TONONOKA STEELS LIMITED

MANUFACTURERS OF :

- Black Pipes (1/2" to 8", Galvanised & (1/2" to 10),
- Square Hollow Sections 16 x 16 to 200 x 200mm
- Rectangular Hollow Sections (40 x 25 to 200 x 100mm)
- Steel Door Profiles
- Cold Formed Channels
- Galvanished Conduits
- Mild Steel Plates, Zed Purlins

DIRECT IMPORTERS & DEALERS OF

- Universal Beams, Columns, Joists
- UPN Channels
- Hot Rolled Angles, Hot Rolled Flats
- Mild Steel. Plates (upto 50 mm)
- Aluminium Sheets
- Plain and Chequered
- Stainless Steel Sheets
- GCI Sheets and Coloured Sheets

HEAD OFFICE & FACTORY : AIRPORT NORTH ROAD, EMBAKASI

Tel: +254-20-826330-6 / 2493144-6 • Fax : 826337 / 823860 / 2493147

TONONOKA ROLLING MILLS LTD.

MANUFACTURERS OF :

- Reinforcement Steel Round, Twisted and Square Bars
- Mild Steel Flats, Mild Steel Angles, Mild Steel Channels
- Mild Steel Zed-Section
- Mild Steel Tee-Section

FACTORY LOCATION: KOMAROK ROAD, DANDORA, NAIROBI

P.O. BOX 44689 - 00100, NAIROBI, KENYA • Tel: 020 - 2121840 / 1 • Mobile: 0703 - 741875, 0733 - 613098
E-mail : trm@tononokasteels.com

WATER PIPES

Tononoka Steels LImited Manufactures water pipes to international standards as specified by **British (BS) International (IS)** and **Kenya (KS) Standards**. Accurately sized strips, cut from high quality hot rolled mild steel coils, are fed Into the tube mill. The flat strip is gradually formed to a round profile with an open seam along its length.

A high frequency induction welding technique is used to form a strong continuous seam joint The formed pipe passes through an external bead scarfing and sizing process to bring its dimensions within specified tolerances. The pipes are then cut to desired length.

The cut pipes are end faced, Straightened, and hydrotested. Each pipe is subjected to a specified pressure at the hydrotester to ensure that welding is strong and free from leakage.

After this stage, if required, the pipes are galvanised threaded and socketed. The manufacturing process uses Hot Rolled (HR) mild steel with a composition of carbon 0.20% maximum : phosphorous 0.05% maximum : manganese 1.20% maximum; sulphur 0.05% maximurn and silicon traces.

All the water pipes are threaded to (BSPT specification and are fitted with a socket on one end)

GALVANISED AND BLACK STEEL PIPES

Bore	Class	Diameter in mm	Thickness in mm	Outside Diameter in mm	Weight of Black Pipe Kg / 6m	Weight of Black Pipe Kg / m	Weight of Galvanised Pipe
1/2 Inch	"A"	15	2	21.3	5.71	0.95	1.04
3/4 Inch	"A"	20	2.35	26.9	8.46	1.41	1.53
1 Inch	"A"	25	2.65	33.7	12.60	2.01	2.19
1 1/4 Inch	"A"	32	2.65	42.4	15.50	2.58	2.82
1 1/2 Inch	"A"	40	2.9	48.3	19.50	3.25	3.55
2 Inch	"A"	50	2.9	60.3	24.70	4.11	4.51
2 1/2 Inch	"A"	65	3.25	76.2	34.80	5.8	6.39
3 Inch	"A"	80	3.25	88.9	40.90	6.81	7.54
4 Inch	"A"	100	3.65	114.3	59.30	9.89	11.02
1/2 Inch	"B"	15	2.65	21.3	7.32	1.22	1.33
3/4 Inch	"B"	20	2.65	26.9	9.48	1.58	1.72
1 Inch	"B"	25	3.25	33.7	14.60	2.44	2.66
1 1/4 Inch	"B"	32	3.25	42.4	18.80	3.14	3.42
1 1/2 Inch	"B"	40	3.25	48.3	21.70	3.61	3.94
2 Inch	"B"	50	3.65	60.3	30.60	5.1	5.58
2 1/2 Inch	"B"	65	3.65	76.2	39.10	6.51	7.16
3 Inch	"B"	80	4.05	88.9	50.80	8.47	9.33
4 Inch	"B"	100	4.5	114.3	72.60	12.1	13.39
5 Inch	"B"	125	4.85	139.7	97.20	16.2	18.04
6 Inch	"B"	150	4.85	165.1	115.20	19.2	21.38
8 Inch	"B"	200	5.00	215.3	156.00	26	26.9
1/2 Inch	"C"	15	3.25	21.3	8.70	1.45	1.58
3/4 Inch	"C"	20	3.25	26.9	11.40	1.9	2.06
1 Inch	"C"	25	4.05	33.7	17.80	2.97	3.23
1 1/4 Inch	"C"	32	4.05	48.3	23.00	4.43	4.83
1 1/2 Inch	"C"	40	4.05	48.3	26.60	4.43	4.83
2 Inch	"C"	50	4.5	60.3	37.00	6.17	6.74
2 1/2 Inch	"C"	65	4.5	76.2	47.40	7.9	8.66
3 Inch	"C"	80	4.85	88.9	60.60	10.1	11.12
4 Inch	"C"	100	5.4	114.3	86.40	14.4	15.88
5 Inch	"C"	125	5.4	139.7	106.80	17.8	19.76
6 Inch	"C"	150	5.4	165.1	127.20	21.2	23.54
8 Inch	"C"	200	6.00	217.3	186.60	31.1	32.00

COLD FORMED SECTIONS

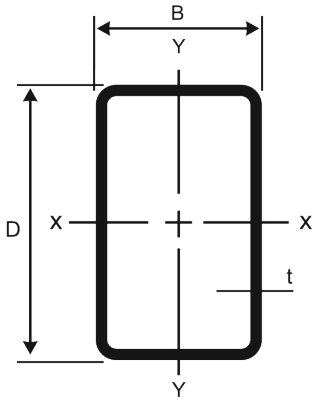
Cold-formed steel sections commonly known as hollow sections conform to **Kenya Bureau of Standards KS 02-104.** Hollow sections are manufactured on tube mails using **high frequency induction welding technique.** The strip is continuously seam welded while round in shape and then gradually brought to the desired section in the sizing mill. The welded seam is put to a great amount of cold working while being sized. This is a very severe test of the strength of a seam weld and ensures that each length of hollow section is welded for maximum strength.

RECTANGULAR HOLLOW SECTIONS

SIZE (DXB)	THICK-NESS(t)	WEIGHT	PIECES PER M.T.	SECT. AREA	MOMENT OF INERTIA		RADIUS OF GYRATION		SECTION MODULUS	
mm	mm	kg/m		(cm^2)	Ix(cm^4)	Iy(cm^4)	Ix(cm)	Iy(cm)	Zx(cm^3)	Zy(cm^3)
40 x 20	1.2 1.5 2.0	1.08 1.40 1.76	154 119 95	1.38 1.71 2.24	2.87 3.49 4.44	0.96 1.15 1.44	1.44 1.43 1.14	0.83 0.83 0.80	1.44 1.75 2.22	0.96 1.15 1.43
40 x 25	1.2 1.5 2.0 3.0	1.18 1.46 1.91 2.78	141 114 87 60	1.50 1.86 2.44 3.54	3.32 4.04 5.17 7.11	1.59 1.73 2.43 3.26	1.49 1.47 1.45 1.42	1.03 1.01 0.99 0.96	1.66 2.02 2.59 3.59	1.27 1.54 1.94 2.61
50 x 25	1.2 1.5 2.0 3.0	1.37 1.69 2.23 3.25	122 99 75 51	1.74 2.15 2.84 4.14	4.73 7.00 9.00 12.55	1.93 2.43 2.96 3.99	1.81 1.80 1.78 1.74	1.05 1.04 1.02 0.96	2.29 2.80 3.60 5.02	1.54 1.87 2.37 3.19
60 x 40	1.2 1.5 2.0 3.0	1.84 2.28 3.01 4.43	91 73 55 38	2.34 2.90 3.83 5.64	12.12 14.89 19.31 27.38	6.48 7.93 10.22 14.31	2.27 2.26 2.24 2.21	1.66 1.65 1.63 1.59	4.04 4.96 6.43 9.12	3.24 3.96 5.11 7.10
75 x 50	2.0 3.0 4.0	3.73 5.60 7.34	45 30 23	4.84 7.14 9.36	38.50 55.30 70.50	20.50 29.10 36.70	2.82 2.78 2.74	2.06 2.02 1.98	10.20 14.70 18.80	8.21 11.60 14.70
100 x 50	3.0 4.0	6.78 8.92	25 19	8.64 11.30	112.00 144.00	37.40 47.30	3.60 3.56	2.08 2.04	22.40 28.80	14.90 18.90
125 x 75	2.0 3.0 4.0 6.0	6.15 9.14 12.06 17.71	27 18 14 9	7.84 11.64 15.36 22.56	172.53 251.74 326.47 463.18	78.56 113.68 146.21 203.99	4.69 4.65 4.61 4.53	3.17 3.13 3.09 3.01	27.60 40.28 52.24 74.11	20.95 30.32 38.99 54.40
150 x 50	3.0 4.0 6.0	9.14 12.06 17.71	18 14 9	11.60 15.30 22.56	311.00 404.00 574.03	54.00 68.50 93.15	5.18 5.14 5.04	2.15 2.11 2.03	41.50 53.80 76.54	21.60 27.40 37.26
200 x 100	3.0 4.0 6.0	13.85 18.34 27.13	12 9 6	17.64 23.36 34.56	947.00 1240.00 1794.00	324.00 421.00 599.00	7.33 7.29 7.20	4.28 4.24 4.16	94.72 124.03 179.39	64.78 84.15 119.81

