Opteon™ XL20
Refrigerant

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

Physical Properties

Molecular Weight	90.8 g/mol
Boiling Point at	
One Atmosphere	-45.6 °C
Critical Temperature	85.7 °C
Critical Pressure	4318.8 kPa
Critical Density	461.6 kg/m3
Critical Volume	0.0022 m3/kg
Ozone Depletion Potential	0
Global Warming Potential AR4	148
ASHRAE Standard 34 Safety Rating	A2L

Units and Factors

t = temperature in °C
P = pressure in kiloPascals absolute (kPa [abs])
C_P = Heat capacity at constant pressure in kJ/(kg-K)
C_V = Heat capacity at constant volume in kJ/(kg-K)
C_P/C_V = Heat capacity ratio (dimensionless)
μ = Viscosity in μPa-sec
ν = Kinematic viscosity in cm²/sec
k = Thermal conductivity in mW/m-K
c = Velocity of sound in m/sec
γ = Surface Tension in mN/m
h_f = enthalpy of saturated liquid in kJ/kg
s_f = entropy of saturated liquid 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).

Chemours™

LOW GWP

Opteon™ XL20 (R-454C)

Saturation Properties - Transport Properties Table

Temp	Heat Capacity, c_p [kJ/kg-K]		c_p/c_v	Viscosity [µPa-sec]		Kinematic Viscosity [cm^2/sec]		Thermal Conductivity [mW/m-K]		Vel. of Sound [m/sec]		Surface Tension
°C	Liquid	Vapor	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	[mN/m]
-85	1.2433	0.6647	1.1671	457.9	6.215	0.0033	0.1883	125.77	5.643	908.4	141.0	23.87
-84	1.2420	0.6672	1.1667	455.9	6.281	0.0033	0.1768	125.32	5.709	905.5	141.3	23.69
-83	1.2408	0.6699	1.1664	454.0	6.346	0.0033	0.1660	124.87	5.775	902.5	141.6	23.50
-82	1.2398	0.6725	1.1661	452.1	6.411	0.0033	0.1561	124.41	5.841	899.5	141.9	23.32
-81	1.2389	0.6751	1.1658	450.1	6.476	0.0033	0.1468	123.95	5.907	896.3	142.2	23.14
-80	1.2382	0.6778	1.1655	448.3	6.540	0.0033	0.1382	123.49	5.973	893.1	142.5	22.95
-79	1.2377	0.6805	1.1652	446.4	6.604	0.0033	0.1302	123.03	6.040	889.9	142.8	22.77
-78	1.2372	0.6832	1.1650	444.6	6.668	0.0033	0.1228	122.57	6.106	886.6	143.1	22.59
-77	1.2369	0.6859	1.1648	442.7	6.731	0.0033	0.1159	122.11	6.173	883.2	143.4	22.40
-76	1.2368	0.6887	1.1645	439.2	6.794	0.0032	0.1094	121.64	6.240	879.8	143.6	22.22
-75	1.2367	0.6914	1.1643	433.7	6.857	0.0032	0.1033	121.18	6.307	876.3	143.9	22.04
-74	1.2368	0.6942	1.1642	428.3	6.919	0.0032	0.0977	120.71	6.374	872.8	144.2	21.86
-73	1.2369	0.6970	1.1640	423.0	6.982	0.0031	0.0924	120.24	6.442	869.2	144.5	21.67
-72	1.2372	0.6999	1.1638	417.8	7.044	0.0031	0.0875	119.77	6.509	865.6	144.8	21.49
-71	1.2376	0.7027	1.1637	412.7	7.105	0.0031	0.0829	119.30	6.577	861.9	145.0	21.31
-70	1.2380	0.7056	1.1636	407.6	7.167	0.0030	0.0785	118.83	6.645	858.2	145.3	21.13
-69	1.2386	0.7085	1.1635	402.6	7.228	0.0030	0.0745	118.35	6.713	854.5	145.5	20.95
-68	1.2392	0.7114	1.1634	397.7	7.289	0.0030	0.0707	117.88	6.781	850.7	145.8	20.77
-67	1.2400	0.7144	1.1633	392.9	7.349	0.0029	0.0671	117.41	6.849	846.9	146.1	20.58
-66	1.2408	0.7173	1.1633	388.1	7.409	0.0029	0.0637	116.93	6.917	843.0	146.3	20.40
-65	1.2417	0.7203	1.1632	383.5	7.469	0.0029	0.0606	116.46	6.986	839.2	146.6	20.22
-64	1.2427	0.7234	1.1632	378.9	7.529	0.0029	0.0576	115.98	7.055	835.3	146.8	20.04
-63	1.2437	0.7264	1.1632	374.3	7.589	0.0028	0.0548	115.50	7.123	831.3	147.0	19.86
-62	1.2449	0.7295	1.1633	369.8	7.648	0.0028	0.0522	115.03	7.192	827.3	147.3	19.68
-61	1.2460	0.7326	1.1633	365.4	7.707	0.0028	0.0497	114.55	7.261	823.4	147.5	19.50
-60	1.2473	0.7357	1.1634	360.8	7.766	0.0027	0.0474	114.07	7.331	819.3	147.8	19.32
-59	1.2486	0.7388	1.1634	356.2	7.824	0.0027	0.0452	113.59	7.400	815.3	148.0	19.14
-58	1.2500	0.7420	1.1635	351.6	7.882	0.0027	0.0431	113.12	7.470	811.2	148.2	18.96
-57	1.2515	0.7452	1.1637	347.0	7.940	0.0027	0.0412	112.64	7.540	807.1	148.4	18.78
-56	1.2530	0.7484	1.1638	342.6	7.998	0.0026	0.0393	112.16	7.609	803.0	148.6	18.61
-55	1.2546	0.7516	1.1639	338.2	8.056	0.0026	0.0376	111.68	7.680	798.9	148.9	18.43
-54	1.2562	0.7549	1.1641	333.9	8.113	0.0026	0.0359	111.20	7.750	794.8	149.1	18.25
-53	1.2579	0.7582	1.1643	329.7	8.170	0.0025	0.0344	110.72	7.820	790.6	149.3	18.07
-52	1.2596	0.7615	1.1645	325.5	8.227	0.0025	0.0329	110.25	7.891	786.4	149.5	17.89
-51	1.2614	0.7648	1.1648	321.4	8.284	0.0025	0.0315	109.77	7.962	782.2	149.7	17.72
-50	1.2633	0.7682	1.1650	317.4	8.340	0.0025	0.0301	109.29	8.032	778.0	149.8	17.54
-49	1.2652	0.7716	1.1653	313.4	8.396	0.0024	0.0289	108.81	8.104	773.8	150.0	17.36
-48	1.2671	0.7750	1.1656	309.5	8.452	0.0024	0.0277	108.33	8.175	769.5	150.2	17.19
-47	1.2691	0.7784	1.1659	305.7	8.508	0.0024	0.0265	107.85	8.246	765.3	150.4	17.01
-46	1.2711	0.7819	1.1662	301.9	8.563	0.0024	0.0255	107.38	8.318	761.0	150.6	16.84
-45	1.2732	0.7854	1.1666	298.1	8.619	0.0023	0.0244	106.90	8.390	756.7	150.7	16.66
-44	1.2754	0.7889	1.1670	294.5	8.674	0.0023	0.0235	106.42	8.462	752.4	150.9	16.49
-43	1.2775	0.7925	1.1674	290.8	8.728	0.0023	0.0225	105.95	8.534	748.1	151.1	16.31
-42	1.2798	0.7960	1.1678	287.3	8.783	0.0023	0.0217	105.47	8.606	743.8	151.2	16.14
-41	1.2820	0.7996	1.1683	283.8	8.838	0.0022	0.0208	104.99	8.679	739.5	151.4	15.97
-40	1.2843	0.8033	1.1687	280.3	8.892	0.0022	0.0200	104.52	8.752	735.2	151.5	15.79
-39	1.2867	0.8069	1.1692	276.9	8.946	0.0022	0.0193	104.04	8.825	730.8	151.7	15.62
-38	1.2891	0.8106	1.1697	273.5	9.000	0.0022	0.0185	103.57	8.898	726.5	151.8	15.45
-37	1.2915	0.8143	1.1703	270.2	9.053	0.0022	0.0178	103.10	8.971	722.1	151.9	15.28
-36	1.2940	0.8180	1.1709	267.0	9.107	0.0021	0.0172	102.62	9.045	717.8	152.0	15.11
-35	1.2965	0.8218	1.1714	263.8	9.160	0.0021	0.0165	102.15	9.119	713.4	152.2	14.94
-34	1.2990	0.8256	1.1721	260.6	9.213	0.0021	0.0159	101.68	9.193	709.0	152.3	14.77
-33	1.3016	0.8294	1.1727	257.5	9.266	0.0021	0.0154	101.21	9.267	704.6	152.4	14.60
-32	1.3042	0.8333	1.1734	254.4	9.319	0.0021	0.0148	100.74	9.342	700.2	152.5	14.43
-31	1.3069	0.8371	1.1741	251.3	9.371	0.0020	0.0143	100.27	9.416	695.8	152.6	14.26
-30	1.3096	0.8410	1.1748	248.4	9.424	0.0020	0.0138	99.80	9.491	691.4	152.7	14.09
-29	1.3123	0.8450	1.1756	245.4	9.476	0.0020	0.0133	99.33	9.567	687.0	152.8	13.92
-28	1.3151	0.8489	1.1763	242.5	9.528	0.0020	0.0128	98.86	9.642	682.6	152.9	13.75

