



Properties of Metals - Thermal

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See conversion formulae at bottom:

Material	Thermal Conductivity Btu / (hr - ft -F)	Density (lbs/in ³)	Specific Heat (Btu/lb/F)	Thermal Conductivity Btu / (hr - ft -F)	Melting Point (F)	Latent Heat of Fusion (Btu/lb)	Thermal Expansion (in/in/F x 10 ⁻⁶)
Aluminum	136	0.098	0.24	136	1220	169	13.1
Antimony	120	-	-	120	-	-	-
Brass (Yellow)	69.33	0.306	0.096	69.33	1724	-	11.2
Cadmium	-	-	-	-	-	-	-
Copper	231	0.322	0.095	231	1976	91.1	9.8
Gold	183	0.698	0.032	183	1945	29	7.9
Incoloy 800	-	0.29	0.13	-	2500	-	7.9
Inconel 600	-	0.304	0.126	-	2500	-	5.8
Iron, Cast	46.33	0.26	0.12	46.33	2150	-	6
Lead, solid	20.39	0.41	0.032	20.39	621	11.3	16.4
Lead, Liquid	-	0.387	0.037	-	-	-	-
Magnesium	-	0.063	0.27	-	1202	160	14
Molybdenum	-	0.369	0.071	-	4750	126	2.9
Monel 400	-	0.319	0.11	-	2400	-	6.4
Nickel	52.4	0.321	0.12	52.4	2642	133	5.8
Nichrome (80% Ni-20% Cr)	-	0.302	0.11	-	2550	-	7.3
Platinum	41.36	0.775	0.035	41.36	3225	49	4.9
Silver	247.87	0.379	0.057	247.87	1760	38	10.8
Solder (50% Pb-50% Sn)	-	0.323	0.051	-	361	17	13.1
Steel, mild	26.0 - 37.5	0.284	0.122	26.0 - 37.5	2570	-	6.7
Steel, Stainless 304	8.09	0.286	0.120	8.09	2550	-	9.6
Steel, Stainless 430	8.11	0.275	0.110	8.11	2650	-	6
Tantalum	-	0.6	0.035	-	5425	-	3.6
Tin, solid	38.48	0.263	0.065	38.48	450	26.1	13
Tin, Liquid	-	0.253	0.052	-	-	-	-
Titanium 99.0%	12.65	0.164	0.13	12.65	3035	-	4.7
Tungsten	100.53	0.697	0.04	100.53	6170	79	2.5
Type metal (85% Pb-15% Sb)	-	0.387	0.04	-	500	14+-	-
Zinc	67.023	0.258	0.096	67.023	786	43.3	22.1
Zirconium	145	0.234	0.067	145	3350	108	3.2


Material	Conductivity W/m-C	Density kg/m ³	Specific Heat J/kg-C
Aluminum, 2024, Temper-T351	143.0	2.8E+3	795.0
Aluminum, 2024, Temper-T4	121.0	2.8E+3	795.0
Aluminum, 5052, Temper-H32	138.0	2.68E+3	963.0
Aluminum, 5052, Temper-O	144.0	2.69E+3	963.0
Aluminum, 6061, Temper-O	180.0	2.71E+3	1.256E+3
Aluminum, 6061, Temper-T4	154.0	2.71E+3	1.256E+3
Aluminum, 6061, Temper-T6	167.0	2.71E+3	1.256E+3
Aluminum, 7075, Temper-T6	130.0	2.8E+3	1.047E+3
Aluminum, A356, Temper-T6	128.0	2.76E+3	900.0
Aluminum, Pure	220.0	2.707E+3	896.0
Beryllium, Pure	175.0	1.85E+3	1.885E+3
Brass, Red, 85%Cu-15%Zn	151.0	8.8E+3	380.0
Brass, Yellow, 65%Cu-35%Zn	119.0	8.8E+3	380.0
Copper, Alloy, 11000	388.0	8.933E+3	385.0
Copper, Aluminum bronze, 95%Cu-5%Al	83.0	8.666E+3	410.0
Copper, Brass, 70%Cu-30%Zn	111.0	8.522E+3	385.0
Copper, Bronze, 75%Cu-25%Sn	26.0	8.666E+3	343.0
Copper, Constantan, 60%Cu-40%Ni	22.7	8.922E+3	410.0
Copper, Drawn Wire	287.0	8.8E+3	376.0
Copper, German silver, 62%Cu-15%Ni-22%Zn	24.9	8.618E+3	394.0
Copper, Pure	386.0	8.954E+3	380.0
Copper, Red brass, 85%Cu-9%Sn-6%Zn	61.0	8.714E+3	385.0
Gold, Pure	318.0	18.9E+3	130.0
Invar, 64%Fe-35%Ni	13.8	8.13E+3	480.0
Iron, Cast	55.0	7.92E+3	456.0

