dent *steel* services


# buyers *guide* book

## Fourth Edition

Prime Steel Plates are now stocked with certification according to EN10204 – 3.1 & 3.2 (L.R.S. + DNV Approval)

Member
BRITISH SAFETY COUNCIL


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# the company

**Dent Steel Services (Yorkshire) Ltd** are a privately owned company specialising in the stocking, supply, processing, shot-blasting and painting of steel for the ship building and ship repairing industries worldwide, both commercial and military. We are also major suppliers to the construction, fabrication, oil and offshore industries.

We have recently made considerable investment in the installation of a state of the art, fully automated shot-blasting and painting machine. This specialist machine has the capability of shot-blasting steel to the highest quality surface cleanliness, and painting with all weldable primers (including water based) to the highest tolerance dry film thickness.

In 1987 we were one of the industry leaders in attaining the high standards of Lloyds Register Quality Assured Certification and now hold the latest approval of ISO9001:2000.

The site of our headquarters in Bradford, West Yorkshire covers more than five acres with covered storage of over 150,000 square feet – allowing stock levels in excess of 10,000 tonnes of steel. This facility, coupled with the most up to date lifting equipment, enables us to offer the most efficient handling and distribution service for all our products.

We are committed to an on-going programme of investment in all areas of our business, maintaining our desire to offer continued improvement in quality and service to our valued customers.

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# additional services

**THE FOLLOWING SERVICES ARE AVAILABLE IN-HOUSE:**

- Automatic shot-blasting & priming facilities
  (Width 4.000 Metres Max)
  (Length 2.00 metres min 18.30 metres max)
  (Max weight 14 Tonnes)
- All types of primers – including water based & mig-weld friendly weld-through primers.
- Plate and section rolling.
- Profile and high definition plasma cutting.
- Machining by use of 60" + 100" Lumsden Grinders.
- CNC and Radial Arm Drilling service including tapping and counter sinking.
- Saw Cutting – for steel sections including mitre cutting.
- Bundling and Marking, preparation for Export.

**OTHER SERVICES AVAILABLE:**

- Chemical & Mechanical Testing
  (including Tensile, Impact Through Thickness Testing)
- Ultra Sonic Testing.
- Re-certification and Re-classification

**Dent Steel Services (Yorkshire) Ltd are accredited with the Lloyds Register of Quality Assurance: ISO9001:2000**

| Plate Size | | | | Grades | | Weight |
|---|---|---|---|---|---|---|
| Thickness mm | Area mm | | | Grade A | D36/DH36 | p/plate Tonnes |
| 5 | 6000 | x | 2000 | * | | 0.471 |
| 5 | 8000 | x | 2000 | * | | 0.628 |
| 5 | 6000 | x | 2500 | * | | 0.589 |
| 5 | 8000 | x | 2500 | * | | 0.785 |
| 5 | 10000 | x | 2500 | * | | 0.981 |
| 6 | 6000 | x | 2000 | * | | 0.565 |
| 6 | 8000 | x | 2000 | * | | 0.754 |
| 6 | 8000 | x | 2500 | * | | 0.942 |
| 6 | 10000 | x | 2500 | * | * | 1.178 |
| 6 | 12000 | x | 3000 | * | * | 1.696 |
| 8 | 12000 | x | 2000 | * | | 1.507 |
| 8 | 8000 | x | 2500 | * | | 1.256 |
| 8 | 10000 | x | 2500 | * | * | 1.570 |
| 8 | 12000 | x | 2500 | * | | 1.884 |
| 8 | 8000 | x | 3000 | * | | 1.507 |
| 8 | 12000 | x | 3000 | * | * | 2.261 |
| 10 | 12000 | x | 2000 | * | * | 1.884 |
| 10 | 8000 | x | 2500 | * | | 1.570 |
| 10 | 10000 | x | 2500 | * | * | 1.963 |
| 10 | 12000 | x | 2500 | * | | 2.355 |
| 10 | 8000 | x | 3000 | * | | 1.884 |
| 10 | 12000 | x | 3000 | * | * | 2.826 |
| 12 | 10000 | x | 2500 | * | | 2.355 |
| 12.5 | 12000 | x | 2000 | * | * | 2.355 |
| 12.5 | 8000 | x | 2500 | * | | 1.963 |
| 12.5 | 10000 | x | 2500 | * | * | 2.453 |
| 12.5 | 12000 | x | 2500 | * | | 2.944 |
| 12.5 | 12000 | x | 3000 | * | * | 3.533 |
| 15 | 12000 | x | 2000 | * | * | 2.826 |
| 15 | 8000 | x | 2500 | * | | 2.355 |
| 15 | 10000 | x | 2500 | * | * | 2.944 |
| 15 | 12000 | x | 2500 | * | | 3.533 |
| 15 | 12000 | x | 3000 | * | * | 4.239 |
| 16 | 10000 | x | 2500 | * | | 3.140 |
| 18 | 10000 | x | 2500 | * | | 3.533 |

# steel plates

## for shipbuilders and repairers

| Plate Size | | | | Grades | | Weight |
|---|---|---|---|---|---|---|
| Thickness mm | Area mm | | | Grade A | D36/DH36 | p/plate Tonnes |
| 20 | 12000 | x | 2000 | * | * | 3.768 |
| 20 | 8000 | x | 2500 | * | | 3.140 |
| 20 | 10000 | x | 2500 | * | * | 3.925 |
| 20 | 12000 | x | 2500 | * | | 4.710 |
| 20 | 12000 | x | 3000 | * | * | 5.652 |
| 22 | 10000 | x | 2500 | * | | 4.318 |
| 25 | 12000 | x | 2000 | * | * | 4.710 |
| 25 | 8000 | x | 2500 | * | | 3.925 |
| 25 | 10000 | x | 2500 | * | * | 4.906 |
| 25 | 12000 | x | 2500 | * | | 5.888 |
| 25 | 12000 | x | 3000 | * | * | 7.065 |
| 30 | 12000 | x | 2000 | | * | 5.652 |
| 30 | 8000 | x | 2500 | | | 4.710 |
| 30 | 10000 | x | 2500 | * | * | 5.888 |
| 30 | 12000 | x | 2500 | | | 7.065 |
| 30 | 12000 | x | 3000 | | * | 8.478 |
| 35 | 10000 | x | 2500 | | * | 6.869 |
| 35 | 12000 | x | 3000 | | * | 9.891 |
| 40 | 10000 | x | 2500 | * | * | 7.850 |
| 40 | 12000 | x | 3000 | | * | 11.304 |
| 45 | 10000 | x | 2500 | | * | 8.831 |
| 45 | 12000 | x | 3000 | | * | 12.717 |
| 50 | 12000 | x | 2000 | | * | 9.420 |
| 50 | 10000 | x | 2500 | | * | 9.813 |
| 50 | 12000 | x | 3000 | | * | 14.130 |
| | | | | S355J2+N (LRS/DNV 3.2 Certificates) | | |
| 55 | 6000 | x | 2500 | | * | 6.476 |
| 60 | 8000 | x | 2000 | | * | 7.536 |
| 60 | 8000 | x | 2500 | | * | 9.420 |
| 60 | 10000 | x | 3000 | | * | 14.130 |
| 65 | 6000 | x | 2500 | | * | 7.654 |
| 70 | 6000 | x | 2500 | | * | 8.243 |
| 75 | 6000 | x | 2500 | | * | 8.831 |
| 80 | 6000 | x | 2500 | | * | 9.420 |
| 90 | 6000 | x | 2500 | | * | 10.598 |
| 100 | 6000 | x | 2500 | | * | 11.775 |

All Steel Plates for Shipbuilding & Repairing are supplied with 3rd Party Classification Certificates in accordance with EN10204 - 3.2

Certificates are endorsed by Lloyds and DNV, other classification endorsments can be supplied upon request.

# steel plates

for structural, bridgebulding, energy & offshore sectors

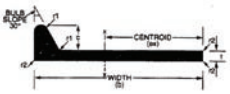
| Plate Size | | | | Grades | | Weight |
|---|---|---|---|---|---|---|
| Thickness mm | Area mm | | | BS EN10025 S275 JR (3.1 & 3.2 Certificates) | BS EN10025 S355J2+N (3.1 & 3.2 Certificates) | p/plate Tonnes |
| 5 | 6000 | x | 2000 | * | | 0.471 |
| 5 | 8000 | x | 2000 | * | | 0.628 |
| 5 | 6000 | x | 2500 | * | | 0.589 |
| 5 | 8000 | x | 2500 | * | | 0.785 |
| 5 | 10000 | x | 2500 | * | | 0.981 |
| 6 | 6000 | x | 2000 | * | | 0.565 |
| 6 | 8000 | x | 2000 | * | | 0.754 |
| 6 | 8000 | x | 2500 | * | | 0.942 |
| 6 | 10000 | x | 2500 | * | * | 1.178 |
| 6 | 12000 | x | 3000 | * | * | 1.696 |
| 8 | 12000 | x | 2000 | * | | 1.507 |
| 8 | 8000 | x | 2500 | * | | 1.256 |
| 8 | 10000 | x | 2500 | * | * | 1.570 |
| 8 | 12000 | x | 2500 | * | | 1.884 |
| 8 | 8000 | x | 3000 | * | | 1.507 |
| 8 | 12000 | x | 3000 | * | * | 2.261 |
| 10 | 12000 | x | 2000 | * | * | 1.884 |
| 10 | 8000 | x | 2500 | * | | 1.570 |
| 10 | 10000 | x | 2500 | * | * | 1.963 |
| 10 | 12000 | x | 2500 | * | | 2.355 |
| 10 | 8000 | x | 3000 | * | | 1.884 |
| 10 | 12000 | x | 3000 | * | * | 2.826 |
| 12 | 10000 | x | 2500 | * | | 2.355 |
| 12.5 | 12000 | x | 2000 | * | * | 2.355 |
| 12.5 | 8000 | x | 2500 | * | | 1.963 |
| 12.5 | 10000 | x | 2500 | * | * | 2.453 |
| 12.5 | 12000 | x | 2500 | * | | 2.944 |
| 12.5 | 12000 | x | 3000 | * | * | 3.533 |
| 15 | 12000 | x | 2000 | * | * | 2.826 |
| 15 | 8000 | x | 2500 | * | | 2.355 |
| 15 | 10000 | x | 2500 | * | * | 2.944 |
| 15 | 12000 | x | 2500 | * | | 3.533 |
| 15 | 12000 | x | 3000 | * | * | 4.239 |
| 16 | 10000 | x | 2500 | * | | 3.140 |

# steel plates

for structural, bridgebulding, energy & offshore sectors

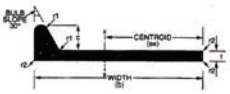
| Plate Size | | | | Grades | | Weight |
|---|---|---|---|---|---|---|
| Thickness mm | Area mm | | | BS EN10025 S275 JR (3.1 & 3.2 Certificates) | BS EN10025 S355J2+N (3.1 & 3.2 Certificates) | p/plate Tonnes |
| 18 | 10000 | x | 2500 | * | | 3.533 |
| 20 | 12000 | x | 2000 | * | * | 3.768 |
| 20 | 8000 | x | 2500 | * | | 3.140 |
| 20 | 10000 | x | 2500 | * | * | 3.925 |
| 20 | 12000 | x | 2500 | * | | 4.710 |
| 20 | 12000 | x | 3000 | * | * | 5.652 |
| 22 | 10000 | x | 2500 | * | | 4.318 |
| 25 | 12000 | x | 2000 | * | * | 4.710 |
| 25 | 8000 | x | 2500 | * | | 3.925 |
| 25 | 10000 | x | 2500 | * | * | 4.906 |
| 25 | 12000 | x | 2500 | * | | 5.888 |
| 25 | 12000 | x | 3000 | * | * | 7.065 |
| 30 | 12000 | x | 2000 | | * | 5.652 |
| 30 | 8000 | x | 2500 | | | 4.710 |
| 30 | 10000 | x | 2500 | * | * | 5.888 |
| 30 | 12000 | x | 2500 | | | 7.065 |
| 30 | 12000 | x | 3000 | | * | 8.478 |
| 35 | 10000 | x | 2500 | | * | 6.869 |
| 35 | 12000 | x | 3000 | | * | 9.891 |
| 40 | 10000 | x | 2500 | * | * | 7.850 |
| 40 | 12000 | x | 3000 | | * | 11.304 |
| 45 | 10000 | x | 2500 | | * | 8.831 |
| 45 | 12000 | x | 3000 | | * | 12.717 |
| 50 | 12000 | x | 2000 | | * | 9.420 |
| 50 | 10000 | x | 2500 | | * | 9.813 |
| 50 | 12000 | x | 3000 | | * | 14.130 |
| 55 | 6000 | x | 2500 | | * | 6.476 |
| 60 | 8000 | x | 2000 | | * | 7.536 |
| 60 | 8000 | x | 2500 | | * | 9.420 |
| 60 | 10000 | x | 3000 | | * | 14.130 |
| 65 | 6000 | x | 2500 | | * | 7.654 |
| 70 | 6000 | x | 2500 | | * | 8.243 |
| 75 | 6000 | x | 2500 | | * | 8.831 |
| 80 | 6000 | x | 2500 | | * | 9.420 |
| 90 | 6000 | x | 2500 | | * | 10.598 |
| 100 | 6000 | x | 2500 | | * | 11.775 |

| Designation | | Dimensions | | |
|---|---|---|---|---|
| Section | Mass per Metre kg | Width b mm | Thickness t mm | Bulb Height c mm |
| 60 x 4 | 3.11 | 60 | 4 | 13 |
| 80 x 5 | 4.42 | 80 | 5 | 14 |
| 80 x 6 | 5.07 | 80 | 6 | 14 |
| 80 x 7 | 5.73 | 80 | 7 | 14 |
| 100 x 6 | 6.33 | 100 | 6 | 15.5 |
| 100 x 7 | 7.13 | 100 | 7 | 15.5 |
| 100 x 8 | 7.97 | 100 | 8 | 15.5 |
| 120 x 6 | 7.60 | 120 | 6 | 17 |
| 120 x 7 | 8.58 | 120 | 7 | 17 |
| 120 x 8 | 9.57 | 120 | 8 | 17 |
| 140 x 7 | 10.1 | 140 | 7 | 19 |
| 140 x 8 | 11.2 | 140 | 8 | 19 |
| 140 x 10 | 13.5 | 140 | 10 | 19 |
| 160 x 7 | 11.9 | 160 | 7 | 22 |
| 160 x 8 | 13.2 | 160 | 8 | 22 |
| 160 x 9 | 14.6 | 160 | 9 | 22 |
| 160 x 11.5 | 18.0 | 160 | 11.5 | 22 |
| 180 x 8 | 15.4 | 180 | 8 | 25 |
| 180 x 9 | 16.9 | 180 | 9 | 25 |
| 180 x 10 | 18.3 | 180 | 10 | 25 |
| 200 x 9 | 19.2 | 200 | 9 | 28 |
| 200 x 10 | 20.9 | 200 | 10 | 28 |
| 200 x 11 | 22.6 | 200 | 11 | 28 |
| 200 x 12 | 24.1 | 200 | 12 | 28 |
| 220 x 10 | 23.7 | 220 | 10 | 31 |
| 220 x 11 | 25.5 | 220 | 11 | 31 |
| 220 x 12 | 27.2 | 220 | 12 | 31 |
| 240 x 10 | 26.4 | 240 | 10 | 34 |
| 240 x 11 | 28.5 | 240 | 11 | 34 |
| 240 x 12 | 30.5 | 240 | 12 | 34 |




| Bulb Radius | Surface Area | Area of x section | Centroid | Moment of Inertia x - x axis | Modulus |
|---|---|---|---|---|---|
| r1 mm | U m2/m | cm2 | ex cm | cm4 | Wx cm3 |
| 3.5 | 0.140 | 3.58 | 3.48 | 13.2 | 3.29 |
| 4 | 0.190 | 5.40 | 4.89 | 33.8 | 6.91 |
| 4 | 0.192 | 6.20 | 4.78 | 39.0 | 8.15 |
| 4 | 0.194 | 7.00 | 4.69 | 43.3 | 9.24 |
| 4.5 | 0.234 | 7.74 | 5.98 | 76.1 | 12.7 |
| 4.5 | 0.236 | 8.74 | 5.87 | 85.3 | 14.5 |
| 4.5 | 0.238 | 9.74 | 5.78 | 94.3 | 16.3 |
| 5 | 0.276 | 9.3 | 7.20 | 133 | 18.4 |
| 5 | 0.278 | 10.5 | 7.07 | 148 | 21.0 |
| 5 | 0.280 | 11.7 | 6.96 | 164 | 23.6 |
| 5.5 | 0.320 | 12.4 | 8.31 | 241 | 29.0 |
| 5.5 | 0.322 | 13.8 | 8.18 | 266 | 32.5 |
| 5.5 | 0.326 | 16.6 | 7.92 | 316 | 39.8 |
| 6 | 0.365 | 14.6 | 9.66 | 373 | 38.6 |
| 6 | 0.367 | 16.2 | 9.49 | 411 | 43.3 |
| 6 | 0.369 | 17.8 | 9.36 | 448 | 47.9 |
| 6 | 0.374 | 21.8 | 9.11 | 544 | 59.8 |
| 7 | 0.411 | 18.9 | 10.9 | 609 | 55.9 |
| 7 | 0.413 | 20.7 | 10.7 | 633 | 61.8 |
| 7 | 0.415 | 22.5 | 10.6 | 717 | 67.8 |
| 8 | 0.457 | 23.6 | 12.1 | 941 | 77.7 |
| 8 | 0.459 | 25.6 | 11.9 | 1020 | 85 |
| 8 | 0.461 | 27.6 | 11.8 | 1090 | 92.3 |
| 8 | 0.463 | 29.6 | 11.7 | 1160 | 99.6 |
| 9 | 0.503 | 29.0 | 13.4 | 1400 | 105 |
| 9 | 0.505 | 31.2 | 13.2 | 1500 | 113 |
| 9 | 0.507 | 33.4 | 13.0 | 1590 | 122 |
| 10 | 0.547 | 32.4 | 14.7 | 1860 | 126 |
| 10 | 0.549 | 34.9 | 14.6 | 2000 | 137 |
| 10 | 0.551 | 37.3 | 14.4 | 2130 | 148 |

| Designation | | Dimensions | | |
|---|---|---|---|---|
| Section | Mass per Metre kg | Width b mm | Thickness t mm | Bulb Height c mm |
| 260 x 10 | 29.3 | 260 | 10 | 37 |
| 260 x 11 | 31.5 | 260 | 11 | 37 |
| 260 x 12 | 33.7 | 260 | 12 | 37 |
| 280 x 11 | 34.9 | 280 | 11 | 40 |
| 280 x 12 | 37.1 | 280 | 12 | 40 |
| 280 x 13 | 39.4 | 280 | 13 | 40 |
| 300 x 11 | 38.1 | 300 | 11 | 43 |
| 300 x 12 | 40.6 | 300 | 12 | 43 |
| 300 x 13 | 42.4 | 300 | 13 | 43 |
| 320 x 12 | 44.2 | 320 | 12 | 46 |
| 320 x 13 | 45.9 | 320 | 13 | 46 |
| 320 x 14 | 49.5 | 320 | 14 | 46 |
| 340 x 12 | 47.9 | 340 | 12 | 49 |
| 340 x 13 | 50.8 | 340 | 13 | 49 |
| 340 x 14 | 53.5 | 340 | 14 | 49 |
| 340 x 15 | 56.2 | 340 | 15 | 49 |
| 370 x 13 | 56.8 | 370 | 13 | 53.5 |
| 370 x 14 | 58.2 | 370 | 14 | 53.5 |
| 370 x 15 | 62.9 | 370 | 15 | 53.5 |
| 370 x 16 | 64.7 | 370 | 16 | 53.5 |
| 400 x 13 | 63.2 | 400 | 13 | 58 |
| 400 x 14 | 65.2 | 400 | 14 | 58 |
| 400 x 15 | 68.3 | 400 | 15 | 58 |
| 400 x 16 | 71.4 | 400 | 16 | 58 |
| 430 x 14 | 72.0 | 430 | 14 | 62.5 |
| 430 x 15 | 75.4 | 430 | 15 | 62.5 |
| 430 x 17 | 82.3 | 430 | 17 | 62.5 |
| 430 x 20 | 92.6 | 430 | 20 | 62.5 |




| Bulb Radius | Surface Area | Area of x section | Centroid | Moment of Inertia | Modulus |
|---|---|---|---|---|---|
| r1 mm | U m2/m | cm2 | ex cm | x - x axis cm4 | Wx cm3 |
| 11 | 0.593 | 36.1 | 16.2 | 2477 | 153 |
| 11 | 0.593 | 38.7 | 16.0 | 2610 | 162 |
| 11 | 0.595 | 41.3 | 15.8 | 2770 | 175 |
| 12 | 0.637 | 42.6 | 17.4 | 3330 | 191 |
| 12 | 0.639 | 45.5 | 17.2 | 3550 | 206 |
| 12 | 0.641 | 48.4 | 17.0 | 3760 | 221 |
| 13 | 0.681 | 46.7 | 18.9 | 4190 | 222 |
| 13 | 0.683 | 49.7 | 18.7 | 4460 | 239 |
| 13 | 0.685 | 52.8 | 18.5 | 4720 | 256 |
| 14 | 0.728 | 54.2 | 20.1 | 5530 | 274 |
| 14 | 0.73 | 57.4 | 19.9 | 5850 | 294 |
| 14 | 0.732 | 60.6 | 19.7 | 6170 | 313 |
| 15 | 0.772 | 58.8 | 21.5 | 6760 | 313 |
| 15 | 0.774 | 62.2 | 21.3 | 7160 | 335 |
| 15 | 0.776 | 65.5 | 21.1 | 7540 | 357 |
| 15 | 0.778 | 69 | 20.9 | 7920 | 379 |
| 16.5 | 0.84 | 69.6 | 23.5 | 9470 | 402 |
| 16.5 | 0.842 | 73.3 | 23.2 | 9980 | 428 |
| 16.5 | 0.844 | 77 | 23.0 | 10490 | 455 |
| 16.5 | 0.846 | 80.7 | 22.8 | 10980 | 481 |
| 18 | 0.907 | 77.4 | 25.8 | 12280 | 476 |
| 18 | 0.908 | 81.4 | 25.5 | 12930 | 507 |
| 18 | 0.91 | 85.4 | 25.2 | 13580 | 537 |
| 18 | 0.912 | 89.4 | 25.0 | 14220 | 568 |
| 19.5 | 0.975 | 89.4 | 27.7 | 16460 | 594 |
| 19.5 | 0.976 | 94.1 | 274 | 17260 | 628 |
| 19.5 | 0.98 | 103 | 26.9 | 18860 | 700 |
| 19.5 | 0.986 | 115 | 26.3 | 21180 | 804 |