TOLERANCES IN DIMENSIONS

CHARACTERISTIC	TOLERANCE
Outside Dimensions	± 1.5mm or 2% Whichever is less
Deviation from straightness	0.17% of total length
Squareness of corners	90° ± 2° ?
Twist	Not to exceed 2mm + 0.5mm per meter
Concavity / Convexity	(i) For dimensions up to 50mm, 2% or 0.5mm whichever is less (ii) For dimensions up to 50mm, 1% or 1.5mm whichever is less
Outside bend radii for right angle bends	3t max
Length (6 meters) - exact - Standard	-0 and + 10mm -10mm and + 100mm
Thickness	± 10 %



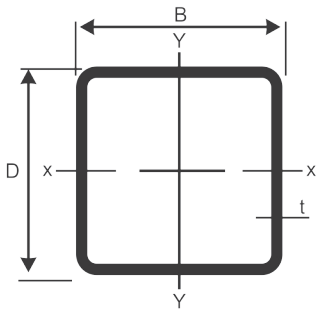
COLD FORMED SECTIONS (Continued)

SQUARE HOLLOW SECTIONS

SIZE (D X B)	Thickness (t)	Weight	Pieces per Metric Tons	Sectional Area	Moment of INERTIA		Radius of GYRATION	
mm	mm	Kg/Mtr	Pcs/MT	(cm2)	Ix(cm4)	Iy(cm4)	Ix(cm4)	Iy(cm4)
16 x 16	1.0	0.48	347	0.60	0.22	0.22	0.60	0.60
	1.2	0.56	298	0.71	0.26	0.26	0.60	0.60
	1.5	0.68	245	0.87	0.30	0.30	0.59	0.59
20 x 20	1.0	0.61	273	0.76	0.46	0.46	0.78	0.78
	1.2	0.71	235	0.90	0.53	0.53	0.77	0.77
	1.5	0.87	192	1.11	0.64	0.64	0.75	0.75
	2.0	1.13	147	1.44	0.79	0.79	0.73	0.73
25 x 25	1.0	0.80	208	0.96	0.92	0.92	0.98	0.98
	1.2	0.90	185	1.14	1.08	1.08	0.97	0.97
	1.5	1.11	150	1.41	1.30	1.30	0.96	0.96
	2.0	1.75	95	2.24	2.94	2.94	0.94	0.94
	3.0	2.07	81	2.64	2.17	2.17	0.90	0.90
30 x 30	1.0	0.93	179	1.16	1.63	1.63	1.17	1.17
	1.2	1.08	154	1.38	1.91	1.91	1.17	1.17
	1.5	1.34	124	1.71	2.32	2.32	1.16	1.16
	2.0	1.75	95	2.24	2.94	2.94	1.14	1.14
	3.0	2.54	66	3.24	3.99	3.99	1.11	1.11
40 x 40	1.2	1.46	114	1.86	4.67	4.67	1.58	1.58
	1.5	1.81	92	2.31	5.71	5.71	1.57	1.57
	2.0	2.39	70	3.04	7.34	7.34	1.55	1.55
	3.0	3.48	48	4.44	10.20	10.20	1.51	1.51
50 x 50	1.2	1.84	91	2.34	9.30	9.30	1.99	1.99
	1.5	2.28	73	2.91	11.42	11.42	1.98	1.98
	2.0	3.01	55	3.84	14.77	14.77	1.96	1.96
	3.0	4.43	38	5.64	20.85	20.85	1.92	1.92
60 x 60	3.0	5.37	31	6.84	37.14	37.14	2.33	2.33
	4.0	7.03	24	8.96	47.07	47.07	2.29	2.29
75 x 75	2.0	4.58	36	5.84	51.91	51.91	2.98	2.98
	3.0	6.78	25	8.64	74.78	74.78	2.94	2.94
	4.0	8.92	19	11.36	95.75	95.75	2.90	2.90
	6.0	13.00	13	16.56	132.40	132.40	2.83	2.83
100 x 100	2.0	6.15	27	7.84	125.54	125.54	3.96	3.96
	3.0	9.14	18	11.64	182.71	182.71	3.91	3.91
	4.0	12.18	14	15.36	236.34	236.34	3.88	3.88
	6.0	17.71	9	22.56	333.59	333.59	3.85	3.85
125 x 125	3.0	11.49	15	14.64	363.00	363.00	3.05	3.05
	4.0	15.20	11	19.36	473.00	473.00	4.94	4.94
	6.0	22.42	7	28.56	676.00	676.00	4.90	4.90
150 x 150	3.0	13.85	12	17.64	636.00	636.00	5.96	5.96
	4.0	18.34	9	23.36	831.00	831.00	5.92	5.92
	6.0	27.13	6	34.56	1196.00	1196.00	5.88	5.88
175 x 175	4.0	21.48	8	27.36	1334.00	1334.00	6.98	6.98
	6.0	31.84	5	40.56	1933.00	1933.00	6.90	6.90
200 x 200	4.0	24.62	7	31.36	2009.00	2009.00	8.00	8.00
	6.0	36.55	5	46.46	2923.35	2923.35	7.92	7.92

TOLERANCES IN DIMENSIONS

CHARACTERISTIC	TOLERANCE
Outside Dimensions	± 1.5mm or 2% Whichever is less
Deviation from straightness	0.17% of total length
Squareness of corners	90° ± 2° ?
Twist	Not to exceed 2mm + 0.5mm per meter
Concavity / Convexity	(i) For dimensions up to 50mm, 2% or 0.5mm whichever is less (ii) For dimensions up to 50mm, 1% or 1.5mm whichever is less
Outside bend radii for right angle bends	3t max
Length (6 meters) - exact - Standard	-0 and + 10mm -10mm and + 100mm
Thickness	± 10 %



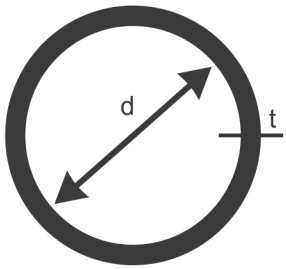
COLD FORMED SECTIONS (Continued)

