# Theoretical Mass Calculations – (kg/m)

<table>
<thead>
<tr>
<th>Type</th>
<th>Formula</th>
<th>Where</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Round Bar</td>
<td>$D \times D \times 0.006165 = \text{kg/m}$</td>
<td>$d = \text{diameter (mm)}$</td>
<td>Flat Bar</td>
<td>$w \times T \times 0.00786 = \text{kg/m}$</td>
<td>$w = \text{width (mm)}$ $T = \text{thickness (mm)}$</td>
</tr>
<tr>
<td>Square Bar</td>
<td>$t \times t \times 0.00786 = \text{kg/m}$</td>
<td>$t = \text{thickness (mm)}$</td>
<td>Hexagonal Bar</td>
<td>$T \times T \times 0.0068 = \text{kg/m}$</td>
<td>$T = \text{thickness across flats (mm)}$</td>
</tr>
<tr>
<td>Hollow Bar</td>
<td>$(\text{OD} - \text{wt}) \times \text{wt} \times 0.02466 = \text{kg/m}$</td>
<td>$\text{OD} = \text{outside diameter (mm)}$ $\text{wt} = \text{wall thickness (mm)}$</td>
<td>Octagonal Bar</td>
<td>$T \times T \times 0.00651 = \text{kg/m}$</td>
<td>$T = \text{thickness across flats (mm)}$</td>
</tr>
</tbody>
</table>

NOTE: Theoretically calculated weight may differ slightly from actual weighed mass.

## Abbreviations

- **Ann** – Annealed
- **N** – Normalized
- **HT** – Heat treated
- **QT** – Quenched and Tempered
- **HB** – Brinell hardness (10 mm ball, 3000 kg load)
- **HRC** – Rockwell hardness, C scale, 150 kg load
- **HRB** – Rockwell hardness, B scale, 100 kg load
- **HV** – Vickers hardness
- **U.T.S.** – Ultimate tensile strength (Rm)
- **Y.S.** – Yield strength (Re)
- **0.2% P.S.** – Proof stress offset at 0.2 percent (Rp0.2)
- **Elong. (%)** – Percentage of elongation [A on 5.65/So where So = original cross sectional area]
- **J** – Joules (Energy absorbed during impact testing)
- **KVC** – Charpy Impact strength (‘V’ notch)
- **MPa** – Megapascal
- **N.mm$^2$** – Newton per square millimeter
- **1 MPa = 1 N.mm$^2$**
- **mm** - Millimetre
- **m** – Metre
- **AR** – As hot rolled
- **AF** – As hot forged
- **Kg/m** – Kilogram per metre

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