# flats

| Metric (mm) | Kg/M |
|---|---|
| 10 x 3 | 0.24 |
| 13 x 3 | 0.31 |
| 13 x 5 | 0.51 |
| 13 x 6 | 0.61 |
| 13 x 10 | 1.02 |
| 15 x 3 | 0.36 |
| 15 x 5 | 0.59 |
| 16 x 3 | 0.38 |
| 16 x 5 | 0.63 |
| 16 x 6 | 0.75 |
| 16 x 8 | 1.00 |
| 16 x 10 | 1.26 |
| 20 x 3 | 0.47 |
| 20 x 5 | 0.79 |
| 20 x 6 | 0.94 |
| 20 x 8 | 1.26 |
| 20 x 10 | 1.57 |
| 20 x 12 | 1.88 |
| 22 x 3 | 0.52 |
| 22 x 5 | 0.86 |
| 22 x 10 | 1.73 |
| 25 x 3 | 0.59 |
| 25 x 5 | 0.98 |
| 25 x 6 | 1.18 |
| 25 x 8 | 1.57 |
| 25 x 9.5 | 1.90 |
| 25 x 10 | 1.96 |
| 25 x 12 | 2.36 |
| 25 x 15 | 2.94 |
| 25 x 20 | 3.92 |
| 30 x 3 | 0.71 |
| 30 x 5 | 1.18 |
| 30 x 6 | 1.41 |
| 30 x 8 | 1.88 |
| 30 x 10 | 2.36 |
| 30 x 12 | 2.83 |
| 30 x 15 | 3.53 |
| 30 x 20 | 4.71 |
| 30 x 25 | 5.89 |
| 35 x 6 | 1.65 |

| Metric (mm) | Kg/M |
|---|---|
| 40 x 3 | 0.94 |
| 40 x 5 | 1.57 |
| 40 x 6 | 1.88 |
| 40 x 8 | 2.51 |
| 40 x 10 | 3.14 |
| 40 x 12 | 3.77 |
| 40 x 15 | 4.71 |
| 40 x 20 | 6.28 |
| 40 x 25 | 7.85 |
| 40 x 30 | 9.42 |
| 45 x 3 | 1.06 |
| 45 x 5 | 1.77 |
| 45 x 6 | 2.12 |
| 45 x 8 | 2.83 |
| 45 x 10 | 3.53 |
| 45 x 12 | 4.24 |
| 45 x 15 | 5.30 |
| 45 x 20 | 7.07 |
| 45 x 25 | 8.83 |
| 45 x 30 | 10.60 |
| 50 x 3 | 1.18 |
| 50 x 5 | 1.96 |
| 50 x 6 | 2.36 |
| 50 x 8 | 3.14 |
| 50 x 10 | 3.93 |
| 50 x 12 | 4.71 |
| 50 x 15 | 5.89 |
| 50 x 20 | 7.85 |
| 50 x 25 | 9.81 |
| 50 x 30 | 11.78 |
| 50 x 40 | 15.70 |
| 55 x 5 | 2.16 |
| 55 x 6 | 2.60 |
| 55 x 8 | 3.45 |
| 55 x 10 | 4.32 |
| 55 x 12 | 5.12 |
| 55 x 15 | 6.48 |
| 55 x 20 | 8.64 |
| 55 x 25 | 10.79 |
| 55 x 30 | 12.95 |
| 60 x 3 | 1.41 |
| 60 x 5 | 2.36 |
| 60 x 6 | 2.83 |
| 60 x 8 | 3.77 |
| 60 x 10 | 4.71 |

# flats

| Metric (mm) | Kg/M |
|---|---|
| 60 x 12 | 5.65 |
| 60 x 15 | 7.07 |
| 60 x 20 | 9.42 |
| 60 x 25 | 11.78 |
| 60 x 30 | 14.13 |
| 60 x 40 | 18.84 |
| 65 x 3 | 1.53 |
| 65 X 4 | 2.04 |
| 65 x 5 | 2.55 |
| 65 x 6 | 3.06 |
| 65 x 8 | 4.08 |
| 65 x 10 | 5.10 |
| 65 x 12 | 6.12 |
| 65 x 15 | 7.65 |
| 65 x 20 | 10.21 |
| 65 x 25 | 12.76 |
| 65 x 30 | 15.31 |
| 65 x 35 | 17.86 |
| 65 x 40 | 20.41 |
| 65 x 45 | 22.96 |
| 65 x 50 | 25.52 |
| 70 x 3 | 1.65 |
| 70 x 5 | 2.75 |
| 70 x 6 | 3.30 |
| 70 x 8 | 4.40 |
| 70 x 10 | 5.50 |
| 70 x 12 | 6.59 |
| 70 x 15 | 8.24 |
| 70 x 20 | 10.99 |
| 70 x 25 | 13.74 |
| 70 x 30 | 16.49 |
| 70 x 50 | 27.48 |
| 75 x 3 | 1.77 |
| 75 x 4 | 2.36 |
| 75 x 5 | 2.97 |
| 75 x 6 | 3.53 |
| 75 x 8 | 4.71 |
| 75 x 10 | 5.89 |
| 75 x 12 | 7.07 |
| 75 x 15 | 8.83 |
| 75 x 20 | 11.80 |
| 75 x 25 | 14.70 |
| 75 x 30 | 17.70 |
| 75 x 40 | 23.60 |
| 75 x 50 | 29.40 |
| 75 x 65 | 38.30 |

| Metric (mm) | Kg/M |
|---|---|
| 80 x 3 | 1.89 |
| 80 x 5 | 3.14 |
| 80 x 6 | 3.77 |
| 80 x 8 | 5.02 |
| 80 x 10 | 6.28 |
| 80 x 12 | 7.54 |
| 80 x 20 | 12.56 |
| 80 x 25 | 15.70 |
| 80 x 30 | 18.84 |
| 80 x 40 | 25.12 |
| 80 x 45 | 28.26 |
| 80 x 50 | 31.40 |
| 80 x 65 | 40.80 |
| 90 x 3 | 2.12 |
| 90 x 4 | 2.83 |
| 90 x 5 | 3.53 |
| 90 x 6 | 4.24 |
| 90 x 8 | 5.65 |
| 90x10 | 7.07 |
| 90 x 12 | 8.48 |
| 90 x 15 | 10.60 |
| 90 x 20 | 14.13 |
| 90 x 25 | 17.66 |
| 90 x 30 | 21.20 |
| 90 x 35 | 24.73 |
| 90 x 40 | 28.26 |
| 90 x 45 | 31.79 |
| 90 x 50 | 35.33 |
| 100 x 3 | 2.36 |
| 100 x 4 | 3.14 |
| 100 x 5 | 3.93 |
| 100 x 6 | 4.71 |
| 100 x 8 | 6.28 |
| 100 x 10 | 7.85 |
| 100 x 12 | 9.42 |
| 100 x 15 | 11.78 |
| 100 x 20 | 15.70 |
| 100 x 25 | 19.63 |
| 100 x 30 | 23.55 |
| 100 x 35 | 27.48 |
| 100 x 40 | 31.40 |
| 100 x 45 | 35.33 |
| 100 x 50 | 39.25 |
| 100 x 60 | 47.10 |
| 100 x 65 | 51.10 |
| 100 x 75 | 58.90 |

# flats

| Metric (mm) | Kg/M |
|---|---|
| 110 x 3 | 2.59 |
| 110 x 5 | 4.32 |
| 110 x 6 | 5.18 |
| 110 x 8 | 6.91 |
| 110 x 10 | 8.64 |
| 110 x 12 | 10.36 |
| 110 x 15 | 12.95 |
| 110 x 20 | 17.27 |
| 110 x 25 | 21.59 |
| 110 x 30 | 25.90 |
| 110 x 40 | 34.54 |
| 110 x 45 | 38.86 |
| 110 x 50 | 43.18 |
| | |
| 120 x 5 | 4.71 |
| 120 x 6 | 5.65 |
| 120 x 10 | 9.42 |
| 120 x 12 | 11.30 |
| 120 x 20 | 18.84 |
| 120 x 25 | 23.55 |
| | |
| | |
| 130 x 3 | 3.06 |
| 130 x 4 | 4.08 |
| 130 x 5 | 5.10 |
| 130 x 6 | 6.12 |
| 130 x 8 | 8.16 |
| 130 x 10 | 10.21 |
| 130 x 12 | 12.25 |
| 130 x 15 | 15.31 |
| 130 x 20 | 20.41 |
| 130 x 22 | 22.40 |
| 130 x 25 | 25.51 |
| 130 x 30 | 30.62 |
| 130 x 40 | 40.80 |
| 130 x 45 | 45.92 |
| 130 x 50 | 51.03 |
| 130 x 60 | 61.23 |
| 130 x 75 | 76.50 |
| | |
| | |
| 140 x 6 | 6.59 |
| 140 x 10 | 10.99 |
| 140 x 12 | 13.20 |
| 140 x 15 | 16.49 |
| 140 x 20 | 21.98 |
| 140 x 25 | 27.48 |

| Metric (mm) | Kg/M |
|---|---|
| 150 x 3 | 3.54 |
| 150 x 4 | 4.71 |
| 150 x 5 | 5.89 |
| 150 x 6 | 7.07 |
| 150 x 7 | 8.24 |
| 150 x 8 | 9.42 |
| 150 x 10 | 11.78 |
| 150 x 12 | 14.13 |
| 150 x 15 | 17.66 |
| 150 x 20 | 23.55 |
| 150 x 25 | 29.44 |
| 150 x 30 | 35.33 |
| 150 x 40 | 47.10 |
| 150 x 45 | 52.99 |
| 150 x 50 | 58.88 |
| 150 x 60 | 70.65 |
| 150 x 75 | 88.32 |
| | |
| 160 x 6 | 7.54 |
| 160 x 10 | 12.56 |
| 160 x 12 | 15.07 |
| 160 x 20 | 25.12 |
| 160 x 25 | 31.40 |
| | |
| 180 x 5 | 7.07 |
| 180 x 6 | 8.48 |
| 180 x 8 | 11.30 |
| 180 x 10 | 14.13 |
| 180 x 12 | 16.96 |
| 180 x 15 | 21.20 |
| 180 x 20 | 28.26 |
| 180 x 25 | 35.33 |
| 180 x 30 | 42.39 |
| 180 x 40 | 56.52 |
| 180 x 50 | 70.60 |
| | |
| 200 x 4 | 6.30 |
| 200 x 6 | 9.42 |
| 200 x 8 | 12.60 |
| 200 x 10 | 15.70 |
| 200 x 12 | 18.84 |
| 200 x 15 | 23.55 |
| 200 x 20 | 31.40 |
| 200 x 25 | 39.25 |
| 200 x 30 | 47.10 |
| 200 x 40 | 62.80 |
| 200 x 45 | 70.65 |
| 200 x 50 | 78.50 |
| 200 x 75 | 117.75 |

# flats

| Metric (mm) | Kg/M |
|---|---|
| 220 x 5 | 8.64 |
| 220 x 6 | 10.36 |
| 220 x 8 | 13.82 |
| 220 x 10 | 17.27 |
| 220 x 12 | 20.72 |
| 220 x 15 | 25.91 |
| 220 x 20 | 34.54 |
| 220 x 25 | 43.18 |
| 220 x 30 | 51.81 |
| 220 x 40 | 69.08 |
| 220 x 50 | 86.35 |
| | |
| 250 x 6 | 11.78 |
| 250 x 8 | 15.70 |
| 250 x 10 | 19.60 |
| 250 x 12 | 23.55 |
| 250 x 15 | 29.44 |
| 250 x 20 | 39.25 |
| 250 x 25 | 49.06 |
| 250 x 30 | 58.88 |
| 250 x 40 | 78.50 |
| 250 x 45 | 88.31 |
| 250 x 50 | 98.13 |
| | |
| 300 x 6 | 14.13 |
| 300 x 8 | 18.84 |
| 300 x 10 | 23.55 |

| Metric (mm) | Kg/M |
|---|---|
| 300 x 12 | 28.26 |
| 300 x 15 | 35.33 |
| 300 x 20 | 47.10 |
| 300 x 25 | 58.88 |
| 300 x 30 | 70.65 |
| 300 x 40 | 94.20 |
| 300 x 45 | 105.98 |
| 300 x 50 | 117.75 |
| 300 x 60 | 141.30 |
| | |
| 350 x 10 | 27.48 |
| 350 x 12 | 33.00 |
| 350 x 15 | 41.21 |
| 350 x 20 | 54.95 |
| 350 x 25 | 68.69 |
| 350 x 30 | 82.43 |
| 350 x 40 | 109.90 |
| | |
| 400 x 10 | 31.40 |
| 400 x 12 | 37.68 |
| 400 x 15 | 47.10 |
| 400 x 20 | 62.80 |
| 400 x 25 | 78.50 |
| 400 x 30 | 94.20 |
| 400 x 40 | 125.60 |
| | |
| 450 x 12 | 42.39 |
| 450 x 20 | 70.65 |
| 450 x 25 | 88.31 |

# equal

## angles

| Designation | | Mass | Area | Distance of |
|---|---|---|---|---|
| Size A mm | Thickness t mm | per metre kg | of section cm2 | centre of gravity c cm |
| 25 x 25 | 5 | 1.77 | 226 | 0.80 |
| | 4 | 1.45 | 1.85 | 0.76 |
| | 3 | 1.11 | 142 | 0.72 |
| 30 x 30 | 6 | 2.56 | 327 | 0.96 |
| | 5 | 2.18 | 278 | 0.92 |
| 40 x 40 | 6 | 3.52 | 448 | 1.20 |
| | 5 | 2.97 | 3.79 | 1.16 |
| | 4 | 2.42 | 3.08 | 1.12 |
| 45 x 45 | 6 | 4.00 | 509 | 1.32 |
| | 5 | 3.38 | 430 | 1.28 |
| | 4 | 2.74 | 3.49 | 1.23 |
| 50 x 50 | 8 | 5.82 | 741 | 1.52 |
| | 6 | 4.47 | 569 | 1.45 |
| | 5 | 3.77 | 4.8 | 1.40 |
| 60 x 60 | 10 | 8.69 | 111 | 1.85 |
| | 8 | 7.09 | 9.03 | 1.77 |
| | 6 | 5.42 | 6.91 | 1.69 |
| | 5 | 4.57 | 582 | 1.64 |
| 70 x 70 | 10 | 10.30 | 131 | 2.09 |
| | 8 | 8.36 | 106 | 2.01 |
| | 6 | 6.38 | 813 | 1.83 |
| 80 x 80 | 10 | 11.90 | 151 | 2.34 |
| | 8 | 9.63 | 123 | 2.26 |
| | 6 | 7.34 | 925 | 2.17 |
| 90 x 90 | 12 | 15.90 | 203 | 2.66 |
| | 10 | 13.40 | 171 | 2.58 |
| | 8 | 10.90 | 139 | 2.50 |
| | 6 | 8.30 | 10.6 | 2.41 |
| 100 x 100 | 15 | 21.90 | 279 | 3.02 |
| | 12 | 17.80 | 22.7 | 2.90 |
| | 10 | 15.00 | 192 | 2.82 |
| | 8 | 12.20 | 155 | 2.74 |

| Moment of inertia | Radius of gyration | Elastic modulus | Plastic modulus |
|---|---|---|---|
| Axis x - x, y - y cm4 | Axis x - x, y - y cm | Axis x - x, y - y cm3 | Axis x - x, y - y cm3 |
| 1.20 | 0.73 | 0.71 | 1.3 |
| 1.01 | 0.74 | 0.58 | 1.07 |
| 0.80 | 0.75 | 0.45 | 0.83 |
| 2.50 | 0.87 | 1.22 | 1.91 |
| 2.16 | 0.88 | 0.65 | 1.91 |
| 6.31 | 1.19 | 2.26 | 4.13 |
| 5.43 | 1.2 | 1.91 | 3.5 |
| 4.47 | 1.21 | 1.55 | 2.85 |
| 9.16 | 1.34 | 2.88 | 5.28 |
| 7.84 | 1.35 | 2.43 | 4.47 |
| 6.43 | 1.36 | 1.97 | 3.63 |
| 16.3 | 1.48 | 4.68 | 8.55 |
| 12.8 | 1.5 | 3.61 | 6.61 |
| 11.0 | 1.51 | 3.05 | 5.58 |
| 34.9 | 1.78 | 8.41 | 15.32 |
| 29.2 | 1.8 | 6.89 | 12.57 |
| 22.8 | 1.82 | 5.29 | 9.67 |
| 19.4 | 1.82 | 4.45 | 8.15 |
| 57.2 | 2.09 | 11.7 | 21.25 |
| 47.5 | 2.11 | 9.52 | 17.37 |
| 36.9 | 2.13 | 7.27 | 13.3 |
| 87.5 | 2.41 | 15.4 | 28.15 |
| 72.2 | 2.43 | 12.6 | 22.95 |
| 55.8 | 2.44 | 9.57 | 17.52 |
| 148 | 2.70 | 23.3 | 42.5 |
| 127 | 2.72 | 19.8 | 36.03 |
| 104 | 2.74 | 16.1 | 29.3 |
| 80.3 | 2.76 | 12.2 | 22.31 |
| 249 | 2.98 | 35.6 | 64.77 |
| 207 | 3.02 | 29.1 | 53.03 |
| 117.7 | 3.04 | 24.6 | 45.15 |
| 145 | 3.06 | 19.9 | 36.43 |

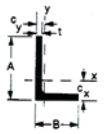
# equal

## angles

| Designation | | Mass | Area | Distance of |
|---|---|---|---|---|
| Size A mm | Thickness t mm | per metre kg | of section cm2 | centre of gravity c cm |
| 120 x 120 | 15 | 26.60 | 339 | 3.51 |
| | 12 | 21.60 | 275 | 3.40 |
| | 10 | 18.20 | 232 | 3.31 |
| | 8 | 14.70 | 187 | 3.23 |
| 150 x 150 | 18 | 40.10 | 510 | 437 |
| | 15 | 33.80 | 430 | 425 |
| | 12 | 27.30 | 348 | 412 |
| | 10 | 23.00 | 293 | 403 |
| 200 x 200 | 24 | 71.10 | 906 | 584 |
| | 20 | 59.90 | 763 | 568 |
| | 18 | 54.20 | 691 | 560 |
| | 16 | 48.50 | 618 | 5.52 |


| Moment of inertia | Radius of gyration | Elastic modulus | Plastic modulus |
|---|---|---|---|
| Axis<br>x - x, y - y<br>cm4 | Axis<br>x - x, y - y<br>cm | Axis<br>x - x, y - y<br>cm3 | Axis<br>x - x, y - y<br>cm3 |
| 445 | 3.62 | 52.4 | 95.26 |
| 368 | 3.65 | 42.7 | 77.73 |
| 313 | 3.67 | 36.0 | 65.6 |
| 255 | 3.69 | 29.1 | 53.1 |
| 1050 | 4.54 | 98.7 | 179.37 |
| 898 | 4.57 | 83.5 | 151.85 |
| 737 | 4.60 | 67.7 | 123.35 |
| 624 | 4.62 | 56.9 | 103.77 |
| 3330 | 6.06 | 235 | 426.2 |
| 2850 | 6.11 | 199 | 361.01 |
| 2600 | 6.13 | 181 | 327.55 |
| 2340 | 6.16 | 162 | 293.49 |

| Designation | | Mass | Area | Dimensions of centre of gravity | |
|---|---|---|---|---|---|
| Size AxB mm | Thickness t mm | per metre kg | of section cm2 | cx cm | cy cm4 |
| 50 x 40 | 6 | 4.24 | 5.07 | 1.56 | 1.10 |
| | 5 | 3.33 | 4.28 | 1.55 | 1.06 |
| 60 x 30 | 6 | 3.99 | 5.08 | 2.20 | 0.72 |
| | 5 | 3.37 | 4.29 | 2.15 | 0.68 |
| 65 x 50 | 8 | 6.75 | 8.6 | 2.11 | 1.37 |
| | 6 | 5.16 | 6.58 | 2.04 | 1.29 |
| | 5 | 4.35 | 5.54 | 1.99 | 1.25 |
| 75 x 50 | 10 | 9.27 | 11.63 | 2.6 | 1.37 |
| | 8 | 7.39 | 9.41 | 2.52 | 1.29 |
| | 6 | 5.65 | 7.19 | 2.44 | 1.21 |
| 80 x 60 | 8 | 8.34 | 10.6 | 2.55 | 1.56 |
| | 7 | 7.36 | 9.38 | 2.51 | 1.52 |
| | 6 | 6.37 | 8.11 | 2.47 | 1.48 |
| 100 x 65 | 10 | 12.3 | 15.6 | 3.36 | 1.63 |
| | 8 | 9.94 | 12.7 | 3.27 | 1.55 |
| | 7 | 8.77 | 11.2 | 3.23 | 1.51 |
| 100 x 75 | 12 | 15.4 | 19.7 | 3.27 | 2.03 |
| | 10 | 13.0 | 16.6 | 3.19 | 1.95 |
| | 8 | 10.6 | 13.5 | 3.1 | 1.87 |
| 125 x 75 | 12 | 17.8 | 22.7 | 4.31 | 1.84 |
| | 10 | 15.0 | 19.1 | 4.23 | 1.76 |
| | 8 | 12.2 | 15.5 | 4.14 | 1.68 |
| 150 x 75 | 15 | 24.8 | 31.6 | 5.53 | 1.81 |
| | 12 | 20.2 | 25.7 | 5.41 | 1.69 |
| | 10 | 17 | 21.6 | 5.32 | 1.61 |
| 150 x 90 | 15 | 26.6 | 33.9 | 5.21 | 2.23 |
| | 12 | 21.6 | 27.5 | 5.08 | 2.12 |
| | 10 | 18.2 | 23.2 | 5.00 | 2.04 |
| 200 x 100 | 15 | 33.7 | 43 | 7.16 | 2.22 |
| | 12 | 27.3 | 34.8 | 7.03 | 2.10 |
| | 10 | 23.0 | 29.2 | 6.93 | 2.01 |
| 200 x 150 | 18 | 47.1 | 60.0 | 6.33 | 3.85 |
| | 15 | 39.6 | 50.5 | 6.21 | 3.73 |
| | 12 | 32.0 | 40.8 | 6.08 | 3.61 |




| Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 12.1 | 6.51 | 1.54 | 1.16 | 3.54 | 2.35 | | |
| 10.3 | 5.55 | 1.55 | 1.17 | 3.00 | 1.99 | | |
| 18.2 | 3.02 | 1.89 | 0.77 | 4.78 | 1.32 | | |
| 15.6 | 2.6 | 1.90 | 0.78 | 4.04 | 1.12 | | |
| 34.8 | 17.7 | 2.01 | 1.44 | 7.93 | 4.89 | 14.40 | 8.94 |
| 27.2 | 14.0 | 2.03 | 1.46 | 6.10 | 3.77 | 11.13 | 6.85 |
| 23.2 | 11.9 | 2.05 | 1.47 | 5.14 | 3.19 | 9.41 | 5.76 |
| 63.5 | 22.2 | 2.33 | 1.38 | 12.75 | 6.05 | | |
| 52.0 | 18.4 | 2.35 | 1.40 | 10.4 | 4.95 | 18.87 | 9.14 |
| 40.5 | 14.4 | 2.37 | 1.42 | 8.01 | 3.81 | 14.54 | 6.95 |
| 66.3 | 31.8 | 2.50 | 1.73 | 12.2 | 7.16 | 22.17 | 13.08 |
| 59.0 | 28.4 | 2.51 | 1.74 | 10.7 | 6.34 | 19.63 | 11.54 |
| 51.4 | 24.8 | 2.52 | 1.75 | 92.9 | 5.49 | 17.02 | 9.96 |
| 154 | 51.0 | 3.14 | 1.81 | 23.2 | 10.5 | 41.91 | 19.41 |
| 127 | 42.2 | 3.16 | 1.83 | 18.9 | 8.54 | 34.21 | 15.67 |
| 113 | 37.6 | 3.17 | 1.83 | 16.6 | 7.53 | 30.23 | 13.77 |
| 189 | 90.2 | 3.10 | 2.14 | 28.0 | 16.5 | 50.97 | 30.27 |
| 162 | 77.6 | 3.12 | 2.16 | 23.8 | 14.0 | 43.31 | 25.55 |
| 133 | 64.1 | 3.14 | 2.18 | 19.3 | 11.4 | 35.31 | 20.69 |
| 354 | 95.5 | 3.95 | 2.05 | 43.2 | 16.9 | 77.36 | 31.42 |
| 302 | 82.1 | 3.97 | 2.07 | 36.5 | 14.3 | 65.57 | 26.34 |
| 247 | 67.6 | 4.00 | 2.09 | 29.6 | 11.6 | 53.33 | 21.19 |
| 713 | 120 | 4.75 | 1.94 | 75.3 | 21.0 | 131.45 | 40.59 |
| 589 | 99.9 | 4.79 | 1.97 | 61.4 | 17.2 | 107.60 | 32.51 |
| 501 | 85.8 | 4.81 | 1.99 | 51.8 | 14.6 | 91.04 | 27.11 |
| 761 | 205 | 4.74 | 2.46 | 77.7 | 30.4 | 138.77 | 56.53 |
| 627 | 171 | 4.77 | 2.49 | 63.3 | 24.8 | 113.40 | 45.60 |
| 533 | 146 | 4.80 | 2.51 | 53.3 | 21.0 | 95.83 | 38.20 |
| 1758 | 299 | 6.4 | 2.64 | 137.0 | 38.4 | 240.46 | 72.75 |
| 1440 | 247 | 6.43 | 2.67 | 111.0 | 31.3 | 195.68 | 57.82 |
| 1220 | 210 | 6.46 | 2.68 | 93.2 | 26.3 | 164.91 | 48.16 |
| 2376 | 1146 | 6.29 | 4.37 | 174.0 | 103.0 | 316.19 | 186.02 |
| 2022 | 979 | 6.33 | 4.40 | 147.0 | 86.9 | 267.38 | 156.62 |
| 1652 | 803 | 6.36 | 4.44 | 119.0 | 70.5 | 216.97 | 126.54 |

