

Table 1

ASTM NUMBER	TENSILE STRENGTH S_{ut} , kpsi	COMPRESSIVE STRENGTH S_{uc} , kpsi	SHEAR MODULUS OF RUPTURE S_{su} , kpsi	MODULUS OF ELASTICITY, Mpsi		ENDURANCE LIMIT S_e , kpsi	BRINELL HARDNESS H_B	FATIGUE STRESS CONCENTRATION FACTOR K_f
				TENSION	TORSION			
20	22	83	26	9.6-14	3.9-5.6	10	156	1.00
25	26	97	32	11.5-14.8	4.6-6.0	11.5	174	1.05
30	31	109	40	13-16.4	5.2-6.6	14	201	1.10
35	36.5	124	48.5	14.5-17.2	5.8-6.9	16	212	1.15
40	42.5	140	57	16-20	6.4-7.8	18.5	235	1.25
50	52.5	164	73	18.8-22.8	7.2-8.0	21.5	262	1.35
60	62.5	187.5	88.5	20.4-23.5	7.8-8.5	24.5	302	1.50

ASTM = American Society for Testing Materials

Source: J. E. Shigley, C. R. Mischke, *Mechanical Engineering Design*, 5d ed., McGraw-Hill, 1989.

Table 2

SURFACE FINISH	FACTOR a		EXPONENT b
	kpsi	MPa	
Ground	1.34	1.58	-0.085
Machined or cold-drawn	2.70	4.51	-0.256
Hot-rolled	14.4	57.7	-0.718
As forged	39.9	272.0	-0.995

Source: J. E. Shigley, C. R. Mischke, "Mechanical Engineering Design", McGraw-Hill, 1989.

Table 3

10³-cycle strength

Bending loads: $S = 0.9 S_u$

Axial loads: $S = 0.75 S_u$

Torsional loads: $S = 0.9 S_{us}$, $S_{us} \approx 0.8S_u$ for steel; $S_{us} \approx 0.7S_u$ for other ductile materials.

10⁶-cycle strength (endurance limit)

$S_e = k_S k_G k_L S'_e$, where S'_e is the specimen endurance limit

$S'_e = 0.5S_u$ for steel, lacking better data

Surface factor, k_S

see Fig. 2

	bending	axial	torsion
<i>Load factor, k_L</i>	1	1	0.58
<i>Gradient factor, k_G</i>			
diameter < (0.4 in. or 10 mm)	1	0.7 - 0.9	1
(0.4 in. or 10 mm) < diameter < (2 in. or 50 mm)	0.9	0.7 - 0.9	0.9

for (2 in. or 50 mm) < diameter < (4 in. or 100 mm) reduce the factors by about 0.1

for (4 in. or 100 mm) < diameter < (6 in. or 150 mm) reduce the factors by about 0.2

Source: R. C. Juvinall, K. M. Marshek, "Fundamentals of Machine Component Design", John Wiley & Sons, 1991.

Table 4

Material Name	Tensile Strength	
	Ultimate MPa	Yield MPa
AISI 1006 Steel, cold drawn	330	285
AISI 1006 Steel, hot rolled bar, 19-32 mm round	295	165
AISI 1006 Steel, cold drawn bar, 19-32 mm round	330	285
AISI 1008 Steel, hot rolled bar, 19-32 mm round	305	170
AISI 1008 Steel, cold drawn bar, 19-32 mm round	340	285
AISI 1010 Steel, cold drawn	365	305
AISI 1010 Steel, hot rolled bar, 19-32 mm round or thickness	325	180
AISI 1010 Steel, cold drawn bar, 19-32 mm round or thickness	365	305
AISI 1012 Steel, cold drawn	370	310
AISI 1012 Steel, hot rolled bar, 19-32 mm round or thickness	330	185
AISI 1012 Steel, cold drawn bar, 19-32 mm round or thickness	370	310
AISI 1015 Steel, cold drawn	385	325
AISI 1015 Steel, cold drawn, 19-32 mm round	385	325
AISI 1015 Steel, hot rolled, 19-32 mm round	345	190
AISI 1015 Steel, as rolled	420	315
AISI 1015 Steel, normalized at 925°C (1700°F)	425	325
AISI 1015 Steel, annealed at 870°C (1600°F)	385	285
AISI 1016 Steel, cold drawn, 19-32 mm round	420	350
AISI 1016 Steel, hot rolled, 19-32 mm round	380	205
AISI 1017 Steel, cold drawn	405	340
AISI 1017 Steel, hot rolled, 19-32 mm round	365	200
AISI 1018 Steel, cold drawn	440	370
AISI 1018 Steel, hot rolled, quenched, and tempered	475	275
AISI 1018 Steel, hot rolled, 19-32 mm round	400	220
AISI 1018 Steel, as cold drawn, 16-22 mm round	485	415
AISI 1018 Steel, as cold drawn, 22-32 mm round	450	380
AISI 1018 Steel, as cold drawn, 32-50 mm round	415	345
AISI 1018 Steel, as cold drawn, 50-76 mm round	380	310
AISI 1019 Steel, cold drawn	455	379
AISI 1019 Steel, hot rolled, 19-32 mm round	407	224
AISI 1020 Steel, cold rolled	420	350
AISI 1020 Steel, hot rolled, 19-32 mm round	380	205
AISI 1020 Steel, as rolled	450	330
AISI 1020 Steel, normalized at 870°C (1600°F)	440	345
AISI 1020 Steel, as rolled, 25 mm round	472	384
AISI 1021 Steel, cold drawn	470	395
AISI 1022 Steel, cold drawn round (19 - 32 mm)	475	400
AISI 1022 Steel, as rolled	505	360

AISI = American Iron and Steel Institute

Source: MatWeb - Material Property Data, <http://www.matweb.com/>

Table 5

Material Name	Tensile Strength	
	Ultimate MPa	Yield MPa
Aluminum 1050-O	76	28
Aluminum 1050-H16	131	124
Aluminum 1060-O	70	30
Aluminum 1060-H12	85	75
Aluminum 1060-H14	95	90
Aluminum 1100-O	90	35
Aluminum 1100-H12	110	105
Aluminum 1100-H14	125	115
Aluminum 1100-H16	145	140
Aluminum 1100-H18	165	150
Aluminum 1145-O	75	35
Aluminum 1145-H18	145	115
Aluminum 1180-O	60	20
Aluminum 1180-H18	125	115
Aluminum 1199-O	45	10
Aluminum 1199-H18	115	110
Aluminum 1350-O	85	30
Aluminum 1350-H12	95	85
Aluminum 1350-H14	110	95
Aluminum 1350-H16	125	110
Aluminum 1350-H19	185	165
Aluminum 2011-T3	380	295
Aluminum 2011-T6	395	270
Aluminum 2011-T8	405	310
Aluminum 2014-O	185	95
Aluminum 2025-T6	400	255
Aluminum 2036-T4	340	195
Aluminum 2017-O	180	70
Aluminum 2091-T8x	430	330
Aluminum 2018-T61	430	315
Aluminum 2090-T84	525	470
Aluminum 2090-T86	550	520
Aluminum 2090-T83	550	520
Aluminum 2124-T851	485	440
Aluminum 2124-T351	470	325
Aluminum 2117-T4	300	165
Aluminum 2024-O	185	75
Aluminum 2024-T86	515	440
Aluminum 2024-T3	485	345

Source: MatWeb - Material Property Data, <http://www.matweb.com/>