TABLE B-1 *Average Physical Properties of Common Metals: U.S. Customary Units (continued)*

Metal	Weight (lb/ft^3)	Temp. coeff. of linear expansion [μ in./(in. · °F)]	Proportional limit (ksi)[a]		Ultimate strength (ksi)			Modulus of elasticity (psi)[a]		Percentage of elongation (in 2 in.)
			Tension	Shear	Tension	Comp.	Shear	Tension, *E*	Shear, *G*	
Steel, 0.2% carbon hot rolled	490	Varies from 6.1 to 7.3 Average is 6.5	35	21	60	[b]	45	29×10^6	12×10^6	35
0.2% carbon cold rolled	490		60	36	80	[b]	60	29×10^6	12×10^6	18
0.6% carbon hot rolled	490		60	36	100	[b]	80	29×10^6	12×10^6	15
0.8% carbon hot rolled	490		70	42	120	[b]	105	29×10^6	12×10^6	10
Gray cast iron	450	6	[c]	[d]	20	75	[d]	15×10^6	6×10^6	Slight
Malleable cast iron	450	6.6	36	23	54	—	48	25×10^6	12.5×10^6	18
Wrought iron	480	6.7	30	18	50	[b]	35	27×10^6	10×10^6	35
Aluminum, cast	165	12.8	9	—	13	[b]	10.5	10×10^6	4×10^6	20
Aluminum alloy 17ST	168	12.8	32	21	56	[b]	32	10.3×10^6	4×10^6	—
Brass, rolled (70% Cu, 30% Zn)	530	10.4	25	15	55	[b]	48	14×10^6	6×10^6	30
Bronze, cast	510	10	20	—	33	56	—	12×10^6	5×10^6	10
Copper, hard-drawn	550	9.3	38	23	55	[b]	—	17×10^6	6×10^6	4

[a] The proportional limit and modulus of elasticity for compression may be assumed to equal these values for tension except for cast iron where the proportional limit is 26 ksi.
[b] The ultimate compressive strength for ductile materials may be taken as the yield point, which is slightly greater than the proportional limit in tension.
[c] Not well defined; approximately 6 ksi.
[d] Cast iron fails by diagonal tension.