



Bianco Group

STRUCTURAL PRODUCTS





NATIONAL TUBE STOCKHOLDERS

Welcome to NTS Structural Products, the market leader in the supply of Hot Finished and Cold Formed structural hollow sections in the UK.

We have in excess of 20 000 tonnes of structural tube and hollow sections in stock at Dalton, North Yorkshire. In addition to this we are also leaders in the supply of Hot Finished seamless and Cold Drawn tubes for the mechanical and hydraulic industries and have a full range of linepipe, fittings and flanges in our 37 000m² purpose built facility. These large stocks, combined with our central location, enable us to swiftly and reliably fulfil both day-to-day ex-stock orders and large scale projects across the whole of the UK and Ireland on a just-in-time basis.

With 30 years of expertise in stockholding, logistics, in-house processing and sector specific requirements, NTS has a loyal and growing customer base. As part of the family owned and managed Bianco Group, which has over 20 companies throughout Europe and North

America, NTS has direct access to over 350 000 tonnes of group stock. This network also allows us to benefit from group purchasing, which ensures we source the highest quality materials at competitive rates, allowing us to pass these onto our customers.

At the heart of what we do is our commitment to customer service. Our experienced team can assist in specification with detailed product and application knowledge. We are also able to offer a large range of in-house processing and ensure that every order is accompanied with the correct documentation. With our continual commitment to health and safety, quality and the environment, NTS is proud to be certified by LRQA to ISO 9001, OHSAS 18001 and ISO 14001.

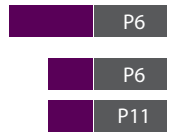




STRUCTURAL PRODUCTS

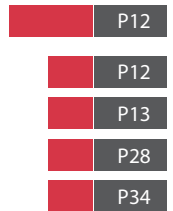
TECHNICAL INTRODUCTION

- Hot Finished or Cold Formed
- Standard Supply and Services



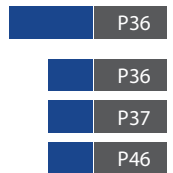
HOT FINISHED STRUCTURAL HOLLOW SECTIONS

- EN10210 Specification Details
- Hot Finished Square and Rectangular Dimensions
- Hot Finished Elliptical and Circular Dimensions
- Hot Finished Seamless Dimensions



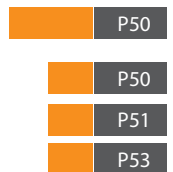
COLD FORMED STRUCTURAL HOLLOW SECTIONS

- EN10219 Specification Details
- Cold Formed Square and Rectangular Dimensions
- Cold Formed Circular Dimensions



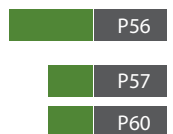
OFFSHORE STRUCTURAL TUBES

- EN10225 Specification Details
- Offshore Structural Specifications
- Offshore Structural Dimensions



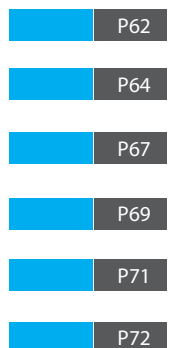
HOT FINISHED SEAMLESS MECHANICAL TUBES

- Hot Finished Seamless Mechanical Tubes Specification
- Sizes, Tolerances and Masses EN10297



Other Products

- Core6 Composites
- Pipes, Fittings and Flanges
- Client Endorsements
- Customer Service
- Meet The Team
- The Bianco Group



KEY DIFFERENCES BETWEEN HOT FINISHED AND COLD FORMED STRUCTURAL HOLLOW SECTIONS

GRAIN STRUCTURE & HARDNESS

Due to the manufacturing process Hot Finished hollow sections have a consistent and uniform grain structure throughout the flat face, weld and corner region as shown in figure 1.

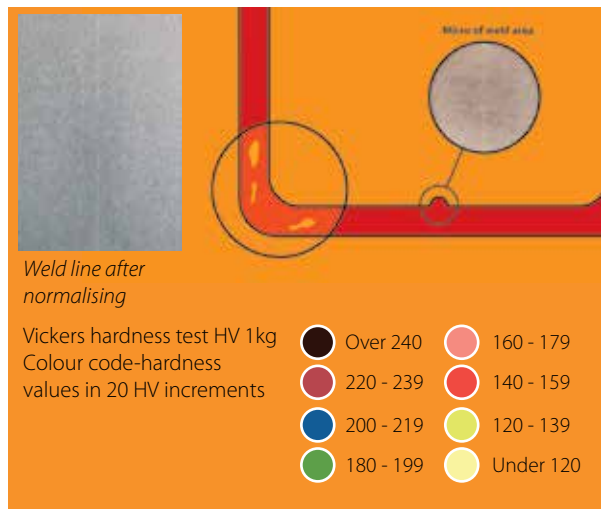


Figure 1: EN10210 Hot Finished products

The Cold Formed hollow section shows significant hardness around the corner region on both internal and external sides. It will also show a different structure within the heat affected zone (HAZ) of the weld (see figure 2).

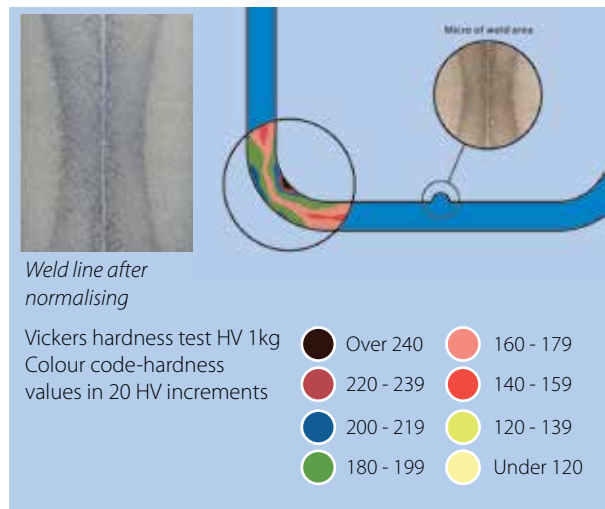


Figure 2: EN10219 Cold Formed products

RESIDUAL STRESS

The Hot Finished process offers benefits for critical applications which require consistent residual stress throughout the whole perimeter. As can be seen from figure 3 the Hot Finished shows uniform and very low stresses over the entire section.

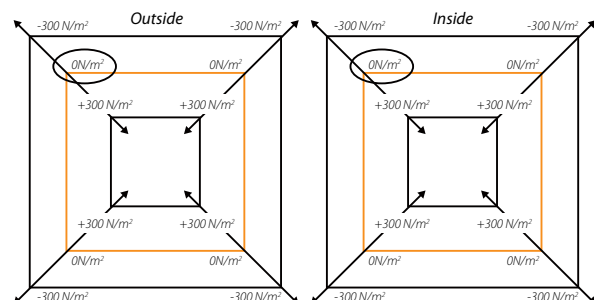


Figure 3: Hot Finished

The Cold Formed hollow sections (figure 4) show high levels of residual stress particularly in the corner region. Due to the cold manufacture the residual stresses are built in and may cause unexpected distortion or cracking during the fabrication process (e.g. welding, galvanising, bending etc).

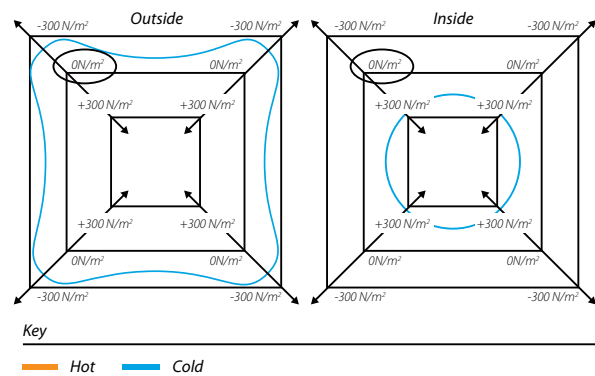


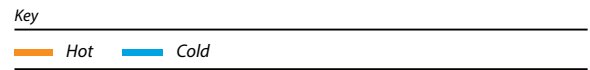
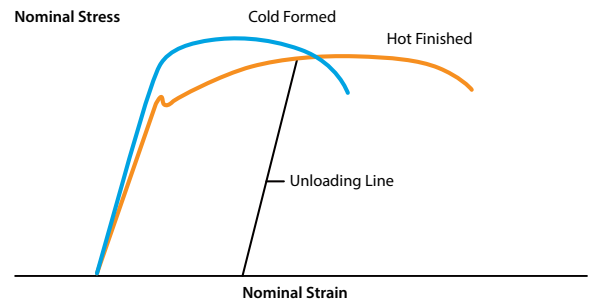
Figure 4: Cold Formed



DUCTILITY

Hot Finished has high ductility at all points and in all directions. So even after yield there is still a reserve of ductility beyond the unloading line. The tensile test is used to measure ductility using specimens in a longitudinal direction, from the centre of the flat face and away from the weld.

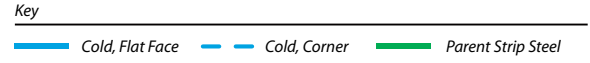
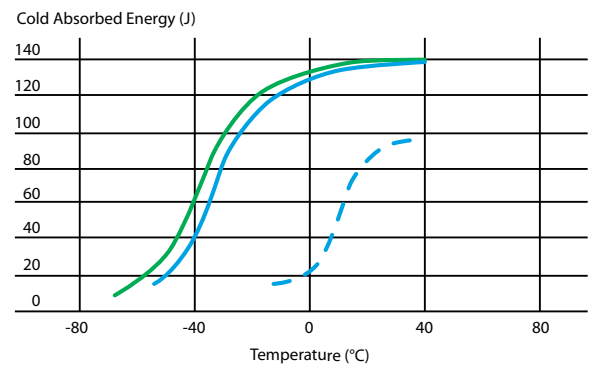
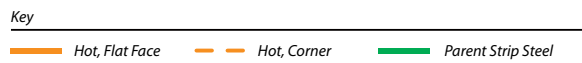
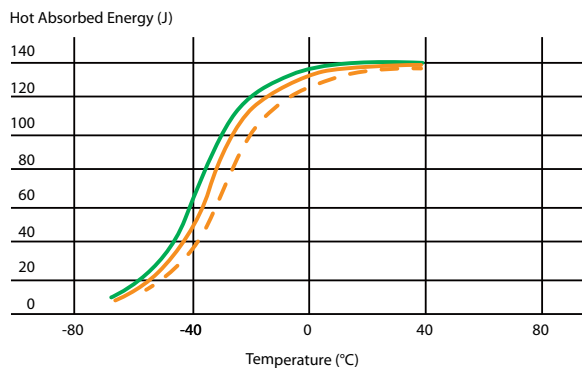
However in Cold Formed sections there is no clear indication of yield and ductility is substantially reduced in the weld and corner. The standard tensile test will not show this.



