	0.0932	348.0	1.620	0.0885	347.7	1.615	0.0841	347.5	1.610				-25
-20	0.0956	352.0	1.636	0.0908	351.8	1.631	0.0863	351.5	1.626	0.0823	351.3	1.622	-20
-15	0.0980	356.1	1.651	0.0930	355.8	1.647	0.0885	355.6	1.642	0.0844	355.4	1.638	-15
-10	0.1003	360.1	1.667	0.0953	359.9	1.662	0.0907	359.7	1.658	0.0865	359.5	1.654	-10
-5	0.1026	364.2	1.682	0.0975	364.0	1.678	0.0928	363.8	1.673	0.0885	363.6	1.669	-5
0	0.1049	368.2	1.697	0.0996	368.1	1.693	0.0949	367.9	1.689	0.0905	367.7	1.684	0
5	0.1071	372.4	1.712	0.1018	372.2	1.708	0.0969	372.0	1.704	0.0925	371.8	1.700	5
10	0.1093	376.5	1.727	0.1039	376.3	1.723	0.0990	376.2	1.718	0.0945	376.0	1.714	10
15	0.1116	380.7	1.741	0.1060	380.5	1.737	0.1010	380.3	1.733	0.0964	380.2	1.729	15
20	0.1138	384.8	1.756	0.1081	384.7	1.752	0.1030	384.6	1.747	0.0984	384.4	1.744	20
25	0.1159	389.1	1.770	0.1102	388.9	1.766	0.1050	388.8	1.762	0.1003	388.6	1.758	25
30	0.1181	393.3	1.784	0.1123	393.2	1.780	0.1070	393.1	1.776	0.1022	392.9	1.772	30
35	0.1203	397.6	1.798	0.1144	397.5	1.794	0.1090	397.4	1.790	0.1041	397.2	1.786	35
40	0.1224	401.9	1.812	0.1164	401.8	1.808	0.1110	401.7	1.804	0.1060	401.6	1.800	40
45	0.1246	406.3	1.826	0.1185	406.2	1.822	0.1129	406.1	1.818	0.1079	405.9	1.814	45
50	0.1267	410.7	1.840	0.1205	410.6	1.836	0.1149	410.5	1.832	0.1098	410.4	1.828	50
55	0.1288	415.1	1.853	0.1226	415.0	1.849	0.1169	414.9	1.845	0.1116	414.8	1.841	55
60	0.1310	419.6	1.867	0.1246	419.5	1.863	0.1188	419.4	1.859	0.1135	419.3	1.855	60
65	0.1331	424.1	1.880	0.1266	424.0	1.876	0.1207	423.9	1.872	0.1154	423.8	1.868	65
70	0.1352	428.6	1.894	0.1286	428.5	1.889	0.1227	428.4	1.885	0.1172	428.3	1.882	70
75	0.1373	433.2	1.907	0.1306	433.1	1.903	0.1246	433.0	1.899	0.1190	432.9	1.895	75
80	0.1394	437.8	1.920	0.1326	437.7	1.916	0.1265	437.6	1.912	0.1209	437.5	1.908	80
85	0.1415	442.4	1.933	0.1346	442.3	1.929	0.1284	442.2	1.925	0.1227	442.1	1.921	85
90	0.1436	447.1	1.946	0.1366	447.0	1.942	0.1303	446.9	1.938	0.1246	446.8	1.934	90
95	0.1457	451.8	1.959	0.1386	451.7	1.955	0.1322	451.6	1.951	0.1264	451.5	1.947	95
100	0.1477	456.5	1.971	0.1406	456.4	1.967	0.1341	456.3	1.964	0.1282	456.3	1.960	100
105	0.1498	461.3	1.984	0.1426	461.2	1.980	0.1360	461.1	1.976	0.1300	461.0	1.973	105
110	0.1519	466.1	1.997	0.1446	466.0	1.993	0.1379	465.9	1.989	0.1318	465.9	1.985	110
115	0.1540	470.9	2.009	0.1466	470.8	2.005	0.1398	470.8	2.001	0.1336	470.7	1.998	115
120	0.1561	475.8	2.022	0.1485	475.7	2.018	0.1417	475.7	2.014	0.1355	475.6	2.010	120

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/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
	-23.53 °C			-22.51 °C			-21.51 °C			-20.54 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0771	348.1	1.606	0.0742	348.7	1.606	0.0715	349.3	1.605	0.0689	349.8	1.604	
-20	0.0786	351.0	1.618	0.0752	350.8	1.614	0.0720	350.5	1.610	0.0691	350.3	1.606	-20
-15	0.0806	355.1	1.634	0.0772	354.9	1.630	0.0740	354.7	1.626	0.0710	354.4	1.623	-15
-10	0.0826	359.2	1.650	0.0791	359.0	1.646	0.0758	358.8	1.642	0.0728	358.6	1.638	-10
-5	0.0846	363.4	1.665	0.0810	363.2	1.661	0.0777	363.0	1.658	0.0746	362.8	1.654	-5
0	0.0865	367.5	1.681	0.0829	367.3	1.677	0.0795	367.1	1.673	0.0763	366.9	1.670	0
5	0.0885	371.6	1.696	0.0847	371.5	1.692	0.0813	371.3	1.688	0.0781	371.1	1.685	5
10	0.0904	375.8	1.711	0.0866	375.7	1.707	0.0830	375.5	1.703	0.0798	375.3	1.700	10
15	0.0922	380.0	1.725	0.0884	379.9	1.722	0.0848	379.7	1.718	0.0815	379.5	1.715	15
20	0.0941	384.3	1.740	0.0902	384.1	1.736	0.0865	384.0	1.733	0.0832	383.8	1.729	20
25	0.0960	388.5	1.754	0.0920	388.4	1.751	0.0883	388.2	1.747	0.0849	388.1	1.744	25
30	0.0978	392.8	1.768	0.0937	392.7	1.765	0.0900	392.5	1.761	0.0865	392.4	1.758	30
35	0.0996	397.1	1.783	0.0955	397.0	1.779	0.0917	396.8	1.775	0.0882	396.7	1.772	35
40	0.1015	401.5	1.797	0.0973	401.3	1.793	0.0934	401.2	1.790	0.0898	401.1	1.786	40
45	0.1033	405.8	1.810	0.0990	405.7	1.807	0.0951	405.6	1.803	0.0914	405.5	1.800	45
50	0.1051	410.2	1.824	0.1007	410.1	1.821	0.0967	410.0	1.817	0.0930	409.9	1.814	50
55	0.1069	414.7	1.838	0.1025	414.6	1.834	0.0984	414.5	1.831	0.0947	414.4	1.828	55
60	0.1087	419.2	1.851	0.1042	419.1	1.848	0.1001	419.0	1.844	0.0963	418.9	1.841	60
65	0.1104	423.7	1.865	0.1059	423.6	1.861	0.1017	423.5	1.858	0.0979	423.4	1.855	65
70	0.1122	428.2	1.878	0.1076	428.1	1.875	0.1034	428.0	1.871	0.0994	427.9	1.868	70
75	0.1140	432.8	1.891	0.1093	432.7	1.888	0.1050	432.6	1.885	0.1010	432.5	1.881	75
80	0.1157	437.4	1.904	0.1110	437.3	1.901	0.1067	437.2	1.898	0.1026	437.1	1.894	80
85	0.1175	442.1	1.918	0.1127	442.0	1.914	0.1083	441.9	1.911	0.1042	441.8	1.908	85
90	0.1193	446.7	1.931	0.1144	446.6	1.927	0.1099	446.6	1.924	0.1058	446.5	1.921	90
95	0.1210	451.4	1.943	0.1161	451.4	1.940	0.1115	451.3	1.937	0.1073	451.2	1.933	95
100	0.1228	456.2	1.956	0.1178	456.1	1.953	0.1132	456.0	1.950	0.1089	456.0	1.946	100
105	0.1245	461.0	1.969	0.1195	460.9	1.966	0.1148	460.8	1.962	0.1104	460.8	1.959	105
110	0.1263	465.8	1.982	0.1211	465.7	1.978	0.1164	465.6	1.975	0.1120	465.6	1.972	110
115	0.1280	470.6	1.994	0.1228	470.6	1.991	0.1180	470.5	1.987	0.1136	470.4	1.984	115
120	0.1297	475.5	2.007	0.1245	475.5	2.003	0.1196	475.4	2.000	0.1151	475.3	1.997	120
125	0.1315	480.4	2.019	0.1261	480.4	2.016	0.1212	480.3	2.012	0.1167	480.2	2.009	125