ROUND HOLLOW SECTIONS

Outside Diameter (mm) (d)	Sheet Thickness (mm) (t)	Sectional Area (cm^2) (a)	Mass (kg/m) (w)	Moment of Inertia (cm^4) (I)	Modulus of section (cm^3) (z)	Radius of Gyration (cm) (r)
16	1.0	0.47	0.37	0.13	0.17	0.53
	1.2	0.56	0.44	0.15	0.19	0.52
	1.5	0.68	0.54	0.18	0.23	0.52
20	1.0	0.60	0.50	0.27	0.27	0.67
	1.2	0.71	0.59	0.31	0.31	0.67
	1.5	0.87	0.75	0.38	0.38	0.66
22	1.0	0.66	0.52	0.36	0.33	0.74
	1.2	0.78	0.62	0.43	0.39	0.74
	1.5	0.97	0.76	0.51	0.46	0.73
25	1.0	0.75	0.59	0.54	0.44	0.85
	1.2	0.90	0.70	0.64	0.51	0.84
	1.5	1.11	0.87	0.77	0.61	0.83
32	1.2	1.16	0.91	1.38	0.86	1.09
	1.5	1.44	1.13	1.68	1.05	1.08
38	1.2	1.39	1.12	2.35	1.24	1.30
	1.5	1.72	1.38	2.87	1.51	1.29
42	1.2	1.55	1.21	3.26	1.54	1.45
	1.5	1.92	1.54	3.99	1.89	1.44
48	1.2	1.77	1.39	4.91	2.04	1.66
	1.5	2.20	1.73	6.02	2.50	1.65
60	1.5	2.76	2.16	11.80	3.93	2.07
	2.0	3.64	2.86	15.34	5.11	2.50
76	2.0	4.65	3.75	31.85	8.38	2.62
	2.5	5.77	4.53	39.02	10.27	2.60

TOLERANCES IN DIMENSIONS

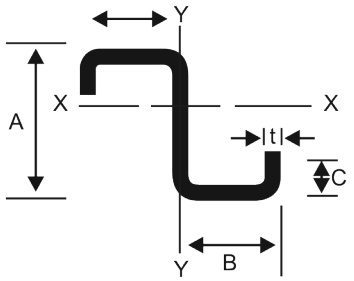
CHARACTERISTIC	TOLERANCE
Outside Dimensions	± 1.5mm or 2% Whichever is less
Deviation from straightness	0.17% of total length
Squareness of corners	90° ± 2° ?
Twist	Not to exceed 2mm + 0.5mm per meter
Concavity / Convexity	(i) For dimensions up to 50mm, 2% or 0.5mm whichever is less (ii) For dimensions up to 50mm, 1% or 1.5mm whichever is less
Outside bend radii for right angle bends	3t max
Length (6 meters) - exact - Standard	-0 and + 10mm -10mm and + 100mm
Thickness	± 10 %



COLD FORMED SECTIONS (Continued)

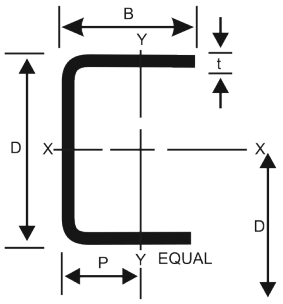
ZED PURLINS

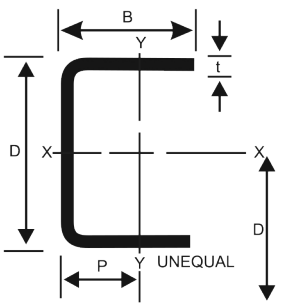
SIZE (AXB)		THICK-NESS (t)	WEIGHT	SECT AREA	DIMENSIONS			MOMENT OF INERTIA		SECTION MODULUS		RADIUS OF GYRATION	
					A	B	C	Ix	Iy	Zx	Zy	ix	iy
mm	inch	mm	kg/m	(cm^2)	mm	mm	mm	(cm^4)	(cm^4)	(cm)	(cm)	(cm^3)	(cm^3)
101.6 x 50.8	4" x 2"	2.0	3.64	4.63	101.6	50.8	12.60	70.18	33.87	13.81	6.80	3.83	2.70
114.6 x 50.8	4½" x 2"	2.0	3.85	4.90	114.6	50.8	22.20	98.24	33.87	17.19	6.80	4.47	2.62
127.0 x 50.8	5" x 2"	2.0	4.05	5.16	127.0	50.8	22.20	125.99	33.87	19.84	6.80	4.94	2.56
139.7 x 50.8	5½" x 2"	2.0	4.24	5.40	139.7	50.8	22.20	157.80	33.87	22.60	6.80	5.40	2.50
152.4 x 50.8	6" x 2"	2.0	4.44	5.66	152.2	50.8	22.20	194.14	33.87	25.47	6.80	5.85	2.44
177.8 x 50.8	7" x 2"	2.0	4.95	6.30	177.8	50.8	22.20	285.83	34.57	32.15	6.94	6.73	2.34
177.8 x 50.8	7" x 2"	2.5	6.15	7.84	177.8	50.8	22.20	350.49	41.58	39.42	8.39	6.68	2.30



PLAIN CHANNELS (COLD FORMED)

SIZE (DXB)	THICK-NESS (t)	WEIGHT	SECT AREA	MOMENT OF INERTIA		SECTION MODULUS		RADIUS OF GYRATION		P
				Ix	Iy	Zx	Zy	ix	iy	mm
mm	mm	kg/m	(cm^2)	(cm^4)	Iy(cm^4)	ix(cm)	iy(cm)	Zx(cm^3)	Zy(cm^3)	mm
50 x 50	1.5 2.0 3.0	1.88 2.32 3.62	2.39 2.96 4.61	11.24 13.69 20.23	6.62 8.16 12.36	4.43 5.40 7.97	2.02 2.50 3.85	2.17 2.15 2.10	1.67 1.66 1.64	17.81 18.03 18.69
65 x 50	2.0 3.0	2.46 3.60	3.14 4.59	23.63 33.99	8.54 12.41	7.27 10.46	2.50 3.68	2.71 2.67	1.63 1.61	15.91 16.28
75 x 50	2.0 3.0	2.62 3.84	3.34 4.89	32.62 47.12	8.95 13.03	8.70 15.56	2.56 3.77	3.09 3.05	1.62 1.60	15.04 15.04
100 x 50	2.0 3.0	3.13 4.91	3.99 6.25	65.55 98.93	10.36 15.94	12.90 19.69	2.79 4.34	3.05 3.94	1.61 1.59	13.64 14.20
150 x 50	2.0 3.0	3.94 6.21	5.02 7.90	168.89 260.08	11.69 18.02	22.17 34.14	2.93 4.95	5.80 5.73	1.52 1.51	11.04 11.58





COLD FORMED SECTIONS (Continued)

STEEL DOOR FRAME SECTIONS (Better alternative to Timber Door Frames)

Steel Door Frame sections are cold formed using hot rolled steel strips. During rolling, care is taken to ensure dimensional uniformity, extremely smooth surface finish and accurately finished edges. The section, being of structural strength has of late come to be a better alternative to timber door frames.

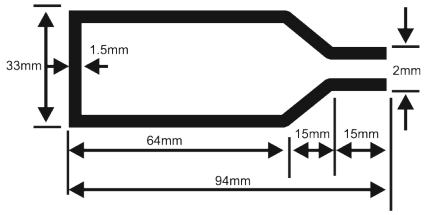
Timber Door Frame section have been having problems like deterioration due to weather, warping and difficult of installation, White Ants etc.

Steel Door Frame section can be used in any modern building, from apartments to educational Institutions, low cost housing to high rise office complexes.

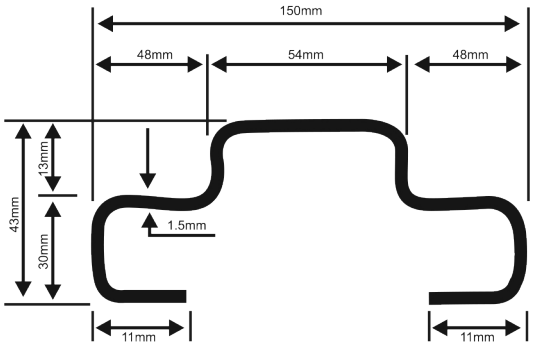
PROFILE DIMENSION AND WEIGHT OF SECTIONS

PROFILE	SIZE (mm)	THICKNESS (mm)	WEIGHT Kgs / Pc (6M)	THICKNESS (mm)	WEIGHT Kgs / Pc (6M)
BOUTEILLE	94 x 33	1.2	12.80	1.5	15.60
HS	150 X 43 X 11	1.2	13.60	1.5	18.00

