

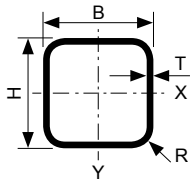
# Steel sections

## Hollow sections

Dimensions and cross-sectional properties

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**Table 1.**  
**Dimensions and cross-sectional properties. Square hollow sections**



M = Weight  
A = Cross-section area  
 $A_u$  = External surface area  
I = Moment of inertia  
W = Section modulus

$W_p$  = Plastic section modulus  
 $i$  = Radius of gyration  
 $I_v$  = Torsion modulus  
 $W_v$  = Section modulus in torsion  
Theoretical density = 7.85 kg/dm<sup>3</sup>

The cross-sectional properties have been calculated by using nominal dimensions H, B and T and corner outer radius R.

R = 2.0 x T, when T ≤ 6.0 mm

R = 2.5 x T, when 6.0 mm < T ≤ 10.0 mm

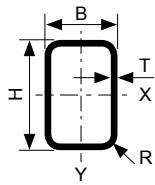
R = 3.0 x T, when T > 10.0 mm

H x B mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	$A_u$ m <sup>2</sup> /m	$I_x = I_y$ mm <sup>4</sup> x 10 <sup>4</sup>	$W_x = W_y$ mm <sup>3</sup> x 10 <sup>3</sup>	$W_{px} = W_{py}$ mm <sup>3</sup> x 10 <sup>3</sup>	$i_x = i_y$ mm x 10	$I_v$ mm <sup>4</sup> x 10 <sup>4</sup>	$W_v$ mm <sup>3</sup> x 10 <sup>3</sup>
25 x 25	2.0	1.36	1.74	0.093	1.48	1.19	1.47	0.92	2.53	1.80
25 x 25	2.5	1.64	2.09	0.091	1.69	1.35	1.71	0.90	2.97	2.07
25 x 25	3.0	1.89	2.41	0.090	1.84	1.47	1.91	0.87	3.33	2.27
30 x 30	2.0	1.68	2.14	0.113	2.72	1.81	2.21	1.13	4.54	2.75
30 x 30	2.5	2.03	2.59	0.111	3.16	2.10	2.61	1.10	5.40	3.20
30 x 30	3.0	2.36	3.01	0.110	3.50	2.34	2.96	1.08	6.15	3.58
40 x 40	2.0	2.31	2.94	0.153	6.94	3.47	4.13	1.54	11.28	5.23
40 x 40	2.5	2.82	3.59	0.151	8.22	4.11	4.97	1.51	13.61	6.21
40 x 40	3.0	3.30	4.21	0.150	9.32	4.66	5.72	1.49	15.75	7.07
40 x 40	4.0	4.20	5.35	0.146	11.07	5.54	7.01	1.44	19.44	8.48
50 x 50	2.0	2.93	3.74	0.193	14.15	5.66	6.66	1.95	22.63	8.51
50 x 50	2.5	3.60	4.59	0.191	16.94	6.78	8.07	1.92	27.53	10.22
50 x 50	3.0	4.25	5.41	0.190	19.47	7.79	9.39	1.90	32.13	11.76
50 x 50	4.0	5.45	6.95	0.186	23.74	9.49	11.73	1.85	40.42	14.43
50 x 50	5.0	6.56	8.36	0.183	27.04	10.82	13.70	1.80	47.46	16.56
60 x 60	2.0	3.56	4.54	0.233	25.14	8.38	9.79	2.35	39.79	12.59
60 x 60	2.5	4.39	5.59	0.231	30.34	10.11	11.93	2.33	48.66	15.22
60 x 60	3.0	5.19	6.61	0.230	35.13	11.71	13.95	2.31	57.09	17.65
60 x 60	4.0	6.71	8.55	0.226	43.55	14.52	17.64	2.26	72.64	21.97
60 x 60	5.0	8.13	10.36	0.223	50.49	16.83	20.88	2.21	86.42	25.61
70 x 70	2.5	5.17	6.59	0.271	49.41	14.12	16.54	2.74	78.49	21.22
70 x 70	3.0	6.13	7.81	0.270	57.53	16.44	19.42	2.71	92.42	24.74
70 x 70	4.0	7.97	10.15	0.266	72.12	20.61	24.76	2.67	118.52	31.11
70 x 70	5.0	9.70	12.36	0.263	84.63	24.18	29.56	2.62	142.21	36.65
80 x 80	2.5	5.96	7.59	0.311	75.15	18.79	21.9	3.15	118.52	28.22
80 x 80	3.0	7.07	9.01	0.310	87.84	21.96	25.78	3.12	139.93	33.02
80 x 80	4.0	9.22	11.75	0.306	111.04	27.76	33.07	3.07	180.44	41.84
80 x 80	5.0	11.30	14.36	0.303	131.44	32.86	39.74	3.03	217.83	49.68
80 x 80	6.0	13.20	16.83	0.299	149.18	37.29	45.79	2.98	252.07	56.59
90 x 90	2.5	6.74	8.59	0.351	108.55	24.12	28.00	3.56	170.26	36.23
90 x 90	3.0	8.01	10.21	0.350	127.28	28.29	33.04	3.53	201.42	42.51
90 x 90	4.0	10.50	13.35	0.346	161.92	35.98	42.58	3.48	260.80	54.17
90 x 90	5.0	12.80	16.36	0.343	192.93	42.87	51.41	3.43	316.26	64.70
90 x 90	6.0	15.10	19.23	0.339	220.48	49.00	59.54	3.39	367.76	74.16
100 x 100	2.5	7.53	9.59	0.391	150.63	30.13	34.86	3.96	235.21	45.23
100 x 100	3.0	8.96	11.41	0.390	177.05	35.41	41.21	3.94	278.68	53.19
100 x 100	4.0	11.70	14.95	0.386	226.35	45.27	53.30	3.89	362.01	68.10
100 x 100	5.0	14.40	18.36	0.383	271.10	54.22	64.59	3.84	440.52	81.72
100 x 100	6.0	17.00	21.63	0.379	311.47	62.29	75.10	3.79	514.16	94.12
100 x 100	7.1	19.40	24.65	0.370	340.13	68.03	83.59	3.71	589.17	105.56
100 x 100	8.0	21.40	27.24	0.366	365.94	73.19	91.05	3.67	644.51	114.23
100 x 100	10.0	25.60	32.57	0.357	411.08	82.22	105.25	3.55	749.84	130.10