ABSOLUTE PRESSURE, kPa													
Temp °C	280			290			300			310			Temp °C
	-19.60 °C			-18.69 °C			-17.80 °C			-16.93 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0666	350.3	1.604	0.0644	350.9	1.603	0.0623	351.3	1.603	0.0604	351.8	1.602	
-15	0.0682	354.2	1.619	0.0656	354.0	1.615	0.0632	353.7	1.612	0.0610	353.5	1.609	-15
-10	0.0700	358.4	1.635	0.0674	358.1	1.631	0.0649	357.9	1.628	0.0626	357.7	1.625	-10
-5	0.0717	362.5	1.651	0.0691	362.3	1.647	0.0666	362.1	1.644	0.0642	361.9	1.641	-5
0	0.0734	366.7	1.666	0.0707	366.5	1.663	0.0682	366.3	1.660	0.0658	366.1	1.656	0
5	0.0751	370.9	1.681	0.0724	370.8	1.678	0.0698	370.6	1.675	0.0674	370.4	1.672	5
10	0.0768	375.1	1.696	0.0740	375.0	1.693	0.0714	374.8	1.690	0.0689	374.6	1.687	10
15	0.0784	379.4	1.711	0.0756	379.2	1.708	0.0729	379.1	1.705	0.0704	378.9	1.702	15
20	0.0801	383.6	1.726	0.0772	383.5	1.723	0.0744	383.3	1.720	0.0719	383.2	1.717	20
25	0.0817	387.9	1.740	0.0787	387.8	1.737	0.0760	387.6	1.734	0.0734	387.5	1.731	25
30	0.0833	392.2	1.755	0.0803	392.1	1.752	0.0775	392.0	1.749	0.0749	391.8	1.746	30
35	0.0849	396.6	1.769	0.0818	396.5	1.766	0.0790	396.3	1.763	0.0763	396.2	1.760	35
40	0.0865	401.0	1.783	0.0834	400.8	1.780	0.0805	400.7	1.777	0.0778	400.6	1.774	40
45	0.0880	405.4	1.797	0.0849	405.2	1.794	0.0819	405.1	1.791	0.0792	405.0	1.788	45
50	0.0896	409.8	1.811	0.0864	409.7	1.808	0.0834	409.6	1.805	0.0806	409.4	1.802	50
55	0.0912	414.3	1.824	0.0879	414.1	1.821	0.0849	414.0	1.818	0.0820	413.9	1.816	55
60	0.0927	418.7	1.838	0.0894	418.6	1.835	0.0863	418.5	1.832	0.0835	418.4	1.829	60
65	0.0943	423.3	1.852	0.0909	423.2	1.848	0.0878	423.1	1.846	0.0849	423.0	1.843	65
70	0.0958	427.8	1.865	0.0924	427.7	1.862	0.0892	427.6	1.859	0.0863	427.5	1.856	70
75	0.0973	432.4	1.878	0.0939	432.3	1.875	0.0907	432.2	1.872	0.0877	432.1	1.869	75
80	0.0989	437.1	1.891	0.0954	437.0	1.888	0.0921	436.9	1.885	0.0890	436.8	1.883	80
85	0.1004	441.7	1.904	0.0968	441.6	1.901	0.0935	441.5	1.899	0.0904	441.5	1.896	85
90	0.1019	446.4	1.917	0.0983	446.3	1.915	0.0950	446.2	1.912	0.0918	446.2	1.909	90
95	0.1034	451.1	1.930	0.0998	451.0	1.927	0.0964	451.0	1.925	0.0932	450.9	1.922	95
100	0.1049	455.9	1.943	0.1012	455.8	1.940	0.0978	455.7	1.937	0.0946	455.7	1.935	100
105	0.1064	460.7	1.956	0.1027	460.6	1.953	0.0992	460.5	1.950	0.0959	460.5	1.947	105
110	0.1079	465.5	1.969	0.1041	465.4	1.966	0.1006	465.4	1.963	0.0973	465.3	1.960	110
115	0.1094	470.3	1.981	0.1056	470.3	1.978	0.1020	470.2	1.975	0.0987	470.2	1.973	115
120	0.1109	475.3	1.994	0.1070	475.2	1.991	0.1034	475.1	1.988	0.1000	475.0	1.985	120
125	0.1124	480.2	2.006	0.1085	480.1	2.003	0.1048	480.0	2.000	0.1014	480.0	1.998	125
130	0.1139	485.1	2.019	0.1099	485.1	2.016	0.1062	485.0	2.013	0.1027	484.9	2.010	130

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/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
	-16.08 °C			-15.26 °C			-14.45 °C			-13.66 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0585	352.3	1.602	0.0568	352.7	1.601	0.0552	353.2	1.601	0.0537	353.6	1.600	
-15	0.0589	353.2	1.605	0.0569	353.0	1.602							-15
-10	0.0605	357.5	1.622	0.0585	357.2	1.618	0.0566	357.0	1.615	0.0548	356.8	1.612	-10
-5	0.0621	361.7	1.638	0.0600	361.5	1.635	0.0581	361.3	1.632	0.0562	361.1	1.629	-5
0	0.0636	366.0	1.653	0.0615	365.8	1.650	0.0595	365.6	1.647	0.0577	365.4	1.644	0
5	0.0651	370.2	1.669	0.0630	370.0	1.666	0.0610	369.8	1.663	0.0591	369.6	1.660	5
10	0.0666	374.5	1.684	0.0644	374.3	1.681	0.0624	374.1	1.678	0.0605	373.9	1.675	10
15	0.0681	378.7	1.699	0.0659	378.6	1.696	0.0638	378.4	1.693	0.0618	378.2	1.690	15
20	0.0695	383.0	1.714	0.0673	382.9	1.711	0.0652	382.7	1.708	0.0632	382.6	1.705	20
25	0.0710	387.4	1.728	0.0687	387.2	1.725	0.0666	387.1	1.723	0.0645	386.9	1.720	25
30	0.0724	391.7	1.743	0.0701	391.6	1.740	0.0679	391.4	1.737	0.0659	391.3	1.734	30
35	0.0738	396.1	1.757	0.0715	395.9	1.754	0.0693	395.8	1.751	0.0672	395.7	1.749	35
40	0.0752	400.5	1.771	0.0728	400.3	1.768	0.0706	400.2	1.766	0.0685	400.1	1.763	40
45	0.0766	404.9	1.785	0.0742	404.8	1.782	0.0719	404.6	1.780	0.0698	404.5	1.777	45
50	0.0780	409.3	1.799	0.0755	409.2	1.796	0.0732	409.1	1.794	0.0710	409.0	1.791	50
55	0.0794	413.8	1.813	0.0769	413.7	1.810	0.0745	413.6	1.807	0.0723	413.5	1.805	55
60	0.0808	418.3	1.826	0.0782	418.2	1.824	0.0758	418.1	1.821	0.0736	418.0	1.819	60
65	0.0821	422.9	1.840	0.0795	422.8	1.837	0.0771	422.7	1.835	0.0748	422.6	1.832	65
70	0.0835	427.4	1.853	0.0809	427.4	1.851	0.0784	427.3	1.848	0.0761	427.2	1.846	70
75	0.0848	432.1	1.867	0.0822	432.0	1.864	0.0797	431.9	1.861	0.0773	431.8	1.859	75
80	0.0862	436.7	1.880	0.0835	436.6	1.877	0.0810	436.5	1.875	0.0786	436.4	1.872	80
85	0.0875	441.4	1.893	0.0848	441.3	1.890	0.0822	441.2	1.888	0.0798	441.1	1.885	85
90	0.0889	446.1	1.906	0.0861	446.0	1.903	0.0835	445.9	1.901	0.0811	445.8	1.898	90
95	0.0902	450.8	1.919	0.0874	450.7	1.916	0.0848	450.6	1.914	0.0823	450.6	1.911	95
100	0.0915	455.6	1.932	0.0887	455.5	1.929	0.0860	455.4	1.927	0.0835	455.3	1.924	100
105	0.0929	460.4	1.945	0.0900	460.3	1.942	0.0873	460.2	1.940	0.0847	460.2	1.937	105
110	0.0942	465.2	1.957	0.0913	465.1	1.955	0.0885	465.1	1.952	0.0859	465.0	1.950	110
115	0.0955	470.1	1.970	0.0926	470.0	1.967	0.0898	469.9	1.965	0.0872	469.9	1.962	115
120	0.0968	475.0	1.983	0.0938	474.9	1.980	0.0910	474.8	1.977	0.0884	474.8	1.975	120
125	0.0982	479.9	1.995	0.0951	479.8	1.992	0.0923	479.8	1.990	0.0896	479.7	1.987	125
130	0.0995	484.9	2.007	0.0964	484.8	2.005	0.0935	484.7	2.002	0.0908	484.7	2.000	130

