



Opteon™ XL41

Refrigerant

Thermodynamic Properties of Opteon™ XL41 (R-454B) SI Units

Physical Properties

Molecular Weight	62.6 g/mol
Boiling Point at One Atmosphere	-50.5 °C
Critical Temperature	78.1 °C
Critical Pressure	5266.9 kPa
Critical Density	443.0 kg/m ³
Critical Volume	0.0023 m ³ /kg
Ozone Depletion Potential	0
Global Warming Potential AR4	466
ASHRAE Standard 34 Safety Rating	A2L

Units and Factors

t	= temperature in °C
P	= pressure in kiloPascals absolute (kPa [abs])
v _f	= volume of saturated liquid in m ³ /kg
v _g	= volume of saturated vapor in m ³ /kg
V	= volume of superheated vapor in m ³ /kg
d _f	= 1/v _f = density of saturated liquid in kg/m ³
d _g	= 1/v _g = density of saturated vapor in kg/m ³
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 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™ XL41 (R-454B)

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 d _f	Vapor d _g	Liquid h _f	Latent h _{fg}	Vapor h _g	Liquid s _f	Vapor s _g	
-60	61.344	58.196	0.000791	0.4717	1264.8	2.120	108.5	324.4	432.9	0.625	2.151	-60
-59	64.827	61.517	0.000792	0.4478	1262.1	2.233	110.0	323.5	433.5	0.632	2.147	-59
-58	68.467	64.988	0.000794	0.4253	1259.4	2.351	111.5	322.6	434.0	0.639	2.142	-58
-57	72.269	68.615	0.000796	0.4043	1256.6	2.474	112.9	321.7	434.6	0.646	2.138	-57
-56	76.238	72.402	0.000798	0.3844	1253.9	2.601	114.4	320.8	435.2	0.652	2.134	-56
-55	80.380	76.354	0.000799	0.3657	1251.2	2.734	115.9	319.9	435.7	0.659	2.129	-55
-54	84.700	80.478	0.000801	0.3481	1248.4	2.873	117.3	319.0	436.3	0.666	2.125	-54
-53	89.203	84.776	0.000803	0.3315	1245.6	3.016	118.8	318.0	436.8	0.672	2.121	-53
-52	93.894	89.256	0.000805	0.3159	1242.8	3.166	120.3	317.1	437.4	0.679	2.117	-52
-51	98.780	93.923	0.000806	0.3011	1240.1	3.321	121.7	316.2	437.9	0.686	2.113	-51
-50	103.867	98.781	0.000808	0.2872	1237.3	3.482	123.2	315.3	438.5	0.692	2.109	-50
-49	109.158	103.837	0.000810	0.2741	1234.5	3.649	124.7	314.3	439.0	0.699	2.105	-49
-48	114.662	109.096	0.000812	0.2616	1231.6	3.822	126.2	313.4	439.6	0.705	2.101	-48
-47	120.383	114.564	0.000814	0.2499	1228.8	4.002	127.6	312.5	440.1	0.712	2.098	-47
-46	126.327	120.246	0.000816	0.2387	1226.0	4.189	129.1	311.5	440.6	0.718	2.094	-46
-45	132.501	126.149	0.000818	0.2282	1223.1	4.382	130.6	310.6	441.2	0.725	2.090	-45
-44	138.910	132.278	0.000819	0.2182	1220.3	4.583	132.1	309.6	441.7	0.731	2.086	-44
-43	145.562	138.640	0.000821	0.2088	1217.4	4.790	133.6	308.7	442.2	0.738	2.083	-43
-42	152.461	145.241	0.000823	0.1998	1214.5	5.005	135.0	307.7	442.8	0.744	2.079	-42
-41	159.615	152.086	0.000825	0.1913	1211.6	5.227	136.5	306.7	443.3	0.751	2.076	-41
-40	167.030	159.182	0.000827	0.1832	1208.7	5.457	138.0	305.8	443.8	0.757	2.072	-40
-39	174.713	166.535	0.000829	0.1756	1205.8	5.695	139.5	304.8	444.3	0.763	2.069	-39
-38	182.669	174.152	0.000831	0.1683	1202.9	5.941	141.0	303.8	444.8	0.770	2.065	-38
-37	190.906	182.039	0.000833	0.1614	1200.0	6.196	142.5	302.8	445.3	0.776	2.062	-37
-36	199.431	190.203	0.000835	0.1548	1197.0	6.458	144.0	301.8	445.8	0.782	2.059	-36
-35	208.250	198.651	0.000837	0.1486	1194.1	6.730	145.5	300.8	446.3	0.789	2.055	-35
-34	217.369	207.388	0.000840	0.1426	1191.1	7.011	147.0	299.8	446.8	0.795	2.052	-34
-33	226.797	216.422	0.000842	0.1370	1188.1	7.300	148.5	298.8	447.3	0.801	2.049	-33
-32	236.540	225.760	0.000844	0.1316	1185.1	7.600	150.0	297.8	447.8	0.807	2.046	-32
-31	246.605	235.409	0.000846	0.1264	1182.1	7.908	151.5	296.7	448.3	0.814	2.042	-31
-30	257.000	245.375	0.000848	0.1216	1179.1	8.227	153.1	295.7	448.7	0.820	2.039	-30
-29	267.730	255.665	0.000850	0.1169	1176.1	8.556	154.6	294.7	449.2	0.826	2.036	-29
-28	278.805	266.288	0.000852	0.1124	1173.0	8.894	156.1	293.6	449.7	0.832	2.033	-28
-27	290.231	277.249	0.000855	0.1082	1170.0	9.244	157.6	292.6	450.2	0.838	2.030	-27
-26	302.015	288.556	0.000857	0.1041	1166.9	9.604	159.1	291.5	450.6	0.844	2.027	-26
-25	314.165	300.217	0.000859	0.1002	1163.8	9.976	160.7	290.4	451.1	0.851	2.024	-25
-24	326.688	312.238	0.000862	0.0965	1160.7	10.358	162.2	289.3	451.5	0.857	2.021	-24
-23	339.593	324.628	0.000864	0.0930	1157.6	10.753	163.7	288.3	452.0	0.863	2.018	-23
-22	352.886	337.394	0.000866	0.0896	1154.5	11.159	165.3	287.2	452.4	0.869	2.016	-22
-21	366.576	350.543	0.000869	0.0864	1151.3	11.577	166.8	286.1	452.9	0.875	2.013	-21
-20	380.670	364.084	0.000871	0.0833	1148.2	12.008	168.4	285.0	453.3	0.881	2.010	-20
-19	395.176	378.023	0.000873	0.0803	1145.0	12.451	169.9	283.8	453.7	0.887	2.007	-19
-18	410.102	392.369	0.000876	0.0775	1141.8	12.908	171.4	282.7	454.2	0.893	2.004	-18
-17	425.456	407.129	0.000878	0.0748	1138.6	13.377	173.0	281.6	454.6	0.899	2.002	-17
-16	441.246	422.311	0.000881	0.0721	1135.4	13.861	174.6	280.5	455.0	0.905	1.999	-16
-15	457.479	437.925	0.000883	0.0696	1132.2	14.358	176.1	279.3	455.4	0.911	1.996	-15
-14	474.165	453.976	0.000886	0.0673	1128.9	14.869	177.7	278.1	455.8	0.917	1.994	-14
-13	491.312	470.474	0.000888	0.0650	1125.6	15.395	179.3	277.0	456.2	0.923	1.991	-13
-12	508.926	487.427	0.000891	0.0627	1122.4	15.936	180.8	275.8	456.6	0.929	1.988	-12
-11	527.018	504.843	0.000894	0.0606	1119.1	16.493	182.4	274.6	457.0	0.935	1.986	-11
-10	545.595	522.731	0.000896	0.0586	1115.7	17.065	184.0	273.4	457.4	0.941	1.983	-10
-9	564.666	541.098	0.000899	0.0566	1112.4	17.653	185.6	272.2	457.8	0.947	1.980	-9
-8	584.238	559.953	0.000902	0.0548	1109.0	18.257	187.1	271.0	458.2	0.953	1.978	-8
-7	604.322	579.305	0.000904	0.0530	1105.7	18.878	188.7	269.8	458.5	0.959	1.975	-7
-6	624.925	599.163	0.000907	0.0512	1102.3	19.517	190.3	268.5	458.9	0.965	1.973	-6
-5	646.055	619.535	0.000910	0.0496	1098.9	20.173	191.9	267.3	459.2	0.971	1.970	-5
-4	667.723	640.430	0.000913	0.0480	1095.4	20.847	193.5	266.0	459.6	0.976	1.968	-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 d _f	Vapor d _g	Liquid h _f	Latent h _{fg}	Vapor h _g	Liquid s _f	Vapor s _g	
-3	689.935	661.856	0.000916	0.0464	1092.0	21.539	195.1	264.8	459.9	0.982	1.965	-3
-2	712.702	683.823	0.000919	0.0449	1088.5	22.250	196.8	263.5	460.3	0.988	1.963	-2
-1	736.032	706.339	0.000922	0.0435	1085.0	22.981	198.4	262.2	460.6	0.994	1.960	-1
0	759.934	729.414	0.000925	0.0421	1081.5	23.732	200.0	260.9	460.9	1.000	1.958	0
1	784.417	753.057	0.000928	0.0408	1077.9	24.502	201.6	259.6	461.2	1.006	1.956	1
2	809.491	777.276	0.000931	0.0395	1074.4	25.294	203.3	258.3	461.5	1.012	1.953	2
3	835.163	802.082	0.000934	0.0383	1070.8	26.107	204.9	256.9	461.8	1.018	1.951	3
4	861.444	827.483	0.000937	0.0371	1067.2	26.942	206.5	255.6	462.1	1.023	1.948	4
5	888.343	853.489	0.000940	0.0360	1063.5	27.800	208.2	254.2	462.4	1.029	1.946	5
6	915.868	880.109	0.000944	0.0349	1059.9	28.680	209.8	252.9	462.7	1.035	1.944	6
7	944.030	907.354	0.000947	0.0338	1056.2	29.584	211.5	251.5	463.0	1.041	1.941	7
8	972.837	935.232	0.000950	0.0328	1052.5	30.512	213.2	250.1	463.2	1.047	1.939	8
9	1002.300	963.754	0.000954	0.0318	1048.7	31.465	214.8	248.7	463.5	1.053	1.936	9
10	1032.427	992.928	0.000957	0.0308	1045.0	32.444	216.5	247.2	463.7	1.058	1.934	10
11	1063.229	1022.767	0.000960	0.0299	1041.2	33.449	218.2	245.8	464.0	1.064	1.932	11
12	1094.715	1053.278	0.000964	0.0290	1037.3	34.481	219.9	244.3	464.2	1.070	1.929	12
13	1126.894	1084.473	0.000968	0.0281	1033.5	35.540	221.6	242.8	464.4	1.076	1.927	13
14	1159.777	1116.361	0.000971	0.0273	1029.6	36.628	223.3	241.4	464.6	1.082	1.925	14
15	1193.374	1148.953	0.000975	0.0265	1025.7	37.745	225.0	239.8	464.8	1.087	1.922	15
16	1227.694	1182.260	0.000979	0.0257	1021.7	38.893	226.7	238.3	465.0	1.093	1.920	16
17	1262.748	1216.291	0.000983	0.0250	1017.8	40.071	228.4	236.8	465.2	1.099	1.918	17
18	1298.545	1251.058	0.000986	0.0242	1013.7	41.281	230.1	235.2	465.3	1.105	1.915	18
19	1335.096	1286.571	0.000990	0.0235	1009.7	42.523	231.9	233.7	465.5	1.111	1.913	19
20	1372.411	1322.842	0.000994	0.0228	1005.6	43.800	233.6	232.1	465.7	1.117	1.910	20
21	1410.500	1359.880	0.000999	0.0222	1001.5	45.111	235.3	230.5	465.8	1.122	1.908	21
22	1449.374	1397.698	0.001003	0.0215	997.3	46.458	237.1	228.8	465.9	1.128	1.906	22
23	1489.044	1436.306	0.001007	0.0209	993.1	47.841	238.9	227.2	466.0	1.134	1.903	23
24	1529.519	1475.716	0.001011	0.0203	988.9	49.263	240.6	225.5	466.1	1.140	1.901	24
25	1570.811	1515.940	0.001016	0.0197	984.6	50.724	242.4	223.8	466.2	1.146	1.898	25
26	1612.930	1556.988	0.001020	0.0191	980.3	52.226	244.2	222.1	466.3	1.152	1.896	26
27	1655.887	1598.873	0.001025	0.0186	975.9	53.769	246.0	220.4	466.4	1.157	1.894	27
28	1699.694	1641.607	0.001029	0.0181	971.5	55.356	247.8	218.6	466.4	1.163	1.891	28
29	1744.361	1685.202	0.001034	0.0175	967.1	56.988	249.6	216.8	466.4	1.169	1.889	29
30	1789.899	1729.670	0.001039	0.0170	962.6	58.665	251.4	215.0	466.5	1.175	1.886	30
31	1836.320	1775.024	0.001044	0.0166	958.0	60.391	253.3	213.2	466.5	1.181	1.884	31
32	1883.635	1821.276	0.001049	0.0161	953.4	62.167	255.1	211.4	466.5	1.187	1.881	32
33	1931.856	1868.439	0.001054	0.0156	948.8	63.994	256.9	209.5	466.4	1.193	1.879	33
34	1980.994	1916.526	0.001059	0.0152	944.0	65.874	258.8	207.6	466.4	1.199	1.876	34
35	2031.062	1965.551	0.001065	0.0147	939.3	67.810	260.7	205.6	466.3	1.204	1.874	35
36	2082.070	2015.526	0.001070	0.0143	934.4	69.804	262.6	203.7	466.3	1.210	1.871	36
37	2134.031	2066.466	0.001076	0.0139	929.5	71.857	264.5	201.7	466.2	1.216	1.868	37
38	2186.958	2118.385	0.001082	0.0135	924.6	73.973	266.4	199.7	466.1	1.222	1.866	38
39	2240.862	2171.296	0.001087	0.0131	919.6	76.154	268.3	197.6	465.9	1.228	1.863	39
40	2295.756	2225.214	0.001094	0.0128	914.5	78.403	270.2	195.5	465.8	1.234	1.860	40
41	2351.653	2280.154	0.001100	0.0124	909.3	80.723	272.2	193.4	465.6	1.240	1.858	41
42	2408.566	2336.131	0.001106	0.0120	904.0	83.116	274.1	191.3	465.4	1.246	1.855	42
43	2466.507	2393.161	0.001113	0.0117	898.7	85.587	276.1	189.1	465.2	1.252	1.852	43
44	2525.490	2451.258	0.001119	0.0113	893.3	88.139	278.1	186.8	464.9	1.258	1.849	44
45	2585.528	2510.440	0.001126	0.0110	887.8	90.776	280.1	184.5	464.7	1.265	1.846	45
46	2646.635	2570.722	0.001134	0.0107	882.2	93.503	282.2	182.2	464.4	1.271	1.843	46
47	2708.825	2632.122	0.001141	0.0104	876.5	96.323	284.2	179.9	464.1	1.277	1.840	47
48	2772.112	2694.657	0.001149	0.0101	870.6	99.242	286.3	177.5	463.7	1.283	1.837	48
49	2836.509	2758.345	0.001156	0.0098	864.7	102.265	288.4	175.0	463.4	1.289	1.834	49
50	2902.032	2823.203	0.001165	0.0095	858.7	105.399	290.5	172.5	462.9	1.296	1.831	50
51	2968.695	2889.252	0.001173	0.0092	852.5	108.650	292.6	169.9	462.5	1.302	1.828	51
52	3036.515	2956.510	0.001182	0.0089	846.2	112.024	294.7	167.3	462.0	1.308	1.824	52
53	3105.505	3024.998	0.001191	0.0087	839.8	115.530	296.9	164.6	461.5	1.315	1.821	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	3175.682	3094.738	0.001200	0.0084	833.2	119.176	299.1	161.9	461.0	1.321	1.817	54
55	3247.062	3165.750	0.001210	0.0081	826.5	122.973	301.3	159.0	460.4	1.328	1.814	55
56	3319.662	3238.057	0.001220	0.0079	819.6	126.931	303.6	156.2	459.7	1.334	1.810	56
57	3393.498	3311.684	0.001231	0.0076	812.5	131.062	305.9	153.2	459.1	1.341	1.806	57
58	3468.588	3386.655	0.001242	0.0074	805.2	135.379	308.2	150.1	458.3	1.348	1.802	58
59	3544.950	3462.997	0.001254	0.0071	797.6	139.897	310.6	147.0	457.6	1.355	1.798	59
60	3622.603	3540.737	0.001266	0.0069	789.9	144.635	313.0	143.7	456.7	1.362	1.794	60
61	3701.565	3619.904	0.001279	0.0067	781.9	149.613	315.4	140.4	455.8	1.369	1.790	61
62	3781.855	3700.531	0.001293	0.0065	773.6	154.852	317.9	136.9	454.8	1.376	1.785	62
63	3863.496	3782.651	0.001307	0.0062	765.0	160.382	320.4	133.3	453.8	1.383	1.781	63
64	3946.506	3866.300	0.001323	0.0060	756.1	166.233	323.0	129.6	452.6	1.390	1.776	64
65	4030.910	3951.518	0.001339	0.0058	746.8	172.444	325.7	125.7	451.4	1.398	1.771	65
66	4116.728	4038.349	0.001357	0.0056	737.1	179.060	328.4	121.7	450.1	1.406	1.765	66
67	4203.986	4126.841	0.001376	0.0054	726.9	186.138	331.2	117.4	448.6	1.413	1.759	67
68	4292.708	4217.049	0.001396	0.0052	716.2	193.747	334.1	112.9	447.0	1.422	1.753	68
69	4382.920	4309.036	0.001419	0.0050	704.8	201.977	337.1	108.2	445.3	1.430	1.747	69
70	4474.650	4402.876	0.001444	0.0047	692.7	210.944	340.2	103.1	443.4	1.439	1.740	70
71	4567.926	4498.658	0.001471	0.0045	679.7	220.803	343.5	97.7	441.2	1.448	1.732	71
72	4662.776	4596.491	0.001502	0.0043	665.6	231.772	347.0	91.8	438.8	1.458	1.724	72
73	4759.229	4696.521	0.001538	0.0041	650.1	244.172	350.7	85.4	436.1	1.468	1.715	73
74	4857.307	4798.944	0.001581	0.0039	632.7	258.504	354.7	78.2	432.8	1.479	1.705	74
75	4957.015	4904.064	0.001632	0.0036	612.6	275.642	359.2	69.8	429.0	1.491	1.692	75

