PROPERTIES OF WATER AND STEAM AS A FUNCTION OF TEMPERATURE AND PRESSURE

This table gives properties of compressed water and superheated steam at selected pressures and temperatures. The properties included are density ρ, enthalpy H, entropy S, heat capacity at constant pressure C_p, and static dielectric constant (relative permittivity). The table was generated from the formulation approved by the International Association for the Properties of Water and Steam for general and scientific use. The reference state for this table is the liquid at the triple point, at which the internal energy and entropy are taken as zero. A duplicate entry in the temperature column indicates a phase transition (liquid–vapor) at that temperature; property values are then given for both phases. In the 100 MPa section of the table, an entry is given at the critical temperature, 647.10 K. Temperatures refer to the ITS-90 scale, on which the normal boiling point of water is 373.12 K (99.97°C).

References

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p/MPa	T/K	ρ/kg m^{-3}	H/J g^{-1}	S/J g^{-1}K^{-1}	C_p/J g^{-1}K^{-1}	Diel. const.
0.1	273.16	999.84	0.10	0.0000	4.2194	87.90
0.1	300	996.56	112.65	0.3931	4.1806	77.75
0.1	325	987.19	217.15	0.7276	4.1819	69.32
0.1	350	973.73	321.84	1.0380	4.1945	61.79
0.1	372.76	958.63	417.50	1.3028	4.2152	55.61
0.1	372.76	0.59034	2674.9	7.3588	2.0784	1.006
0.1	375	0.58653	2679.6	7.3713	2.0686	1.006
0.1	400	0.54761	2730.4	7.5025	2.0078	1.005
0.1	450	0.48458	2829.7	7.7365	1.9752	1.004
0.1	500	0.43514	2928.6	7.9447	1.9813	1.003
0.1	550	0.39507	3028.1	8.1344	2.0010	1.003
0.1	600	0.36185	3128.8	8.3096	2.0268	1.002
0.1	650	0.33384	3230.8	8.4730	2.0557	1.002
0.1	700	0.30988	3334.4	8.6264	2.0867	1.002
0.1	750	0.28915	3439.5	8.7715	2.1191	1.002
0.1	800	0.27102	3546.3	8.9093	2.1525	1.001
0.1	850	0.25504	3654.8	9.0408	2.1868	1.001
0.1	900	0.24085	3765.0	9.1668	2.2216	1.001
0.1	950	0.22815	3876.9	9.2879	2.2568	1.001
0.1	1000	0.21673	3990.7	9.4045	2.2921	1.001
0.1	1050	0.20640	4106.1	9.5172	2.3273	1.001
0.1	1100	0.19701	4223.4	9.6263	2.3621	1.001
0.1	1150	0.18844	4342.3	9.7321	2.3965	1.001
0.1	1200	0.18058	4463.0	9.8348	2.4302	1.001
1	273.16	1000.3	1.02	0.0000	4.2150	87.93
1	300	996.96	113.48	0.3928	4.1781	77.78
1	325	987.58	217.93	0.7272	4.1798	69.36
1	350	974.13	322.56	1.0374	4.1925	61.82
1	375	957.43	427.64	1.3274	4.2158	55.09
1	400	937.87	533.47	1.6005	4.2535	49.06
1	450	890.39	749.20	2.1086	4.3924	38.81
1	453.03	887.13	762.51	2.1381	4.4045	38.23
1	453.03	5.1450	2777.1	6.5850	2.7114	1.042
1	500	4.5323	2891.2	6.8250	2.2795	1.034
1	550	4.0581	3001.8	7.0359	2.1647	1.028
1	600	3.6871	3109.0	7.2224	2.1292	1.024
1	650	3.3843	3215.2	7.3925	2.1254	1.020
1	700	3.1305	3321.7	7.5504	2.1368	1.017
1	750	2.9140	3429.0	7.6984	2.1566	1.015
1	800	2.7265	3537.5	7.8384	2.1816	1.013
1	850	2.5624	3647.3	7.9715	2.2098	1.012
1	900	2.4174	3758.5	8.0986	2.2402	1.011

p/MPa	T/K	ρ/kg m^{-3}	H/J g^{-1}	S/J g^{-1}K^{-1}	C_p/J g^{-1}K^{-1}	Diel. const.
1	950	2.2882	3871.3	8.2206	2.2721	1.010
1	1000	2.1723	3985.7	8.3380	2.3048	1.009
1	1050	2.0678	4101.8	8.4512	2.3380	1.008
1	1100	1.9729	4219.5	8.5608	2.3713	1.007
1	1150	1.8865	4338.9	8.6669	2.4044	1.007
1	1200	1.8074	4460.0	8.7699	2.4371	1.006
10	273.16	1004.8	10.1	0.000	4.173	88.30
10	300	1001.0	121.7	0.390	4.153	78.11
10	325	991.46	225.6	0.723	4.160	69.67
10	350	978.09	329.7	1.031	4.173	62.13
10	375	961.62	434.4	1.320	4.195	55.40
10	400	942.42	539.6	1.592	4.230	49.39
10	450	896.16	753.9	2.096	4.355	39.17
10	500	838.02	977.1	2.566	4.602	30.79
10	550	761.82	1218	3.027	5.140	23.53
10	584.15	688.42	1408	3.360	6.123	18.70
10	584.15	55.463	2725	5.616	7.140	1.404
10	600	49.773	2820	5.775	5.136	1.365
10	650	40.479	3022	6.100	3.396	1.267
10	700	35.355	3177	6.330	2.874	1.214
10	750	31.810	3314	6.520	2.645	1.179
10	800	29.107	3443	6.686	2.531	1.154
10	850	26.933	3568	6.838	2.473	1.134
10	900	25.123	3691	6.978	2.445	1.118
10	950	23.580	3813	7.110	2.436	1.105
10	1000	22.241	3935	7.235	2.439	1.095
10	1050	21.063	4057	7.354	2.450	1.086
10	1100	20.017	4180	7.469	2.466	1.078
10	1150	19.078	4304	7.579	2.485	1.072
10	1200	18.230	4429	7.685	2.507	1.066
100	273.16	1045.3	95.4	–0.008	3.905	91.83
100	300	1037.2	201.4	0.362	3.979	81.22
100	325	1026.6	301.3	0.682	4.008	72.58
100	350	1013.6	401.7	0.979	4.025	64.95
100	375	998.59	502.6	1.258	4.040	58.19
100	400	981.82	603.7	1.518	4.056	52.20
100	450	943.51	807.8	1.999	4.110	42.15
100	500	899.21	1015	2.436	4.196	34.15
100	550	848.78	1228	2.842	4.323	27.67
100	600	791.49	1448	3.225	4.501	22.29
100	647.10	730.24	1665	3.573	4.733	17.97
100	650	726.21	1679	3.595	4.750	17.72
100	700	651.77	1925	3.958	5.083	13.75
100	750	568.52	2188	4.322	5.449	10.34
100	800	482.23	2466	4.681	5.610	7.562
100	850	404.66	2742	5.016	5.380	5.571
100	900	343.61	3000	5.310	4.887	4.284
100	950	298.61	3231	5.560	4.382	3.477
100	1000	265.45	3440	5.774	3.978	2.956
100	1050	240.32	3631	5.961	3.683	2.601
100	1100	220.62	3809	6.127	3.471	2.347
100	1150	204.71	3979	6.278	3.319	2.158
100	1200	191.53	4142	6.417	3.209	2.011