

# engineering data conversions

## IMPERIAL TO METRIC

### Length

ft x 0.305 = M  
in x 25.4 = mm

### Volume

ft<sup>3</sup> x 0.028 = m<sup>3</sup>  
UK Gall x 4.546 = Litres  
US Gall x 3.785 = Litres

### Weight

lb x 0.45 = Kg

### Pressure

psi x 0.069 = Bar  
psi x 6.89 = kPa (kN/m<sup>2</sup>)  
Bar x 100 = kPa (kN/m<sup>2</sup>)  
ft.hd. x 2.98 = kPa (kN/m<sup>2</sup>)  
in.w.g. x 0.249 = kPa (kN/m<sup>2</sup>)

### Velocity/Flow Rate

GPM x 0.076 = l/s  
lbs/hr x 0.000126 = kg/s  
ft<sup>3</sup>/min x 0.000472 = m<sup>3</sup>/s  
ft<sup>2</sup>/min x 1.7 = m<sup>3</sup>/h  
ft/min x 0.0051 = m/s  
ft/s x 0.305 = m/s

## METRIC TO IMPERIAL

### Length

M x 3.28 = ft  
mm x 0.039 = in

### Volume

m<sup>3</sup> x 35.31 = ft<sup>3</sup>  
Litres x 0.22 = UK Gall  
Litres x 0.2642 = US Gall

### Weight

Kg x 2.2 = lb

### Pressure

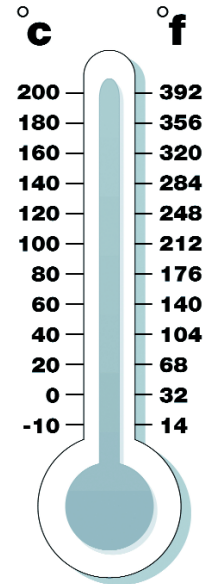
Bar x 14.5 = psi  
kPa (kN/m<sup>2</sup>) x 0.145 = psi  
kPa (kN/m<sup>2</sup>) x 0.01 = Bar  
kPa (kN/m<sup>2</sup>) x 0.33 = ft.hd.  
kPa (kN/m<sup>2</sup>) x 4 = in.w.g.

### Velocity/Flow Rate

l/s x 13.2 = GPM  
kg/s x 7937 = lbs/hr  
m<sup>3</sup>/s x 2119 = ft<sup>3</sup>/min  
m<sup>3</sup>/h x 0.588 = ft<sup>3</sup>/min  
m/s x 197 = ft/min  
m/s x 3.28 = ft/s

## TEMPERATURE

(°C x 1.8) + 32 = °F  
(°F - 32) x 0.555 = °C



## useful tables

### length

millimetre mm	metre m	inch in	foot ft	yard yd
1	0.001	0.0394	0.0033	0.0011
1000	1	39.3701	3.2808	1.0936
25.4	0.0254	1	0.0833	0.0278
304.8	0.3048	12	1	0.3333
914.4	0.9144	36	3	1

### volume

cubic metre m <sup>3</sup>	cubic centimetre cm <sup>3</sup>	litre l	cubic inch in <sup>3</sup>	cubic foot ft <sup>3</sup>	uk gallon uk gal	us gallon us gal
1	1 000 000	999.972	61 023.7	35.3147	219.969	264.172
0.000 001	1	0.000 999 7	0.0610	0.000 035 3	0.00 22	0.00 26
0.001	1 000.028	1	61.0255	0.035 3	0.22	0.264 2
0.000 016	16.3871	0.016 4	1	0.000 58	0.003 6	0.004 3
0.028 3	28 316.8	28.316 1	1 728	1	6.228 8	7.480 5
0.004 5	4 546.09	4.546	277.419	0.160 5	1	1.201
0.003 8	3 785.41	3.785 3	231	0.133 7	0.832 7	1

### velocity

metre per second m/s	foot per second ft/s	foot per minute ft/m	kilometre per hour km/h	mile per hour mile/h
1	3.208	0.0547	3.6	2.2369
0.3048	1	0.0167	1.097	0.6818
18.288	60	1	65.8368	40.9091
0.2778	0.9113	0.0152	1	0.6214
0.4470	1.4667	0.0245	1.6903	1

# engineering data

## useful tables

### volumetric rate of flow (liquid)

litre per second l/s	litre per minute l/min	cubic metre per hour m <sup>3</sup> /h	cubic foot per hour ft <sup>3</sup> /h	cubic foot per minute ft <sup>3</sup> /m	uk gallon per minute uk gal/min	us gallon per minute us gal/min	us barrel per day us barrel/d
1	60	3.6001	127.136	2.1189	13.1986	15.8508	543.456
0.0167	1	0.0600	2.1189	0.3532	0.22	0.2642	9.0576
0.2778	16.6666	1	35.3147	0.5886	3.6662	4.4029	150.956
0.0079	0.4719	0.0283	1	0.1067	0.1038	0.1247	4.2746
0.4719	28.316	1.6990	60	1	6.2288	7.4805	256.475
0.0758	4.546	0.2728	9.6326	0.1605	1	1.201	41.1754
0.0631	3.7853	0.2271	8.0208	0.1337	0.8327	1	4.2857
0.0018	0.1104	0.0066	0.2339	0.0039	0.0243	0.0292	1

