

TABLE C-7  
Saturated steam: temperature table\*

Temp., °F. t	Abs. pressure, lb./sq. in. p	Volume, cu. ft./lb.		Enthalpy, B.t.u./lb.		Entropy, B.t.u./lb.(°R.)		Temp., °F. t	Abs. pressure, lb./sq. in. p	Volume, cu. ft./lb.		Enthalpy, B.t.u./lb.		Entropy, B.t.u./lb.(°R.)	
		Liquid v <sub>f</sub>	Vapor v <sub>g</sub>	Liquid h <sub>f</sub>	Vapor h <sub>g</sub>	Liquid s <sub>f</sub>	Vapor s <sub>g</sub>			Liquid v <sub>f</sub>	Vapor v <sub>g</sub>	Liquid h <sub>f</sub>	Vapor h <sub>g</sub>	Liquid s <sub>f</sub>	Vapor s <sub>g</sub>
32	0.08854	0.01602	3306	0.00	1075.8	0.0000	2.1877	250	29.825	0.1700	13.821	216.48	1164.0	0.3675	1.6998
35	.09995	0.01602	2947	3.02	1077.1	0.061	2.1770	260	35.429	0.1709	11.763	228.64	1167.3	0.3817	1.6860
40	12.170	0.01602	2444	8.05	1079.3	0.162	2.1597	270	41.858	0.1717	10.061	238.84	1170.6	0.3958	1.6727
45	14.752	0.01602	2036.4	13.06	1081.5	0.262	2.1429	280	49.203	0.1726	8.645	249.06	1173.8	0.4096	1.6597
50	17.811	0.01603	1703.2	18.07	1083.7	0.361	2.1264	290	57.556	0.1735	7.461	259.31	1176.8	0.4234	1.6472
60	25.63	0.01604	1206.7	28.06	1088.0	0.555	2.0948	300	67.013	0.1745	6.466	269.59	1179.7	0.4369	1.6350
70	36.31	0.01606	867.9	38.04	1092.3	0.745	2.0647	310	77.68	0.1755	5.626	279.92	1182.5	0.4504	1.6231
80	50.69	0.01608	633.1	48.02	1096.6	0.932	2.0360	320	89.66	0.1765	4.914	290.28	1185.2	0.4637	1.6115
90	69.82	0.01610	468.0	57.99	1100.9	1.115	2.0087	330	103.06	0.1776	4.307	300.68	1187.7	0.4769	1.6002
100	94.92	0.01613	350.4	67.97	1105.2	1.295	1.9826	340	118.01	0.1787	3.788	311.13	1190.1	0.4900	1.5891
110	127.48	0.01617	265.4	77.94	1109.5	1.471	1.9577	350	134.63	0.1799	3.342	321.63	1192.3	0.5029	1.5783
120	169.24	0.01620	203.27	87.92	1113.7	1.645	1.9339	360	153.04	0.1811	2.957	332.18	1194.4	0.5158	1.5677
130	222.25	0.01625	157.34	97.90	1117.9	1.816	1.9112	370	173.37	0.1823	2.625	342.79	1196.3	0.5286	1.5573
140	288.86	0.01629	123.01	107.89	1122.0	1.984	1.8894	380	195.77	0.1836	2.335	353.45	1198.1	0.5413	1.5471
150	371.8	0.01634	97.07	117.89	1126.1	2.149	1.8685	390	220.37	0.1850	2.0836	364.17	1199.6	0.5539	1.5371
160	474.1	0.01639	77.29	127.89	1130.2	2.311	1.8485	400	247.31	0.1864	1.8633	374.97	1201.0	0.5664	1.5272
170	599.2	0.01645	62.06	137.90	1134.2	2.472	1.8293	410	276.75	0.1878	1.6700	385.83	1202.1	0.5788	1.5174
180	751.0	0.01651	50.23	147.92	1138.1	2.630	1.8109	420	308.83	0.1894	1.5000	396.77	1203.1	0.5912	1.5078
190	933.9	0.01657	40.96	157.95	1142.0	2.785	1.7932	430	343.72	0.1910	1.3499	407.79	1203.8	0.6035	1.4982
200	1152.6	0.01663	33.64	167.99	1145.9	2.938	1.7762	440	381.59	0.1926	1.2171	418.90	1204.3	0.6158	1.4887
210	1412.3	0.01670	27.82	178.05	1149.7	3.090	1.7598	450	422.6	0.194	1.0993	430.1	1204.6	0.6280	1.4793
212	14.696	0.01672	26.80	180.07	1150.4	3.120	1.7566	460	466.9	0.196	0.9944	441.4	1204.6	0.6402	1.4700
220	17.186	0.01677	23.15	188.13	1153.4	3.239	1.7440	470	514.7	0.198	0.9009	452.8	1204.3	0.6523	1.4606
230	20.780	0.01684	19.382	198.23	1157.0	3.387	1.7288	480	566.1	0.200	0.8172	464.4	1203.7	0.6645	1.4513
240	24.969	0.01692	16.323	208.34	1160.5	3.531	1.7140	490	621.4	0.202	0.7423	476.0	1202.8	0.6766	1.4419
500	680.8	0.0204	6.749	487.8	1201.7	6.887	1.4325	620	1786.6	0.0247	2.201	646.7	1150.3	8.398	1.3062
520	812.4	0.0209	5.594	511.9	1198.2	7.130	1.4136	640	2059.7	0.0260	1.798	678.6	1130.5	8.679	1.2789
540	962.5	0.0215	4.649	536.6	1193.2	7.374	1.3942	660	2365.4	0.0278	1.442	714.2	1104.4	8.987	1.2472
560	1133.1	0.0221	3.868	562.2	1186.4	7.621	1.3742	680	2708.1	0.0305	1.115	757.3	1067.2	9.351	1.2071
580	1325.8	0.0228	3.217	588.9	1177.3	7.872	1.3532								
600	1542.9	0.0236	2.668	617.0	1165.5	8.131	1.3307	700	3093.7	0.0369	0.761	823.3	995.4	9.905	1.1389
								705.4	3206.2	0.0503	0.503	902.7	902.7	1.0580	1.0580