Opteon™ XL41 (R-454B)

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
	-86.91			-77.33			-71.15			-66.48			
	V	H	S	V	H	S	V	H	S	V	H	S	
	2.4498	416.8	2.300	1.2807	422.7	2.240	0.0007	69.4	0.429	0.0007	69.4	0.429	
-85	2.4762	418.2	2.308										-85
-80	2.5447	421.7	2.326										-80
-75	2.6129	425.3	2.344	1.2971	424.4	2.249							-75
-70	2.6808	428.8	2.362	1.3319	428.1	2.267	0.8821	427.3	2.210				-70
-65	2.7486	432.4	2.379	1.3665	431.7	2.285	0.9057	431.0	2.228	0.6752	430.3	2.187	-65
-60	2.8162	436.1	2.397	1.4009	435.4	2.302	0.9291	434.8	2.246	0.6931	434.1	2.206	-60
-55	2.8837	439.7	2.414	1.4352	439.1	2.319	0.9523	438.6	2.264	0.7109	438.0	2.223	-55
-50	2.9510	443.4	2.430	1.4693	442.9	2.336	0.9754	442.3	2.281	0.7284	441.8	2.241	-50
-45	3.0182	447.1	2.447	1.5034	446.6	2.353	0.9984	446.1	2.298	0.7459	445.6	2.258	-45
-40	3.0854	450.8	2.463	1.5373	450.4	2.369	1.0213	449.9	2.314	0.7633	449.5	2.274	-40
-35	3.1524	454.6	2.479	1.5712	454.2	2.385	1.0441	453.8	2.330	0.7806	453.4	2.291	-35
-30	3.2194	458.4	2.495	1.6050	458.0	2.401	1.0669	457.6	2.346	0.7978	457.3	2.307	-30
-25	3.2864	462.2	2.510	1.6388	461.9	2.417	1.0896	461.5	2.362	0.8149	461.2	2.323	-25
-20	3.3533	466.1	2.526	1.6725	465.8	2.433	1.1122	465.5	2.378	0.8320	465.1	2.339	-20
-15	3.4201	470.0	2.541	1.7061	469.7	2.448	1.1348	469.4	2.393	0.8491	469.1	2.354	-15
-10	3.4869	474.0	2.556	1.7397	473.7	2.463	1.1573	473.4	2.409	0.8661	473.1	2.370	-10
-5	3.5537	477.9	2.571	1.7733	477.7	2.478	1.1799	477.4	2.424	0.8831	477.1	2.385	-5
0	3.6205	482.0	2.586	1.8069	481.7	2.493	1.2023	481.5	2.439	0.9001	481.2	2.400	0
5	3.6872	486.0	2.601	1.8404	485.8	2.508	1.2248	485.6	2.454	0.9170	485.3	2.415	5
10	3.7539	490.1	2.615	1.8739	489.9	2.523	1.2472	489.7	2.468	0.9339	489.4	2.429	10
15	3.8206	494.3	2.630	1.9074	494.1	2.537	1.2697	493.8	2.483	0.9508	493.6	2.444	15
20	3.8872	498.4	2.644	1.9408	498.2	2.552	1.2920	498.0	2.497	0.9676	497.8	2.459	20
25	3.9538	502.7	2.658	1.9743	502.5	2.566	1.3144	502.3	2.512	0.9845	502.1	2.473	25
30	4.0205	506.9	2.673	2.0077	506.7	2.580	1.3368	506.5	2.526	1.0013	506.4	2.487	30
35	4.0871	511.2	2.687	2.0411	511.0	2.594	1.3591	510.9	2.540	1.0181	510.7	2.501	35
40	4.1537	515.5	2.701	2.0745	515.4	2.608	1.3815	515.2	2.554	1.0349	515.0	2.515	40
45	4.2203	519.9	2.714	2.1079	519.8	2.622	1.4038	519.6	2.568	1.0517	519.4	2.529	45
50	4.2868	524.3	2.728	2.1413	524.2	2.636	1.4261	524.0	2.582	1.0685	523.9	2.543	50
55	4.3534	528.8	2.742	2.1746	528.7	2.650	1.4484	528.5	2.595	1.0852	528.4	2.557	55
60	4.4199	533.3	2.756	2.2080	533.2	2.663	1.4707	533.0	2.609	1.1020	532.9	2.571	60

ABSOLUTE PRESSURE, kPa													
Temp °C	50			60			70			80			Temp °C
	-62.68			-59.45			-56.63			-54.11			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.5437	431.4	2.164	0.4584	433.2	2.149	0.0008	104.6	0.607	0.0008	104.7	0.607	
-60	0.5515	433.5	2.173										-60
-55	0.5659	437.4	2.192	0.4693	436.8	2.165	0.4002	436.1	2.142				-55
-50	0.5802	441.3	2.209	0.4814	440.7	2.183	0.4108	440.2	2.161	0.3578	439.6	2.141	-50
-45	0.5944	445.1	2.226	0.4933	444.7	2.201	0.4212	444.1	2.178	0.3670	443.6	2.159	-45
-40	0.6084	449.0	2.243	0.5052	448.6	2.218	0.4315	448.1	2.196	0.3761	447.7	2.176	-40
-35	0.6224	453.0	2.260	0.5170	452.5	2.234	0.4416	452.1	2.213	0.3851	451.7	2.193	-35
-30	0.6363	456.9	2.276	0.5287	456.5	2.251	0.4518	456.1	2.229	0.3941	455.7	2.210	-30
-25	0.6502	460.8	2.292	0.5403	460.5	2.267	0.4618	460.1	2.245	0.4030	459.7	2.227	-25
-20	0.6640	464.8	2.308	0.5519	464.5	2.283	0.4718	464.1	2.261	0.4118	463.8	2.243	-20
-15	0.6777	468.8	2.324	0.5634	468.5	2.299	0.4818	468.2	2.277	0.4206	467.9	2.259	-15
-10	0.6914	472.8	2.339	0.5749	472.5	2.314	0.4917	472.2	2.293	0.4293	471.9	2.274	-10
-5	0.7051	476.9	2.354	0.5864	476.6	2.330	0.5016	476.3	2.308	0.4380	476.1	2.290	-5
0	0.7187	481.0	2.370	0.5978	480.7	2.345	0.5114	480.4	2.323	0.4466	480.2	2.305	0
5	0.7323	485.1	2.384	0.6092	484.8	2.360	0.5212	484.6	2.339	0.4553	484.3	2.320	5
10	0.7459	489.2	2.399	0.6206	489.0	2.374	0.5310	488.8	2.353	0.4639	488.5	2.335	10
15	0.7595	493.4	2.414	0.6319	493.2	2.389	0.5408	493.0	2.368	0.4725	492.8	2.350	15
20	0.7730	497.6	2.428	0.6432	497.4	2.404	0.5505	497.2	2.383	0.4810	497.0	2.365	20
25	0.7865	501.9	2.443	0.6545	501.7	2.418	0.5603	501.5	2.397	0.4896	501.3	2.379	25
30	0.8000	506.2	2.457	0.6658	506.0	2.432	0.5700	505.8	2.412	0.4981	505.6	2.393	30
35	0.8135	510.5	2.471	0.6771	510.3	2.447	0.5797	510.2	2.426	0.5066	510.0	2.408	35
40	0.8270	514.9	2.485	0.6884	514.7	2.461	0.5894	514.5	2.440	0.5151	514.4	2.422	40
45	0.8405	519.3	2.499	0.6996	519.1	2.475	0.5991	519.0	2.454	0.5236	518.8	2.436	45
50	0.8539	523.7	2.513	0.7109	523.6	2.489	0.6087	523.4	2.468	0.5321	523.3	2.450	50
55	0.8674	528.2	2.527	0.7221	528.1	2.502	0.6184	527.9	2.482	0.5406	527.8	2.464	55
60	0.8808	532.7	2.541	0.7333	532.6	2.516	0.6280	532.5	2.495	0.5490	532.3	2.477	60
65	0.8942	537.3	2.554	0.7446	537.2	2.530	0.6376	537.0	2.509	0.5575	536.9	2.491	65
70	0.9077	541.9	2.568	0.7558	541.8	2.543	0.6473	541.6	2.523	0.5659	541.5	2.504	70
75	0.9211	546.5	2.581	0.7670	546.4	2.557	0.6569	546.3	2.536	0.5743	546.2	2.518	75
80	0.9345	551.2	2.595	0.7782	551.1	2.570	0.6665	551.0	2.549	0.5828	550.9	2.531	80
85	0.9479	555.9	2.608	0.7893	555.8	2.583	0.6761	555.7	2.563	0.5912	555.6	2.545	85

