



Properties of Common Solid Materials

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Introduction

Properties of common **solid** materials are divided into following categories:

- [Physical properties](#): Density, melting and boiling temperature.
- [Mechanical Properties](#): Including [basic mechanical properties](#), such as elastic modulus, shear modulus, Poisson's ratio, and [mechanical strength properties](#), i.e., yielding stress, ultimate stress, elongation.
- [Thermal Properties](#): Coefficient of thermal expansion, thermal conductivity.
- [Electric Properties](#): Electric resistivity.
- [Acoustic Properties](#): Compression wave velocity, shear wave velocity, bar velocity.

- Note:
1. All properties are under **1 atm** (1.01325×10^5 Pa; 760 mmHg; 14.6959 psi) and at room temperature **25 °C** (77 °F) unless specified otherwise.
 2. Further information on a specific material can be obtained by clicking the **name** of that particular material in the following table.
 3. Users who prefer Standard or other unit systems rather than the [SI units](#), click the **amount** (number) of the specific material property for unit conversion.
 4. Materials in different phases at room temperature: [Liquid](#), [Gas](#).

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Basic Mechanical Properties

Material	Elastic Modulus (GPa)	Shear Modulus (GPa)	Poisson's Ratio
Aluminum [Al]	70	26	0.33
Aluminum Alloy	70 - 79	26 - 30	0.33

Brass	96 - 110	36 - 41	0.34
Brass; Noval	100	39	0.34
Brass; Red (80% Cu, 20% Zn)	100	39	0.34
Brick (Compression)	10 - 24	-	-
Bronze; Regular	96 - 120	36 - 44	0.34
Bronze; Manganese	100	39	0.34
Carbon [C]	6.9	-	-
Ceramic	300 - 400	-	-
Concrete	18 - 30	-	0.1 - 0.2
Copper [Cu]	110 - 120	40 - 47	0.33 - 0.36
Copper Alloy	120	47	-
Cork	-	-	0
Glass	48 - 83	19 - 34	0.2 - 0.27
Gold [Au]	83	-	0.44
Iron (Cast)	83 - 170	32 - 69	0.2 - 0.3
Iron (Wrought)	190	75	0.3
Magnesium [Mg]	41	15	0.35
Magnesium Alloy	45	17	0.35
Monel (67% Ni, 30% Cu)	170	66	0.32
Nickel [Ni]	210	80	0.31
Nylon; Polyamide	2.1 - 2.8	-	0.4
Platinum [Pt]	145	-	0.38
Rubber	7.0×10^{-4} - 4.0×10^{-3}	2.0×10^{-4} - 1.0×10^{-3}	0.45 - 0.5
Silver [Ag]	76	-	-
Solder; Tin-Lead	18 - 35	-	-
Steel	190 - 210	75 - 80	0.27 - 0.3
Stone; Granite (Compression)	40 - 70	-	0.2 - 0.3
Stone; Limestone (Compression)	20 - 70	-	0.2 - 0.3
Stone; Marble (Compression)	50 - 100	-	0.2 - 0.3
Tin [Sn]	42	-	0.36
Titanium [Ti]	110	40 - 40	0.33
Titanium Alloy	110 - 120	39 - 44	0.33
Wood; Ash (Bending)	10 - 11	-	-
Wood; Douglas Fir (Bending)	11 - 13	-	-

Wood; Oak (Bending)	11 - 12	-	-
Wood; Southern Pine (Bending)	11 - 14	-	-
Zinc [Zn]	-	-	0.25

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Mechanical Strength Properties

Material	Yield Stress (MPa)	Ultimate Stress (MPa)	Elongation (%)
Aluminum [Al]	20	70	60
Aluminum Alloy	35 - 500	100 - 550	1 - 45
Brass	70 - 550	200 - 620	4 - 60
Brass; Noval	170 - 410	410 - 590	15 - 50
Brass; Red (80% Cu, 20% Zn)	90 - 470	300 - 590	4 - 50
Brick	-	7.0 - 70	-
Bronze; Regular	82 - 690	200 - 830	5 - 60
Bronze; Manganese	170 - 450	450 - 620	10 - 35
Concrete (Compression)	-	10 - 70	-
Copper [Cu]	55 - 330	230 - 380	10 - 50
Copper Alloy	760	830	4
Glass	-	30 - 1000	-
Iron (Cast)	120 - 290	69 - 480	0 - 1
Iron (Wrought)	210	340	35
Magnesium [Mg]	20 - 70	100 - 170	5 - 15
Magnesium Alloy	80 - 280	140 - 340	2 - 20
Monel (67% Ni, 30% Cu)	170 - 1100	450 - 1200	2 - 50
Nickel [Ni]	140 - 620	310 - 760	2 - 50
Nylon; Polyamide	-	40 - 70	50
Rubber	1.0 - 7.0	7.0 - 20	100 - 800
Solder; Tin-Lead	-	12 - 54	55 - 30
Steel	280 - 1600	340 - 1900	3 - 40
Stone; Granite (Compression)	-	70 - 280	-
Stone; Limestone (Compression)	-	20 - 200	-
Stone; Marble (Compression)	-	50 - 180	-
Titanium [Ti]	-	500	25
Titanium Alloy	-	900 - 970	10

Tungsten [W]	-	1400 - 4000	0 - 4
Wood; Ash (Bending)	40 - 70	50 - 100	-
Wood; Douglas Fir (Bending)	30 - 50	50 - 80	-
Wood; Oak (Bending)	40 - 60	50 - 100	-
Wood; Southern Pine (Bending)	40 - 60	50 - 100	-

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