Schematic stress: strain plots for test specimens taken from corners of Celsius® 355 and Cold Formed structural hollow sections indicating differences in ductility.

RESISTANCE TO FRACTURE (IMPACT PROPERTIES)

Even when bent, manipulated or fabricated the Hot Finished product will have very little drop off with energy absorbed for the given specified temperature. The cold product due to the manufacture will lose more energy and will vary around the perimeter.



WELDING PROPERTIES

Welding is the critical operation for construction and mechanical applications and must be carried out in total safety to avoid any mechanical failure.

The Hot Finished product allows full welding operations around the whole perimeter. The product has excellent welding properties due to the manufacture thereby offering the best mechanical results and maximum reliability for the finished application.

Cold Forming has the built in residual stresses from manufacture and may have issues with welding particularly in the corner. This is recognised in the European Standard EC 3-1-8 clause 4.14 table 4.2 (overleaf) and clearly shows the dangers of welding with cold. If the Cold Formed does not comply with the table then you cannot weld within 5t from the corner. The welding limits from table 4.2 only apply to Cold Formed and Hot Finished is ok to weld around the whole perimeter.

SECTION PROPERTIES

In almost all sizes of Hot Finished the product will have tighter corner radii than the Cold Formed. This is recognised in the product standards for hollow sections. EN10210 Hot Finished has greater area than EN10219 cold therefore giving better geometric properties for same size same thickness. The tighter corner profile with Hot Finished also gives a more aesthetic shape than the rounded corners of cold.

Eurocode 3-1-8

4.14 Welding in Cold Formed Zones

(1) Welding may be carried out within a length $5t$ either side of a Cold Formed zone, see Table 4.2, provided that one of the following conditions is fulfilled:

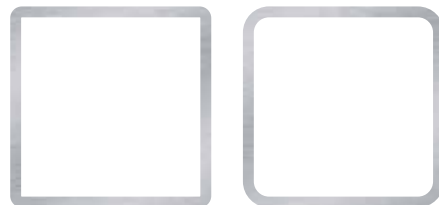
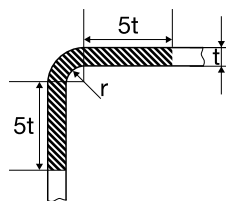
- the Cold Formed zones are normalized after Cold Forming but before welding;
- the r/t -ratio satisfies the relevant value obtained from Table 4.2.

Table 4.2 Conditions for Welding Cold Formed Zones and Adjacent Material

r/t	Strain due to cold forming (%)	Maximum thickness (mm)		
		Generally		Fully killed Aluminium-killed steel (Al \geq 0,02%)
		Predominantly static loading	Where fatigue predominates	
≥ 25	≤ 2	Any	Any	Any
≥ 10	≤ 5	Any	16	Any
≥ 3.0	≤ 14	24	12	24
≥ 2.0	≤ 20	12	10	12
≥ 1.5	≤ 25	8	8	10
≥ 1.0	≤ 33	4	4	6

NOTE: Cold Formed hollow sections according to EN10219 which do not satisfy the limits given in Table 4.2 can be assumed to satisfy these limits if these sections have a thickness not exceeding 12.5mm and are Al-killed with a quality J2H, K2H, MH, MLH, NH or NLH and further satisfy $C \leq 0.18\%$, $P \leq 0.020\%$ and $S \leq 0.012\%$.

In other cases welding is only permitted within a distance of $5t$ from the corners if it can be shown by tests that welding is permitted for that particular application.

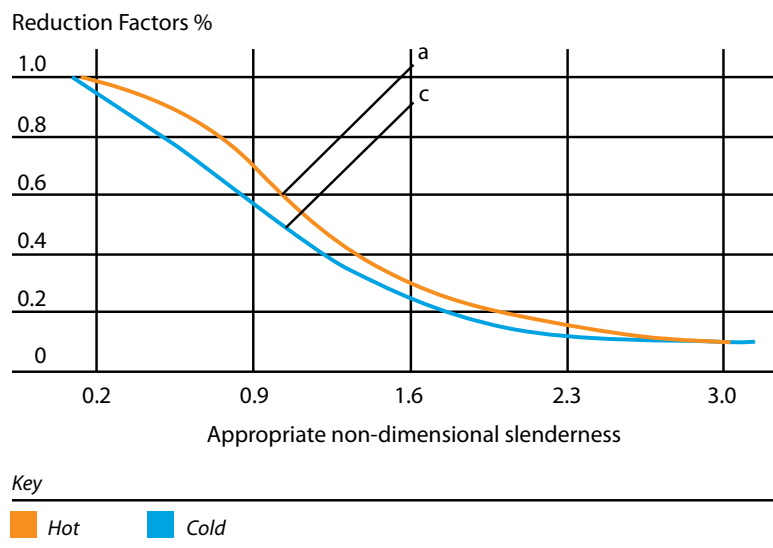


Photograph showing the difference in profile between Hot Finished (left) and Cold Formed (right) structural hollow sections.

BUCKLING STRENGTH (STRESS OF FLEXURE)

The manufacture of Hot Finished is recognised in the design of structural elements with improved buckling strength compared to that of cold.

Hot Finished can utilise strut curve 'a' from Eurocode 3 whereas Cold Formed, which has residual stresses and reduced plastic deformation from manufacture uses the lower strut curve 'c'. The buckling strengths of Hot Finished are up to 35% greater than Cold Formed sections of the same size and same thickness.





OUR PEOPLE

National Tube Stockholders employs over 100 people at our sites in the UK and Ireland. The quality of our workforce is something that we are extremely proud of. Whilst we are always searching to increase our existing customer base our philosophy is to retain our existing customers through exemplary service. We have a vastly experienced team with many years of industry experience and you can be assured that you will be treated both professionally and courteously, whatever your enquiry may be.

OUR STOCK

Our stockholding facility at Thirsk holds in excess of 30 000 tonnes of tubes and hollow sections and our strengths are twofold. Firstly our depth of stock allows us to satisfy the requirements for large projects on an ex stock basis – projects that alternatively would only be accommodated by a rolling mill. Secondly our length range ensures that wastage is kept to an absolute minimum – again an essential requirement for any steel buyer.

STEEL GRADES

National Tube Stockholders carries a comprehensive range of both Cold Formed and Hot Finished structural hollow section in various grades to suit all applications. Our standard grades for Cold Formed material are EN10219 S275J2H / S355J2H and our Hot Finished material is to EN10210 S355J2H / S355NH. We also carry a unique range of Offshore structural hollow section to EN10225 in many differing grades and conditions.

MILL CERTIFICATION, TESTING & TRACEABILITY

All products listed within this brochure can be supplied with full mill certification to EN10204 3.1 upon request. Some specific Offshore structural hollow section grades carry full mill certification to EN10204 3.2.

In addition we are happy to undertake supplementary testing, as well as third party inspection for our customers, as required.

Full traceability of materials through our supply chain from our supplier to your point of delivery is always maintained. If you have specific requirements in relation to the marking of materials then we will work with you to ensure your needs are met.

ADDITIONAL PROCESSING

National Tube Stockholders can accommodate a large variety of additional processes for you including shotblasting and painting, straight/mitre cutting and laser profiling to name but a few.

LOGISTICS

Based in Thirsk, North Yorkshire and in Carlow, Ireland, National Tube Stockholders operates a considerable fleet of some 20+ vehicles, which are privately owned and employee driven and cover the whole of the UK and Ireland. With the flexibility to utilise these vehicles to suit your own particular delivery requirements and our satellite based tracking system, we will always be able to keep you informed of the progress of your order.

EXPORT

National Tube Stockholders has the ability to handle any of your export requirements upon request.

CE MARKING

NTS has put in place the necessary systems to comply with the Construction Products Regulation. Any products distributed by us, which are covered by the Regulation, are CE Marked by the manufacturer of the product.

ISO CERTIFICATION

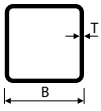
NTS operates a Quality Management System approved by Lloyds Register of Quality Assurance to ISO 9001. We are also happy to work with you on any specific audit requirements you may have and we regularly welcome customer audits at Dalton and can facilitate mill and sub-contractor audits should you require this.

HOT FINISHED STRUCTURAL HOLLOW SECTIONS TO: EN10210 S355J2H / S355NH

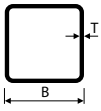
Dimensional tolerances to EN10210-2

	Circular/Ellipticals	Square/Rectangular
Outside dimension (D B and H):	Circular $\pm 1\%$ with a min of $\pm 0.5\text{mm}$ and maximum of $\pm 10\text{mm}$ Ellipticals $\pm 1\%$ with a min of $\pm 0.5\text{mm}$ (The permitted tolerance is twice the value for $H < 250$)	$\pm 1\%$ with a min of $\pm 0.5\text{mm}$
Thickness (T):	-10% -12.5% may occur in smooth transition over $< 25\%$ of circumference for Seamless Note: positive deviation limited by mass tolerance	-10% Note: Positive deviation limited by mass tolerance
Out of roundness (O):	2% for $D/T < 100$, where $D/T \geq 100$ out-of-roundness tolerance to be agreed	-
Squareness of side:	-	$90^\circ \pm 1^\circ$
External corner profile:	-	3T max at each corner*
Concavity/convexity (x):	-	$\pm 1\%$ of the side, measured independently of the tolerance on the outside dimension
Twist (V):	Ellipticals: 2mm plus 0.5mm/m max (The permitted tolerance is twice the value for $H < 250$)	2mm plus 0.5mm/m max Section is placed on a flat surface with one end held flat. At the other end the height difference of the two lower corners is taken
Mass (M):	$\pm 6\%$ on individual lengths +8/-6% for seamless hollow sections	$\pm 6\%$ on individual lengths
Straightness:	Maximum 0.2% of the total length and 3mm over every 1m length Ellipticals: the permitted tolerance is twice the value for $H < 250$	Maximum 0.2% of total length and 3mm over every 1m length
Length:	-0/+150mm	-0/+150mm