# rounds

| Metric (mm) | Kg/M |
|---|---|
| 5.5 | 0.19 |
| 6.0 | 0.22 |
| 6.5 | 0.26 |
| 8.0 | 0.39 |
| 9.5 | 0.56 |
| 10.0 | 0.62 |
| 12.0 | 0.89 |
| 12.5 | 0.96 |
| 13.0 | 1.04 |
| 16.0 | 1.58 |
| 20.0 | 2.47 |
| 22.0 | 2.98 |
| 25.0 | 3.85 |
| 27.0 | 4.48 |
| 85.5 | 5.00 |
| 30.0 | 5.55 |
| 32.0 | 6.31 |
| 35.0 | 7.55 |
| 38.0 | 8.90 |
| 40.0 | 9.86 |
| 45.0 | 12.50 |
| 50.0 | 15.40 |
| 55.0 | 18.70 |
| 60.0 | 22.20 |
| 65.0 | 26.00 |
| 70.0 | 30.20 |
| 75.0 | 34.70 |
| 80.0 | 38.50 |
| 85.0 | 44.50 |
| 90.0 | 49.90 |
| 95.0 | 55.60 |

| Metric (mm) | Kg/M |
|---|---|
| 100.0 | 61.60 |
| 105.0 | 68.00 |
| 110.5 | 74.60 |
| 115.0 | 81.50 |
| 120.0 | 88.00 |
| 125.0 | 96.30 |
| 130.0 | 104.00 |
| 135.0 | 112.00 |
| 140.0 | 121.00 |
| 145.0 | 130.00 |
| 150.0 | 139.00 |
| 155.0 | 148.00 |
| 160.0 | 158.00 |
| 165.0 | 168.00 |
| 170.0 | 178.00 |
| 180.0 | 200.00 |
| 185.0 | 211.00 |
| 190.0 | 222.37 |
| 200.0 | 247.00 |
| 210.0 | 272.00 |
| 220.0 | 298.00 |
| 230.0 | 326.00 |
| 240.0 | 356.00 |
| 250.0 | 385.00 |
| 270.0 | 448.00 |
| 280.0 | 482.00 |
| 300.0 | 553.00 |
| 305.0 | 573.00 |

## half-round/convex

| Metric (mm) | Kg/M |
|---|---|
| 50 x 25 | 7.71 |
| 60 x 30 | 11.70 |
| 76 x 19 | 8.93 |
| 76 x 25 | 11.31 |
| 76 x 38 | 17.90 |
| 100 x 50 | 30.85 |

## squares

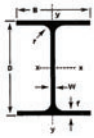
| Metric (mm) | Kg/M |
|---|---|
| 6.4 | 0.32 |
| 8.0 | 0.50 |
| 10.0 | 0.79 |
| 12.0 | 1.13 |
| 12.5 | 1.22 |
| 13.0 | 1.33 |
| 15.0 | 1.77 |
| 16.0 | 2.01 |
| 19.0 | 2.82 |
| 20.0 | 3.14 |
| 22.0 | 3.80 |
| 25.0 | 4.91 |
| 29.0 | 6.57 |
| 30.0 | 7.07 |
| 32.0 | 8.04 |
| 35.0 | 9.62 |
| 38.0 | 11.30 |
| 40.0 | 12.60 |
| 44.5 | 15.49 |
| 45.0 | 15.90 |

| Metric (mm) | Kg/M |
|---|---|
| 50.0 | 19.60 |
| 55.0 | 23.70 |
| 60.0 | 28.30 |
| 65.0 | 33.20 |
| 70.0 | 38.50 |
| 75.0 | 44.20 |
| 76.2 | 45.51 |
| 80.0 | 50.20 |
| 85.0 | 56.70 |
| 90.0 | 63.60 |
| 100.0 | 78.50 |
| 115.0 | 104.00 |
| 120.0 | 113.00 |
| 125.0 | 123.00 |
| 130.0 | 133.00 |
| 150.0 | 177.00 |

# tees

| Section Number | Calculated Weight Kg per Metre | Metric (mm) | Kg/M |
|---|---|---|---|
| 13 | 13.306 | 40 x 40 x 5 | 3.52 |
| 16 | 15.974 | 40 x 40 x 6 | 2.97 |
| 20 | 19.861 | 50 x 50 x 6 | 4.47 |
| 28 | 28.523 | | |
| 35 | 35.213 | | |
| 50 | 50.412 | | |

| Designation | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|
| | | Depth | Width | Thickness | | Radius | Area |
| Section mm | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | of Fillet (r) mm | of section cm2 |
| 127 x 76 | 13 | 127.0 | 76.2 | 4.2 | 7.6 | 7.6 | 16.8 |
| 152 x 89 | 16 | 152.4 | 88.9 | 4.6 | 7.7 | 7.6 | 20.5 |
| 178 x 102 | 19 | 1778.0 | 101.6 | 4.7 | 7.9 | 7.6 | 24.2 |
| 203 x 102 | 23 | 203.2 | 101.6 | 5.2 | 9.3 | 7.6 | 29.0 |
| 203 x 133 | 25 | 203.2 | 133.4 | 5.8 | 7.8 | 7.6 | 32.3 |
| | 30 | 206.8 | 133.8 | 6.3 | 9.6 | 7.6 | 38.0 |
| 254 x 102 | 22 | 254.0 | 101.6 | 5.8 | 6.8 | 7.6 | 28.4 |
| | 25 | 257.0 | 101.9 | 6.1 | 8.4 | 7.6 | 32.2 |
| | 28 | 260.4 | 102.1 | 6.4 | 10.0 | 7.6 | 36.2 |
| 254 x 146 | 31 | 251.5 | 146.1 | 6.1 | 8.6 | 7.6 | 40.0 |
| | 37 | 256.0 | 146.4 | 6.4 | 10.9 | 7.6 | 47.5 |
| | 43 | 259.6 | 147.3 | 7.3 | 12.7 | 7.6 | 55.1 |
| 305 x 102 | 25 | 304.8 | 101.6 | 5.8 | 6.8 | 7.6 | 31.4 |
| | 28 | 308.9 | 101.9 | 6.1 | 8.9 | 7.6 | 36.3 |
| | 33 | 312.7 | 102.4 | 6.6 | 10.8 | 7.6 | 41.8 |
| 305 x 127 | 37 | 303.8 | 123.5 | 7.2 | 10.7 | 8.9 | 47.5 |
| | 42 | 306.6 | 124.3 | 8.0 | 12.1 | 8.9 | 53.2 |
| | 48 | 310.4 | 125.2 | 8.9 | 14.0 | 8.9 | 60.8 |
| 305 x 165 | 40 | 303.8 | 165.1 | 6.1 | 10.2 | 8.9 | 51.5 |
| | 46 | 307.1 | 165.7 | 6.7 | 11.8 | 8.9 | 58.9 |
| | 54 | 310.9 | 166.8 | 7.7 | 13.7 | 8.9 | 68.4 |
| 356 x 127 | 33 | 348.5 | 125.4 | 5.9 | 8.5 | 10.2 | 41.8 |
| | 39 | 352.8 | 126.0 | 6.5 | 10.7 | 10.2 | 49.4 |
| 356 x 171 | 45 | 352.0 | 171.0 | 6.9 | 9.7 | 10.2 | 57.0 |
| | 51 | 355.6 | 171.5 | 7.3 | 11.5 | 10.2 | 64.6 |
| | 57 | 358.6 | 172.1 | 8.0 | 13.0 | 10.2 | 72.2 |
| | 67 | 364.0 | 173.2 | 9.1 | 15.7 | 10.2 | 85.4 |
| 406 x 140 | 39 | 397.3 | 141.8 | 6.3 | 8.6 | 10.2 | 49.4 |
| | 46 | 402.3 | 142.4 | 6.9 | 11.2 | 10.2 | 59.0 |
| 406 x 178 | 54 | 402.6 | 177.6 | 7.6 | 10.9 | 10.2 | 68.4 |
| | 60 | 406.4 | 177.8 | 7.8 | 12.8 | 10.2 | 76.0 |
| | 67 | 409.4 | 178.8 | 8.8 | 14.3 | 10.2 | 85.5 |
| | 74 | 412.8 | 179.7 | 9.7 | 16.0 | 10.2 | 95.0 |



| Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 477 | 56 | 5.33 | 1.83 | 75.0 | 15.0 | 84.7 | 22.5 |
| 838 | 90 | 6.40 | 2.10 | 110.0 | 20.0 | 123.7 | 31.0 |
| 1357 | 138 | 7.5 | 23.90 | 153.0 | 27.0 | 1718.0 | 41.4 |
| 2091 | 163 | 84.9 | 23.70 | 206.0 | 32.0 | 2318.0 | 47.8 |
| 2356 | 310 | 85.4 | 3.10 | 231.9 | 46.4 | 2598.0 | 71.39 |
| 2887 | 384 | 87.2 | 3.18 | 279.3 | 57.4 | 3133.0 | 88.05 |
| 2867 | 120 | 10.0 | 2.05 | 2257.0 | 23.6 | 261.9 | 37.55 |
| 3408 | 148 | 10.3 | 2.14 | 2652.0 | 29.0 | 305.6 | 45.82 |
| 4008 | 178 | 10.5 | 2.22 | 3079.0 | 34.9 | 353.4 | 54.84 |
| 4439 | 449 | 10.5 | 3.35 | 353.1 | 61.5 | 395.6 | 94.5 |
| 5556 | 571 | 10.8 | 3.47 | 434.0 | 78.1 | 485.3 | 119.6 |
| 6558 | 677 | 10.9 | 3.51 | 505.3 | 92.0 | 568.2 | 141.2 |
| 4387 | 120 | 11.8 | 1.96 | 287.9 | 23.6 | 337.8 | 37.98 |
| 5421 | 157 | 12.2 | 2.08 | 351.0 | 30.8 | 407.2 | 48.92 |
| 6487 | 193 | 12.5 | 2.15 | 415.0 | 37.8 | 479.9 | 59.85 |
| 7162 | 337 | 12.3 | 2.67 | 471.5 | 54.6 | 540.6 | 85.66 |
| 8143 | 388 | 12.4 | 2.70 | 531.2 | 62.5 | 610.5 | 982.4 |
| 9504 | 460 | 12.5 | 2.75 | 612.4 | 73.5 | 706.1 | 1157.0 |
| 8523 | 763 | 12.9 | 3.85 | 561.2 | 92.4 | 624.5 | 141.5 |
| 9948 | 897 | 13.0 | 3.90 | 647.9 | 108.3 | 722.7 | 165.8 |
| 11710 | 1061 | 13.1 | 39.40 | 753.3 | 127.3 | 844.8 | 195.3 |
| 8200 | 280 | 14.0 | 25.90 | 470.6 | 44.7 | 539.8 | 70.2 |
| 10087 | 357 | 14.3 | 26.90 | 571.8 | 56.6 | 653.6 | 886.8 |
| 12091 | 812 | 14.6 | 37.80 | 686.9 | 95.0 | 773.7 | 146.7 |
| 14156 | 968 | 14.8 | 3.87 | 796.2 | 112.9 | 894.9 | 174.1 |
| 16077 | 1109 | 14.9 | 3.92 | 896.5 | 128.9 | 100.9 | 198.8 |
| 19522 | 1362 | 15.1 | 3.99 | 107.3 | 157.3 | 121.2 | 243.0 |
| 12452 | 411 | 15.9 | 2.89 | 626.9 | 58.0 | 720.8 | 910.8 |
| 15647 | 539 | 16.3 | 3.02 | 777.8 | 75.7 | 888.4 | 118.3 |
| 18626 | 1017 | 16.5 | 3.85 | 925.3 | 114.5 | 1048 | 177.5 |
| 21508 | 1199 | 16.8 | 3.97 | 105.8 | 134.8 | 1194 | 208.3 |
| 24329 | 1365 | 16.9 | 4.00 | 118.8 | 152.7 | 1346 | 236.5 |
| 27329 | 1545 | 17.0 | 4.03 | 132.4 | 172.0 | 1504 | 266.9 |

| Designation | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|
| | | Depth | Width | Thickness | | Radius | Area |
| Section mm | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | of Fillet (r) mm | of section cm2 |
| 457 x 152 | 52 | 449.8 | 152.4 | 7.6 | 10.9 | 10.2 | 66.5 |
| | 60 | 454.7 | 152.9 | 8.0 | 13.3 | 10.2 | 75.9 |
| | 67 | 457.2 | 151.9 | 9.1 | 15.0 | 10.2 | 85.4 |
| | 74 | 461.3 | 152.7 | 9.9 | 17.0 | 10.2 | 95.0 |
| | 82 | 465.1 | 153.5 | 10.7 | 18.9 | 10.2 | 104.5 |
| 457 x 191 | 67 | 453.6 | 189.9 | 8.5 | 12.7 | 10.2 | 85.4 |
| | 74 | 457.2 | 190.5 | 9.1 | 14.5 | 10.2 | 95.0 |
| | 82 | 460.2 | 191.3 | 9.9 | 16.0 | 10.2 | 104.5 |
| | 89 | 463.6 | 192.0 | 10.6 | 17.7 | 10.2 | 113.9 |
| | 98 | 467.4 | 192.8 | 11.4 | 19.6 | 10.2 | 125.3 |
| 533 x 210 | 82 | 528.3 | 208.7 | 9.6 | 13.2 | 12.7 | 104.4 |
| | 92 | 533.1 | 209.3 | 10.2 | 15.6 | 12.7 | 117.8 |
| | 101 | 536.7 | 210.1 | 10.9 | 17.4 | 12.7 | 129.3 |
| | 109 | 539.5 | 210.7 | 11.6 | 18.8 | 12.7 | 138.6 |
| | 122 | 544.6 | 211.9 | 12.8 | 21.3 | 12.7 | 155.8 |
| 610 x 229 | 101 | 602.2 | 227.6 | 10.6 | 14.8 | 12.7 | 129.2 |
| | 113 | 607.3 | 228.2 | 11.2 | 17.3 | 12.7 | 144.5 |
| | 125 | 611.9 | 229.0 | 11.9 | 19.6 | 12.7 | 159.6 |
| | 140 | 617.0 | 230.1 | 13.1 | 22.1 | 12.7 | 178.4 |
| 610 x 305 | 149 | 609.6 | 304.8 | 11.9 | 19.7 | 16.5 | 190.1 |
| | 179 | 617.5 | 307.0 | 14.1 | 23.6 | 16.5 | 227.9 |
| | 238 | 633.0 | 311.5 | 18.6 | 31.4 | 16.5 | 303.8 |
| 686 x 254 | 125 | 677.9 | 253.0 | 11.7 | 16.2 | 16.5 | 159.6 |
| | 140 | 683.5 | 253.7 | 12.4 | 19.0 | 16.5 | 178.6 |
| | 152 | 687.6 | 254.5 | 13.2 | 21.0 | 16.5 | 193.5 |
| | 170 | 692.9 | 255.8 | 14.5 | 23.7 | 16.5 | 216.6 |
| 762 x 267 | 147 | 753.9 | 265.3 | 12.9 | 17.5 | 16.5 | 188.1 |
| | 173 | 762.0 | 266.7 | 14.3 | 21.6 | 16.5 | 220.5 |
| | 197 | 769.6 | 268.0 | 15.6 | 25.4 | 16.5 | 250.8 |
| 838 x 292 | 176 | 834.9 | 291.6 | 14.0 | 18.8 | 17.8 | 224.1 |
| | 194 | 840.7 | 292.4 | 14.7 | 21.7 | 17.8 | 247.2 |
| | 226 | 850.9 | 293.8 | 16.1 | 26.8 | 17.8 | 288.7 |
| 914 x 305 | 201 | 903.0 | 303.4 | 15.2 | 20.2 | 19.1 | 256.4 |
| | 224 | 910.3 | 304.1 | 15.9 | 23.9 | 19.1 | 285.3 |
| | 253 | 918.5 | 305.5 | 17.3 | 27.9 | 19.1 | 322.8 |
| | 289 | 926.6 | 307.8 | 196.0 | 32.0 | 19.1 | 368.8 |
| 914 x 419 | 343 | 911.4 | 418.5 | 19.4 | 32.0 | 24.1 | 437.5 |
| | 388 | 920.5 | 420.5 | 21.5 | 36.6 | 24.1 | 494.5 |

| Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 21345 | 645 | 17.9 | 3.11 | 949 | 94.6 | 1094 | 133.2 |
| 25464 | 794 | 18.3 | 3.23 | 1120 | 103.9 | 1284 | 162.9 |
| 28577 | 878 | 18.3 | 3.21 | 1250 | 115.5 | 1441 | 182.2 |
| 32435 | 1012 | 18.5 | 3.26 | 1406 | 132.5 | 1622 | 209.1 |
| 36215 | 1143 | 18.6 | 3.31 | 1557 | 149.0 | 1800 | 235.4 |
| 29401 | 1452 | 18.5 | 4.12 | 1296 | 152.9 | 1471 | 237.3 |
| 33388 | 1671 | 18.7 | 4.19 | 1461 | 175.5 | 1657 | 272.2 |
| 37103 | 1871 | 18.8 | 4.23 | 1612 | 195.6 | 1833 | 304.0 |
| 41021 | 2086 | 19.0 | 4.28 | 1770 | 217.4 | 2014 | 337.9 |
| 45717 | 2343 | 19.1 | 4.33 | 1956 | 243.0 | 2232 | 378.3 |
| 47491 | 2005 | 21.3 | 4.38 | 1798 | 192.2 | 2056 | 300.1 |
| 55353 | 2392 | 21.7 | 4.51 | 2076 | 228.6 | 2366 | 356.2 |
| 61659 | 2694 | 21.8 | 4.56 | 2298 | 256.5 | 2620 | 400.0 |
| 66739 | 2937 | 21.9 | 46.0 | 2474 | 278.8 | 2824 | 435.1 |
| 76207 | 3393 | 22.1 | 4.67 | 2799 | 320.2 | 3203 | 500.6 |
| 75720 | 2912 | 24.2 | 4.75 | 2515 | 255.9 | 2882 | 400.0 |
| 87431 | 3439 | 24.6 | 4.88 | 2879 | 301.4 | 3288 | 470.2 |
| 98579 | 3933 | 24.7 | 4.96 | 3222 | 343.5 | 3677 | 535.7 |
| 111844 | 4512 | 25.0 | 5.03 | 3626 | 392.1 | 4146 | 612.5 |
| 124660 | 9300 | 25.6 | 6.99 | 4090 | 610.3 | 4572 | 936.8 |
| 151631 | 11412 | 25.8 | 7.08 | 4911 | 743.3 | 5521 | 1144 |
| 207571 | 15838 | 26.1 | 7.22 | 6559 | 1017 | 7456 | 1574 |
| 118003 | 4379 | 27.2 | 5.24 | 3481 | 346.1 | 3996 | 542.0 |
| 136276 | 5179 | 27.6 | 5.38 | 3988 | 408.2 | 4560 | 637.8 |
| 150319 | 5782 | 27.8 | 5.46 | 4372 | 454.5 | 4997 | 710.0 |
| 170147 | 6621 | 28.0 | 5.53 | 4911 | 517.7 | 5624 | 810.3 |
| 168966 | 5468 | 30.0 | 5.39 | 4483 | 412.3 | 5174 | 649.0 |
| 205177 | 6846 | 30.5 | 5.57 | 5385 | 513.4 | 6197 | 807.3 |
| 239894 | 8174 | 30.9 | 5.71 | 6234 | 610.0 | 7167 | 958.7 |
| 246029 | 7792 | 33.1 | 5.9 | 5894 | 534.0 | 6809 | 841.5 |
| 279450 | 9069 | 33.6 | 6.06 | 6648 | 620.0 | 7648 | 974.4 |
| 339747 | 11353 | 34.3 | 6.27 | 7986 | 772.9 | 9157 | 1211 |
| 325529 | 9427 | 35.6 | 6.06 | 7210 | 621.0 | 8362 | 982.5 |
| 375924 | 11223 | 36.3 | 6.27 | 8259 | 738.1 | 9522 | 1162 |
| 436610 | 13318 | 36.8 | 6.2 | 9507 | 871.9 | 10947 | 1372 |
| 504594 | 15610 | 37.0 | 6.51 | 10891 | 1014 | 12583 | 1603 |
| 625282 | 39150 | 37.8 | 9.46 | 13722 | 1871 | 15474 | 2890 |
| 718742 | 45407 | 38.1 | 9.58 | 15616 | 2160 | 17657 | 3339 |