Opteon™ XL41 (R-454B)
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
	-51.84			-49.76			-49.49			-47.83			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.3134	437.5	2.116	0.2839	438.6	2.108	0.0008	120.5	0.680	0.0008	120.5	0.680	
-50	0.3165	439.0	2.123										-50
-45	0.3249	443.1	2.142	0.2912	442.6	2.126	0.2872	442.5	2.124	0.2636	442.1	2.111	-45
-40	0.3331	447.2	2.159	0.2986	446.7	2.144	0.2946	446.7	2.142	0.2705	446.2	2.129	-40
-35	0.3412	451.3	2.176	0.3060	450.8	2.161	0.3019	450.8	2.159	0.2772	450.4	2.147	-35
-30	0.3492	455.3	2.193	0.3133	454.9	2.178	0.3091	454.9	2.176	0.2839	454.5	2.164	-30
-25	0.3572	459.4	2.210	0.3205	459.0	2.195	0.3162	459.0	2.193	0.2906	458.7	2.181	-25
-20	0.3651	463.5	2.226	0.3277	463.1	2.211	0.3233	463.1	2.209	0.2971	462.8	2.197	-20
-15	0.3729	467.5	2.242	0.3348	467.2	2.227	0.3303	467.2	2.225	0.3036	466.9	2.214	-15
-10	0.3807	471.7	2.258	0.3419	471.4	2.243	0.3373	471.3	2.241	0.3101	471.1	2.230	-10
-5	0.3885	475.8	2.273	0.3489	475.5	2.259	0.3443	475.5	2.257	0.3166	475.2	2.245	-5
0	0.3963	479.9	2.289	0.3559	479.7	2.274	0.3512	479.6	2.272	0.3230	479.4	2.261	0
5	0.4040	484.1	2.304	0.3629	483.9	2.289	0.3581	483.8	2.287	0.3293	483.6	2.276	5
10	0.4117	488.3	2.319	0.3699	488.1	2.304	0.3650	488.1	2.302	0.3357	487.9	2.291	10
15	0.4193	492.5	2.334	0.3768	492.3	2.319	0.3718	492.3	2.317	0.3420	492.1	2.306	15
20	0.4270	496.8	2.348	0.3837	496.6	2.334	0.3786	496.6	2.332	0.3483	496.4	2.321	20
25	0.4346	501.1	2.363	0.3906	500.9	2.348	0.3854	500.9	2.347	0.3546	500.7	2.335	25
30	0.4422	505.4	2.377	0.3975	505.3	2.363	0.3922	505.2	2.361	0.3609	505.1	2.350	30
35	0.4498	509.8	2.392	0.4043	509.6	2.377	0.3990	509.6	2.375	0.3671	509.4	2.364	35
40	0.4574	514.2	2.406	0.4112	514.0	2.391	0.4057	514.0	2.390	0.3733	513.9	2.378	40
45	0.4649	518.6	2.420	0.4180	518.5	2.405	0.4125	518.5	2.404	0.3796	518.3	2.392	45
50	0.4725	523.1	2.434	0.4248	523.0	2.419	0.4192	522.9	2.418	0.3858	522.8	2.406	50
55	0.4800	527.6	2.448	0.4316	527.5	2.433	0.4259	527.5	2.431	0.3920	527.3	2.420	55
60	0.4876	532.2	2.461	0.4384	532.0	2.447	0.4326	532.0	2.445	0.3982	531.9	2.434	60
65	0.4951	536.8	2.475	0.4452	536.6	2.461	0.4393	536.6	2.459	0.4044	536.5	2.448	65
70	0.5026	541.4	2.489	0.4520	541.2	2.474	0.4460	541.2	2.473	0.4106	541.1	2.461	70
75	0.5101	546.0	2.502	0.4588	545.9	2.488	0.4527	545.9	2.486	0.4167	545.8	2.475	75
80	0.5176	550.7	2.515	0.4655	550.6	2.501	0.4594	550.6	2.499	0.4229	550.5	2.488	80
85	0.5251	555.5	2.529	0.4723	555.4	2.515	0.4661	555.3	2.513	0.4290	555.2	2.502	85
90	0.5326	560.2	2.542	0.4790	560.1	2.528	0.4727	560.1	2.526	0.4352	560.0	2.515	90
95	0.5401	565.1	2.555	0.4858	565.0	2.541	0.4794	564.9	2.539	0.4413	564.8	2.528	95

ABSOLUTE PRESSURE, kPa													
Temp °C	120			130			140			150			Temp °C
	-46.04			-44.37			-42.79			-41.30			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.2392	440.6	2.094	0.2218	441.5	2.088	0.0008	129.1	0.718	0.0008	129.1	0.718	
-45	0.2405	441.5	2.098										-45
-40	0.2470	445.8	2.116	0.2271	445.3	2.104	0.2100	444.8	2.092	0.1952	444.3	2.082	-40
-35	0.2532	450.0	2.134	0.2329	449.5	2.122	0.2155	449.1	2.111	0.2004	448.6	2.100	-35
-30	0.2594	454.1	2.151	0.2387	453.7	2.140	0.2210	453.3	2.128	0.2055	452.9	2.118	-30
-25	0.2656	458.3	2.168	0.2444	457.9	2.157	0.2263	457.5	2.146	0.2106	457.2	2.135	-25
-20	0.2716	462.4	2.185	0.2501	462.1	2.173	0.2316	461.8	2.162	0.2156	461.4	2.152	-20
-15	0.2777	466.6	2.201	0.2557	466.3	2.190	0.2368	466.0	2.179	0.2205	465.6	2.169	-15
-10	0.2836	470.8	2.217	0.2612	470.5	2.206	0.2420	470.2	2.195	0.2254	469.9	2.185	-10
-5	0.2896	475.0	2.233	0.2667	474.7	2.222	0.2472	474.4	2.211	0.2302	474.1	2.201	-5
0	0.2955	479.2	2.248	0.2722	478.9	2.237	0.2523	478.6	2.227	0.2350	478.4	2.217	0
5	0.3013	483.4	2.264	0.2777	483.1	2.252	0.2574	482.9	2.242	0.2398	482.6	2.232	5
10	0.3072	487.6	2.279	0.2831	487.4	2.268	0.2624	487.2	2.257	0.2445	486.9	2.247	10
15	0.3130	491.9	2.294	0.2885	491.7	2.283	0.2674	491.5	2.272	0.2492	491.2	2.263	15
20	0.3188	496.2	2.309	0.2939	496.0	2.297	0.2725	495.8	2.287	0.2539	495.6	2.277	20
25	0.3246	500.5	2.323	0.2992	500.3	2.312	0.2775	500.1	2.302	0.2586	499.9	2.292	25
30	0.3304	504.9	2.338	0.3045	504.7	2.327	0.2824	504.5	2.316	0.2633	504.3	2.307	30
35	0.3361	509.3	2.352	0.3099	509.1	2.341	0.2874	508.9	2.331	0.2679	508.7	2.321	35
40	0.3418	513.7	2.366	0.3152	513.5	2.355	0.2923	513.4	2.345	0.2725	513.2	2.336	40
45	0.3476	518.2	2.380	0.3205	518.0	2.369	0.2973	517.8	2.359	0.2771	517.7	2.350	45
50	0.3533	522.6	2.395	0.3258	522.5	2.384	0.3022	522.3	2.373	0.2818	522.2	2.364	50
55	0.3590	527.2	2.408	0.3310	527.0	2.397	0.3071	526.9	2.387	0.2863	526.7	2.378	55
60	0.3647	531.7	2.422	0.3363	531.6	2.411	0.3120	531.5	2.401	0.2909	531.3	2.392	60
65	0.3704	536.3	2.436	0.3416	536.2	2.425	0.3169	536.1	2.415	0.2955	535.9	2.405	65
70	0.3760	541.0	2.450	0.3468	540.8	2.439	0.3218	540.7	2.429	0.3001	540.6	2.419	70
75	0.3817	545.7	2.463	0.3521	545.5	2.452	0.3267	545.4	2.442	0.3046	545.3	2.433	75
80	0.3874	550.4	2.477	0.3573	550.2	2.466	0.3315	550.1	2.456	0.3092	550.0	2.446	80
85	0.3930	555.1	2.490	0.3625	555.0	2.479	0.3364	554.9	2.469	0.3138	554.8	2.460	85
90	0.3987	559.9	2.503	0.3678	559.8	2.492	0.3413	559.7	2.482	0.3183	559.6	2.473	90
95	0.4043	564.7	2.516	0.3730	564.6	2.506	0.3461	564.5	2.495	0.3228	564.4	2.486	95
100	0.4100	569.6	2.529	0.3782	569.5	2.519	0.3510	569.4	2.509	0.3274	569.3	2.499	100

Opteon™ XL41 (R-454B)
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
	-39.89			-38.54			-37.26			-36.02			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1824	443.8	2.072	0.1722	444.5	2.067	0.0008	138.2	0.758	0.0008	138.2	0.758	
-35	0.1872	448.2	2.090	0.1755	447.7	2.080	0.1652	447.2	2.071	0.1559	446.7	2.063	-35
-30	0.1921	452.5	2.108	0.1802	452.1	2.099	0.1696	451.6	2.090	0.1601	451.2	2.081	-30
-25	0.1968	456.8	2.126	0.1847	456.4	2.116	0.1739	456.0	2.108	0.1642	455.6	2.099	-25
-20	0.2015	461.1	2.143	0.1892	460.7	2.133	0.1782	460.3	2.125	0.1683	460.0	2.117	-20
-15	0.2062	465.3	2.159	0.1936	465.0	2.150	0.1823	464.7	2.142	0.1723	464.3	2.134	-15
-10	0.2108	469.6	2.176	0.1979	469.3	2.167	0.1865	469.0	2.158	0.1763	468.7	2.150	-10
-5	0.2153	473.8	2.192	0.2022	473.5	2.183	0.1906	473.3	2.174	0.1802	473.0	2.166	-5
0	0.2199	478.1	2.207	0.2065	477.8	2.199	0.1947	477.6	2.190	0.1840	477.3	2.182	0
5	0.2244	482.4	2.223	0.2108	482.1	2.214	0.1987	481.9	2.206	0.1879	481.6	2.198	5
10	0.2288	486.7	2.238	0.2150	486.5	2.230	0.2027	486.2	2.221	0.1917	486.0	2.214	10
15	0.2333	491.0	2.253	0.2192	490.8	2.245	0.2067	490.6	2.237	0.1955	490.3	2.229	15
20	0.2377	495.4	2.268	0.2234	495.1	2.260	0.2106	494.9	2.252	0.1993	494.7	2.244	20
25	0.2421	499.7	2.283	0.2275	499.5	2.275	0.2146	499.3	2.267	0.2030	499.1	2.259	25
30	0.2465	504.1	2.298	0.2317	503.9	2.289	0.2185	503.8	2.281	0.2067	503.6	2.274	30
35	0.2508	508.6	2.312	0.2358	508.4	2.304	0.2224	508.2	2.296	0.2105	508.0	2.288	35
40	0.2552	513.0	2.327	0.2399	512.8	2.318	0.2263	512.7	2.310	0.2142	512.5	2.303	40
45	0.2595	517.5	2.341	0.2440	517.3	2.332	0.2302	517.2	2.324	0.2178	517.0	2.317	45
50	0.2639	522.0	2.355	0.2481	521.9	2.347	0.2341	521.7	2.339	0.2215	521.6	2.331	50
55	0.2682	526.6	2.369	0.2522	526.4	2.361	0.2379	526.3	2.353	0.2252	526.1	2.345	55
60	0.2725	531.2	2.383	0.2562	531.0	2.374	0.2418	530.9	2.367	0.2288	530.7	2.359	60
65	0.2768	535.8	2.397	0.2603	535.6	2.388	0.2456	535.5	2.380	0.2325	535.4	2.373	65
70	0.2811	540.4	2.410	0.2643	540.3	2.402	0.2494	540.2	2.394	0.2361	540.0	2.387	70
75	0.2854	545.1	2.424	0.2684	545.0	2.415	0.2533	544.9	2.408	0.2398	544.8	2.400	75
80	0.2897	549.9	2.437	0.2724	549.8	2.429	0.2571	549.6	2.421	0.2434	549.5	2.414	80
85	0.2939	554.6	2.451	0.2764	554.5	2.442	0.2609	554.4	2.435	0.2470	554.3	2.427	85
90	0.2982	559.4	2.464	0.2805	559.3	2.456	0.2647	559.2	2.448	0.2506	559.1	2.441	90
95	0.3025	564.3	2.477	0.2845	564.2	2.469	0.2685	564.1	2.461	0.2542	564.0	2.454	95
100	0.3067	569.2	2.490	0.2885	569.1	2.482	0.2723	569.0	2.474	0.2578	568.8	2.467	100
105	0.3110	574.1	2.504	0.2925	574.0	2.495	0.2761	573.9	2.487	0.2614	573.8	2.480	105
110	0.3152	579.0	2.517	0.2965	578.9	2.508	0.2799	578.8	2.501	0.2650	578.7	2.493	110