ABSOLUTE PRESSURE, kPa													
Temp °C	360			370			380			390			Temp °C
	-12.89 °C			-12.13 °C			-11.39 °C			-10.66 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0522	354.0	1.600	0.0509	354.5	1.600	0.0496	354.9	1.599	0.0483	355.2	1.599	
-10	0.0531	356.5	1.609	0.0515	356.3	1.607	0.0500	356.1	1.604	0.0485	355.8	1.601	-10
-5	0.0545	360.9	1.626	0.0529	360.6	1.623	0.0513	360.4	1.620	0.0499	360.2	1.617	-5
0	0.0559	365.2	1.642	0.0543	365.0	1.639	0.0527	364.7	1.636	0.0512	364.5	1.633	0
5	0.0573	369.5	1.657	0.0556	369.3	1.654	0.0540	369.1	1.652	0.0525	368.9	1.649	5
10	0.0587	373.8	1.673	0.0570	373.6	1.670	0.0553	373.4	1.667	0.0538	373.2	1.665	10
15	0.0600	378.1	1.688	0.0583	377.9	1.685	0.0566	377.7	1.682	0.0550	377.6	1.680	15
20	0.0613	382.4	1.703	0.0596	382.3	1.700	0.0579	382.1	1.697	0.0563	381.9	1.695	20
25	0.0626	386.8	1.717	0.0608	386.6	1.715	0.0591	386.5	1.712	0.0575	386.3	1.710	25
30	0.0639	391.1	1.732	0.0621	391.0	1.729	0.0604	390.9	1.727	0.0587	390.7	1.724	30
35	0.0652	395.5	1.746	0.0633	395.4	1.744	0.0616	395.3	1.741	0.0599	395.1	1.739	35
40	0.0665	400.0	1.760	0.0646	399.8	1.758	0.0628	399.7	1.756	0.0611	399.6	1.753	40
45	0.0677	404.4	1.775	0.0658	404.3	1.772	0.0640	404.2	1.770	0.0623	404.0	1.767	45
50	0.0690	408.9	1.788	0.0670	408.8	1.786	0.0652	408.6	1.784	0.0634	408.5	1.781	50
55	0.0702	413.4	1.802	0.0682	413.3	1.800	0.0664	413.2	1.797	0.0646	413.0	1.795	55
60	0.0715	417.9	1.816	0.0694	417.8	1.814	0.0675	417.7	1.811	0.0657	417.6	1.809	60
65	0.0727	422.5	1.830	0.0706	422.4	1.827	0.0687	422.3	1.825	0.0669	422.2	1.823	65
70	0.0739	427.1	1.843	0.0718	427.0	1.841	0.0699	426.9	1.838	0.0680	426.8	1.836	70
75	0.0751	431.7	1.856	0.0730	431.6	1.854	0.0710	431.5	1.852	0.0691	431.4	1.849	75
80	0.0763	436.3	1.870	0.0742	436.2	1.867	0.0722	436.2	1.865	0.0703	436.1	1.863	80
85	0.0775	441.0	1.883	0.0754	440.9	1.881	0.0733	440.8	1.878	0.0714	440.8	1.876	85
90	0.0787	445.7	1.896	0.0765	445.7	1.894	0.0745	445.6	1.891	0.0725	445.5	1.889	90
95	0.0799	450.5	1.909	0.0777	450.4	1.907	0.0756	450.3	1.904	0.0736	450.2	1.902	95
100	0.0811	455.3	1.922	0.0789	455.2	1.920	0.0767	455.1	1.917	0.0747	455.0	1.915	100
105	0.0823	460.1	1.935	0.0800	460.0	1.932	0.0779	459.9	1.930	0.0758	459.9	1.928	105
110	0.0835	464.9	1.947	0.0812	464.9	1.945	0.0790	464.8	1.943	0.0769	464.7	1.941	110
115	0.0847	469.8	1.960	0.0823	469.7	1.958	0.0801	469.7	1.955	0.0780	469.6	1.953	115
120	0.0859	474.7	1.973	0.0835	474.6	1.970	0.0813	474.6	1.968	0.0791	474.5	1.966	120
125	0.0870	479.6	1.985	0.0846	479.6	1.983	0.0824	479.5	1.981	0.0802	479.4	1.978	125
130	0.0882	484.6	1.998	0.0858	484.6	1.995	0.0835	484.5	1.993	0.0813	484.4	1.991	130
135	0.0894	489.6	2.010	0.0869	489.6	2.008	0.0846	489.5	2.005	0.0824	489.4	2.003	135

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/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
	-9.95 °C			-8.23 °C			-6.58 °C			-5.01 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0472	355.6	1.598	0.0444	356.5	1.598	0.0420	357.4	1.597	0.0399	358.2	1.596	
-5	0.0485	360.0	1.615	0.0453	359.4	1.608	0.0424	358.8	1.602	0.0399	358.2	1.596	-5
0	0.0498	364.3	1.631	0.0465	363.8	1.625	0.0436	363.3	1.619	0.0410	362.7	1.613	0
5	0.0511	368.7	1.647	0.0477	368.2	1.641	0.0448	367.7	1.635	0.0422	367.2	1.629	5
10	0.0523	373.0	1.662	0.0489	372.6	1.656	0.0459	372.1	1.650	0.0433	371.7	1.645	10
15	0.0535	377.4	1.677	0.0501	377.0	1.672	0.0471	376.6	1.666	0.0443	376.1	1.660	15
20	0.0548	381.8	1.693	0.0513	381.4	1.687	0.0482	381.0	1.681	0.0454	380.6	1.676	20
25	0.0560	386.2	1.707	0.0524	385.8	1.702	0.0493	385.4	1.696	0.0465	385.0	1.691	25
30	0.0571	390.6	1.722	0.0535	390.2	1.716	0.0504	389.9	1.711	0.0475	389.5	1.706	30
35	0.0583	395.0	1.736	0.0547	394.7	1.731	0.0514	394.3	1.725	0.0485	394.0	1.720	35
40	0.0595	399.4	1.751	0.0558	399.1	1.745	0.0525	398.8	1.740	0.0495	398.5	1.735	40
45	0.0606	403.9	1.765	0.0569	403.6	1.759	0.0535	403.3	1.754	0.0505	403.0	1.749	45
50	0.0618	408.4	1.779	0.0579	408.1	1.773	0.0545	407.8	1.768	0.0515	407.5	1.763	50
55	0.0629	412.9	1.793	0.0590	412.7	1.787	0.0556	412.4	1.782	0.0525	412.1	1.777	55
60	0.0640	417.5	1.807	0.0601	417.2	1.801	0.0566	417.0	1.796	0.0534	416.7	1.791	60
65	0.0651	422.1	1.820	0.0611	421.8	1.815	0.0576	421.6	1.810	0.0544	421.3	1.805	65
70	0.0662	426.7	1.834	0.0622	426.4	1.828	0.0586	426.2	1.823	0.0553	425.9	1.818	70
75	0.0673	431.3	1.847	0.0632	431.1	1.842	0.0596	430.8	1.837	0.0563	430.6	1.832	75
80	0.0684	436.0	1.861	0.0643	435.7	1.855	0.0606	435.5	1.850	0.0572	435.3	1.845	80
85	0.0695	440.7	1.874	0.0653	440.5	1.868	0.0615	440.2	1.863	0.0582	440.0	1.859	85
90	0.0706	445.4	1.887	0.0663	445.2	1.882	0.0625	445.0	1.877	0.0591	444.8	1.872	90
95	0.0717	450.2	1.900	0.0674	450.0	1.895	0.0635	449.8	1.890	0.0600	449.6	1.885	95
100	0.0728	455.0	1.913	0.0684	454.8	1.908	0.0645	454.6	1.903	0.0610	454.4	1.898	100
105	0.0739	459.8	1.926	0.0694	459.6	1.920	0.0654	459.4	1.915	0.0619	459.2	1.911	105
110	0.0750	464.6	1.938	0.0704	464.4	1.933	0.0664	464.3	1.928	0.0628	464.1	1.924	110
115	0.0760	469.5	1.951	0.0714	469.3	1.946	0.0674	469.2	1.941	0.0637	469.0	1.936	115
120	0.0771	474.4	1.964	0.0724	474.3	1.958	0.0683	474.1	1.954	0.0646	473.9	1.949	120
125	0.0782	479.4	1.976	0.0735	479.2	1.971	0.0693	479.1	1.966	0.0655	478.9	1.961	125
130	0.0792	484.4	1.989	0.0745	484.2	1.983	0.0702	484.0	1.979	0.0664	483.9	1.974	130
135	0.0803	489.4	2.001	0.0755	489.2	1.996	0.0712	489.1	1.991	0.0673	488.9	1.986	135
140	0.0813	494.4	2.013	0.0765	494.3	2.008	0.0721	494.1	2.003	0.0682	494.0	1.999	140