H x B mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	A <sub>u</sub> m <sup>2</sup> /m	I <sub>x</sub> = I <sub>y</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>x</sub> = W <sub>y</sub> mm <sup>3</sup> x 10 <sup>3</sup>	W <sub>px</sub> = W <sub>py</sub> mm <sup>3</sup> x 10 <sup>3</sup>	I <sub>x</sub> = I <sub>y</sub> mm x 10	I <sub>v</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>v</sub> mm <sup>3</sup> x 10 <sup>3</sup>
110 x 110	2.5	8.31	10.59	0.431	202.38	36.80	42.47	4.37	314.86	55.23
110 x 110	3.0	9.90	12.61	0.430	238.34	43.33	50.27	4.35	373.51	65.07
110 x 110	4.0	13.00	16.55	0.426	305.94	55.62	65.21	4.30	486.47	83.63
110 x 110	5.0	16.00	20.36	0.423	367.95	66.90	79.27	4.25	593.60	100.74
110 x 110	6.0	18.90	24.03	0.419	424.57	77.19	92.46	4.20	694.85	116.47
120 x 120	3.0	10.80	13.81	0.470	312.35	52.06	60.24	4.76	487.72	78.15
120 x 120	4.0	14.30	18.15	0.466	402.28	67.05	78.33	4.71	636.57	100.75
120 x 120	5.0	17.60	22.36	0.463	485.47	80.91	95.45	4.66	778.50	121.75
120 x 120	5.6	19.50	24.82	0.461	532.25	88.71	105.26	4.63	860.31	133.61
120 x 120	6.0	20.80	26.43	0.459	562.16	93.69	111.61	4.61	913.46	141.22
120 x 120	7.1	23.80	30.33	0.449	623.30	103.88	125.65	4.53	1056.01	160.08
120 x 120	8.0	26.40	33.64	0.446	676.88	112.81	137.81	4.49	1162.95	174.58
120 x 120	8.8	28.60	36.48	0.442	719.88	119.98	147.89	4.44	1252.41	186.45
120 x 120	10.0	31.80	40.57	0.437	776.81	129.47	161.82	4.38	1376.41	202.52
140 x 140	4.0	16.80	21.35	0.546	651.62	93.09	108.15	5.52	1023.32	139.80
140 x 140	5.0	20.70	26.36	0.543	790.56	112.94	132.30	5.48	1255.76	169.78
140 x 140	5.6	23.00	29.30	0.541	869.55	124.22	146.25	5.45	1390.71	186.87
140 x 140	6.0	24.50	31.23	0.539	920.43	131.49	155.33	5.43	1478.77	197.90
140 x 140	7.1	28.30	36.01	0.529	1031.40	147.34	176.27	5.35	1718.74	225.95
140 x 140	8.0	31.40	40.04	0.526	1126.77	160.97	194.18	5.30	1900.84	247.69
140 x 140	8.8	34.20	43.52	0.522	1205.03	172.15	209.23	5.26	2055.40	265.79
140 x 140	10.0	38.10	48.57	0.517	1311.67	187.38	230.38	5.20	2273.90	290.85
150 x 150	4.0	18.00	22.95	0.586	807.82	107.71	124.87	5.93	1264.76	161.73
150 x 150	5.0	22.30	28.36	0.583	982.12	130.95	152.98	5.89	1554.13	196.79
150 x 150	6.0	26.40	33.63	0.579	1145.91	152.79	179.88	5.84	1832.69	229.84
150 x 150	7.1	30.50	38.85	0.569	1289.35	171.91	204.78	5.76	2134.21	263.13
150 x 150	8.0	34.00	43.24	0.566	1411.83	188.24	225.96	5.71	2364.08	289.03
150 x 150	8.8	36.90	47.04	0.562	1513.12	201.75	243.86	5.67	2560.17	310.72
150 x 150	10.0	41.30	52.57	0.557	1652.53	220.34	269.17	5.61	2839.24	340.98
150 x 150	12.5	48.70	62.04	0.536	1817.44	242.33	305.58	5.41	3320.84	389.30
160 x 160	4.0	19.30	24.55	0.626	987.17	123.40	142.78	6.34	1541.45	185.25
160 x 160	5.0	23.80	30.36	0.623	1202.36	150.29	175.16	6.29	1896.32	225.79
160 x 160	6.0	28.30	36.03	0.619	1405.48	175.69	206.24	6.25	2238.90	264.18
160 x 160	7.1	32.70	41.69	0.609	1587.01	198.38	235.41	6.17	2611.42	303.15
160 x 160	8.0	36.50	46.44	0.606	1741.23	217.65	260.14	6.12	2896.58	333.56
160 x 160	8.8	39.70	50.56	0.602	1869.59	233.70	281.12	6.08	3140.82	359.16
160 x 160	10.0	44.40	56.57	0.597	2047.67	255.96	310.95	6.02	3490.29	395.10
160 x 160	12.0	50.90	64.86	0.578	2224.36	278.05	346.05	5.86	3996.72	443.13
160 x 160	12.5	52.60	67.04	0.576	2275.04	284.38	355.66	5.83	4113.99	454.58
180 x 180	5.0	27.00	34.36	0.703	1736.87	192.99	224.02	7.11	2724.16	289.81
180 x 180	6.0	32.10	40.83	0.699	2036.52	226.28	264.35	7.06	3222.65	340.05
180 x 180	7.1	37.20	47.37	0.689	2312.84	256.98	303.07	6.99	3768.11	391.70
180 x 180	8.0	41.50	52.84	0.686	2545.86	282.87	335.70	6.94	4188.56	432.21
180 x 180	8.8	45.20	57.60	0.682	2741.73	304.64	363.58	6.90	4550.90	466.57
180 x 180	10.0	50.70	64.57	0.677	3016.80	335.20	403.51	6.84	5073.57	515.31
180 x 180	12.5	60.50	77.04	0.656	3406.43	378.49	467.08	6.65	6049.85	600.06
200 x 200	5.0	30.10	38.36	0.783	2410.09	241.01	278.87	7.93	3763.30	361.82
200 x 200	6.0	35.80	45.63	0.779	2832.75	283.27	329.67	7.88	4458.81	425.51
200 x 200	7.1	41.60	53.05	0.769	3231.60	323.16	379.25	7.81	5222.90	491.61
200 x 200	8.0	46.50	59.24	0.766	3566.25	356.63	420.86	7.76	5815.18	543.64

H x B mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	A <sub>u</sub> m <sup>2</sup> /m	I <sub>x</sub> = I <sub>y</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>x</sub> = W <sub>y</sub> mm <sup>3</sup> x 10 <sup>3</sup>	W <sub>px</sub> = W <sub>py</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i <sub>x</sub> = i <sub>y</sub> mm x 10	I <sub>v</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>v</sub> mm <sup>3</sup> x 10 <sup>3</sup>
200 x 200	8.8	50.80	64.64	0.762	3849.59	384.96	456.59	7.72	6327.89	588.05
200 x 200	10.0	57.00	72.57	0.757	4251.06	425.11	508.08	7.65	7071.73	651.48
200 x 200	12.5	68.30	87.04	0.736	4859.42	485.94	593.50	7.47	8501.74	765.47
220 x 220	6.0	39.60	50.43	0.859	3813.36	346.67	402.18	8.70	5976.18	520.57
220 x 220	7.1	46.10	58.73	0.849	4366.03	396.91	463.95	8.62	7009.86	602.86
220 x 220	8.0	51.50	65.64	0.846	4828.01	438.91	515.62	8.58	7814.84	667.86
220 x 220	8.8	56.30	71.68	0.842	5221.35	474.67	560.17	8.53	8514.01	723.58
220 x 220	10.0	63.20	80.57	0.837	5782.46	525.68	624.65	8.47	9532.77	803.62
220 x 220	12.5	76.20	97.04	0.816	6673.98	606.73	734.92	8.29	11529.63	950.82
250 x 250	6.0	45.20	57.63	0.979	5672.00	453.76	524.45	9.92	8842.52	681.15
250 x 250	7.1	52.80	67.25	0.969	6521.74	521.74	606.97	9.85	10387.69	791.03
250 x 250	8.0	59.10	75.24	0.966	7229.20	578.34	675.77	9.80	11597.77	878.18
250 x 250	8.8	64.60	82.24	0.962	7835.39	626.83	735.33	9.76	12652.72	953.27
250 x 250	10.0	72.70	92.57	0.957	8706.67	696.53	822.00	9.70	14197.22	1061.80
250 x 250	12.5	88.00	112.04	0.936	10161.31	812.91	975.17	9.52	17282.65	1266.25
260 x 260	6.0	47.10	60.03	1.019	6404.54	492.66	568.80	10.33	9969.77	739.48
260 x 260	7.1	55.00	70.09	1.009	7372.75	567.13	658.90	10.26	11716.64	859.43
260 x 260	8.0	61.60	78.44	1.006	8178.02	629.08	733.95	10.21	13086.86	954.68
260 x 260	8.8	67.30	85.76	1.002	8869.18	682.24	799.00	10.17	14282.62	1036.86
260 x 260	10.0	75.80	96.57	0.997	9864.65	758.82	893.78	10.11	16035.47	1155.85
260 x 260	11.0	81.90	104.37	0.983	10475.62	805.82	956.45	10.02	17497.85	1246.94
260 x 260	12.5	91.90	117.04	0.976	11547.88	888.3	1062.76	9.93	19553.31	1381.37
300 x 300	6.0	54.70	69.63	1.179	9963.67	664.24	764.23	11.96	15433.82	996.78
300 x 300	7.1	63.90	81.45	1.169	11516.13	767.65	887.94	11.89	18161.09	1161.42
300 x 300	8.0	71.60	91.24	1.166	12800.69	853.38	990.67	11.84	20311.84	1292.67
300 x 300	8.8	78.40	99.84	1.162	13910.50	927.37	1080.07	11.80	22194.64	1406.43
300 x 300	10.0	88.40	112.57	1.157	15519.37	1034.62	1210.91	11.74	24965.66	1572.02
300 x 300	12.5	108.00	137.04	1.136	18348.13	1223.21	1450.60	11.57	30600.78	1891.80

**Table 2.**  
**Dimensions and cross-sectional properties. Rectangular hollow sections**



M = Weight  
A = Cross-section area  
 $A_o$  = External surface area  
I = Moment of inertia  
W = Section modulus

i = Radius of gyration  
 $I_p$  = Torsion modulus  
 $W_p$  = Section modulus in torsion  
Theoretical density = 7.85 kg/dm<sup>3</sup>

The cross-sectional properties have been calculated by using nominal dimensions H, B and T and corner outer radius R.