| Designation | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|
| | | Depth | Width | Thickness | | Radius | Area |
| Section mm | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | of Fillet (r) mm | of section cm2 |
| 152 x 152 | 23 | 152.4 | 152.4 | 6.1 | 6.8 | 7.6 | 29.8 |
| | 30 | 157.5 | 152.9 | 6.6 | 9.4 | 7.6 | 38.2 |
| | 37 | 161.8 | 154.4 | 8.1 | 11.5 | 7.6 | 47.4 |
| 203 x 203 | 46 | 203.2 | 203.2 | 7.3 | 11.0 | 10.2 | 58.8 |
| | 52 | 206.2 | 203.9 | 8.0 | 12.5 | 10.2 | 66.4 |
| | 60 | 209.6 | 205.2 | 9.3 | 14.2 | 10.2 | 75.8 |
| | 71 | 215.9 | 206.2 | 10.3 | 17.3 | 10.2 | 91.1 |
| | 86 | 222.3 | 208.8 | 13.0 | 20.5 | 10.2 | 110.1 |
| 254 x 254 | 73 | 254.0 | 254.0 | 8.6 | 14.2 | 12.7 | 92.9 |
| | 89 | 260.4 | 255.9 | 10.5 | 17.3 | 12.7 | 114.0 |
| | 107 | 266.7 | 258.3 | 13.0 | 20.5 | 12.7 | 136.6 |
| | 132 | 276.4 | 261.0 | 15.6 | 25.3 | 12.7 | 168.9 |
| | 167 | 289.1 | 264.5 | 19.2 | 31.7 | 12.7 | 212.4 |
| 305 x 305 | 97 | 307.8 | 304.8 | 9.9 | 15.4 | 15.2 | 123.3 |
| | 118 | 314.5 | 306.8 | 11.9 | 18.7 | 15.2 | 149.8 |
| | 137 | 320.5 | 308.7 | 13.8 | 21.7 | 15.2 | 174.6 |
| | 158 | 327.2 | 310.6 | 15.7 | 25.0 | 15.2 | 201.2 |
| | 198 | 339.9 | 314.1 | 19.2 | 31.4 | 15.2 | 252.3 |
| | 240 | 352.6 | 317.9 | 23.0 | 37.7 | 15.2 | 305.6 |
| | 283 | 365.3 | 321.8 | 26.9 | 44.1 | 15.2 | 360.4 |
| 356 x 368 | 129 | 355.6 | 368.3 | 10.7 | 17.5 | 15.2 | 164.9 |
| | 153 | 362.0 | 370.2 | 12.6 | 20.7 | 15.2 | 195.2 |
| | 177 | 368.3 | 372.1 | 14.5 | 23.8 | 15.2 | 225.7 |
| | 202 | 374.7 | 374.4 | 16.8 | 27.0 | 15.2 | 257.9 |
| 356 x 406 | 235 | 381.0 | 395.0 | 18.5 | 30.2 | 15.2 | 299.8 |
| | 287 | 393.7 | 399.0 | 22.6 | 36.5 | 15.2 | 366.0 |
| | 340 | 406.4 | 403.0 | 26.5 | 42.9 | 15.2 | 432.7 |
| | 393 | 419.1 | 407.0 | 30.6 | 49.2 | 15.2 | 500.9 |
| | 467 | 436.6 | 412.4 | 35.9 | 58.0 | 15.2 | 595.5 |
| | 551 | 455.7 | 418.5 | 42.0 | 67.5 | 15.2 | 701.8 |
| | 634 | 474.7 | 424.1 | 47.6 | 77.0 | 15.2 | 808.1 |

| Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 1263 | 403 | 65.1 | 3.68 | 165.7 | 52.95 | 184.3 | 80.87 |
| 1742 | 558 | 67.5 | 3.82 | 221.2 | 73.06 | 247.1 | 111.2 |
| 2218 | 709 | 68.4 | 3.87 | 247.2 | 91.78 | 310.1 | 140.1 |
| 4564 | 1539 | 88.1 | 5.11 | 449.2 | 151.5 | 497.4 | 230.0 |
| 5263 | 1770 | 89.0 | 5.16 | 510.4 | 173.6 | 568.1 | 263.7 |
| 6088 | 2041 | 89.6 | 5.19 | 581.1 | 199.0 | 652.0 | 302.8 |
| 7647 | 2536 | 91.6 | 5.28 | 708.4 | 246.0 | 802.4 | 374.2 |
| 9462 | 3119 | 92.7 | 5.32 | 851.5 | 298.7 | 978.8 | 455.9 |
| 11360 | 3973 | 11.1 | 6.46 | 894.5 | 305.0 | 988.6 | 462.4 |
| 14307 | 4849 | 11.2 | 6.52 | 1099 | 378.9 | 1228 | 575.4 |
| 17510 | 5901 | 11.3 | 6.57 | 1313 | 456.9 | 1485 | 695.5 |
| 22575 | 7519 | 11.6 | 6.68 | 1634 | 576.2 | 1875 | 878.6 |
| 29914 | 9796 | 11.9 | 6.79 | 2070 | 740.6 | 2417 | 1132 |
| 22202 | 7268 | 13.4 | 7.68 | 1442 | 476.9 | 1589 | 7235 |
| 27601 | 9006 | 13.6 | 7.75 | 1755 | 587.0 | 1953 | 8917 |
| 32838 | 10672 | 13.7 | 7.82 | 2049 | 691.4 | 2298 | 1052 |
| 38740 | 12524 | 13.9 | 7.89 | 2368 | 806.3 | 2680 | 1228 |
| 50832 | 16230 | 14.2 | 8.02 | 2991 | 103.4 | 3436 | 1576 |
| 64177 | 20239 | 14.5 | 8.14 | 3641 | 127.3 | 4245 | 1947 |
| 78777 | 24545 | 14.8 | 8.25 | 4314 | 152.5 | 5101 | 2337 |
| 40246 | 14555 | 15.6 | 9.39 | 2264 | 790.4 | 2482 | 1196 |
| 48525 | 17469 | 15.8 | 9.46 | 2681 | 943.8 | 2964 | 1430 |
| 57153 | 20470 | 15.9 | 9.52 | 3104 | 1100 | 3457 | 1668 |
| 66307 | 23632 | 16.0 | 9.57 | 3540 | 1262 | 3977 | 1917 |
| 79110 | 31008 | 16.2 | 10.2 | 4153 | 1270 | 4689 | 2384 |
| 99994 | 38714 | 16.5 | 10.3 | 5080 | 1940 | 5818 | 2952 |
| 122474 | 46816 | 16.8 | 10.4 | 6027 | 2324 | 6994 | 3541 |
| 146765 | 55410 | 17.1 | 10.5 | 7004 | 2723 | 8229 | 4157 |
| 183118 | 67905 | 17.5 | 10.7 | 8388 | 3293 | 10009 | 5038 |
| 227023 | 82665 | 18.0 | 10.9 | 9964 | 3951 | 12078 | 6058 |
| 275140 | 98211 | 18.5 | 11.0 | 11592 | 4632 | 14247 | 7114 |

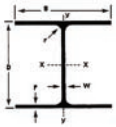
| Designation | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|
| | | Depth | Width | Thickness | | Radius | Area |
| Section mm | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | of Fillet (r) mm | of section cm2 |
| 100 x 50 x 10 | 10.2 | 100 | 50 | 5.0 | 8.5 | 9 | 13.0 |
| 125 x 65 x 15 | 14.8 | 125 | 65 | 5.5 | 9.5 | 12 | 18.8 |
| 150 x 75 x 18 | 17.9 | 150 | 75 | 5.5 | 10.0 | 12 | 22.8 |
| 150 x 90 x 24 | 23.9 | 150 | 90 | 6.5 | 12.0 | 12 | 30.4 |
| 180 x 75 x 20 | 20.3 | 180 | 75 | 6.0 | 10.5 | 12 | 25.9 |
| 180 x 90 x 26 | 26.1 | 180 | 90 | 65.0 | 12.5 | 12 | 33.2 |
| 200 x 75 x 23 | 23.4 | 200 | 75 | 6.0 | 12.5 | 12 | 29.9 |
| 200 x 90 x 30 | 29.7 | 200 | 90 | 7.0 | 14.0 | 12 | 37.9 |
| 230 x 75 x 26 | 25.7 | 230 | 75 | 6.5 | 12.5 | 12 | 32.7 |
| 230 x 90 x 32 | 32.2 | 230 | 90 | 7.5 | 14.0 | 12 | 41.0 |
| 260 x 75 x 28 | 27.6 | 260 | 75 | 7.0 | 12.0 | 12 | 35.1 |
| 260 x 90 x 35 | 34.8 | 260 | 90 | 8.0 | 14.0 | 12 | 44.4 |
| 300 x 90 x 41 | 41.4 | 300 | 90 | 9.0 | 15.5 | 12 | 52.7 |
| 300 x 100 x 46 | 45.5 | 300 | 100 | 9.0 | 16.5 | 15 | 58.0 |
| 380 x 100 x 54 | 54.0 | 380 | 100 | 9.5 | 17.5 | 15 | 68.7 |
| 430 x 100 x 64 | 64.4 | 430 | 100 | 11.0 | 19.0 | 15 | 82.1 |

| Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 208 | 32.3 | 4.00 | 1.58 | 41.5 | 9.89 | 48.9 | 17.5 |
| 483 | 80.0 | 5.07 | 2.06 | 77.3 | 18.8 | 89.9 | 33.2 |
| 861 | 131 | 6.15 | 2.40 | 115 | 26.6 | 132 | 47.2 |
| 1162 | 253 | 6.18 | 2.89 | 155 | 44.4 | 179 | 76.9 |
| 1370 | 146 | 7.27 | 2.38 | 152 | 28.8 | 176 | 51.8 |
| 1817 | 277 | 7.40 | 2.89 | 202 | 47.4 | 232 | 83.5 |
| 1963 | 170 | 8.11 | 2.39 | 196 | 33.8 | 227 | 60.6 |
| 2523 | 314 | 8.16 | 2.88 | 252 | 53.4 | 291 | 94.5 |
| 2748 | 181 | 9.17 | 2.35 | 239 | 34.8 | 278 | 63.2 |
| 3518 | 334 | 9.27 | 2.86 | 306 | 55.0 | 355 | 98.9 |
| 3619 | 185 | 10.10 | 2.30 | 278 | 34.4 | 328 | 62.0 |
| 4728 | 353 | 10.30 | 2.82 | 364 | 56.3 | 425 | 102 |
| 7218 | 404 | 11.70 | 2.77 | 481 | 63.1 | 568 | 114 |
| 8229 | 568 | 11.90 | 3.13 | 549 | 81.7 | 641 | 148 |
| 15030 | 643 | 14.80 | 3.06 | 791 | 89.2 | 933 | 161 |
| 21940 | 722 | 16.30 | 2.97 | 1020 | 97.9 | 1222 | 176 |

# european broad flange

## beams in accordance with Euronorm 53-62

| Designation | | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Depth | Width | Thickness | | Radius | Area |
| Section mm | | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | of Fillet (r) mm | of section cm2 |
| HE A | 100 | 17.1 | 96 | 100 | 5 | 8 | 12 | 21.2 |
| HE B | 100 | 20.9 | 100 | 100 | 6 | 10 | 12 | 26.0 |
| HE M | 100 | 42.8 | 120 | 106 | 12 | 20 | 12 | 53.2 |
| HE A | 120 | 20.4 | 114 | 120 | 5 | 8 | 12 | 25.3 |
| HE B | 120 | 27.5 | 120 | 120 | 6.5 | 11 | 12 | 34.0 |
| HE M | 120 | 53.4 | 140 | 126 | 12.5 | 21 | 12 | 66.4 |
| HE A | 140 | 25.3 | 133 | 140 | 5.5 | 8.5 | 12 | 31.4 |
| HE B | 140 | 34.5 | 140 | 140 | 7 | 12 | 12 | 43.0 |
| HE M | 140 | 64.8 | 160 | 146 | 13 | 22 | 12 | 80.6 |
| HE A | 160 | 31.2 | 152 | 160 | 6 | 9 | 15 | 38.8 |
| HE B | 160 | 43.7 | 160 | 160 | 8 | 13 | 15 | 54.3 |
| HE M | 160 | 78.1 | 180 | 166 | 14 | 23 | 15 | 97.1 |
| HE A | 180 | 36.4 | 171 | 180 | 6 | 9.5 | 15 | 45.3 |
| HE B | 180 | 52.5 | 180 | 180 | 8.5 | 14 | 15 | 65.3 |
| HE M | 180 | 91.1 | 200 | 186 | 14.5 | 24 | 15 | 113.0 |
| HE A | 200 | 43.0 | 190 | 200 | 6.5 | 10 | 18 | 53.8 |
| HE B | 200 | 63.0 | 200 | 200 | 9 | 15 | 18 | 78.1 |
| HE M | 200 | 106.0 | 220 | 206 | 15 | 25 | 18 | 131.0 |
| HE A | 220 | 52.0 | 210 | 220 | 7 | 11 | 18 | 64.3 |
| HE B | 220 | 73.0 | 220 | 220 | 9.5 | 16 | 18 | 91.0 |
| HE M | 220 | 120.0 | 240 | 226 | 15.5 | 26 | 18 | 149.0 |
| HE A | 240 | 62.0 | 230 | 240 | 7.5 | 12 | 21 | 76.8 |
| HE B | 240 | 85.0 | 240 | 240 | 10 | 17 | 21 | 106 |
| HE M | 240 | 161.0 | 270 | 248 | 18 | 32 | 21 | 200 |
| HE A | 260 | 70.0 | 250 | 260 | 7.5 | 12.5 | 24 | 86.8 |
| HE B | 260 | 95.0 | 260 | 260 | 10 | 17.5 | 24 | 118 |
| HE M | 260 | 176.0 | 290 | 268 | 18 | 32.5 | 24 | 220 |
| HE A | 280 | 78.0 | 270 | 280 | 8 | 13 | 24 | 97.3 |
| HE B | 280 | 106.0 | 280 | 280 | 10.5 | 18 | 24 | 131 |
| HE M | 280 | 194.0 | 310 | 288 | 18.5 | 33 | 24 | 240 |
| HE A | 300 | 90.0 | 290 | 300 | 8.5 | 14 | 27 | 113 |
| HE B | 300 | 120.0 | 300 | 300 | 11 | 19 | 27 | 149 |
| HE M | 300 | 244.0 | 340 | 310 | 21 | 39 | 27 | 303 |
| HE A | 320 | 100.0 | 310 | 300 | 9 | 15.5 | 27 | 124 |
| HE B | 320 | 130.0 | 320 | 300 | 11.5 | 20.5 | 27 | 161 |
| HE M | 320 | 251.0 | 359 | 309 | 21 | 40 | 27 | 312 |

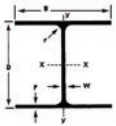


| Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 349 | 134 | 4.06 | 2.51 | 72.8 | 26.8 | 83 | 41.1 |
| 450 | 167 | 4.16 | 2.53 | 89.9 | 33.5 | 104 | 51.4 |
| 1143 | 399 | 4.63 | 2.74 | 190 | 75.3 | 236 | 116 |
| 606 | 231 | 4.89 | 3.02 | 106 | 38.5 | 119 | 58.9 |
| 864 | 318 | 5.04 | 3.06 | 144 | 52.9 | 165 | 81.0 |
| 2018 | 703 | 5.51 | 3.25 | 288 | 112 | 351 | 172 |
| 1033 | 389 | 5.73 | 3.52 | 155 | 55.6 | 173 | 84.8 |
| 1509 | 550 | 5.93 | 3.58 | 216 | 78.5 | 245 | 120 |
| 3291 | 1144 | 6.39 | 3.77 | 411 | 157 | 494 | 241 |
| 1673 | 616 | 6.57 | 3.98 | 220 | 76.9 | 245 | 118 |
| 2492 | 889 | 6.78 | 4.05 | 311 | 111 | 354 | 170 |
| 5098 | 1759 | 7.25 | 4.26 | 566 | 212 | 675 | 325 |
| 2510 | 925 | 7.45 | 4.52 | 294 | 103 | 325 | 156 |
| 3831 | 1363 | 7.66 | 4.57 | 426 | 151 | 481 | 231 |
| 7483 | 2580 | 8.13 | 4.77 | 748 | 277 | 883 | 425 |
| 3692 | 1336 | 8.28 | 4.98 | 389 | 134 | 429 | 204 |
| 5696 | 2003 | 8.54 | 5.07 | 570 | 200 | 643 | 306 |
| 10640 | 3651 | 9.00 | 5.27 | 967 | 354 | 1135 | 543 |
| 5410 | 1955 | 9.17 | 5.51 | 515 | 178 | 568 | 271 |
| 8091 | 2843 | 9.43 | 5.59 | 736 | 258 | 827 | 394 |
| 14600 | 5012 | 9.89 | 5.79 | 1220 | 444 | 1419 | 679 |
| 7763 | 2769 | 10.10 | 6.00 | 675 | 231 | 745 | 352 |
| 11260 | 3923 | 10.30 | 6.08 | 938 | 327 | 1053 | 498 |
| 24290 | 8153 | 11.00 | 6.39 | 1800 | 657 | 2117 | 1006 |
| 10450 | 3668 | 11.00 | 6.50 | 836 | 282 | 920 | 430 |
| 14920 | 5135 | 11.20 | 6.58 | 1150 | 395 | 1283 | 602 |
| 31310 | 10450 | 11.90 | 6.90 | 2160 | 780 | 2524 | 1192 |
| 13670 | 4763 | 11.90 | 7.00 | 1010 | 340 | 1112 | 518 |
| 19270 | 6595 | 12.10 | 7.09 | 1380 | 471 | 1534 | 718 |
| 39550 | 13160 | 12.80 | 7.40 | 2550 | 914 | 2966 | 1397 |
| 18260 | 6310 | 12.70 | 7.49 | 1260 | 421 | 1383 | 641 |
| 25170 | 8563 | 13.00 | 7.58 | 1680 | 571 | 1869 | 870 |
| 59200 | 19400 | 14.00 | 8.00 | 3480 | 1252 | 4078 | 1913 |
| 22930 | 6985 | 13.60 | 7.49 | 1480 | 466 | 1628 | 710 |
| 30820 | 9239 | 13.80 | 7.57 | 1930 | 616 | 2149 | 939 |
| 68130 | 19710 | 14.80 | 7.95 | 3800 | 1276 | 4435 | 1951 |

# european broad flange

## beams in accordance with Euronorm 53-62

| Designation | | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Depth | Width | Thickness | | Radius | Area |
| Section mm | | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | of Fillet (r) mm | of section cm2 |
| HE A | 340 | 108.0 | 330 | 300 | 9.5 | 16.5 | 27 | 133 |
| HE B | 340 | 137.0 | 340 | 300 | 12 | 21.5 | 27 | 171 |
| HE M | 340 | 254.0 | 377 | 309 | 21 | 40 | 27 | 316 |
| HE A | 360 | 115.0 | 350 | 300 | 10 | 17.5 | 27 | 143 |
| HE B | 360 | 146.0 | 360 | 300 | 12.5 | 22.5 | 27 | 181 |
| HE M | 360 | 256.0 | 395 | 308 | 21 | 40 | 27 | 319 |
| HE A | 400 | 128.0 | 390 | 300 | 11 | 19 | 27 | 159 |
| HE B | 400 | 159.0 | 400 | 300 | 13.5 | 24 | 27 | 198 |
| HE M | 400 | 262.0 | 432 | 307 | 21 | 40 | 27 | 326 |
| HE A | 450 | 143.0 | 440 | 300 | 11.5 | 21 | 27 | 178 |
| HE B | 450 | 175.0 | 450 | 300 | 14 | 26 | 27 | 218 |
| HE M | 450 | 270.0 | 478 | 307 | 21 | 40 | 27 | 335 |
| HE A | 500 | 159.0 | 490 | 300 | 12 | 23 | 27 | 198 |
| HE B | 500 | 192.0 | 500 | 300 | 14.5 | 28 | 27 | 239 |
| HE M | 500 | 277.0 | 524 | 306 | 21 | 40 | 27 | 344 |
| HE A | 550 | 170.0 | 540 | 300 | 12.5 | 24 | 27 | 212 |
| HE B | 550 | 204.0 | 550 | 300 | 15 | 29 | 27 | 254 |
| HE M | 550 | 285.0 | 572 | 306 | 21 | 40 | 27 | 354 |
| HE A | 600 | 182.0 | 590 | 300 | 13 | 25 | 27 | 226 |
| HE B | 600 | 217.0 | 600 | 300 | 15.5 | 30 | 27 | 270 |
| HE M | 600 | 292.0 | 620 | 305 | 21 | 40 | 27 | 364 |
| HE A | 650 | 195.0 | 640 | 300 | 13.5 | 26 | 27 | 242 |
| HE B | 650 | 231.0 | 650 | 300 | 16 | 31 | 27 | 286 |
| HE M | 650 | 300.0 | 668 | 305 | 21 | 40 | 27 | 374 |
| HE A | 700 | 209.0 | 690 | 300 | 14.5 | 27 | 27 | 260 |
| HE B | 700 | 247.0 | 700 | 300 | 17 | 32 | 27 | 306 |
| HE M | 700 | 309.0 | 716 | 304 | 21 | 40 | 27 | 383 |
| HE A | 800 | 230.0 | 790 | 300 | 15 | 28 | 30 | 286 |
| HE B | 800 | 269.0 | 800 | 300 | 17.5 | 33 | 30 | 334 |
| HE M | 800 | 325.0 | 814 | 303 | 21 | 40 | 30 | 404 |
| HE A | 900 | 258.0 | 890 | 300 | 16 | 30 | 30 | 321 |
| HE B | 900 | 298.0 | 900 | 300 | 18.5 | 35 | 30 | 371 |
| HE M | 900 | 341.0 | 910 | 302 | 21 | 40 | 30 | 424 |
| HE A | 1000 | 279.0 | 990 | 300 | 16.5 | 31 | 30 | 347 |
| HE B | 1000 | 322.0 | 1000 | 300 | 19 | 36 | 30 | 400 |
| HE M | 1000 | 358.0 | 1008 | 302 | 21 | 40 | 30 | 444 |



| Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 27690 | 7436 | 14.40 | 7.46 | 1678 | 496 | 1850 | 756 |
| 36660 | 9690 | 14.60 | 7.53 | 2156 | 646 | 2408 | 986 |
| 76370 | 19710 | 15.60 | 7.90 | 4052 | 1276 | 4718 | 1953 |
| 33090 | 7887 | 15.20 | 7.43 | 1891 | 526 | 2088 | 802 |
| 43190 | 10140 | 15.50 | 7.49 | 2400 | 676 | 2683 | 1032 |
| 84870 | 19520 | 16.30 | 7.83 | 4297 | 1268 | 4989 | 1942 |
| 45070 | 8564 | 16.80 | 7.34 | 2311 | 571 | 2562 | 873 |
| 57680 | 10820 | 17.10 | 7.40 | 2884 | 721 | 3232 | 1104 |
| 104100 | 19340 | 17.90 | 7.70 | 4820 | 1260 | 5571 | 1934 |
| 63720 | 9465 | 18.90 | 7.29 | 2896 | 631 | 3216 | 966 |
| 79890 | 11720 | 19.10 | 7.33 | 3551 | 781 | 3982 | 1198 |
| 131500 | 19340 | 19.80 | 7.59 | 5501 | 1260 | 6331 | 1939 |
| 86970 | 10370 | 21.00 | 7.24 | 3550 | 691 | 3949 | 1059 |
| 107200 | 12620 | 21.20 | 7.27 | 4287 | 842 | 4815 | 1292 |
| 161900 | 19150 | 21.70 | 7.46 | 6180 | 1252 | 7094 | 1932 |
| 111900 | 10820 | 23.00 | 7.15 | 4146 | 721 | 4622 | 1107 |
| 136700 | 13080 | 23.20 | 7.17 | 4971 | 872 | 5591 | 1341 |
| 198000 | 19160 | 23.60 | 7.35 | 6923 | 1252 | 7933 | 1937 |
| 141200 | 11270 | 25.00 | 7.05 | 4787 | 751 | 5350 | 1156 |
| 171000 | 13530 | 25.20 | 7.08 | 5701 | 902 | 6425 | 1391 |
| 237400 | 18980 | 25.60 | 7.22 | 7660 | 1244 | 8772 | 1930 |
| 175200 | 11720 | 26.90 | 6.97 | 5474 | 782 | 6136 | 1205 |
| 210600 | 13980 | 27.10 | 6.99 | 6480 | 932 | 7320 | 1441 |
| 281700 | 18980 | 27.50 | 7.13 | 8433 | 1245 | 9657 | 1936 |
| 215300 | 12180 | 28.80 | 6.84 | 6241 | 812 | 7032 | 1257 |
| 256900 | 14440 | 29.00 | 6.87 | 7340 | 963 | 8327 | 1495 |
| 329300 | 18800 | 29.30 | 7.01 | 9198 | 1237 | 10540 | 1929 |
| 303400 | 12640 | 32.60 | 6.65 | 7682 | 843 | 8699 | 1312 |
| 359100 | 14900 | 32.80 | 6.68 | 8977 | 994 | 10230 | 1553 |
| 442600 | 18630 | 33.10 | 6.79 | 10870 | 1230 | 12490 | 1930 |
| 422100 | 13550 | 36.30 | 6.50 | 9485 | 903 | 10810 | 1414 |
| 494100 | 15820 | 36.50 | 6.53 | 10980 | 1054 | 12580 | 1658 |
| 570400 | 18450 | 36.70 | 6.60 | 12540 | 1222 | 14440 | 1929 |
| 553800 | 14000 | 40.00 | 6.35 | 11190 | 934 | 12820 | 1470 |
| 644700 | 16280 | 40.10 | 6.38 | 12890 | 1085 | 14860 | 1716 |
| 722300 | 18460 | 40.30 | 6.45 | 14330 | 1222 | 16570 | 1940 |