ABSOLUTE PRESSURE, kPa													
Temp °C	500			525			550			575			Temp °C
	-3.49 °C			-2.03 °C			-0.63 °C			0.73 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0379	359.0	1.595	0.0361	359.8	1.595	0.0345	360.5	1.594	0.0330	361.2	1.594	
0	0.0387	362.2	1.607	0.0366	361.6	1.602	0.0346	361.1	1.596				0
5	0.0398	366.7	1.623	0.0376	366.2	1.618	0.0357	365.7	1.613	0.0339	365.1	1.608	5
10	0.0408	371.2	1.639	0.0387	370.7	1.634	0.0367	370.2	1.629	0.0348	369.8	1.624	10
15	0.0419	375.7	1.655	0.0397	375.2	1.650	0.0376	374.8	1.645	0.0358	374.3	1.640	15
20	0.0429	380.2	1.670	0.0407	379.7	1.665	0.0386	379.3	1.661	0.0367	378.9	1.656	20
25	0.0439	384.6	1.686	0.0416	384.2	1.681	0.0395	383.9	1.676	0.0376	383.5	1.671	25
30	0.0449	389.1	1.701	0.0426	388.8	1.696	0.0405	388.4	1.691	0.0385	388.0	1.687	30
35	0.0459	393.6	1.715	0.0435	393.3	1.711	0.0414	392.9	1.706	0.0394	392.6	1.702	35
40	0.0469	398.1	1.730	0.0444	397.8	1.725	0.0423	397.5	1.721	0.0403	397.1	1.716	40
45	0.0478	402.7	1.744	0.0454	402.4	1.740	0.0431	402.0	1.735	0.0411	401.7	1.731	45
50	0.0488	407.2	1.758	0.0463	406.9	1.754	0.0440	406.6	1.749	0.0420	406.3	1.745	50
55	0.0497	411.8	1.772	0.0472	411.5	1.768	0.0449	411.2	1.764	0.0428	411.0	1.759	55
60	0.0506	416.4	1.786	0.0481	416.1	1.782	0.0457	415.9	1.777	0.0436	415.6	1.773	60
65	0.0515	421.0	1.800	0.0489	420.8	1.796	0.0466	420.5	1.791	0.0444	420.2	1.787	65
70	0.0524	425.7	1.814	0.0498	425.4	1.809	0.0474	425.2	1.805	0.0452	424.9	1.801	70
75	0.0533	430.4	1.827	0.0507	430.1	1.823	0.0483	429.9	1.819	0.0460	429.6	1.815	75
80	0.0542	435.1	1.841	0.0515	434.8	1.836	0.0491	434.6	1.832	0.0468	434.4	1.828	80
85	0.0551	439.8	1.854	0.0524	439.6	1.850	0.0499	439.4	1.845	0.0476	439.1	1.841	85
90	0.0560	444.6	1.867	0.0533	444.3	1.863	0.0507	444.1	1.859	0.0484	443.9	1.855	90
95	0.0569	449.3	1.880	0.0541	449.1	1.876	0.0515	448.9	1.872	0.0492	448.7	1.868	95
100	0.0578	454.2	1.893	0.0549	454.0	1.889	0.0524	453.8	1.885	0.0500	453.6	1.881	100
105	0.0587	459.0	1.906	0.0558	458.8	1.902	0.0532	458.6	1.898	0.0508	458.4	1.894	105
110	0.0596	463.9	1.919	0.0566	463.7	1.915	0.0540	463.5	1.911	0.0515	463.3	1.907	110
115	0.0604	468.8	1.932	0.0575	468.6	1.928	0.0548	468.4	1.923	0.0523	468.3	1.920	115
120	0.0613	473.7	1.944	0.0583	473.6	1.940	0.0556	473.4	1.936	0.0531	473.2	1.932	120
125	0.0622	478.7	1.957	0.0591	478.5	1.953	0.0563	478.4	1.949	0.0538	478.2	1.945	125
130	0.0630	483.7	1.969	0.0599	483.6	1.965	0.0571	483.4	1.961	0.0546	483.2	1.957	130
135	0.0639	488.7	1.982	0.0608	488.6	1.978	0.0579	488.4	1.974	0.0553	488.3	1.970	135
140	0.0647	493.8	1.994	0.0616	493.7	1.990	0.0587	493.5	1.986	0.0561	493.3	1.982	140
145	0.0656	498.9	2.006	0.0624	498.7	2.002	0.0595	498.6	1.998	0.0568	498.5	1.994	145

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/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
	2.05 °C			3.32 °C			4.56 °C			5.76 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0316	361.8	1.593	0.0304	362.5	1.592	0.0292	363.1	1.592	0.0281	363.7	1.591	
5	0.0322	364.6	1.603	0.0307	364.1	1.598	0.0293	363.5	1.593				5
10	0.0332	369.3	1.620	0.0316	368.8	1.615	0.0302	368.2	1.610	0.0289	367.7	1.606	10
15	0.0341	373.9	1.636	0.0325	373.4	1.631	0.0311	372.9	1.627	0.0297	372.4	1.622	15
20	0.0350	378.5	1.651	0.0334	378.0	1.647	0.0319	377.6	1.643	0.0306	377.1	1.639	20
25	0.0359	383.0	1.667	0.0343	382.6	1.663	0.0328	382.2	1.658	0.0314	381.8	1.654	25
30	0.0367	387.6	1.682	0.0351	387.2	1.678	0.0336	386.9	1.674	0.0322	386.5	1.670	30
35	0.0376	392.2	1.697	0.0359	391.9	1.693	0.0344	391.5	1.689	0.0330	391.1	1.685	35
40	0.0384	396.8	1.712	0.0367	396.5	1.708	0.0352	396.1	1.704	0.0337	395.8	1.700	40
45	0.0393	401.4	1.727	0.0375	401.1	1.723	0.0360	400.8	1.719	0.0345	400.4	1.715	45
50	0.0401	406.0	1.741	0.0383	405.7	1.737	0.0367	405.4	1.733	0.0352	405.1	1.729	50
55	0.0409	410.7	1.755	0.0391	410.4	1.751	0.0375	410.1	1.747	0.0360	409.8	1.744	55
60	0.0417	415.3	1.769	0.0399	415.0	1.765	0.0382	414.8	1.762	0.0367	414.5	1.758	60
65	0.0425	420.0	1.783	0.0406	419.7	1.779	0.0390	419.5	1.776	0.0374	419.2	1.772	65
70	0.0432	424.7	1.797	0.0414	424.4	1.793	0.0397	424.2	1.789	0.0381	423.9	1.786	70
75	0.0440	429.4	1.811	0.0421	429.2	1.807	0.0404	428.9	1.803	0.0388	428.7	1.800	75
80	0.0448	434.1	1.824	0.0429	433.9	1.820	0.0411	433.7	1.817	0.0395	433.4	1.813	80
85	0.0455	438.9	1.838	0.0436	438.7	1.834	0.0418	438.5	1.830	0.0402	438.2	1.827	85
90	0.0463	443.7	1.851	0.0444	443.5	1.847	0.0426	443.3	1.844	0.0409	443.1	1.840	90
95	0.0471	448.5	1.864	0.0451	448.3	1.860	0.0433	448.1	1.857	0.0416	447.9	1.853	95
100	0.0478	453.4	1.877	0.0458	453.2	1.873	0.0440	453.0	1.870	0.0422	452.8	1.866	100
105	0.0486	458.3	1.890	0.0465	458.1	1.886	0.0447	457.9	1.883	0.0429	457.7	1.880	105
110	0.0493	463.2	1.903	0.0472	463.0	1.899	0.0453	462.8	1.896	0.0436	462.6	1.892	110
115	0.0500	468.1	1.916	0.0480	467.9	1.912	0.0460	467.7	1.909	0.0443	467.5	1.905	115
120	0.0508	473.1	1.929	0.0487	472.9	1.925	0.0467	472.7	1.921	0.0449	472.5	1.918	120
125	0.0515	478.0	1.941	0.0494	477.9	1.938	0.0474	477.7	1.934	0.0456	477.5	1.931	125
130	0.0522	483.1	1.954	0.0501	482.9	1.950	0.0481	482.7	1.947	0.0462	482.6	1.943	130
135	0.0530	488.1	1.966	0.0508	488.0	1.963	0.0488	487.8	1.959	0.0469	487.6	1.956	135
140	0.0537	493.2	1.978	0.0515	493.0	1.975	0.0494	492.9	1.971	0.0475	492.7	1.968	140
145	0.0544	498.3	1.991	0.0522	498.2	1.987	0.0501	498.0	1.984	0.0482	497.9	1.981	145
150	0.0551	503.4	2.003	0.0529	503.3	1.999	0.0508	503.1	1.996	0.0488	503.0	1.993	150