ABSOLUTE PRESSURE, kPa													
Temp °C	200			210			220			230			Temp °C
	-34.84			-33.71			-32.61			-31.56			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1476	446.4	2.055	0.1410	447.0	2.051	0.0008	145.7	0.790	0.0008	145.7	0.790	
-30	0.1516	450.8	2.073	0.1438	450.3	2.065	0.1368	449.9	2.058	0.1304	449.5	2.050	-30
-25	0.1555	455.2	2.091	0.1477	454.8	2.083	0.1405	454.4	2.076	0.1340	454.0	2.069	-25
-20	0.1594	459.6	2.109	0.1514	459.3	2.101	0.1441	458.9	2.094	0.1374	458.5	2.087	-20
-15	0.1633	464.0	2.126	0.1551	463.7	2.118	0.1476	463.3	2.111	0.1409	463.0	2.104	-15
-10	0.1670	468.4	2.142	0.1587	468.0	2.135	0.1511	467.7	2.128	0.1442	467.4	2.121	-10
-5	0.1708	472.7	2.159	0.1623	472.4	2.152	0.1546	472.1	2.145	0.1475	471.8	2.138	-5
0	0.1745	477.0	2.175	0.1658	476.8	2.168	0.1580	476.5	2.161	0.1508	476.2	2.154	0
5	0.1782	481.4	2.191	0.1694	481.1	2.183	0.1614	480.9	2.177	0.1540	480.6	2.170	5
10	0.1818	485.7	2.206	0.1728	485.5	2.199	0.1647	485.3	2.192	0.1573	485.0	2.186	10
15	0.1854	490.1	2.221	0.1763	489.9	2.214	0.1680	489.7	2.208	0.1604	489.5	2.201	15
20	0.1890	494.5	2.237	0.1797	494.3	2.230	0.1713	494.1	2.223	0.1636	493.9	2.216	20
25	0.1926	498.9	2.252	0.1832	498.7	2.245	0.1746	498.5	2.238	0.1667	498.3	2.232	25
30	0.1961	503.4	2.266	0.1866	503.2	2.259	0.1778	503.0	2.253	0.1699	502.8	2.246	30
35	0.1997	507.8	2.281	0.1899	507.7	2.274	0.1811	507.5	2.267	0.1730	507.3	2.261	35
40	0.2032	512.3	2.295	0.1933	512.2	2.288	0.1843	512.0	2.282	0.1761	511.8	2.276	40
45	0.2067	516.8	2.310	0.1967	516.7	2.303	0.1875	516.5	2.296	0.1792	516.3	2.290	45
50	0.2102	521.4	2.324	0.2000	521.2	2.317	0.1907	521.1	2.311	0.1822	520.9	2.304	50
55	0.2137	526.0	2.338	0.2033	525.8	2.331	0.1939	525.7	2.325	0.1853	525.5	2.318	55
60	0.2172	530.6	2.352	0.2067	530.4	2.345	0.1971	530.3	2.339	0.1883	530.2	2.332	60
65	0.2207	535.2	2.366	0.2100	535.1	2.359	0.2003	535.0	2.352	0.1914	534.8	2.346	65
70	0.2241	539.9	2.379	0.2133	539.8	2.373	0.2034	539.6	2.366	0.1944	539.5	2.360	70
75	0.2276	544.6	2.393	0.2166	544.5	2.386	0.2066	544.4	2.380	0.1974	544.2	2.374	75
80	0.2310	549.4	2.407	0.2199	549.3	2.400	0.2097	549.1	2.393	0.2005	549.0	2.387	80
85	0.2345	554.2	2.420	0.2232	554.0	2.413	0.2129	553.9	2.407	0.2035	553.8	2.401	85
90	0.2379	559.0	2.433	0.2264	558.9	2.427	0.2160	558.8	2.420	0.2065	558.6	2.414	90
95	0.2413	563.8	2.447	0.2297	563.7	2.440	0.2191	563.6	2.434	0.2095	563.5	2.428	95
100	0.2448	568.7	2.460	0.2330	568.6	2.453	0.2223	568.5	2.447	0.2125	568.4	2.441	100
105	0.2482	573.7	2.473	0.2362	573.6	2.466	0.2254	573.5	2.460	0.2154	573.4	2.454	105
110	0.2516	578.6	2.486	0.2395	578.5	2.479	0.2285	578.4	2.473	0.2184	578.3	2.467	110
115	0.2550	583.6	2.499	0.2428	583.5	2.492	0.2316	583.4	2.486	0.2214	583.4	2.480	115

Opteon™ XL41 (R-454B)
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
	-30.54			-29.55			-28.59			-27.66			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1241	448.5	2.041	0.1194	449.0	2.038	0.0008	152.2	0.816	0.0008	152.2	0.816	
-30	0.1245	449.0	2.043										-30
-25	0.1280	453.6	2.062	0.1224	453.2	2.055	0.1173	452.8	2.049	0.1126	452.4	2.042	-25
-20	0.1313	458.2	2.080	0.1257	457.8	2.074	0.1205	457.4	2.067	0.1157	457.0	2.061	-20
-15	0.1346	462.7	2.098	0.1289	462.3	2.091	0.1236	462.0	2.085	0.1187	461.6	2.079	-15
-10	0.1379	467.1	2.115	0.1320	466.8	2.108	0.1266	466.5	2.102	0.1216	466.2	2.096	-10
-5	0.1411	471.5	2.131	0.1351	471.2	2.125	0.1296	471.0	2.119	0.1245	470.7	2.113	-5
0	0.1442	476.0	2.148	0.1382	475.7	2.142	0.1326	475.4	2.136	0.1274	475.1	2.130	0
5	0.1473	480.4	2.164	0.1412	480.1	2.158	0.1355	479.9	2.152	0.1302	479.6	2.146	5
10	0.1504	484.8	2.179	0.1442	484.6	2.173	0.1384	484.3	2.168	0.1330	484.1	2.162	10
15	0.1535	489.2	2.195	0.1471	489.0	2.189	0.1412	488.8	2.183	0.1358	488.5	2.178	15
20	0.1565	493.7	2.210	0.1501	493.5	2.204	0.1441	493.2	2.199	0.1385	493.0	2.193	20
25	0.1596	498.1	2.225	0.1530	497.9	2.219	0.1469	497.7	2.214	0.1412	497.5	2.208	25
30	0.1626	502.6	2.240	0.1559	502.4	2.234	0.1497	502.2	2.229	0.1439	502.0	2.223	30
35	0.1656	507.1	2.255	0.1587	506.9	2.249	0.1524	506.7	2.243	0.1466	506.6	2.238	35
40	0.1685	511.6	2.270	0.1616	511.5	2.264	0.1552	511.3	2.258	0.1493	511.1	2.253	40
45	0.1715	516.2	2.284	0.1645	516.0	2.278	0.1580	515.9	2.273	0.1519	515.7	2.267	45
50	0.1745	520.8	2.298	0.1673	520.6	2.292	0.1607	520.4	2.287	0.1546	520.3	2.282	50
55	0.1774	525.4	2.312	0.1701	525.2	2.307	0.1634	525.1	2.301	0.1572	524.9	2.296	55
60	0.1803	530.0	2.326	0.1729	529.9	2.321	0.1661	529.7	2.315	0.1598	529.6	2.310	60
65	0.1832	534.7	2.340	0.1758	534.5	2.335	0.1688	534.4	2.329	0.1624	534.3	2.324	65
70	0.1862	539.4	2.354	0.1786	539.2	2.348	0.1715	539.1	2.343	0.1651	539.0	2.338	70
75	0.1891	544.1	2.368	0.1814	544.0	2.362	0.1742	543.9	2.357	0.1676	543.7	2.351	75
80	0.1920	548.9	2.381	0.1841	548.8	2.376	0.1769	548.6	2.370	0.1702	548.5	2.365	80
85	0.1948	553.7	2.395	0.1869	553.6	2.389	0.1796	553.4	2.384	0.1728	553.3	2.379	85
90	0.1977	558.5	2.408	0.1897	558.4	2.403	0.1823	558.3	2.397	0.1754	558.2	2.392	90
95	0.2006	563.4	2.422	0.1925	563.3	2.416	0.1849	563.2	2.411	0.1780	563.1	2.405	95
100	0.2035	568.3	2.435	0.1952	568.2	2.429	0.1876	568.1	2.424	0.1805	568.0	2.419	100
105	0.2064	573.3	2.448	0.1980	573.1	2.442	0.1903	573.0	2.437	0.1831	572.9	2.432	105
110	0.2092	578.2	2.461	0.2007	578.1	2.456	0.1929	578.0	2.450	0.1857	577.9	2.445	110
115	0.2121	583.3	2.474	0.2035	583.2	2.469	0.1956	583.1	2.463	0.1882	583.0	2.458	115
ABSOLUTE PRESSURE, kPa													
Temp °C	280			290			300			310			Temp °C
	-26.75			-25.87			-25.02			-24.18			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.1072	450.3	2.029	0.1036	450.7	2.027	0.0009	158.0	0.840	0.0009	158.0	0.840	
-25	0.1082	452.0	2.036	0.1041	451.5	2.030	0.1003	451.1	2.024				-25
-20	0.1112	456.7	2.055	0.1071	456.3	2.049	0.1032	455.9	2.044	0.0995	455.5	2.038	-20
-15	0.1141	461.3	2.073	0.1099	460.9	2.067	0.1059	460.6	2.062	0.1022	460.2	2.056	-15
-10	0.1170	465.8	2.091	0.1127	465.5	2.085	0.1087	465.2	2.080	0.1049	464.9	2.074	-10
-5	0.1198	470.4	2.108	0.1154	470.1	2.102	0.1113	469.8	2.097	0.1075	469.5	2.092	-5
0	0.1226	474.9	2.124	0.1181	474.6	2.119	0.1139	474.3	2.114	0.1100	474.0	2.108	0
5	0.1253	479.3	2.141	0.1208	479.1	2.135	0.1165	478.8	2.130	0.1125	478.6	2.125	5
10	0.1280	483.8	2.156	0.1234	483.6	2.151	0.1191	483.3	2.146	0.1150	483.1	2.141	10
15	0.1307	488.3	2.172	0.1260	488.1	2.167	0.1216	487.9	2.162	0.1175	487.6	2.157	15
20	0.1334	492.8	2.188	0.1286	492.6	2.182	0.1241	492.4	2.177	0.1199	492.2	2.173	20
25	0.1360	497.3	2.203	0.1311	497.1	2.198	0.1265	496.9	2.193	0.1223	496.7	2.188	25
30	0.1386	501.8	2.218	0.1336	501.6	2.213	0.1290	501.5	2.208	0.1247	501.3	2.203	30
35	0.1412	506.4	2.233	0.1361	506.2	2.228	0.1314	506.0	2.223	0.1270	505.8	2.218	35
40	0.1438	510.9	2.247	0.1387	510.8	2.242	0.1339	510.6	2.237	0.1294	510.4	2.233	40
45	0.1463	515.5	2.262	0.1411	515.4	2.257	0.1363	515.2	2.252	0.1317	515.0	2.247	45
50	0.1489	520.1	2.276	0.1436	520.0	2.271	0.1387	519.8	2.266	0.1341	519.6	2.262	50
55	0.1514	524.8	2.291	0.1461	524.6	2.286	0.1411	524.5	2.281	0.1364	524.3	2.276	55
60	0.1540	529.4	2.305	0.1485	529.3	2.300	0.1434	529.1	2.295	0.1387	529.0	2.290	60
65	0.1565	534.1	2.319	0.1510	534.0	2.314	0.1458	533.8	2.309	0.1410	533.7	2.304	65
70	0.1590	538.8	2.333	0.1534	538.7	2.328	0.1482	538.6	2.323	0.1433	538.4	2.318	70
75	0.1615	543.6	2.346	0.1558	543.5	2.341	0.1505	543.3	2.337	0.1456	543.2	2.332	75
80	0.1640	548.4	2.360	0.1583	548.3	2.355	0.1529	548.1	2.350	0.1478	548.0	2.346	80
85	0.1665	553.2	2.374	0.1607	553.1	2.369	0.1552	553.0	2.364	0.1501	552.8	2.359	85
90	0.1690	558.1	2.387	0.1631	557.9	2.382	0.1575	557.8	2.377	0.1524	557.7	2.373	90
95	0.1715	563.0	2.400	0.1655	562.8	2.395	0.1599	562.7	2.391	0.1546	562.6	2.386	95
100	0.1740	567.9	2.414	0.1679	567.8	2.409	0.1622	567.7	2.404	0.1569	567.5	2.399	100
105	0.1765	572.8	2.427	0.1703	572.7	2.422	0.1645	572.6	2.417	0.1591	572.5	2.413	105
110	0.1789	577.8	2.440	0.1727	577.7	2.435	0.1668	577.6	2.430	0.1613	577.5	2.426	110
115	0.1814	582.9	2.453	0.1750	582.8	2.448	0.1691	582.7	2.443	0.1636	582.6	2.439	115
120	0.1839	587.9	2.466	0.1774	587.8	2.461	0.1714	587.7	2.456	0.1658	587.6	2.452	120

