



1.0 Units conversion

Length	1	m	▼	=	3.280839895	feet	▼	=	3.280839895	feet	▼
Area	1	m^2	▼	=	10000	cm^2	▼	=	10.76391042	feet^2	▼
Volume	1	cm^3	▼	=	0.061023744	inch^3	▼	=	0.000219969	Imp gal	▼
Flow rate	1	litre/s	▼	=	2.1189	ft^3/min	▼	=	0.035315	ft^3/s	▼
Mass	1	kg	▼	=	2.204624	lb	▼	=	35.273991	oz	▼
Density	1	kg/m^3	▼	=	0.000578038	oz/in^3	▼	=	0.062427818	lb/feet^3	▼
Inertia	1	kg*m^2	▼	=	0.737561	lbf*ft*s^2	▼	=	141.61197	ozf*in*s^2	▼
Force	1	N	▼	=	0.224809	lbf	▼	=	101.971621	p	▼
Moment	1	N*m	▼	=	8.850732	lbf*in	▼	=	11.80099742	ozf*ft	▼
Speed	1	m/s	▼	=	60	m/min	▼	=	3.280839895	ft/s	▼
Acceleration	1	m/s^2	▼	=	3.280839895	ft/s^2	▼	=	3600	m/min^2	▼
Power	1	kW	▼	=	1.34102	HP	▼	=	101.97	kg*m/s	▼
Energy	1	N*m	▼	=	0.000947813	BTU	▼	=	0.000277778	Wh	▼
Pressure	1	kPa	▼	=	0.145037	psi	▼	=	1000	Pa	▼
Time	0	hour	▼	=	0	minute	▼	=	0	second	▼
Temperature	20	°C	▼	=	68	°F	▼	=	293.15	°K	▼

Gearing dimension 3 3 ▼ Modul [mm] ▼ = 8.46667 Diametral Pich ▼

2.0 Hardness table

HV	HRB	HRC	HB	HB	HB	S	Rm	ScSc
122	67		5.5	116	116	58	401	15
127	70		5.4	121	121	63	432	-
132	72.5		5.3	126	126	65	448	20
137	75		5.2	131	131	66	455	20.5
143	77		5.1	137	137	67	463	21
150	80		5	143	143	69	479	22
156	82		4.9	149	149	72	494	-
163	84.2		4.8	156	156	76	525	23
171	86		4.7	163	163	78	540	-
178	88.5		4.6	170	170	81	556	24
188	91	12	4.5	179	179	88	602	-
196	93		4.4	187	187	92	632	25
212	96	15	4.3	197	197	97	664	27
218	97		4.2	207	207	101	695	28
222	98	19	4.15	212	212	103	710	29
228	-	20	4.1	217	217	107	741	-
234	-	20.8	4.05	223	223	110	756	30
241	-	22	4	229	229	112	772	31
247	101	23	3.95	235	235	114	787	32
255	-	24.3	3.9	241	241	118	818	33
HV	HRB	HRC	HB	HB	HB	S	Rm	ScSc
261	104	25.2	3.85	248	248	123	849	34
269	105	26.6	3.8	255	255	125	865	35
275	-	27.5	3.75	262	262	130	895	36
284	106	29	3.7	269	269	132	911	37
292	-	29.8	3.65	277	277	136	942	38
300	-	30.9	3.6	285	285	141	973	40
308	109	32	3.55	293	293	143	988	41
318		33	3.5	302	302	147	1019	42
327		34	3.45	311	311	152	1050	43
337		35	3.4	321	321	159	1096	45
349		36.7	3.35	331	331	163	1127	46
359		37.7	3.3	341	341	168	1158	48
370		38.8	3.25	352	352	172	1189	49
381		39.9	3.2	363	363	179	1235	51

Extruding Cold Rolling, Drawing Die Casting														
Ra (µm)	50	25	12.5	6.3	3.2	1.6	0.8	0.4	0.2	0.1	0.05	0.025	0.012	
Ra (µin)	2000	1000	500	250	125	63	32	16	8	4	2	1	0.5	
Rz (µm)	100	50	25	12.5	6.3	3.2	1.6	0.8	0.4	0.2	0.1	0.05	0.025	