Opteon™ XL20 (R-454C)

Saturation Properties - Transport Properties Table

Temp	Heat Capacity, c_p [kJ/kg-K]		c_p/c_v	Viscosity [µPa-sec]		Kinematic Viscosity [cm^2/sec]		Thermal Conductivity [mW/m-K]		Vel. of Sound [m/sec]		Surface Tension
°C	Liquid	Vapor	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	[mN/m]
-27	1.3180	0.8529	1.1772	239.6	9.580	0.0020	0.0124	98.39	9.718	678.1	152.9	13.58
-26	1.3208	0.8570	1.1780	236.8	9.631	0.0019	0.0120	97.93	9.794	673.7	153.0	13.42
-25	1.3237	0.8610	1.1789	234.0	9.683	0.0019	0.0116	97.46	9.870	669.3	153.1	13.25
-24	1.3267	0.8651	1.1798	231.2	9.734	0.0019	0.0112	97.00	9.947	664.8	153.1	13.09
-23	1.3296	0.8692	1.1807	228.5	9.785	0.0019	0.0108	96.54	10.024	660.4	153.2	12.92
-22	1.3327	0.8734	1.1817	225.8	9.836	0.0019	0.0105	96.07	10.101	655.9	153.3	12.76
-21	1.3357	0.8776	1.1827	223.2	9.887	0.0019	0.0101	95.61	10.178	651.5	153.3	12.59
-20	1.3388	0.8818	1.1837	220.5	9.938	0.0018	0.0098	95.15	10.256	647.0	153.3	12.43
-19	1.3420	0.8861	1.1848	217.9	9.988	0.0018	0.0095	94.69	10.334	642.5	153.4	12.26
-18	1.3451	0.8904	1.1859	215.4	10.038	0.0018	0.0092	94.23	10.413	638.1	153.4	12.10
-17	1.3484	0.8947	1.1870	212.9	10.089	0.0018	0.0089	93.77	10.492	633.6	153.4	11.94
-16	1.3516	0.8991	1.1882	210.4	10.139	0.0018	0.0086	93.32	10.571	629.1	153.4	11.78
-15	1.3550	0.9035	1.1894	207.9	10.188	0.0018	0.0083	92.86	10.650	624.6	153.4	11.62
-14	1.3583	0.9079	1.1906	205.5	10.238	0.0017	0.0081	92.41	10.730	620.1	153.4	11.45
-13	1.3617	0.9124	1.1919	203.1	10.288	0.0017	0.0078	91.95	10.810	615.6	153.4	11.29
-12	1.3652	0.9169	1.1933	200.7	10.337	0.0017	0.0076	91.50	10.891	611.1	153.4	11.14
-11	1.3686	0.9215	1.1946	198.4	10.386	0.0017	0.0074	91.05	10.972	606.6	153.4	10.98
-10	1.3722	0.9261	1.1961	196.1	10.435	0.0017	0.0071	90.60	11.054	602.1	153.4	10.82
-9	1.3758	0.9308	1.1975	193.8	10.484	0.0017	0.0069	90.15	11.135	597.6	153.3	10.66
-8	1.3794	0.9355	1.1990	191.6	10.533	0.0016	0.0067	89.70	11.218	593.0	153.3	10.50
-7	1.3831	0.9402	1.2006	189.3	10.582	0.0016	0.0065	89.25	11.301	588.5	153.2	10.35
-6	1.3868	0.9451	1.2022	187.1	10.630	0.0016	0.0063	88.81	11.384	584.0	153.2	10.19
-5	1.3906	0.9499	1.2039	184.9	10.679	0.0016	0.0061	88.36	11.468	579.4	153.1	10.03
-4	1.3945	0.9548	1.2056	182.8	10.727	0.0016	0.0060	87.92	11.552	574.9	153.1	9.88
-3	1.3984	0.9598	1.2074	180.7	10.775	0.0016	0.0058	87.48	11.637	570.3	153.0	9.72
-2	1.4023	0.9648	1.2092	178.6	10.823	0.0016	0.0056	87.04	11.723	565.7	152.9	9.57
-1	1.4063	0.9699	1.2111	176.5	10.871	0.0015	0.0055	86.60	11.809	561.2	152.8	9.42
0	1.4104	0.9751	1.2131	174.4	10.919	0.0015	0.0053	86.16	11.895	556.6	152.7	9.26
1	1.4146	0.9803	1.2151	172.4	10.966	0.0015	0.0052	85.72	11.982	552.0	152.6	9.11
2	1.4188	0.9856	1.2171	170.4	11.014	0.0015	0.0050	85.28	12.070	547.4	152.5	8.96
3	1.4230	0.9909	1.2193	168.4	11.061	0.0015	0.0049	84.85	12.159	542.8	152.4	8.81
4	1.4274	0.9963	1.2215	166.4	11.108	0.0015	0.0047	84.41	12.248	538.2	152.3	8.66
5	1.4318	1.0018	1.2238	164.5	11.155	0.0015	0.0046	83.98	12.338	533.6	152.1	8.51
6	1.4362	1.0074	1.2262	162.5	11.202	0.0015	0.0045	83.55	12.429	529.0	152.0	8.36
7	1.4408	1.0131	1.2286	160.6	11.249	0.0014	0.0044	83.12	12.521	524.4	151.9	8.22
8	1.4454	1.0189	1.2311	158.8	11.296	0.0014	0.0043	82.69	12.613	519.7	151.7	8.07
9	1.4501	1.0247	1.2338	156.9	11.343	0.0014	0.0041	82.26	12.706	515.1	151.5	7.92
10	1.4549	1.0307	1.2365	155.0	11.389	0.0014	0.0040	81.84	12.800	510.4	151.4	7.78
11	1.4598	1.0367	1.2392	153.2	11.435	0.0014	0.0039	81.41	12.895	505.8	151.2	7.63
12	1.4647	1.0429	1.2421	151.4	11.482	0.0014	0.0038	80.99	12.991	501.1	151.0	7.49
13	1.4698	1.0492	1.2451	149.6	11.528	0.0014	0.0037	80.56	13.089	496.4	150.8	7.34
14	1.4749	1.0555	1.2482	147.8	11.574	0.0014	0.0036	80.14	13.187	491.8	150.6	7.20
15	1.4802	1.0621	1.2514	146.1	11.620	0.0013	0.0035	79.72	13.286	487.1	150.4	7.06
16	1.4855	1.0687	1.2547	144.3	11.666	0.0013	0.0034	79.30	13.386	482.4	150.2	6.92
17	1.4910	1.0755	1.2581	142.6	11.712	0.0013	0.0033	78.88	13.488	477.7	149.9	6.78
18	1.4966	1.0824	1.2617	140.9	11.758	0.0013	0.0033	78.47	13.591	473.0	149.7	6.64
19	1.5023	1.0895	1.2653	139.2	11.804	0.0013	0.0032	78.05	13.695	468.2	149.5	6.50
20	1.5081	1.0967	1.2691	137.5	11.850	0.0013	0.0031	77.64	13.800	463.5	149.2	6.36
21	1.5140	1.1041	1.2730	135.9	11.896	0.0013	0.0030	77.22	13.907	458.8	148.9	6.22
22	1.5201	1.1117	1.2771	134.2	11.942	0.0013	0.0029	76.81	14.016	454.0	148.7	6.08
23	1.5264	1.1194	1.2813	132.6	11.988	0.0013	0.0029	76.40	14.126	449.3	148.4	5.95
24	1.5327	1.1273	1.2857	131.0	12.033	0.0013	0.0028	75.99	14.237	444.5	148.1	5.81
25	1.5393	1.1354	1.2903	129.4	12.079	0.0012	0.0027	75.58	14.351	439.8	147.8	5.68
26	1.5460	1.1438	1.2950	127.8	12.124	0.0012	0.0026	75.17	14.466	435.0	147.5	5.54
27	1.5529	1.1523	1.2999	126.2	12.170	0.0012	0.0026	74.77	14.583	430.2	147.1	5.41
28	1.5600	1.1611	1.3049	124.6	12.215	0.0012	0.0025	74.36	14.703	425.4	146.8	5.28
29	1.5673	1.1700	1.3102	123.1	12.266	0.0012	0.0025	73.96	14.824	420.6	146.5	5.15
30	1.5748	1.1793	1.3157	121.5	12.329	0.0012	0.0024	73.56	14.947	415.8	146.1	5.02