R = 2.0 x T, when  $T \leq 6.0$  mm  
R = 2.5 x T, when  $6.0 \text{ mm} < T \leq 10.0$  mm  
R = 3.0 x T, when  $T > 10.0$  mm

H x B mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	$A_o$ m <sup>2</sup> /m	$I_x$ mm <sup>4</sup> x 10 <sup>4</sup>	$W_x$ mm <sup>3</sup> x 10 <sup>3</sup>	$W_{px}$ mm <sup>3</sup> x 10 <sup>3</sup>	$i_x$ mm x 10	$I_y$ mm <sup>4</sup> x 10 <sup>4</sup>	$W_y$ mm <sup>3</sup> x 10 <sup>3</sup>	$W_{py}$ mm <sup>3</sup> x 10 <sup>3</sup>	$i_y$ mm x 10	$I_{xy}$ mm <sup>4</sup> x 10 <sup>4</sup>	$W_v$ mm <sup>3</sup> x 10 <sup>3</sup>
40 x 20	2.0	1.68	2.14	0.113	4.05	2.02	2.61	1.38	1.34	1.34	1.60	0.79	3.45	2.36
40 x 20	2.5	2.03	2.59	0.111	4.69	2.35	3.09	1.35	1.54	1.54	1.88	0.77	4.06	2.72
40 x 20	3.0	2.36	3.01	0.110	5.21	2.60	3.50	1.32	1.68	1.68	2.12	0.75	4.57	3.00
40 x 30	2.0	1.99	2.54	0.133	5.49	2.75	3.37	1.47	3.51	2.34	2.77	1.18	7.07	3.79
40 x 30	2.5	2.42	3.09	0.131	6.45	3.23	4.03	1.45	4.10	2.74	3.30	1.15	8.47	4.46
40 x 30	3.0	2.83	3.61	0.130	7.27	3.63	4.61	1.42	4.60	3.07	3.77	1.13	9.72	5.03
50 x 30	2.0	2.31	2.94	0.153	9.54	3.81	4.74	1.8	4.29	2.86	3.33	1.21	9.77	4.84
50 x 30	2.5	2.82	3.59	0.151	11.30	4.52	5.70	1.77	5.05	3.37	3.98	1.19	11.74	5.72
50 x 30	3.0	3.30	4.21	0.150	12.83	5.13	6.57	1.75	5.70	3.80	4.58	1.16	13.53	6.49
50 x 30	4.0	4.20	5.35	0.146	15.25	6.10	8.05	1.69	6.69	4.46	5.58	1.12	16.53	7.71
60 x 40	2.0	2.93	3.74	0.193	18.41	6.14	7.47	2.22	9.83	4.92	5.65	1.62	20.70	8.12
60 x 40	2.5	3.60	4.59	0.191	22.07	7.36	9.06	2.19	11.74	5.87	6.84	1.60	25.14	9.72
60 x 40	3.0	4.25	5.41	0.190	25.38	8.46	10.53	2.17	13.44	6.72	7.94	1.58	29.28	11.17
60 x 40	4.0	5.45	6.95	0.186	30.99	10.33	13.16	2.11	16.28	8.14	9.89	1.53	36.67	13.65
60 x 40	5.0	6.56	8.36	0.183	35.33	11.78	15.38	2.06	18.43	9.21	11.52	1.48	42.85	15.60
70 x 50	2.0	3.56	4.54	0.233	31.48	8.99	10.80	2.63	18.76	7.50	8.58	2.03	37.45	12.20
70 x 50	2.5	4.39	5.59	0.231	38.01	10.86	13.16	2.61	22.59	9.04	10.45	2.01	45.75	14.72
70 x 50	3.0	5.19	6.61	0.230	44.05	12.59	15.40	2.58	26.10	10.44	12.21	1.99	53.62	17.06
70 x 50	4.0	6.71	8.55	0.226	54.67	15.62	19.48	2.53	32.22	12.89	15.41	1.94	68.07	21.19
70 x 50	5.0	8.13	10.36	0.223	63.46	18.13	23.06	2.48	37.20	14.88	18.20	1.90	80.77	24.64
80 x 40	2.0	3.56	4.54	0.233	37.36	9.34	11.61	2.87	12.72	6.36	7.17	1.67	30.88	11.00
80 x 40	2.5	4.39	5.59	0.231	45.11	11.28	14.15	2.84	15.26	7.63	8.72	1.65	37.58	13.24
80 x 40	3.0	5.19	6.61	0.230	52.25	13.06	16.54	2.81	17.56	8.78	10.16	1.63	43.88	15.28
80 x 40	4.0	6.71	8.55	0.226	64.79	16.20	20.91	2.75	21.49	10.74	12.77	1.59	55.24	18.84
80 x 40	5.0	8.13	10.36	0.223	75.11	18.78	24.74	2.69	24.59	12.30	15.02	1.54	64.97	21.74
80 x 60	2.5	5.17	6.59	0.271	60.13	15.03	18.02	3.02	38.61	12.87	14.81	2.42	75.07	20.73
80 x 60	3.0	6.13	7.81	0.270	70.05	17.51	21.16	3.00	44.89	14.96	17.37	2.40	88.35	24.14
80 x 60	4.0	7.97	10.15	0.266	87.92	21.98	26.99	2.94	56.12	18.71	22.12	2.35	113.12	30.32
80 x 60	5.0	9.70	12.36	0.263	103.28	25.82	32.24	2.89	65.66	21.89	26.38	2.31	135.53	35.67
90 x 50	2.5	5.17	6.59	0.271	70.26	15.61	19.25	3.27	28.24	11.29	12.82	2.07	65.30	19.24
90 x 50	3.0	6.13	7.81	0.270	81.85	18.19	22.60	3.24	32.74	13.10	15.03	2.05	76.67	22.36
90 x 50	4.0	7.97	10.15	0.266	102.71	22.82	28.82	3.18	40.71	16.28	19.09	2.00	97.70	27.96
90 x 50	5.0	9.70	12.36	0.263	120.60	26.80	34.41	3.12	47.37	18.95	22.70	1.96	116.47	32.75
100 x 40	2.5	5.17	6.59	0.271	79.32	15.86	20.23	3.47	18.78	9.39	10.59	1.69	50.52	16.76
100 x 40	3.0	6.13	7.81	0.270	92.34	18.47	23.75	3.44	21.67	10.84	12.38	1.67	59.05	19.39
100 x 40	4.0	7.97	10.15	0.266	115.70	23.14	30.26	3.38	26.69	13.35	15.65	1.62	74.53	24.04
100 x 40	5.0	9.70	12.36	0.263	135.60	27.12	36.09	3.31	30.76	15.38	18.52	1.58	87.92	27.90
100 x 50	2.5	5.56	7.09	0.291	91.20	18.24	22.67	3.59	31.06	12.42	14.01	2.09	75.39	21.49
100 x 50	3.0	6.60	8.41	0.290	106.46	21.29	26.66	3.56	36.06	14.42	16.44	2.07	88.56	25.01
100 x 50	4.0	8.59	10.95	0.286	134.14	26.83	34.10	3.50	44.95	17.98	20.93	2.03	112.99	31.35
100 x 50	5.0	10.50	13.36	0.283	158.19	31.64	40.84	3.44	52.45	20.98	24.95	1.98	134.87	36.80

