

**PERMITTIVITY (DIELECTRIC CONSTANT) OF WATER AS A  
FUNCTION OF TEMPERATURE AND PRESSURE**

The following table summarizes the relative permittivity (static dielectric constant) of liquid water and steam over a wide range of temperature and pressure. Values are given from slightly above the freezing point to 1000 K and at pressures from normal atmospheric to 1000 MPa (about 10000 atm). The values are generated from an equation that correlates the best experimental measurements from a large number of sources. The correlating equation and full details of the formulation may be found in Reference 1.

Temperatures are given on the ITS-90 scale. Liquid–vapor boundaries are indicated by horizontal lines.

T/K	Pressure in MPa										
	0.1	1	2	5	10	20	50	100	200	500	1000
275	87.16	87.20	87.24	87.36	87.57	87.97	89.16	91.05	94.55	103.7	
280	85.19	85.23	85.27	85.39	85.59	85.98	87.14	88.98	92.38	101.3	
285	83.27	83.30	83.34	83.46	83.65	84.04	85.17	86.96	90.27	98.91	
290	81.39	81.42	81.46	81.57	81.76	82.14	83.24	84.99	88.22	96.64	
295	79.55	79.58	79.62	79.73	79.92	80.29	81.37	83.08	86.24	94.44	
300	77.75	77.78	77.82	77.93	78.11	78.48	79.54	81.22	84.31	92.31	
305	75.99	76.02	76.06	76.17	76.35	76.71	77.75	79.40	82.43	90.25	101.3
310	74.27	74.30	74.33	74.44	74.62	74.98	76.01	77.63	80.61	88.26	99.06
315	72.58	72.61	72.65	72.76	72.93	73.28	74.30	75.90	78.84	86.34	96.87
320	70.93	70.97	71.00	71.11	71.28	71.63	72.64	74.22	77.11	84.48	94.76
340	64.70	64.73	64.77	64.87	65.04	65.38	66.36	67.89	70.65	77.58	87.07
360	<u>59.00</u>	59.03	59.07	59.17	59.34	59.68	60.65	62.15	64.83	71.45	80.36
380	1.006	53.83	53.86	53.97	54.14	54.48	55.45	56.94	59.57	65.95	74.43
400	1.005	49.06	49.10	49.21	49.39	49.73	50.71	52.20	54.80	61.00	69.12
420	1.005	44.70	44.74	44.85	45.04	45.39	46.39	47.90	50.48	56.53	64.35
440	1.004	<u>40.70</u>	40.74	40.85	41.05	41.42	42.45	43.98	46.55	52.48	60.03
460	1.004	1.041	37.04	37.17	37.37	37.76	38.84	40.40	42.99	48.81	56.11
480	1.004	1.038	<u>33.61</u>	33.75	33.97	34.39	35.53	37.14	39.75	45.47	52.55
500	1.003	1.034	1.074	<u>30.55</u>	30.79	31.25	32.47	34.15	36.79	42.44	49.30
550	1.003	1.028	1.059	1.177	<u>23.53</u>	24.18	25.73	27.67	30.46	35.99	42.38
600	1.002	1.024	1.049	1.137	1.365	<u>17.50</u>	19.90	22.29	25.34	30.82	36.82
650	1.002	1.020	1.041	1.112	1.267	2.066	14.50	17.72	21.12	26.62	32.31
700	1.002	1.017	1.036	1.095	1.214	1.603	8.963	13.75	17.60	23.17	28.60
750	1.002	1.015	1.031	1.082	1.179	1.452	4.424	10.34	14.65	20.30	25.51
800	1.001	1.013	1.027	1.071	1.154	1.365	2.844	7.562	12.17	17.88	22.91
850	1.001	1.012	1.024	1.063	1.134	1.307	2.269	5.571	10.10	15.83	20.70
900	1.001	1.011	1.022	1.056	1.118	1.265	1.975	4.284	8.416	14.08	18.80
950	1.001	1.010	1.020	1.050	1.105	1.232	1.793	3.477	7.066	12.57	17.15
1000	1.001	1.009	1.018	1.046	1.095	1.206	1.668	2.956	6.003	11.27	15.72
1050	1.001	1.008	1.016	1.041	1.086	1.184	1.576	2.601	5.172	10.14	14.45
1100	1.001	1.007	1.015	1.038	1.078	1.167	1.505	2.347	4.523	9.160	13.34
1150	1.001	1.007	1.014	1.035	1.072	1.151	1.449	2.158	4.012	8.309	12.35
1200	1.001	1.006	1.013	1.032	1.066	1.139	1.403	2.011	3.606	7.569	11.47