Opteon™ XL20 (R-454C)

Saturation Properties - Transport Properties Table

Temp	Heat Capacity, c_p [kJ/kg-K]		c_p/c_v	Viscosity [µPa-sec]		Kinematic Viscosity [cm^2/sec]		Thermal Conductivity [mW/m-K]		Vel. of Sound [m/sec]		Surface Tension
°C	Liquid	Vapor	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	[mN/m]
31	1.5826	1.1888	1.3214	120.0	12.392	0.0012	0.0023	73.15	15.072	411.0	145.8	4.89
32	1.5905	1.1986	1.3273	118.5	12.457	0.0012	0.0023	72.75	15.200	406.1	145.4	4.76
33	1.5988	1.2087	1.3335	117.0	12.521	0.0012	0.0022	72.35	15.330	401.3	145.0	4.64
34	1.6073	1.2190	1.3400	115.5	12.587	0.0012	0.0022	71.96	15.463	396.4	144.6	4.51
35	1.6161	1.2297	1.3467	114.0	12.652	0.0011	0.0021	71.56	15.599	391.6	144.2	4.38
36	1.6253	1.2408	1.3537	112.5	12.719	0.0011	0.0021	71.16	15.737	386.7	143.8	4.26
37	1.6347	1.2522	1.3610	111.1	12.786	0.0011	0.0020	70.77	15.879	381.8	143.4	4.14
38	1.6446	1.2640	1.3686	109.6	12.855	0.0011	0.0020	70.37	16.024	376.9	142.9	4.01
39	1.6548	1.2761	1.3765	108.2	12.924	0.0011	0.0019	69.98	16.177	371.9	142.5	3.89
40	1.6654	1.2887	1.3848	106.8	12.994	0.0011	0.0019	69.59	16.344	367.0	142.0	3.77
41	1.6765	1.3018	1.3935	105.3	13.066	0.0011	0.0019	69.19	16.515	362.0	141.5	3.65
42	1.6880	1.3154	1.4027	103.9	13.139	0.0011	0.0018	68.80	16.692	357.0	141.1	3.53
43	1.7000	1.3294	1.4122	102.5	13.213	0.0011	0.0018	68.41	16.874	351.9	140.6	3.42
44	1.7125	1.3441	1.4222	101.1	13.288	0.0011	0.0017	68.02	17.062	346.9	140.0	3.30
45	1.7256	1.3593	1.4328	99.7	13.366	0.0010	0.0017	67.63	17.256	341.8	139.5	3.18
46	1.7394	1.3751	1.4438	98.3	13.444	0.0010	0.0017	67.25	17.456	336.6	139.0	3.07
47	1.7538	1.3916	1.4555	96.9	13.525	0.0010	0.0016	66.86	17.663	331.5	138.4	2.96
48	1.7689	1.4089	1.4677	95.5	13.608	0.0010	0.0016	66.47	17.877	326.3	137.9	2.84
49	1.7847	1.4269	1.4807	94.2	13.692	0.0010	0.0015	66.09	18.099	321.0	137.3	2.73
50	1.8014	1.4458	1.4943	92.8	13.779	0.0010	0.0015	65.70	18.328	315.7	136.7	2.62
51	1.8190	1.4656	1.5087	91.4	13.868	0.0010	0.0015	65.31	18.566	310.4	136.1	2.51
52	1.8376	1.4864	1.5240	90.1	13.959	0.0010	0.0014	64.93	18.813	305.1	135.5	2.41
53	1.8573	1.5083	1.5402	88.7	14.053	0.0010	0.0014	64.54	19.070	299.6	134.9	2.30
54	1.8781	1.5313	1.5574	87.4	14.150	0.0010	0.0014	64.16	19.337	294.2	134.2	2.19
55	1.9001	1.5557	1.5757	86.0	14.249	0.0010	0.0014	63.78	19.615	288.7	133.6	2.09
56	1.9236	1.5814	1.5951	84.6	14.352	0.0010	0.0013	63.39	19.905	283.1	132.9	1.99
57	1.9487	1.6087	1.6159	83.3	14.458	0.0009	0.0013	63.01	20.208	277.5	132.2	1.89
58	1.9754	1.6377	1.6381	81.9	14.568	0.0009	0.0013	62.63	20.524	271.9	131.5	1.79
59	2.0041	1.6685	1.6619	80.6	14.682	0.0009	0.0012	62.25	20.855	266.2	130.8	1.70
60	2.0349	1.7015	1.6875	79.2	14.800	0.0009	0.0012	61.87	21.202	260.5	130.0	1.60
61	2.0681	1.7368	1.7150	77.9	14.923	0.0009	0.0012	61.49	21.565	254.7	129.3	1.51
62	2.1040	1.7746	1.7447	76.5	15.051	0.0009	0.0012	61.12	21.948	248.9	128.5	1.42
63	2.1429	1.8153	1.7768	75.1	15.184	0.0009	0.0011	60.74	22.350	243.1	127.7	1.34
64	2.1854	1.8594	1.8117	73.8	15.323	0.0009	0.0011	60.37	22.774	237.2	126.9	1.25
65	2.2319	1.9071	1.8497	72.4	15.468	0.0009	0.0011	60.00	23.222	231.3	126.0	1.16
66	2.2830	1.9590	1.8913	71.0	15.620	0.0009	0.0011	59.63	23.696	225.4	125.2	1.08
67	2.3395	2.0158	1.9369	69.6	15.781	0.0009	0.0010	59.27	24.199	219.4	124.3	1.00
68	2.4024	2.0781	1.9871	68.2	15.950	0.0008	0.0010	58.91	24.733	213.4	123.4	0.92
69	2.4727	2.1469	2.0428	66.8	16.128	0.0008	0.0010	58.56	25.303	207.3	122.4	0.84
70	2.5521	2.2233	2.1049	65.4	16.317	0.0008	0.0010	58.22	25.912	201.3	121.5	0.76
71	2.6423	2.3086	2.1743	63.9	16.519	0.0008	0.0009	57.89	26.565	195.2	120.5	0.69
72	2.7457	2.4045	2.2527	62.5	16.734	0.0008	0.0009	57.57	27.268	189.0	119.5	0.62
73	2.8655	2.5134	2.3418	61.0	16.964	0.0008	0.0009	57.27	28.027	182.8	118.5	0.55
74	3.0061	2.6380	2.4441	59.5	17.213	0.0008	0.0009	57.00	28.851	176.6	117.4	0.48
75	3.1732	2.7822	2.5625	57.9	17.482	0.0008	0.0009	56.75	29.750	170.3	116.3	0.42
76	3.3752	2.9510	2.7013	56.4	17.776	0.0008	0.0008	56.54	30.738	164.0	115.2	0.36
77	3.6240	3.1516	2.8665	54.7	18.100	0.0008	0.0008	56.39	31.830	157.6	114.0	0.30
78	3.9376	3.3941	3.0662	53.0	18.459	0.0008	0.0008	56.30	33.050	151.1	112.8	0.24
79	4.3445	3.6937	3.3129	51.3	18.864	0.0008	0.0008	56.31	34.427	144.6	111.6	0.19
80	4.8914	4.0737	3.6256	49.4	19.326	0.0007	0.0008	56.46	36.004	138.0	110.3	0.15

Opteon™ XL20 (R-454C)