\*Abridged from Keenan and Keyes, *Thermodynamic Properties of Steam*, Wiley, New York, 1936. Copyright, 1937, by Joseph H. Keenan and Frederick G. Keyes.

TABLE C-8  
Saturated water: temperature table

Temp., $T^{\circ}\text{C}$	Sat. press., $P_{\text{sat}}$ kPa	Specific volume, $\text{m}^3/\text{kg}$		Internal energy, $\text{kJ}/\text{kg}$			Enthalpy, $\text{kJ}/\text{kg}$			Entropy, $\text{kJ}/(\text{kg} \cdot \text{K})$		
		Sat. liquid, $v_f$	Sat. vapor, $v_g$	Sat. liquid, $u_f$	Evap., $u_{fg}$	Sat. vapor, $u_g$	Sat. liquid, $h_f$	Evap., $h_{fg}$	Sat. vapor, $h_g$	Sat. liquid, $s_f$	Evap., $s_{fg}$	Sat. vapor, $s_g$
0.01	0.6113	0.001000	206.14	0.0	2375.3	2375.3	0.01	2501.3	2501.4	0.000	9.1562	9.1562
5	0.8721	0.001000	147.12	20.97	2361.3	2382.3	20.98	2489.6	2510.6	0.0761	8.9496	9.0257
10	1.2276	0.001000	106.38	42.00	2347.2	2389.2	42.01	2477.7	2519.8	0.1510	8.7498	8.9008
15	1.7051	0.001001	77.93	62.99	2333.1	2396.1	62.99	2465.9	2528.9	0.2245	8.5569	8.7814
20	2.339	0.001002	57.79	83.95	2319.0	2402.9	83.96	2454.1	2538.1	0.2966	8.3706	8.6672
25	3.169	0.001003	43.36	104.88	2304.9	2409.8	104.89	2442.3	2547.2	0.3674	8.1905	8.5580
30	4.246	0.001004	32.89	125.78	2290.8	2416.6	125.79	2430.5	2556.3	0.4369	8.0164	8.4533
35	5.628	0.001006	25.22	146.67	2276.7	2423.4	146.68	2418.6	2565.3	0.5053	7.8478	8.3531
40	7.384	0.001008	19.52	167.56	2262.6	2430.1	167.57	2406.7	2574.3	0.5725	7.6845	8.2570
45	9.593	0.001010	15.26	188.44	2248.4	2436.8	188.45	2394.8	2583.2	0.6387	7.5261	8.1648
50	12.349	0.001012	12.03	209.32	2234.2	2443.5	209.33	2382.7	2592.1	0.7038	7.3725	8.0763
55	15.758	0.001015	9.568	230.21	2219.9	2450.1	230.23	2370.7	2600.9	0.7679	7.2234	7.9913
60	19.940	0.001017	7.671	251.11	2205.5	2456.6	251.13	2358.5	2609.6	0.8312	7.0784	7.9096
65	25.03	0.001020	6.197	272.02	2191.1	2463.1	272.06	2346.2	2618.3	0.8935	6.9375	7.8310
70	31.19	0.001023	5.042	292.95	2176.6	2469.6	292.98	2333.8	2626.8	0.9549	6.8004	7.7553
75	38.58	0.001026	4.131	313.90	2162.0	2475.9	313.93	2321.4	2635.3	1.0155	6.6669	7.6824
80	47.39	0.001029	3.407	334.86	2147.4	2482.2	334.91	2308.8	2643.7	1.0753	6.5369	7.6122
85	57.83	0.001033	2.828	355.84	2132.6	2488.4	355.90	2296.0	2651.9	1.1343	6.4102	7.5445