PROFILE BOUTEILLE



PROFILE HS



OTHER PRODUCTS

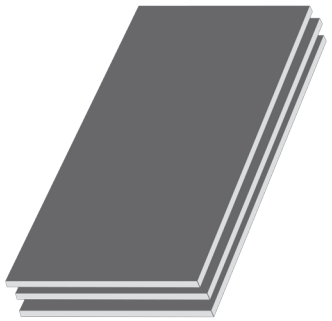
SHEETS AND PLATES

COLD ROLLED PLATES

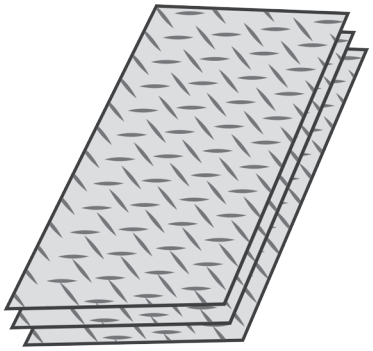
THICKNESS in mm	Weight	ALUMINIUM in 8ft x 4ft	BRASS in 8ft x 4 ft	COPPER in 8ft x 4 ft
0.4 mm CR	9.33	3.23	10.20	10.70
0.5 mm CR	11.70	4.03	12.70	13.30
0.6 mm CR	14.00	4.48	15.30	16.00
0.8 mm CR	18.70	6.45	20.40	21.30

HOT ROLLED PLATES

1.0 mm HR	23.30	8.06	25.50	26.60
1.2 mm HR	28.00	9.68	30.60	32.00
1.5 mm HR	35.00	12.10	38.20	39.90
2.0 mm HR	46.70	16.10	51.00	53.30
2.5 mm HR	58.30	20.20	637.00	66.60
2.8 mm HR	65.30	22.60	71.40	74.60
3.0 mm HR	70.00	24.20	76.40	79.90
4.0 mm HR	93.30	32.30	102.00	107.00
4.5 mm HR	105.00	36.30	115.00	120.00
6 mm HR	140.00	48.40	153.00	160.00
7 mm HR	164.00	-	-	-
8 mm HR	187.00	-	-	-
9 mm HR	210.00	-	-	-
10 mm HR	234.00	-	-	-
12 mm HR	280.00	-	-	-
15 mm HR	350.00	-	-	-
18 mm HR	420.00	-	-	-
20 mm HR	468.00	-	-	-
22 mm HR	514.00	-	-	-
25 mm HR	585.00	-	-	-
30 mm HR	702.00	-	-	-
32 mm HR	749.00	-	-	-
38 mm HR	887.00	-	-	-
50 mm HR	1170.00	-	-	-



MS Sheets



Chequered Plates

CHEQUERED PLATES

THICKNESS in mm	MILD STEEL	ALUMINIUM
1.2 mm	-	12.00
1.5 mm	-	15.35
1.6 mm	43.20	-
1.8 mm	48.60	19.25
2.0 mm	54.00	19.30
2.3 mm	62.10	-
2.5 mm	67.50	-
2.8 mm	71.00	29.80
3.0 mm	76.00	32.20
4.0 mm	98.70	-
4.5 mm	115.00	-
6.0 mm	150.00	-

GALVANISED STEEL CONDUITS

NOMINAL SIZE	OUTSIDE DIAMETER		WALL THICKNESS	LENGTH OF THREAD		WEIGHT	RESISTANCE
	MIN	MAX		MIN	MAX		OHMS/m
mm	mm	mm	mm	mm	mm	kg/m	max
20	19.7	20	1.6	13	15	0.75	5×10^3
25	24.6	25	1.6	16	18	0.91	5×10^3
32	31.6	32	1.6	18	20	1.16	5×10^3
50	49.5	50	1.6	24	26	1.88	5×10^3

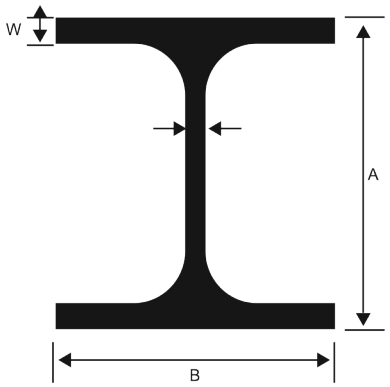
TRADING ITEMS

DIRECT IMPORTERS & DEALERS OF:

- Beams HE & IPE
- MS Channels UPN & Angles
- MS Plates 8mm up to 50mm thck
- MS Flats up to 250mm
- Aluminum Sheets - Plan & Chequered
- Stainless Steel Sheets

UNIVERSAL BEAMS AND COLUMNS, WIDE FLANGE BEAMS

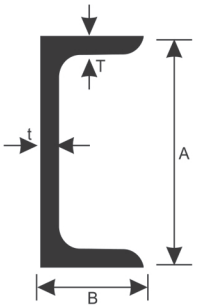
NOMINAL SIZE	THEORETICAL	H HEIGHT	B WIDTH	tw FLANGE	tf WEB
Milimeters	Mass kg/m	mm	mm	Thickness(mm)	Thickness(mm)
203 x 133	25.1	203.2	133.4	7.8	5.8
	30.0	206.8	133.8	9.6	6.3
254 x 146	31.1	251.5	146.1	8.6	6.1
	37.0	256.0	146.4	10.9	6.4
	43.0	259.6	147.3	12.7	7.3
305 x 102	24.8	304.8	101.6	6.8	5.8
	28.2	308.9	101.9	8.9	6.1
	32.8	312.7	102.4	10.8	6.6
305 x 165	40.3	303.8	165.1	10.2	6.1
	46.1	307.1	165.7	11.8	6.7
	54.0	310.9	166.8	13.7	7.7
356 x 171	45.0	352.0	171.0	9.7	6.9
	51.0	355.6	171.5	11.5	7.3
	57.0	358.6	172.1	13.0	8.0
	67.1	364.0	173.2	15.7	9.1
406 x 140	39.0	397.3	141.8	8.6	6.3
	46.3	402.3	142.4	11.2	6.9
406 x 178	54.1	402.6	177.6	10.9	7.6
	60.1	406.4	177.8	12.8	7.8
	67.1	409.4	178.8	14.3	8.8
	74.2	412.8	179.7	16.0	9.7
457 x 191	67.1	453.6	189.9	12.7	8.5
	74.3	457.2	190.5	14.5	9.1
	82.0	460.2	191.3	16.0	9.9
	89.3	463.6	192.0	19.6	11.4
	98.3	467.4	192.8	19.6	11.4
533 x 210	82.2	528.3	208.7	13.2	9.6
	92.1	533.1	209.3	15.6	10.2
	101.0	536.7	210.1	17.4	10.9
	109.0	539.8	210.7	18.8	11.6
	122.0	544.6	211.9	21.3	12.8



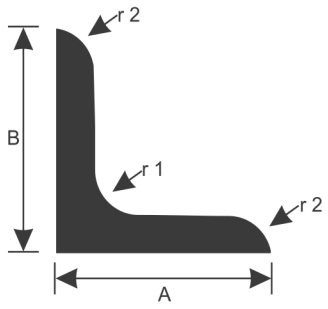
UNIVERSAL COLUMNS					
NOMINAL SIZE	THEORETICAL	H HEIGHT	B WIDTH	tw FLANGE	tf WEB
Millimeters	Mass kg/m	mm	mm	Thickness(mm)	Thickness(mm)
152 x 152	23.0	152.4	152.4	6.8	6.1
	30.0	157.2	152.9	9.4	6.6
	37.0	161.8	154.4	11.5	8.1
203 x 203	46.1	203.2	203.2	11.0	7.3
	52.0	206.2	203.9	12.5	8.0
	60.0	209.6	205.2	14.2	9.3
	71.0	215.9	206.2	17.3	10.3
	86.1	222.3	208.8	20.5	13.0
254 x 254	73.1	254.2	254.0	14.2	8.6
	88.9	260.4	255.9	17.3	10.5
	107.1	266.0	258.3	20.5	13.0
	132.0	276.4	261.0	25.1	15.6
	167.0	289.1	264.5	31.7	19.2
305 x 305	96.9	307.8	304.8	15.4	9.9
	117.9	314.5	306.8	18.7	11.9
	136.9	320.5	308.7	21.7	13.8
	158.1	327.2	310.6	25.0	15.7