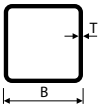
*Unless shown otherwise



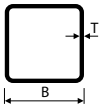
Outside dimension B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
40 x 40	3.00	3.41	4.34	9.78	1.50	4.89	5.97	15.7	7.10
	3.20	3.61	4.60	10.2	1.49	5.11	6.28	16.5	7.42
	4.00	4.39	5.59	11.8	1.45	5.91	7.44	19.5	8.54
	5.00	5.28	6.73	13.4	1.41	6.68	8.66	22.5	9.60
	6.30	6.33	8.07	14.7	1.35	7.34	9.9	25.4	10.5
50 x 50	3.00	4.35	5.54	20.2	1.91	8.08	9.7	32.1	11.8
	3.20	4.62	5.88	21.2	1.90	8.49	10.2	33.8	12.4
	4.00	5.64	7.19	25.0	1.86	9.99	12.3	40.4	14.5
	5.00	6.85	8.73	28.9	1.82	11.6	14.5	47.6	16.7
	6.30	8.31	10.6	32.8	1.76	13.1	17	55.2	18.8
	8.00	10.0	12.8	36.0	1.68	14.4	19.5	62.3	20.6
	10.00	11.7	14.9	37.6	1.59	15.0	21.4	66.7	21.4
60 x 60	3.20	5.62	7.16	38.2	2.31	12.7	15.2	60.2	18.6
	4.00	6.90	8.79	45.4	2.27	15.1	18.3	72.5	22.0
	5.00	8.42	10.7	53.3	2.23	17.8	21.9	86.4	25.7
	6.30	10.3	13.1	61.6	2.17	20.5	26	102	29.6
	7.10	11.4	14.5	65.8	2.13	21.9	28.2	110	31.6
	8.00	12.5	16.0	69.7	2.09	23.2	30.4	118	33.4
	10.00	14.9	18.9	75.5	2.00	25.2	34.4	131	36.0
	12.50	17.3	22.1	78.0	1.88	26.0	37.5	139	37.0
70 x 70	3.60	7.40	9.42	68.6	2.70	19.6	23.3	108	28.7
	4.00	8.15	10.4	74.7	2.68	21.3	25.5	118	31.2
	5.00	9.99	12.7	88.5	2.64	25.3	30.8	142	36.8
	6.30	12.3	15.6	104	2.58	29.7	36.9	169	42.9
	7.10	13.6	17.3	112	2.54	32.0	40.3	185	46.1
	8.00	15.0	19.2	120	2.50	34.2	43.8	200	49.2
	10.00	18.0	22.9	133	2.41	38.0	50.3	227	54.4
	12.50	21.3	27.1	142	2.29	40.6	56.3	249	58.0
80 x 80	3.60	8.53	10.9	105	3.11	26.2	31	164	38.5
	4.00	9.41	12.0	114	3.09	28.6	34	180	41.9
	5.00	11.6	14.7	137	3.05	34.2	41.1	217	49.8
	6.30	14.2	18.1	162	2.99	40.5	49.7	262	58.7
	7.10	15.8	20.2	176	2.95	43.9	54.5	286	63.5
	8.00	17.5	22.4	189	2.91	47.3	59.5	312	68.3
	10.00	21.1	26.9	214	2.82	53.5	69.3	360	76.8
	12.50	25.2	32.1	234	2.70	58.6	78.9	404	83.8



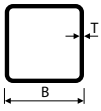
Outside dimension B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
90 x 90	3.60	9.66	12.3	152	3.52	33.8	39.7	237	49.7
	4.00	10.7	13.6	166	3.50	37.0	43.6	260	54.2
	5.00	13.1	16.7	200	3.45	44.4	53	316	64.8
	6.30	16.2	20.7	238	3.40	53.0	64.3	382	77.0
	7.10	18.1	23.0	260	3.36	57.7	70.8	419	83.7
	8.00	20.1	25.6	281	3.32	62.6	77.6	459	90.5
	10.00	24.3	30.9	322	3.23	71.6	91.3	536	103
	12.50	29.1	37.1	359	3.11	79.8	105	612	114
100 x 100	4.00	11.9	15.2	232	3.91	46.4	54.4	361	68.2
	5.00	14.7	18.7	279	3.86	55.9	66.4	439	81.8
	6.30	18.2	23.2	336	3.80	67.1	80.9	534	97.8
	7.10	20.3	25.8	367	3.77	73.4	89.2	589	107
	8.00	22.6	28.8	400	3.73	79.9	98.2	646	116
	10.00	27.4	34.9	462	3.64	92.4	116	761	133
	12.50	33.0	42.1	522	3.52	104	135	879	150
	14.20	36.6	46.6	553	3.44	111	146	943	158
110 x 110	5.00	16.3	20.7	378	4.27	68.8	81.2	592	101
	6.30	20.2	25.7	456	4.21	83.0	99.3	722	121
	8.00	25.1	32.0	547	4.14	99.4	121	878	144
	10.00	30.6	38.9	637	4.05	116	144	1041	168
120 x 120	4.00	14.4	18.4	410	4.72	68.4	79.7	635	101
	5.00	17.8	22.7	498	4.68	83.0	97.6	777	122
	6.30	22.2	28.2	603	4.62	100	120	950	147
	7.10	24.7	31.5	663	4.59	110	133	1051	161
	8.00	27.6	35.2	726	4.55	121	146	1160	176
	10.00	33.7	42.9	852	4.46	142	175	1382	206
	12.50	40.9	52.1	982	4.34	164	207	1623	236
	14.20	45.5	57.9	1053	4.26	176	226	1763	253
130 x 130	5.00	19.4	24.7	640	5.09	98.5	115	996	145
	6.30	24.1	30.7	778	5.03	120	142	1221	175
	8.00	30.1	38.4	941	4.95	145	174	1496	211
	10.00	36.8	46.9	1110	4.86	171	209	1791	248
	12.50	44.8	57.1	1288	4.75	198	248	2115	286



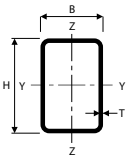
Outside dimension B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
140 x 140	5.00	21.0	26.7	807	5.50	115	135	1253	170
	6.30	26.1	33.3	984	5.44	141	166	1540	206
	7.10	29.2	37.2	1086	5.40	155	184	1709	227
	8.00	32.6	41.6	1195	5.36	171	204	1892	249
	10.00	40.0	50.9	1416	5.27	202	246	2272	294
	12.50	48.7	62.1	1653	5.16	236	293	2696	342
	14.20	54.4	69.3	1790	5.08	256	322	2952	369
150 x 150	4.00	18.2	23.2	821	5.95	109	127	1262	162
	5.00	22.6	28.7	1002	5.90	134	156	1550	197
	6.30	28.1	35.8	1223	5.85	163	192	1909	240
	8.00	35.1	44.8	1491	5.77	199	237	2351	291
	10.00	43.1	54.9	1773	5.68	236	286	2832	344
	12.50	52.7	67.1	2080	5.57	277	342	3375	402
	14.20	58.9	75.0	2262	5.49	302	377	3707	436
	16.00	65.2	83.0	2430	5.41	324	411	4026	467
160 x 160	5.00	24.1	30.7	1225	6.31	153	178	1892	226
	6.30	30.1	38.3	1499	6.26	187	220	2333	275
	8.00	37.6	48.0	1831	6.18	229	272	2880	335
	10.00	46.3	58.9	2186	6.09	273	329	3478	398
	12.50	56.6	72.1	2576	5.98	322	395	4158	467
	14.20	63.3	80.7	2809	5.90	351	436	4579	508
	16.00	70.2	89.4	3028	5.82	379	476	4988	546
	20.00	84.6	108	3422	5.64	428	554	5760	615
180 x 180	5.00	27.3	34.7	1765	7.13	196	227	2718	290
	6.30	34.0	43.3	2168	7.07	241	281	3361	355
	8.00	42.7	54.4	2661	7.00	296	349	4162	434
	10.00	52.5	66.9	3193	6.91	355	424	5048	518
	12.50	64.4	82.1	3790	6.80	421	511	6070	613
	14.20	72.2	92.0	4154	6.72	462	566	6711	670
	16.00	80.2	102	4504	6.64	500	621	7343	724
	20.00	97.1	124	5156	6.46	573	730	8576	825



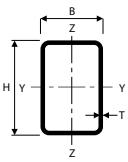
Outside dimension B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
200 x 200	5.00	30.4	38.7	2445	7.95	245	283	3756	362
	6.30	38.0	48.4	3011	7.89	301	350	4653	444
	8.00	47.7	60.8	3709	7.81	371	436	5778	545
	10.00	58.8	74.9	4471	7.72	447	531	7031	655
	12.50	72.3	92.1	5336	7.61	534	643	8491	778
	14.20	81.1	103	5872	7.54	587	714	9417	854
	16.00	90.3	115	6394	7.46	639	785	10340	927
220 x 220	5.00	33.5	42.7	3281	8.76	298	344	5028	442
	6.30	41.9	53.4	4049	8.71	368	427	6240	544
	8.00	52.7	67.2	5002	8.63	455	532	7765	669
	10.00	65.1	82.9	6050	8.54	550	650	9473	807
	12.50	80.1	102	7254	8.43	659	789	11480	963
	14.20	90.1	115	8007	8.35	728	879	12770	1060
	16.00	100	128	8749	8.27	795	969	14050	1156
250 x 250	5.00	38.3	48.7	4861	9.99	389	447	7430	577
	6.30	47.9	61.0	6014	9.93	481	556	9238	712
	8.00	60.3	76.8	7455	9.86	596	694	11530	880
	10.00	74.5	94.9	9055	9.77	724	851	14110	1065
	12.50	91.9	117	10920	9.66	873	1037	17160	1279
	14.20	103	132	12090	9.58	967	1158	19140	1413
	16.00	115	147	13270	9.50	1061	1280	21140	1546
260 x 260	6.30	49.9	63.5	6788	10.3	522	603	10420	773
	8.00	62.8	80.0	8423	10.3	648	753	13010	956
	10.00	77.7	98.9	10240	10.2	788	924	15930	1159
	12.50	95.8	122	12360	10.1	951	1127	19410	1394
	14.20	108	137	13710	9.99	1055	1259	21660	1542
	16.00	120	153	15060	9.91	1159	1394	23940	1689
300 x 300	6.30	57.8	73.6	10550	12.0	703	809	16140	1043
	8.00	72.8	92.8	13130	11.9	875	1013	20190	1294
	10.00	90.2	115	16030	11.8	1068	1246	24810	1575
	12.50	112	142	19440	11.7	1296	1525	30330	1904
	14.20	126	160	21640	11.6	1442	1708	33940	2114
16.00	141	179	23850	11.5	1590	1895	37620	2325	