H x B mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	A <sub>u</sub> m <sup>2</sup> /m	I <sub>x</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>x</sub> m <sup>3</sup> x 10 <sup>3</sup>	W <sub>px</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i <sub>x</sub> mm x 10	I <sub>y</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>y</sub> mm <sup>3</sup> x 10 <sup>3</sup>	W <sub>py</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i <sub>y</sub> mm x 10	I <sub>yy</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>y</sub> mm <sup>3</sup> x 10 <sup>3</sup>
100 x 50	6.0	12.30	15.63	0.279	178.75	35.75	46.90	3.38	58.67	23.47	28.52	1.94	154.20	41.43
100 x 60	2.5	5.96	7.59	0.311	103.09	20.62	25.11	3.69	46.88	15.63	17.68	2.49	103.25	26.23
100 x 60	3.0	7.07	9.01	0.310	120.57	24.11	29.57	3.66	54.65	18.22	20.79	2.46	121.67	30.64
100 x 60	4.0	9.22	11.75	0.306	152.58	30.52	37.94	3.60	68.68	22.89	26.60	2.42	156.27	38.68
100 x 60	5.0	11.30	14.36	0.303	180.77	36.15	45.59	3.55	80.83	26.94	31.88	2.37	187.86	45.75
100 x 60	6.0	13.20	16.83	0.299	205.30	41.06	52.54	3.49	91.20	30.40	36.64	2.33	216.44	51.92
100 x 80	2.5	6.74	8.59	0.351	126.86	25.37	29.98	3.84	90.17	22.54	25.77	3.24	165.84	35.73
100 x 80	3.0	8.01	10.21	0.350	148.81	29.76	35.39	3.82	105.64	26.41	30.40	3.22	196.12	41.91
100 x 80	4.0	10.50	13.35	0.346	189.47	37.89	45.62	3.77	134.17	33.54	39.15	3.17	253.79	53.38
100 x 80	5.0	12.80	16.36	0.343	225.94	45.19	55.09	3.72	159.61	39.90	47.24	3.12	307.55	63.72
100 x 80	6.0	15.10	19.23	0.339	258.39	51.68	63.82	3.67	182.1	45.53	54.67	3.08	357.38	72.98
120 x 40	2.5	5.96	7.59	0.311	126.71	21.12	27.32	4.09	22.30	11.15	12.47	1.71	63.77	20.27
120 x 40	3.0	7.07	9.01	0.310	148.04	24.67	32.16	4.05	25.79	12.89	14.60	1.69	74.56	23.51
120 x 40	4.0	9.22	11.75	0.306	186.89	31.15	41.21	3.99	31.90	15.95	18.53	1.65	94.23	29.24
120 x 40	5.0	11.30	14.36	0.303	220.81	36.80	49.45	3.92	36.93	18.46	22.02	1.60	111.35	34.05
120 x 40	6.0	13.20	16.83	0.299	249.97	41.66	56.89	3.85	40.97	20.49	25.08	1.56	125.97	38.02
120 x 50	2.5	6.35	8.09	0.331	143.97	23.99	30.26	4.22	36.70	14.68	16.39	2.13	96.03	26.01
120 x 50	3.0	7.54	9.61	0.330	168.58	28.10	35.67	4.19	42.69	17.08	19.26	2.11	112.87	30.32
120 x 50	4.0	9.85	12.55	0.326	213.82	35.64	45.85	4.13	53.43	21.37	24.61	2.06	144.22	38.13
120 x 50	5.0	12.10	15.36	0.323	253.89	42.32	55.20	4.07	62.62	25.05	29.45	2.02	172.44	44.92
120 x 50	6.0	14.20	18.03	0.319	288.99	48.16	63.73	4.00	70.36	28.14	33.80	1.98	197.55	50.76
120 x 60	2.5	6.74	8.59	0.351	161.23	26.87	33.20	4.33	55.15	18.38	20.56	2.53	132.57	31.75
120 x 60	3.0	8.01	10.21	0.350	189.12	31.52	39.18	4.30	64.40	21.47	24.21	2.51	156.34	37.14
120 x 60	4.0	10.50	13.35	0.346	240.74	40.12	50.49	4.25	81.25	27.08	31.08	2.47	201.12	47.05
120 x 60	5.0	12.80	16.36	0.343	286.97	47.83	60.95	4.19	95.99	32.00	37.38	2.42	242.23	55.85
120 x 60	6.0	15.10	19.23	0.339	328.01	54.67	70.57	4.13	108.77	36.26	43.12	2.38	279.67	63.60
120 x 80	2.5	7.53	9.59	0.391	195.75	32.63	39.07	4.52	105.19	26.30	29.65	3.31	215.82	43.23
120 x 80	3.0	8.96	11.41	0.390	230.20	38.37	46.20	4.49	123.43	30.86	35.02	3.29	255.47	50.80
120 x 80	4.0	11.70	14.95	0.386	294.59	49.10	59.77	4.44	157.29	39.32	45.23	3.24	331.24	64.93
120 x 80	5.0	14.40	18.36	0.383	353.14	58.86	72.45	4.39	187.78	46.94	54.74	3.20	402.27	77.77
120 x 80	6.0	17.00	21.63	0.379	406.06	67.68	84.25	4.33	215.03	53.76	63.55	3.15	468.54	89.40
120 x 80	7.1	19.40	24.65	0.369	442.06	73.68	93.59	4.24	234.41	58.60	70.68	3.08	535.11	99.99
120 x 80	8.0	21.40	27.24	0.366	475.83	79.31	101.97	4.18	251.66	62.92	76.93	3.04	584.04	108.01
120 x 80	8.8	23.10	29.44	0.362	501.79	83.63	108.75	4.13	264.84	66.21	81.97	3.00	623.54	114.33
120 x 80	10.0	25.60	32.57	0.357	534.14	89.02	117.82	4.05	281.14	70.29	88.68	2.94	675.59	122.44
120 x 100	2.5	8.31	10.59	0.431	230.27	38.38	44.95	4.66	174.40	34.88	39.73	4.06	309.43	54.73
120 x 100	3.0	9.90	12.61	0.430	271.27	45.21	53.22	4.64	205.28	41.06	47.03	4.04	367.01	64.47
120 x 100	4.0	13.00	16.55	0.426	348.43	58.07	69.05	4.59	263.24	52.65	60.98	3.99	477.84	82.83
120 x 100	5.0	16.00	20.36	0.423	419.31	69.88	83.95	4.54	316.27	63.25	74.09	3.94	582.86	99.75
120 x 100	6.0	18.90	24.03	0.419	484.11	80.68	97.93	4.49	364.56	72.91	86.38	3.89	682.04	115.29
140 x 60	2.5	7.53	9.59	0.391	236.55	33.79	42.29	4.97	63.43	21.14	23.43	2.57	162.67	37.26
140 x 60	3.0	8.96	11.41	0.390	278.08	39.73	49.98	4.94	74.16	24.72	27.63	2.55	191.92	43.64
140 x 60	4.0	11.70	14.95	0.386	355.59	50.80	64.63	4.88	93.81	31.27	35.56	2.51	247.13	55.42
140 x 60	5.0	14.40	18.36	0.383	425.89	60.84	78.30	4.82	111.16	37.05	42.88	2.46	297.97	65.94
140 x 60	6.0	17.00	21.63	0.379	489.19	69.88	91.01	4.76	126.34	42.11	49.60	2.42	344.46	75.29
140 x 70	2.5	7.92	10.09	0.411	260.18	37.17	45.72	5.08	89.30	25.51	28.35	2.98	213.11	44.00
140 x 70	3.0	9.43	12.01	0.410	306.24	43.75	54.09	5.05	104.69	29.91	33.49	2.95	251.99	51.66
140 x 70	4.0	12.40	15.75	0.406	392.60	56.09	70.07	4.99	133.18	38.05	43.24	2.91	326.02	65.94
140 x 70	5.0	15.20	19.36	0.403	471.48	67.35	85.05	4.94	158.71	45.35	52.31	2.86	395.06	78.88
140 x 70	6.0	17.90	22.83	0.399	543.10	77.59	99.05	4.88	181.44	51.84	60.71	2.82	459.09	90.54