CHANNELS

NOMINAL SIZE	THEORETICAL	H HEIGHT	B WIDTH	tw FLANGE	tf WEB
Millimeters	Mass kg/m	mm	mm	Thickness(mm)	Thickness(mm)
57 x 51	6.84	57.2	50.8	6.1	6.1
76 x 38	6.70	76.2	38.1	6.8	5.1
100 x 50	10.60	100.0	50.0	8.5	6.0
120 x 55	13.40	120.0	55.0	9.0	7.0
127 x 64	14.90	127.0	63.5	9.2	6.4
140 x 60	16.00	140.0	60.0	10.0	7.0
152 x 76	17.90	152.4	76.2	9.0	6.4
160 x 65	18.80	160.0	65.0	10.5	7.5
178 x 54	14.51	177.8	54.0	8.3	5.8
178 x 76	20.84	177.8	76.2	10.3	6.6
180 x 70	22.00	180.0	70.0	11.0	8.0
200 x 75	23.30	200.0	75.0	11.5	8.5
200 x 80	29.40	220.0	80.0	12.5	9.0
229 x 76	26.10	229.0	76.0	11.2	7.6
254 x 76	28.27	254.0	76.0	10.9	8.1
254 x 89	35.70	254.0	89.0	13.6	9.1
260 x 90	37.90	260.0	90.0	14.0	10.0
300 x 100	46.20	300.0	100.0	16.0	10.0
305 x 89	41.80	305.0	89.0	13.7	10.2
381 x 102	55.05	381.0	101.6	16.3	10.4



ANGLES - Equal									
Designation	Nominal Mass	Typical radius	Sectional area	Distance of centre of gravity				Paint area	
A x A x t (mm)	Kg/m	root (mm)	10^3 mm^2	c_x (mm)	c_y (mm)	c_v (mm)	e_{v_v} (mm)	m^2/m Length	m^2/ton
25 x 25 x 2.0	0.775	3,5	0.099	6.9	6.9	9.7	9.2	0.097	125.2
25 x 25 x 2.5	0.953	3,5	0.124	7.0	7.0	9.9	8.7	0.097	103.2
25 x 25 x 3	1.114	3,5	0.142	7.2	7.2	10.2	8.8	0.097	87.4
25 x 25 x 4.5	1.614	3,5	0.205	7.4	7.4	11.0		0.097	59.9
25 x 25 x 5	1.773	3,5	0.226	8.0	8.0	11.3	9.1	0.097	54.8
30 x 30 x 2.0	0.953	3,5	0.121	8.1	8.1	11.5	10.5	0.116	121.7
30 x 30 x 2.5	1.171	3,5	0.146	8.1	8.1	11.5	10.5	0.116	100.9
30 x 30 x 3	1.363	3,5	0.174	8.4	8.4	11.8	10.5	0.116	85.3
30 x 30 x 5	2.180	3,5	0.278	9.2	9.2	13.0	10.7	0.116	53.2
40 x 40 x 2,0	1.246	3,5	0.159	10.0	10.0	15.0	14.7	0.155	124.4
40 x 40 x 2.5	1.582	3,5	0.988	10.5	10.5	14.9	14.1	0.155	98.7
40 x 40 x 3	1.845	3,5	0.235	10.7	10.7	15.2	14.0	0.155	84.2
40 x 40 x 4	2.417	3,5	0.308	11.2	11.2	15.8		0.155	64.3
40 x 40 x 5	2.974	3,5	0.379	11.6	11.6	16.4	14.1	0.155	52.2
40 x 40 x 6	3.516	3,5	0.448	12.0	12.0	17.0	14.3	0.155	44.0
45 x 45 x 3	2.131	3,5	0.266	11.8	11.8	16.7	15.7	0.174	83.3
45 x 45 x 4	2.742	3,5	0.349	12.3	12.3	17.5		0.174	63.5
45 x 45 x 5	3.378	3,5	0.430	12.8	12.8	18.1	15.8	0.174	51.5
50 x 50 x 3	2.367	7	0.296	13.1	13.1	18.5	17.5	0.194	85.1
50 x 50 x 4	3.056	7	0.389	13.6	13.6	19.2	17.6	0.194	60.0
50 x 50 x 5	3.770	7	0.480	14.0	14.0	19.9	17.6	0.194	51.5
50 x 50 x 6	4.469	7	0.569	14.4	14.4	20.4	17.7	0.194	43.4
50 x 50 x 8	5.819	7	0.741	15.2	15.2	21.6	18.0	0.194	33.3
60 x 60 x 4	3.696	7	0.471	16.0	16.0	22.6	21.0	0.233	63.7
60 x 60 x 5	4.568	7	0.582	16.4	16.4	23.2	21.1	0.233	51.0
60 x 60 x 6	5.423	7	0.691	16.9	16.9	23.9	21.1	0.233	43.0
60 x 60 x 8	7.088	7	0.903	17.7	17.7	25.0	21.4	0.233	32.9
65 x 65 x 5	4.974	7	0.634	17.7	17.7	25.0	22.9	0.253	51.0
65 x 65 x 6	5.908	7	0.753	18.0	18.0	25.6	22.6	0.253	42.9
70 x 70 x 6	6.380	9	0.813	19.3	19.3	27.3	24.6	0.272	42.6
70 x 70 x 8	8.358	9	1.065	20.1	20.1	28.5	24.8	0.272	32.5
70 x 70 x 10	10.273	9	1.309	20.9	20.9	29.6	24.1	0.272	26.4
80 x 80 x 6	7.338	10	0.935	21.7	21.7	30.7	28.1	0.311	42.4
80 x 80 x 8	9.630	10	1.227	22.6	22.6	31.9	28.3	0.311	32.3
80 x 80 x 10	11.859	10	1.511	23.4	23.4	33.0	28.5	0.311	26.1
90 x 90 x 6	8.297	11	1.060	24.1	24.1	34.0	31.5	0.350	42.2
90 x 90 x 7	9.608	11	1.224	24.5	24.5	34.7	31.6	0.350	36.8
90 x 90 x 8	10.904	11	1.389	25.0	25.0	35.3	31.7	0.350	32.1
90 x 90 x 10	13.447	11	1.713	25.8	25.8	36.5	31.9	0.350	26.1
100 x 100 x 6	9.259	12	1.180	26.4	26.4	37.4	35.1	0.390	42.2
100 x 100 x 7	10.727	12	1.367	26.9	26.9	38.1	35.1	0.390	36.4
100 x 100 x 8	12.179	12	1.551	27.4	27.4	38.7	35.2	0.390	32.0
100 x 100 x 10	15.036	12	1.915	28.2	28.2	39.9	35.4	0.390	25.9
100 x 100 x 12	17.831	12	2.271	29.0	29.0	41.1	35.7	0.390	21.9
110 x 110 x 8	13.477	13	1.717	29.8	29.8	42.2	38.8	0.429	31.9
110 x 110 x 10	16.648	13	2.212	30.7	30.7	43.4	39.0	0.429	25.8
120 x 120 x 8	14.712	13	1.870	32.3	32.3	45.6	42.0	0.469	31.9
120 x 120 x 10	18.197	13	2.318	33.1	33.1	46.9	42.4	0.469	25.8
120 x 120 x 12	21.620	13	2.754	34.0	34.0	48.0	42.6	0.469	21.7
120 x 120 x 15	26.636	13	3.393	35.1	35.1	49.7	43.1	0.469	17.6
150 x 150 x 10	22.981	16	2.930	40.3	40.3	57.1	52.5	0.586	25.5
150 x 150 x 12	27.345	16	3.483	41.2	41.2	58.3	52.9	0.586	21.4
150 x 150 x 15	33.774	16	4.302	42.5	42.5	60.1	53.3	0.586	17.4
150 x 150 x 18	40.062	16	5.103	43.7	43.7	61.7	53.7	0.586	14.6