ABSOLUTE PRESSURE, kPa													
Temp °C	700			725			750			775			Temp °C
	6.92 °C			8.06 °C			9.17 °C			10.24 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0271	364.2	1.591	0.0261	364.8	1.591	0.0253	365.3	1.590	0.0244	365.8	1.590	
10	0.0276	367.2	1.602	0.0265	366.6	1.597	0.0254	366.1	1.593				10
15	0.0285	372.0	1.618	0.0273	371.5	1.614	0.0262	371.0	1.610	0.0252	370.4	1.606	15
20	0.0293	376.7	1.634	0.0281	376.2	1.630	0.0270	375.8	1.627	0.0260	375.3	1.623	20
25	0.0301	381.4	1.650	0.0289	381.0	1.646	0.0278	380.5	1.643	0.0267	380.1	1.639	25
30	0.0309	386.1	1.666	0.0297	385.7	1.662	0.0285	385.3	1.658	0.0275	384.9	1.655	30
35	0.0316	390.8	1.681	0.0304	390.4	1.678	0.0293	390.0	1.674	0.0282	389.6	1.670	35
40	0.0324	395.4	1.696	0.0311	395.1	1.693	0.0300	394.7	1.689	0.0289	394.4	1.686	40
45	0.0331	400.1	1.711	0.0319	399.8	1.708	0.0307	399.4	1.704	0.0296	399.1	1.701	45
50	0.0339	404.8	1.726	0.0326	404.5	1.722	0.0314	404.2	1.719	0.0302	403.8	1.715	50
55	0.0346	409.5	1.740	0.0333	409.2	1.737	0.0320	408.9	1.733	0.0309	408.6	1.730	55
60	0.0353	414.2	1.754	0.0339	413.9	1.751	0.0327	413.6	1.748	0.0316	413.3	1.744	60
65	0.0360	418.9	1.768	0.0346	418.6	1.765	0.0334	418.4	1.762	0.0322	418.1	1.759	65
70	0.0367	423.7	1.782	0.0353	423.4	1.779	0.0340	423.1	1.776	0.0328	422.9	1.773	70
75	0.0373	428.4	1.796	0.0360	428.2	1.793	0.0347	427.9	1.790	0.0335	427.7	1.786	75
80	0.0380	433.2	1.810	0.0366	433.0	1.807	0.0353	432.7	1.803	0.0341	432.5	1.800	80
85	0.0387	438.0	1.823	0.0373	437.8	1.820	0.0359	437.5	1.817	0.0347	437.3	1.814	85
90	0.0393	442.8	1.837	0.0379	442.6	1.833	0.0366	442.4	1.830	0.0353	442.2	1.827	90
95	0.0400	447.7	1.850	0.0385	447.5	1.847	0.0372	447.3	1.844	0.0359	447.1	1.841	95
100	0.0407	452.6	1.863	0.0392	452.4	1.860	0.0378	452.2	1.857	0.0365	452.0	1.854	100
105	0.0413	457.5	1.876	0.0398	457.3	1.873	0.0384	457.1	1.870	0.0371	456.9	1.867	105
110	0.0420	462.4	1.889	0.0404	462.2	1.886	0.0390	462.0	1.883	0.0377	461.8	1.880	110
115	0.0426	467.4	1.902	0.0411	467.2	1.899	0.0396	467.0	1.896	0.0383	466.8	1.893	115
120	0.0432	472.4	1.915	0.0417	472.2	1.912	0.0402	472.0	1.909	0.0389	471.8	1.906	120
125	0.0439	477.4	1.927	0.0423	477.2	1.924	0.0408	477.0	1.921	0.0395	476.9	1.918	125
130	0.0445	482.4	1.940	0.0429	482.2	1.937	0.0414	482.1	1.934	0.0400	481.9	1.931	130
135	0.0452	487.5	1.953	0.0435	487.3	1.949	0.0420	487.2	1.946	0.0406	487.0	1.944	135
140	0.0458	492.6	1.965	0.0441	492.4	1.962	0.0426	492.3	1.959	0.0412	492.1	1.956	140
145	0.0464	497.7	1.977	0.0448	497.6	1.974	0.0432	497.4	1.971	0.0418	497.3	1.968	145
150	0.0470	502.9	1.990	0.0454	502.7	1.986	0.0438	502.6	1.984	0.0423	502.4	1.981	150
155	0.0477	508.0	2.002	0.0460	507.9	1.999	0.0444	507.8	1.996	0.0429	507.6	1.993	155