### pressure and liquid head

① bar	② kilogram force per square centimetre kgf/cm <sup>2</sup>	③ pound force per square inch lbf/in <sup>2</sup>	④ atm	⑤ foot of water ft h <sub>2</sub> o	inch of water in h <sub>2</sub> o	metre of water m h <sub>2</sub> o	centimetre of mercury cm hg	inch of mercury in hg	millimetre of mercury mm hg
1	1.0197	14.5038	0.9869	33.4553	401.463	10.1972	75.0062	29.530	750.062
0.9807	1	14.2233	0.9878	32.8084	393.701	10	73.556	28.959	735.559
0.0689	0.0703	1	0.0609	2.3067	27.68	0.7031	5.1715	2.036	51.715
1.0133	1.0332	14.6959	1	33.889	406.782	10.3323	76.0	29.9213	760
0.0299	0.0305	0.4335	0.0295	1	12	0.3048	2.242	0.8827	22.4198
0.0025	0.0025	0.0361	0.0025	0.0833	1	0.0254	0.1868	0.0734	1.8683
0.0981	0.1000	1.422	0.0968	3.2808	39.3701	1	7.3556	2.896	73.356
0.0133	0.0136	0.1934	0.0132	0.4461	5.3524	0.136	1	0.3937	10
0.0339	0.0345	0.4911	0.0334	1.133	13.5951	0.3453	2.54	1	25.4
0.0013	0.0014	0.0193	0.0013	0.446	0.5352	0.0136	0.1	0.0394	1

① 1 bar = 10<sup>5</sup>N/m<sup>2</sup>

② Technical (metric) atmosphere (at)

③ Often denoted non-technically as psi

④ International standard atmosphere

⑤ At density 1g/cm<sup>3</sup>

⑥ Also known as torr

### dimensions of flanges (mm)

flange size inch n.b.mm o.d.	nominal	bs4504 pn6					bs4504 pn10				bs4504 pn16			
		pcd	od	bolt	no bolts	pcd	od	bolt	no bolts	pcd	od	bolt	no bolts	
1/2"	20	15	55	80	M10	4	65	95	M12	4	65	95	M12	4
3/4"	25	20	65	90	M10	4	75	105	M12	4	75	105	M12	4
1	32	25	75	100	M10	4	85	115	M12	4	85	115	M12	4
1 1/4"	40	32	90	120	M12	4	100	140	M16	4	100	140	M16	4
1 1/2"	50	40	100	130	M12	4	110	150	M16	4	110	150	M16	4
2	63	50	110	140	M12	4	125	165	M16	4	125	165	M16	4
2 1/2"	75	65	130	160	M12	4	145	185	M16	4	145	185	M16	4
3"	90	80	150	190	M16	4	160	200	M16	8	160	200	M16	8
4"	110	100	170	210	M16	4	180	220	M16	8	180	220	M16	8
5"	140	125	200	240	M16	8	210	240	M16	8	210	240	M16	8
6"	160	150	225	265	M16	8	240	285	M20	8	240	285	M20	8
8"	225	200	280	320	M16	8	295	340	M20	8	295	340	M20	12
10"	280	250	335	375	M16	12	350	395	M20	12	355	405	M24	12
12"	315	300	395	440	M20	12	400	445	M20	12	410	460	M24	12

flange size inch n.b.mm o.d.	nominal	bs10 table d				bs10 table e				asa 150				
		pcd	od	bolt	no bolts	pcd	od	bolt	no bolts	pcd	od	bolt	no bolts	
1/2"	20	15	67	95	1/2"	4	67	95	1/2"	4	60	89	1/2"	4
3/4"	25	20	73	102	1/2"	4	73	102	1/2"	4	70	98	1/2"	4
1	32	25	83	114	1/2"	4	83	114	1/2"	4	80	114	1/2"	4
1 1/4"	40	32	87	121	1/2"	4	87	121	1/2"	4	90	117	1/2"	4
1 1/2"	50	40	98	133	1/2"	4	98	133	1/2"	4	98	127	1/2"	4
2	63	50	114	152	5/8"	4	114	152	5/8"	4	121	152	5/8"	4
2 1/2"	75	65	127	165	5/8"	4	127	165	5/8"	4	138	178	5/8"	4
3"	90	80	146	184	5/8"	4	146	184	5/8"	4	152	191	5/8"	4
4"	110	100	178	216	5/8"	4	178	216	5/8"	8	190	229	5/8"	8
5"	140	125	210	254	5/8"	8	210	254	5/8"	8	216	254	3/4"	8
6"	160	150	235	279	5/8"	8	235	279	3/4"	8	241	279	3/4"	8
8"	225	200	292	337	5/8"	8	292	337	3/4"	8	298	343	3/4"	8
10"	280	250	356	406	3/4"	8	356	406	3/4"	12	364	406	7/8"	12
12"	315	300	406	457	3/4"	12	406	457	7/8"	12	433	483	7/8"	12