Opteon™ XL41 (R-454B)

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
	-23.37			-22.58			-21.80			-21.04			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0943	451.8	2.019	0.0915	452.2	2.017	0.0009	163.2	0.861	0.0009	163.2	0.860	
-20	0.0961	455.1	2.033	0.0929	454.7	2.027	0.0899	454.3	2.022	0.0870	453.9	2.017	-20
-15	0.0988	459.9	2.051	0.0955	459.5	2.046	0.0924	459.1	2.041	0.0895	458.8	2.036	-15
-10	0.1013	464.5	2.069	0.0980	464.2	2.064	0.0949	463.9	2.059	0.0919	463.5	2.054	-10
-5	0.1039	469.2	2.087	0.1005	468.9	2.082	0.0973	468.6	2.077	0.0943	468.2	2.072	-5
0	0.1063	473.7	2.103	0.1029	473.5	2.099	0.0997	473.2	2.094	0.0966	472.9	2.089	0
5	0.1088	478.3	2.120	0.1053	478.0	2.115	0.1020	477.8	2.111	0.0989	477.5	2.106	5
10	0.1112	482.9	2.136	0.1076	482.6	2.131	0.1043	482.4	2.127	0.1011	482.1	2.122	10
15	0.1136	487.4	2.152	0.1100	487.2	2.147	0.1065	486.9	2.143	0.1033	486.7	2.138	15
20	0.1159	491.9	2.168	0.1123	491.7	2.163	0.1088	491.5	2.159	0.1055	491.3	2.154	20
25	0.1183	496.5	2.183	0.1145	496.3	2.179	0.1110	496.1	2.174	0.1077	495.9	2.170	25
30	0.1206	501.1	2.198	0.1168	500.9	2.194	0.1132	500.7	2.189	0.1098	500.5	2.185	30
35	0.1229	505.6	2.213	0.1190	505.5	2.209	0.1154	505.3	2.204	0.1119	505.1	2.200	35
40	0.1252	510.2	2.228	0.1213	510.1	2.224	0.1175	509.9	2.219	0.1140	509.7	2.215	40
45	0.1275	514.8	2.243	0.1235	514.7	2.238	0.1197	514.5	2.234	0.1161	514.3	2.230	45
50	0.1297	519.5	2.257	0.1257	519.3	2.253	0.1218	519.2	2.248	0.1182	519.0	2.244	50
55	0.1320	524.1	2.271	0.1279	524.0	2.267	0.1240	523.8	2.263	0.1203	523.7	2.259	55
60	0.1342	528.8	2.286	0.1300	528.7	2.281	0.1261	528.5	2.277	0.1224	528.4	2.273	60
65	0.1365	533.6	2.300	0.1322	533.4	2.295	0.1282	533.3	2.291	0.1244	533.1	2.287	65
70	0.1387	538.3	2.314	0.1344	538.2	2.309	0.1303	538.0	2.305	0.1265	537.9	2.301	70
75	0.1409	543.1	2.327	0.1365	542.9	2.323	0.1324	542.8	2.319	0.1285	542.7	2.315	75
80	0.1431	547.9	2.341	0.1387	547.8	2.337	0.1345	547.6	2.333	0.1305	547.5	2.329	80
85	0.1453	552.7	2.355	0.1408	552.6	2.350	0.1366	552.5	2.346	0.1326	552.4	2.342	85
90	0.1475	557.6	2.368	0.1429	557.5	2.364	0.1386	557.4	2.360	0.1346	557.2	2.356	90
95	0.1497	562.5	2.382	0.1450	562.4	2.377	0.1407	562.3	2.373	0.1366	562.2	2.369	95
100	0.1519	567.4	2.395	0.1472	567.3	2.391	0.1428	567.2	2.387	0.1386	567.1	2.383	100
105	0.1540	572.4	2.408	0.1493	572.3	2.404	0.1448	572.2	2.400	0.1406	572.1	2.396	105
110	0.1562	577.4	2.421	0.1514	577.3	2.417	0.1469	577.2	2.413	0.1426	577.1	2.409	110
115	0.1584	582.5	2.435	0.1535	582.4	2.430	0.1489	582.3	2.426	0.1446	582.2	2.422	115
120	0.1605	587.5	2.448	0.1556	587.4	2.443	0.1509	587.4	2.439	0.1466	587.3	2.435	120
125	0.1627	592.7	2.460	0.1577	592.6	2.456	0.1530	592.5	2.452	0.1485	592.4	2.448	125

ABSOLUTE PRESSURE, kPa													
Temp °C	360			370			380			390			Temp °C
	-20.30			-19.57			-18.86			-18.16			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0842	453.2	2.011	0.0820	453.5	2.009	0.0009	167.9	0.879	0.0009	167.9	0.879	
-20	0.0843	453.5	2.012	0.0820	453.5	2.009	0.0009	167.9	0.879	0.0009	167.9	0.879	-20
-15	0.0868	458.4	2.031	0.0842	458.0	2.026	0.0817	457.7	2.022	0.0794	457.3	2.017	-15
-10	0.0891	463.2	2.050	0.0865	462.9	2.045	0.0840	462.5	2.040	0.0816	462.2	2.036	-10
-5	0.0914	467.9	2.067	0.0888	467.6	2.063	0.0862	467.3	2.058	0.0838	467.0	2.054	-5
0	0.0937	472.6	2.085	0.0910	472.3	2.080	0.0884	472.0	2.076	0.0859	471.7	2.072	0
5	0.0959	477.3	2.102	0.0931	477.0	2.097	0.0905	476.7	2.093	0.0880	476.4	2.089	5
10	0.0981	481.9	2.118	0.0953	481.6	2.114	0.0926	481.4	2.109	0.0901	481.1	2.105	10
15	0.1003	486.5	2.134	0.0974	486.2	2.130	0.0947	486.0	2.126	0.0921	485.8	2.122	15
20	0.1024	491.1	2.150	0.0995	490.8	2.146	0.0967	490.6	2.142	0.0941	490.4	2.138	20
25	0.1045	495.7	2.165	0.1015	495.5	2.161	0.0987	495.3	2.157	0.0960	495.0	2.153	25
30	0.1066	500.3	2.181	0.1036	500.1	2.177	0.1007	499.9	2.173	0.0980	499.7	2.169	30
35	0.1087	504.9	2.196	0.1056	504.7	2.192	0.1027	504.5	2.188	0.0999	504.3	2.184	35
40	0.1107	509.5	2.211	0.1076	509.3	2.207	0.1047	509.2	2.203	0.1018	509.0	2.199	40
45	0.1128	514.2	2.226	0.1096	514.0	2.221	0.1066	513.8	2.218	0.1038	513.7	2.214	45
50	0.1148	518.8	2.240	0.1116	518.7	2.236	0.1085	518.5	2.232	0.1056	518.4	2.228	50
55	0.1168	523.5	2.254	0.1136	523.4	2.251	0.1105	523.2	2.247	0.1075	523.1	2.243	55
60	0.1189	528.2	2.269	0.1155	528.1	2.265	0.1124	528.0	2.261	0.1094	527.8	2.257	60
65	0.1209	533.0	2.283	0.1175	532.8	2.279	0.1143	532.7	2.275	0.1113	532.6	2.271	65
70	0.1228	537.8	2.297	0.1194	537.6	2.293	0.1162	537.5	2.289	0.1131	537.3	2.285	70
75	0.1248	542.6	2.311	0.1214	542.4	2.307	0.1181	542.3	2.303	0.1149	542.2	2.299	75
80	0.1268	547.4	2.325	0.1233	547.3	2.321	0.1199	547.1	2.317	0.1168	547.0	2.313	80
85	0.1288	552.2	2.338	0.1252	552.1	2.334	0.1218	552.0	2.331	0.1186	551.9	2.327	85
90	0.1307	557.1	2.352	0.1271	557.0	2.348	0.1237	556.9	2.344	0.1204	556.8	2.340	90
95	0.1327	562.1	2.365	0.1290	561.9	2.361	0.1256	561.8	2.358	0.1223	561.7	2.354	95
100	0.1347	567.0	2.379	0.1309	566.9	2.375	0.1274	566.8	2.371	0.1241	566.7	2.367	100
105	0.1366	572.0	2.392	0.1328	571.9	2.388	0.1293	571.8	2.384	0.1259	571.7	2.381	105
110	0.1385	577.0	2.405	0.1347	576.9	2.401	0.1311	576.8	2.397	0.1277	576.7	2.394	110
115	0.1405	582.1	2.418	0.1366	582.0	2.414	0.1329	581.9	2.411	0.1295	581.8	2.407	115
120	0.1424	587.2	2.431	0.1385	587.1	2.427	0.1348	587.0	2.424	0.1313	586.9	2.420	120
125	0.1443	592.3	2.444	0.1404	592.2	2.440	0.1366	592.1	2.437	0.1331	592.0	2.433	125

Opteon™ XL41 (R-454B)
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
	-17.48			-15.83			-14.25			-12.73			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0760	454.4	2.003	0.0717	455.1	1.998	0.0009	172.3	0.896	0.0009	172.3	0.896	
-15	0.0772	456.9	2.013	0.0721	455.9	2.002							-15
-10	0.0794	461.8	2.032	0.0742	461.0	2.021	0.0696	460.1	2.011	0.0654	459.2	2.001	-10
-5	0.0815	466.7	2.050	0.0762	465.9	2.040	0.0715	465.1	2.030	0.0673	464.3	2.020	-5
0	0.0836	471.5	2.067	0.0782	470.7	2.057	0.0734	470.0	2.048	0.0692	469.2	2.038	0
5	0.0856	476.2	2.085	0.0802	475.5	2.075	0.0753	474.8	2.065	0.0710	474.1	2.056	5
10	0.0876	480.9	2.101	0.0821	480.2	2.092	0.0771	479.6	2.082	0.0727	478.9	2.073	10
15	0.0896	485.5	2.118	0.0840	484.9	2.108	0.0789	484.3	2.099	0.0745	483.7	2.090	15
20	0.0916	490.2	2.134	0.0858	489.6	2.124	0.0807	489.1	2.115	0.0762	488.5	2.107	20
25	0.0935	494.8	2.149	0.0877	494.3	2.140	0.0825	493.8	2.131	0.0778	493.2	2.123	25
30	0.0954	499.5	2.165	0.0895	499.0	2.156	0.0842	498.5	2.147	0.0795	498.0	2.138	30
35	0.0973	504.1	2.180	0.0913	503.7	2.171	0.0859	503.2	2.162	0.0811	502.7	2.154	35
40	0.0992	508.8	2.195	0.0931	508.4	2.186	0.0876	507.9	2.177	0.0827	507.5	2.169	40
45	0.1010	513.5	2.210	0.0948	513.1	2.201	0.0893	512.6	2.192	0.0843	512.2	2.184	45
50	0.1029	518.2	2.225	0.0966	517.8	2.216	0.0910	517.4	2.207	0.0859	517.0	2.199	50
55	0.1047	522.9	2.239	0.0983	522.5	2.230	0.0926	522.1	2.222	0.0875	521.7	2.214	55
60	0.1066	527.7	2.253	0.1000	527.3	2.245	0.0943	526.9	2.236	0.0891	526.5	2.228	60
65	0.1084	532.4	2.268	0.1018	532.1	2.259	0.0959	531.7	2.250	0.0906	531.3	2.243	65
70	0.1102	537.2	2.282	0.1035	536.9	2.273	0.0975	536.5	2.265	0.0922	536.2	2.257	70
75	0.1120	542.0	2.296	0.1052	541.7	2.287	0.0991	541.4	2.279	0.0937	541.0	2.271	75
80	0.1138	546.9	2.309	0.1069	546.6	2.301	0.1007	546.2	2.293	0.0953	545.9	2.285	80
85	0.1156	551.8	2.323	0.1086	551.4	2.315	0.1023	551.1	2.306	0.0968	550.8	2.299	85
90	0.1173	556.7	2.337	0.1102	556.4	2.328	0.1039	556.1	2.320	0.0983	555.8	2.312	90
95	0.1191	561.6	2.350	0.1119	561.3	2.342	0.1055	561.0	2.334	0.0998	560.7	2.326	95
100	0.1209	566.6	2.364	0.1136	566.3	2.355	0.1071	566.0	2.347	0.1013	565.7	2.339	100
105	0.1226	571.6	2.377	0.1153	571.3	2.368	0.1087	571.0	2.360	0.1028	570.8	2.353	105
110	0.1244	576.6	2.390	0.1169	576.3	2.382	0.1103	576.1	2.374	0.1043	575.8	2.366	110
115	0.1262	581.7	2.403	0.1186	581.4	2.395	0.1118	581.2	2.387	0.1058	580.9	2.379	115
120	0.1279	586.8	2.416	0.1202	586.5	2.408	0.1134	586.3	2.400	0.1073	586.1	2.392	120
125	0.1297	591.9	2.429	0.1219	591.7	2.421	0.1150	591.4	2.413	0.1088	591.2	2.405	125
130	0.1314	597.1	2.442	0.1235	596.9	2.434	0.1165	596.6	2.426	0.1103	596.4	2.418	130