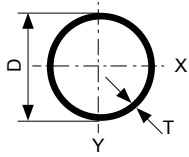
H x B mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	A <sub>u</sub> m <sup>2</sup> /m	I <sub>x</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>x</sub> m <sup>3</sup> x 10 <sup>3</sup>	W <sub>ox</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i <sub>x</sub> mm x 10	I <sub>y</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>y</sub> mm <sup>3</sup> x 10 <sup>3</sup>	W <sub>oy</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i <sub>y</sub> mm x 10	I <sub>xy</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>v</sub> mm <sup>3</sup> x 10 <sup>3</sup>
140 x 80	3.0	9.90	12.61	0.430	334.40	47.77	58.20	5.15	141.23	35.31	39.64	3.35	317.07	59.69
140 x 80	4.0	13.00	16.55	0.426	429.60	61.37	75.51	5.10	180.42	45.10	51.31	3.30	411.6	76.48
140 x 80	5.0	16.00	20.36	0.423	517.06	73.87	91.80	5.04	215.94	53.99	62.24	3.26	500.51	91.83
140 x 80	6.0	18.90	24.03	0.419	597.00	85.29	107.09	4.98	247.96	61.99	72.43	3.21	583.80	105.83
150 x 50	2.5	7.53	9.59	0.391	254.08	33.88	43.52	5.15	45.17	18.07	19.95	2.17	127.74	32.78
150 x 50	3.0	8.96	11.41	0.390	298.55	39.81	51.43	5.12	52.65	21.06	23.49	2.15	150.22	38.28
150 x 50	4.0	11.70	14.95	0.386	381.39	50.85	66.47	5.05	66.16	26.47	30.13	2.10	192.14	48.30
150 x 50	5.0	14.40	18.36	0.383	456.29	60.84	80.48	4.99	77.87	31.15	36.20	2.06	230.05	57.11
150 x 50	6.0	1.07	21.63	0.379	523.47	69.80	93.48	4.92	87.89	35.16	41.72	2.02	263.99	64.77
150 x 100	3.0	11.30	14.41	0.490	460.64	61.42	73.48	5.65	247.64	49.53	55.76	4.15	507.20	81.40
150 x 100	4.0	14.90	18.95	0.486	594.60	79.28	95.67	5.60	318.57	63.71	72.50	4.10	661.63	104.94
150 x 100	5.0	18.30	23.36	0.483	719.20	95.89	116.73	5.55	384.02	76.80	88.34	4.05	808.68	126.81
150 x 100	6.0	21.70	27.63	0.479	834.69	111.29	136.68	5.50	444.19	88.84	103.30	4.01	948.34	147.07
150 x 100	7.1	24.90	31.75	0.469	926.59	123.55	154.05	5.40	493.46	98.69	116.54	3.94	1095.51	166.74
150 x 100	8.0	27.70	35.24	0.466	1008.13	134.42	169.16	5.35	535.65	107.13	127.85	3.90	1205.89	181.85
150 x 100	8.8	30.00	38.24	0.462	1073.93	143.19	181.73	5.30	569.53	113.91	137.25	3.86	1298.14	194.22
150 x 100	10.0	33.40	42.57	0.457	1161.70	154.89	199.17	5.22	614.41	122.88	150.25	3.80	1425.87	210.96
160 x 70	4.0	13.60	17.35	0.446	549.03	68.63	86.62	5.63	150.62	43.04	48.52	2.95	389.66	75.90
160 x 70	5.0	16.80	21.36	0.443	661.61	82.70	105.41	5.57	179.88	51.39	58.81	2.90	472.53	90.96
160 x 70	6.0	19.80	25.23	0.439	764.83	95.60	123.08	5.51	206.09	58.88	68.39	2.86	549.60	104.60
160 x 70	8.0	25.20	32.04	0.426	908.72	113.59	150.70	5.33	243.26	69.50	83.55	2.76	683.68	126.70
160 x 80	3.0	10.80	13.81	0.470	463.81	57.98	71.41	5.80	159.03	39.76	44.26	3.39	380.34	68.59
160 x 80	4.0	14.30	18.15	0.466	597.71	74.71	92.86	5.74	203.54	50.89	57.39	3.35	494.10	88.03
160 x 80	5.0	17.60	22.36	0.463	721.69	90.21	113.16	5.68	244.11	61.03	69.74	3.30	601.34	105.90
160 x 80	6.0	20.80	26.43	0.459	836.01	104.5	132.32	5.62	280.89	70.22	81.31	3.26	702.06	122.27
160 x 80	7.1	23.80	30.33	0.449	922.59	115.32	148.56	5.52	310.11	77.53	91.39	3.20	805.54	137.76
160 x 80	8.0	26.40	33.64	0.446	1001.22	125.15	162.86	5.46	334.95	83.74	99.97	3.16	882.33	149.54
160 x 80	8.8	28.60	36.48	0.442	1063.96	132.99	174.68	5.40	354.52	88.63	107.03	3.12	945.41	159.02
160 x 80	10.0	31.80	40.57	0.437	1146.34	143.29	190.95	5.32	379.81	94.95	116.68	3.06	1030.69	171.57
160 x 90	3.0	11.30	14.41	0.490	500.79	62.60	76.12	5.90	206.79	45.95	51.31	3.79	465.40	77.82
160 x 90	4.0	14.90	18.95	0.486	646.39	80.80	99.10	5.84	265.54	59.01	66.66	3.74	606.16	100.17
160 x 90	5.0	18.30	23.36	0.483	781.77	97.72	120.91	5.79	319.52	71.00	81.16	3.70	739.70	120.86
160 x 90	6.0	21.70	27.63	0.479	907.19	113.40	141.56	5.73	368.91	81.98	94.82	3.65	866.01	139.96
160 x 90	7.1	24.90	31.75	0.469	1005.64	125.70	159.42	5.63	409.20	90.93	106.90	3.59	997.94	158.36
160 x 90	8.0	27.70	35.24	0.466	1093.73	136.72	175.02	5.57	443.46	98.55	117.19	3.55	1096.54	172.44
160 x 90	8.8	30.00	38.24	0.462	1164.66	145.58	187.98	5.52	470.82	104.63	125.71	3.51	1178.47	183.91
180 x 100	4.0	16.80	21.35	0.546	926.04	102.89	125.89	6.59	373.89	74.78	84.02	4.18	853.85	127.06
180 x 100	5.0	20.70	26.36	0.543	1124.20	124.91	154.02	6.53	451.77	90.35	102.59	4.14	1044.79	153.88
180 x 100	5.6	23.00	29.30	0.541	1236.96	137.44	170.26	6.50	495.69	99.14	113.28	4.11	1155.01	169.10
180 x 100	6.0	24.50	31.23	0.539	1309.61	145.51	180.83	6.48	523.83	104.77	120.22	4.10	1226.68	178.88
180 x 100	7.1	28.30	36.01	0.529	1463.36	162.60	204.86	6.38	585.55	117.11	136.32	4.03	1419.69	203.52
180 x 100	8.0	31.40	40.04	0.526	1598.49	177.61	225.62	6.32	637.47	127.49	149.93	3.99	1565.24	222.49
180 x 100	8.8	34.20	43.52	0.522	1709.13	189.90	243.05	6.27	679.66	135.93	161.33	3.95	1687.64	238.16
180 x 100	10.0	38.10	48.57	0.517	1859.47	206.61	267.51	6.19	736.41	147.28	177.25	3.89	1858.62	259.61
180 x 120	4.0	18.00	22.95	0.586	1049.97	116.66	139.97	6.76	563.81	93.97	106.17	4.96	1160.17	154.55
180 x 120	5.0	22.30	28.36	0.583	1277.37	141.93	171.52	6.71	683.97	110.00	129.95	4.91	1423.83	187.84
180 x 120	6.0	26.40	33.63	0.579	1491.34	165.70	201.71	6.66	796.30	132.72	152.65	4.87	1676.88	219.13
180 x 120	7.1	30.50	38.85	0.569	1675.73	186.19	229.41	6.57	895.15	149.19	173.75	4.80	1949.25	250.49
180 x 120	8.0	34.00	43.24	0.566	1835.33	203.93	253.14	6.51	978.44	163.07	191.57	4.76	2156.35	274.82
180 x 120	8.8	36.90	47.04	0.562	1967.28	218.59	273.19	6.47	1047.00	174.50	206.61	4.72	2332.35	295.13