Superheated Vapor - Viscosity Table

Viscosity in µPa-sec **Saturation Properties in Light Blue**

Temp °C	ABSOLUTE PRESSURE, kPa												
	50	101.325	200	300	400	500	600	800	1000	1500	2000	2500	3000
	-51.8	-37.8	-22.2	-11.7	-3.7	2.9	8.6	18.0	25.8	41.1	52.8	62.4	70.4
	8.241	9.013	9.827	10.351	10.742	11.058	11.323	11.760	12.117	13.072	14.033	15.097	16.400
-50	8.340												
-45	8.619												
-40	8.892												
-35	9.160	9.160											
-30	9.424	9.424											
-25	9.683	9.683											
-20	9.938	9.938	9.938										
-15	10.188	10.188	10.188										
-10	10.435	10.435	10.435	10.435									
-5	10.679	10.679	10.679	10.679									
0	10.919	10.919	10.919	10.919	10.919								
5	11.155	11.155	11.155	11.155	11.155	11.155							
10	11.389	11.389	11.389	11.389	11.389	11.389	11.389						
15	11.620	11.620	11.620	11.620	11.620	11.620	11.620						
20	11.848	11.848	11.848	11.848	11.848	11.848	11.848	11.850					
25	12.073	12.073	12.073	12.073	12.073	12.073	12.073	12.075					
30	12.296	12.296	12.296	12.296	12.296	12.296	12.297	12.299	12.302				
35	12.516	12.516	12.516	12.516	12.516	12.517	12.518	12.520	12.540				
40	12.734	12.734	12.734	12.735	12.735	12.735	12.736	12.739	12.787				
45	12.950	12.950	12.951	12.951	12.951	12.952	12.953	12.976	13.026	13.251			
50	13.164	13.165	13.165	13.165	13.166	13.166	13.173	13.210	13.260	13.477			
55	13.377	13.377	13.377	13.377	13.378	13.386	13.400	13.438	13.490	13.701	14.112		
60	13.587	13.587	13.587	13.588	13.595	13.608	13.623	13.663	13.715	13.922	14.299		
65	13.796	13.796	13.796	13.801	13.812	13.826	13.842	13.884	13.938	14.142	14.493	15.139	
70	14.002	14.003	14.005	14.015	14.027	14.041	14.059	14.102	14.157	14.359	14.690	15.254	
75	14.208	14.208	14.215	14.225	14.238	14.254	14.273	14.317	14.373	14.573	14.889	15.396	16.301
80	14.412	14.413	14.422	14.434	14.448	14.465	14.484	14.531	14.588	14.786	15.089	15.553	16.313
85	14.614	14.617	14.627	14.640	14.656	14.674	14.694	14.741	14.800	14.997	15.289	15.720	16.384
90	14.816	14.820	14.831	14.845	14.862	14.880	14.901	14.950	15.009	15.205	15.488	15.893	16.488
95	15.016	15.021	15.033	15.048	15.066	15.085	15.107	15.157	15.217	15.412	15.687	16.070	16.613
100	15.216	15.221	15.234	15.250	15.268	15.289	15.311	15.363	15.423	15.617	15.885	16.250	16.752
105	15.414	15.420	15.434	15.451	15.469	15.491	15.514	15.566	15.627	15.820	16.082	16.432	16.901
110	15.611	15.617	15.632	15.650	15.669	15.691	15.715	15.768	15.830	16.022	16.279	16.615	17.057
115	15.807	15.813	15.829	15.847	15.868	15.890	15.914	15.968	16.031	16.222	16.474	16.799	17.217
120	16.001	16.009	16.025	16.044	16.065	16.088	16.112	16.167	16.230	16.421	16.668	16.983	17.382
125	16.195	16.203	16.220	16.239	16.261	16.284	16.309	16.365	16.428	16.618	16.861	17.167	17.549
130	16.388	16.396	16.414	16.434	16.456	16.480	16.505	16.562	16.625	16.814	17.054	17.351	17.718
135	16.580	16.588	16.606	16.627	16.650	16.674	16.700	16.757	16.820	17.009	17.245	17.535	17.889
140	16.771	16.780	16.798	16.820	16.843	16.867	16.893	16.951	17.015	17.203	17.435	17.719	18.061
145	16.961	16.970	16.989	17.011	17.034	17.059	17.086	17.144	17.208	17.395	17.625	17.902	18.234
150	17.151	17.160	17.180	17.202	17.225	17.251	17.278	17.336	17.400	17.587	17.814	18.085	18.407
155	17.340	17.349	17.369	17.392	17.416	17.441	17.468	17.527	17.591	17.777	18.001	18.268	18.581
160	17.528	17.537	17.558	17.581	17.605	17.631	17.658	17.717	17.781	17.966	18.188	18.450	18.755
165	17.715	17.725	17.746	17.769	17.794	17.820	17.847	17.906	17.971	18.155	18.374	18.631	18.929
170	17.902	17.912	17.933	17.957	17.981	18.008	18.035	18.095	18.159	18.343	18.559	18.812	19.104
175	18.088	18.098	18.120	18.144	18.169	18.195	18.223	18.282	18.347	18.529	18.744	18.993	19.278
180	18.274	18.284	18.306	18.330	18.355	18.382	18.410	18.469	18.534	18.716	18.928	19.173	19.452
185	18.459	18.470	18.492	18.516	18.541	18.568	18.596	18.656	18.720	18.901	19.111	19.352	19.626
190	18.644	18.654	18.676	18.701	18.726	18.753	18.781	18.841	18.905	19.086	19.294	19.532	19.800
195	18.828	18.838	18.861	18.885	18.911	18.938	18.966	19.026	19.090	19.269	19.476	19.710	19.974
200	19.011	19.022	19.045	19.069	19.095	19.122	19.151	19.210	19.275	19.453	19.657	19.889	20.148
205	19.195	19.206	19.228	19.253	19.279	19.306	19.334	19.394	19.458	19.636	19.838	20.066	20.322
210	19.377	19.388	19.411	19.436	19.462	19.489	19.518	19.578	19.641	19.818	20.018	20.244	20.495
215	19.560	19.571	19.594	19.619	19.645	19.672	19.701	19.760	19.824	19.999	20.198	20.421	20.668
220	19.742	19.753	19.776	19.801	19.827	19.855	19.883	19.943	20.006	20.181	20.378	20.598	20.841
225	19.923	19.935	19.958	19.983	20.009	20.036	20.065	20.124	20.188	20.361	20.557	20.774	21.014
230	20.105	20.116	20.139	20.164	20.191	20.218	20.246	20.306	20.369	20.541	20.735	20.950	21.186
235	20.285	20.297	20.320	20.345	20.372	20.399	20.427	20.487	20.550	20.721	20.913	21.126	21.359
240	20.466	20.478	20.501	20.526	20.553	20.580	20.608	20.667	20.730	20.901	21.091	21.301	21.531
245	20.646	20.658	20.681	20.707	20.733	20.760	20.788	20.848	20.910	21.080	21.268	21.476	21.703
250	20.826	20.838	20.861	20.887	20.913	20.940	20.969	21.027	21.090	21.258	21.445	21.651	21.875
255	21.006	21.018	21.041	21.067	21.093	21.120	21.148	21.207	21.269	21.436	21.622	21.826	22.047
260	21.186	21.197	21.221	21.246	21.272	21.300	21.328	21.386	21.448	21.614	21.799	22.000	22.218
265	21.365	21.376	21.400	21.425	21.452	21.479	21.507	21.565	21.626	21.792	21.975	22.174	22.390
270	21.544	21.555	21.579	21.604	21.631	21.658	21.686	21.744	21.805	21.969	22.150	22.348	22.561
275	21.723	21.734	21.758	21.783	21.809	21.836	21.864	21.922	21.983	22.146	22.326	22.521	22.732
280	21.901	21.913	21.936	21.962	21.988	22.015	22.042	22.100	22.161	22.323	22.501	22.695	22.903
285	22.080	22.091	22.115	22.140	22.166	22.193	22.221	22.278	22.338	22.500	22.677	22.868	23.074

Opteon™ XL20 (R-454C)

