TABLE 8. SPECIFIC HEAT OF VARIOUS SOLIDS AND LIQUIDS BETWEEN 32 AND 212 DEG. FAHR.[a]

SOLIDS		SOLIDS		SOLIDS	
Alloys:		Glass:		Tufa	0.33
Bismuth-tin	0.040–0.045	Normal	0.199	Vulcanite	0.331
Bell metal	0.086	Crown	0.16	Wood:	
Brass, yellow	0.0883	Flint	0.12	Fir	0.65
Brass, red	0.090	Gneiss	0.18	Oak	0.57
Bronze	0.104	Granite	0.195	Pine	0.67
Constantan	0.098	Graphite	0.201		
D'Arcet's metal	0.050	Gypsum	0.259	LIQUIDS	
German silver	0.095	Hornblende	0.195	Acetic acid	0.51
Lipowitz's metal	0.040	Humus (soil)	0.44	Alcohol (absolute)	0.58
Nickel steel	0.109	Ice	0.504	Aniline	0.49
Rose's metal	0.050	India rubber (Para)	0.27–0.48	Benzol	0.40
Solders (Pb and Sn)	0.040–0.045	Kaolin	0.224	Chloroform	0.23
Type metal	0.0388	Limestone	0.217	Ether	0.54
Wood's metal	0.040	Marble	0.210	Fusel oil	0.56
40 Pb + 60 Bi	0.0317	Oxides:		Gasoline	0.50
25 Pb + 75 Bi	0.030	Alumina (Al_2O_3)	0.183	Glycerine	0.576
Asbestos	0.20	Cu_2O	0.111	Hydrochloric acid	0.60
Ashes	0.20	Lead oxide (PbO)	0.055	Kerosene	0.50
Basalt (lava)	0.20	Lodestone	0.156	Naphthalene	0.31
Borax	0.229	Magnesia	0.222	Machine oil	0.40
Brick	0.22	Magnetite (Fe_3O_4)	0.168	Mercury	0.033
Carbon-coke	0.203	Silica	0.191	Olive oil	0.40
Chalk	0.215	Soda	0.231	Paraffin oil	0.52
Charcoal	0.20	Zinc oxide (ZnO)	0.125	Petroleum	0.498
Cinders	0.18	Paraffin wax	0.69	Sulphuric acid	0.336
Coal	0.314	Porcelain	0.22	Sea water	0.94
Concrete	0.156	Quartz	0.17–0.28	Toluene	0.40
Cork	0.485	Quicklime	0.217	Turpentine	0.42
Corundum	0.198	Salt, rock	0.21	Molten metals:	
Dolomite	0.222	Sand	0.195	Bismuth (535–725 deg. fahr)	0.036
Ebonite	0.33	Sandstone	0.22	Lead (590–680 deg. fahr.)	0.041
		Serpentine	0.25	Sulphur (246–297 deg. fahr.)	0.235
		Sulphur	0.180	Tin (460–660 deg. fahr.)	0.058
		Talc	0.209		

[a] From Marks' *Mechanical Engineers' Handbook.*

TABLE 9. WEIGHTS OF MATERIALS

	Pounds per Cubic Foot		*Pounds per Cubic Foot*
Ashes	45 – 50	Lignite	31 – 47
Barley	37 – 40	Lime	50 – 80
Cement	90 – 118	Limestone	90 – 110
Charcoal	17 – 27	Oats	28 – 31
Clay	95 – 169	Ore	105 – 215
Coal (lump)	50 – 54	Rye	44 – 50
Nut and screenings	53 – 60	Sand	75 – 120
Coke	26 – 30	Slag (blast-furnace)	37 – 63
Earth	75 – 115	Stone	90 – 120
Gravel	90 – 135	Wheat	44 – 50

TABLE 10. LINEAL EXPANSION OF SOLIDS AT ORDINARY TEMPERATURES[a]

(Tabular values represent increase per foot per 100 deg. increase in temperature, Fahrenheit)

SUBSTANCE	TEMP. CONDITIONS[b] DEG. FAHR.	COEFFICIENT PER 100 DEG. FAHR.	SUBSTANCE	TEMP. CONDITIONS[b] DEG. FAHR.	COEFFICIENT PER 100 DEG. FAHR.
Brass (cast)	32 to 212	0.001042	Lead	32 to 212	0.001505
Brass (wire)	32 to 212	0.001072	Mercury[c]	32 to 212	0.009984
Copper	32 to 212	0.000926	Limestone	32 to 212	0.000139
Glass (English flint)	32 to 212	0.000451	Steel (Bessemer rolled, hard)	0 to 212	0.00056
Granite (average)	32 to 212	0.000482	Steel (Bessemer rolled, soft)	0 to 212	0.00063
Iron (cast)	104	0.000589	Steel (cast, French)	104	0.000734
Iron (soft forged)	0 to 212	0.000634	Steel (cast annealed, English)	104	0.000608
Iron (wire)	32 to 212	0.000800			

[a] From *Mechanical Equipment of Buildings*, Vol. 1, by Harding and Willard, revised edition, 1929.

[b] Where range of temperature is given, coefficient is mean over range.

[c] Coefficient of cubical expansion.