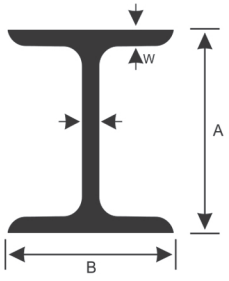


ANGLES - Unequal												
Designation	Nominal Mass	Typical radius	Sectional area	Distance of centre of gravity						Inclination of V - V	Paint area	
A x A x t (mm)	Kg/m	root (mm)	10^3 mm^2	c_x (mm)	c_y (mm)	c_v (mm)	e_v (mm)	e_u (mm)	c_u (mm)	axis tan	m^2/m Length	m^2/ton
100 x 75 x 6	8.044	10.00	1.025	30.1	17.9	30.1	36.7	69.9	53.9	0.548	0.341	42.44
100 x 75 x 7	9.316	10.00	1.187	30.6	18.3	30.7	36.6	69.7	54.1	0.549	0.341	36.67
100 x 75 x 8	10.572	10.00	1.347	31.0	18.7	31.3	36.5	69.5	54.2	0.547	0.341	32.29
100 x 75 x 9	11.812	10.00	1.505	31.5	19.1	31.8	36.5	69.4	54.3	0.546	0.341	28.92
100 x 75 x 10	13.037	10.00	1.661	31.9	19.5	32.4	36.5	69.2	54.5	0.544	0.341	26.18
125 x 75 x 7	10.707	11.00	1.364	40.9	16.4	28.9	42.2	86.7	58.4	0.360	0.391	36.58
125 x 75 x 8	12.160	11.00	1.549	41.4	16.8	29.8	42.0	84.4	58.6	0.360	0.391	32.11
125 x 75 x 9	13.596	11.00	1.732	41.8	17.2	30.3	41.9	84.1	58.8	0.358	0.391	28.81
125 x 75 x 10	15.017	11.00	1.913	42.3	17.6	30.8	41.7	83.8	59.1	0.357	0.391	26.00
125 x 75 x 12	17.812	11.00	2.269	43.1	18.4	31.7	41.5	83.3	59.5	0.354	0.391	21.92
150 x 75 x 9	15.362	11.00	1.957	52.7	15.7	28.7	45.0	90.0	51.1	0.260	0.441	23.77
150 x 75 x 10	16.979	11.00	2.163	53.2	16.1	29.1	44.8	97.7	56.3	0.261	0.441	25.94
150 x 75 x 11	18.581	11.00	2.367	53.6	16.5	29.5	44.7	97.4	61.6	0.260	0.441	23.77
150 x 75 x 12	20.167	11.00	2.569	54.1	16.9	29.9	44.5	97.1	66.9	0.259	0.441	21.34
150 x 90 x 9	16.441	12.00	2.095	49.5	20.0	35.6	50.5	101.5	70.4	0.368	0.470	28.63
150 x 90 x 10	18.176	12.00	2.315	50.0	20.4	36.1	50.3	101.0	70.6	0.361	0.470	25.84
150 x 90 x 12	21.599	12.00	2.751	50.8	21.2	37.1	50.0	100.5	71.1	0.358	0.470	21.75
150 x 90 x 15	26.615	12.00	3.390	52.0	22.3	38.4	49.8	99.8	71.6	0.354	0.470	17.64

JOISTS AND BEAMS IPE

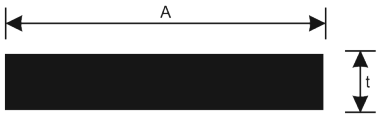
I.P.E. SECTION					
Size (A x B) in mm	Mass Kg/M	Height in mm	Width in mm	WEB Thickness in mm (t)	FLANGE Thickness in mm (w)
100 x 55	8.1	100.0	55.0	4.1	5.7
120 x 64	10.4	120.0	64.0	4.4	6.3
140 x 73	12.9	140.0	73.0	4.7	6.9
160 x 82	15.8	160.0	82.0	5.0	7.4
180 x 91	18.8	180.0	91.0	5.3	8.0
200 x 100	22.4	200.0	100.0	5.6	8.5

I.P.E. AA SECTION					
NOMINAL SIZE	THEORETICAL	H HEIGHT	B WIDTH	tf WEB	tw FLANGE
Millimeters	Mass kg/m	mm	mm	Thickness(mm)	Thickness(mm)
100 x 55	6.72	97.6	55.0	3.6	4.5
120 x 64	8.36	117.0	64.0	3.8	4.8
135 X 74	6.98	165.0	74.0	2.9	3.2
140 x 73	10.05	136.6	73.0	3.8	5.2
160 x 82	12.31	156.4	82.0	4.0	5.6
180 x 91	14.90	176.4	91.0	4.3	6.2
200 x 100	17.95	196.4	100.0	4.5	6.7



FLAT IRON WEIGHT PER 6 METER LENGTH

THICKNESS (I) / WIDTH in mm (A)	3.0mm	4.5mm	6.0mm	8.0mm	10.0mm	12.0mm	16.0mm	18.0mm
15.9	2.25	3.37						
19.05	2.69	4.04	5.38	7.18	8.97	10.77		
25.4	3.59	5.38	7.18	9.57	11.96	14.36	19.14	
31.8	4.49	6.74	8.99	11.98	14.98	17.97	23.96	
38.1	5.38	8.08	10.77	14.36	17.95	21.53	28.71	32.30
50.8	7.18	10.77	14.36	19.14	23.93	28.71	38.28	43.07
63.5	8.97	13.46	17.95	23.93	29.91	35.89	47.85	53.84
76.2	10.77	16.15	21.53	28.71	35.89	43.07	57.42	64.60
101.6	14.36	21.53	28.71	38.28	47.85	57.42	76.52	86.14
127.0	17.95	26.92	35.89	47.85	59.82	71.78	95.71	107.67
152.4	21.53	32.30	43.07	57.42	71.78	86.14	114.85	129.20



FLAT BARS (Dimensions and Properties)	Mass in Kg/m						
Thickness in mm	3 mm	4 mm	6 mm	8 mm	10 mm	12 mm	16 mm
20 mm	0.470	0.626	0.941	1.260	1.570	-	-
25 mm	0.590	0.785	1.180	1.570	1.960	2.360	-
30 mm	0.710	0.942	1.410	1.880	2.350	2.830	-
40 mm	0.940	1.255	1.880	2.510	3.140	3.770	-
50 mm	1.180	1.570	2.360	3.140	3.930	4.710	6.280
60 mm	-	-	2.830	3.770	4.710	5.650	7.540
65 mm	-	-	3.060	4.080	5.100	6.120	8.160
75 mm	-	-	3.530	5.290	6.380	7.070	9.860
100 mm	-	-	5.180	6.280	7.850	9.420	12.600

FLAT BARS		
Size	Thickness	Mass in Kilograms
20 mm	3 mm	2.82
20 mm	4 mm	3.76
20 mm	6 mm	5.65
25 mm	3 mm	3.54
25 mm	4 mm	4.71
25 mm	6 mm	7.08
25 mm	8 mm	9.42
25 mm	10 mm	11.76
25 mm	12 mm	14.16
30 mm	3 mm	4.26
30 mm	4 mm	5.65
30 mm	6 mm	8.46
30 mm	8 mm	11.28
30 mm	10 mm	14.16
30 mm	12 mm	16.98
40 mm	3 mm	5.64
40 mm	4 mm	7.53
40 mm	6 mm	11.28
40 mm	8 mm	15.06
40 mm	10 mm	18.84
40 mm	12 mm	22.62
50 mm	3 mm	7.08
50 mm	4 mm	9.42
50 mm	6 mm	14.16
50 mm	8 mm	18.84
50 mm	10 mm	23.58
50 mm	12 mm	28.26
50 mm	16 mm	37.68
60 mm	6 mm	16.98
60 mm	8 mm	22.62
60 mm	10 mm	28.00
65 mm	6 mm	18.36
65 mm	8 mm	24.48
65 mm	9 mm	27.54
65 mm	10 mm	30.60
65 mm	12 mm	36.72
75 mm	6 mm	21.18
75 mm	9 mm	31.80
75 mm	12 mm	42.42
100 mm	6 mm	28.26
100 mm	8 mm	37.68
100 mm	10 mm	47.10
100 mm	12 mm	56.52

WEIGHT OF 8' X 4' SHEETS AND PLATES IN KILOS

THICKNESS in mm	MILD STEEL STAINLESS STEEL	ALUMINIUM	BRASS	COPPER
0.4	9.33	3.23	10.2	10.7
0.5	11.7	4.03	12.7	13.3
0.6	14	4.48	15.3	16.0
0.8	18.7	6.45	20.4	21.3
1.0	23.3	8.06	25.5	26.6
1.2	28	9.68	30.6	32.0
1.5	35	12.10	38.2	39.9
2.0	46.7	16.10	51.0	53.3
2.5	58.3	20.20	637	66.6
2.8	65.3	22.60	71.4	74.6
3.0	70	24.20	76.4	79.9
4.0	93.3	32.30	102.0	107.0
4.5	105	36.30	115.0	120.0
6.0	140	48.40	153.0	160.0
7.0	164			
8.0	187			
9.0	210			
10.0	234			
12.0	280			
15.0	350			
18.0	420			
20.0	468			
22.0	514			
25.0	585			
30.0	702			
32.0	749			
38.0	887			
50.0	1170			
65.0	1515			
75.0	1750			
100.0	2335			