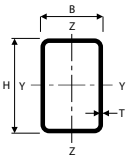
Outside dimension B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
350 x 350	6.30	67.7	86.2	16920	14.0	967	1109	25820	1436
	8.00	85.4	109	21130	13.9	1207	1392	32380	1789
	10.00	106	135	25880	13.9	1479	1715	39890	2185
	12.50	131	167	31540	13.7	1802	2107	48930	2654
	14.20	148	189	35210	13.7	2012	2364	54880	2957
	16.00	166	211	38940	13.6	2225	2630	60990	3264
400 x 400	6.30	77.5	98.8	25460	16.1	1273	1456	38760	1893
	8.00	97.9	125	31860	16.0	1593	1830	48690	2363
	10.00	122	155	39130	15.9	1956	2260	60090	2895
	12.50	151	192	47840	15.8	2392	2782	73910	3530
	14.20	170	217	53530	15.7	2676	3127	83030	3942
	16.00	191	243	59340	15.6	2967	3484	92440	4362
	20.00	235	300	71530	15.4	3577	4247	112500	5237



Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el yy}$ cm ³	Elastic section modulus $W_{el zz}$ cm ³	Plastic section modulus $W_{pl yy}$ cm ³	Plastic section modulus $W_{pl zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
50 x 30	3.20	3.61	4.60	14.2	6.20	1.76	1.16	5.68	4.13	7.25	5	14.2	6.80
	4.00	4.39	5.59	16.5	7.08	1.72	1.13	6.60	4.72	8.59	5.88	16.6	7.77
	5.00	5.28	6.73	18.7	7.89	1.67	1.08	7.49	5.26	10	6.8	19.0	8.67
	6.30	6.33	8.07	20.6	8.50	1.60	1.03	8.26	5.66	11.5	7.68	21.1	9.36
60 x 40	3.20	4.62	5.88	27.8	14.6	2.18	1.57	9.27	7.29	11.5	8.64	30.8	11.7
	4.00	5.64	7.19	32.8	17.0	2.14	1.54	10.9	8.52	13.8	10.3	36.7	13.7
	5.00	6.85	8.73	38.1	19.5	2.09	1.50	12.7	9.77	16.4	12.2	43.0	15.7
	6.30	8.31	10.6	43.4	21.9	2.02	1.44	14.5	11.0	19.2	14.2	49.5	17.6
70 x 40	6.30	9.30	11.8	65.4	25.5	2.35	1.47	18.7	12.8	24.8	16.3	62.4	21.2
70 x 50	5.00	8.42	10.7	67.3	39.0	2.50	1.91	19.2	15.6	24.3	19	80.8	24.8
	6.30	10.3	13.1	78.2	44.9	2.44	1.85	22.3	18.0	28.9	22.5	95.0	28.4
	10.00	14.9	18.9	96.6	53.9	2.26	1.69	27.6	21.6	38.3	29.4	121	34.2
	12.50	17.3	22.1	100	55.0	2.13	1.58	28.6	22.0	41.9	31.7	127	34.9
80 x 40	3.20	5.62	7.16	57.2	18.9	2.83	1.63	14.3	9.46	18	11	46.2	16.1
	4.00	6.90	8.79	68.2	22.2	2.79	1.59	17.1	11.1	21.8	13.2	55.2	18.9
	5.00	8.42	10.7	80.3	25.7	2.74	1.55	20.1	12.9	26.1	15.7	65.1	21.9
	6.30	10.3	13.1	93.3	29.2	2.67	1.49	23.3	14.6	31.1	18.4	75.6	24.8
	8.00	12.5	16.0	106	32.1	2.58	1.42	26.5	16.1	36.5	21.2	85.8	27.4
	10.00	14.9	18.9	115	33.7	2.47	1.33	28.8	16.9	41.3	23.5	92.5	28.9
80 x 50	4.00	7.53	9.59	79.8	37.7	2.88	1.98	19.9	15.1	24.9	17.8	82.6	24.6
	5.00	9.21	11.7	94.4	44.1	2.84	1.94	23.6	17.7	29.9	21.3	98.4	28.8
	6.30	11.3	14.4	110	50.9	2.77	1.88	27.6	20.4	35.7	25.3	116	33.2
	7.10	12.5	15.9	119	54.3	2.73	1.85	29.7	21.7	38.9	27.4	125	35.5
	8.00	13.8	17.6	127	57.4	2.69	1.81	31.7	23.0	42.2	29.6	135	37.5
	10.00	16.4	20.9	140	62.1	2.59	1.72	35.0	24.8	48.3	33.4	150	40.6
	12.50	19.3	24.6	148	64.1	2.45	1.61	37.0	25.6	53.6	36.4	159	42.0
80 x 60	4.00	8.15	10.4	91.3	58.0	2.97	2.36	22.8	19.3	27.9	22.8	113	30.4
	5.00	9.99	12.7	108	68.4	2.92	2.32	27.1	22.8	33.6	27.4	135	35.8
	6.30	12.3	15.6	128	79.9	2.86	2.26	31.9	26.6	40.4	32.8	161	41.7
	7.10	13.6	17.3	138	85.8	2.82	2.23	34.4	28.6	44.1	35.7	175	44.8
	8.00	15.0	19.2	148	91.5	2.78	2.19	36.9	30.5	48	38.8	189	47.7
	10.00	18.0	22.9	165	101	2.68	2.10	41.1	33.6	55.3	44.4	215	52.6
	12.50	21.3	27.1	177	107	2.55	1.99	44.2	35.6	62	49.3	234	55.8



Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el yy}$ cm ³	Elastic section modulus $W_{el zz}$ cm ³	Plastic section modulus $W_{pl yy}$ cm ³	Plastic section modulus $W_{pl zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
90 x 50	3.60	7.40	9.42	98.3	38.7	3.23	2.03	21.8	15.5	27.2	18	89.4	25.9
	5.00	9.99	12.7	127	49.2	3.16	1.97	28.3	19.7	36	23.5	116	32.9
	6.30	12.3	15.6	150	57.0	3.10	1.91	33.3	22.8	43.2	28	138	38.1
	7.10	13.6	17.3	162	60.9	3.06	1.88	36.0	24.4	47.2	30.5	149	40.7
	8.00	15.0	19.2	174	64.6	3.01	1.84	38.6	25.8	51.4	32.9	160	43.2
	10.00	18.0	22.9	194	70.2	2.91	1.75	43.0	28.1	59.3	37.4	179	47.1
100 x 40	5.00	9.99	12.7	144	31.9	3.36	1.58	28.8	15.9	37.9	19.2	88.0	28.0
	6.30	12.3	15.6	169	36.4	3.29	1.53	33.9	18.2	45.4	22.6	103	32.1
	8.00	15.0	19.2	196	40.5	3.20	1.45	39.2	20.2	54	26.3	117	35.8
100 x 50	3.20	7.13	9.08	116	38.8	3.57	2.07	23.2	15.5	28.9	17.7	93.4	26.4
	4.00	8.78	11.2	140	46.2	3.53	2.03	27.9	18.5	35.2	21.5	113	31.4
	5.00	10.8	13.7	167	54.3	3.48	1.99	33.3	21.7	42.6	25.8	135	36.9
	6.30	13.3	16.9	197	63.0	3.42	1.93	39.4	25.2	51.3	30.8	160	42.9
	8.00	16.3	20.8	230	71.7	3.33	1.86	46.0	28.7	61.4	36.3	186	48.9
	10.00	19.6	24.9	259	78.4	3.22	1.77	51.8	31.4	71.2	41.4	209	53.6
100 x 60	3.60	8.53	10.9	145	64.8	3.65	2.44	28.9	21.6	35.6	24.9	142	35.6
	4.00	9.41	12.0	158	70.5	3.63	2.43	31.6	23.5	39.1	27.3	156	38.7
	5.00	11.6	14.7	189	83.6	3.58	2.38	37.8	27.9	47.4	32.9	188	45.9
	6.30	14.2	18.1	225	98.1	3.52	2.33	45.0	32.7	57.3	39.5	224	53.8
	8.00	17.5	22.4	264	113	3.44	2.25	52.8	37.8	68.7	47.1	265	62.2
	10.00	21.1	26.9	299	126	3.33	2.16	59.9	42.1	80.2	54.4	304	69.3
	12.50	25.2	32.1	329	136	3.21	2.06	65.9	45.2	91.6	61.2	336	74.8
100 x 80	4.00	10.7	13.6	195	138	3.79	3.18	39.0	34.4	46.8	40.1	253	53.4
	5.00	13.1	16.7	234	165	3.74	3.14	46.9	41.2	56.9	48.6	307	63.8
	6.30	16.2	20.7	280	196	3.68	3.08	56.0	49.0	69.1	58.9	371	75.8
	7.10	18.1	23.0	306	213	3.64	3.05	61.1	53.4	76.1	64.8	407	82.3
	8.00	20.1	25.6	332	231	3.60	3.01	66.3	57.7	83.5	71	445	89.0
	8.80	21.8	27.8	353	245	3.57	2.97	70.6	61.2	89.7	76.2	477	94.3
	10.00	24.3	30.9	381	263	3.51	2.92	76.2	65.8	98.2	83.3	519	101
	12.50	29.1	37.1	426	292	3.39	2.81	85.2	73.0	113	95.8	591	112
120 x 50	5.00	12.3	15.7	266	64.5	4.11	2.02	44.4	25.8	57.3	30.3	172	45.0
	6.30	15.2	19.4	318	75.2	4.04	1.97	52.9	30.1	69.5	36.3	205	52.6
	8.00	18.8	24.0	374	86.0	3.95	1.89	62.4	34.4	83.7	43	240	60.3



Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el yy}$ cm ³	Elastic section modulus $W_{el zz}$ cm ³	Plastic section modulus $W_{pl yy}$ cm ³	Plastic section modulus $W_{pl zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
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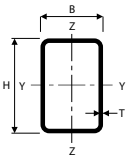
120 x 60	3.60	9.66	12.3	227	76.3	4.30	2.49	25.4	25.3	47.2	28.9	183	43.3
	5.00	13.1	16.7	299	98.8	4.23	2.43	49.9	32.9	63.1	38.4	242	56.0
	6.30	16.2	20.7	358	116	4.16	2.37	59.7	38.8	76.7	46.3	290	65.9
	7.10	18.1	23.0	391	126	4.12	2.34	65.2	41.9	84.4	50.8	317	71.3
	8.00	20.1	25.6	425	135	4.08	2.30	70.8	45.0	92.7	55.4	344	76.6
	8.80	21.8	27.8	452	142	4.04	2.27	75.3	47.5	99.6	59.2	366	80.8
	10.00	24.3	30.9	488	152	3.97	2.21	81.4	50.5	109	64.4	396	86.1
12.50	29.1	37.1	546	165	3.84	2.11	91.1	54.9	126	73.1	442	93.8	

120 x 80	4.00	11.9	15.2	303	161	4.46	3.25	50.4	40.2	61.2	46.1	330	65.0
	5.00	14.7	18.7	365	193	4.42	3.21	60.9	48.2	74.6	56.1	401	77.9
	6.30	18.2	23.2	440	230	4.36	3.15	73.3	57.6	91	68.2	487	92.9
	7.10	20.3	25.8	482	251	4.32	3.12	80.3	62.8	100	75.2	535	101
	8.00	22.6	28.8	525	273	4.27	3.08	87.5	68.1	111	82.6	587	110
	10.00	27.4	34.9	609	313	4.18	2.99	102	78.1	131	97.3	688	126
	12.50	33.0	42.1	692	349	4.05	2.88	115	87.4	153	113	789	141

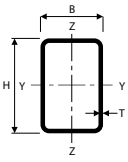
120 x 100	5.00	14.7	18.7	432	325	4.56	3.96	71.9	64.9	86.1	75.9	581	99.9
	6.30	20.2	25.7	521	391	4.50	3.90	86.9	78.2	105	92.7	709	120
	8.00	25.1	32.0	626	467	4.43	3.82	104	93.5	129	113	862	143
	10.00	30.6	38.9	731	543	4.33	3.74	122	109	153	134	1020	166
	12.50	37.0	47.1	837	619	4.22	3.62	139	124	180	157	1188	188

140 x 60	5.00	14.7	18.7	443	114	4.86	2.47	63.3	38.0	80.8	43.9	297	66.0
	6.30	18.2	23.2	533	135	4.79	2.41	76.2	44.9	98.6	53.1	357	78.1
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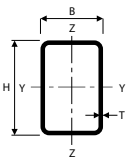
140 x 70	4.00	12.6	16.0	404	136	5.02	2.91	57.7	38.8	71.7	44	325	66.0
	5.00	15.5	19.7	488	163	4.98	2.87	69.8	46.5	87.6	53.5	394	79.0
	6.30	19.2	24.4	589	194	4.91	2.81	84.2	55.3	107	65	477	94.0
	7.10	21.4	27.3	647	211	4.87	2.78	92.4	60.2	118	71.5	523	102
	8.00	23.8	30.4	707	228	4.82	2.74	101	65.1	130	78.5	572	111
	10.00	29.0	36.9	823	260	4.72	2.65	118	74.3	155	92.3	668	127
	12.50	35.0	44.6	939	289	4.59	2.55	134	82.6	182	107	761	141



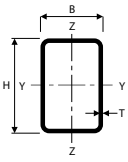
Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el,yy}$ cm ³	Elastic section modulus $W_{el,zz}$ cm ³	Plastic section modulus $W_{pl,yy}$ cm ³	Plastic section modulus $W_{pl,zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
140 x 80	5.00	16.3	20.7	534	221	5.08	3.27	76.3	55.3	94.3	63.6	499	91.9
	6.30	20.2	25.7	646	265	5.01	3.21	92.3	66.2	115	77.5	607	110
	7.10	22.5	28.7	709	289	4.97	3.17	101	72.3	128	85.5	668	120
	8.00	25.1	32.0	776	314	4.93	3.14	111	78.5	141	94.1	733	130
	10.00	30.6	38.9	908	362	4.83	3.05	130	90.5	168	111	862	150
	12.50	37.0	47.1	1041	407	4.70	2.94	149	102	198	130	994	169
150 x 50	5.00	14.7	18.7	476	79.7	5.04	2.06	63.4	31.9	83.2	37	230	57.2
	6.30	18.2	23.2	572	93.3	4.97	2.01	76.3	37.3	101	44.5	273	67.1
	8.00	22.6	28.8	683	107	4.87	1.93	91.1	43.0	123	53.1	321	77.4
	10.00	27.4	34.9	792	119	4.76	1.85	106	47.7	146	61.4	364	86.1
150 x 60	8.00	23.8	30.4	764	168	5.02	2.35	102	55.9	135	67.9	466	98.4
150 x 75	5.00	16.7	21.2	607	203	5.35	3.09	81.0	54.1	101	62	490	92.0
	6.30	20.7	26.3	735	243	5.28	3.03	98.0	64.7	124	75.5	594	110
	7.10	23.1	29.4	808	265	5.24	3.00	108	70.5	137	83.3	654	120
	8.00	25.7	32.8	885	287	5.20	2.96	118	76.6	152	91.5	716	130
	10.00	31.3	39.9	1037	330	5.10	2.87	138	88.0	181	108	841	150
150 x 100	5.00	18.6	23.7	739	392	5.58	4.07	98.5	78.5	119	90.1	807	127
	6.30	23.1	29.5	898	474	5.52	4.01	120	94.8	147	110	986	153
	7.10	25.9	32.9	990	520	5.48	3.97	132	104	163	122	1091	168
	8.00	28.9	36.8	1087	569	5.44	3.94	145	114	180	135	1203	183
	10.00	35.3	44.9	1282	665	5.34	3.85	171	133	216	161	1432	214
	12.50	42.8	54.6	1488	763	5.22	3.74	198	153	256	190	1679	246
160 x 80	4.00	14.4	18.4	612	207	5.77	3.35	76.5	51.7	94.7	58.3	493	88.1
	5.00	17.8	22.7	744	249	5.72	3.31	93.0	62.3	116	71.1	600	106
	6.30	22.2	28.2	903	299	5.66	3.26	113	74.8	142	86.8	730	127
	7.10	24.7	31.5	994	327	5.62	3.22	124	81.7	158	95.9	804	139
	8.00	27.6	35.2	1091	356	5.57	3.18	136	89.0	175	106	883	151
	10.00	33.7	42.9	1284	411	5.47	3.10	161	103	209	125	1041	175
	12.50	40.9	52.1	1485	465	5.34	2.99	186	116	247	146	1204	198



Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el,yy}$ cm ³	Elastic section modulus $W_{el,zz}$ cm ³	Plastic section modulus $W_{pl,yy}$ cm ³	Plastic section modulus $W_{pl,zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
160 x 90	5.00	18.6	23.7	804	326	5.82	3.71	101	72.5	124	82.7	738	121
	6.30	23.1	29.5	978	393	5.76	3.65	122	87.3	152	101	901	146
	7.10	25.9	32.9	1078	431	5.72	3.62	135	95.7	169	112	995	160
	8.00	28.9	36.8	1184	470	5.68	3.58	148	105	187	124	1095	174
	8.80	31.5	40.1	1273	503	5.64	3.54	159	112	202	133	1180	186
	10.00	35.3	44.9	1397	547	5.58	3.49	175	122	224	147	1299	203
	12.50	42.8	54.6	1622	624	5.45	3.38	203	139	266	173	1515	231
	14.20	47.7	60.8	1749	665	5.36	3.31	219	148	291	188	1639	247
180 x 60	5.00	17.8	22.7	846	144	6.10	2.52	94.0	48.1	122	54.9	411	86.3
	6.30	22.2	28.2	1027	171	6.03	2.46	114	57.0	150	66.6	495	102
	8.00	27.6	35.2	1240	201	5.94	2.39	138	66.9	184	80.4	590	120
	10.00	33.7	42.9	1457	228	5.83	2.30	162	75.8	220	94.4	683	137
180 x 80	5.00	19.4	24.7	1000	277	6.36	3.35	111	69.4	140	78.6	703	120
	6.30	24.1	30.7	1217	333	6.29	3.29	135	83.4	172	96.1	855	144
	7.10	27.0	34.4	1343	365	6.25	3.26	149	91.2	191	106	943	158
	8.00	30.1	38.4	1477	397	6.20	3.22	164	99.4	211	117	1036	172
	10.00	36.8	46.9	1747	461	6.10	3.13	194	115	254	139	1223	199
	12.50	44.8	57.1	2034	522	5.97	3.03	226	131	302	163	1418	227
180 x 90	5.00	20.2	25.7	1076	362	6.47	3.75	120	80.5	149	91.2	867	137
	6.30	25.1	32.0	1312	437	6.40	3.70	146	97.2	183	112	1059	165
	8.00	31.4	40.0	1595	524	6.32	3.62	177	117	225	137	1290	198
180 x 100	5.00	21.0	26.7	1153	460	6.57	4.15	128	92.0	157	104	1042	154
	6.30	26.1	33.3	1407	557	6.50	4.09	156	111	194	128	1277	186
	7.10	29.2	37.2	1555	613	6.47	4.06	173	123	215	142	1413	205
	8.00	32.6	41.6	1713	671	6.42	4.02	190	134	239	157	1560	224
	8.80	35.6	45.4	1847	720	6.38	3.98	205	144	259	170	1685	240
	10.00	40.0	50.9	2036	787	6.32	3.93	226	157	288	188	1862	263
	12.50	48.7	62.1	2385	908	6.20	3.82	265	182	344	223	2191	303
	14.20	54.4	69.3	2589	974	6.11	3.75	288	195	378	244	2385	326
180 x 120	6.30	28.1	35.8	1597	847	6.68	4.87	177	141	216	163	1746	228
	8.00	35.1	44.8	1950	1028	6.60	4.79	217	171	266	200	2146	276
	10.00	43.1	54.9	2325	1216	6.51	4.71	258	203	322	241	2578	327
	12.50	52.7	67.1	2736	1387	6.39	4.50	304	231	0	0	3060	380