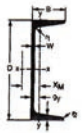
| Designation | | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Depth | Width | Thickness | | Radius | Area |
| Section mm | | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | of Fillet (r) mm | of section cm2 |
| IPE | 80 | 6.2 | 80 | 46 | 3.8 | 5.2 | 5 | 76.4 |
| IPE | 100 | 8.3 | 100 | 55 | 4.1 | 5.7 | 7 | 10.3 |
| IPE | 120 | 10.7 | 120 | 64 | 4.4 | 6.3 | 7 | 13.2 |
| IPE | 140 | 13.2 | 140 | 73 | 4.7 | 6.9 | 7 | 16.4 |
| IPE | 160 | 16.2 | 160 | 82 | 5.0 | 7.4 | 9 | 20.1 |
| IPE | 180 | 19.3 | 180 | 91 | 53 | 8.0 | 9 | 23.9 |
| IPE | 200 | 23.0 | 200 | 100 | 5.6 | 8.5 | 12 | 28.5 |
| IPE | 220 | 26.9 | 220 | 110 | 5.9 | 9.2 | 12 | 33.4 |
| IPE | 240 | 31.5 | 240 | 120 | 6.2 | 9.8 | 15 | 39.1 |
| IPE | 270 | 37.0 | 270 | 135 | 6.6 | 10.2 | 15 | 45.9 |
| IPE | 300 | 43.3 | 300 | 150 | 7.1 | 10.7 | 15 | 53.8 |
| IPE | 330 | 50.4 | 330 | 160 | 7.5 | 11.5 | 18 | 62.6 |
| IPE | 360 | 58.6 | 360 | 170 | 8.0 | 12.7 | 18 | 72.7 |
| IPE | 400 | 68.0 | 400 | 180 | 8.6 | 13.5 | 21 | 84.5 |
| IPE | 450 | 80.0 | 450 | 190 | 9.4 | 14.6 | 21 | 98.8 |
| IPE | 500 | 93.0 | 500 | 200 | 10.2 | 16.0 | 21 | 116 |
| IPE | 550 | 109 | 550 | 210 | 11.1 | 17.2 | 24 | 134 |
| IPE | 600 | 125 | 600 | 220 | 12.0 | 19.0 | 24 | 156 |

| Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 80.1 | 8.49 | 3.24 | 1.05 | 20.0 | 36.9 | 23.2 | 5.82 |
| 171 | 15.9 | 4.07 | 1.24 | 34.2 | 5.79 | 39.4 | 9.15 |
| 318 | 27.7 | 4.9 | 1.45 | 53.0 | 86.5 | 60.7 | 13.6 |
| 541 | 44.9 | 574 | 1.65 | 77.3 | 12.3 | 88.3 | 19.2 |
| 869 | 68.3 | 6.58 | 1.84 | 109 | 16.7 | 124 | 26.1 |
| 1317 | 101 | 7.42 | 2.05 | 146 | 22.2 | 166 | 34.6 |
| 1943 | 142 | 8.26 | 2.24 | 194 | 28.5 | 221 | 44.6 |
| 2772 | 205 | 9.11 | 2.48 | 252 | 37.3 | 285 | 58.1 |
| 3892 | 284 | 9.97 | 2.69 | 324 | 47.3 | 367 | 73.9 |
| 5790 | 420 | 11.2 | 3.02 | 429 | 62.2 | 484 | 97.0 |
| 8356 | 604 | 12.5 | 3.35 | 557 | 80.5 | 628 | 125 |
| 11770 | 788 | 13.7 | 3.55 | 713 | 98.5 | 804 | 154 |
| 16270 | 1043 | 15.0 | 3.79 | 904 | 123 | 1019 | 191 |
| 23130 | 1318 | 16.5 | 3.95 | 1156 | 146 | 1307 | 229 |
| 33740 | 1676 | 18.5 | 4.12 | 1500 | 176 | 1702 | 276 |
| 48200 | 2142 | 20.4 | 4.31 | 1928 | 214 | 2194 | 336 |
| 67120 | 2668 | 22.3 | 4.45 | 2441 | 254 | 2787 | 401 |
| 92080 | 3387 | 24.3 | 4.66 | 3069 | 308 | 3512 | 486 |

| Designation | | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Depth | Width | Thickness | | Radius | |
| Section mm | | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | Fillet (r1) mm | Toe (r2) mm |
| IPN | 80 | 6.1 | 80 | 42 | 3.9 | 5.9 | 3.9 | 2.3 |
| IPN | 100 | 8.5 | 100 | 50 | 4.5 | 6.8 | 4.5 | 2.7 |
| IPN | 120 | 11.5 | 120 | 58 | 5.1 | 7.7 | 5.1 | 3.1 |
| IPN | 140 | 14.7 | 140 | 66 | 5.7 | 8.6 | 5.7 | 3.4 |
| IPN | 160 | 18.5 | 160 | 74 | 6.3 | 9.5 | 6.3 | 3.8 |
| IPN | 180 | 22.5 | 180 | 82 | 6.9 | 10.4 | 6.9 | 4.1 |
| IPN | 200 | 27 | 200 | 90 | 7.5 | 11.3 | 7.5 | 4.5 |
| IPN | 220 | 32 | 220 | 98 | 8.1 | 12.2 | 8.1 | 4.9 |
| IPN | 240 | 37 | 240 | 106 | 8.7 | 13.1 | 8.7 | 5.2 |
| IPN | 260 | 43 | 260 | 113 | 9.4 | 14.1 | 9.4 | 5.6 |
| IPN | 280 | 49 | 280 | 119 | 10.1 | 15.2 | 10.1 | 6.1 |
| IPN | 300 | 56 | 300 | 125 | 10.8 | 16.2 | 10.8 | 6.5 |
| IPN | 320 | 63 | 320 | 131 | 11.5 | 17.3 | 11.5 | 6.9 |
| IPN | 340 | 70 | 340 | 137 | 12.2 | 18.3 | 12.2 | 7.3 |
| IPN | 360 | 78 | 360 | 143 | 13.0 | 19.5 | 13.0 | 7.8 |
| IPN | 380 | 86 | 380 | 149 | 13.7 | 20.5 | 13.7 | 8.2 |
| IPN | 400 | 95 | 400 | 155 | 14.4 | 21.6 | 14.4 | 8.6 |
| IPN | 450 | 118 | 450 | 170 | 16.2 | 24.3 | 16.2 | 9.7 |
| IPN | 500 | 145 | 500 | 185 | 18.0 | 27.0 | 18.0 | 10.8 |
| IPN | 550 | 171 | 550 | 200 | 19.0 | 30.0 | 19.0 | 11.9 |


| | Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|---|
| Area of section cm2 | Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 7.57 | 77.8 | 6.29 | 3.2 | 0.91 | 19.5 | 3.00 | 22.8 | 4.99 |
| 10.6 | 171 | 12.2 | 4.01 | 1.07 | 34.2 | 4.88 | 39.8 | 8.09 |
| 14.2 | 328 | 21.5 | 4.81 | 1.23 | 54.7 | 7.41 | 63.6 | 12.3 |
| 18.2 | 573 | 35.2 | 5.61 | 1.40 | 81.9 | 10.7 | 95.4 | 17.9 |
| 22.8 | 935 | 54.7 | 6.4 | 1.55 | 117 | 14.8 | 136 | 24.9 |
| 27.9 | 1450 | 81.3 | 7.20 | 1.71 | 161 | 19.8 | 187 | 33.2 |
| 33.4 | 2140 | 117 | 8.00 | 1.87 | 214 | 26.0 | 250 | 43.5 |
| 39.5 | 3060 | 162 | 8.80 | 2.02 | 278 | 33.1 | 324 | 55.7 |
| 46.1 | 4250 | 221 | 9.59 | 2.20 | 354 | 41.7 | 412 | 70.0 |
| 53.3 | 5740 | 288 | 10.4 | 2.32 | 442 | 51.0 | 514 | 85.9 |
| 61.0 | 7590 | 364 | 11.1 | 2.45 | 542 | 61.2 | 632 | 103 |
| 69.0 | 9800 | 451 | 11.9 | 2.56 | 653 | 72.2 | 762 | 121 |
| 77.7 | 12510 | 555 | 12.7 | 2.67 | 782 | 84.7 | 914 | 143 |
| 86.7 | 15700 | 674 | 13.5 | 2.80 | 923 | 98.4 | 1080 | 166 |
| 97.0 | 19610 | 818 | 14.2 | 2.90 | 1090 | 114 | 1276 | 194 |
| 107 | 24010 | 975 | 15.0 | 3.02 | 1260 | 131 | 1482 | 221 |
| 118 | 29210 | 1160 | 15.7 | 3.13 | 1460 | 149 | 1714 | 253 |
| 147 | 45850 | 1730 | 17.7 | 3.43 | 2040 | 203 | 2400 | 345 |
| 179 | 68740 | 2480 | 19.6 | 3.72 | 2750 | 268 | 3240 | 456 |
| 212 | 99180 | 3490 | 21.6 | 4.02 | 3610 | 349 | 4240 | 592 |

| Designation | | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Depth | Width | Thickness | | Radius | |
| Section mm | | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | Fillet (r1) mm | Toe (r2) mm |
| UPN | 80 | 8.9 | 80 | 45 | 6 | 8 | 8 | 4 |
| UPN | 100 | 10.9 | 100 | 50 | 6 | 8.5 | 8.5 | 4.5 |
| UPN | 120 | 13.7 | 120 | 55 | 7 | 9 | 9 | 4.5 |
| UPN | 140 | 16.4 | 140 | 60 | 7 | 10 | 10 | 5 |
| UPN | 160 | 19.3 | 160 | 65 | 7.5 | 10.5 | 10.5 | 5.5 |
| UPN | 180 | 22.5 | 180 | 70 | 8 | 11 | 11 | 5.5 |
| UPN | 200 | 26.0 | 200 | 75 | 8.5 | 11.5 | 11.5 | 6 |
| UPN | 220 | 30.0 | 220 | 80 | 9 | 12.5 | 12.5 | 6.5 |
| UPN | 240 | 34.0 | 240 | 85 | 9.5 | 13 | 13 | 6.5 |
| UPN | 260 | 39.0 | 260 | 90 | 10 | 14 | 14 | 7 |
| UPN | 280 | 43.0 | 280 | 95 | 10 | 15 | 15 | 7.5 |
| UPN | 300 | 48.0 | 300 | 100 | 10 | 16 | 16 | 8 |
| UPN | 320 | 61.0 | 320 | 100 | 14 | 17.5 | 17.5 | 8.75 |
| UPN | 350 | 62.0 | 350 | 100 | 14 | 16 | 16 | 8 |
| UPN | 380 | 65.0 | 380 | 102 | 13.5 | 16 | 16 | 8 |
| UPN | 400 | 74.0 | 400 | 110 | 14 | 18 | 18 | 9 |



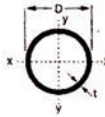
| | Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|---|
| Area of section cm2 | Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 11.0 | 106 | 19.4 | 3.10 | 1.33 | 26.5 | 6.36 | 2.67 | 1.45 |
| 13.5 | 206 | 29.3 | 3.91 | 1.47 | 41.2 | 8.49 | 2.93 | 1.55 |
| 17.0 | 364 | 43.2 | 4.62 | 1.59 | 60.7 | 11.1 | 3.03 | 1.60 |
| 20.4 | 605 | 62.7 | 5.45 | 1.75 | 86.4 | 14.8 | 3.37 | 1.75 |
| 24.0 | 925 | 85.3 | 6.21 | 1.89 | 116 | 18.3 | 3.56 | 1.84 |
| 28.0 | 1350 | 11.4 | 6.95 | 2.02 | 150 | 22.4 | 3.75 | 1.92 |
| 32.2 | 1910 | 14.8 | 7.70 | 2.14 | 191 | 27.0 | 3.94 | 2.01 |
| 37.4 | 2690 | 19.7 | 8.48 | 2.30 | 245 | 33.6 | 4.20 | 2.14 |
| 42.3 | 3600 | 24.8 | 9.22 | 2.42 | 300 | 39.6 | 4.39 | 2.23 |
| 48.3 | 4820 | 31.7 | 9.99 | 2.56 | 371 | 47.7 | 4.66 | 2.36 |
| 53.3 | 6280 | 39.9 | 10.9 | 2.74 | 448 | 57.2 | 5.02 | 2.53 |
| 58.8 | 8030 | 49.5 | 11.7 | 2.90 | 535 | 67.8 | 5.41 | 2.70 |
| 75.8 | 10870 | 59.7 | 12.1 | 2.81 | 679 | 80.6 | 4.82 | 2.60 |
| 77.3 | 12840 | 57.0 | 12.9 | 2.72 | 734 | 75.0 | 4.45 | 2.40 |
| 80.4 | 15760 | 61.5 | 14.0 | 2.77 | 829 | 78.7 | 4.58 | 2.38 |
| 91.5 | 20350 | 84.6 | 14.9 | 3.04 | 1020 | 102 | 5.11 | 2.65 |

## Channels (UAP/UPE)

| Designation | | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Depth | Width | Thickness | | Radius | |
| Section mm | | Mass p/Metre Kg | D mm | B mm | Web(w) mm | Flange (f) mm | Fillet (r1) mm | Toe (r2) mm |
| UPE | 80 | 7.9 | 80 | 50 | 4 | 7 | 10 | n/a |
| UPE | 100 | 9.82 | 100 | 55 | 4.5 | 7.5 | 10 | n/a |
| UPE | 120 | 12.1 | 120 | 60 | 5 | 8 | 12 | n/a |
| UPE | 140 | 14.5 | 140 | 65 | 5 | 9 | 12 | n/a |
| UPE | 160 | 17 | 160 | 70 | 5.5 | 9.5 | 12 | n/a |
| UPE | 180 | 19.7 | 180 | 75 | 5.5 | 10.5 | 12 | n/a |
| UPE | 200 | 22.8 | 200 | 80 | 6 | 11 | 13 | n/a |
| UPE | 220 | 26.6 | 220 | 85 | 6.5 | 12 | 13 | n/a |
| UPE | 240 | 30.2 | 240 | 90 | 7 | 12.5 | 15 | n/a |
| UPE | 270 | 35.2 | 270 | 95 | 7.5 | 13.5 | 15 | n/a |
| UPE | 300 | 44.4 | 300 | 100 | 9.5 | 15 | 15 | n/a |
| UPE | 330 | 53.2 | 330 | 105 | 11 | 16 | 18 | n/a |
| UPE | 360 | 61.2 | 360 | 110 | 12 | 17 | 18 | n/a |
| UPE | 400 | 72.2 | 400 | 115 | 13.5 | 18 | 18 | n/a |
| UAP | 80 | 8.38 | 80 | 45 | 5 | 8 | 8 | n/a |
| UAP | 100 | 10.5 | 100 | 50 | 5.5 | 8.5 | 8.5 | n/a |
| UAP | 130 | 13.7 | 130 | 55 | 6 | 9.5 | 9.5 | n/a |
| UAP | 150 | 17.9 | 150 | 65 | 7 | 10.25 | 10.25 | n/a |
| UAP | 175 | 21.2 | 175 | 70 | 7.5 | 10.75 | 10.75 | n/a |
| UAP | 200 | 25.1 | 200 | 75 | 8 | 11.5 | 11.5 | n/a |
| UAP | 220 | 28.5 | 220 | 80 | 8 | 12.5 | 12.5 | n/a |
| UAP | 250 | 34.4 | 250 | 85 | 9 | 13.5 | 13.5 | n/a |
| UAP | 300 | 46 | 300 | 100 | 9.5 | 16 | 16 | n/a |

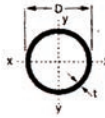
| | Moment of inertia | | Radius of gyration | | Elastic modulus | | Plastic modulus | |
|---|---|---|---|---|---|---|---|---|
| Area of section cm2 | Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm | Axis y-y cm | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 |
| 10.1 | 107 | 25.4 | 3.26 | 1.59 | 26.8 | 7.98 | 31.2 | 14.1 |
| 12.5 | 207 | 38.2 | 4.07 | 1.75 | 41.4 | 10.6 | 48 | 18.9 |
| 15.4 | 364 | 55.4 | 4.86 | 1.9 | 60.6 | 13.8 | 70.3 | 24.8 |
| 18.4 | 599 | 78.7 | 5.71 | 2.07 | 85.6 | 18.2 | 98.8 | 32.6 |
| 21.7 | 911 | 107 | 6.48 | 2.22 | 114 | 22.2 | 132 | 40.7 |
| 25.1 | 1353 | 144 | 7.34 | 2.39 | 150 | 28.6 | 173 | 51.3 |
| 29 | 1909 | 187 | 8.11 | 2.54 | 191 | 34.4 | 220 | 62.2 |
| 33.9 | 2682 | 246 | 8.9 | 2.7 | 244 | 42.5 | 281 | 76.9 |
| 38.5 | 3599 | 311 | 9.67 | 2.84 | 300 | 50.1 | 347 | 90.8 |
| 44.8 | 5255 | 401 | 10.8 | 2.99 | 389 | 60.7 | 451 | 110 |
| 56.6 | 7823 | 238 | 11.8 | 3.08 | 522 | 75.6 | 613 | 137 |
| 67.8 | 11008 | 681 | 12.7 | 3.17 | 667 | 89.7 | 792 | 162 |
| 77.9 | 14825 | 844 | 13.8 | 3.29 | 824 | 105 | 982 | 189 |
| 91.9 | 20981 | 1045 | 15.1 | 3.37 | 1049 | 123 | 1263 | 221 |
| 10.7 | 107 | 21.3 | 3.16 | 1.41 | 26.8 | 7.38 | | |
| 13.4 | 209 | 32.8 | 3.97 | 1.57 | 41.9 | 9.95 | | |
| 17.5 | 459 | 51.3 | 5.13 | 1.71 | 70.7 | 13.8 | | |
| 22.9 | 797 | 93.3 | 5.9 | 2.02 | 106 | 21 | | |
| 27 | 1272 | 126.4 | 6.86 | 2.16 | 145 | 25.9 | | |
| 32 | 1946 | 169.7 | 7.8 | 2.3 | 195 | 32.1 | | |
| 36.3 | 2710 | 222.3 | 8.64 | 2.48 | 247 | 39.8 | | |
| 43.8 | 4136 | 296.7 | 9.72 | 2.61 | 331 | 49.1 | | |
| 58.6 | 8170 | 562.1 | 11.81 | 3.1 | 545 | 79.8 | | |

| Designation | | | | |
|---|---|---|---|---|
| Outside diameter D mm | thickness T mm | Mass per metre kg | Area of section cm2 | Moment of inertia cm4 |
| 21.3 | 3.2 | 1.43 | 1.82 | 0.77 |
| 26.9 | 3.2 | 1.87 | 2.38 | 1.70 |
| 33.7 | 2.6 | 1.99 | 2.54 | 3.09 |
| | 3.2 | 2.41 | 3.07 | 3.60 |
| | 4.0 | 2.93 | 3.73 | 4.19 |
| 42.4 | 2.6 | 2.55 | 3.25 | 6.46 |
| | 3.2 | 3.09 | 3.94 | 7.62 |
| | 4.0 | 3.79 | 4.83 | 8.99 |
| 48.3 | 3.2 | 3.56 | 4.53 | 11.6 |
| | 4.0 | 4.37 | 5.57 | 13.8 |
| | 5.0 | 5.34 | 6.80 | 16.2 |
| 60.3 | 3.2 | 4.51 | 5.74 | 23.5 |
| | 4.0 | 5.55 | 7.07 | 28.2 |
| | 5.0 | 6.82 | 8.69 | 33.5 |
| 76.1 | 3.2 | 5.75 | 7.33 | 48.8 |
| | 4.0 | 7.11 | 9.06 | 59.1 |
| | 5.0 | 8.77 | 11.2 | 70.9 |
| 88.9 | 3.2 | 6.76 | 8.62 | 79.2 |
| | 4.0 | 8.38 | 10.7 | 96.3 |
| | 5.0 | 10.3 | 13.2 | 116 |
| 114.3 | 3.6 | 9.83 | 12.5 | 192 |
| | 5.0 | 13.5 | 17.2 | 257 |
| | 6.3 | 16.8 | 21.4 | 313 |
| 139.7 | 5.0 | 16.6 | 21.2 | 481 |
| | 6.3 | 20.7 | 26.4 | 589 |
| | 8.0 | 26.0 | 33.1 | 720 |
| | 10.0 | 32.0 | 40.7 | 862 |
| 168.3 | 5.0 | 20.1 | 25.7 | 856 |
| | 6.3 | 25.2 | 32.1 | 1053 |
| | 8.0 | 31.6 | 40.3 | 1297 |
| | 10.0 | 39.0 | 49.7 | 1564 |
| 193.7 | 5.4 | 25.1 | 31.9 | 1417 |
| | 6.3 | 29.1 | 37.1 | 1630 |
| | 8.0 | 36.6 | 46.7 | 2016 |
| | 10.0 | 45.3 | 57.7 | 2442 |
| | 12.5 | 55.9 | 71.2 | 2934 |
| | 16.0 | 70.1 | 89.3 | 3554 |
| 219.1 | 6.3 | 33.1 | 42.1 | 2386 |
| | 8.0 | 41.6 | 53.1 | 2960 |