WEIGHT OF ROUND BARS IN KILOS PER METER

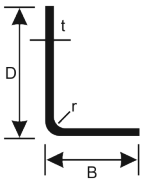
DIAMETER	BRASS	COPPER	BRIGHT STEEL
1/4"	0.27	0.29	0.25
5/16"	0.43	0.45	0.39
3/8"	0.61	0.64	0.56
7/16"	0.84	0.88	0.77
1/2"	1.08	1.13	0.99
9/16"	1.38	1.44	1.26
5/8"	1.69	1.77	1.55
3/4"	2.45	2.56	2.24
7/8"	3.32	3.47	3.04
1"	4.35	4.54	3.98
1 1/4"	5.49	5.74	5.03
1 1/2"	6.78	7.09	6.21
1 3/8"	8.21	8.58	7.52
1 3/4"	9.78	10.22	8.95
1 5/8"	11.47	11.98	10.50

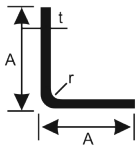
DIAMETER	BRASS	COPPER	BRIGHT STEEL
1 3/4	13.30	13.90	12.18
1 7/8	15.27	15.96	13.98
2"	17.37	18.15	15.90
2 1/4"	21.99	22.98	20.13
2 1/2"	27.14	23.36	24.85
2 5/8"	29.90	31.24	27.37
2 3/4"	32.85	34.24	30.07
3"	39.08	40.84	35.78
3 1/4"	45.87	47.93	41.99
3 1/2"	53.20	55.59	48.70
4"	69.48	72.60	63.61
4 1/2"	87.94	91.99	80.51
5"	108.56	113.44	99.39
5 1/8"	131.60	137.44	120.49
6"	156.33	163.36	143.12

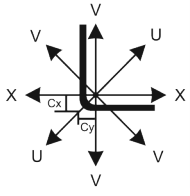
SAFE LOAD TABLE (For Cold Formed Sections)

SIZES MM D X B X t	WT KG/MT	AREA OF SECTION cm^2	RADIUS OF GYRATION cm	SECTION MODULUS cm^3	MAX. AXIAL TENSION (KN)				
						0.5	1	1.5	2
50 X 50 X 2	3.01	3.84	1.96	5.90	59	56	51	42	29
50 X 50 X 3	4.43	5.64	1.92	8.34	87	83	75	60	42
50 X 50 X 4	5.78	7.36	1.88	10.44	114	107	98	77	53
75 X 75 X 3	6.78	8.64	2.94	19.90	133	128	124	116	103
75 X 75 X 4	8.92	11.30	2.90	26.00	175	167	162	152	133
75 X 75 X 5	10.9	14.00	2.87	30.60	217	208	201	188	164
75 X 75 X 6	13.0	16.50	2.83	35.30	255	245	237	220	192
100 X 100 X 3	9.14	11.60	3.96	36.50	179	173	170	165	157
100 X 100 X 4	12	15.30	3.92	47.20	237	226	224	218	206
100 X 100 X 5	14.9	19.00	3.88	57.30	294	283	279	270	256
100 X 100 X 6	17.7	22.5	3.86	66.70	348	335	330	319	302
125 X 125 X 3	11.4	14.60	4.99	56.00	226	218	216	212	206
125 X 125 X 4	15.2	19.30	4.95	75.50	299	288	285	280	273
125 X 125 X 5	18.3	24.00	4.90	92.30	372	358	355	349	339
125 X 125 X 6	22.4	28.50	4.87	108.00	441	426	421	414	402
150 X 150 X 4	18.3	23.30	5.96	110.00	361	348	346	342	336
150 X 150 X 6	27.1	34.50	5.88	159.00	534	512	506	506	497
175 X 175 X 6	31.8	40.50	6.86	220.00	627	606	598	598	590

This chart above shows how much the RHS is superior to the angle in terms of weight and also in percentage terms how much greater load bearing capacity the RHS substitute has over the respective angles. The chart should be used only if the angle and the RHS substitute are being used in Axial compression.







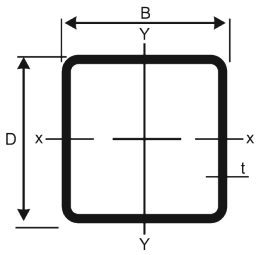
ANGLES		3.0 METRE RHS				4.0 METRE RHS		
SIZE (MM)	WT	SIZE (MM)	WT	SUPERIORITY		SIZE (MM)	WT	SUPER
DXBXt	Kg/mtr	DXBXt	Kg/mtr	Lighter	Stronger	DXBXt	Kg/mtr	Lighter
70x70x8	8.36	75x75x3	6.78	19%	41%	75x75x3	6.78	19%
70x70x10	10.0	75x75x3	6.78	32%	48%	75x75x3	6.78	32%
90x90x8	10.9	100x100x3	9.14	16%	31%	100x100x3	9.14	60%
90x90x10	13.4	100x100x3	9.14	31%	8%	100x100x3	9.14	31%
90x90x12	15.9	125x125x3	11.4	28%	34%	100x100x3	9.14	42%
100x100x8	12.2	100x100x3	9.14	25%		100x100x3	9.14	25%
100x100x12	17.8	125x125x3	11.4	36%		125x125x3	11.4	36%
100x100x15	21.9	125x125x4	15.2	30%	10%	125x125x3	11.4	48%
120x120x8	14.7	100x100x5	14.9		6%	125x125x3	11.4	22%
120x120x10	18.2	125x125x4	15.2	16%		125x125x4	15.2	16%
120x120x12	21.6	150x150x4	18.3	15%	12%	125x125x4	15.2	30%
120x120x15	26.6	150x150x5	22.7	14%	14%	150x150x4	18.3	
150x150x10	23.0	150x150x5	22.7		8%	150x150x5	22.7	
150x150x12	27.3	150x150x6	27.1		9%	150x150x5	22.7	17%
150x150x15	33.8	175x175x6	31.8	6%		150x150x6	27.1	20%
150x150x18	40.1	175x175x7	36.9	8%		150x150x6	36.9	20%

SAFE LOAD TABLE (For Cold Formed Sections) - Continued

MAXIMUM AXIAL COMPRESSION EFFECTIVE LENGTH IN METERS															
2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
20	15	11	8.7	7.0	5.7	4.7	4.0	3.4							
29	21	15	12	9.8	8.0	6.6	5.6	4.8							
37	26	20	15	12	10	8.3	7.0	6.0							
85	67	52	41	33	27	23	19	16	14	12	11	10	8.9	8.0	7.2
109	86	67	53	43	35	29	25	21	18	16	14	12	11	10	9.2
134	105	82	64	52	43	35	30	26	22	19	17	15	13	12	11
155	121	94	74	60	49	41	34	29	25	22	19	17	15	14	17
144	128	109	91	76	64	54	46	39	34	30	26	23	21	19	22
189	167	142	118	99	83	70	59	51	44	39	34	30	27	24	27
234	206	174	145	121	101	85	73	62	54	47	42	37	33	30	32
276	242	204	170	141	118	99	85	73	63	55	49	44	39	35	34
198	186	171	153	134	116	100	87	76	66	59	52	46	42	37	44
261	245	224	200	175	152	131	114	99	87	76	68	61	54	49	54
324	304	277	247	215	186	161	139	121	106	96	83	74	66	60	64
384	360	328	291	254	219	189	164	142	125	110	97	87	78	70	
327	316	300	281	258	233	208	184	163	145	129	115	103	98	84	
484	466	442	412	377	340	347	268	237	210	187	167	149	135	122	
580	566	548	525	496	463	426	389	352	317	286	258	233	211	191	

This table below is a guide for finding RHS substitutes for different sizes of angle. It shows which size of RHS is the most suitable substitute for each size of angle for different effective length.