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/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
	11.30 °C			15.27 °C			18.93 °C			22.31 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0236	366.3	1.589	0.0209	368.0	1.588	0.0188	369.6	1.586	0.0170	370.9	1.585	
15	0.0242	369.9	1.602										15
20	0.0250	374.8	1.619	0.0216	372.8	1.604	0.0189	370.7	1.590				20
25	0.0258	379.6	1.635	0.0223	377.8	1.621	0.0196	375.9	1.608	0.0173	373.8	1.594	25
30	0.0265	384.5	1.651	0.0230	382.8	1.637	0.0202	381.0	1.624	0.0179	379.1	1.612	30
35	0.0272	389.2	1.667	0.0237	387.6	1.653	0.0209	386.0	1.641	0.0185	384.3	1.629	35
40	0.0279	394.0	1.682	0.0243	392.5	1.669	0.0215	391.0	1.657	0.0191	389.4	1.645	40
45	0.0285	398.8	1.697	0.0249	397.4	1.685	0.0221	395.9	1.673	0.0197	394.4	1.661	45
50	0.0292	403.5	1.712	0.0255	402.2	1.700	0.0226	400.8	1.688	0.0202	399.4	1.677	50
55	0.0298	408.3	1.727	0.0261	407.0	1.714	0.0232	405.8	1.703	0.0207	404.4	1.692	55
60	0.0305	413.0	1.741	0.0267	411.9	1.729	0.0237	410.7	1.718	0.0213	409.4	1.707	60
65	0.0311	417.8	1.755	0.0273	416.7	1.743	0.0243	415.6	1.732	0.0218	414.4	1.722	65
70	0.0317	422.6	1.769	0.0279	421.5	1.758	0.0248	420.5	1.747	0.0223	419.3	1.737	70
75	0.0323	427.4	1.783	0.0284	426.4	1.772	0.0253	425.4	1.761	0.0227	424.3	1.751	75
80	0.0329	432.2	1.797	0.0290	431.3	1.786	0.0258	430.3	1.775	0.0232	429.3	1.765	80
85	0.0335	437.1	1.811	0.0295	436.2	1.799	0.0263	435.2	1.789	0.0237	434.3	1.779	85
90	0.0341	442.0	1.824	0.0301	441.1	1.813	0.0268	440.2	1.803	0.0241	439.2	1.793	90
95	0.0347	446.8	1.838	0.0306	446.0	1.826	0.0273	445.1	1.816	0.0246	444.2	1.807	95
100	0.0353	451.8	1.851	0.0311	450.9	1.840	0.0278	450.1	1.830	0.0251	449.2	1.820	100
105	0.0359	456.7	1.864	0.0317	455.9	1.853	0.0283	455.1	1.843	0.0255	454.3	1.834	105
110	0.0365	461.6	1.877	0.0322	460.9	1.866	0.0288	460.1	1.856	0.0259	459.3	1.847	110
115	0.0370	466.6	1.890	0.0327	465.9	1.879	0.0292	465.2	1.869	0.0264	464.4	1.860	115
120	0.0376	471.6	1.903	0.0332	470.9	1.892	0.0297	470.2	1.882	0.0268	469.5	1.873	120
125	0.0382	476.7	1.915	0.0337	476.0	1.905	0.0302	475.3	1.895	0.0273	474.6	1.886	125
130	0.0387	481.7	1.928	0.0342	481.1	1.917	0.0306	480.4	1.908	0.0277	479.7	1.899	130
135	0.0393	486.8	1.941	0.0347	486.2	1.930	0.0311	485.5	1.920	0.0281	484.9	1.912	135
140	0.0399	492.0	1.953	0.0352	491.3	1.943	0.0316	490.7	1.933	0.0285	490.1	1.924	140
145	0.0404	497.1	1.966	0.0357	496.5	1.955	0.0320	495.9	1.945	0.0290	495.3	1.937	145
150	0.0410	502.3	1.978	0.0362	501.7	1.967	0.0325	501.1	1.958	0.0294	500.5	1.949	150
155	0.0415	507.5	1.990	0.0367	506.9	1.980	0.0329	506.3	1.970	0.0298	505.7	1.961	155
160	0.0421	512.7	2.002	0.0372	512.1	1.992	0.0334	511.6	1.982	0.0302	511.0	1.974	160

ABSOLUTE PRESSURE, kPa													
Temp °C	1200			1300			1400			1500			Temp °C
	25.47 °C			28.43 °C			31.23 °C			33.88 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0154	372.1	1.583	0.0142	373.2	1.582	0.0130	374.1	1.580	0.0121	374.9	1.579	
30	0.0160	377.1	1.600	0.0143	375.0	1.588							30
35	0.0166	382.4	1.617	0.0149	380.5	1.606	0.0135	378.5	1.595	0.0122	376.2	1.583	35
40	0.0172	387.7	1.634	0.0155	385.9	1.623	0.0140	384.1	1.613	0.0127	382.1	1.602	40
45	0.0177	392.9	1.651	0.0160	391.3	1.640	0.0145	389.6	1.630	0.0133	387.8	1.620	45
50	0.0182	398.0	1.667	0.0165	396.5	1.657	0.0150	394.9	1.647	0.0137	393.3	1.637	50
55	0.0187	403.1	1.682	0.0170	401.7	1.673	0.0155	400.2	1.663	0.0142	398.7	1.654	55
60	0.0192	408.1	1.698	0.0175	406.8	1.688	0.0159	405.5	1.679	0.0146	404.1	1.670	60
65	0.0197	413.2	1.713	0.0179	412.0	1.703	0.0164	410.7	1.695	0.0151	409.4	1.686	65
70	0.0201	418.2	1.727	0.0184	417.0	1.718	0.0168	415.9	1.710	0.0155	414.6	1.701	70
75	0.0206	423.2	1.742	0.0188	422.1	1.733	0.0172	421.0	1.725	0.0159	419.9	1.717	75
80	0.0210	428.3	1.756	0.0192	427.2	1.747	0.0176	426.1	1.739	0.0163	425.0	1.731	80
85	0.0215	433.3	1.770	0.0196	432.3	1.762	0.0180	431.3	1.754	0.0166	430.2	1.746	85
90	0.0219	438.3	1.784	0.0200	437.4	1.776	0.0184	436.4	1.768	0.0170	435.4	1.760	90
95	0.0224	443.3	1.798	0.0204	442.4	1.790	0.0188	441.5	1.782	0.0174	440.6	1.774	95
100	0.0228	448.4	1.812	0.0208	447.5	1.803	0.0192	446.6	1.796	0.0178	445.7	1.788	100
105	0.0232	453.5	1.825	0.0212	452.6	1.817	0.0196	451.8	1.809	0.0181	450.9	1.802	105
110	0.0236	458.5	1.838	0.0216	457.7	1.830	0.0199	456.9	1.823	0.0185	456.1	1.816	110
115	0.0240	463.6	1.852	0.0220	462.9	1.844	0.0203	462.1	1.836	0.0188	461.3	1.829	115
120	0.0244	468.8	1.865	0.0224	468.0	1.857	0.0207	467.3	1.850	0.0191	466.5	1.843	120
125	0.0248	473.9	1.878	0.0228	473.2	1.870	0.0210	472.5	1.863	0.0195	471.7	1.856	125
130	0.0252	479.0	1.891	0.0231	478.4	1.883	0.0214	477.7	1.876	0.0198	477.0	1.869	130
135	0.0256	484.2	1.903	0.0235	483.6	1.896	0.0217	482.9	1.889	0.0201	482.2	1.882	135
140	0.0260	489.4	1.916	0.0239	488.8	1.908	0.0221	488.1	1.901	0.0205	487.5	1.895	140
145	0.0264	494.6	1.929	0.0243	494.0	1.921	0.0224	493.4	1.914	0.0208	492.8	1.907	145
150	0.0268	499.9	1.941	0.0246	499.3	1.934	0.0227	498.7	1.927	0.0211	498.1	1.920	150
155	0.0272	505.2	1.953	0.0250	504.6	1.946	0.0231	504.0	1.939	0.0214	503.4	1.932	155
160	0.0276	510.5	1.966	0.0253	509.9	1.958	0.0234	509.3	1.951	0.0218	508.7	1.945	160
165	0.0279	515.8	1.978	0.0257	515.2	1.971	0.0238	514.7	1.964	0.0221	514.1	1.957	165
170	0.0283	521.1	1.990	0.0260	520.6	1.983	0.0241	520.0	1.976	0.0224	519.5	1.969	170
175	0.0287	526.5	2.002	0.0264	526.0	1.995	0.0244	525.4	1.988	0.0227	524.9	1.982	175