TABLE 11. THERMAL PROPERTIES OF WATER[a]

TEMP., °F	SAT. PRESSURE, LB. PER SQ. IN.	VOLUME, CU. FT. PER LB.	WEIGHT, LB. PER CU. FT.	SPECIFIC HEAT	TEMP., °F	SAT. PRESSURE, LB. PER SQ. IN.	VOLUME, CU. FT. PER LB.	WEIGHT, LB. PER CU. FT.	SPECIFIC HEAT
20	0.050	0.01603	62.37	1.0210	370	173.2	0.01829	54.66	1.053
30	0.081	0.01602	62.42	1.0104	380	195.6	0.01843	54.25	1.057
40	0.122	0.01602	62.43	1.0048	390	220.1	0.01857	53.84	1.062
50	0.178	0.01602	62.42	1.0015	**400**	247	0.0187	53.42	1.067
60	0.256	0.01603	62.37	0.9995	410	276	0.0189	52.99	1.072
70	0.363	0.01605	62.30	0.9982	420	308	0.0190	52.55	1.078
80	0.507	0.01607	62.22	0.9975	430	343	0.0192	52.11	1.083
90	0.698	0.01610	62.11	0.9971	440	381	0.0194	51.66	1.089
100	0.949	0.01613	62.00	0.9970	**450**	422	0.0195	51.2	1.095
110	1.274	0.01616	61.86	0.9971	460	466	0.0197	50.7	1.101
120	1.692	0.01620	61.71	0.9974	470	514	0.0199	50.2	1.107
130	2.221	0.01625	61.55	0.9978	480	565	0.0201	49.7	1.114
140	2.887	0.01629	61.38	0.9984	490	620	0.0203	49.2	1.121
150	3.716	0.01634	61.20	0.9990	**500**	679	0.0205	48.7	1.130
160	4.739	0.01639	61.00	0.9998	510	743	0.0208	48.2	1.140
170	5.99	0.01645	60.80	1.0007	520	810	0.0210	47.6	1.151
180	7.51	0.01651	60.58	1.0017	530	883	0.0212	47.1	1.164
190	9.34	0.01657	60.36	1.0028	540	960	0.0215	46.5	1.181
200	11.53	0.01663	60.12	1.0039	**550**	1043	0.0218	45.9	1.200
210	14.12	0.01670	59.88	1.0052	560	1131	0.0221	45.2	1.222
220	17.19	0.01677	59.63	1.0068	570	1224	0.0224	44.6	1.249
230	20.78	0.01684	59.37	1.0085	580	1323	0.0227	44.0	1.281
240	24.97	0.01692	59.11	1.0104	590	1429	0.0231	43.3	1.318
250	29.83	0.01700	58.83	1.0125	**600**	1540	0.0235	42.6	1.362
260	35.44	0.01708	58.55	1.0148	610	1659	0.024	41.8	1.415
270	41.87	0.01716	58.26	1.0173	620	1784	0.024	41.0	1.479
280	49.22	0.01725	57.96	1.020	630	1917	0.025	40.2	1.559
290	57.57	0.01735	57.65	1.023	640	2057	0.025	39.2	1.661
300	67.02	0.01745	57.32	1.026	**650**	2205	0.026	38.2	1.793
310	77.68	0.01755	56.98	1.029	660	2361	0.027	37.2	------
320	89.65	0.01766	56.62	1.033	670	2526	0.028	36.0	------
330	103.0	0.01778	56.24	1.036	680	2699	0.029	34.5	------
340	118.0	0.01790	55.85	1.040	690	2882	0.031	32.6	------
350	134.6	0.01803	55.46	1.044	**700**	3075	0.034	29.7	------
360	153.0	0.01816	55.06	1.048	706.3	3200	0.048	20.9	------

[a] From *Properties of Steam and Ammonia*, by G. A. Goodenough. John Wiley & Sons, Inc.

TABLE 12. METRIC UNITS

1 cm.	= 0.3937 in.	1 cu. cm.	= 0.061 cu. in.
1 in.	= 2.54 cm.	1 cu. in.	= 16.38 cu. cm.
1 meter	= 3.281 ft.	1 cu. meter	= 35.32 cu. ft.
1 ft.	= 0.3048 meters	1 cu. ft.	= 0.0283 cu. meter
1 sq. cm.	= 0.155 sq. in.	1 liter	= 1000 cu. cm. = 0.264 gal.
1 sq. in.	= 6.45 sq. cm.	1 kilogram	= 2.2046 lb.
1 sq. meter	= 10.765 sq. ft.	1 lb.	= 0.4536 kilograms
1 sq. ft.	= 0.0929 sq. meter	1 met. ton	= 2205 lb. (avoir.)
		1 gram	= 980.59 dynes

1 kilometer per hour	= 0.6214 mile per hour.
1 gram per square centimeter	= 0.2896 in. mercury (at 0 deg. cent.) = 0.394 in. water (at 15 deg. cent.)
1 kg. per square centimeter (metric atmosphere)	= 14.22 lb. per square inch
1 gram per cubic centimeter	= 0.03613 lb. per cubic inch = 62.43 lb. per cubic foot
1 dyne	= 0.00007233 poundals
1 joule	= 10,000,000 ergs = 0.73767 ft. lb.
1 metric hp. (force de cheval)	= 75 kg.-meters per second = 0.986 hp. (U. S.)
1 kilogram-calorie (large calorie)	= 1,000 gram-calories (small calorie)
1 kilogram-calorie	= 3.97 B.t.u.
1 kg. calorie per kilogram	= 1.8 B.t.u. per pound
1 gram-calorie per square centimeter	= 3.687 B.t.u. per sq. ft.
1 gram-calorie per square centimeter per centimeter	= 1.451 B.t.u. per square foot per inch
1 gram-calorie per second per square centimeter for a temperature graduation of 1 deg. cent. per centimeter of thickness.	= 2,903 B.t.u. per hour per square foot for a temperature graduation of 1 deg. fahr. per inch of thickness.