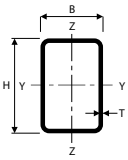


Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el yy}$ cm ³	Elastic section modulus $W_{el zz}$ cm ³	Plastic section modulus $W_{pl yy}$ cm ³	Plastic section modulus $W_{pl zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
200 x 100	4.00	18.2	23.2	1223	416	7.26	4.24	122	83.2	150	92.8	983	142
	5.00	22.6	28.7	1495	505	7.21	4.19	149	101	185	114	1204	172
	6.30	28.1	35.8	1829	613	7.15	4.14	183	123	228	140	1475	208
	8.00	35.1	44.8	2234	739	7.06	4.06	223	148	282	172	1804	251
	10.00	43.1	54.9	2664	869	6.96	3.98	266	174	341	206	2156	295
	12.50	52.7	67.1	3136	1004	6.84	3.87	314	201	408	245	2541	341
	14.20	58.9	75.0	3416	1080	6.75	3.80	342	216	450	268	2770	368
16.00	65.2	83.0	3678	1147	6.66	3.72	368	229	491	290	2982	391	
200 x 120	5.00	24.1	30.7	1685	762	7.40	4.98	168	127	205	144	1648	210
	6.30	30.1	38.3	2065	929	7.34	4.92	207	155	253	177	2030	255
	8.00	37.6	48.0	2529	1128	7.26	4.85	253	188	313	218	2490	310
	10.00	46.3	58.9	3026	1337	7.17	4.76	303	223	379	263	3000	367
	12.50	56.6	72.1	3576	1562	7.04	4.66	358	260	455	314	3570	428
	14.20	63.3	80.7	3907	1693	6.96	4.58	391	282	503	346	3920	464
	16.00	70.2	89.4	4221	1813	6.87	4.50	422	302	550	377	4250	497
200 x 150	5.00	26.5	33.7	1970	1265	7.64	6.12	197	169	234	192	2386	267
	6.30	33.0	42.1	2420	1549	7.58	6.07	242	207	289	237	2947	326
	8.00	41.4	52.8	2971	1894	7.50	5.99	297	253	359	294	3643	398
	10.00	51.0	64.9	3568	2264	7.41	5.91	357	302	436	356	4409	475
	12.50	62.5	79.6	4236	2673	7.30	5.80	424	356	525	428	5287	559
	14.20	70.0	89.2	4644	2919	7.22	5.72	464	389	582	473	5834	610
	16.00	77.7	99.0	5036	3152	7.13	5.64	504	420	638	518	6370	658
220 x 80	5.00	22.6	28.7	1663	334	7.61	3.41	151	83.4	193	93.6	912	148
	6.30	28.1	35.8	2034	402	7.54	3.35	185	101	238	115	1111	179
	8.00	35.1	44.8	2484	481	7.45	3.28	226	120	294	140	1348	214
	10.00	43.1	54.9	2961	559	7.34	3.19	269	140	356	167	1594	249
220 x 120	5.00	25.7	32.7	2125	812	8.01	5.02	188	135	236	155	1889	232
	6.30	32.0	40.8	2610	1010	8.00	4.98	237	168	292	191	2320	283
	8.00	40.2	51.2	3203	1229	7.91	4.90	291	205	362	236	2850	343
	10.00	49.4	62.9	3844	1459	7.82	4.81	349	243	440	285	3431	407
	12.50	60.5	77.1	4560	1707	7.69	4.71	415	285	530	341	4087	476
	14.20	67.8	86.3	4996	1853	7.61	4.63	454	309	586	376	4488	517
	16.00	75.2	95.8	5413	1988	7.52	4.55	492	331	643	410	4873	555



Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el,yy}$ cm ³	Elastic section modulus $W_{el,zz}$ cm ³	Plastic section modulus $W_{pl,yy}$ cm ³	Plastic section modulus $W_{pl,zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
250 x 50	5.00	22.6	28.7	1859	131	8.04	2.13	149	52.2	202	59.5	427	97.9
	6.30	28.1	35.8	2272	154	7.97	2.07	182	61.6	249	72.1	509	115
250 x 100	5.00	26.5	33.7	2610	618	8.80	4.28	209	124	263	138	1617	217
	6.30	33.0	42.1	3207	751	8.73	4.22	257	150	326	169	1983	264
	8.00	41.4	52.8	3940	909	8.64	4.15	315	182	404	209	2430	319
	10.00	51.0	64.9	4733	1072	8.54	4.06	379	214	491	251	2908	376
	12.50	62.5	79.6	5622	1245	8.41	3.96	450	249	592	299	3436	438
	14.20	70.0	89.2	6165	1344	8.31	3.88	493	269	655	329	3752	473
	16.00	77.7	99.0	6686	1433	8.22	3.80	535	287	719	358	4050	505
250 x 150	5.00	30.4	38.7	3360	1527	9.31	6.28	269	204	324	228	3278	337
	6.30	38.0	48.4	4143	1874	9.25	6.22	331	250	402	283	4054	413
	8.00	47.7	60.8	5111	2298	9.17	6.15	409	306	501	350	5021	506
	10.00	58.8	74.9	6174	2755	9.08	6.06	494	367	611	426	6090	605
	12.50	72.3	92.1	7387	3265	8.96	5.96	591	435	740	514	7326	717
	14.20	81.1	103	8141	3576	8.87	5.88	651	477	823	570	8102	784
	16.00	90.3	115	8879	3873	8.79	5.80	710	516	906	625	8868	849
260 x 140	6.30	38.0	48.4	4355	1660	9.49	5.86	335	237	411	267	3803	399
	8.00	47.7	60.8	5373	2032	9.40	5.78	413	290	511	331	4704	488
	10.00	58.8	74.9	6490	2432	9.31	5.70	499	347	624	402	5698	584
	12.50	72.3	92.1	7767	2876	9.18	5.59	597	411	756	485	6841	690
	14.20	81.1	103	8560	3144	9.10	5.52	658	449	840	537	7555	754
	16.00	90.3	115	9337	3400	9.01	5.44	718	486	925	588	8257	815
260 x 180	6.30*	41.9	53.4	5166	2929	9.83	7.40	397	325	475	369	5810	524
	8.00*	52.7	67.2	6390	3608	9.75	7.33	492	401	592	459	7221	644
	10.00*	65.1	82.9	7741	4351	9.66	7.24	595	483	724	560	8798	775
	12.50*	80.1	102	9299	5196	9.54	7.13	715	577	879	679	10640	924
	14.20*	90.1	115	10280	5719	9.46	7.06	791	635	980	755	11820	1016
	16.00*	100	128	11250	6231	9.38	6.98	865	692	1081	831	12990	1106

* External Corner Radius > 3T



Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el\ yy}$ cm ³	Elastic section modulus $W_{el\ zz}$ cm ³	Plastic section modulus $W_{pl\ yy}$ cm ³	Plastic section modulus $W_{pl\ zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
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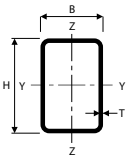
300 x 100	5.00	30.4	38.7	4146	731	10.3	4.34	276	146	354	161	2040	262
	6.30	38.0	48.4	5111	890	10.3	4.29	341	178	439	199	2504	319
	8.00	47.7	60.8	6305	1078	10.2	4.21	420	216	546	245	3069	387
	10.00	58.8	74.9	7613	1275	10.1	4.13	508	255	666	296	3676	458
	12.50	72.3	92.1	9103	1486	9.94	4.02	607	297	806	354	4350	534
	14.20	81.1	103	10030	1607	9.85	3.94	669	321	896	390	4755	578
	16.00	90.3	115	10930	1719	9.75	3.87	729	344	986	425	5138	619

300 x 150	5.00*	34.3	43.7	5234	1790	10.9	6.40	349	239	427	264	4207	407
	6.30*	42.9	54.7	6470	2200	10.9	6.34	431	293	531	328	5206	500
	8.00*	54.0	68.8	8011	2702	10.8	6.27	534	360	663	407	6454	613
	10.00*	66.7	84.9	9716	3246	10.7	6.18	648	433	811	496	7839	736
	12.50*	82.1	105	11690	3858	10.6	6.07	779	514	986	600	9445	874
	14.20*	92.3	118	12930	4233	10.5	6.00	862	564	1099	666	10460	959
	16.00*	103	131	14160	4595	10.4	5.92	944	613	1213	732	11460	1041

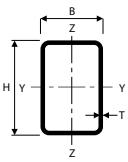
300 x 200	5.00	38.3	48.7	6322	3396	11.4	8.35	421	340	501	380	6824	552
	6.30	47.9	61.0	7829	4193	11.3	8.29	522	419	624	472	8476	681
	8.00	60.3	76.8	9717	5184	11.3	8.22	648	518	779	589	10560	840
	10.00	74.5	94.9	11820	6278	11.2	8.13	788	628	956	721	12910	1015
	12.50	91.9	117	14270	7537	11.0	8.02	952	754	1165	877	15680	1217
	14.20	103	132	15830	8328	11.0	7.95	1055	833	1302	978	17460	1343
	16.00	115	147	17390	9109	10.9	7.87	1159	911	1441	1080	19250	1468
	20.00	141	180	20520	10650	10.7	7.70	1368	1065	1728	1290	22910	1714

350 x 150	5.00	38.3	48.7	7655	2053	12.5	6.49	437	274	543	301	5161	477
	6.30	47.9	61.0	9481	2525	12.5	6.43	542	337	676	373	6389	586
	8.00	60.3	76.8	11770	3105	12.4	6.36	673	414	844	464	7926	721
	10.00	74.5	94.9	14320	3737	12.3	6.27	818	498	1035	566	9633	867
	12.50	91.9	117	17300	4450	12.2	6.17	988	593	1263	686	11620	1032
	14.20	103	132	19190	4890	12.1	6.09	1097	652	1411	763	12880	1134