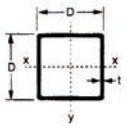

| Radius of gyration cm | Elastic modulus cm3 | Plastic modulus cm3 | Torsional constants | |
|---|---|---|---|---|
| | | | J cm4 | C cm3 |
| 0.65 | 0.72 | 1.06 | 1.54 | 1.44 |
| 0.846 | 1.27 | 1.81 | 3.41 | 2.53 |
| 1.10 | 1.84 | 2.52 | 6.19 | 3.67 |
| 1.08 | 2.14 | 2.99 | 7.21 | 4.28 |
| 1.06 | 2.49 | 3.55 | 8.38 | 4.97 |
| 1.41 | 3.05 | 4.12 | 12.9 | 6.10 |
| 1.39 | 3.59 | 4.93 | 15.2 | 7.19 |
| 1.36 | 4.24 | 5.92 | 18 | 8.48 |
| 1.60 | 4.80 | 6.52 | 23.2 | 9.59 |
| 1.57 | 5.70 | 7.87 | 27.5 | 11.4 |
| 1.54 | 6.69 | 9.42 | 32.3 | 13.4 |
| 2.02 | 7.78 | 10.4 | 46.9 | 15.6 |
| 2.00 | 9.34 | 12.7 | 56.3 | 18.7 |
| 1.96 | 11.1 | 15.3 | 67.0 | 22.2 |
| 2.58 | 12.8 | 17 | 97.6 | 25.6 |
| 2.55 | 15.5 | 20.8 | 118 | 31.0 |
| 2.52 | 18.6 | 25.3 | 142 | 37.3 |
| 3.03 | 17.8 | 23.5 | 158 | 35.6 |
| 3.00 | 21.7 | 28.9 | 193 | 43.3 |
| 2.97 | 26.2 | 35.2 | 233 | 52.4 |
| 3.92 | 33.6 | 44.1 | 384 | 67.2 |
| 3.87 | 45.0 | 59.8 | 514 | 89.9 |
| 3.82 | 54.7 | 73.6 | 625 | 109 |
| 4.77 | 68.8 | 90.8 | 961 | 138 |
| 4.72 | 84.3 | 112 | 1177 | 169 |
| 4.66 | 103 | 139 | 1441 | 206 |
| 4.60 | 123 | 169 | 1724 | 247 |
| 5.78 | 102 | 133 | 1712 | 203 |
| 5.73 | 125 | 165 | 2107 | 250 |
| 5.67 | 154 | 206 | 2595 | 308 |
| 5.61 | 186 | 251 | 3128 | 372 |
| 6.66 | 146 | 192 | 2834 | 293 |
| 6.63 | 168 | 221 | 3260 | 337 |
| 6.57 | 208 | 276 | 4031 | 416 |
| 6.50 | 252 | 338 | 4883 | 504 |
| 6.42 | 303 | 411 | 5869 | 606 |
| 6.31 | 367 | 507 | 7109 | 734 |
| 7.53 | 218 | 285 | 4772 | 436 |
| 7.47 | 270 | 357 | 5919 | 540 |

| Designation | | | | |
|---|---|---|---|---|
| Outside diameter D mm | thickness T mm | Mass per metre kg | Area of section cm2 | Moment of inertia cm4 |
| 219.1 | 10.0 | 51.6 | 65.7 | 3598 |
| | 12.5 | 63.7 | 81.1 | 4345 |
| | 16.0 | 80.1 | 102 | 5297 |
| | 20.0 | 98.2 | 125 | 6261 |
| 244.5 | 6.3 | 37.0 | 47.1 | 3346 |
| | 8.0 | 46.7 | 59.4 | 4160 |
| | 10.0 | 57.8 | 73.7 | 5073 |
| | 12.5 | 71.5 | 91.1 | 6147 |
| | 16.0 | 90.2 | 115 | 7533 |
| | 20.0 | 111 | 151 | 8957 |
| 273 | 63.0 | 41.4 | 52.8 | 4696 |
| | 8.0 | 52.3 | 66.6 | 5852 |
| | 10.0 | 64.9 | 82.6 | 7154 |
| | 12.5 | 80.3 | 102 | 8697 |
| | 16.0 | 101 | 129 | 10710 |
| | 20.0 | 125 | 159 | 12800 |
| | 25.0 | 153 | 195 | 15130 |
| 323.9 | 8.0 | 62.3 | 79.4 | 9910 |
| | 10.0 | 77.4 | 98.6 | 12160 |
| | 12.5 | 96.0 | 122 | 14850 |
| | 16.0 | 121 | 155 | 18390 |
| | 20.0 | 150 | 191 | 22140 |
| | 25.0 | 184 | 235 | 26400 |
| 355.6 | 8.0 | 68.6 | 87.4 | 13200 |
| | 10.0 | 85.2 | 109 | 16220 |
| | 12.5 | 106 | 135 | 19850 |
| | 16.0 | 134 | 171 | 24660 |
| | 20.0 | 166 | 211 | 29790 |
| | 25.0 | 204 | 260 | 35680 |
| 406.4 | 10.0 | 97.8 | 125 | 24480 |
| | 12.5 | 121 | 155 | 30030 |
| | 16.0 | 154 | 196 | 37450 |
| | 20.0 | 191 | 243 | 45430 |
| | 25.0 | 235 | 376 | 54700 |
| | 32.0 | 295 | 376 | 66430 |
| 457 | 10.0 | 110 | 140 | 35090 |
| | 12.5 | 137 | 175 | 43140 |
| | 16.0 | 174 | 222 | 53960 |
| | 20.0 | 216 | 275 | 65680 |
| | 25.0 | 266 | 339 | 79420 |
| | 32.0 | 335 | 427 | 97010 |
| | 40.0 | 411 | 524 | 114900 |



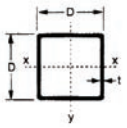

| Radius of gyration cm | Elastic modulus cm3 | Plastic modulus cm3 | Torsional constants | |
|---|---|---|---|---|
| | | | J cm4 | C cm3 |
| 7.40 | 328 | 438 | 7197 | 657 |
| 7.32 | 397 | 534 | 8689 | 793 |
| 7.20 | 483 | 661 | 10590 | 967 |
| 7.07 | 572 | 795 | 12520 | 1143 |
| 8.42 | 274 | 358 | 6692 | 547 |
| 8.37 | 340 | 448 | 8321 | 681 |
| 8.30 | 415 | 550 | 10150 | 830 |
| 8.21 | 503 | 673 | 12290 | 1006 |
| 8.10 | 616 | 837 | 15070 | 1232 |
| 7.97 | 733 | 1011 | 17910 | 1465 |
| 9.43 | 344 | 448 | 9392 | 688 |
| 9.37 | 429 | 562 | 11700 | 857 |
| 9.31 | 524 | 692 | 14310 | 1048 |
| 9.22 | 637 | 849 | 17390 | 1274 |
| 9.10 | 784 | 1058 | 21410 | 1569 |
| 8.97 | 938 | 1283 | 25600 | 1875 |
| 8.81 | 1108 | 1543 | 30250 | 2216 |
| 11.2 | 612 | 799 | 19820 | 1224 |
| 11.1 | 751 | 986 | 24320 | 1501 |
| 11.0 | 917 | 1213 | 29690 | 1833 |
| 10.9 | 1136 | 1518 | 36780 | 2271 |
| 10.8 | 1367 | 1850 | 44280 | 2734 |
| 10.6 | 1630 | 2239 | 52800 | 3260 |
| 12.3 | 742 | 967 | 26400 | 1485 |
| 12.2 | 912 | 1195 | 32450 | 1825 |
| 12.1 | 1117 | 1472 | 39700 | 2233 |
| 12.0 | 1387 | 1847 | 49330 | 2774 |
| 11.9 | 1676 | 2255 | 59580 | 3351 |
| 11.7 | 2007 | 2738 | 71350 | 4013 |
| 14.0 | 1205 | 1572 | 48950 | 2409 |
| 13.9 | 1478 | 1940 | 60060 | 2956 |
| 13.8 | 1843 | 2440 | 74900 | 3686 |
| 13.7 | 2236 | 2989 | 90860 | 4472 |
| 13.5 | 2692 | 3642 | 109400 | 5384 |
| 13.3 | 3269 | 4497 | 132900 | 6539 |
| 15.8 | 1536 | 1998 | 70180 | 3071 |
| 15.7 | 1888 | 2470 | 86290 | 3776 |
| 15.6 | 2361 | 3113 | 107900 | 4723 |
| 15.5 | 2874 | 3822 | 131400 | 5749 |
| 15.1 | 4246 | 5791 | 194000 | 8491 |
| 14.8 | 5031 | 6977 | 229900 | 10060 |

| Designation | | | | |
|---|---|---|---|---|
| size DxD mm | thickness T mm | Mass per metre kg | Area of section cm2 | Moment of inertia cm4 |
| 20 x 20 | 2.0 | 1.12 | 1.42 | 0.76 |
| | 2.6 | 1.39 | 1.78 | 0.88 |
| 25 x 25 | 2.0+ | 1.43 | 1.82 | 1.59 |
| | 2.6+ | 1.80 | 2.30 | 1.90 |
| | 3.2+ | 2.15 | 2.74 | 2.14 |
| 30 x 30 | 2.6 | 2.21 | 2.82 | 3.49 |
| | 2.9+ | 2.44 | 3.10 | 3.76 |
| | 3.2 | 2.65 | 3.38 | 4.00 |
| 40 x 40 | 2.4+ | 2.81 | 3.58 | 8.39 |
| | 2.6 | 3.03 | 3.86 | 8.94 |
| | 2.9+ | 3.35 | 4.26 | 9.71 |
| | 3.2 | 3.66 | 4.66 | 10.4 |
| | 4.0 | 4.46 | 5.68 | 12.1 |
| 50 x 50 | 2.5+ | 3.71 | 4.72 | 17.7 |
| | 2.9+ | 4.26 | 5.42 | 19.9 |
| | 3.2 | 4.66 | 5.94 | 21.6 |
| | 4.0 | 5.72 | 7.28 | 25.5 |
| | 5.0 | 6.97 | 8.88 | 29.6 |
| 60 x 60 | 2.9+ | 5.17 | 6.58 | 35.6 |
| | 3.2 | 5.67 | 7.22 | 38.7 |
| | 4.0 | 6.97 | 8.88 | 46.1 |
| | 5.0 | 8.54 | 10.90 | 54.4 |
| 63.5 x 63.5 | 3.2 | 6.02 | 7.67 | 46.3 |
| | 4.0 | 7.41 | 9.44 | 55.40 |
| | 4.9 | 8.93 | 11.37 | 64.59 |
| | 6.3 | 11.17 | 14.22 | 76.74 |
| 70 x 70 | 2.9+ | 6.08 | 7.74 | 57.9 |
| | 3.6 | 7.46 | 9.50 | 69.5 |
| | 5.0 | 10.10 | 12.90 | 90.1 |
| 76.2 x 38.1 | 3.2 | 5.80 | 6.86 | 49.77 |
| | 4.0 | 6.62 | 8.43 | 59.59 |
| 76.2 x 50.8 | 3.2 | 6.02 | 7.67 | 60.61 |
| | 4.9 | 8.93 | 11.37 | 85.06 |
| | 6.3 | 11.17 | 14.22 | 101.53 |



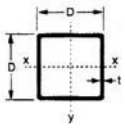

| Radius of gyration cm | Elastic modulus cm3 | Plastic modulus cm3 | Torsional constants | |
|---|---|---|---|---|
| | | | J cm4 | C cm3 |
| 0.73 | 0.76 | 0.95 | 1.22 | 1.07 |
| 0.70 | 0.88 | 1.15 | 1.44 | 1.23 |
| 0.94 | 1.27 | 1.56 | 2.52 | 1.81 |
| 0.91 | 1.52 | 1.91 | 3.06 | 2.14 |
| 0.88 | 1.71 | 2.21 | 3.49 | 2.38 |
| 1.11 | 2.33 | 2.88 | 5.56 | 3.30 |
| 1.10 | 2.51 | 3.13 | 6.02 | 3.54 |
| 1.09 | 2.67 | 3.37 | 6.45 | 3.75 |
| 1.53 | 4.20 | 5.03 | 13.1 | 6.04 |
| 1.52 | 4.47 | 5.39 | 14.0 | 6.41 |
| 1.51 | 4.86 | 5.9 | 15.3 | 6.94 |
| 1.50 | 5.22 | 6.4 | 16.5 | 7.43 |
| 1.46 | 6.07 | 7.61 | 19.5 | 8.56 |
| 1.94 | 7.07 | 8.38 | 27.4 | 10.2 |
| 1.92 | 7.98 | 9.54 | 31.1 | 11.5 |
| 1.91 | 8.62 | 10.4 | 33.8 | 12.4 |
| 1.87 | 10.2 | 12.5 | 40.4 | 14.5 |
| 1.83 | 11.9 | 14.9 | 47.6 | 16.7 |
| 2.33 | 11.9 | 14.1 | 55.2 | 17.2 |
| 2.31 | 12.9 | 15.3 | 60.1 | 18.6 |
| 2.28 | 15.4 | 18.6 | 72.4 | 22.1 |
| 2.24 | 18.1 | 22.3 | 86.3 | 25.8 |
| 2.46 | 14.6 | 17.3 | 71.8 | 21.1 |
| 2.42 | 17.45 | 21.0 | 86.72 | 25.07 |
| 2.38 | 20.34 | 24.85 | 102.08 | 29.0 |
| 2.32 | 24.17 | 30.27 | 123.07 | 34.08 |
| 2.73 | 16.5 | 19.4 | 89.3 | 24.1 |
| 2.70 | 19.9 | 23.6 | 108 | 28.7 |
| 2.64 | 25.7 | 31.2 | 142 | 36.8 |
| 2.69 | 13.06 | 16.48 | 39.52 | 14.42 |
| 2.66 | 15.61 | 19.97 | 47.11 | 16.91 |
| 2.81 | 15.91 | 19.45 | 65.6 | 20.08 |
| 2.74 | 22.33 | 28.03 | 92.73 | 27.46 |
| 2.67 | 26.64 | 34.21 | 111.26 | 32.14 |

| Designation | | | | |
|---|---|---|---|---|
| size DxD mm | thickness T mm | Mass per metre kg | Area of section cm2 | Moment of inertia cm4 |
| 76.2 x 76.2 | 3.2 | 7.3 | 9.30 | 82.28 |
| | 4.0 | 9.01 | 11.48 | 99.25 |
| | 4.9 | 10.88 | 13.86 | 116.75 |
| | 6.3 | 13.68 | 17.42 | 140.72 |
| 80 x 80 | 2.9+ | 69.9 | 8.90 | 88.0 |
| | 3.6 | 85.9 | 10.90 | 106.0 |
| | 5.0 | 11.7 | 14.90 | 139.0 |
| | 6.3 | 14.4 | 18.40 | 165.0 |
| 90 x 90 | 3.6 | 97.2 | 12.40 | 154.0 |
| | 5.0 | 13.3 | 16.90 | 202.0 |
| | 6.3 | 16.4 | 20.90 | 242.0 |
| 100 x 100 | 4.0 | 12.0 | 15.30 | 234 |
| | 5.0 | 14.8 | 18.90 | 283 |
| | 6.3 | 18.4 | 23.40 | 341 |
| | 8.0 | 22.9 | 29.10 | 408 |
| | 10.0 | 27.9 | 35.50 | 474 |
| 120 x 120 | 5.0 | 18.0 | 22.90 | 503 |
| | 6.3 | 22.3 | 28.50 | 610 |
| | 8.0 | 27.9 | 35.50 | 738 |
| | 1.0 | 34.2 | 43.50 | 870 |
| 140 x 140 | 5.0+ | 21.1 | 26.90 | 814 |
| | 6.3+ | 26.3 | 33.50 | 994 |
| | 8.0+ | 32.9 | 41.90 | 1212 |
| | 10.0+ | 40.4 | 51.50 | 1441 |
| 150 x 150 | 5.0 | 22.7 | 28.90 | 1009 |
| | 6.3 | 28.3 | 36.00 | 1236 |
| | 8.0 | 35.4 | 45.10 | 1510 |
| | 10.0 | 43.6 | 55.50 | 1803 |
| | 12.5 | 53.4 | 68.00 | 2125 |
| | 16.0 | 66.4 | 84.50 | 2500 |
| 152.4 x 76.2 | 4.9 | 16.74 | 21.33 | 635.80 |
| | 6.3 | 21.21 | 27.02 | 786.04 |
| | 9.5 | 30.92 | 39.39 | 1082.92 |



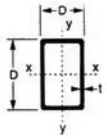

| Radius of gyration cm | Elastic modulus cm3 | Plastic modulus cm3 | Torsional constants | |
|---|---|---|---|---|
| | | | J cm4 | C cm3 |
| 3.00 | 21.6 | 25.39 | 126.96 | 31.42 |
| 2.94 | 26.05 | 30.97 | 154.26 | 37.65 |
| 2.90 | 30.64 | 36.90 | 182.91 | 43.99 |
| 2.84 | 36.93 | 45.40 | 223.2 | 52.50 |
| 3.14 | 22.0 | 25.7 | 135 | 32.1 |
| 3.11 | 26.5 | 31.3 | 164 | 38.5 |
| 3.05 | 34.7 | 41.7 | 217 | 49.8 |
| 3.00 | 41.3 | 50.5 | 261 | 58.8 |
| 3.52 | 34.1 | 40.0 | 237 | 49.7 |
| 3.46 | 45.0 | 53.6 | 315 | 64.9 |
| 3.41 | 53.9 | 65.3 | 381 | 77.1 |
| 3.91 | 46.8 | 54.9 | 361 | 68.2 |
| 3.87 | 56.6 | 67.1 | 439 | 81.9 |
| 3.81 | 68.2 | 82.0 | 533 | 97.9 |
| 3.74 | 81.5 | 99.9 | 646 | 116 |
| 3.65 | 94.9 | 119 | 761 | 134 |
| 4.69 | 83.8 | 98.4 | 775 | 122 |
| 4.63 | 102 | 121 | 949 | 147 |
| 4.56 | 123 | 149 | 1159 | 176 |
| 4.47 | 145 | 178 | 1381 | 206 |
| 5.50 | 116 | 136 | 1251 | 170 |
| 5.45 | 142 | 168 | 1538 | 206 |
| 5.38 | 173 | 207 | 1889 | 249 |
| 5.29 | 206 | 250 | 2269 | 294 |
| 5.91 | 135 | 157 | 1548 | 197 |
| 5.86 | 165 | 194 | 1907 | 240 |
| 5.78 | 201 | 240 | 2348 | 291 |
| 5.70 | 240 | 290 | 2829 | 345 |
| 5.59 | 283 | 348 | 3372 | 403 |
| 5.44 | 333 | 421 | 4029 | 468 |
| 5.46 | 83.37 | 103.93 | 505.51 | 93.78 |
| 5.40 | 103.16 | 130.07 | 624.23 | 114.03 |
| 5.24 | 142.12 | 184.07 | 855.05 | 151.16 |

| Designation | | | | |
|---|---|---|---|---|
| size DxD mm | thickness T mm | Mass per metre kg | Area of section cm2 | Moment of inertia cm4 |
| 180 x 180 | 6.3 | 34.2 | 43.6 | 2186 |
| | 8.0 | 43.0 | 54.7 | 2689 |
| | 10.0 | 53.0 | 67.5 | 3237 |
| | 12.5 | 65.2 | 83.0 | 3856 |
| | 16.0 | 81.4 | 104 | 4607 |
| 200 x 200 | 6.3 | 38.2 | 48.6 | 3033 |
| | 8.0 | 48.0 | 61.1 | 3744 |
| | 10.0 | 59.3 | 75.5 | 4525 |
| | 12.5 | 73.0 | 93.0 | 5419 |
| | 16.0 | 91.5 | 117 | 6524 |
| 203.2 x 152.4 | 5.9 | 31.71 | 40.4 | 2420.08 |
| | 6.3 | 33.78 | 43.03 | 2565.82 |
| | 7.1 | 37.87 | 48.24 | 2850.58 |
| | 9.5 | 49.86 | 63.52 | 3652.00 |
| | 12.5 | 64.29 | 81.9 | 4546.00 |
| | 16.0 | 80.32 | 102.32 | 5445.01 |
| 250 x 250 | 6.3 | 48.1 | 61.2 | 6049 |
| | 8.0 | 60.5 | 77.1 | 7510 |
| | 10.0 | 75.0 | 95.5 | 9141 |
| | 12.5 | 92.6 | 118 | 11050 |
| | 16.0 | 117 | 149 | 13480 |
| 300 x 300 | 10.0 | 90.7 | 116 | 16150 |
| | 12.5 | 112 | 143 | 19630 |
| | 16.0 | 142 | 181 | 24160 |
| 350 x 350 | 10.0 | 106 | 136 | 26050 |
| | 12.5 | 132 | 168 | 31810 |
| | 16.0 | 167 | 213 | 39370 |
| 400 x 400 | 10.0 | 122 | 156 | 39350 |
| | 12.5 | 152 | 193 | 48190 |
| | 16.0 | 192 | 245 | 59900 |
| | 20.0 | 237 | 302 | 72400 |



