MECHANICAL PROPERTIES OF SELECTED ALLOYS

Table 1 Typical tensile properties of a number of common structural alloys.

Alloy	Condition	Young's Modulus (GPa)	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Reduction in Area (%)	Hardness
Aluminum Alloys[1] Gage length=2 inches, diameter=0.5 inch							
1100	O	68.9	34.5	89.7	45	-	23 BHN
2017	T451	72.4	275	428	22	-	105 BHN
2024	T351	73.1	290	441	-	-	-
6061	T651	68.9	255	290	-	-	-
7075	T651	71.7	503	524	11	-	150 BHN
Copper-Based Alloys[2] Gage length=2 inches or 50 mm, diameter=0.25 inches (6 mm) or thickness=1mm							
C10100 - OFHC Copper - Cu 99.99+%	M20 H00 H01 H04	115	69 195 205 310	220 250 260 345	50 40 35 12	- - - -	40 HRF 60 HRF 70 HRF 90 HRF
C17000 - Beryllium Copper - Cu 98% Be 1.7% Co 0.3%	TB00 TD01 TD02 TD04	115	190-370 310-520 450-620 550-760	410-540 520-610 590-690 690-825	35-60 10-35 5-25 2-8	- - - -	45-78 HRB 68-90 HRB 88-96 HRB 96-102 HRB
C21000 - Gilding Metal - Cu 95% Zn 5%	OS050 OS035 OS015 H01 H02 H04 H06	115	69 76 97 220 275 345 380	235 240 260 290 330 385 420	45 45 42 25 12 5 4	- - - - - - -	46 HRF 52 HRF 60 HRF 38 HRB 52 HRB 64 HRB 70 HRB
C26000 - Cartridge Brass - Cu 70% Zn 30%	OS100 OS070 OS050 OS035 OS025 OS015 H01 H02 H04 H06	110	75 95 105 115 130 150 275 360 435 450	300 315 325 340 350 365 370 425 525 595	68 65 62 57 55 54 43 23 8 5	- - - - - - - - - -	54 HRF 58 HRF 64 HRF 68 HRF 72 HRF 78 HRF 55 HRB 70 HRB 82 HRB 83 HRB

C28000 - Muntz Metal - Cu 60% Zn 40%	M20 O61 H00 H02	105	145 145 240 345	370 370 415 485	45 45 30 10	- - - -	85 HRF 80 HRF 55 HRB 75 HRB
C36000 - Free Cutting Brass - Cu 61.5% Zn 35.5% Pb 3%	H02	97	360	470	18	48	80 HRB
C46400 - Naval Brass - Cu 60% Zn 39.2% Sn 0.8%	O50 H01 H02	100	207 331 393	434 482 552	40 25 20	60 55 50	56 HRB 60 HRB 80 HRB
Carbon and Alloy Steels[3] Gage length=2 inches, diameter=1 inch							
1018	HR CR	207 207	331 482	475 565	38 20	62 57	79 HRB 85 HRB
1045	HR CR WQ	207 207 207	407 621 621	675 710 710	24 14 18	45 40 52	16 HRC 18 HRC 22 HRC
1095	HR WQ	207 207	572 951	979 1379	18 12	38 37	28 HRC 42 HRC
4140	HR CR OQ	207 207 207	427 620 903	613 703 1055	26 18 14	58 50 42	91 HRB 19 HRC 33 HRC
4340	CR HR OQ	207 207 207	476 662 1117	696 765 1255	21 16 15	45 42 40	15 HRC 19 HRC 39 HRC

1. Brinell hardness of aluminum: 500 kg load, 10 mm ball
2. Temper designations for copper alloys: OSxxx=Annealed with grain size xxx in microns, Hxx=cold worked to 00=⅛-hard, 01=¼-hard, 02=½-hard, 04=full hard, 06=extra hard, M20=as manufactured, hot rolled, O61=annealed, TDxx=solution treated and cold worked to the xx condition (see Hxx), TB00=Solution treated.
3. Condition codes for the steels: CR=cold rolled, HR=hot rolled, OQ=oil quenched, WQ=water quenched.

References for Table 1.

1. Ryerson Data Book, Joseph T. Ryerson & Sons, Inc., pp.17-28 and pp.231-232, (1967).
2. ASM Metals Handbook, Properties and Selection: Nonferrous Alloys and Pure Metals, 9th edition, ASM International, Metals Park, Ohio, vol. 2, (1986).)