* External Corner Radius > 3T



Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el yy}$ cm ³	Elastic section modulus $W_{el zz}$ cm ³	Plastic section modulus $W_{pl yy}$ cm ³	Plastic section modulus $W_{pl zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
350 x 250	6.30	57.8	73.6	13200	7885	13.4	10.4	754	631	892	709	15210	1011
	8.00	72.8	92.8	16450	9798	13.3	10.3	940	784	1118	888	19030	1254
	10.00	90.2	115	20100	11940	13.2	10.2	1149	955	1375	1091	23350	1525
	12.50	112	142	24420	14440	13.1	10.1	1395	1156	1685	1334	28530	1842
	14.20	126	160	27200	16050	13.0	10.0	1554	1284	1887	1492	31890	2044
	16.00	141	179	30010	17650	12.9	9.93	1715	1412	2095	1655	35330	2246
400 x 100	6.30	47.9	61.0	10810	1167	13.3	4.37	541	233	712	258	3565	430
	8.00	60.3	76.8	13410	1418	13.2	4.30	671	284	889	319	4373	523
	10.00	74.5	94.9	16310	1682	13.1	4.21	815	336	1090	386	5242	620
	12.50	91.9	117	19670	1967	13.0	4.10	984	393	1329	463	6210	726
400 x 200	6.30	57.8	73.6	15700	5376	14.6	8.55	785	538	960	594	12610	917
	8.00	72.8	92.8	19560	6660	14.5	8.47	978	666	1203	743	15730	1135
	10.00	90.2	115	23910	8084	14.4	8.39	1196	808	1480	911	19260	1376
	12.50	112	142	29060	9738	14.3	8.28	1453	974	1813	1111	23440	1656
	14.20	126	160	32380	10780	14.2	8.21	1619	1078	2032	1242	26140	1834
	16.00	141	179	35740	11820	14.1	8.13	1787	1182	2256	1374	28870	2010
400 x 250	6.30	62.7	79.9	18140	8821	15.1	10.5	907	706	1084	786	18380	1161
	8.00	79.1	101	22640	10970	15.0	10.4	1132	878	1360	985	23000	1442
	10.00	98.1	125	27720	13380	14.9	10.3	1386	1070	1675	1211	28250	1756
	12.50	121	155	33760	16210	14.8	10.2	1688	1297	2056	1482	34540	2124
	14.20	137	174	37670	18020	14.7	10.2	1883	1442	2306	1660	38650	2360
	16.00	153	195	41640	19850	14.6	10.1	2082	1588	2563	1842	42840	2597
400 x 300	6.30	67.7	86.2	20580	13260	15.5	12.4	1029	884	1208	994	24740	1405
	8.00	85.4	109	25710	16540	15.4	12.3	1285	1103	1517	1247	31010	1749
	10.00	106	135	31520	20230	15.3	12.2	1576	1349	1870	1536	38180	2135
	12.50	131	167	38450	24610	15.2	12.1	1923	1641	2298	1884	46810	2592
	14.20	148	189	42950	27440	15.1	12.1	2148	1829	2579	2113	52470	2887
	16.00	166	211	47540	30310	15.0	12.0	2377	2021	2870	2349	58290	3184
450 x 250	6.30	67.7	86.2	24070	9756	16.7	10.6	1070	781	1292	863	21630	1310
	8.00	85.4	109	30080	12140	16.6	10.6	1337	971	1622	1081	27080	1629
	10.00	106	135	36890	14820	16.5	10.5	1640	1185	2000	1331	33280	1986
	12.50	131	167	45030	17970	16.4	10.4	2001	1438	2458	1631	40720	2406
	14.20	148	189	50310	20000	16.3	10.3	2236	1600	2759	1827	45580	2675
	16.00	166	211	55710	22040	16.2	10.2	2476	1763	3070	2029	50550	2947

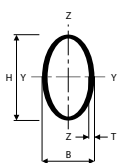


Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I_{yy} cm ⁴	Second moment of area I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic section modulus $W_{el yy}$ cm ³	Elastic section modulus $W_{el zz}$ cm ³	Plastic section modulus $W_{pl yy}$ cm ³	Plastic section modulus $W_{pl zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
500 x 200	6.30	67.7	86.2	27240	6558	17.8	8.72	1090	656	1360	716	16920	1153
	8.00	85.4	109	34050	8135	17.7	8.65	1365	814	1707	896	21120	1430
	10.00	106	135	41760	9891	17.6	8.56	1670	989	2105	1101	25870	1737
	12.50	131	167	50960	11940	17.5	8.45	2038	1194	2586	1346	31510	2096
	14.20	148	189	56940	13240	17.4	8.38	2278	1324	2904	1505	35170	2324
	16.00	166	211	63040	14540	17.3	8.30	2521	1454	3231	1669	38870	2552
500 x 300	6.30	77.5	98.8	34920	15980	18.8	12.7	1397	1065	1671	1179	33920	1767
	8.00	97.9	125	43730	19950	18.7	12.6	1749	1330	2100	1480	42560	2203
	10.00	122	155	53760	24440	18.6	12.6	2150	1629	2595	1826	52450	2696
	12.50	151	192	65810	29780	18.5	12.5	2633	1985	3196	2244	64390	3281
	14.20	170	217	73700	33240	18.4	12.4	2948	2216	3593	2519	72240	3660
	16.00	191	243	81780	36770	18.3	12.3	3271	2451	4005	2804	80330	4044
	20.00	235	300	98780	44080	18.2	12.1	3951	2939	4885	3408	97450	4842

Tables report calculations from manufacturers and/or from specification EN10210-2.

HOT FINISHED ELLIPTICAL AND
CIRCULAR STRUCTURAL HOLLOW
SECTIONS TO:
EN10210 S355J2H / S355NH

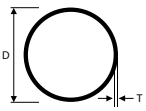




HOT FINISHED ELLIPTICAL DIMENSIONS

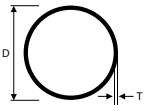
Size B x H mm	W.T. T mm	Linear mass M Kg/m	Cross- sectional area A cm ²	Moment of inertia I_{yy} cm ⁴	Moment of inertia I_{zz} cm ⁴	Radius of gyration i_{yy} cm	Radius of gyration i_{zz} cm	Elastic modulus $W_{el yy}$ cm ³	Elastic modulus $W_{el zz}$ cm ³	Plastic section modulus $W_{pl yy}$ cm ³	Plastic section modulus $W_{pl zz}$ cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
150 x 75	4.00	10.7	13.6	301	101	4.70	2.72	40.1	26.9	56.1	34.4	303	60.1
	5.00	13.3	16.9	367	122	4.66	2.69	48.9	32.5	68.9	42	367	72.2
	6.30	16.5	21.0	448	147	4.62	2.64	59.7	39.1	84.9	51.5	443	86.3
200 x 100	5.00	17.9	22.8	897	302	6.27	3.64	89.7	60.4	125	76.8	905	135
	6.30	22.3	28.4	1103	368	6.23	3.60	110	73.5	155	94.7	1105	163
	8.00	28.0	35.7	1358	446	6.17	3.54	136	89.3	193	117	1347	197
	10.00	34.5	44.0	1637	529	6.10	3.47	164	106	235	141	1605	232
	12.50	42.4	54.0	1954	619	6.02	3.39	195	124	284	169	1889	269
250 x 125	6.30	28.2	35.9	2205	742	7.84	4.55	176	119	246	151	2224	265
	8.00	35.4	45.1	2732	909	7.78	4.49	219	145	307	188	2734	323
	10.00	43.8	55.8	3316	1090	7.71	4.42	265	174	376	228	3288	385
	12.50	53.9	68.7	3996	1292	7.63	4.34	320	207	458	276	3918	453
300 x 150	8.00	42.8	54.5	4813	1616	9.39	5.44	321	215	449	275	4846	481
	10.00	53.0	67.5	5872	1950	9.32	5.37	391	260	551	336	5867	577
	12.50	65.5	83.4	7120	2334	9.24	5.29	475	311	674	409	7047	686
	14.20	73.8	94.0	7921	2573	9.18	5.23	528	343	755	456	7790	753
	16.00	82.5	105	8731	2809	9.12	5.17	582	374	837	503	8529	818
400 x 200	8.00	57.6	73.4	11690	3966	12.6	7.35	584	397	811	500	11860	890
	10.00	71.5	91.1	14350	4829	12.5	7.28	717	483	1001	615	14470	1079
	12.50	88.6	113	17530	5843	12.5	7.19	877	584	1232	753	17560	1299
	14.20	100	127	19610	6491	12.4	7.14	980	649	1384	843	19540	1438
	16.00	112	143	21730	7143	12.3	7.07	1087	714	1541	936	21550	1577
500 x 250	10.00	90	115	28540	9682	15.8	9.19	1142	775	1585	976	28950	1739
	12.50	112	142	35030	11790	15.7	9.10	1401	943	1956	1201	35330	2108
	14.20	126	161	39300	13160	15.6	9.04	1572	1053	2202	1349	39490	2346
	16.00	142	180	43710	14550	15.6	8.98	1748	1164	2459	1501	43740	2586



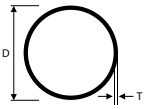


HOT FINISHED CIRCULAR DIMENSIONS

Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
26.9	3.20	1.87	2.38	1.70	0.85	1.27	1.81	3.41	2.53
33.7	3.20	2.41	3.07	3.60	1.08	2.14	2.99	7.21	4.28
	4.00	2.93	3.73	4.19	1.06	2.49	3.55	8.38	4.97
42.4	3.20	3.09	3.94	7.62	1.39	3.59	4.93	15.2	7.19
	4.00	3.79	4.83	8.99	1.36	4.24	5.92	18.0	8.48
48.3	3.20	3.56	4.53	11.6	1.60	4.80	6.52	23.2	9.59
	4.00	4.37	5.57	13.8	1.57	5.70	7.87	27.5	11.4
	5.00	5.34	6.80	16.2	1.54	6.69	9.42	32.3	13.4
60.3	3.20	4.51	5.74	23.5	2.02	7.78	10.4	46.9	15.6
	4.00	5.55	7.07	28.2	2.00	9.34	12.7	56.3	18.7
	5.00	6.82	8.69	33.5	1.96	11.1	15.3	67.0	22.2
	6.30	8.39	10.7	39.5	1.92	13.1	18.5	79.0	26.2
	8.00	10.3	13.1	46.0	1.87	15.3	22.1	92.0	30.5
76.1	3.20	5.75	7.33	48.8	2.58	12.8	17	97.6	25.6
	4.00	7.11	9.06	59.1	2.55	15.5	20.8	118	31.0
	5.00	8.77	11.2	70.9	2.52	18.6	25.3	142	37.3
	6.30	10.8	13.8	84.8	2.48	22.3	30.8	170	44.6
	8.00	13.4	17.1	101	2.42	26.4	37.3	201	52.9
88.9	3.20	6.76	8.62	79.2	3.03	17.8	23.5	158	35.6
	4.00	8.38	10.7	96.3	3.00	21.7	28.9	193	43.3
	5.00	10.3	13.2	116	2.97	26.2	35.2	233	52.4
	6.30	12.8	16.3	140	2.93	31.5	43.1	280	63.1
	8.00	16.0	20.3	168	2.87	37.8	52.5	336	75.6
114.3	3.60	9.83	12.5	192	3.92	33.6	44.1	384	67.2
	5.00	13.5	17.2	257	3.87	45.0	59.8	514	89.9
	6.30	16.8	21.4	313	3.82	54.7	73.6	625	109
	8.00	21.0	26.7	379	3.77	66.4	90.6	759	133