	3.0 METRE RHS				4.0 METRE RHS			
IORITY	SIZE (MM)	WT	SUPERIORITY		SIZE (MM)	WT	SUPERIORITY	
Stronger	DXBXt	Kg/mtr	Lighter	Stronger	DXBXt	Kg/mtr	Lighter	Stronger
50%	75x75x3	6.78	19%	54%	75x75x3	6.78	19%	55%
57%	75x75x3	6.78	32%	61%	75x75x3	6.78	32%	60%
54%	100x100x3	9.14	16%	63%	100x100x3	9.14	16%	67%
54%	100x100x3	9.14	31%	34%	100x100x3	9.14	31%	37%
27%	100x100x3	9.14	42%	15%	100x100x3	9.14	42%	17%
8%	100x100x3	9.14	25%	19%	100x100x3	9.14	25%	21%
13%	125x125x3	11.4	36%	51%	125x125x3	11.4	36%	61%
32%	125x125x3	11.4	48%	26%	125x125x3	11.4	48%	34%
10%	125x125x3	11.4	22%	27%	125x125x3	11.4	22%	33%
15%	125x125x3	11.4	37%		125x125x4	15.2	37%	
21%	125x125x4	15.2	30%	16%	125x125x4	15.2	30%	21%
	150x150x3	18.3	31%	45%	150x150x4	15.2	42%	
21%	150x150x4	18.3	20%	11%	150x150x5	18.3	20%	19%
	150x150x5	22.7	17%	16%	150x150x5	18.3	33%	
	150x150x6	27.1	20%		150x150x6	22.7	32%	
	175x175x6	31.8	20%	30%	150x150x6	27.1	32%	



MANUFACTURES OF : REINFORCEMENT STEEL ROUND, SQUARE BARS, ANGLES, CHANNELS, FLATS, ZED SECTION AND TEE SECTION

ROUND BARS

SIZE (mm)	WEIGHT kgs/12m
6	2.50
8	4.76
10	7.40
12	10.67
16	18.95
20	29.60
25	46.30
32	75.76

SQUARE BARS

SIZE (mm)	WEIGHT kgs/12m
8	4.76
10	7.40
12	10.67
16	18.95
20	29.60
25	46.30
32	75.76

MILD STEEL FLATS

SIZE (mm)	WEIGHT kgs/6m
20x3	2.82
25x3	3.54
30x3	4.26
40x3	5.64
50x3	7.08
20x4	3.76
25x4	4.71
30x4	5.65
40x4	7.53
50x4	9.42
20x6	5.64
25x6	7.08
30x6	8.46
40x6	11.28
50x6	14.16
65x6	18.63
75x6	21.18
100x6	42.39
25x9	10.58
30x9	12.74
40x9	16.95
50x9	21.20
65x9	27.54
75x9	31.80
100x9	42.39
25x12	14.16
30x12	16.98
40x12	22.60
50x12	28.26
65x12	36.72
75x12	42.42
100x12	56.52

MILD STEEL ANGLES

SIZE (mm)	WEIGHT kgs/6m
20x20x3	5.28
25x25x3	6.66
30x30x3	8.16
40x40x3	11.04
50x50x3	13.98
25x25x4	8.67
30x30x4	10.68
40x40x4	14.52
25x25x6	18.63
30x30x6	12.43
40x40x6	21.12
50x50x6	26.82
65x65x6	34.08
75x75x6	40.68

MILD STEEL CHANNEL

SIZE (mm)	WEIGHT kgs/6m
75X40X6	52
100X50X6	62

MILD STEEL ZED SECTION

Size	Thickness	Weight in Kilograms
20 mm x 20 mm (Light Duty)	3 mm	5.50
20 mm x 20 mm (Heavy Duty)	3 mm	6.50
25 mm x 25 mm	3 mm	11.10

MILD STEEL TEE SECTION

SIZE (mm)	WEIGHT kgs/6m
20X20X3	5.30
25X25X3	6.60

SQUARE BARS / ROUND BARS / DEFORMED / TMT BARS

PROFILE DIMENSIONS AND WEIGHT OF SECTIONS

Nominal Diameter	Cross Sectional Area mm	Mass Per Metre kg	Minimum Mass Per Meter	Maximum Mass Per Meter
8 mm	50.3	0.395	0.3713	0.41870
10 mm	78.5	0.617	0.5923	0.64168
12 mm	113.0	0.888	0.8525	0.92352
16 mm	201.0	1.580	1.5168	1.64320
20 mm	314.0	2.470	2.3712	2.56880
25 mm	491.0	3.850	3.6960	4.00400
32 mm	804.0	6.310	6.0576	6.56240

TOLERANCES

The permissible deviation from nominal mass per meter shall be not be more than +/-4.5% on nominal diameters greater than 8 mm, and +/- on nominal diameters less than or equal to 8 mm.

LENGTH

The nominal length of steel bars is 12 meters.

The permissible deviation from the nominal length shall be +100/- 0mm; other tolerances may be agreed at the time of enquiry and order.

CHEMICAL COMPOSITION

Element	Element content Maximum %
Carbon	0.20 to 0.28
Maganese	1.40 to 1.60
Sulphur	0.03 to 0.05
Phosphorus	0.03 to 0.05
Silicon	0.32 to 0.35
Chromium	0.40 to 0.50
Magnese plus Chromium	1.50 to 1.60

THERMO MECHANICALLY TREATED (TMT BARS)

Bars of TMT Grade 560

S. No.	Properties	Characteristic Value	Typical Values
1	Yield Strength Mpa	560	520-625
2	Stress Ratio (TS/YS)	1.12	1.12 - 1.30
3	A5 Elongation, % (L=5Dn)	15	15 - 30

SHAFTING

BS970 of 1955	EN3
AISI (American)	1020

CHEMICAL COMPOSITION

Carbon	0.16-0.24
Silicon	0.10-0.40
Manganese	0.50-0.90
Sulphur	0.05 Max
Phosphorus	0.05 Max

Tensile Strenth Rm Mpa	Yield Stress Re Mpa	Rp0.2	A min on 5.65 $\sqrt{S_o}$	Limiting Ruling Section
560	440	420	10	≥6 ≤13
530	420	390	12	≥13 ≤16
490	370	340	12	≥16 ≤40
480	355	290	13	≥40 ≤63
450	325	280	14	≥63 ≤76

SIZE	ROUND	HEXAGON	SQUARE
1/4"	-	-	0.3
3/8"	0.6	-	-
7/16"	0.8	-	-
½"	1.0	-	1.3
9/16"	1.3	-	-
5/8"	1.6	1.9	2.1
¾"	2.2	2.7	3.1
7/8"	3.0	3.6	4.2
1"	4.0	4.7	5.5
1 ⅛"	5.0	-	-
1 ¼"	6.2	7.5	8.6
1⅜"	7.5	-	-
1½"	9.0	10.7	-
1¾"	12.2	14.5	-
2	15.9	19.0	-
2 ¼	20.2	24.0	-
2½	24.9	30.0	-
2¾"	30.0	-	-
3"	35.8	-	-
3½"	48.7	-	-
4"	63.6	-	-
5"	99.5	-	-
6"	143.2	-	-

CHEMICAL COMPOSITION

Carbon	0.50-0.60
Silicon	0.10-0.40
Manganese	0.50-0.90
Sulphur	0.05 Max
Phosphorus	0.05 Max

Heat Treatment	Tensile Strength Rm Mpa	Yield Stress Re Mpa	Rp0.2	A min on 5.65 $\sqrt{S_o}$	Hardness HB	Limiting Ruling Section
N	700	355	-	12	201/255	63
	600	310	-	13	170/223	250
R	700/850	415	385	14	201/255	100
S	775/925	480	450	14	233/277	63
T	850/1000	570	555	12	248/302	19

SIZE mm	Mass Kg/m
8 mm	0.4
10 mm	0.62
12 mm	0.9
16 mm	1.6
20 mm	2.5
22 mm	2.6
25 mm	3.9
28 mm	4.8
30 mm	5.6
32 mm	6.32
35 mm	7.6
38 mm	8.84
40 mm	9.9
45 mm	12.5
50 mm	15.5
55 mm	18.5
60 mm	22.5
65 mm	26
70 mm	30
75 mm	35
80 mm	40
90 mm	50
100 mm	62
115 mm	82
130 mm	104
140 mm	121
150 mm	139
170 mm	178
180 mm	200
200 mm	247
230 mm	326
250 mm	385
270 mm	450
305 mm	586
350 mm	756

SPECIFICATION	CODE	Tensile Strength (Mpa)	Yield Strength (Mpa)	Elongation	Impact Test
SANS 1431: 1987	185 002	480 - 650	350 min≤16 mm	20% min on 5,65$\sqrt{S_o}$1)	-
Gr 350wa			345 min>16 mm		

NOTES