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Iron, Pure	71.8	7.897E+3	452.0
Iron, Wrought, 0.5%C	59.0	7.849E+3	460.0
Kovar, 54%Fe-29%Ni-17%Co	16.3	8.36E+3	432.0
Lead, Pure	35.0	11.373E+3	130.0
Magnesium, Mg-Al, Electrolytic, 8%Al-2%Zn	66.0	1.81E+3	1.0E+3
Magnesium, Pure	171.0	1.746E+3	1.013E+3
Molybdenum	130.0	10.22E+3	251.0
Nichrome, 80%Ni-20%Cr	12.0	8.4E+3	420.0
Nickel, Ni-Cr, 80%Ni-20%Cr	12.6	8.314E+3	444.0
Nickel, Ni-Cr, 90%Ni-10%Cr	17.0	8.666E+3	444.0
Nickel, Pure	99.0	8.906E+3	445.9
Silver, Pure	418.0	10.51E+3	230.0
Solder, Hard, 80%Au-20%Sn	57.0	15.0E+3	15.0
Solder, Hard, 88%Au-12%Ge	88.0	15.0E+3	No Data
Solder, Hard, 95%Au-3%Si	94.0	15.7E+3	147.0
Solder, Soft, 60%Sn-40%Pb	50.0	9.29E+3	180.0
Solder, Soft, 63%Sn-37%Pb	51.0	9.25E+3	180.0
Solder, Soft, 92.5%Pb-2.5%Ag-5%In	39.0	12.0E+3	No Data
Solder, Soft, 95%Pb-5%Sn	32.3	11.0E+3	134.0
Steel, Carbon, 0.5%C	54.0	7.833E+3	465.0
Steel, Carbon, 1.0%C	43.0	7.801E+3	473.0
Steel, Carbon, 1.5%C	36.0	7.753E+3	486.0
Steel, Chrome, Cr0%	73.0	7.897E+3	452.0
Steel, Chrome, Cr1%	61.0	7.865E+3	460.0
Steel, Chrome, Cr20%	22.0	7.689E+3	460.0
Steel, Chrome, Cr5%	40.0	7.833E+3	460.0
Steel, Chrome-Nickel, 18%Cr-8%Ni	16.3	7.817E+3	460.0
Steel, Invar, 36%Ni	10.7	8.137E+3	460.0
Steel, Nickel, Ni0%	73.0	7.897E+3	452.0
Steel, Nickel, Ni20%	19.0	7.933E+3	460.0
Steel, Nickel, Ni40%	10.0	8.169E+3	460.0
Steel, Nickel, Ni80%	35.0	8.618E+3	460.0
Steel, SAE 1010	59.0	7.832E+3	434.0
Steel, SAE 1010, Sheet	63.9	7.832E+3	434.0
Steel, Stainless, 316	16.26	8.0272E+3	502.1
Steel, Tungsten, W0%	73.0	7.897E+3	452.0
Steel, Tungsten, W1%	66.0	7.913E+3	448.0
Steel, Tungsten, W10%	48.0	8.314E+3	419.0
Steel, Tungsten, W5%	54.0	8.073E+3	435.0
Tin, Cast, Hammered	62.5	7.352E+3	226.0
Tin, Pure	64.0	7.304E+3	226.5
Titanium	15.6	4.51E+3	544.0
Tungsten	180.0	19.35E+3	134.4
Zinc, Pure	112.2	7.144E+3	384.3

Thermal Conductivity Conversions:

$$1 \text{ cal/cm}^2\text{/cm/sec/}^\circ\text{C} = 10.63 \text{ watts/in} - ^\circ\text{C}$$

$$117 \text{ BTU}/(\text{hr}\cdot\text{ft}\cdot^\circ\text{F}) \times (.293 \text{ watt}\cdot\text{hr}/\text{BTU}) \times (1.8^\circ\text{F}/^\circ\text{C}) \times (\text{ft}/12 \text{ in.}) = 5.14 \text{ watts/in} - ^\circ\text{C}$$

or

$$117 \text{ Btu} / (\text{hr}\cdot\text{ft}\cdot^\circ\text{F}) \times .04395 \text{ watt}\cdot\text{hr}\cdot^\circ\text{F}/(\text{Btu}\cdot^\circ\text{C} - \text{in}) = 5.14 \text{ watts/in}\cdot^\circ\text{C}$$

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