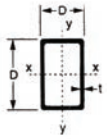

| Radius of gyration cm | Elastic modulus cm3 | Plastic modulus cm3 | Torsional constants | |
|---|---|---|---|---|
| | | | J cm4 | C cm3 |
| 7.08 | 243 | 283 | 3357 | 355 |
| 7.01 | 299 | 352 | 4156 | 434 |
| 6.92 | 360 | 429 | 5041 | 519 |
| 6.82 | 428 | 519 | 6062 | 613 |
| 6.66 | 512 | 634 | 7339 | 725 |
| 7.90 | 303 | 353 | 4647 | 444 |
| 7.83 | 374 | 439 | 5770 | 545 |
| 7.74 | 452 | 536 | 7020 | 655 |
| 7.63 | 542 | 651 | 8479 | 779 |
| 7.48 | 652 | 799 | 10330 | 929 |
| 7.74 | 238.2 | 283.63 | 2912.84 | 319.12 |
| 7.72 | 253.54 | 301.37 | 3091.20 | 337.63 |
| 7.69 | 280.57 | 336.28 | 3440.80 | 373.57 |
| 7.58 | 359.45 | 436.60 | 4433.22 | 472.94 |
| 7.45 | 447.44 | 552.77 | 5556.96 | 580.52 |
| 7.30 | 535.93 | 675.62 | 6708.10 | 684.78 |
| 9.94 | 484 | 559 | 9228 | 712 |
| 9.87 | 601 | 699 | 11511 | 880 |
| 9.78 | 731 | 858 | 14086 | 1065 |
| 9.68 | 884 | 1048 | 17139 | 1279 |
| 9.53 | 1078 | 1298 | 21109 | 1548 |
| 11.8 | 1077 | 1254 | 24776 | 1575 |
| 11.7 | 1309 | 1538 | 30290 | 1905 |
| 11.6 | 1610 | 1916 | 37566 | 2327 |
| 13.9 | 1489 | 1725 | 39840 | 2186 |
| 13.8 | 1817 | 2122 | 48869 | 2655 |
| 13.6 | 2250 | 2655 | 60901 | 3265 |
| 15.9 | 1968 | 2272 | 60028 | 2896 |
| 15.8 | 2409 | 2800 | 73815 | 3530 |
| 15.7 | 2995 | 3410 | 92300 | 4360 |
| 15.5 | 3620 | 4292 | 112320 | 5240 |

| Designation | | | | Moment of inertia | |
|---|---|---|---|---|---|
| Size D x D mm | Thickness T mm | Mass per metre kg | Area of section cm2 | Axis x-x cm4 | Axis y-y cm4 |
| 50 x 30 | 2.5 | 2.81 | 3.58 | 11.6 | 5.14 |
| | 2.6 | 3.03 | 3.86 | 12.4 | 5.45 |
| | 2.9 | 3.35 | 4.26 | 13.5 | 5.90 |
| | 3.2 | 3.66 | 4.66 | 14.5 | 6.31 |
| 60 x 40 | 2.5 | 3.71 | 4.72 | 23.1 | 12.2 |
| | 2.9 | 4.26 | 5.42 | 26.2 | 13.7 |
| | 3.2 | 4.66 | 5.94 | 28.3 | 14.8 |
| | 4.0 | 5.72 | 7.28 | 33.6 | 17.3 |
| 80 x 40 | 2.9 | 5.17 | 6.58 | 53.5 | 17.7 |
| | 3.2 | 5.67 | 7.22 | 58.1 | 19.1 |
| | 4.0 | 6.97 | 8.88 | 69.6 | 22.6 |
| 90 x 50 | 2.9 | 6.08 | 7.74 | 82.9 | 32.8 |
| | 3.6 | 7.46 | 9.50 | 99.8 | 39.1 |
| | 5.0 | 10.10 | 12.9 | 130 | 50.0 |
| 100 x 50 | 2.9 | 6.53 | 8.32 | 108 | 36.1 |
| | 3.2 | 7.18 | 9.14 | 117 | 39.1 |
| | 4.0 | 8.86 | 11.3 | 142 | 46.7 |
| | 5.0 | 10.9 | 13.9 | 170 | 55.1 |
| | 6.3 | 13.4 | 17.1 | 202 | 64.2 |
| 100 x 60 | 2.9 | 6.99 | 8.90 | 121 | 54.6 |
| | 3.6 | 8.59 | 10.9 | 147 | 65.4 |
| | 5.0 | 11.7 | 14.9 | 192 | 84.7 |
| | 6.3 | 14.4 | 18.4 | 230 | 99.9 |
| 120 x 60 | 3.6 | 9.72 | 12.4 | 230 | 76.9 |
| | 5.0 | 13.3 | 16.9 | 304 | 99.9 |
| | 6.3 | 16.4 | 20.9 | 366 | 118 |
| 120 x 80 | 5.0 | 14.8 | 18.9 | 370 | 195 |
| | 6.3 | 18.4 | 23.4 | 447 | 234 |
| | 8.0 | 22.9 | 29.1 | 537 | 278 |
| | 10.0 | 27.9 | 35.5 | 628 | 320 |
| 150 x 100 | 5.0 | 18.7 | 23.9 | 747 | 396 |
| | 6.3 | 23.3 | 29.7 | 910 | 479 |
| | 8.0 | 29.1 | 37.1 | 1106 | 577 |
| | 10.0 | 35.7 | 45.5 | 1312 | 678 |




| Radius of gyration | | Elastic modulus | | Plastic modulus | | Torsional constants | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 | j cm4 | c cm3 |
| 1.80 | 1.20 | 4.66 | 3.42 | 5.80 | 4.02 | 11.3 | 5.57 |
| 1.79 | 1.19 | 4.96 | 3.63 | 6.21 | 4.30 | 12.1 | 5.90 |
| 1.78 | 1.18 | 5.40 | 3.93 | 6.81 | 4.70 | 13.2 | 6.37 |
| 1.77 | 1.16 | 5.82 | 4.21 | 7.39 | 5.08 | 14.2 | 6.81 |
| 2.21 | 1.61 | 7.71 | 6.10 | 9.43 | 7.09 | 25.0 | 9.74 |
| 2.20 | 1.59 | 8.72 | 6.86 | 10.7 | 8.05 | 28.4 | 10.9 |
| 2.18 | 1.58 | 9.44 | 7.39 | 11.7 | 8.75 | 30.8 | 11.8 |
| 2.15 | 1.54 | 11.2 | 8.67 | 14.1 | 10.5 | 36.6 | 13.7 |
| 2.85 | 1.64 | 13.4 | 8.86 | 16.7 | 10.2 | 42.5 | 14.9 |
| 2.84 | 1.63 | 14.5 | 9.56 | 18.3 | 11.1 | 46.1 | 16.1 |
| 2.80 | 1.59 | 17.4 | 11.3 | 22.2 | 13.4 | 55.1 | 18.9 |
| 3.27 | 2.06 | 18.4 | 13.1 | 22.7 | 15.0 | 74.2 | 21.8 |
| 3.24 | 2.03 | 22.2 | 15.6 | 27.6 | 18.1 | 89.3 | 25.9 |
| 3.18 | 1.97 | 28.9 | 20.0 | 36.6 | 23.9 | 116 | 32.9 |
| 3.60 | 2.08 | 21.5 | 14.4 | 26.7 | 16.4 | 85.7 | 24.4 |
| 3.58 | 2.07 | 23.5 | 15.6 | 29.2 | 17.9 | 93.3 | 26.4 |
| 3.55 | 2.03 | 28.4 | 18.7 | 35.7 | 21.7 | 113 | 31.4 |
| 3.50 | 1.99 | 34.0 | 22.0 | 43.3 | 26.1 | 135 | 37.0 |
| 3.44 | 1.94 | 40.5 | 25.7 | 52.5 | 31.3 | 160 | 43.0 |
| 3.69 | 2.48 | 24.3 | 18.2 | 29.2 | 20.7 | 118 | 29.8 |
| 3.66 | 2.45 | 29.3 | 21.8 | 26.0 | 25.1 | 142 | 36.0 |
| 3.60 | 2.39 | 38.5 | 28.2 | 48.1 | 33.3 | 187 | 45.9 |
| 3.54 | 2.33 | 46.0 | 33.3 | 58.4 | 40.2 | 224 | 53.9 |
| 4.31 | 2.49 | 38.3 | 25.6 | 47.6 | 29.2 | 183 | 43.3 |
| 4.24 | 2.43 | 50.7 | 33.3 | 63.9 | 38.8 | 242 | 56.0 |
| 4.18 | 2.38 | 61.0 | 39.4 | 78.0 | 46.9 | 290 | 66.0 |
| 4.43 | 3.21 | 61.7 | 48.8 | 75.4 | 56.7 | 401 | 77.9 |
| 4.37 | 3.16 | 74.6 | 58.4 | 92.3 | 69.1 | 486 | 93.0 |
| 4.29 | 3.09 | 89.5 | 69.4 | 113 | 83.9 | 586 | 110 |
| 4.20 | 3.00 | 105 | 80.0 | 134 | 99.4 | 688 | 126 |
| 5.59 | 4.07 | 99.5 | 79.1 | 121 | 90.8 | 806 | 127 |
| 5.53 | 4.02 | 121 | 95.9 | 148 | 111 | 985 | 153 |
| 5.46 | 3.94 | 147 | 115 | 183 | 137 | 1202 | 184 |
| 5.37 | 3.86 | 175 | 136 | 220 | 164 | 1431 | 215 |

| Designation | | | | Moment of inertia | |
|---|---|---|---|---|---|
| Size D x D mm | Thickness T mm | Mass per metre kg | Area of section cm2 | Axis x-x cm4 | Axis y-y cm4 |
| 160 x 80 | 5.0 | 18.0 | 22.9 | 753 | 251 |
| | 6.3 | 22.3 | 28.5 | 917 | 302 |
| | 8.0 | 27.9 | 35.5 | 1113 | 361 |
| | 10.0 | 34.2 | 43.5 | 1318 | 419 |
| 200 x 100 | 5.0 | 22.7 | 28.9 | 1509 | 509 |
| | 6.3 | 28.3 | 36.0 | 1851 | 618 |
| | 8.0 | 35.4 | 45.1 | 2269 | 747 |
| | 10.0 | 43.6 | 55.5 | 2718 | 881 |
| | 12.5 | 53.4 | 68.0 | 3218 | 1022 |
| | 16.0 | 66.4 | 84.5 | 3808 | 1175 |
| 250 x 150 | 6.3 | 38.2 | 48.6 | 4178 | 1886 |
| | 8.0 | 48.0 | 61.1 | 5167 | 2317 |
| | 10.0 | 59.3 | 75.5 | 6259 | 2784 |
| | 12.5 | 73.0 | 93.0 | 7518 | 3310 |
| | 16.0 | 91.5 | 117 | 9089 | 3943 |
| 300 x 200 | 6.3 | 48.1 | 61.2 | 7880 | 4216 |
| | 8.0 | 60.5 | 77.1 | 9798 | 5219 |
| | 10.0 | 75.0 | 95.5 | 11940 | 6331 |
| | 12.5 | 92.6 | 118 | 14460 | 7619 |
| | 16.0 | 117.0 | 149 | 17700 | 9293 |
| 400 x 200 | 10.0 | 90.7 | 116 | 24140 | 8138 |
| | 12.5 | 112 | 143 | 29410 | 9820 |
| | 16.0 | 142 | 181 | 36300 | 11950 |
| 450 x 250 | 10.0 | 106 | 136 | 37180 | 14900 |
| | 12.5 | 132 | 168 | 45470 | 18100 |
| | 16.0 | 167 | 213 | 56420 | 22250 |




| Radius of gyration | | Elastic modulus | | Plastic modulus | | Torsional constants | |
|---|---|---|---|---|---|---|---|
| Axis x-x cm4 | Axis y-y cm4 | Axis x-x cm3 | Axis y-y cm3 | Axis x-x cm3 | Axis y-y cm3 | j cm4 | c cm3 |
| 57.4 | 3.31 | 94.1 | 62.8 | 117 | 71.7 | 599 | 106 |
| 56.8 | 3.26 | 115 | 75.6 | 144 | 87.7 | 739 | 127 |
| 56.0 | 3.19 | 139 | 90.2 | 177 | 107 | 882 | 151 |
| 55.0 | 3.10 | 165 | 105 | 213 | 127 | 1041 | 175 |
| 72.3 | 4.20 | 151 | 102 | 186 | 115 | 1202 | 172 |
| 7.17 | 4.14 | 185 | 124 | 231 | 141 | 1473 | 208 |
| 7.09 | 4.07 | 227 | 149 | 286 | 174 | 1802 | 251 |
| 7.00 | 3.98 | 272 | 176 | 346 | 209 | 2154 | 296 |
| 6.88 | 3.88 | 322 | 204 | 417 | 249 | 2541 | 342 |
| 6.71 | 3.73 | 381 | 235 | 505 | 297 | 2988 | 393 |
| 9.27 | 6.23 | 334 | 252 | 405 | 284 | 4049 | 413 |
| 9.19 | 6.16 | 413 | 309 | 505 | 353 | 5014 | 506 |
| 9.10 | 6.07 | 501 | 371 | 618 | 430 | 6082 | 606 |
| 8.99 | 5.97 | 601 | 441 | 751 | 520 | 7317 | 717 |
| 8.83 | 5.82 | 727 | 526 | 924 | 635 | 8863 | 851 |
| 11.3 | 8.30 | 525 | 422 | 627 | 475 | 8468 | 681 |
| 11.3 | 8.23 | 953 | 522 | 785 | 593 | 10549 | 840 |
| 11.2 | 8.14 | 796 | 633 | 964 | 726 | 12890 | 1016 |
| 11.1 | 8.04 | 964 | 762 | 1179 | 886 | 15654 | 1217 |
| 10.9 | 7.89 | 1180 | 924 | 1462 | 1094 | 19227 | 1469 |
| 14.5 | 8.39 | 1207 | 814 | 1492 | 916 | 19236 | 1377 |
| 14.3 | 8.29 | 1471 | 982 | 1831 | 1120 | 23408 | 1657 |
| 14.2 | 8.14 | 1815 | 1185 | 2285 | 1388 | 28835 | 2011 |
| 16.6 | 10.5 | 1653 | 1192 | 2013 | 1338 | 33247 | 1986 |
| 16.5 | 10.4 | 2021 | 1448 | 2478 | 1642 | 40668 | 2407 |
| 16.3 | 10.2 | 2508 | 1780 | 3103 | 2047 | 50478 | 2948 |

*(The following information supplied in our technical section has been compiled from various standards publications. It is by no means comprehensive and is for quick reference only.*
*For more detailed information please contact our sales department who will be happy to supply you with up-to-date technical help)*

**INTRODUCTION**

As part of the exercise towards the removal of technical barriers to trade, the European Committee for Iron & Steel Standardisation (ECISS) has prepared a series of European Standards (ENs) for structural steels.

EN 10025 : 2004 is the new European standard for structural steel. The following pages show the new grades, properties and the nearest equivalent grades from former standards including EN 10025 : 1993. The grade designation system is also explained.

Dent Steel can provide a very wide range of rolled sections and plates and the information following has been prepared to show how the new standard applies to these products.

The European Committee for Iron and Steel Standardisation is responsible for producing the European Standards (ENs) for structural steels. The first of these standards, EN 10025, was published in the UK by BSI as EN 10025:1990, partly superseding BS 4360 : 1986, which was reissued as BS 4360 : 1990.
In 1993, a second edition of EN 10025 was made available together with EN 10113 : parts 1,2 & 3 and EN 10155. In June 1994, EN 10210 : part 1 was published and at the same time BS 4360 was officially withdrawn. The balance of the BS 4360 steels not affected by these ENs were re-issued in new British Standards BS 7613 and BS 7668.

In 1996, with the publication of EN 10137, BS 7613 was withdrawn. BS 7668 will remain until an EN for atmospheric corrosion resistant hollow sections is available.

In 2004 the standard EN 10025 was revised to address the provisions of EU Construction Products Directive (89/106/EEC). It is now published in six parts to bring together almost all the “Structural Metallic Products” into one comprehensive standard.

**The New European Standard EN 10025 : 2004**

The new standard is published in six parts and draws together earlier standards to produce one standard for the majority of structural steel products.

The six parts are:

| | |
|---|---|
| PART 1 | General technical delivery conditions. |
| PART 2 | Technical delivery conditions for non-alloy structural steels. *(Supersedes EN 10025 : 1993)* |
| PART 3 | Technical delivery conditions for normalised/normalised rolled weldable fine grain structural steels. *(Supersedes EN 10113 : parts 1 & 2 : 1993)* |
| PART 4 | Technical delivery conditions for thermomechanically rolled weldable fine grain structural steels. *(Supersedes EN 10113 : parts 1 & 3 : 1993)* |
| PART 5 | Technical delivery conditions for structural steels with improved atmospheric corrosion resistance – also known as weathering steels. *(Supersedes EN 10155 : 1993)* |
| PART 6 | Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition. *(Supersedes EN 10137 : parts 1 & 2 : 1996)* |

**Grade Designation Systems**

The designation systems used in the new standard are similar but not identical to EN 10025 : 1993 and very different to the more familiar BS 4360 designations so the guide below has been prepared to assist purchasers, specifiers, designers and steel users.

**Symbols used in EN 10025 : part 2 : 2004**
**Non-alloy structural steels**

| | |
|---|---|
| S… | Structural Steel |
| E… | Engineering Steel |
| .235… | Minimum yield strength (Reh) in MPa @ 16mm |
| …JO… | Longitudinal Charpy V-notch impacts 27 J @ 0 deg C |
| …J2… | Longitudinal Charpy V-notch impacts 27 J @ -20 deg C |
| …K2… | Longitudinal Charpy V-notch impacts 40 J @ -20 deg C |
| …+AR | Supply condition as rolled |
| …+N | Supply condition normalised or normalised rolled |

**Customer Options**

| | |
|---|---|
| …C… | Grade suitable for cold forming |
| …Z… | Grade with improved properties perpendicular to surface |

**Examples: S235JR+AR, S355K2C+N**

## Grades, properties and nearest equivalents.

**Table 1. EN10025 : part 2 : 2004 - Nonalloy structural steels**

Comparison between grades in EN 10025: part 2 : 2004 & nearest equivalent versions in EN 10025 : 1993 and BS 4360 : 1990

| EN 10025 : part 2 : 2004 | | | | | EN 10025 : 1993 | BS 4360 : 1990 |
|---|---|---|---|---|---|---|
| Grade | Yield (Reh) min | Tensile (Rm) | Charpy V-notch longitudinal | | Grade | Grade |
| | Strength at t = 16mm (MPa) | | Temp (deg C) | Energy (J) t = 16mm | | |
| S185 | 185 | 290/510 | - | - | S185 | - |
| - *1 | 235 | 360/510 | - | - | S235 | 40A |
| S235JR *2 | | | 20 | 27 | S235JRG1/G2 | 40B |
| S235J0 | | | 0 | 27 | S235J0 | 40C |
| S235J2 | | | -20 | 27 | S235J2G3/G4 | 40D |
| - *1 | 275 | 410/560 | - | - | S275 | 43A |
| S275JR *2 | | | 20 | 27 | S275JR | 43B |
| S275J0 | | | 0 | 27 | S275J0 | 43C |
| S275J2 | | | -20 | 27 | S275J2G3/G4 | 43D |
| -*1 | 355 | 470/630 | - | - | S355 | 50A |
| S355JR *2 | | | 20 | 27 | S355JR | 50B |
| S355J0 | | | 0 | 27 | S355J0 | 50C |
| S355J2 | | | -20 | 27 | S355J2G3/G4 | 50D |
| S355K2 | | | -20 | 40 | S355J2G3/G4 | 50DD |
| E295 | 295 | 470/610 | - | - | E295 | - |
| S335 | 335 | 570/710 | - | - | S335 | - |
| E360 | 360 | 650/830 | - | - | E360 | - |

(1 MPa = 1 N/mm2)

**Notes:**

1. For all products to be compliant with the EU Construction Products Directive (CPD 89/106/EC) the material must offer a guarenteed minimum impact performance. This has resulted in the removal of this grade from the standard, and the lowest grade now offered is the JR version for each yield strength variation.

2. Verification of the specified impact value is only carried out when agreed at the time of the enquiry and order.

**Table 2. EN10025 : part 2 : 2004 - Nonalloy structural steels**

Comparison between grades in EN 10025: part 2 : 2004 & nearest equivalent versions in EN 10025 : 1993 and BS 4360 : 1990

| EN 10025 : part 3 : 2004 | | | | | EN10113 : part 2 : 1993 | BS 4360 : 1990 |
|---|---|---|---|---|---|---|
| Grade | Yield (Reh) min | Tensile (Rm) | Charpy V-notch longitudinal | | Grade | Grade |
| | Strength at t = 16mm (MPa) | | Temp (deg C) | Energy (J) t = 16mm | | |
| S275N | 275 | 375/510 | -20 | 40 | S275N | 43DD |
| S275NL | | | -50 | 27 | S275NL | 43EE |
| S355N | 355 | 470/630 | -20 | 40 | S355 | 50 |
| S355NL | | | -50 | 27 | S355NL | 50EE |
| S420N | 420 | 520/680 | -20 | 40 | S420N | - |
| S420NL | | | -50 | 27 | S420NL | - |
| S460M | 460 | 550/720 | -20 | 40 | S460M | 55C |
| S460ML | | | -50 | 27 | S460ML | 55EE |

(1 MPa = 1 N/mm2)

**Notes:**
1. For all products to be compliant with the EU Construction Products Directive (CPD 89/106/EC) the material must offer a guaranteed minimum impact performance. This has resulted in the removal of this grade from the standard, and the lowest grade now offered is the JR version for each yield strength variation.

2. Verification of the specified impact value is only carried out when agreed at the time of the enquiry and order.

**Table 3. EN10025 : part 4 : 2004 - Thermomechanically rolled weldable fine grain structural steels**

Comparison between grades in EN 10025 : part 4 : 2004 & nearest equivalent versions in EN 10113 : part 3 : 1993

| EN 10025 : part 4 : 2004 | | | | | EN10113 : part 3 : 1993 |
|---|---|---|---|---|---|
| Grade | Yield (Reh) min | Tensile (Rm) | Charpy V-notch longitudinal | | Grade |
| | Strength at t = 16mm (MPa) | | Temp (deg C) | Energy (J) t = 16mm | |
| S275M | 275 | 370/510 | -20 | 40 | S275N |
| S275ML | | | -50 | 27 | S275NL |
| S355M | 355 | 470/630 | -20 | 40 | S355 |
| S355ML | | | -50 | 27 | S355NL |
| S420M | 420 | 520/680 | -20 | 40 | S420N |
| S420ML | | | -50 | 27 | S420NL |
| S460M | 460 | 550/720 | -20 | 40 | S460M |
| S460ML | | | -50 | 27 | S460ML |

## Grades, properties and nearest equivalents (continued)

**Table 4. EN10025 : part 5 : 2004 - Structural steels with improved atmospheric corrosion resistance**

Comparison between grades in EN 10025: part 5 : 2004 and nearest equivalent versions in EN 10155 : 1993 and BS 4360 : 1990

| EN 10025 : part 5 : 2004 | | | | | EN 10155 : 1993 | BS 4360 : 1990 |
|---|---|---|---|---|---|---|
| Grade | Yield (Reh) min | Tensile (Rm) | Charpy V-notch longitudinal | | Grade | Grade |
| | Strength at t = 16mm (MPa) | | Temp (deg C) | Energy (J) t = 16mm | | |
| S235JOW | 235 | 360/510 | 0 | 27 | S235JOW | - |
| S235J2W | | | -20 | 27 | S235J2W | - |
| S355JOWP | 355 | 470/630 | 0 | 27 | S355JOWP | WR50A |
| S355J2WP | | | -20 | 27 | S355J2WP | - |
| S355JOW | 355 | 470/630 | 0 | 27 | S355JOW | WR50B |
| S355J2W | | | -20 | 27 | S355J2W | WR50C |
| S355K2W | | | -20 | 40 | S355K2W | WR50D |

(1 MPa = 1 N/mm2)

**Table 5.**

**EN 10025 : part 6 : 2004**
**Flat products of high yield strength structural steels in the quenched and tempered condition**

Comparison between grades in EN 10025: part 6 : 2004 and nearest equivalent versions in EN 10137 : 1996 and BS 4360 : 1990

| EN 10025 : part 6 : 2004 | | | | | EN 10137 : part 2 : 1996 | BS 4360 : 1990 |
|---|---|---|---|---|---|---|
| Grade | Yield (Reh) min | Tensile (Rm) | Charpy V-notch longitudinal | | Grade | Grade |
| | Strength at t = 16mm (MPa) | | Temp (deg C) | Energy (J) t = 16mm | | |
| S460Q | 460 | 550/720 | 0 | 40 | S460Q | - |
| S460QL | | | 0 | 50 | S460QL | - |
| S460GL1 | | | 0 | 60 | S460QL1 | 55F |
| S500Q | 500 | 590/770 | 0 | 40 | S500Q | - |
| S500QL | | | 0 | 50 | S500QL | - |
| S500QL1 | | | 0 | 60 | S500QL1 | - |
| S550Q | 550 | 640/820 | 0 | 40 | S550Q | - |
| S550QL | | | 0 | 50 | S550QL | - |
| S550QL1 | | | 0 | 60 | S550QL1 | - |
| S620Q | 620 | 700/890 | 0 | 40 | S620Q | - |
| S620QL | | | 0 | 50 | S620QL | - |
| S620QL1 | | | 0 | 60 | S620QL1 | - |
| S690Q | 690 | 770/940 | 0 | 40 | S690Q | - |
| S690QL | | | 0 | 50 | S690QL | - |
| S690QL1 | | | 0 | 60 | S690QL1 | - |
| S890Q | 890 | 940/1100 | 0 | 40 | S890Q | - |
| S890QL | | | 0 | 50 | S890QL | - |
| S890QL1 | | | 0 | 60 | S890QL1 | - |
| S960Q | 960 | 980/1150 | 0 | 40 | S960Q | - |
| S960QL | | | 0 | 50 | S960QL | - |

(1 MPa = 1 N/mm2)

## Chemical composition and deoxidation practice

| Grade | A | B | D | E |
|---|---|---|---|---|
| **Deoxidation** Any method (for rimmed steel, see Note 1) | For t ≤ 50 mm: Any method except rimmed steel | For t < 50 mm: Killed | For t < 25 mm: grain treated with aluminium | Killed and fine |
| For t < 50 mm: Killed | For t < 50 mm: Killed | For t < 25 mm: Killed and fine gain treated with aluminium | | |
| Chemical composition % | | | | |
| Carbon | 0,21 max. (see Note 3) | 0,21 max. | 0,21 max. | 0,018 max. |
| Manganese | 2,5 x C% min. | 0,80 min (see Note 3) | 0,60 min. | 0,70 min. |
| Silicon | 0,50 max. | 0,35 max. | 0,10 – 0,35 | 0,10 – 0,35 |
| Sulphur | 0,035 max. | 0,035 max. | 0,035 max. | 0,035 max |
| Phosphorus | 0,035 max. | 0,035 max. | 0,035 max. | 0,035 max |
| Aluminium (acid soluble) | - | - | 0,015 min. (see Note 4) | 0,015 min. (see Note 4) |
| Carbon + ¼ of the manganese content is not to exceed 0,40% | | | | |

NOTES

(1) For Grade A, rimmed steel may be accepted up to 12,5mm thick inclusive, provided that it is stated on the test certificates or shipping statements to be rimmed steel and is not excluded by the purchaser's order.