Superheated Vapor - Heat Capacity Table

Heat Capacity, C_p, in kJ/kg-K

Saturation Properties in Light Blue

Temp °C	ABSOLUTE PRESSURE, kPa												
	50	101.325	200	300	400	500	600	800	1000	1500	2000	2500	3000
	-51.8	-37.8	-22.2	-11.7	-3.7	2.9	8.6	18.0	25.8	41.1	52.8	62.4	70.4
	0.762	0.812	0.873	0.918	0.956	0.990	1.022	1.083	1.142	1.303	1.504	1.789	2.258
-50	0.7640												
-45	0.7698												
-40	0.7765												
-35	0.7837	0.8127											
-30	0.7912	0.8163											
-25	0.7991	0.8211											
-20	0.8071	0.8267	0.8719										
-15	0.8153	0.8329	0.8719										
-10	0.8237	0.8395	0.8737	0.9164									
-5	0.8321	0.8464	0.8769	0.9135									
0	0.8406	0.8536	0.8809	0.9129	0.9510								
5	0.8492	0.8610	0.8856	0.9139	0.9468	0.9861							
10	0.8578	0.8686	0.8909	0.9162	0.9450	0.9784	1.0184						
15	0.8665	0.8764	0.8967	0.9194	0.9449	0.9740	1.0078						
20	0.8751	0.8842	0.9028	0.9233	0.9461	0.9717	1.0009	1.0750					
25	0.8838	0.8922	0.9092	0.9279	0.9484	0.9712	0.9967	1.0595					
30	0.8925	0.9002	0.9158	0.9329	0.9515	0.9719	0.9945	1.0487	1.1210				
35	0.9011	0.9082	0.9226	0.9383	0.9552	0.9736	0.9938	1.0412	1.1021				
40	0.9098	0.9164	0.9296	0.9440	0.9595	0.9762	0.9943	1.0363	1.0885				
45	0.9184	0.9245	0.9368	0.9500	0.9642	0.9794	0.9958	1.0332	1.0787	1.2608			
50	0.9269	0.9326	0.9440	0.9563	0.9693	0.9832	0.9982	1.0318	1.0717	1.2216			
55	0.9355	0.9408	0.9514	0.9627	0.9747	0.9875	1.0012	1.0315	1.0671	1.1935	1.4531		
60	0.9440	0.9489	0.9588	0.9693	0.9805	0.9922	1.0047	1.0323	1.0642	1.1729	1.3708		
65	0.9524	0.9571	0.9663	0.9761	0.9864	0.9973	1.0088	1.0340	1.0627	1.1576	1.3157	1.6685	
70	0.9608	0.9652	0.9738	0.9829	0.9925	1.0026	1.0132	1.0364	1.0624	1.1462	1.2767	1.5249	
75	0.9692	0.9733	0.9813	0.9899	0.9988	1.0082	1.0180	1.0393	1.0631	1.1377	1.2482	1.4363	1.8651
80	0.9775	0.9813	0.9889	0.9969	1.0052	1.0140	1.0231	1.0428	1.0646	1.1316	1.2267	1.3764	1.6602
85	0.9857	0.9893	0.9964	1.0039	1.0118	1.0199	1.0284	1.0467	1.0667	1.1273	1.2104	1.3335	1.5407
90	0.9939	0.9973	1.0040	1.0110	1.0184	1.0260	1.0340	1.0509	1.0694	1.1246	1.1979	1.3016	1.4622
95	1.0020	1.0052	1.0115	1.0182	1.0251	1.0322	1.0396	1.0554	1.0726	1.1230	1.1884	1.2774	1.4068
100	1.0100	1.0130	1.0190	1.0253	1.0318	1.0385	1.0455	1.0602	1.0762	1.1225	1.1812	1.2587	1.3661
105	1.0180	1.0209	1.0265	1.0324	1.0386	1.0449	1.0514	1.0652	1.0801	1.1228	1.1760	1.2442	1.3352
110	1.0259	1.0286	1.0340	1.0396	1.0454	1.0513	1.0575	1.0704	1.0843	1.1238	1.1722	1.2329	1.3113
115	1.0337	1.0363	1.0414	1.0467	1.0522	1.0578	1.0636	1.0758	1.0888	1.1255	1.1697	1.2241	1.2927
120	1.0414	1.0439	1.0487	1.0538	1.0590	1.0643	1.0698	1.0813	1.0935	1.1277	1.1683	1.2175	1.2780
125	1.0491	1.0515	1.0561	1.0609	1.0658	1.0708	1.0760	1.0869	1.0983	1.1303	1.1678	1.2124	1.2664
130	1.0567	1.0589	1.0633	1.0679	1.0726	1.0774	1.0823	1.0925	1.1034	1.1332	1.1680	1.2088	1.2573
135	1.0642	1.0664	1.0706	1.0749	1.0793	1.0839	1.0886	1.0983	1.1085	1.1366	1.1688	1.2063	1.2502
140	1.0717	1.0737	1.0777	1.0819	1.0861	1.0904	1.0949	1.1041	1.1138	1.1401	1.1702	1.2048	1.2448
145	1.0790	1.0810	1.0848	1.0888	1.0928	1.0970	1.1012	1.1099	1.1191	1.1440	1.1721	1.2041	1.2407
150	1.0863	1.0882	1.0918	1.0956	1.0995	1.1034	1.1075	1.1158	1.1245	1.1480	1.1744	1.2041	1.2377
155	1.0935	1.0953	1.0988	1.1024	1.1061	1.1099	1.1138	1.1217	1.1300	1.1522	1.1770	1.2047	1.2357
160	1.1006	1.1024	1.1057	1.1092	1.1127	1.1164	1.1200	1.1276	1.1355	1.1565	1.1799	1.2057	1.2346
165	1.1077	1.1093	1.1126	1.1159	1.1193	1.1228	1.1263	1.1335	1.1410	1.1610	1.1830	1.2073	1.2341
170	1.1147	1.1162	1.1194	1.1226	1.1258	1.1291	1.1325	1.1394	1.1466	1.1656	1.1864	1.2092	1.2342
175	1.1215	1.1231	1.1261	1.1291	1.1323	1.1354	1.1387	1.1453	1.1521	1.1702	1.1900	1.2114	1.2349
180	1.1283	1.1298	1.1327	1.1357	1.1387	1.1417	1.1448	1.1512	1.1577	1.1750	1.1937	1.2140	1.2359
185	1.1351	1.1365	1.1393	1.1421	1.1450	1.1479	1.1509	1.1570	1.1633	1.1798	1.1976	1.2167	1.2374
190	1.1417	1.1431	1.1458	1.1485	1.1513	1.1541	1.1570	1.1628	1.1688	1.1846	1.2015	1.2197	1.2392
195	1.1483	1.1496	1.1522	1.1549	1.1575	1.1603	1.1630	1.1686	1.1744	1.1895	1.2056	1.2229	1.2413
200	1.1548	1.1561	1.1586	1.1611	1.1637	1.1663	1.1690	1.1744	1.1799	1.1944	1.2098	1.2262	1.2436
205	1.1612	1.1625	1.1649	1.1673	1.1698	1.1724	1.1749	1.1801	1.1854	1.1993	1.2141	1.2297	1.2462
210	1.1676	1.1688	1.1711	1.1735	1.1759	1.1783	1.1808	1.1858	1.1909	1.2043	1.2184	1.2333	1.2490
215	1.1738	1.1750	1.1772	1.1795	1.1819	1.1842	1.1866	1.1914	1.1964	1.2092	1.2227	1.2369	1.2519
220	1.1800	1.1811	1.1833	1.1856	1.1878	1.1901	1.1924	1.1971	1.2018	1.2142	1.2271	1.2407	1.2550
225	1.1861	1.1872	1.1893	1.1915	1.1937	1.1959	1.1981	1.2026	1.2072	1.2191	1.2315	1.2445	1.2582
230	1.1922	1.1932	1.1953	1.1974	1.1995	1.2016	1.2038	1.2081	1.2126	1.2240	1.2360	1.2485	1.2615
235	1.1981	1.1992	1.2012	1.2032	1.2052	1.2073	1.2094	1.2136	1.2179	1.2289	1.2404	1.2524	1.2649
240	1.2040	1.2050	1.2070	1.2089	1.2109	1.2129	1.2149	1.2190	1.2232	1.2338	1.2449	1.2564	1.2683
245	1.2099	1.2108	1.2127	1.2146	1.2165	1.2185	1.2204	1.2244	1.2284	1.2387	1.2494	1.2604	1.2719
250	1.2156	1.2166	1.2184	1.2202	1.2221	1.2240	1.2259	1.2297	1.2336	1.2436	1.2539	1.2645	1.2755
255	1.2213	1.2222	1.2240	1.2258	1.2276	1.2294	1.2313	1.2350	1.2387	1.2484	1.2583	1.2686	1.2792
260	1.2269	1.2278	1.2295	1.2313	1.2330	1.2348	1.2366	1.2402	1.2439	1.2532	1.2628	1.2727	1.2828
265	1.2325	1.2333	1.2350	1.2367	1.2384	1.2401	1.2419	1.2454	1.2489	1.2580	1.2672	1.2768	1.2866
270	1.2379	1.2388	1.2404	1.2421	1.2437	1.2454	1.2471	1.2505	1.2539	1.2627	1.2717	1.2809	1.2903
275	1.2434	1.2442	1.2458	1.2474	1.2490	1.2506	1.2523	1.2556	1.2589	1.2674	1.2761	1.2850	1.2941
280	1.2487	1.2495	1.2510	1.2526	1.2542	1.2558	1.2574	1.2606	1.2638	1.2721	1.2805	1.2891	1.2979
285	1.2540	1.2548	1.2563	1.2578	1.2593	1.2609	1.2624	1.2655	1.2687	1.2767	1.2849	1.2932	1.3017

Opteon™ XL20 (R-454C)