ABSOLUTE PRESSURE, kPa													
Temp °C	500			525			550			575			Temp °C
	-11.28			-9.87			-8.52			-7.22			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0612	456.9	1.986	0.0584	457.4	1.983	0.0009	182.0	0.933	0.0009	182.0	0.933	
-10	0.0617	458.3	1.991										-10
-5	0.0635	463.4	2.011	0.0601	462.6	2.002	0.0570	461.7	1.993	0.0541	460.8	1.985	-5
0	0.0653	468.5	2.030	0.0618	467.7	2.021	0.0587	466.9	2.013	0.0557	466.1	2.004	0
5	0.0671	473.4	2.047	0.0635	472.7	2.039	0.0603	472.0	2.031	0.0573	471.3	2.023	5
10	0.0687	478.3	2.065	0.0651	477.6	2.057	0.0619	477.0	2.049	0.0589	476.3	2.041	10
15	0.0704	483.1	2.082	0.0667	482.5	2.074	0.0634	481.9	2.066	0.0604	481.3	2.058	15
20	0.0720	487.9	2.098	0.0683	487.4	2.090	0.0649	486.8	2.083	0.0618	486.2	2.075	20
25	0.0736	492.7	2.114	0.0699	492.2	2.107	0.0664	491.6	2.099	0.0633	491.1	2.092	25
30	0.0752	497.5	2.130	0.0714	497.0	2.123	0.0679	496.5	2.115	0.0647	495.9	2.108	30
35	0.0768	502.2	2.146	0.0729	501.8	2.138	0.0693	501.3	2.131	0.0661	500.8	2.124	35
40	0.0784	507.0	2.161	0.0744	506.5	2.154	0.0708	506.1	2.146	0.0675	505.6	2.139	40
45	0.0799	511.8	2.176	0.0759	511.3	2.169	0.0722	510.9	2.162	0.0688	510.5	2.155	45
50	0.0814	516.6	2.191	0.0773	516.1	2.184	0.0736	515.7	2.177	0.0702	515.3	2.170	50
55	0.0829	521.4	2.206	0.0788	521.0	2.199	0.0750	520.6	2.192	0.0715	520.2	2.185	55
60	0.0844	526.2	2.221	0.0802	525.8	2.213	0.0764	525.4	2.206	0.0729	525.0	2.200	60
65	0.0859	531.0	2.235	0.0816	530.6	2.228	0.0777	530.3	2.221	0.0742	529.9	2.214	65
70	0.0874	535.8	2.249	0.0830	535.5	2.242	0.0791	535.1	2.235	0.0755	534.8	2.228	70
75	0.0889	540.7	2.263	0.0844	540.4	2.256	0.0804	540.0	2.249	0.0768	539.7	2.243	75
80	0.0903	545.6	2.277	0.0858	545.3	2.270	0.0818	545.0	2.263	0.0781	544.6	2.257	80
85	0.0918	550.5	2.291	0.0872	550.2	2.284	0.0831	549.9	2.277	0.0794	549.6	2.271	85
90	0.0932	555.5	2.305	0.0886	555.2	2.298	0.0844	554.9	2.291	0.0806	554.6	2.284	90
95	0.0947	560.5	2.318	0.0900	560.2	2.311	0.0858	559.9	2.305	0.0819	559.6	2.298	95
100	0.0961	565.5	2.332	0.0914	565.2	2.325	0.0871	564.9	2.318	0.0832	564.6	2.312	100
105	0.0975	570.5	2.345	0.0928	570.2	2.338	0.0884	570.0	2.332	0.0844	569.7	2.325	105
110	0.0990	575.6	2.359	0.0941	575.3	2.352	0.0897	575.1	2.345	0.0857	574.8	2.339	110
115	0.1004	580.7	2.372	0.0955	580.4	2.365	0.0910	580.2	2.358	0.0869	579.9	2.352	115
120	0.1018	585.8	2.385	0.0968	585.6	2.378	0.0923	585.3	2.371	0.0882	585.1	2.365	120
125	0.1032	591.0	2.398	0.0982	590.7	2.391	0.0936	590.5	2.385	0.0894	590.3	2.378	125
130	0.1046	596.2	2.411	0.0995	596.0	2.404	0.0949	595.7	2.398	0.0907	595.5	2.391	130
135	0.1060	601.4	2.424	0.1009	601.2	2.417	0.0962	601.0	2.411	0.0919	600.7	2.404	135

Opteon™ XL41 (R-454B)
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
	-5.96			-4.74			-3.55			-2.40			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0512	458.9	1.973	0.0491	459.3	1.970	0.0009	190.4	0.965	0.0009	190.4	0.965	
-5	0.0515	459.9	1.977										-5
0	0.0531	465.3	1.996	0.0506	464.5	1.989	0.0484	463.7	1.981	0.0462	462.8	1.974	0
5	0.0546	470.5	2.015	0.0521	469.8	2.008	0.0498	469.0	2.001	0.0477	468.2	1.993	5
10	0.0561	475.6	2.033	0.0536	474.9	2.026	0.0512	474.2	2.019	0.0491	473.5	2.012	10
15	0.0576	480.6	2.051	0.0550	480.0	2.044	0.0526	479.4	2.037	0.0504	478.7	2.030	15
20	0.0590	485.6	2.068	0.0564	485.0	2.061	0.0540	484.4	2.054	0.0517	483.8	2.048	20
25	0.0604	490.5	2.085	0.0577	490.0	2.078	0.0553	489.4	2.071	0.0530	488.8	2.065	25
30	0.0618	495.4	2.101	0.0591	494.9	2.094	0.0566	494.4	2.088	0.0543	493.8	2.082	30
35	0.0631	500.3	2.117	0.0604	499.8	2.110	0.0578	499.3	2.104	0.0555	498.8	2.098	35
40	0.0645	505.2	2.133	0.0617	504.7	2.126	0.0591	504.2	2.120	0.0567	503.8	2.114	40
45	0.0658	510.0	2.148	0.0629	509.6	2.142	0.0603	509.1	2.135	0.0579	508.7	2.129	45
50	0.0671	514.9	2.163	0.0642	514.5	2.157	0.0616	514.0	2.151	0.0591	513.6	2.145	50
55	0.0684	519.8	2.178	0.0655	519.4	2.172	0.0628	519.0	2.166	0.0603	518.6	2.160	55
60	0.0696	524.6	2.193	0.0667	524.3	2.187	0.0640	523.9	2.181	0.0614	523.5	2.175	60
65	0.0709	529.5	2.208	0.0679	529.2	2.201	0.0651	528.8	2.195	0.0626	528.4	2.190	65
70	0.0722	534.4	2.222	0.0691	534.1	2.216	0.0663	533.7	2.210	0.0637	533.4	2.204	70
75	0.0734	539.4	2.236	0.0703	539.0	2.230	0.0675	538.7	2.224	0.0649	538.4	2.219	75
80	0.0747	544.3	2.250	0.0715	544.0	2.244	0.0687	543.7	2.238	0.0660	543.4	2.233	80
85	0.0759	549.3	2.264	0.0727	549.0	2.258	0.0698	548.7	2.252	0.0671	548.4	2.247	85
90	0.0771	554.3	2.278	0.0739	554.0	2.272	0.0709	553.7	2.266	0.0682	553.4	2.261	90
95	0.0784	559.3	2.292	0.0751	559.0	2.286	0.0721	558.7	2.280	0.0693	558.5	2.275	95
100	0.0796	564.4	2.306	0.0763	564.1	2.300	0.0732	563.8	2.294	0.0704	563.5	2.288	100
105	0.0808	569.4	2.319	0.0774	569.2	2.313	0.0743	568.9	2.307	0.0715	568.6	2.302	105
110	0.0820	574.5	2.333	0.0786	574.3	2.327	0.0755	574.0	2.321	0.0726	573.8	2.315	110
115	0.0832	579.7	2.346	0.0798	579.4	2.340	0.0766	579.2	2.334	0.0737	578.9	2.329	115
120	0.0844	584.8	2.359	0.0809	584.6	2.353	0.0777	584.4	2.348	0.0747	584.1	2.342	120
125	0.0856	590.0	2.372	0.0821	589.8	2.366	0.0788	589.6	2.361	0.0758	589.3	2.355	125
130	0.0868	595.3	2.385	0.0832	595.0	2.379	0.0799	594.8	2.374	0.0769	594.6	2.368	130
135	0.0880	600.5	2.398	0.0844	600.3	2.392	0.0810	600.1	2.387	0.0779	599.9	2.381	135
140	0.0892	605.8	2.411	0.0855	605.6	2.405	0.0821	605.4	2.400	0.0790	605.2	2.394	140

ABSOLUTE PRESSURE, kPa													
Temp °C	700			725			750			775			Temp °C
	-1.28			-0.19			0.87			1.91			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0439	460.5	1.961	0.0424	460.9	1.958	0.0009	197.9	0.992	0.0009	197.9	0.992	
0	0.0443	462.0	1.966	0.0424	461.1	1.959							0
5	0.0457	467.5	1.986	0.0438	466.7	1.980	0.0421	465.9	1.973	0.0405	465.1	1.966	5
10	0.0471	472.8	2.005	0.0452	472.1	1.999	0.0434	471.4	1.992	0.0418	470.6	1.986	10
15	0.0484	478.0	2.024	0.0465	477.4	2.017	0.0447	476.7	2.011	0.0430	476.0	2.005	15
20	0.0497	483.2	2.041	0.0477	482.6	2.035	0.0459	482.0	2.029	0.0442	481.3	2.023	20
25	0.0509	488.3	2.059	0.0489	487.7	2.053	0.0471	487.1	2.047	0.0454	486.5	2.041	25
30	0.0521	493.3	2.075	0.0501	492.8	2.069	0.0483	492.2	2.064	0.0465	491.7	2.058	30
35	0.0533	498.3	2.092	0.0513	497.8	2.086	0.0494	497.3	2.080	0.0476	496.8	2.075	35
40	0.0545	503.3	2.108	0.0525	502.8	2.102	0.0505	502.3	2.096	0.0487	501.8	2.091	40
45	0.0557	508.2	2.124	0.0536	507.8	2.118	0.0516	507.3	2.112	0.0498	506.9	2.107	45
50	0.0568	513.2	2.139	0.0547	512.8	2.133	0.0527	512.3	2.128	0.0509	511.9	2.122	50
55	0.0580	518.1	2.154	0.0558	517.7	2.149	0.0538	517.3	2.143	0.0519	516.9	2.138	55
60	0.0591	523.1	2.169	0.0569	522.7	2.164	0.0549	522.3	2.158	0.0530	521.9	2.153	60
65	0.0602	528.1	2.184	0.0580	527.7	2.178	0.0559	527.3	2.173	0.0540	526.9	2.168	65
70	0.0613	533.0	2.199	0.0591	532.7	2.193	0.0570	532.3	2.188	0.0550	532.0	2.183	70
75	0.0624	538.0	2.213	0.0601	537.7	2.208	0.0580	537.3	2.202	0.0560	537.0	2.197	75
80	0.0635	543.0	2.227	0.0612	542.7	2.222	0.0590	542.4	2.217	0.0570	542.0	2.212	80
85	0.0646	548.1	2.241	0.0622	547.7	2.236	0.0600	547.4	2.231	0.0580	547.1	2.226	85
90	0.0656	553.1	2.255	0.0633	552.8	2.250	0.0610	552.5	2.245	0.0590	552.2	2.240	90
95	0.0667	558.2	2.269	0.0643	557.9	2.264	0.0621	557.6	2.259	0.0599	557.3	2.254	95
100	0.0678	563.3	2.283	0.0653	563.0	2.278	0.0630	562.7	2.273	0.0609	562.4	2.268	100
105	0.0688	568.4	2.297	0.0664	568.1	2.291	0.0640	567.8	2.286	0.0619	567.6	2.281	105
110	0.0699	573.5	2.310	0.0674	573.2	2.305	0.0650	573.0	2.300	0.0628	572.7	2.295	110
115	0.0709	578.7	2.323	0.0684	578.4	2.318	0.0660	578.2	2.313	0.0638	577.9	2.309	115
120	0.0720	583.9	2.337	0.0694	583.6	2.332	0.0670	583.4	2.327	0.0647	583.1	2.322	120
125	0.0730	589.1	2.350	0.0704	588.9	2.345	0.0680	588.6	2.340	0.0657	588.4	2.335	125
130	0.0740	594.4	2.363	0.0714	594.1	2.358	0.0689	593.9	2.353	0.0666	593.7	2.348	130
135	0.0751	599.6	2.376	0.0724	599.4	2.371	0.0699	599.2	2.366	0.0676	599.0	2.361	135
140	0.0761	605.0	2.389	0.0734	604.7	2.384	0.0709	604.5	2.379	0.0685	604.3	2.374	140
145	0.0771	610.3	2.402	0.0744	610.1	2.397	0.0718	609.9	2.392	0.0694	609.7	2.387	145