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/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			1900			Temp °C
	36.39 °C			38.78 °C			41.07 °C			43.26 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0112	375.6	1.577	0.0104	376.2	1.576	0.0098	376.7	1.574	0.0091	377.1	1.572	
40	0.0116	380.0	1.592	0.0106	377.7	1.581							40
45	0.0121	385.9	1.610	0.0111	383.9	1.600	0.0102	381.7	1.590	0.0093	379.4	1.580	45
50	0.0126	391.6	1.628	0.0116	389.8	1.619	0.0107	387.9	1.609	0.0098	385.9	1.600	50
55	0.0131	397.2	1.645	0.0120	395.5	1.636	0.0111	393.8	1.628	0.0103	392.0	1.619	55
60	0.0135	402.6	1.662	0.0125	401.1	1.653	0.0115	399.6	1.645	0.0107	398.0	1.637	60
65	0.0139	408.0	1.678	0.0129	406.7	1.670	0.0119	405.2	1.662	0.0111	403.7	1.654	65
70	0.0143	413.4	1.693	0.0133	412.1	1.686	0.0123	410.8	1.678	0.0115	409.4	1.671	70
75	0.0147	418.7	1.709	0.0136	417.5	1.701	0.0127	416.2	1.694	0.0119	415.0	1.687	75
80	0.0151	423.9	1.724	0.0140	422.8	1.716	0.0131	421.6	1.709	0.0122	420.4	1.702	80
85	0.0154	429.2	1.739	0.0144	428.1	1.731	0.0134	427.0	1.724	0.0125	425.9	1.718	85
90	0.0158	434.4	1.753	0.0147	433.4	1.746	0.0137	432.4	1.739	0.0129	431.3	1.733	90
95	0.0161	439.6	1.767	0.0150	438.7	1.760	0.0141	437.7	1.754	0.0132	436.7	1.747	95
100	0.0165	444.8	1.781	0.0154	443.9	1.775	0.0144	443.0	1.768	0.0135	442.0	1.762	100
105	0.0168	450.1	1.795	0.0157	449.2	1.789	0.0147	448.3	1.782	0.0138	447.4	1.776	105
110	0.0172	455.3	1.809	0.0160	454.4	1.802	0.0150	453.6	1.796	0.0141	452.7	1.790	110
115	0.0175	460.5	1.823	0.0163	459.7	1.816	0.0153	458.9	1.810	0.0144	458.1	1.804	115
120	0.0178	465.7	1.836	0.0167	465.0	1.830	0.0156	464.2	1.824	0.0147	463.4	1.818	120
125	0.0181	471.0	1.849	0.0170	470.3	1.843	0.0159	469.5	1.837	0.0150	468.8	1.831	125
130	0.0185	476.3	1.862	0.0173	475.5	1.856	0.0162	474.8	1.850	0.0153	474.1	1.845	130
135	0.0188	481.5	1.875	0.0176	480.8	1.869	0.0165	480.2	1.863	0.0155	479.5	1.858	135
140	0.0191	486.8	1.888	0.0179	486.2	1.882	0.0168	485.5	1.876	0.0158	484.8	1.871	140
145	0.0194	492.1	1.901	0.0182	491.5	1.895	0.0171	490.9	1.889	0.0161	490.2	1.884	145
150	0.0197	497.5	1.914	0.0185	496.8	1.908	0.0173	496.2	1.902	0.0164	495.6	1.897	150
155	0.0200	502.8	1.926	0.0187	502.2	1.920	0.0176	501.6	1.915	0.0166	501.0	1.909	155
160	0.0203	508.2	1.939	0.0190	507.6	1.933	0.0179	507.0	1.927	0.0169	506.4	1.922	160
165	0.0206	513.6	1.951	0.0193	513.0	1.945	0.0182	512.4	1.940	0.0171	511.9	1.934	165
170	0.0209	519.0	1.963	0.0196	518.4	1.958	0.0184	517.9	1.952	0.0174	517.3	1.947	170
175	0.0212	524.4	1.975	0.0199	523.9	1.970	0.0187	523.3	1.964	0.0177	522.8	1.959	175
180	0.0215	529.8	1.988	0.0202	529.3	1.982	0.0190	528.8	1.976	0.0179	528.3	1.971	180
185	0.0218	535.3	2.000	0.0204	534.8	1.994	0.0192	534.3	1.988	0.0182	533.8	1.983	185

ABSOLUTE PRESSURE, kPa													
Temp °C	2000			2100			2200			2300			Temp °C
	45.37 °C			47.39 °C			49.33 °C			51.21 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0086	377.4	1.571	0.0081	377.6	1.569	0.0076	377.7	1.567	0.0072	377.8	1.565	
50	0.0091	383.7	1.590	0.0084	381.4	1.580	0.0077	378.8	1.570				50
55	0.0095	390.1	1.610	0.0088	388.1	1.601	0.0082	385.9	1.592	0.0076	383.6	1.582	55
60	0.0100	396.3	1.629	0.0093	394.5	1.620	0.0086	392.6	1.612	0.0080	390.6	1.604	60
65	0.0104	402.2	1.646	0.0097	400.6	1.639	0.0090	398.9	1.631	0.0084	397.1	1.623	65
70	0.0107	408.0	1.663	0.0100	406.5	1.656	0.0094	405.0	1.649	0.0088	403.4	1.641	70
75	0.0111	413.6	1.680	0.0104	412.3	1.673	0.0098	410.9	1.666	0.0092	409.5	1.659	75
80	0.0114	419.2	1.696	0.0107	418.0	1.689	0.0101	416.7	1.682	0.0095	415.4	1.676	80
85	0.0118	424.8	1.711	0.0111	423.6	1.705	0.0104	422.4	1.698	0.0098	421.2	1.692	85
90	0.0121	430.2	1.726	0.0114	429.1	1.720	0.0107	428.0	1.714	0.0101	426.9	1.708	90
95	0.0124	435.7	1.741	0.0117	434.6	1.735	0.0110	433.6	1.729	0.0104	432.5	1.723	95
100	0.0127	441.1	1.756	0.0120	440.1	1.750	0.0113	439.1	1.744	0.0107	438.1	1.738	100
105	0.0130	446.5	1.770	0.0123	445.6	1.764	0.0116	444.6	1.759	0.0110	443.7	1.753	105
110	0.0133	451.9	1.784	0.0125	451.0	1.779	0.0119	450.1	1.773	0.0113	449.2	1.768	110
115	0.0136	457.2	1.798	0.0128	456.4	1.793	0.0121	455.5	1.787	0.0115	454.7	1.782	115
120	0.0139	462.6	1.812	0.0131	461.8	1.807	0.0124	461.0	1.801	0.0118	460.2	1.796	120
125	0.0141	468.0	1.826	0.0134	467.2	1.820	0.0127	466.4	1.815	0.0120	465.7	1.810	125
130	0.0144	473.4	1.839	0.0136	472.6	1.834	0.0129	471.9	1.829	0.0123	471.1	1.824	130
135	0.0147	478.8	1.852	0.0139	478.0	1.847	0.0132	477.3	1.842	0.0125	476.6	1.837	135
140	0.0149	484.1	1.865	0.0141	483.5	1.860	0.0134	482.8	1.855	0.0128	482.1	1.850	140
145	0.0152	489.5	1.878	0.0144	488.9	1.873	0.0137	488.2	1.868	0.0130	487.6	1.864	145
150	0.0155	495.0	1.891	0.0146	494.3	1.886	0.0139	493.7	1.881	0.0132	493.1	1.877	150
155	0.0157	500.4	1.904	0.0149	499.8	1.899	0.0141	499.2	1.894	0.0135	498.6	1.890	155
160	0.0160	505.8	1.917	0.0151	505.2	1.912	0.0144	504.7	1.907	0.0137	504.1	1.902	160
165	0.0162	511.3	1.929	0.0154	510.7	1.924	0.0146	510.2	1.920	0.0139	509.6	1.915	165
170	0.0165	516.8	1.942	0.0156	516.2	1.937	0.0148	515.7	1.932	0.0141	515.1	1.928	170
175	0.0167	522.3	1.954	0.0159	521.7	1.949	0.0151	521.2	1.945	0.0144	520.7	1.940	175
180	0.0170	527.8	1.966	0.0161	527.3	1.961	0.0153	526.7	1.957	0.0146	526.2	1.952	180
185	0.0172	533.3	1.978	0.0163	532.8	1.974	0.0155	532.3	1.969	0.0148	531.8	1.965	185
190	0.0174	538.9	1.990	0.0166	538.4	1.986	0.0158	537.9	1.981	0.0150	537.4	1.977	190
195	0.0177	544.4	2.002	0.0168	543.9	1.998	0.0160	543.5	1.993	0.0152	543.0	1.989	195