90	70.14	0.001036	2.361	376.85	2117.7	2494.5	376.92	2283.2	2660.1	1.1925	6.2866	7.4791
95	84.55	0.001040	1.982	297.88	2102.7	2500.6	397.96	2270.2	2668.1	1.2500	6.1659	7.4159
<b>Sat. press., MPa</b>												
100	0.10135	0.001044	1.6729	418.94	2087.6	2506.5	419.04	2257.0	2676.1	1.3069	6.0480	7.3549
105	0.12082	0.001048	1.4194	440.02	2072.3	2512.4	440.15	2243.7	2683.8	1.3630	5.9328	7.2958
110	0.14327	0.001052	1.2102	461.14	2057.0	2518.1	461.30	2230.2	2691.5	1.4185	5.8202	7.2387
115	0.16906	0.001056	1.0366	482.30	2041.4	2523.7	482.48	2216.5	2699.0	1.4734	5.7100	7.1833
120	0.19853	0.001060	0.8919	503.50	2025.8	2529.3	503.71	2202.6	2706.3	1.5276	5.6020	7.1296
125	0.2321	0.001065	0.7706	524.74	2009.9	2534.6	524.99	2188.5	2713.5	1.5813	5.4962	7.0775
130	0.2701	0.001070	0.6685	546.02	1993.9	2539.9	546.31	2174.2	2720.5	1.6344	5.3925	7.0269
135	0.3130	0.001075	0.5822	567.35	1977.7	2545.0	567.69	2159.6	2727.3	1.6870	5.2907	6.9777
140	0.3613	0.001080	0.5089	588.74	1961.3	2550.0	589.13	2144.7	2733.9	1.7391	5.1908	6.9299
145	0.4154	0.001085	0.4463	610.18	1944.7	2554.9	610.63	2129.6	2740.3	1.7907	5.0926	6.8833
150	0.4758	0.001091	0.3928	631.68	1927.9	2559.5	632.20	2114.3	2746.5	1.8418	4.9960	6.8379
155	0.5431	0.001096	0.3468	653.24	1910.8	2564.1	653.84	2098.6	2752.4	1.8925	4.9010	6.7935
160	0.6178	0.001102	0.3071	674.87	1893.5	2568.4	675.55	2082.6	2758.1	1.9427	4.8075	6.7502
165	0.7005	0.001108	0.2727	696.56	1876.0	2572.5	697.34	2066.2	2763.5	1.9925	4.7153	6.7078
170	0.7917	0.001114	0.2428	718.33	1858.1	2576.5	719.21	2049.5	2768.7	2.0419	4.6244	6.6663
175	0.8920	0.001121	0.2168	740.17	1840.0	2580.2	741.17	2032.4	2773.6	2.0909	4.5347	6.6256
180	1.0021	0.001127	0.19405	762.09	1821.6	2583.7	763.22	2015.0	2778.2	2.1396	4.4461	6.5857
185	1.1227	0.001134	0.17409	784.10	1802.9	2587.0	785.37	1997.1	2782.4	2.1879	4.3586	6.5465
190	1.2544	0.001141	0.15654	806.19	1783.8	2590.0	807.62	1978.8	2786.4	2.2359	4.2720	6.5079
195	1.3978	0.001149	0.14105	828.37	1764.4	2592.8	829.98	1960.0	2790.0	2.2835	4.1863	6.4698

Source: Cengel, Y. A., and M. A. Boles: *Thermodynamics: An Engineering Approach*, McGraw-Hill, Table A-4, pp. 904–905, 1998.