Opteon™ XL41 (R-454B)
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
	2.92			6.73			10.24			13.49			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0384	461.8	1.951	0.0341	462.9	1.942	0.0009	204.8	1.017	0.0009	204.8	1.016	
5	0.0390	464.2	1.960										5
10	0.0402	469.9	1.980	0.0349	466.8	1.956							10
15	0.0414	475.4	1.999	0.0360	472.5	1.976	0.0317	469.6	1.954	0.0280	466.4	1.932	15
20	0.0426	480.7	2.017	0.0371	478.1	1.995	0.0327	475.4	1.974	0.0291	472.6	1.954	20
25	0.0438	486.0	2.035	0.0382	483.5	2.013	0.0337	481.1	1.993	0.0300	478.5	1.974	25
30	0.0449	491.1	2.052	0.0392	488.9	2.031	0.0347	486.6	2.011	0.0310	484.2	1.993	30
35	0.0460	496.3	2.069	0.0402	494.2	2.048	0.0356	492.0	2.029	0.0319	489.8	2.011	35
40	0.0470	501.4	2.085	0.0412	499.4	2.065	0.0366	497.4	2.046	0.0327	495.3	2.029	40
45	0.0481	506.4	2.102	0.0422	504.6	2.082	0.0375	502.7	2.063	0.0336	500.7	2.046	45
50	0.0491	511.5	2.117	0.0431	509.7	2.098	0.0383	507.9	2.079	0.0344	506.1	2.063	50
55	0.0502	516.5	2.133	0.0441	514.8	2.113	0.0392	513.1	2.095	0.0352	511.4	2.079	55
60	0.0512	521.5	2.148	0.0450	520.0	2.129	0.0401	518.3	2.111	0.0360	516.7	2.095	60
65	0.0522	526.6	2.163	0.0459	525.1	2.144	0.0409	523.5	2.127	0.0368	522.0	2.111	65
70	0.0532	531.6	2.178	0.0468	530.2	2.159	0.0417	528.7	2.142	0.0376	527.2	2.126	70
75	0.0541	536.7	2.192	0.0477	535.3	2.174	0.0425	533.9	2.157	0.0383	532.5	2.141	75
80	0.0551	541.7	2.207	0.0486	540.4	2.188	0.0434	539.1	2.172	0.0391	537.7	2.156	80
85	0.0561	546.8	2.221	0.0494	545.5	2.203	0.0442	544.2	2.186	0.0398	542.9	2.171	85
90	0.0570	551.9	2.235	0.0503	550.7	2.217	0.0449	549.4	2.201	0.0406	548.2	2.185	90
95	0.0580	557.0	2.249	0.0512	555.8	2.231	0.0457	554.6	2.215	0.0413	553.4	2.200	95
100	0.0589	562.1	2.263	0.0520	561.0	2.245	0.0465	559.9	2.229	0.0420	558.7	2.214	100
105	0.0599	567.3	2.277	0.0529	566.2	2.259	0.0473	565.1	2.243	0.0427	564.0	2.228	105
110	0.0608	572.5	2.290	0.0537	571.4	2.273	0.0481	570.3	2.257	0.0434	569.3	2.242	110
115	0.0617	577.7	2.304	0.0546	576.6	2.286	0.0488	575.6	2.270	0.0441	574.6	2.256	115
120	0.0626	582.9	2.317	0.0554	581.9	2.300	0.0496	580.9	2.284	0.0448	579.9	2.269	120
125	0.0636	588.2	2.330	0.0562	587.2	2.313	0.0503	586.2	2.297	0.0455	585.3	2.283	125
130	0.0645	593.4	2.344	0.0570	592.5	2.326	0.0511	591.6	2.311	0.0462	590.7	2.296	130
135	0.0654	598.7	2.357	0.0579	597.9	2.340	0.0518	597.0	2.324	0.0469	596.1	2.310	135
140	0.0663	604.1	2.370	0.0587	603.2	2.353	0.0526	602.4	2.337	0.0476	601.5	2.323	140
145	0.0672	609.5	2.383	0.0595	608.6	2.366	0.0533	607.8	2.350	0.0483	606.9	2.336	145
150	0.0681	614.9	2.396	0.0603	614.1	2.378	0.0541	613.2	2.363	0.0489	612.4	2.349	150

ABSOLUTE PRESSURE, kPa													
Temp °C	1200			1300			1400			1500			Temp °C
	16.52			19.37			22.06			24.61			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0253	465.1	1.919	0.0233	465.6	1.912	0.0010	227.5	1.096	0.0010	227.5	1.095	
20	0.0260	469.6	1.934	0.0234	466.4	1.915							20
25	0.0269	475.8	1.955	0.0243	472.9	1.937	0.0220	469.9	1.919	0.0200	466.7	1.901	25
30	0.0278	481.7	1.975	0.0252	479.1	1.958	0.0229	476.4	1.941	0.0209	473.6	1.924	30
35	0.0287	487.5	1.994	0.0260	485.1	1.977	0.0237	482.7	1.961	0.0217	480.1	1.945	35
40	0.0295	493.2	2.012	0.0268	491.0	1.996	0.0245	488.7	1.980	0.0224	486.4	1.966	40
45	0.0303	498.7	2.030	0.0276	496.7	2.014	0.0252	494.6	1.999	0.0231	492.4	1.985	45
50	0.0311	504.2	2.047	0.0283	502.3	2.032	0.0259	500.3	2.017	0.0238	498.3	2.003	50
55	0.0319	509.6	2.063	0.0291	507.8	2.049	0.0266	506.0	2.034	0.0245	504.1	2.021	55
60	0.0326	515.0	2.080	0.0298	513.3	2.065	0.0273	511.6	2.051	0.0252	509.8	2.038	60
65	0.0334	520.4	2.096	0.0305	518.8	2.081	0.0280	517.1	2.068	0.0258	515.5	2.055	65
70	0.0341	525.7	2.111	0.0311	524.2	2.097	0.0286	522.6	2.084	0.0264	521.0	2.071	70
75	0.0348	531.0	2.127	0.0318	529.6	2.113	0.0293	528.1	2.100	0.0270	526.6	2.087	75
80	0.0355	536.3	2.142	0.0325	534.9	2.128	0.0299	533.5	2.115	0.0276	532.1	2.103	80
85	0.0362	541.6	2.157	0.0331	540.3	2.143	0.0305	539.0	2.131	0.0282	537.6	2.119	85
90	0.0369	546.9	2.171	0.0338	545.7	2.158	0.0311	544.4	2.146	0.0288	543.1	2.134	90
95	0.0376	552.2	2.186	0.0344	551.0	2.173	0.0317	549.8	2.160	0.0294	548.5	2.149	95
100	0.0382	557.5	2.200	0.0351	556.4	2.187	0.0323	555.2	2.175	0.0300	554.0	2.163	100
105	0.0389	562.9	2.214	0.0357	561.7	2.201	0.0329	560.6	2.189	0.0305	559.5	2.178	105
110	0.0396	568.2	2.228	0.0363	567.1	2.216	0.0335	566.0	2.204	0.0311	564.9	2.192	110
115	0.0402	573.5	2.242	0.0369	572.5	2.230	0.0341	571.5	2.218	0.0316	570.4	2.207	115
120	0.0409	578.9	2.256	0.0375	577.9	2.243	0.0346	576.9	2.232	0.0322	575.9	2.221	120
125	0.0415	584.3	2.270	0.0381	583.3	2.257	0.0352	582.4	2.245	0.0327	581.4	2.234	125
130	0.0422	589.7	2.283	0.0387	588.8	2.271	0.0358	587.8	2.259	0.0332	586.9	2.248	130
135	0.0428	595.1	2.296	0.0393	594.2	2.284	0.0363	593.3	2.273	0.0337	592.4	2.262	135
140	0.0434	600.6	2.310	0.0399	599.7	2.297	0.0369	598.8	2.286	0.0343	597.9	2.275	140
145	0.0441	606.1	2.323	0.0405	605.2	2.311	0.0374	604.4	2.299	0.0348	603.5	2.289	145
150	0.0447	611.6	2.336	0.0411	610.7	2.324	0.0380	609.9	2.313	0.0353	609.1	2.302	150
155	0.0453	617.1	2.349	0.0417	616.3	2.337	0.0385	615.5	2.326	0.0358	614.7	2.315	155
160	0.0459	622.7	2.362	0.0422	621.9	2.350	0.0391	621.1	2.339	0.0363	620.3	2.328	160
165	0.0465	628.2	2.375	0.0428	627.5	2.363	0.0396	626.7	2.352	0.0368	626.0	2.341	165

Opteon™ XL41 (R-454B)
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			2000			Temp °C
	27.03			29.33			31.54			35.69			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0186	466.4	1.894	0.0174	466.4	1.888	0.0010	246.0	1.157	0.0010	245.9	1.156	
30	0.0191	470.6	1.908	0.0175	467.4	1.891							30
35	0.0199	477.4	1.930	0.0183	474.6	1.915	0.0168	471.7	1.899				35
40	0.0206	483.9	1.951	0.0190	481.4	1.936	0.0176	478.8	1.922	0.0151	473.1	1.894	40
45	0.0213	490.2	1.971	0.0197	487.9	1.957	0.0183	485.5	1.944	0.0158	480.4	1.917	45
50	0.0220	496.2	1.990	0.0204	494.1	1.977	0.0189	491.9	1.964	0.0164	487.3	1.938	50
55	0.0227	502.2	2.008	0.0210	500.2	1.995	0.0196	498.2	1.983	0.0170	493.9	1.959	55
60	0.0233	508.0	2.026	0.0216	506.2	2.013	0.0202	504.3	2.001	0.0176	500.4	1.978	60
65	0.0239	513.8	2.043	0.0222	512.0	2.031	0.0207	510.3	2.019	0.0182	506.6	1.997	65
70	0.0245	519.4	2.059	0.0228	517.8	2.048	0.0213	516.1	2.036	0.0187	512.7	2.015	70
75	0.0251	525.1	2.076	0.0234	523.5	2.064	0.0218	522.0	2.053	0.0192	518.7	2.032	75
80	0.0257	530.7	2.092	0.0239	529.2	2.080	0.0224	527.7	2.070	0.0197	524.7	2.049	80
85	0.0262	536.2	2.107	0.0245	534.8	2.096	0.0229	533.4	2.086	0.0202	530.5	2.066	85
90	0.0268	541.8	2.123	0.0250	540.4	2.112	0.0234	539.1	2.101	0.0207	536.4	2.082	90
95	0.0273	547.3	2.138	0.0255	546.0	2.127	0.0239	544.7	2.117	0.0212	542.1	2.098	95
100	0.0279	552.8	2.152	0.0260	551.6	2.142	0.0244	550.4	2.132	0.0216	547.9	2.113	100
105	0.0284	558.3	2.167	0.0266	557.1	2.157	0.0249	556.0	2.147	0.0221	553.6	2.128	105
110	0.0289	563.8	2.182	0.0271	562.7	2.171	0.0254	561.6	2.162	0.0225	559.3	2.143	110
115	0.0295	569.3	2.196	0.0276	568.3	2.186	0.0259	567.2	2.176	0.0230	565.0	2.158	115
120	0.0300	574.8	2.210	0.0280	573.8	2.200	0.0263	572.8	2.190	0.0234	570.7	2.173	120
125	0.0305	580.4	2.224	0.0285	579.4	2.214	0.0268	578.4	2.205	0.0239	576.3	2.187	125
130	0.0310	585.9	2.238	0.0290	585.0	2.228	0.0273	584.0	2.219	0.0243	582.0	2.201	130
135	0.0315	591.5	2.252	0.0295	590.5	2.242	0.0277	589.6	2.233	0.0247	587.7	2.215	135
140	0.0320	597.0	2.265	0.0300	596.1	2.255	0.0282	595.2	2.246	0.0251	593.4	2.229	140
145	0.0325	602.6	2.279	0.0304	601.8	2.269	0.0286	600.9	2.260	0.0255	599.1	2.243	145
150	0.0330	608.2	2.292	0.0309	607.4	2.282	0.0291	606.5	2.273	0.0259	604.8	2.256	150
155	0.0335	613.9	2.305	0.0314	613.0	2.296	0.0295	612.2	2.287	0.0263	610.6	2.270	155
160	0.0339	619.5	2.318	0.0318	618.7	2.309	0.0299	617.9	2.300	0.0267	616.3	2.283	160
165	0.0344	625.2	2.331	0.0323	624.4	2.322	0.0304	623.6	2.313	0.0271	622.1	2.296	165
170	0.0349	630.9	2.344	0.0327	630.1	2.335	0.0308	629.4	2.326	0.0275	627.9	2.309	170
175	0.0354	636.6	2.357	0.0332	635.9	2.348	0.0312	635.1	2.339	0.0279	633.7	2.322	175