Opteon™ XP44 (R-452A)
Superheated Vapor - Constant Pressure Tables

V = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg-K

Saturation Properties in Light Blue

ABSOLUTE PRESSURE, kPa													
Temp °C	2400			2600			2800			3000			Temp °C
	53.02 °C			56.47 °C			59.70 °C			62.73 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0068	377.8	1.562	0.0061	377.5	1.557	0.0054	376.8	1.552	0.0049	375.7	1.546	
55	0.0070	381.0	1.572										55
60	0.0075	388.4	1.595	0.0065	383.6	1.576	0.0055	377.4	1.554				60
65	0.0079	395.3	1.615	0.0069	391.2	1.599	0.0060	386.5	1.581	0.0052	380.6	1.560	65
70	0.0083	401.8	1.634	0.0073	398.2	1.619	0.0064	394.3	1.604	0.0057	389.7	1.587	70
75	0.0086	408.0	1.652	0.0077	404.8	1.638	0.0068	401.4	1.624	0.0061	397.6	1.610	75
80	0.0090	414.0	1.669	0.0080	411.1	1.656	0.0072	408.1	1.643	0.0064	404.8	1.630	80
85	0.0093	419.9	1.686	0.0083	417.3	1.674	0.0075	414.5	1.662	0.0067	411.5	1.649	85
90	0.0096	425.7	1.702	0.0086	423.3	1.690	0.0078	420.7	1.679	0.0070	418.0	1.667	90
95	0.0099	431.4	1.718	0.0089	429.2	1.706	0.0081	426.8	1.695	0.0073	424.3	1.685	95
100	0.0102	437.1	1.733	0.0092	435.0	1.722	0.0083	432.8	1.711	0.0076	430.5	1.701	100
105	0.0104	442.7	1.748	0.0094	440.7	1.737	0.0086	438.6	1.727	0.0078	436.5	1.717	105
110	0.0107	448.3	1.762	0.0097	446.4	1.752	0.0088	444.4	1.742	0.0081	442.5	1.733	110
115	0.0109	453.8	1.777	0.0099	452.0	1.767	0.0091	450.2	1.757	0.0083	448.3	1.748	115
120	0.0112	459.3	1.791	0.0102	457.7	1.781	0.0093	455.9	1.772	0.0085	454.1	1.763	120
125	0.0114	464.9	1.805	0.0104	463.3	1.795	0.0095	461.6	1.786	0.0088	459.9	1.777	125
130	0.0117	470.4	1.819	0.0106	468.8	1.809	0.0097	467.3	1.800	0.0090	465.7	1.792	130
135	0.0119	475.9	1.832	0.0109	474.4	1.823	0.0100	472.9	1.814	0.0092	471.4	1.806	135
140	0.0122	481.4	1.846	0.0111	480.0	1.837	0.0102	478.5	1.828	0.0094	477.1	1.820	140
145	0.0124	486.9	1.859	0.0113	485.5	1.850	0.0104	484.2	1.842	0.0096	482.8	1.833	145
150	0.0126	492.4	1.872	0.0115	491.1	1.863	0.0106	489.8	1.855	0.0098	488.4	1.847	150
155	0.0128	497.9	1.885	0.0117	496.7	1.876	0.0108	495.4	1.868	0.0100	494.1	1.860	155
160	0.0131	503.5	1.898	0.0119	502.2	1.889	0.0110	501.0	1.881	0.0102	499.8	1.873	160
165	0.0133	509.0	1.911	0.0122	507.8	1.902	0.0112	506.7	1.894	0.0103	505.5	1.886	165
170	0.0135	514.5	1.923	0.0124	513.4	1.915	0.0114	512.3	1.907	0.0105	511.1	1.899	170
175	0.0137	520.1	1.936	0.0126	519.0	1.927	0.0116	517.9	1.920	0.0107	516.8	1.912	175
180	0.0139	525.7	1.948	0.0128	524.6	1.940	0.0118	523.6	1.932	0.0109	522.5	1.925	180
185	0.0141	531.3	1.960	0.0130	530.3	1.952	0.0119	529.2	1.945	0.0111	528.2	1.937	185
190	0.0143	536.9	1.972	0.0132	535.9	1.964	0.0121	534.9	1.957	0.0113	533.9	1.950	190
195	0.0146	542.5	1.985	0.0133	541.6	1.977	0.0123	540.6	1.969	0.0114	539.6	1.962	195
200	0.0148	548.2	1.997	0.0135	547.2	1.989	0.0125	546.3	1.981	0.0116	545.3	1.974	200

ABSOLUTE PRESSURE, kPa													
Temp °C	3200			3400			3600			3800			Temp °C
	65.58 °C			68.26 °C			70.77 °C			73.08 °C			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0044	374.0	1.538	0.0039	371.7	1.529	0.0034	368.3	1.517	0.0029	362.8	1.499	
70	0.0049	384.2	1.568	0.0042	377.0	1.544							70
75	0.0054	393.2	1.594	0.0047	388.2	1.577	0.0041	381.9	1.556	0.0034	372.9	1.528	75
80	0.0057	401.1	1.616	0.0051	397.0	1.602	0.0045	392.4	1.586	0.0040	386.9	1.568	80
85	0.0061	408.3	1.637	0.0055	404.9	1.624	0.0049	401.1	1.610	0.0044	396.8	1.596	85
90	0.0064	415.2	1.656	0.0058	412.1	1.644	0.0053	408.9	1.632	0.0048	405.3	1.619	90
95	0.0067	421.7	1.674	0.0061	419.0	1.663	0.0055	416.1	1.652	0.0051	413.0	1.640	95
100	0.0069	428.1	1.691	0.0063	425.6	1.681	0.0058	423.0	1.670	0.0053	420.2	1.660	100
105	0.0072	434.3	1.707	0.0066	432.0	1.698	0.0061	429.6	1.688	0.0056	427.1	1.678	105
110	0.0074	440.4	1.723	0.0068	438.3	1.714	0.0063	436.1	1.705	0.0058	433.8	1.696	110
115	0.0076	446.4	1.739	0.0071	444.4	1.730	0.0065	442.4	1.721	0.0061	440.2	1.713	115
120	0.0079	452.3	1.754	0.0073	450.5	1.746	0.0067	448.5	1.737	0.0063	446.6	1.729	120
125	0.0081	458.2	1.769	0.0075	456.4	1.761	0.0069	454.6	1.752	0.0065	452.8	1.744	125
130	0.0083	464.0	1.784	0.0077	462.4	1.775	0.0071	460.7	1.768	0.0067	458.9	1.760	130
135	0.0085	469.8	1.798	0.0079	468.3	1.790	0.0073	466.6	1.782	0.0068	465.0	1.775	135
140	0.0087	475.6	1.812	0.0081	474.1	1.804	0.0075	472.6	1.797	0.0070	471.0	1.789	140
145	0.0089	481.4	1.826	0.0083	479.9	1.818	0.0077	478.5	1.811	0.0072	477.0	1.804	145
150	0.0091	487.1	1.839	0.0084	485.7	1.832	0.0079	484.3	1.825	0.0074	482.9	1.818	150
155	0.0093	492.8	1.853	0.0086	491.5	1.846	0.0081	490.2	1.839	0.0075	488.8	1.832	155
160	0.0094	498.5	1.866	0.0088	497.3	1.859	0.0082	496.0	1.852	0.0077	494.7	1.845	160
165	0.0096	504.3	1.879	0.0090	503.0	1.872	0.0084	501.8	1.865	0.0079	500.6	1.859	165
170	0.0098	510.0	1.892	0.0091	508.8	1.885	0.0086	507.6	1.879	0.0080	506.4	1.872	170
175	0.0100	515.7	1.905	0.0093	514.6	1.898	0.0087	513.4	1.892	0.0082	512.3	1.885	175
180	0.0101	521.4	1.918	0.0095	520.3	1.911	0.0089	519.2	1.905	0.0083	518.1	1.898	180
185	0.0103	527.1	1.930	0.0096	526.1	1.924	0.0090	525.0	1.917	0.0085	524.0	1.911	185
190	0.0105	532.9	1.943	0.0098	531.9	1.936	0.0092	530.9	1.930	0.0086	529.8	1.924	190
195	0.0106	538.6	1.955	0.0100	537.7	1.949	0.0093	536.7	1.942	0.0088	535.7	1.936	195
200	0.0108	544.4	1.967	0.0101	543.4	1.961	0.0095	542.5	1.955	0.0089	541.5	1.949	200
205	0.0110	550.2	1.979	0.0103	549.2	1.973	0.0096	548.3	1.967	0.0091	547.4	1.961	205
210	0.0111	555.9	1.991	0.0104	555.0	1.985	0.0098	554.1	1.979	0.0092	553.2	1.973	210
215	0.0113	561.7	2.003	0.0106	560.9	1.997	0.0099	560.0	1.991	0.0094	559.1	1.985	215

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