TABLE C-8  
Continued

Temp., T°C	Sat. press., P <sub>sat</sub> MPa	Specific volume, m <sup>3</sup> /kg		Internal energy, kJ/kg			Enthalpy, kJ/kg			Entropy, kJ/(kg · K)		
		Sat. liquid, v <sub>f</sub>	Sat. vapor, v <sub>g</sub>	Sat. liquid, u <sub>f</sub>	Evap., u <sub>fg</sub>	Sat. vapor, u <sub>g</sub>	Sat. liquid, h <sub>f</sub>	Evap., h <sub>fg</sub>	Sat. vapor, h <sub>g</sub>	Sat. liquid, s <sub>f</sub>	Evap., s <sub>fg</sub>	Sat. vapor, s <sub>g</sub>
200	1.5538	0.001157	0.13736	850.65	1744.7	2595.3	852.45	1940.7	2793.2	2.3309	4.1014	6.4323
205	1.7230	0.001164	0.11521	873.04	1724.5	2597.5	875.04	1921.0	2796.0	2.3780	4.0172	6.3952
210	1.9062	0.001173	0.10441	895.53	1703.9	2599.5	897.76	1900.7	2798.5	2.4248	3.9337	6.3585
215	2.104	0.001181	0.09479	918.14	1682.9	2601.1	920.62	1879.9	2800.5	2.4714	3.8507	6.3221
220	2.318	0.001190	0.08619	940.87	1661.5	2602.4	943.62	1858.5	2802.1	2.5178	3.7683	6.2861
225	2.548	0.001199	0.07849	963.73	1639.6	2603.3	966.78	1836.5	2803.3	2.5639	3.6863	6.2503
230	2.795	0.001209	0.07158	986.74	1617.2	2603.9	990.12	1813.8	2804.0	2.6099	3.6047	6.2146
235	3.060	0.001219	0.06537	1009.89	1594.2	2604.1	1013.62	1790.5	2804.2	2.6558	3.5233	6.1791
240	3.344	0.001229	0.05976	1033.21	1570.8	2604.0	1037.32	1766.5	2803.8	2.7015	3.4422	6.1437
245	3.648	0.001240	0.05471	1056.71	1546.7	2603.4	1061.23	1741.7	2803.0	2.7472	3.3612	6.1083
250	3.973	0.001251	0.05013	1080.39	1522.0	2602.4	1085.36	1716.2	2801.5	2.7927	3.2802	6.0730
255	4.319	0.001263	0.04598	1104.28	1596.7	2600.9	1109.73	1689.8	2799.5	2.8383	3.1992	6.0375
260	4.688	0.001276	0.04221	1128.39	1470.6	2599.0	1134.37	1662.5	2796.9	2.8838	3.1181	6.0019
265	5.081	0.001289	0.03877	1152.74	1443.9	2596.6	1159.28	1634.4	2793.6	2.9294	3.0368	5.9662
270	5.499	0.001302	0.03564	1177.36	1416.3	2593.7	1184.51	1605.2	2789.7	2.9751	2.9551	5.9301
275	5.942	0.001317	0.03279	1202.25	1387.9	2590.2	1210.07	1574.9	2785.0	3.0208	2.8730	5.8938
280	6.412	0.001332	0.03017	1227.46	1358.7	2586.1	1235.99	1543.6	2779.6	3.0668	2.7903	5.8571
285	6.909	0.001348	0.02777	1253.00	1328.4	2581.4	1262.31	1511.0	2773.3	3.1130	2.7070	5.8199
290	7.436	0.001366	0.02557	1278.92	1297.1	2576.0	1289.07	1477.1	2766.2	3.1594	2.6227	5.7821
295	7.993	0.001384	0.02354	1305.2	1264.7	2569.9	1316.3	1441.8	2758.1	3.2062	2.5375	5.7437
300	8.581	0.001404	0.02167	1332.0	1231.0	2563.0	1344.0	1404.9	2749.0	3.2534	2.4511	5.7045
305	9.202	0.001425	0.019948	1359.3	1195.9	2555.2	1372.4	1366.4	2738.7	3.3010	2.3633	5.6643
310	9.856	0.001447	0.018350	1387.1	1159.4	2546.4	1401.3	1326.0	2727.3	3.3493	2.2737	5.6230
315	10.547	0.001472	0.016867	1415.5	1121.1	2536.6	1431.0	1283.5	2714.5	3.3982	2.1821	5.5804
320	11.274	0.001499	0.015488	1444.6	1080.9	2525.5	1461.5	1238.6	2700.1	3.4480	2.0882	5.5362
330	12.845	0.001561	0.012996	1505.3	993.7	2498.9	1525.3	1140.6	2665.9	3.5507	1.8909	5.4417
340	14.586	0.001638	0.010797	1570.3	894.3	2464.6	1594.2	1027.9	2622.0	3.6594	1.6763	5.3357
350	16.513	0.001740	0.008813	1641.9	776.6	2418.4	1670.6	893.4	2563.9	3.7777	1.4335	5.2112
360	18.651	0.001893	0.006945	1725.2	626.3	2351.5	1760.5	720.3	2481.0	3.9147	1.1379	5.0526
370	21.03	0.002213	0.004925	1844.0	384.5	2228.5	1890.5	441.6	2332.1	4.1106	0.6865	4.7971
374.14	22.09	0.003155	0.003155	2029.6	0	2029.6	2099.3	0	2099.3	4.4298	0	4.4298