(2) The maximum carbon content for Grade A steel may be increased to 0,23% for sections.

(3) Where Grade B is impact tested the minimum manganese content may be reduced to 0,60%.

(4) The total aluminium content may be determined instead of the acid soluble content. In such cases the total aluminium content is to be not less than 0,020%.

(5) Where additions of any other elements are made as part of the steelmaking practice, the content is to be recorded.

## Mechanical properties for acceptance purposes (see Note 1)

| | | | | Charpy V-notch impact test (longitudinal) | | |
|---|---|---|---|---|---|---|
| Grade | Yield Stress N/mm² minimum | Tensile Strength N/mm² | Elongation on 5,65 $\sqrt{S_o}$ % minimum | Thickness mm | Average energy J minimum | |
| | | | | | Longitudinal | Transverse (See Note 3) |
| A | 235 | 400 – 520 (see Note 1) m | 22 (see Note 2) | - | - | - |
| B | | | | ≤ 50 | 27 | 20 |
| D | | | | > 50 ≤ 70 | 34 | 24 |
| E | | | | > 70 ≤ 100 | 41 | 27 |

Impact tests are to be made on the various grades at the following temperatures:

A grade 20°C
B grade 0°C
C grade -20°C
D grade -40°C

NOTES

(1) Requirements for products over 50mm thick in Grades A, B and D and 100mm thick in Grade E are subject to agreement. See 2.1.1.

(2) For full thickness tensile test specimens with a width of 25mm and a gauge length of 200mm (see Fig. 2.2.4 in Chapter 2), the minimum elongation is to be:

| **Thickness mm** | | **>5** | **>10** | **>15** | **>20** | **>25** | **>30** | **>35** |
|---|---|---|---|---|---|---|---|---|
| | **≤5** | **≤10** | **≤15** | **≤20** | **≤25** | **≤30** | **≤35** | **≤50** |
| **Elongation %** | 14 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |

(3) Generally, tests need only be made in the longitudinal direction. For special applications, transverse test specimens may be required by the purchaser of LR. Transverse test results are to be guaranteed by the supplier.

(4) Impact tests are not required for Grade A material up to 50mm thick, nor for thicknesses above 50mm when the material is produced using a fine grained practice and is also normalized or thermomechanically controlled rolled.

(5) Impact tests are generally not required for Grade B steel of 25mm or less in thickness. However, the manufacturer should confirm, by way of regular in-house tests, and on occasional material selected by the Surveyor, that the material meets the above requirement. These results shall be reported to the Surveyor. The frequency of the in-house checks, should as a minimum, be every 250 tonnes.

## Chemical composition

| Strength Levels | 32, 36, 40 | | 42, 46, 50, 55, 62, 69 | |
|---|---|---|---|---|
| **Grades** | **AH,DH, EH** | **FH** | **DH, EH** | **FH** |
| Carbon % max. | 0,18 | 0,16 | 0,20 | 0,18 |
| Manganese % | 0,9 – 1,60 (see Note 1) | 0,9 – 1,60 | 1,70 max. | 1,60 max. |
| Silicon % max. | 0,50 | 0,50 | 0,55 | 0,55 |
| Phosphorous % max. (see Note 2) | 0,035 | 0,025 | 0,035 | 0,025 |
| Sulphur % max. (see Note 2) | 0,030 | 0,025 | 0,030 | 0,025 |
| Grain refining elements (see Note 3) | | | | |
| Aluminium (acid soluble) % | 0,015 min. (see Note 3) | | | |
| Niobium % | 0,02 – 0,05 | | | |
| Vanadium % | | | | |
| Titanium % | 0,02 max. | | | |
| Total (Nb + V + Ti) % (see Note 6) | 0,12 max. | | | |
| Residual elements | | | | |
| Nickel % max. | 0,40 | 0,80 | to comply with the | |
| Copper % max. | 0,35 | 0,35 | approved specification | |
| Chromium % max. | 0,20 | 0,20 | | |
| Molybdenum % max. | 0,08 | 0,08 | | |

NOTES

(1) For AH grade steels in all strength levels and thicknesses up to 12,5mm, the specified minimum manganese content is 0,70%.

(2) The steel is to contain aluminium, niobium, vanadium or other suitable grain refining elements, either singly or in any combination.

When used singly, the steel is to contain the specified minimum content of the grain refining element. When used in combination, the specified minimum content of each element is not applicable.

(3) The total aluminium content may be determined instead of the acid soluble content. In such cases the total aluminium content is not to be less than 0,020%.

(4) Alloying elements other than those listed above are to be included in the approved manufacturing specification.

(5) The grain refining elements are to be in accordance with the approved composition.

Mechanical properties for acceptance purposes –

(See note 1)

| Grade | Yield Stress N/mm² min. | Tensile Strength N/mm² | Elongation On 5,65 $\sqrt{S_o}$ % min. (see Note 2) | Charpy V-notch impact tests Average energy J minimum | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | t ≤50 mm | | 50 < t ≤70 mm | | 70 < t ≤100 mm | |
| | | | | Longitudinal | Transverse | Longitudinal | Transverse | Longitudinal | Transverse |
| AH 32<br>DH 32<br>EH 32<br>FH 32 | 315 | 440-590 | 22 | 31 | 22 | 38 | 26 | 46 | 31 |
| AH 36<br>DH 36<br>EH 36<br>FH 36 | 355 | 490-620 | 21 | 34 | 24 | 41 | 27 | 50 | 34 |
| AH 40<br>DH 40<br>EH 40<br>FH 40 | 390 | 510-650 | 20 | 41 | 27 | - | - | - | - |

Impact tests are to be made on the various grades at the following temperatures

AH grades 0°C

DH grades -20°C

EH grades -40°C

FH grades -60°C

NOTES

(1) The requirements for products thicker than those detailed in the Table are subject to agreement.

(2) For full thickness tensile test specimens with a width of 25mm and a gauge length of 200mm, the minimum elongation is to be:

| Thickness mm | | <5 | >5 <10 | >10 <15 | >15 <20 | >20 <25 | >25 <30 | >30 <40 | >40 <50 | >50 |
|---|---|---|---|---|---|---|---|---|---|---|
| Elongation % | Strength level 32 | 14 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | to be specially agreed |
| | Strength level 36 | 13 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | |
| | Strength level 40 | 12 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |

(3) In the case of FH grades, the requirements of this Table apply only up to a maximum thickness of 50mm.

# EN10029:1991

## dimensional tolerances

| EN10029:1991 | Tolerances on the nominal thickness | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nominal thickness | Class A | | Class B | | Class C | | Class D | |
| | Lower | Upper | Lower | Upper | Lower | Upper | Lower | Upper |
| ≥ 3 < 5 | -0,4 | +0,8 | -0,3 | +0,9 | -0 | +1,2 | -0,6 | +0,6 |
| ≥ 5 < 8 | -0,4 | +1,1 | -0,3 | +1,2 | -0 | +1,5 | -0,75 | +0,75 |
| ≥ 8 < 15 | -0,5 | +1,2 | -0,3 | +1,4 | -0 | +1,7 | -0,85 | +0,85 |
| ≥ 15 < 25 | -0,6 | +1,3 | -0,3 | +1,6 | -0 | +1,9 | -0,95 | +0,95 |
| ≥ 25 < 40 | -0,8 | +1,4 | -0,3 | +1,9 | -0 | +2,2 | -1.1 | +1,1 |
| ≥ 40 < 80 | -1,0 | +1,8 | -0,3 | +2,5 | -0 | +2,8 | -1,4 | +1,4 |
| ≥ 80 <150 | -1,0 | +2,2 | -0,3 | +2,9 | -0 | +3,2 | -1,6 | +1,6 |
| ≥ 150 < 250 | -1,2 | +2,4 | -0,3 | +3,3 | -0 | +3,6 | -1.8 | +1,8 |

| EN10029:1991 | Special tolerances for flatness | | | |
|---|---|---|---|---|
| Class N | Dimensions in mm | | | |
| Nominal thickness | Steel type L (1) | | Steel type H (1) | |
| | Measuring Length | | | |
| | 1000 | 2000 | 1000 | 2000 |
| ≥ 3 < 5 | 9 | 14 | 12 | 17 |
| ≥ 5 < 8 | 8 | 12 | 11 | 15 |
| ≥ 8 < 15 | 7 | 11 | 10 | 14 |
| ≥ 15 < 25 | 7 | 10 | 10 | 13 |
| ≥ 25 < 40 | 6 | 9 | 9 | 12 |
| ≥ 40 < 250 | 5 | 8 | 8 | 11 |

If the distance between the points of contact of the straight-edge and the plate is <1000 mm the permissible deviation from flatness shall comply with the following requirements:

For steel type L max. 1% or for steel type H max. 1,5% of the distance between points of contact on the plate between 300mm to 1000mm, but not exceeding the values given in table 4.

| Tolerances on the nominal thickness | | | | | Dimensions in mm |
|---|---|---|---|---|---|
| Nominal plate width | | | | | |
| | | | | | |
| > 600<br>< 2000 | > 2000<br>< 2500 | > 2500<br>< 3000 | > 3000<br>< 3500 | >3500<br>< 4000 | > 4000 |
| 0,8 | 0,9 | 0,9 | - | - | - |
| 0,9 | 0,9 | 1,0 | 1,0 | - | - |
| 0,9 | 1,0 | 1,0 | 1,1 | 1,1 | 1,2 |
| 1,0 | 1,1 | 1,2 | 1,2 | 1,3 | 1,4 |
| 1,1 | 1,2 | 1,2 | 1,3 | 1,3 | 1,4 |
| 1,2 | 1,3 | 1,4 | 1,4 | 1,5 | 1,6 |
| 1,3 | 1,4 | 1,5 | 1,5 | 1,6 | 1,7 |
| 1,4 | 1,5 | 1,6 | 1,6 | 1,7 | - |

| **Special tolerances for flatness** | | | | | | |
|---|---|---|---|---|---|---|
| **Class S** | | | | | **Dimensions in mm** | |
| **Nominal thickness** | **Steel type L** | | | | **Steel type H** | |
| | **Plate width** | | | | | |
| | **< 2750** | | **< 2750** | | | |
| | **Measuring Length** | | | | | |
| | **1000** | **2000** | **1000** | **2000** | **1000** | **2000** |
| ≥ 3 < 5 | 4 | 8 | 5 | 10 | Shall be agreed at the time of enquiry and order Option 6 | |
| ≥ 5 < 8 | 3 | 6 | 3 | 6 | | |

If the distance between the points of contact of the straight-edge and the plate is < 1000mm the permissible deviation from flatness shall comply with the following requirements:

Max. 0,5% of the distance between the points of contact, but not exceeding the values in table 5 and not <2mm.

# weight guide

**For Guidance: Size of Plates and weights (KGS)**

| MM | 2000x1000 | 2500 x1250 | 3000x1500 | 4000 x2000 | 6000x2000 | 8000x2000 | 12000x2000 | 5000x2500 | 6000x2500 |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 47 | 74 | 106 | 188 | 283 | 377 | 565 | 294 | 353 |
| 4 | 63 | 98 | 141 | 251 | 377 | 502 | 754 | 393 | 471 |
| 5 | 79 | 123 | 177 | 314 | 471 | 628 | 942 | 491 | 589 |
| 6 | 94 | 147 | 212 | 377 | 565 | 754 | 1130 | 589 | 707 |
| 6.5 | 102 | 159 | 230 | 408 | 612 | 816 | 1225 | 638 | 765 |
| 7 | 110 | 172 | 247 | 440 | 659 | 879 | 1319 | 687 | 824 |
| 8 | 126 | 196 | 283 | 502 | 754 | 1005 | 1507 | 785 | 942 |
| 9 | 141 | 221 | 318 | 565 | 848 | 1130 | 1696 | 883 | 1060 |
| 10 | 157 | 245 | 353 | 628 | 942 | 1256 | 1884 | 981 | 1178 |
| 11 | 173 | 270 | 389 | 691 | 1036 | 1382 | 2072 | 1079 | 1295 |
| 12 | 188 | 294 | 424 | 754 | 1130 | 1507 | 2261 | 1178 | 1413 |
| 12.5 | 196 | 307 | 442 | 785 | 1178 | 1570 | 2355 | 1227 | 1472 |
| 15 | 236 | 368 | 530 | 942 | 1413 | 1884 | 2826 | 1472 | 1766 |
| 16 | 251 | 393 | 565 | 1005 | 1507 | 2010 | 3014 | 1570 | 1884 |
| 18 | 283 | 442 | 636 | 1130 | 1696 | 2261 | 3391 | 1766 | 2120 |
| 20 | 314 | 491 | 707 | 1256 | 1884 | 2512 | 3768 | 1963 | 2355 |
| 22 | 345 | 540 | 777 | 1382 | 2072 | 2763 | 4145 | 2159 | 2591 |
| 25 | 393 | 613 | 883 | 1570 | 2355 | 3140 | 4710 | 2453 | 2944 |
| 30 | 471 | 736 | 1060 | 1884 | 2826 | 3768 | 5652 | 2944 | 3533 |
| 35 | 550 | 859 | 1236 | 2198 | 3297 | 4396 | 6594 | 3434 | 4121 |
| 40 | 628 | 981 | 1413 | 2512 | 3768 | 5024 | 7536 | 3925 | 4710 |
| 45 | 707 | 1104 | 1590 | 2826 | 4239 | 5652 | 8478 | 4416 | 5299 |
| 50 | 785 | 1227 | 1766 | 3140 | 4710 | 6280 | 9420 | 4906 | 5888 |
| 60 | 942 | 1472 | 2120 | 3768 | 5652 | 7536 | 11304 | 5888 | 7065 |
| 65 | 1021 | 1595 | 2296 | 4082 | 6123 | 8164 | 12246 | 6378 | 7654 |
| 70 | 1099 | 1717 | 2473 | 4396 | 6594 | 8792 | 13188 | 6869 | 8243 |
| 75 | 1178 | 1840 | 2649 | 4710 | 7065 | 9420 | 14130 | 7359 | 8831 |
| 80 | 1256 | 1963 | 2826 | 5024 | 7536 | 10048 | 15072 | 7850 | 9420 |
| 90 | 1413 | 2208 | 3179 | 5652 | 8478 | 11304 | 16956 | 8831 | 10598 |
| 100 | 1570 | 2453 | 3533 | 6280 | 9420 | 12560 | 18840 | 9813 | 11775 |
| | | | | | | | | | |

**For Guidance: Size of Plates and weights (KGS)**

| MM | 7500x2500 | 8000x2500 | 10000x2500 | 12000x2500 | 6000x3000 | 8000x3000 | 9000x3000 | 10000x3000 | 12000x3000 |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 442 | 471 | 589 | 707 | 424 | 565 | 636 | 707 | 848 |
| 4 | 589 | 628 | 785 | 942 | 565 | 754 | 848 | 942 | 1130 |
| 5 | 736 | 785 | 981 | 1178 | 707 | 942 | 1060 | 1178 | 1413 |
| 6 | 883 | 942 | 1178 | 1413 | 848 | 1130 | 1272 | 1413 | 1696 |
| 6.5 | 957 | 1021 | 1276 | 1531 | 918 | 1225 | 1378 | 1531 | 1837 |
| 7 | 1030 | 1099 | 1374 | 1649 | 989 | 1319 | 1484 | 1649 | 1978 |
| 8 | 1178 | 1256 | 1570 | 1884 | 1130 | 1507 | 1696 | 1884 | 2261 |
| 9 | 1325 | 1413 | 1766 | 2120 | 1272 | 1696 | 1908 | 2120 | 2543 |
| 10 | 1472 | 1570 | 1963 | 2355 | 1413 | 1884 | 2120 | 2355 | 2826 |
| 11 | 1619 | 1727 | 2159 | 2591 | 1554 | 2072 | 2331 | 2591 | 3109 |
| 12 | 1766 | 1884 | 2355 | 2826 | 1696 | 2261 | 2543 | 2826 | 3391 |
| 12.5 | 1840 | 1963 | 2453 | 2944 | 1766 | 2355 | 2649 | 2944 | 3533 |
| 15 | 2208 | 2355 | 2944 | 3533 | 2120 | 2826 | 3179 | 3533 | 4239 |
| 16 | 2355 | 2512 | 3140 | 3768 | 2261 | 3014 | 3391 | 3768 | 4522 |
| 18 | 2649 | 2826 | 3533 | 4239 | 2543 | 3391 | 3815 | 4239 | 5087 |
| 20 | 2944 | 3140 | 3925 | 4710 | 2826 | 3768 | 4239 | 4710 | 5652 |
| 22 | 3238 | 3454 | 4318 | 5181 | 3109 | 4145 | 4663 | 5181 | 6217 |
| 25 | 3680 | 3925 | 4906 | 5888 | 3533 | 4710 | 5299 | 5888 | 7065 |
| 30 | 4416 | 4710 | 5888 | 7065 | 4239 | 5652 | 6359 | 7065 | 8478 |
| 35 | 5152 | 5495 | 6869 | 8243 | 4946 | 6594 | 7418 | 8243 | 9891 |
| 35 | 5152 | 5495 | 6869 | 8243 | 4946 | 6594 | 7418 | 8243 | 9891 |
| 40 | 5888 | 6280 | 7850 | 9420 | 5652 | 7536 | 8478 | 9420 | 11304 |
| 45 | 6623 | 7065 | 8831 | 10598 | 6359 | 8478 | 9538 | 10598 | 12717 |
| 50 | 7359 | 7850 | 9813 | 11775 | 7065 | 9420 | 10598 | 11775 | 14130 |
| 60 | 8831 | 9420 | 11775 | 14130 | 8478 | 11304 | 12717 | 14130 | 16956 |
| 65 | 9567 | 10205 | 12756 | 15308 | 9185 | 12246 | 13777 | 15308 | 18369 |
| 70 | 10303 | 10990 | 13738 | 16485 | 9891 | 13188 | 14837 | 16485 | 19782 |
| 75 | 11039 | 11775 | 14719 | 17663 | 10598 | 14130 | 15896 | 17663 | 21195 |
| 80 | 11775 | 12560 | 15700 | 18840 | 11304 | 15072 | 16956 | 18840 | 22608 |
| 90 | 13247 | 14130 | 17663 | 21195 | 12717 | 16956 | 19076 | 21195 | 25434 |
| 100 | 14719 | 15700 | 19625 | 23550 | 14130 | 18840 | 21195 | 23550 | 28260 |

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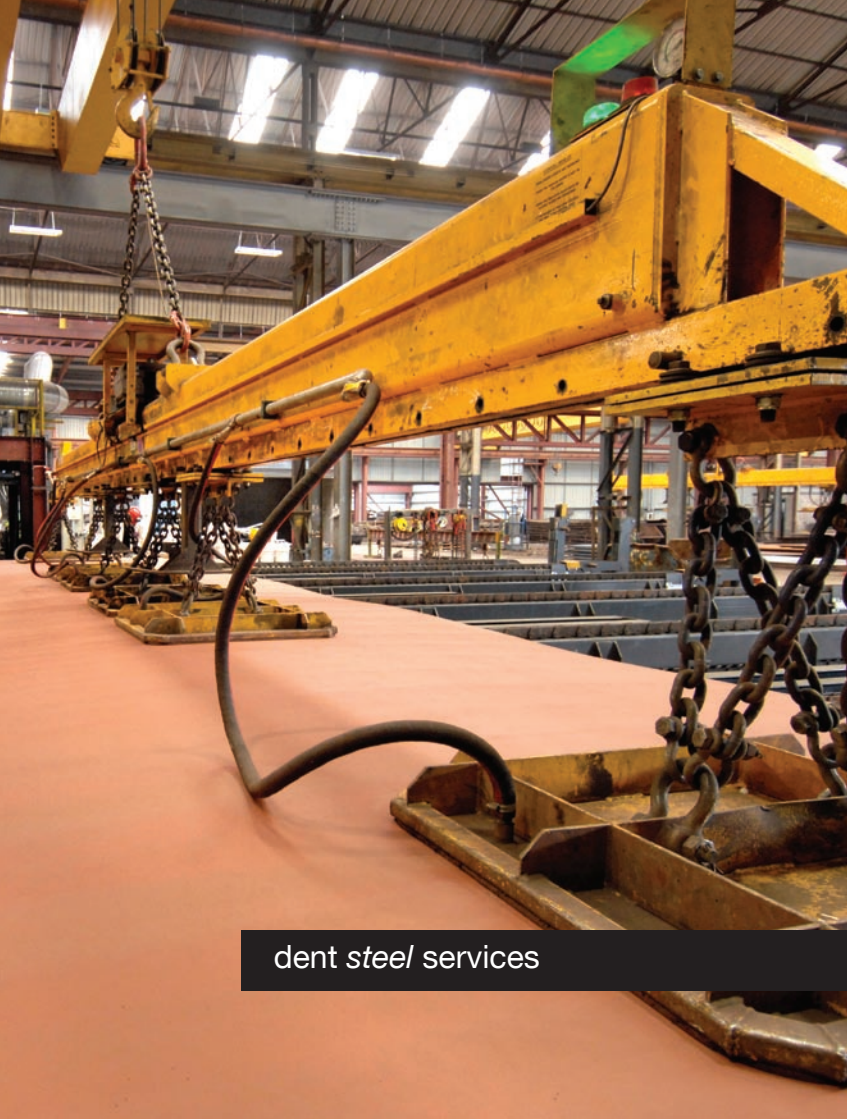
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