Superheated Vapor - Heat Capacity Ratio Table

Heat Capacity Ratio, C_p/C_v

Saturation Properties in Light Blue

Temp °C	ABSOLUTE PRESSURE, kPa												
	50	101.325	200	300	400	500	600	800	1000	1500	2000	2500	3000
	-51.8	-37.8	-22.2	-11.7	-3.7	2.9	8.6	18.0	25.8	41.1	52.8	62.4	70.4
	1.165	1.170	1.181	1.194	1.206	1.219	1.233	1.262	1.294	1.394	1.537	1.756	2.133
-50	1.1629												
-45	1.1584												
-40	1.1543												
-35	1.1506	1.1666											
-30	1.1472	1.1613											
-25	1.1440	1.1566											
-20	1.1411	1.1524	1.1781										
-15	1.1384	1.1485	1.1712										
-10	1.1358	1.1450	1.1652	1.1904									
-5	1.1334	1.1417	1.1598	1.1819									
0	1.1311	1.1387	1.1550	1.1745	1.1981								
5	1.1290	1.1359	1.1507	1.1681	1.1887	1.2137							
10	1.1269	1.1333	1.1467	1.1624	1.1806	1.2022	1.2284						
15	1.1250	1.1308	1.1431	1.1572	1.1735	1.1924	1.2148						
20	1.1231	1.1285	1.1398	1.1526	1.1672	1.1839	1.2033	1.2540					
25	1.1214	1.1264	1.1367	1.1484	1.1615	1.1764	1.1935	1.2366					
30	1.1197	1.1243	1.1339	1.1445	1.1565	1.1698	1.1849	1.2222	1.2735				
35	1.1181	1.1224	1.1312	1.1410	1.1519	1.1639	1.1774	1.2100	1.2532				
40	1.1165	1.1205	1.1287	1.1378	1.1477	1.1586	1.1708	1.1995	1.2365				
45	1.1151	1.1188	1.1264	1.1348	1.1439	1.1539	1.1648	1.1904	1.2226	1.3577			
50	1.1136	1.1171	1.1242	1.1320	1.1404	1.1495	1.1595	1.1825	1.2107	1.3216			
55	1.1123	1.1155	1.1221	1.1293	1.1371	1.1455	1.1546	1.1754	1.2004	1.2938	1.4950		
60	1.1109	1.1140	1.1202	1.1269	1.1341	1.1418	1.1502	1.1691	1.1914	1.2714	1.4247		
65	1.1097	1.1125	1.1183	1.1246	1.1313	1.1385	1.1462	1.1634	1.1835	1.2530	1.3751	1.6573	
70	1.1084	1.1111	1.1166	1.1225	1.1287	1.1353	1.1424	1.1582	1.1764	1.2375	1.3378	1.5362	
75	1.1073	1.1098	1.1149	1.1204	1.1263	1.1324	1.1390	1.1535	1.1701	1.2243	1.3086	1.4584	1.8094
80	1.1061	1.1085	1.1134	1.1185	1.1240	1.1297	1.1359	1.1492	1.1644	1.2128	1.2849	1.4033	1.6352
85	1.1050	1.1073	1.1118	1.1167	1.1218	1.1272	1.1329	1.1453	1.1592	1.2028	1.2654	1.3619	1.5302
90	1.1039	1.1061	1.1104	1.1150	1.1198	1.1248	1.1302	1.1417	1.1545	1.1940	1.2488	1.3295	1.4588
95	1.1029	1.1050	1.1090	1.1134	1.1179	1.1226	1.1276	1.1383	1.1502	1.1861	1.2347	1.3033	1.4066
100	1.1019	1.1038	1.1077	1.1118	1.1161	1.1205	1.1252	1.1352	1.1462	1.1791	1.2225	1.2817	1.3666
105	1.1009	1.1028	1.1064	1.1103	1.1143	1.1185	1.1229	1.1323	1.1425	1.1728	1.2118	1.2635	1.3347
110	1.1000	1.1018	1.1052	1.1089	1.1127	1.1167	1.1208	1.1296	1.1391	1.1670	1.2023	1.2480	1.3088
115	1.0991	1.1008	1.1041	1.1076	1.1112	1.1149	1.1188	1.1271	1.1360	1.1618	1.1939	1.2346	1.2872
120	1.0982	1.0998	1.1030	1.1063	1.1097	1.1132	1.1169	1.1247	1.1330	1.1570	1.1863	1.2228	1.2690
125	1.0973	1.0989	1.1019	1.1050	1.1083	1.1116	1.1151	1.1224	1.1303	1.1526	1.1795	1.2125	1.2533
130	1.0965	1.0980	1.1008	1.1038	1.1069	1.1101	1.1134	1.1203	1.1277	1.1485	1.1734	1.2033	1.2397
135	1.0957	1.0971	1.0998	1.1027	1.1056	1.1087	1.1118	1.1183	1.1253	1.1448	1.1678	1.1951	1.2278
140	1.0949	1.0963	1.0989	1.1016	1.1044	1.1073	1.1103	1.1165	1.1230	1.1413	1.1626	1.1877	1.2172
145	1.0942	1.0954	1.0979	1.1006	1.1032	1.1060	1.1088	1.1147	1.1209	1.1381	1.1579	1.1810	1.2079
150	1.0934	1.0946	1.0970	1.0995	1.1021	1.1047	1.1074	1.1130	1.1189	1.1351	1.1536	1.1749	1.1995
155	1.0927	1.0939	1.0962	1.0986	1.1010	1.1035	1.1061	1.1114	1.1170	1.1323	1.1496	1.1693	1.1919
160	1.0920	1.0931	1.0953	1.0976	1.1000	1.1024	1.1048	1.1099	1.1152	1.1296	1.1459	1.1642	1.1850
165	1.0913	1.0924	1.0945	1.0967	1.0990	1.1012	1.1036	1.1084	1.1135	1.1271	1.1424	1.1595	1.1788
170	1.0907	1.0917	1.0937	1.0958	1.0980	1.1002	1.1024	1.1070	1.1118	1.1248	1.1392	1.1552	1.1730
175	1.0900	1.0910	1.0930	1.0950	1.0971	1.0992	1.1013	1.1057	1.1103	1.1226	1.1362	1.1512	1.1678
180	1.0894	1.0904	1.0922	1.0942	1.0962	1.0982	1.1002	1.1044	1.1088	1.1205	1.1333	1.1475	1.1629
185	1.0888	1.0897	1.0915	1.0934	1.0953	1.0972	1.0992	1.1032	1.1074	1.1185	1.1307	1.1440	1.1585
190	1.0882	1.0891	1.0908	1.0926	1.0944	1.0963	1.0982	1.1021	1.1061	1.1167	1.1282	1.1407	1.1543
195	1.0876	1.0885	1.0902	1.0919	1.0936	1.0954	1.0972	1.1009	1.1048	1.1149	1.1258	1.1377	1.1505
200	1.0871	1.0879	1.0895	1.0912	1.0929	1.0946	1.0963	1.0999	1.1035	1.1132	1.1236	1.1348	1.1469
205	1.0865	1.0873	1.0889	1.0905	1.0921	1.0937	1.0954	1.0988	1.1024	1.1116	1.1215	1.1322	1.1435
210	1.0860	1.0867	1.0882	1.0898	1.0914	1.0930	1.0946	1.0979	1.1012	1.1101	1.1195	1.1296	1.1404
215	1.0854	1.0862	1.0876	1.0891	1.0907	1.0922	1.0937	1.0969	1.1001	1.1086	1.1177	1.1273	1.1374
220	1.0849	1.0857	1.0871	1.0885	1.0900	1.0914	1.0929	1.0960	1.0991	1.1072	1.1159	1.1250	1.1347
225	1.0844	1.0851	1.0865	1.0879	1.0893	1.0907	1.0922	1.0951	1.0981	1.1059	1.1142	1.1229	1.1321
230	1.0840	1.0846	1.0859	1.0873	1.0887	1.0900	1.0914	1.0942	1.0971	1.1046	1.1125	1.1209	1.1296
235	1.0835	1.0841	1.0854	1.0867	1.0880	1.0894	1.0907	1.0934	1.0962	1.1034	1.1110	1.1189	1.1273
240	1.0830	1.0837	1.0849	1.0861	1.0874	1.0887	1.0900	1.0926	1.0953	1.1022	1.1095	1.1171	1.1250
245	1.0826	1.0832	1.0844	1.0856	1.0868	1.0881	1.0893	1.0919	1.0944	1.1011	1.1081	1.1154	1.1230
250	1.0821	1.0827	1.0839	1.0851	1.0863	1.0875	1.0887	1.0911	1.0936	1.1000	1.1068	1.1137	1.1210
255	1.0817	1.0823	1.0834	1.0845	1.0857	1.0869	1.0880	1.0904	1.0928	1.0990	1.1055	1.1122	1.1191
260	1.0813	1.0818	1.0829	1.0840	1.0851	1.0863	1.0874	1.0897	1.0920	1.0980	1.1042	1.1106	1.1173
265	1.0809	1.0814	1.0825	1.0835	1.0846	1.0857	1.0868	1.0890	1.0913	1.0971	1.1030	1.1092	1.1156
270	1.0805	1.0810	1.0820	1.0831	1.0841	1.0852	1.0862	1.0884	1.0906	1.0961	1.1019	1.1078	1.1139
275	1.0801	1.0806	1.0816	1.0826	1.0836	1.0846	1.0857	1.0877	1.0899	1.0952	1.1008	1.1065	1.1124
280	1.0797	1.0802	1.0812	1.0821	1.0831	1.0841	1.0851	1.0871	1.0892	1.0944	1.0997	1.1052	1.1109
285	1.0793	1.0798	1.0807	1.0817	1.0826	1.0836	1.0846	1.0865	1.0885	1.0936	1.0987	1.1040	1.1095