H x B mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	A <sub>u</sub> m <sup>2</sup> /m	I <sub>x</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>x</sub> m <sup>3</sup> x 10 <sup>3</sup>	W <sub>px</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i <sub>x</sub> mm x 10	I <sub>y</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>y</sub> mm <sup>3</sup> x 10 <sup>3</sup>	W <sub>py</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i <sub>y</sub> mm x 10	I <sub>xy</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>v</sub> mm <sup>3</sup> x 10 <sup>3</sup>
180 x 120	10.0	41.30	52.57	0.557	2148.80	238.76	301.51	6.39	1140.81	190.13	227.82	4.66	2581.64	323.34
180 x 120	12.5	48.70	62.04	0.536	2352.37	261.37	341.46	6.16	1252.33	208.72	258.45	4.49	3001.38	367.47
200 x 80	4.0	16.80	21.35	0.546	1046.02	104.60	132.36	7.00	249.80	62.45	69.55	3.42	663.60	111.14
200 x 80	5.0	20.70	26.36	0.543	1269.09	126.91	161.87	6.94	300.44	75.11	84.74	3.38	808.38	134.05
200 x 80	6.0	24.50	31.23	0.539	1477.42	147.74	189.99	6.88	346.74	86.69	99.07	3.33	944.77	155.16
200 x 80	7.1	28.30	36.01	0.529	1645.72	164.57	214.90	6.76	385.82	96.45	112.09	3.27	1086.19	175.56
200 x 80	8.0	31.40	40.04	0.526	1795.76	179.58	236.54	6.70	418.23	104.56	123.01	3.23	1191.77	191.11
200 x 80	8.8	34.20	43.52	0.522	1918.00	191.80	254.69	6.64	444.20	111.05	132.09	3.19	1279.19	203.77
200 x 80	10.0	38.10	48.57	0.517	2083.06	208.31	280.08	6.55	478.48	119.62	144.68	3.14	1398.83	220.79
200 x 100	4.0	18.00	22.95	0.586	1199.71	119.97	148.04	7.23	410.78	82.16	91.70	4.23	985.38	141.81
200 x 100	5.0	22.30	28.36	0.583	1459.25	145.93	181.37	7.17	496.94	99.39	112.09	4.19	1206.29	171.94
200 x 100	6.0	26.40	33.63	0.579	1703.31	170.33	213.27	7.12	576.91	115.38	131.50	4.14	1417.03	200.10
200 x 100	7.1	30.50	38.85	0.569	1910.04	191.00	242.29	7.01	646.95	129.39	149.52	4.08	1641.19	228.04
200 x 100	8.0	34.00	43.24	0.566	2090.84	209.08	267.26	6.95	705.36	141.07	164.65	4.04	1810.72	249.60
200 x 100	8.8	36.90	47.04	0.562	2239.93	223.99	288.34	6.90	753.08	150.62	177.38	4.00	1953.68	267.47
200 x 100	10.0	41.30	52.57	0.557	2444.40	244.44	318.08	6.82	817.74	163.55	195.25	3.94	2154.13	292.07
200 x 100	12.5	48.70	62.04	0.536	2658.89	265.89	359.13	6.55	892.15	178.43	220.78	3.79	2473.75	328.83
200 x 120	5.0	23.80	30.36	0.623	1649.42	164.94	200.87	7.37	750.14	125.02	141.45	4.97	1652.00	209.87
200 x 120	6.0	28.30	36.03	0.619	1929.20	192.92	236.55	7.32	874.35	145.72	166.33	4.93	1946.73	245.12
200 x 120	7.1	32.70	41.69	0.609	2174.35	217.44	269.68	7.22	985.77	164.30	189.78	4.86	2264.63	280.65
200 x 120	8.0	36.50	46.44	0.606	2385.92	238.59	297.98	7.17	1078.97	179.83	209.49	4.82	2507.04	308.27
200 x 120	8.8	39.70	50.56	0.602	2561.86	256.19	321.99	7.12	1156.05	192.67	226.18	4.78	2713.55	331.40
200 x 120	10.0	44.40	56.57	0.597	2805.73	280.57	356.08	7.04	1262.14	210.36	249.82	4.72	3007.03	363.69
200 x 120	12.5	52.60	67.00	0.576	3099.00	310.00	406.00	6.80	1397.00	233.00	285.00	4.57	3514.00	416.00
220 x 120	5.0	25.40	32.36	0.663	2082.19	189.29	232.23	8.02	816.31	136.05	152.95	5.02	1884.69	231.92
220 x 120	6.0	30.20	38.43	0.659	2439.12	221.74	273.78	7.97	952.40	158.73	180.01	4.98	2221.88	271.11
220 x 120	7.1	35.00	44.53	0.649	2756.35	250.58	312.79	7.87	1076.39	179.40	205.81	4.92	2586.02	310.83
220 x 120	8.0	39.00	49.64	0.646	3029.40	275.40	346.02	7.81	1179.49	196.58	227.41	4.87	2864.35	341.73
220 x 120	8.8	42.50	54.08	0.642	3257.58	296.14	374.31	7.76	1265.09	210.85	245.75	4.84	3101.90	367.69
220 x 120	10.0	47.50	60.57	0.637	3575.79	325.07	414.65	7.68	1383.47	230.58	271.82	4.78	3440.33	404.05
250 x 100	5.0	26.18	33.36	0.683	2553.76	204.30	258.51	8.75	609.85	121.97	135.84	4.28	1620.11	217.08
250 x 100	6.0	31.11	39.63	0.679	2992.34	239.39	304.85	8.69	709.63	141.93	159.70	4.23	1904.54	253.15
250 x 100	8.0	40.23	51.24	0.666	3714.08	297.13	385.37	8.51	875.06	175.01	201.45	4.13	2438.66	317.41
250 x 100	10.0	49.11	62.57	0.657	4384.17	350.73	462.00	8.37	1021.08	204.22	240.25	4.04	2909.59	373.27
250 x 150	5.0	30.10	38.36	0.783	3304.18	264.33	319.76	9.28	1507.95	201.06	225.48	6.27	3284.54	336.90
250 x 150	6.0	35.80	45.63	0.779	3885.56	310.84	378.05	9.23	1768.35	235.78	266.28	6.23	3885.80	395.65
250 x 150	7.1	41.60	53.05	0.769	4426.62	354.13	434.51	9.13	2014.87	268.65	306.24	6.16	4542.75	456.33
250 x 150	8.0	46.50	59.24	0.766	4885.79	390.86	482.17	9.08	2219.25	295.90	339.56	6.12	5050.45	503.96
250 x 150	8.8	50.80	64.64	0.762	5274.44	421.96	523.07	9.03	2391.51	318.87	368.11	6.08	5488.32	544.47
250 x 150	10.0	57.00	72.57	0.757	5825.01	466.00	582.00	8.96	2634.20	351.23	409.17	6.02	6120.70	602.08
250 x 150	12.5	68.30	87.04	0.736	6632.67	530.61	678.30	8.73	3002.33	400.31	477.46	5.87	7314.55	704.10
260 x 140	6.0	35.80	45.63	0.779	4081.53	313.96	385.92	9.46	1567.27	223.90	251.81	5.86	3646.18	382.52
260 x 140	7.1	41.60	53.05	0.769	4647.40	357.49	443.43	9.36	1784.54	254.93	289.50	5.8	4258.54	440.82
260 x 140	8.0	46.50	59.24	0.766	5128.80	394.52	492.03	9.30	1964.15	280.59	320.90	5.76	4731.08	486.51
260 x 140	8.8	50.80	64.64	0.762	5536.06	425.85	533.73	9.25	2115.26	302.18	347.78	5.72	5137.89	525.31
260 x 140	10.0	57.00	72.57	0.757	6112.65	470.20	593.78	9.18	2327.67	332.52	386.38	5.66	5724.07	580.38
260 x 140	12.5	68.30	87.04	0.736	6949.76	534.60	691.51	8.94	2648.36	378.34	450.50	5.52	6820.62	677.15
260 x 180	6.0	39.60	50.43	0.859	4855.87	373.53	446.88	9.81	2763.43	307.05	347.87	7.4	5565.69	501.44
260 x 180	7.1	46.10	58.73	0.849	5555.85	427.37	515.26	9.73	3162.31	351.37	401.28	7.34	6522.55	580.26
260 x 180	8.0	51.50	65.64	0.846	6145.21	472.71	572.67	9.68	3493.23	388.14	445.78	7.29	7266.68	642.43



H x B mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	A <sub>u</sub> m <sup>2</sup> /m	I <sub>x</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>x</sub> m <sup>3</sup> x 10 <sup>3</sup>	W <sub>px</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i <sub>x</sub> mm x 10	I <sub>y</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>y</sub> mm <sup>3</sup> x 10 <sup>3</sup>	W <sub>py</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i <sub>y</sub> mm x 10	I <sub>yy</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>y</sub> mm <sup>3</sup> x 10 <sup>3</sup>
260 x 180	8.8	56.30	71.68	0.842	6647.10	511.32	622.15	9.63	3774.33	419.37	484.10	7.26	7911.95	695.64
260 x 180	10.0	63.20	80.57	0.837	7363.31	566.41	693.78	9.56	4174.13	463.79	539.51	7.20	8850.30	771.94
300 x 100	5.0	30.10	38.36	0.783	4065.22	271.01	348.15	10.29	722.77	144.55	159.59	4.34	2043.80	262.23
300 x 100	6.0	35.80	45.63	0.779	4776.79	318.45	411.43	10.23	842.35	168.47	187.90	4.30	2403.46	306.21
300 x 100	7.1	41.60	53.05	0.769	5422.43	361.50	472.02	10.11	953.92	190.78	215.47	4.24	2787.39	350.74
300 x 100	8.0	46.50	59.24	0.766	5977.86	398.52	523.47	10.05	1044.77	208.95	238.25	4.20	3080.34	385.24
300 x 100	8.8	50.80	64.64	0.762	6446.06	429.74	567.55	9.99	1120.18	224.04	257.63	4.16	3329.01	414.15
300 x 100	10.0	57.00	72.57	0.757	7106.03	473.74	630.91	9.90	1224.41	244.88	285.25	4.11	3681.00	454.51
300 x 100	12.5	68.30	87.04	0.736	8009.59	533.97	731.85	9.59	1373.92	274.78	330.16	3.97	4291.50	521.17
300 x 150	6.0	40.50	51.63	0.879	6073.51	404.90	499.63	10.85	2079.57	277.28	309.48	6.35	4988.47	478.60
300 x 150	7.1	47.20	60.15	0.870	6946.90	463.13	576.09	10.75	2377.98	317.06	357.01	6.29	5834.16	553.01
300 x 150	8.0	52.80	67.24	0.866	7683.57	512.24	640.27	10.69	2622.95	349.73	396.36	6.25	6490.59	611.52
300 x 150	10.0	64.80	82.57	0.857	9209.37	613.96	775.91	10.56	3125.03	416.67	479.17	6.15	7878.65	732.81
300 x 150	12.5	78.10	99.54	0.836	10594.23	706.28	911.53	10.32	3594.78	479.30	563.39	6.01	9451.90	861.80
300 x 200	6.0	45.20	57.63	0.979	7370.23	491.35	587.83	11.31	3962.19	396.22	446.07	8.29	8115.23	651.24
300 x 200	7.1	52.80	67.25	0.969	8468.59	564.57	679.98	11.22	4553.17	455.32	516.21	8.23	9524.48	755.67
300 x 200	8.0	59.10	75.24	0.966	9389.27	625.95	757.07	11.17	5041.67	504.17	574.46	8.19	10626.50	838.38
300 x 200	8.8	64.60	82.24	0.962	10178.28	678.55	823.81	11.12	5459.26	545.93	624.85	8.15	11585.67	909.54
300 x 200	10.0	72.70	92.57	0.957	11312.70	754.18	920.91	11.05	6057.73	605.77	698.08	8.09	12987.13	1012.19
300 x 200	12.5	88.00	112.04	0.936	13178.86	878.59	1091.22	10.85	7059.94	705.99	827.88	7.94	15767.68	1204.48
400 x 200	6.0	54.70	69.63	1.179	14789.35	739.47	905.99	14.57	5091.63	509.16	562.47	8.55	12068.52	877.05
400 x 200	7.1	63.90	81.45	1.169	17067.90	853.40	1051.71	14.48	5874.74	587.47	653.17	8.49	14169.41	1019.86
400 x 200	8.0	71.60	91.24	1.166	18974.42	948.72	1173.29	14.42	6517.08	651.71	728.06	8.45	15820.22	1133.29
400 x 200	8.8	78.40	99.84	1.162	20619.13	1030.96	1279.03	14.37	7068.92	706.89	793.11	8.41	17259.78	1231.25
400 x 200	10.0	88.40	112.57	1.157	23002.65	1150.13	1433.74	14.30	7864.40	786.44	888.08	8.36	19368.49	1373.21
400 x 200	12.5	108.00	137.04	1.136	27100.50	1355.02	1713.94	14.06	9260.46	926.05	1062.25	8.22	23594.07	1644.04