ABSOLUTE PRESSURE, kPa													
Temp °C	2000			2100			2200			2300			Temp °C
	37.65			39.53			41.36			43.12			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0137	466.1	1.867	0.0129	465.8	1.862	0.0011	265.6	1.219	0.0011	265.5	1.219	
40	0.0140	470.0	1.879	0.0130	466.6	1.864							40
45	0.0147	477.7	1.903	0.0137	474.8	1.890	0.0128	471.8	1.876	0.0119	468.5	1.862	45
50	0.0154	484.9	1.926	0.0144	482.3	1.914	0.0134	479.7	1.901	0.0126	476.9	1.888	50
55	0.0160	491.7	1.947	0.0150	489.4	1.935	0.0140	487.1	1.924	0.0132	484.6	1.912	55
60	0.0165	498.3	1.967	0.0155	496.2	1.956	0.0146	494.1	1.945	0.0138	491.8	1.934	60
65	0.0171	504.7	1.986	0.0161	502.8	1.975	0.0151	500.8	1.965	0.0143	498.8	1.955	65
70	0.0176	511.0	2.004	0.0166	509.2	1.994	0.0157	507.3	1.984	0.0148	505.5	1.974	70
75	0.0181	517.1	2.022	0.0171	515.4	2.012	0.0161	513.7	2.003	0.0153	511.9	1.993	75
80	0.0186	523.1	2.039	0.0176	521.5	2.030	0.0166	519.9	2.020	0.0157	518.3	2.011	80
85	0.0191	529.1	2.056	0.0180	527.6	2.047	0.0171	526.1	2.038	0.0162	524.5	2.029	85
90	0.0195	535.0	2.072	0.0185	533.5	2.063	0.0175	532.1	2.054	0.0166	530.7	2.046	90
95	0.0200	540.8	2.088	0.0189	539.5	2.079	0.0180	538.1	2.071	0.0171	536.7	2.062	95
100	0.0205	546.6	2.104	0.0194	545.3	2.095	0.0184	544.0	2.087	0.0175	542.7	2.078	100
105	0.0209	552.4	2.119	0.0198	551.2	2.111	0.0188	549.9	2.102	0.0179	548.7	2.094	105
110	0.0213	558.1	2.134	0.0202	557.0	2.126	0.0192	555.8	2.118	0.0183	554.6	2.110	110
115	0.0218	563.9	2.149	0.0206	562.8	2.141	0.0196	561.6	2.133	0.0187	560.5	2.125	115
120	0.0222	569.6	2.164	0.0210	568.5	2.156	0.0200	567.5	2.148	0.0191	566.4	2.140	120
125	0.0226	575.3	2.178	0.0214	574.3	2.170	0.0204	573.3	2.163	0.0194	572.2	2.155	125
130	0.0230	581.0	2.193	0.0218	580.1	2.185	0.0208	579.1	2.177	0.0198	578.1	2.169	130
135	0.0234	586.8	2.207	0.0222	585.8	2.199	0.0212	584.9	2.191	0.0202	583.9	2.184	135
140	0.0238	592.5	2.221	0.0226	591.6	2.213	0.0215	590.7	2.205	0.0205	589.7	2.198	140
145	0.0242	598.2	2.235	0.0230	597.4	2.227	0.0219	596.5	2.219	0.0209	595.6	2.212	145
150	0.0246	604.0	2.248	0.0234	603.1	2.241	0.0223	602.3	2.233	0.0212	601.4	2.226	150
155	0.0250	609.8	2.262	0.0238	608.9	2.254	0.0226	608.1	2.247	0.0216	607.2	2.240	155
160	0.0254	615.5	2.275	0.0241	614.7	2.268	0.0230	613.9	2.260	0.0219	613.1	2.253	160
165	0.0258	621.3	2.289	0.0245	620.5	2.281	0.0233	619.8	2.274	0.0223	619.0	2.267	165
170	0.0261	627.1	2.302	0.0249	626.4	2.294	0.0237	625.6	2.287	0.0226	624.8	2.280	170
175	0.0265	632.9	2.315	0.0252	632.2	2.307	0.0241	631.5	2.300	0.0230	630.7	2.293	175
180	0.0269	638.8	2.328	0.0256	638.1	2.320	0.0244	637.4	2.313	0.0233	636.6	2.306	180
185	0.0273	644.7	2.341	0.0260	644.0	2.333	0.0248	643.3	2.326	0.0236	642.6	2.319	185

Opteon™ XL41 (R-454B)
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

Temp °C	ABSOLUTE PRESSURE, kPa												Temp °C
	2500			3000			3500			4000			
	44.82			52.64			59.48			65.56			
	V	H	S	V	H	S	V	H	S	V	H	S	
	0.0111	464.7	1.847	0.0088	461.7	1.822	0.0011	278.6	1.256	0.0011	278.0	1.253	
45	0.0111	465.1	1.848										45
50	0.0118	474.0	1.875										50
55	0.0124	482.0	1.900	0.0091	466.8	1.838							55
60	0.0130	489.5	1.923	0.0097	476.5	1.867	0.0071	458.6	1.801				60
65	0.0135	496.7	1.944	0.0103	485.1	1.893	0.0078	470.6	1.836				65
70	0.0140	503.5	1.964	0.0108	493.1	1.916	0.0084	480.6	1.866	0.0064	464.4	1.808	70
75	0.0145	510.2	1.984	0.0113	500.6	1.938	0.0089	489.6	1.892	0.0070	476.3	1.842	75
80	0.0149	516.6	2.002	0.0117	507.8	1.958	0.0093	497.9	1.915	0.0075	486.4	1.871	80
85	0.0154	523.0	2.020	0.0121	514.8	1.978	0.0097	505.7	1.937	0.0079	495.5	1.897	85
90	0.0158	529.2	2.037	0.0125	521.5	1.997	0.0101	513.2	1.958	0.0083	503.9	1.920	90
95	0.0162	535.3	2.054	0.0129	528.1	2.015	0.0105	520.3	1.978	0.0087	511.9	1.942	95
100	0.0166	541.4	2.070	0.0133	534.6	2.032	0.0109	527.3	1.997	0.0090	519.5	1.962	100
105	0.0170	547.4	2.086	0.0136	541.0	2.049	0.0112	534.1	2.015	0.0093	526.9	1.982	105
110	0.0174	553.4	2.102	0.0140	547.3	2.066	0.0115	540.8	2.032	0.0097	534.0	2.001	110
115	0.0178	559.4	2.117	0.0143	553.5	2.082	0.0118	547.4	2.049	0.0100	541.0	2.019	115
120	0.0182	565.3	2.133	0.0147	559.7	2.098	0.0121	553.9	2.066	0.0103	547.8	2.036	120
125	0.0185	571.2	2.148	0.0150	565.8	2.113	0.0125	560.3	2.082	0.0105	554.5	2.053	125
130	0.0189	577.1	2.162	0.0153	571.9	2.128	0.0127	566.6	2.098	0.0108	561.1	2.070	130
135	0.0193	582.9	2.177	0.0156	578.0	2.143	0.0130	572.9	2.113	0.0111	567.7	2.086	135
140	0.0196	588.8	2.191	0.0159	584.1	2.158	0.0133	579.2	2.129	0.0113	574.2	2.102	140
145	0.0200	594.7	2.205	0.0163	590.1	2.173	0.0136	585.4	2.144	0.0116	580.6	2.117	145
150	0.0203	600.5	2.219	0.0166	596.1	2.187	0.0139	591.6	2.158	0.0119	587.0	2.132	150
155	0.0206	606.4	2.233	0.0169	602.2	2.201	0.0141	597.8	2.173	0.0121	593.4	2.147	155
160	0.0210	612.3	2.246	0.0171	608.2	2.215	0.0144	604.0	2.187	0.0123	599.8	2.162	160
165	0.0213	618.2	2.260	0.0174	614.2	2.229	0.0147	610.2	2.202	0.0126	606.1	2.177	165
170	0.0217	624.1	2.273	0.0177	620.2	2.243	0.0149	616.3	2.215	0.0128	612.4	2.191	170
175	0.0220	630.0	2.287	0.0180	626.3	2.256	0.0152	622.5	2.229	0.0131	618.7	2.205	175
180	0.0223	635.9	2.300	0.0183	632.3	2.270	0.0154	628.7	2.243	0.0133	625.0	2.219	180
185	0.0226	641.9	2.313	0.0186	638.4	2.283	0.0157	634.8	2.257	0.0135	631.2	2.233	185
190	0.0230	647.8	2.326	0.0189	644.4	2.296	0.0159	641.0	2.270	0.0137	637.5	2.246	190
195	0.0233	653.8	2.339	0.0191	650.5	2.309	0.0162	647.2	2.283	0.0140	643.8	2.260	195
200	0.0236	659.8	2.351	0.0194	656.6	2.322	0.0164	653.4	2.296	0.0142	650.1	2.273	200
205	0.0239	665.8	2.364	0.0197	662.7	2.335	0.0167	659.6	2.309	0.0144	656.4	2.287	205
210	0.0242	671.9	2.377	0.0200	668.8	2.348	0.0169	665.8	2.322	0.0146	662.7	2.300	210
215	0.0245	677.9	2.389	0.0202	675.0	2.360	0.0171	672.0	2.335	0.0148	669.0	2.313	215
220	0.0249	684.0	2.402	0.0205	681.1	2.373	0.0174	678.2	2.348	0.0150	675.3	2.326	220
225	0.0252	690.1	2.414	0.0208	687.3	2.385	0.0176	684.5	2.360	0.0152	681.6	2.338	225
230	0.0255	696.3	2.426	0.0210	693.5	2.398	0.0178	690.7	2.373	0.0155	688.0	2.351	230
235	0.0258	702.4	2.438	0.0213	699.7	2.410	0.0181	697.0	2.385	0.0157	694.3	2.364	235
240	0.0261	708.6	2.450	0.0215	706.0	2.422	0.0183	703.3	2.398	0.0159	700.7	2.376	240
245	0.0264	714.8	2.462	0.0218	712.2	2.434	0.0185	709.7	2.410	0.0161	707.1	2.388	245
250	0.0267	721.0	2.474	0.0221	718.5	2.446	0.0188	716.0	2.422	0.0163	713.5	2.401	250
255	0.0270	727.2	2.486	0.0223	724.8	2.458	0.0190	722.4	2.434	0.0165	719.9	2.413	255
260	0.0273	733.5	2.498	0.0226	731.1	2.470	0.0192	728.7	2.446	0.0167	726.4	2.425	260
265	0.0276	739.8	2.510	0.0228	737.5	2.482	0.0194	735.1	2.458	0.0169	732.8	2.437	265
270	0.0279	746.1	2.521	0.0231	743.8	2.494	0.0197	741.6	2.470	0.0171	739.3	2.449	270
275	0.0282	752.5	2.533	0.0233	750.2	2.506	0.0199	748.0	2.482	0.0173	745.8	2.461	275
280	0.0285	758.8	2.545	0.0236	756.6	2.517	0.0201	754.5	2.494	0.0175	752.3	2.473	280
285	0.0288	765.2	2.556	0.0238	763.1	2.529	0.0203	761.0	2.505	0.0177	758.8	2.485	285
290	0.0291	771.6	2.568	0.0241	769.5	2.540	0.0205	767.5	2.517	0.0179	765.4	2.496	290

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