4.0 Density and thermal expansion

		Density		Thermal expansion			
ID	Materialnames	[kg/m ³]	lb/in ³ ▼	[m/m/C*e-6]	C	[in/in/F*e-6]	F
1	Steel Carbon	7850	0.283598594	11.7	20-100	6.500	68-212
2	Steel for electric sheets	7850	0.283598594				
3	Tin bronze (8%Sn)	8800	0.317919443	17.5	20-100	9.722	68-212
4	Aluminium bronze (9%Al)	7600	0.274566791	15.6	20-100	8.667	68-212
5	Leaded bronze (25%Pb)	8800	0.317919443	18.4	20-200	10.222	68-392
6	Dural	2800	0.101156186	22.9	20-100	12.722	68-212
7	Aluminium (99.5%)	2700	0.097543465	23.8	20-100	13.222	68-212
8	gray iron	7200	0.260115908	8.5	20-100	4.722	68-212
9	Copper (99.5%)	8890	0.321170892	17.7	25-300	9.833	77-572
10	Brass (70%Cu)	8550	0.30888764	18.5	25-100	10.278	77-212
11	Pewter (Sn)	7280	0.263006084	27	20	15.000	68
12	Magnesium (Mg)	1740	0.062861344	26	20	14.444	68
13	Chrome (Cr)	7100	0.256503187	8	20	4.444	68
14	Silver (Ag)	10500	0.379335699	18.9	20	10.500	68
15	Titanium (Ti)	4530	0.163656259	9	20	5.000	68
16	Wolfram (W)	19300	0.697255141	4.3	20	2.389	68
17	Oak-tree	680	0.024566502				
18	Spruce	330	0.011921979				
19	Pine tree	500	0.018063605				
20	Larch	680	0.024566502				
21	cork	250	0.009031802				
22	Nylon	1150	0.041546291	70-120	20-50	38.9-66.7	68-122
23	Polypropylene (PP)	910	0.032875761	180	20-50	100.000	68-122
24	polyvinyl chloride (PVC)	1400	0.050578093	80-210	20-50	44.4-116.7	68-122
25	pottery	2400	0.086705303	3	0-100	1.667	32-212
26	bakelite	1200	0.043352651	21-36	0-100	44023.000	32-212
27	silica glass	2700	0.097543465	3.1	0-500	1.722	32-932
28	Iridium (Ir)	22400	0.80924949	6.6	20	3.667	68
29	Cobalt (Co)	8800	0.317919443	12.6	20	7.000	68
30	Silicon (Si)	2330	0.084176398	2.4	20	1.333	68
31	Nickel (Ni)	8900	0.321532164	13	20	7.222	68
32	Slug (Pb)	11340	0.409682555	29	20	16.111	68
33	Platinum (Pt)	21450	0.774928642	9	20	5.000	68
34	Carbon- diamond	3514	0.126951014	1.3	18	0.722	64.4
35	carbon- graphite	2220	0.080202405	2	18	1.111	64.4
36	Uranus (U)	1870	0.067557882		20		68
37	Calcium (Ca)	1540	0.055635902	25	20	13.889	68
38	Zinc (Zn)	7130	0.257587003	29	20	16.111	68
39	Zircon (Zr)	6530	0.235910677		20		68
40	Gold (Au)	19290	0.696893869	14.2	20	7.889	68
41	Iron (Fe)	7860	0.283959866	12.3	20	6.833	68
42	Nickel bronze	8800	0.317919443	15.7	20-220	8.722	68-428
43	Electron Beam	1810	0.065390249	26.8	20-100	14.889	68-212
44	Wrought Copper (99.85%Cu)	8900	0.321532164	17.7	25-300	9.833	77-572
45	Wrought Copper (99.5%Cu)	8890	0.321170892	17.5	25-300	9.722	77-572
46	Cast brass (Ms 60)	8300	0.299855838	21	20-200	11.667	68-392
47	wrought brass (63% Cu)	8430	0.304552375	19	25-100	10.556	77-212
48	Alloy steel	7850	0.283598594	11.4	20-100	6.333	68-212

49				14.5	20-600	8.056	68-1112
50	Premium steel Cr, Ni	7800	0.281792233	15	20-100	8.333	68-212
51				17.3	20-400	9.611	68-752
52	Premium steel Chrome	7700	0.278179512	10.5	20-100	5.833	68-212
53				11.5	20-400	6.389	68-752
54	silumin	2650	0.095737105	18.8	20-200	10.444	68-392
55	ABS (akrylonitril butadien styren)	1045	0.037752934	0.5-1	20-50	0.28-0.6	68-122
56	asphalt	1200	0.043352651				
57	asbestos	2450	0.088511663				
58	Asbestos carton	1200	0.043352651				
59	bakelite	1270	0.045881556	21-36	0-100	44023.000	32-212
60	concrete	1600	0.057803535	5.8-6.6	0-100	3.2-3.7	32-212
61	brick	1600	0.057803535	3.6-5.8	0-100	37317.000	32-212
62	Oak wood (along the fibre)	650	0.023482686	7.6	0-100	4.222	32-212
63	Oak wood (plumb on fibre)	650	0.023482686	54.4	0-100	30.222	32-212
64	Whitewood (along the fibre)	620	0.02239887	3	0-100	1.667	32-212
65	Whitewood(plumb on fibre)	620	0.02239887	58	0-100	32.222	32-212
66	hard rubrer	1325	0.047868552	17-28	0-100	9.4-15.6	32-212
67	Rude rubber	940	0.033959577	37	0-100	20.556	32-212
68	Cured paper	1250	0.045159012				
69	pertinax	1300	0.046965372	40	0-100	22.222	32-212
70	Furcate polyethylene	930	0.033598305	230	20-50	127.778	68-122
71	polyethylentereftalat PETP	1350	0.048771733	70-80	20-50	38.9-44.4	68-122
72	polyfenylenoxid PPO/PS (Noryl)	1080	0.039017386	60-70	20-50	38.9-33.3	68-122
73	polyfarmaldehyt POM	1420	0.051300637	100-140	20-50	55-78	68-122
74	polycarbonate PC	1220	0.044075195	60-70	20-50	38.9-33.3	68-122
75	polymethylmetalcrylate PMMA (Umaplex)	1180	0.042630107	70	20-50	33.333	68-122
76	polystyrene PS (Krasten)	1050	0.03793357	60-80	20-50	38.9-44.4	68-122
78	polytetrafluorethylen PTFE (Teflon)	2170	0.078396044	120	20-50	66.667	68-122
79	Jens Glas	2600	0.093930744	3.4-6.3	0-100	1.9-3.5	32-212
80				20,2-34	0-500	11.2-18.9	32-932
81	Black coal	905	0.032695125				
82	Wood coal	182.5	0.006593216				
83	Brown coal	715	0.025830955				