**Table 3**  
**Dimensions and cross-sectional properties. Circular hollow sections**



M = Weight  
A = Cross-section area  
 $A_u$  = External surface area  
I = Moment of inertia  
W = Section modulus

$W_p$  = Plastic section modulus  
 $i$  = Radius of gyration  
 $I_v$  = Torsion modulus  
 $W_v$  = Section modulus in torsion

Theoretical density = 7.85 kg/dm<sup>3</sup>  
The cross-sectional properties have been calculated by using nominal dimensions D and T.  
Theoretical density = 7.85 kg/dm<sup>3</sup>

D mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	$A_u$ m <sup>2</sup> /m	I mm <sup>4</sup> x 10 <sup>4</sup>	W mm <sup>3</sup> x 10 <sup>3</sup>	$W_p$ mm <sup>3</sup> x 10 <sup>3</sup>	$i$ mm x 10	$I_v$ mm <sup>4</sup> x 10 <sup>4</sup>	$W_v$ mm <sup>3</sup> x 10 <sup>3</sup>
26.9	2.0	1.23	1.56	0.085	1.22	0.91	1.24	0.88	2.44	1.81
26.9	2.5	1.50	1.92	0.085	1.44	1.07	1.49	0.87	2.88	2.14
26.9	2.6	1.56	1.98	0.085	1.48	1.10	1.54	0.86	2.96	2.20
33.7	2.0	1.56	1.99	0.106	2.51	1.49	2.01	1.12	5.02	2.98
33.7	2.5	1.92	2.45	0.106	3.00	1.78	2.44	1.11	6.00	3.56
33.7	2.6	1.99	2.54	0.106	3.09	1.84	2.52	1.10	6.19	3.67
33.7	3.0	2.27	2.89	0.106	3.44	2.04	2.84	1.09	6.88	4.08
33.7	3.2	2.41	3.07	0.106	3.60	2.14	2.99	1.08	7.21	4.28
42.4	2.0	1.99	2.54	0.133	5.19	2.45	3.27	1.43	10.38	4.90
42.4	2.5	2.46	3.13	0.133	6.26	2.95	3.99	1.41	12.52	5.91
42.4	2.6	2.55	3.25	0.133	6.46	3.05	4.12	1.41	12.93	6.10
42.4	2.9	2.82	3.60	0.133	7.06	3.33	4.53	1.40	14.11	6.66
42.4	3.0	2.91	3.71	0.133	7.25	3.42	4.67	1.40	14.49	6.84
42.4	3.2	3.09	3.94	0.133	7.62	3.59	4.93	1.39	15.24	7.19
42.4	4.0	3.79	4.83	0.133	8.99	4.24	5.92	1.36	17.98	8.48
48.3	2.0	2.28	2.91	0.152	7.81	3.23	4.29	1.64	15.62	6.47
48.3	2.5	2.82	3.60	0.152	9.46	3.92	5.25	1.62	18.92	7.83
48.3	2.6	2.93	3.73	0.152	9.78	4.05	5.44	1.62	19.55	8.10
48.3	3.0	3.35	4.27	0.152	11.00	4.55	6.17	1.61	22.00	9.11
48.3	3.2	3.56	4.53	0.152	11.59	4.80	6.52	1.60	23.17	9.59
48.3	4.0	4.37	5.57	0.152	13.77	5.70	7.87	1.57	27.54	11.40
60.3	2.0	2.88	3.66	0.189	15.58	5.17	6.80	2.06	31.16	10.34
60.3	2.5	3.56	4.54	0.189	18.99	6.30	8.36	2.05	37.99	12.60
60.3	2.9	4.11	5.23	0.189	21.59	7.16	9.56	2.03	43.18	14.32
60.3	3.0	4.24	5.40	0.189	22.22	7.37	9.86	2.03	44.45	14.74
60.3	3.2	4.51	5.74	0.189	23.47	7.78	10.44	2.02	46.94	15.57
60.3	4.0	5.55	7.07	0.189	28.17	9.34	12.70	2.00	56.35	18.69
60.3	5.0	6.82	8.69	0.189	33.48	11.10	15.33	1.96	66.95	22.21
76.1	2.0	3.65	4.66	0.239	31.98	8.40	10.98	2.62	63.96	16.81
76.1	2.5	4.54	5.78	0.239	39.19	10.30	13.55	2.60	78.37	20.60
76.1	2.9	5.24	6.67	0.239	44.74	11.76	15.55	2.59	89.48	23.52
76.1	3.0	5.41	6.89	0.239	46.10	12.11	16.04	2.59	92.19	24.23
76.1	4.0	7.11	9.06	0.239	59.06	15.52	20.81	2.55	118.11	31.04
76.1	5.0	8.77	11.17	0.239	70.92	18.64	25.32	2.52	141.84	37.28
76.1	6.3	10.80	13.81	0.239	84.82	22.29	30.78	2.48	169.64	44.58
88.9	2.5	5.33	6.79	0.279	63.37	14.26	18.67	3.06	126.75	28.51
88.9	3.0	6.36	8.10	0.279	74.76	16.82	22.15	3.04	149.53	33.64
88.9	3.2	6.76	8.62	0.279	79.21	17.82	23.51	3.03	158.41	35.64
88.9	4.0	8.38	10.67	0.279	96.34	21.67	28.85	3.00	192.68	43.35
88.9	5.0	10.40	13.18	0.279	116.37	26.18	35.24	2.97	232.75	52.36
88.9	6.0	12.30	15.63	0.279	134.94	30.36	41.31	2.94	269.88	60.72
88.9	6.3	12.80	16.35	0.279	140.24	31.55	43.07	2.93	280.47	63.10

D mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	A <sub>u</sub> m <sup>2</sup> /m	I mm <sup>4</sup> x 10 <sup>4</sup>	W mm <sup>3</sup> x 10 <sup>3</sup>	W <sub>p</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i mm x 10	I <sub>v</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>v</sub> mm <sup>3</sup> x 10 <sup>3</sup>
101.6	2.5	6.11	7.78	0.319	95.61	18.82	24.56	3.50	191.22	37.64
101.6	3.0	7.29	9.29	0.319	113.04	22.25	29.17	3.49	226.07	44.50
101.6	3.6	8.70	11.08	0.319	133.24	26.23	34.59	3.47	266.47	52.46
101.6	4.0	9.63	12.26	0.319	146.28	28.80	38.12	3.45	292.57	57.59
101.6	5.0	11.90	15.17	0.319	177.47	34.93	46.70	3.42	354.94	69.87
101.6	6.0	14.20	18.02	0.319	206.68	40.68	54.91	3.39	413.35	81.37
101.6	6.3	14.80	18.86	0.319	215.07	42.34	57.30	3.38	430.13	84.67
108.0	2.5	6.50	8.29	0.339	115.35	21.36	27.83	3.73	230.69	42.72
108.0	3.0	7.77	9.90	0.339	136.49	25.28	33.08	3.71	272.98	50.55
108.0	3.6	9.27	11.81	0.339	161.06	29.83	39.25	3.69	322.11	59.65
108.0	4.0	10.30	13.07	0.339	176.95	32.77	43.29	3.68	353.91	65.54
108.0	5.0	12.70	16.18	0.339	215.06	39.83	53.09	3.65	430.12	79.65
108.0	6.0	15.10	19.23	0.339	250.91	46.46	62.50	3.61	501.81	92.93
108.0	6.3	15.80	20.13	0.339	261.23	48.38	65.24	3.60	522.46	96.75
114.3	2.5	6.89	8.78	0.359	137.26	24.02	31.25	3.95	274.52	48.03
114.3	3.0	8.23	10.49	0.359	162.55	28.44	37.17	3.94	325.10	56.88
114.3	3.6	9.83	12.52	0.359	191.98	33.59	44.13	3.92	383.97	67.19
114.3	4.0	10.90	13.86	0.359	211.07	36.93	48.69	3.90	422.13	73.86
114.3	5.0	13.50	17.17	0.359	256.92	44.96	59.77	3.87	513.84	89.91
114.3	6.0	16.00	20.41	0.359	300.21	52.53	70.45	3.83	600.42	105.06
114.3	6.3	16.80	21.38	0.359	312.71	54.72	73.57	3.82	625.43	109.44
127.0	2.5	7.68	9.78	0.399	189.53	29.85	38.76	4.40	379.06	59.70
127.0	3.0	9.17	11.69	0.399	224.75	35.39	46.14	4.39	449.50	70.79
127.0	4.0	12.10	15.46	0.399	292.61	46.08	60.54	4.35	585.23	92.16
127.0	5.0	15.00	19.16	0.399	357.14	56.24	74.46	4.32	714.28	112.48
127.0	6.0	17.90	22.81	0.399	418.44	65.90	87.92	4.28	836.88	131.79
127.0	6.3	18.80	23.89	0.399	436.22	68.70	91.86	4.27	872.44	137.39
133.0	2.5	8.05	10.25	0.418	218.27	32.82	42.58	4.61	436.54	65.64
133.0	3.0	9.62	12.25	0.418	258.97	38.94	50.71	4.60	517.93	77.88
133.0	4.0	12.70	16.21	0.418	337.53	50.76	66.59	4.56	675.05	101.51
133.0	5.0	15.80	20.11	0.418	412.40	62.02	81.96	4.53	824.81	124.03
133.0	6.0	18.80	23.94	0.418	483.72	72.74	96.85	4.50	967.43	145.48
133.0	6.3	19.70	25.08	0.418	504.43	75.85	101.22	4.49	1008.86	151.71
139.7	3.0	10.10	12.88	0.439	301.09	43.11	56.07	4.83	602.18	86.21
139.7	4.0	13.40	17.05	0.439	392.86	56.24	73.68	4.80	785.72	112.49
139.7	5.0	16.60	21.16	0.439	480.54	68.80	90.76	4.77	961.08	137.59
139.7	6.0	19.80	25.20	0.439	564.26	80.78	107.33	4.73	1128.52	161.56
139.7	6.3	20.70	26.40	0.439	588.62	84.27	112.20	4.72	1177.24	168.54
139.7	8.0	26.00	33.10	0.439	720.29	103.12	138.93	4.66	1440.58	206.24
139.7	10.0	32.00	40.75	0.439	861.89	123.39	168.55	4.60	1723.79	246.78
152.4	3.0	11.10	14.08	0.479	393.01	51.58	66.07	5.28	786.03	103.15
152.4	4.0	14.60	18.65	0.479	513.73	67.42	88.11	5.25	1027.46	134.84
152.4	5.0	18.20	23.15	0.479	629.54	82.62	108.68	5.21	1259.08	165.23
152.4	6.0	21.70	27.60	0.479	740.56	97.19	128.67	5.18	1481.13	194.37
152.4	6.3	22.70	28.92	0.479	772.96	101.44	134.56	5.17	1545.92	202.88
159.0	3.0	11.50	14.70	0.500	447.42	56.28	73.02	5.52	894.84	112.56
159.0	4.0	15.30	19.48	0.500	585.33	73.63	96.12	5.48	1170.67	147.25
159.0	5.0	19.00	24.19	0.500	717.88	90.30	118.62	5.45	1435.75	180.60
159.0	6.0	22.60	28.84	0.500	845.19	106.31	140.53	5.41	1690.37	212.63
159.0	6.3	23.70	30.22	0.500	882.38	110.99	146.98	5.40	1764.76	221.98

D mm	T mm	M kg/m	A mm <sup>2</sup> x 10 <sup>2</sup>	A <sub>u</sub> m <sup>2</sup> /m	I mm <sup>4</sup> x 10 <sup>4</sup>	W mm <sup>3</sup> x 10 <sup>3</sup>	W <sub>p</sub> mm <sup>3</sup> x 10 <sup>3</sup>	i mm x 10	I <sub>v</sub> mm <sup>4</sup> x 10 <sup>4</sup>	W <sub>v</sub> mm <sup>3</sup> x 10 <sup>3</sup>
168.3	3.0	12.20	15.58	0.529	532.28	63.25	81.98	5.85	1064.57	126.51
168.3	3.2	13.00	16.60	0.529	565.74	67.23	87.24	5.84	1131.47	134.46
168.3	4.0	16.20	20.65	0.529	697.09	82.84	108.00	5.81	1394.18	165.68
168.3	4.5	18.20	23.16	0.529	777.22	92.36	120.77	5.79	1554.43	184.72
168.3	5.0	20.10	25.65	0.529	855.85	101.70	133.38	5.78	1711.69	203.41
168.3	6.0	24.00	30.59	0.529	1008.69	119.87	158.12	5.74	2017.39	239.74
168.3	6.3	25.20	32.06	0.529	1053.42	125.18	165.42	5.73	2106.84	250.37
168.3	8.0	31.60	40.29	0.529	1297.27	154.16	205.74	5.67	2594.54	308.32
168.3	10.0	39.00	49.73	0.529	1563.98	185.86	250.92	5.61	3127.97	371.71
193.7	4.0	18.70	23.84	0.609	1072.79	110.77	143.97	6.71	2145.58	221.54
193.7	5.0	23.30	29.64	0.609	1320.23	136.32	178.08	6.67	2640.46	272.63
193.7	6.0	27.80	35.38	0.609	1559.72	161.05	211.46	6.64	3119.45	322.09
193.7	6.3	29.10	37.09	0.609	1630.05	168.31	221.33	6.63	3260.09	336.61
193.7	8.0	36.60	46.67	0.609	2015.54	208.11	276.05	6.57	4031.07	416.22
193.7	10.0	45.30	57.71	0.609	2441.59	252.10	337.79	6.50	4883.18	504.20
193.7	12.5	55.90	71.16	0.609	2934.31	302.97	411.07	6.42	5868.62	605.95
219.1	4.0	21.20	27.03	0.688	1563.84	142.75	185.09	7.61	3127.67	285.50
219.1	4.5	23.80	30.34	0.688	1747.24	159.49	207.27	7.59	3494.48	318.98
219.1	5.0	26.40	33.63	0.688	1928.04	176.00	229.24	7.57	3856.08	351.99
219.1	6.0	31.50	40.17	0.688	2281.95	208.30	272.54	7.54	4563.89	416.60
219.1	6.3	33.10	42.12	0.688	2386.14	217.81	285.37	7.53	4772.28	435.63
219.1	8.0	41.70	53.06	0.688	2959.63	270.16	356.68	7.47	5919.26	540.33
219.1	10.0	51.60	65.69	0.688	3598.44	328.47	437.56	7.40	7196.88	656.95
219.1	12.5	63.70	81.13	0.688	4344.58	396.58	534.20	7.32	8689.16	793.17
244.5	6.0	35.29	44.96	0.768	3198.53	261.64	341.37	8.43	6397.07	523.28
244.5	8.0	46.66	59.44	0.768	4160.45	340.32	447.63	8.37	8320.89	680.65
244.5	10.0	57.83	73.67	0.768	5073.15	414.98	550.24	8.30	10146.29	829.96
244.5	12.5	71.52	91.11	0.768	6147.42	502.86	673.45	8.21	12294.83	1005.71
273.0	4.0	26.50	33.80	0.858	3058.25	224.05	289.47	9.51	6116.50	448.09
273.0	5.0	33.10	42.10	0.858	3780.81	276.98	359.16	9.48	7561.63	553.97
273.0	6.0	39.50	50.33	0.858	4487.08	328.72	427.81	9.44	8974.17	657.45
273.0	6.3	41.40	52.79	0.858	4695.82	344.02	448.20	9.43	9391.64	688.03
273.0	8.0	52.30	66.60	0.858	5851.71	428.70	561.97	9.37	11703.43	857.39
273.0	10.0	64.90	82.62	0.858	7154.09	524.11	692.02	9.31	14308.18	1048.22
273.0	12.5	80.30	102.30	0.858	8697.45	637.18	848.90	9.22	17394.90	1274.35
323.9	4.0	31.60	40.20	1.018	5143.16	317.58	409.37	11.31	10286.33	635.15
323.9	5.0	39.30	50.09	1.018	6369.42	393.30	508.53	11.28	12738.85	786.59
323.9	6.0	47.00	59.92	1.018	7572.47	467.58	606.43	11.24	15144.93	935.16
323.9	6.3	49.30	62.86	1.018	7928.90	489.59	635.56	11.23	15857.79	979.18
323.9	8.0	62.30	79.39	1.018	9910.08	611.92	798.51	11.17	19820.16	1223.84
323.9	10.0	77.40	98.61	1.018	12158.34	750.75	985.67	11.10	24316.68	1501.49
323.9	12.5	96.00	122.29	1.018	14846.53	916.74	1212.78	11.02	29693.05	1833.47

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