Opteon™ XL20 (R-454C)

Superheated Vapor - Thermal Conductivity Table

Thermal Conductivity in mW/m-K

Saturation Properties in Light Blue

Temp °C	ABSOLUTE PRESSURE, kPa												
	50	101.325	200	300	400	500	600	800	1000	1500	2000	2500	3000
	-51.8	-37.8	-22.2	-11.7	-3.7	2.9	8.6	18.0	25.8	41.1	52.8	62.4	70.4
	7.908	8.916	10.087	10.914	11.579	12.152	12.668	13.595	14.447	16.532	19.016	22.086	26.178
-50	8.030												
-45	8.380												
-40	8.734												
-35	9.090	9.112											
-30	9.450	9.470											
-25	9.813	9.831											
-20	10.179	10.196	10.244										
-15	10.548	10.564	10.608										
-10	10.921	10.935	10.975	11.038									
-5	11.296	11.310	11.346	11.403									
0	11.675	11.688	11.721	11.772	11.845								
5	12.057	12.069	12.100	12.146	12.211	12.300							
10	12.442	12.453	12.482	12.524	12.582	12.661	12.766						
15	12.831	12.840	12.867	12.905	12.958	13.029	13.121						
20	13.222	13.231	13.255	13.291	13.339	13.402	13.484	13.724					
25	13.617	13.625	13.647	13.680	13.724	13.781	13.854	14.064					
30	14.014	14.022	14.043	14.073	14.113	14.165	14.231	14.416	14.701				
35	14.415	14.422	14.441	14.469	14.505	14.553	14.612	14.778	15.025				
40	14.819	14.826	14.843	14.868	14.902	14.945	14.999	15.147	15.364				
45	15.227	15.232	15.248	15.272	15.302	15.342	15.391	15.524	15.716	16.692			
50	15.637	15.642	15.657	15.678	15.706	15.743	15.787	15.908	16.084	16.948			
55	16.050	16.055	16.069	16.088	16.114	16.147	16.188	16.308	16.480	17.245	18.971		
60	16.467	16.471	16.483	16.503	16.529	16.564	16.607	16.722	16.884	17.572	18.995		
65	16.888	16.893	16.907	16.927	16.954	16.989	17.031	17.142	17.295	17.921	19.133	21.722	
70	17.312	17.318	17.334	17.355	17.383	17.418	17.460	17.568	17.713	18.289	19.344	21.372	
75	17.740	17.747	17.764	17.788	17.816	17.851	17.893	17.998	18.137	18.672	19.607	21.273	24.644
80	18.170	18.179	18.199	18.224	18.253	18.289	18.331	18.434	18.567	19.068	19.908	21.321	23.867
85	18.605	18.615	18.637	18.663	18.694	18.731	18.772	18.874	19.003	19.475	20.238	21.464	23.507
90	19.042	19.053	19.078	19.106	19.139	19.176	19.218	19.319	19.445	19.892	20.592	21.674	23.376
95	19.482	19.495	19.522	19.553	19.587	19.626	19.668	19.769	19.892	20.318	20.966	21.934	23.391
100	19.926	19.940	19.970	20.003	20.039	20.078	20.122	20.223	20.344	20.752	21.356	22.233	23.503
105	20.372	20.388	20.420	20.455	20.493	20.535	20.580	20.681	20.801	21.195	21.761	22.562	23.688
110	20.822	20.839	20.874	20.911	20.951	20.994	21.041	21.143	21.262	21.644	22.179	22.917	23.927
115	21.275	21.293	21.330	21.370	21.412	21.457	21.505	21.609	21.728	22.100	22.608	23.292	24.209
120	21.730	21.751	21.790	21.832	21.877	21.923	21.972	22.078	22.197	22.562	23.047	23.686	24.524
125	22.189	22.211	22.253	22.297	22.344	22.392	22.443	22.551	22.671	23.030	23.495	24.096	24.869
130	22.651	22.674	22.719	22.766	22.814	22.864	22.916	23.027	23.148	23.503	23.952	24.520	25.237
135	23.116	23.141	23.188	23.237	23.287	23.339	23.393	23.506	23.629	23.981	24.416	24.956	25.626
140	23.585	23.610	23.660	23.711	23.764	23.817	23.873	23.989	24.113	24.464	24.887	25.404	26.033
145	24.056	24.083	24.135	24.189	24.243	24.299	24.355	24.474	24.600	24.951	25.365	25.861	26.455
150	24.530	24.558	24.613	24.669	24.726	24.783	24.842	24.963	25.091	25.442	25.849	26.328	26.892
155	25.008	25.037	25.094	25.152	25.211	25.270	25.331	25.454	25.584	25.937	26.339	26.802	27.341
160	25.488	25.519	25.578	25.638	25.699	25.761	25.823	25.950	26.081	26.436	26.834	27.285	27.801
165	25.972	26.003	26.065	26.127	26.190	26.254	26.318	26.448	26.581	26.939	27.333	27.774	28.271
170	26.459	26.491	26.555	26.619	26.684	26.750	26.816	26.949	27.085	27.445	27.837	28.270	28.751
175	26.948	26.982	27.048	27.114	27.181	27.248	27.316	27.453	27.592	27.954	28.346	28.772	29.239
180	27.441	27.476	27.544	27.612	27.681	27.750	27.820	27.960	28.102	28.467	28.858	29.279	29.735
185	27.937	27.973	28.043	28.113	28.184	28.255	28.326	28.470	28.615	28.984	29.375	29.791	30.237
190	28.436	28.473	28.545	28.617	28.690	28.762	28.836	28.982	29.130	29.505	29.895	30.308	30.746
195	28.939	28.977	29.050	29.124	29.198	29.273	29.348	29.498	29.648	30.030	30.419	30.830	31.261
200	29.444	29.483	29.558	29.634	29.710	29.786	29.863	30.016	30.170	30.556	30.948	31.355	31.782
205	29.952	29.992	30.069	30.147	30.225	30.303	30.381	30.537	30.693	31.086	31.482	31.885	32.308
210	30.464	30.505	30.583	30.663	30.743	30.822	30.902	31.061	31.220	31.619	32.019	32.422	32.838
215	30.978	31.020	31.101	31.182	31.263	31.344	31.426	31.588	31.750	32.154	32.558	32.964	33.373
220	31.496	31.539	31.621	31.704	31.787	31.870	31.952	32.117	32.282	32.692	33.100	33.508	33.917
225	32.017	32.061	32.144	32.229	32.313	32.398	32.482	32.650	32.817	33.233	33.646	34.056	34.466
230	32.541	32.585	32.671	32.757	32.843	32.929	33.015	33.185	33.355	33.776	34.193	34.607	35.018
235	33.068	33.113	33.200	33.288	33.376	33.463	33.550	33.724	33.896	34.323	34.744	35.161	35.573
240	33.598	33.644	33.733	33.822	33.911	34.000	34.089	34.265	34.440	34.872	35.298	35.717	36.131
245	34.131	34.178	34.268	34.359	34.450	34.540	34.630	34.809	34.986	35.424	35.854	36.276	36.692
250	34.667	34.715	34.807	34.899	34.991	35.083	35.174	35.356	35.536	35.979	36.413	36.838	37.256
255	35.207	35.255	35.348	35.442	35.536	35.629	35.722	35.906	36.088	36.536	36.975	37.403	37.822
260	35.749	35.799	35.893	35.989	36.084	36.178	36.272	36.459	36.643	37.097	37.539	37.970	38.391
265	36.295	36.345	36.441	36.538	36.634	36.730	36.825	37.014	37.201	37.659	38.105	38.539	38.962
270	36.843	36.894	36.992	37.090	37.188	37.285	37.381	37.572	37.761	38.224	38.672	39.108	39.530
275	37.395	37.447	37.546	37.645	37.744	37.843	37.940	38.134	38.326	38.794	39.247	39.687	40.113
280	37.950	38.002	38.103	38.204	38.304	38.404	38.503	38.699	38.893	39.366	39.825	40.268	40.698
285	38.508	38.561	38.663	38.765	38.867	38.968	39.068	39.267	39.463	39.942	40.405	40.853	41.286

