

Useful Technical Conversion Data

Rotary Inertia Conversion Table

Don't confuse mass-inertia with weight-inertia: mass inertia = $\frac{wt. \text{ inertia}}{g}$

To convert from A to B, multiply by entry in Table.

A	B											
	kg-m ²	kg-cm ²	g-cm ²	kg-m-sec ²	kg-cm-sec ²	g-cm-sec ²	oz-in ²	oz-in-s ²	lb-in ²	lb-in-s ²	lb-ft ²	lb-ft-s ² (slug-ft ²)
kg-m ²	1	10 ⁴	10 ⁷	0.101972	10.1972	1.01972-10 ⁴	5.46744-10 ⁴	1.41612-10 ²	3.41716-10 ³	8.85073	23.7303	0.737556
kg-cm ²	10 ⁻⁴	1	10 ³	1.01972-10 ⁻⁵	1.01972-10 ⁻³	1.01972	5.46744	1.41612-10 ⁻²	0.341716	8.85073-10 ⁻⁴	2.37303-10 ⁻³	7.37556-10 ⁻⁵
g-cm ²	10 ⁻⁷	10 ⁻³	1	1.01972-10 ⁻⁸	1.01972-10 ⁻⁶	1.01972-10 ⁻³	5.46744-10 ⁻³	1.41612-10 ⁻⁵	3.41716-10 ⁻⁴	8.85073-10 ⁻⁷	2.37303-10 ⁻⁶	7.37556-10 ⁻⁸
kg-m-s ²	9.80665	9.80665-10 ⁴	9.80665-10 ⁷	1	10 ²	10 ⁵	5.36173-10 ⁵	1.38874-10 ³	3.35109-10 ⁴	86.796	2.32714-10 ²	7.23295
kg-cm-s ²	9.80665-10 ⁻²	9.80665-10 ²	9.80665-10 ⁵	10 ⁻²	1	10 ³	5.36173-10 ³	13.8874	3.35109-10 ²	0.86796	2.32714	7.23295-10 ⁻²
g-cm-s ²	9.80665-10 ⁻⁵	0.980665	9.80665-10 ²	10 ⁻⁵	10 ⁻³	1	5.36173	1.38874-10 ⁻²	0.335109	8.6796-10 ⁻⁴	2.32714-10 ⁻³	7.23295-10 ⁻⁵
oz-in ²	1.82901-10 ⁻⁵	0.182901	1.82901-10 ²	1.86507-10 ⁻⁶	1.86507-10 ⁻⁴	0.186507	1	2.59001-10 ⁻³	6.25001-10 ⁻²	1.618801-10 ⁻⁴	4.34029-10 ⁻⁴	1.349-10 ⁻⁵
oz-in-s ²	7.06154-10 ⁻³	70.6154	7.06154-10 ⁴	7.20077-10 ⁻⁴	7.20077-10 ⁻²	72.0077	3.86085-10 ²	1	24.13044	6.24998-10 ⁻²	0.167572	5.20828-10 ⁻³
lb-in ²	2.92641-10 ⁻⁴	2.92641	2.92641-10 ³	2.98411-10 ⁻⁵	2.98411-10 ⁻³	2.98411	16	4.14415-10 ⁻²	1	2.59009-10 ⁻³	6.94445-10 ⁻³	2.15839-10 ⁻⁴
lb-in-s ²	0.112985	1.12985-10 ³	1.12985-10 ⁶	1.15213-10 ⁻²	1.15213	1.15213-10 ³	6.17739-10 ³	16	3.86087-10 ²	1	2.681176	8.33327-10 ⁻²
lb-ft ²	4.21403-10 ⁻²	4.21403-10 ²	4.21403-10 ⁵	4.29711-10 ⁻³	0.429711	4.29711-10 ²	2.304-10 ³	5.96758	144	0.372973	1	3.10808-10 ⁻²
lb-ft-s ² (slug ft ²)	1.35583	1.35583-10 ⁴	1.35583-10 ⁷	0.138256	13.8256	1.38256-10 ⁴	7.41292-10 ⁴	192	4.63308-10 ³	12	32.1742	1

Torque Conversion Table

To convert from A to B, multiply by entry in Table.

A	B								
	N-m	N-cm	dyn-cm	kg-m	kg-cm	g-cm	oz-in	ft-lbs	in-lbs
N-m	1	10 ²	10 ⁷	0.101972	10.1972	1.01972-10 ⁴	141.612	0.737561	8.92172
N-cm	10 ⁻²	1	10 ⁵	1.01972-10 ⁻³	0.101972-3	1.01972-10 ²	1.41612	7.37561-10 ⁻³	8.92172-10 ⁻²
dyn-cm	10 ⁻⁷	10 ⁻⁵	1	1.01972-10 ⁻⁸	1.01972-10 ⁻⁶	1.01972-10 ⁻³	1.41612-10 ⁻⁵	7.37561-10 ⁻⁸	8.92172-10 ⁻⁷
kg-m	9.80665	9.80665-10 ²	9.80665-10 ⁷	1	10 ²	10 ⁵	1.38874-10 ³	7.233	87.4922
kg-cm	9.80665-10 ⁻²	9.80665	9.80665-10 ⁵	10 ⁻²	1	10 ³	13.8874	7.233-10 ⁻²	87.4922
g-cm	9.80665-10 ⁻⁵	9.80665-10 ⁻³	9.80665-10 ²	10 ⁻⁵	10 ⁻³	1	1.38874-10 ⁻²	7.233-10 ⁻⁵	8.74992-10 ⁻⁴
oz-in	7.06155-10 ⁻³	0.706155	7.06155-10 ⁴	7.20078-10 ⁻⁴	7.20078-10 ⁻²	72.0078	1	5.20832-10 ⁻³	6.30012-10 ⁻²
ft-lbs	1.35582	1.35582-10 ²	1.35582-10 ⁷	0.138255	13.8255	1.38255-10 ⁴	192	1	12.0962
in-lbs	0.112086	11.2086	1.12086-10 ⁶	1.14296-10 ⁻²	1.14296	1.15827-10 ³	15.8727	8.26703-10 ⁻²	1

Force Conversion

1 lb_f = 4.45 N
 1 N = 0.225 lb
 1 kg = 2.2 lb
 1 kg = 9.8 N

Lengths

1 in = 25.4 mm
 1 m = 39.37 in (~40 in)
 1 mm = 0.03937 in

Calculate Horsepower

$$\text{Horsepower} = \frac{\text{Torque} \times \text{Speed}}{16,800}$$

Torque = oz-in

Speed = revolutions per second

* The horsepower calculation uses the torque available at the specified speed

$$1 \text{ Horsepower} = 746 \text{ watts}$$

Most tables give densities in lb/ft³. To convert to oz/in³ divide this value by 108. To convert lb/ft³ to gm/cm³ divide by 62.5. The conversion from oz/in³ to gm/cm³ is performed by multiplying oz/in³ by 1.73.

Reference: *Elements of Strength of Materials*, S. Timoshenko and D.H. Young, pp. 342-343.

Densities of Common Materials

Material	oz/in ³	gm/cm ³
Aluminum (cast or hard-drawn)	1.54	2.66
Brass (cast or rolled 60% CU; 40% Zn)	4.80	8.30
Bronze (cast, 90% CU; 10% Sn)	4.72	8.17
Copper (cast or hand-drawn)	5.15	8.91
Plastic	0.64	1.11
Steel (hot or cold rolled, 0.2 or 0.8% carbon)	4.48	7.75
Hard Wood	0.46	0.80
Soft Wood	0.28	0.48