Opteon™ XL20 (R-454C)

Superheated Vapor - Velocity of Sound Table

Velocity of Sound in m/sec **Saturation Properties in Light Blue**

	ABSOLUTE PRESSURE, kPa												
	50	101.325	200	300	400	500	600	800	1000	1500	2000	2500	3000
Temp °C	-51.8	-37.8	-22.2	-11.7	-3.7	2.9	8.6	18.0	25.8	41.1	52.8	62.4	70.4
	149.510	151.824	153.243	153.406	153.049	152.415	151.610	149.689	147.515	141.496	135.005	128.196	121.091
-50	150.13												
-45	151.87												
-40	153.58												
-35	155.25	152.84											
-30	156.89	154.65											
-25	158.51	156.41											
-20	160.10	158.13	154.11										
-15	161.66	159.81	156.06										
-10	163.21	161.46	157.95	154.15									
-5	164.73	163.08	159.79	156.24									
0	166.23	164.68	161.58	158.26	154.73								
5	167.72	166.25	163.32	160.21	156.93	153.43							
10	169.18	167.79	165.03	162.11	159.04	155.80	152.35						
15	170.64	169.31	166.70	163.95	161.07	158.05	154.86						
20	172.07	170.81	168.34	165.74	163.03	160.21	157.25	150.83					
25	173.49	172.29	169.95	167.49	164.94	162.30	159.54	153.61					
30	174.89	173.76	171.53	169.20	166.79	164.31	161.73	156.23	150.17				
35	176.28	175.20	173.08	170.87	168.60	166.26	163.84	158.72	153.14				
40	177.66	176.63	174.61	172.51	170.36	168.15	165.87	161.09	155.93				
45	179.03	178.04	176.12	174.12	172.08	169.99	167.84	163.36	158.57	144.68			
50	180.38	179.44	177.60	175.71	173.77	171.79	169.76	165.54	161.08	148.40			
55	181.72	180.82	179.07	177.26	175.42	173.54	171.62	167.65	163.47	151.82	137.33		
60	183.05	182.19	180.52	178.79	177.04	175.26	173.44	169.69	165.77	154.99	142.10		
65	184.37	183.54	181.94	180.30	178.63	176.93	175.21	171.66	167.97	157.96	146.33	131.72	
70	185.67	184.88	183.36	181.79	180.19	178.58	176.94	173.58	170.11	160.77	150.17	137.48	
75	186.97	186.21	184.75	183.25	181.73	180.19	178.64	175.45	172.17	163.43	153.69	142.45	128.52
80	188.26	187.53	186.13	184.70	183.25	181.78	180.30	177.27	174.16	165.96	156.97	146.85	134.97
85	189.53	188.84	187.50	186.12	184.74	183.34	181.93	179.05	176.10	168.39	160.04	150.84	140.42
90	190.80	190.13	188.85	187.54	186.21	184.87	183.52	180.79	177.99	170.72	162.94	154.51	145.21
95	192.06	191.42	190.19	188.93	187.66	186.38	185.10	182.49	179.83	172.96	165.69	157.92	149.51
100	193.31	192.69	191.51	190.31	189.09	187.87	186.64	184.16	181.63	175.13	168.32	161.11	153.44
105	194.55	193.96	192.82	191.67	190.51	189.34	188.16	185.79	183.39	177.23	170.82	164.12	157.08
110	195.78	195.21	194.12	193.02	191.90	190.79	189.66	187.40	185.11	179.26	173.23	166.97	160.47
115	197.00	196.46	195.41	194.35	193.28	192.21	191.14	188.97	186.79	181.24	175.55	169.69	163.65
120	198.22	197.70	196.69	195.67	194.65	193.62	192.59	190.52	188.44	183.17	177.78	172.28	166.66
125	199.42	198.92	197.96	196.98	196.00	195.02	194.03	192.05	190.06	185.04	179.94	174.77	169.52
130	200.62	200.14	199.22	198.28	197.33	196.39	195.45	193.55	191.65	186.87	182.04	177.16	172.24
135	201.82	201.35	200.46	199.56	198.66	197.75	196.85	195.04	193.22	188.66	184.08	179.47	174.85
140	203.00	202.56	201.70	200.83	199.97	199.10	198.23	196.50	194.76	190.41	186.06	181.70	177.36
145	204.18	203.75	202.93	202.10	201.26	200.43	199.60	197.94	196.27	192.12	187.98	183.86	179.77
150	205.35	204.94	204.15	203.35	202.55	201.75	200.95	199.36	197.77	193.80	189.87	185.96	182.09
155	206.51	206.12	205.36	204.59	203.82	203.05	202.29	200.76	199.24	195.45	191.70	187.99	184.34
160	207.67	207.29	206.56	205.82	205.08	204.35	203.61	202.15	200.69	197.07	193.50	189.98	186.52
165	208.82	208.45	207.75	207.04	206.33	205.63	204.92	203.52	202.12	198.66	195.25	191.91	188.63
170	209.96	209.61	208.94	208.25	207.57	206.89	206.22	204.87	203.53	200.22	196.98	193.79	190.69
175	211.10	210.76	210.11	209.46	208.80	208.15	207.50	206.21	204.93	201.76	198.66	195.64	192.69
180	212.23	211.91	211.28	210.65	210.02	209.40	208.77	207.53	206.30	203.28	200.32	197.44	194.64
185	213.36	213.04	212.44	211.84	211.23	210.63	210.03	208.84	207.67	204.77	201.95	199.20	196.54
190	214.48	214.17	213.60	213.01	212.43	211.86	211.28	210.14	209.01	206.24	203.54	200.93	198.40
195	215.59	215.30	214.74	214.18	213.63	213.07	212.52	211.43	210.34	207.69	205.11	202.62	200.22
200	216.70	216.42	215.88	215.35	214.81	214.28	213.75	212.70	211.66	209.12	206.66	204.29	202.00
205	217.80	217.53	217.02	216.50	215.98	215.47	214.97	213.96	212.96	210.53	208.18	205.92	203.75
210	218.89	218.64	218.14	217.65	217.15	216.66	216.17	215.21	214.25	211.93	209.68	207.52	205.46
215	219.98	219.74	219.26	218.78	218.31	217.84	217.37	216.45	215.53	213.30	211.16	209.10	207.13
220	221.07	220.83	220.38	219.92	219.46	219.01	218.56	217.67	216.80	214.66	212.62	210.65	208.78
225	222.15	221.92	221.48	221.04	220.60	220.17	219.74	218.89	218.05	216.01	214.05	212.18	210.40
230	223.22	223.00	222.58	222.16	221.74	221.32	220.91	220.09	219.29	217.34	215.47	213.69	211.99
235	224.29	224.08	223.68	223.27	222.87	222.47	222.07	221.29	220.52	218.65	216.87	215.17	213.56
240	225.36	225.15	224.77	224.38	223.99	223.61	223.23	222.48	221.74	219.96	218.25	216.63	215.10
245	226.41	226.22	225.85	225.48	225.11	224.74	224.37	223.66	222.95	221.24	219.62	218.07	216.62
250	227.47	227.28	226.93	226.57	226.21	225.86	225.51	224.83	224.15	222.52	220.97	219.50	218.11
255	228.52	228.34	228.00	227.65	227.31	226.98	226.64	225.99	225.34	223.78	222.30	220.90	219.59
260	229.56	229.39	229.06	228.73	228.41	228.09	227.77	227.14	226.52	225.03	223.62	222.29	221.04
265	230.60	230.44	230.12	229.81	229.50	229.19	228.88	228.28	227.69	226.27	224.93	223.66	222.47
270	231.64	231.48	231.18	230.88	230.58	230.28	229.99	229.42	228.85	227.50	226.22	225.01	223.89
275	232.67	232.52	232.23	231.94	231.66	231.37	231.09	230.54	230.01	228.71	227.50	226.35	225.29
280	233.69	233.55	233.27	233.00	232.73	232.46	232.19	231.66	231.15	229.92	228.76	227.68	226.67
285	234.71	234.58	234.31	234.05	233.79	233.53	233.28	232.78	232.29	231.11	230.01	228.98	228.03

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

C-XL20TRP-SI (12/23)