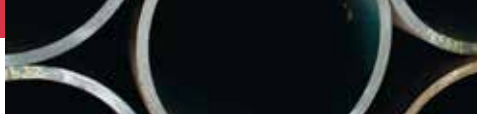
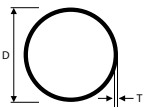


Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
139.7	5.00	16.6	21.2	481	4.77	68.8	90.8	961	138
	6.30	20.7	26.4	589	4.72	84.3	112	1177	169
	8.00	26.0	33.1	720	4.66	103	139	1441	206
	10.00	32.0	40.7	862	4.60	123	169	1724	247
	12.50	39.2	50.0	1020	4.52	146	203	2040	292
168.3	5.00	20.1	25.7	856	5.78	102	90.8	1712	203
	6.30	25.2	32.1	1053	5.73	125	112	2107	250
	8.00	31.6	40.3	1297	5.67	154	139	2595	308
	10.00	39.0	49.7	1564	5.61	186	169	3128	372
	12.50	48.0	61.2	1868	5.53	222	203	3737	444
193.7	5.00	23.3	29.6	1320	6.67	136	178	2640	273
	6.30	29.1	37.1	1630	6.63	168	221	3260	337
	8.00	36.6	46.7	2016	6.57	208	276	4031	416
	10.00	45.3	57.7	2442	6.50	252	338	4883	504
	12.50	55.9	71.2	2934	6.42	303	411	5869	606
	16.00	70.1	89.3	3554	6.31	367	507	7109	734
219.1	5.00	26.4	33.6	1928	7.57	176	229	3856	352
	6.30	33.1	42.1	2386	7.53	218	285	4772	436
	8.00	41.6	53.1	2960	7.47	270	357	5919	540
	10.00	51.6	65.7	3598	7.40	328	438	7197	657
	12.50	63.7	81.1	4345	7.32	397	534	8689	793
	16.00	80.1	102	5297	7.20	483	661	10590	967
244.5	5.00	29.5	37.6	2699	8.47	221	287	5397	441
	6.30	37.0	47.1	3346	8.42	274	358	6692	547
	8.00	46.7	59.4	4160	8.37	340	448	8321	681
	10.00	57.8	73.7	5073	8.30	415	550	10150	830
	12.50	71.5	91.1	6147	8.21	503	673	12290	1006
	16.00	90.2	115	7533	8.10	616	837	15070	1232



Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
273.0	5.00	33.0	42.1	3781	9.48	277	359	7562	554
	6.30	41.4	52.8	4696	9.43	344	448	9392	688
	8.00	52.3	66.6	5852	9.37	429	562	11700	857
	10.00	64.9	82.6	7154	9.31	524	692	14310	1048
	12.50	80.3	102	8697	9.22	637	849	17390	1274
	16.00	101	129	10710	9.10	784	1058	21410	1569
323.9	5.00	39.3	50.1	6369	11.3	393	509	12740	787
	6.30	49.3	62.9	7929	11.2	490	636	15860	979
	8.00	62.3	79.4	9910	11.2	612	799	19820	1224
	10.00	77.4	98.6	12160	11.1	751	986	24320	1501
	12.50	96.0	122	14850	11.0	917	1213	29690	1833
	16.00	121	155	18390	10.9	1136	1518	36780	2271
355.6	6.30	54.3	69.1	10550	12.4	593	769	21090	1186
	8.00	68.6	87.4	13200	12.3	742	967	26400	1485
	10.00	85.2	109	16220	12.2	912	1195	32450	1825
	12.50	106	135	19850	12.1	1117	1472	39700	2233
	16.00	134	171	24660	12.0	1387	1847	49330	2774
406.4	6.30	62.2	79.2	15850	14.1	780	1009	31700	1560
	8.00	78.6	100	19870	14.1	978	1270	39750	1956
	10.00	97.8	125	24480	14.0	1205	1572	48950	2409
	12.50	121	155	30030	13.9	1478	1940	60060	2956
	16.00	154	196	37450	13.8	1843	2440	74900	3686
457.0	6.30	70.0	89.2	22650	15.9	991	1280	45310	1983
	8.00	88.6	113	28450	15.9	1245	1613	56890	2490
	10.00	110	140	35090	15.8	1536	1998	70180	3071
	12.50	137	175	43140	15.7	1888	2470	86290	3776
	16.00	174	222	53960	15.6	2361	3113	107900	4723
508.0	6.30	77.9	99.3	31250	17.7	1230	1586	62490	2460
	8.00	98.6	126	39280	17.7	1546	2000	78560	3093
	10.00	123	156	48520	17.6	1910	2480	97040	3820
	12.50	153	195	59760	17.5	2353	3070	119500	4705
	16.00	194	247	74910	17.4	2949	3874	149800	5898

HOT FINISHED SEAMLESS
STRUCTURAL HOLLOW SECTIONS TO:
EN10210 S355J2H



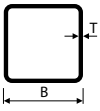
HOT FINISHED SEAMLESS DIMENSIONS

Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
193.7	16.00	70.1	89.3	3554	6.31	367	507	7109	734
219.1	20.00	98.2	125	6261	7.07	572	795	12520	1143
244.5	20.00	111	141	8957	7.97	733	1011	17910	1465
	25.00	135	172	10520	7.81	860	1210	21030	1721
273.0	20.00	125	159	12800	8.97	938	1283	25600	1875
	25.00	153	195	15130	8.81	1108	1543	30250	2216
323.9	20.00	150	191	22140	10.8	1367	1850	44280	2734
	25.00	184	235	26400	10.6	1630	2239	52800	3260
	30.00	217	277	30220	10.4	1866	2600	60440	3732
355.6	20.00	166	211	29790	11.9	1676	2255	59580	3351
	25.00	204	260	35680	11.7	2007	2738	71350	4013
406.4	20.00	191	243	45430	13.7	2236	2989	90860	4472
	25.00	235	300	54700	13.5	2692	3642	109400	5384
	30.00	278	355	63220	13.3	3111	4259	126400	6223
457.0	20.00	216	275	65680	15.5	2874	3822	131400	5749
	25.00	266	339	79420	15.3	3475	4671	158800	6951
	30.00	316	402	92170	15.1	4034	5479	184300	8068
508.0	20.00	241	307	91430	17.3	3600	4766	182900	7199
	25.00	298	379	110900	17.1	4367	5837	221800	8734
	30.00	354	451	129200	16.9	5086	6864	258300	10170
610.0	25.00	361	459	196900	20.7	6456	8561	393800	12910
	30.00	429	547	230500	20.5	7557	10100	461000	15110

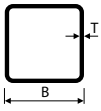
COLD FORMED HOLLOW SECTIONS TO: EN10219 S275J2H / S355J2H

Dimensional tolerances to EN10219-2

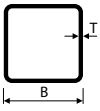
	Circular	Square/Rectangular	
Outside dimension (D B and H):	$\pm 1\%$ with a min of $\pm 0.5\text{mm}$ and a max of $\pm 10\text{mm}$	Side length (mm) $H, B < 100$	Tolerance $\pm 1\%$ with a min of $\pm 0.5\text{mm}$
		$100 \leq H, B \leq 200$ $H, B > 200$	$\pm 0.8\%$ $\pm 0.6\%$
Thickness (T):	For $D \leq 406.4\text{mm}$ $T \leq 5\text{mm} \pm 10\%$ $T > 5\text{mm} \pm 0.5\text{mm}$ For $D > 406.4\text{mm}$ $\pm 10\%$ with a max of $\pm 2\text{mm}$	$T \leq 5\text{mm}$ $T > 5\text{mm}$	$\pm 10\%$ $\pm 0.5\text{mm}$
Out of roundness (O):	2% for $D/T < 100$, where $D/T \geq 100$ out-of-roundness tolerance to be agreed	-	-
Concavity/Convexity (independent tolerance on outside dimensions):	-	Max 0.8% with a min of 0.5mm	
Squareness of side:	-	$90^\circ \pm 1^\circ$	
External corner profile (radius need not be tangential to the sides) EN10219:	-	$T \leq 6.0$ $6.0 < T \leq 10.0$ $T > 10.0$	$1.6T$ to $2.4T$ 2.0 to $3.0T$ $2.4T$ to $3.6T$
Twist (V):	-	2mm plus 0.5mm/m length	
Straightness:	0.2% of total length and 3mm over any 1m length	0.15% of total length and 3mm over any 1m length	
Mass (M):	$\pm 6\%$ on individual lengths	$\pm 6\%$ on individual lengths	
Length:	$-0/+150\text{mm}$	$-0/+150\text{mm}$	



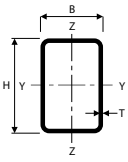
Outside dimension B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _p cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ²
30 x 30	3.00	2.36	3.01	3.50	1.08	2.34	2.96	6.15	3.58
40 x 40	3.00	3.30	4.21	9.32	1.49	4.66	5.72	15.8	7.07
	4.00	4.20	5.35	11.1	1.44	5.54	7.01	19.4	8.48
50 x 50	3.00	4.25	5.41	19.5	1.90	7.79	9.39	32.1	11.8
	4.00	5.45	6.95	23.7	1.85	9.49	11.7	40.4	14.4
	5.00	6.56	8.36	27.0	1.80	10.8	13.7	47.5	16.6
60 x 60	3.00	5.19	6.61	35.1	2.31	11.7	14	57.1	17.7
	4.00	6.71	8.55	43.6	2.26	14.5	17.6	72.6	22.0
	5.00	8.13	10.4	50.5	2.21	16.8	20.9	86.4	25.6
70 x 70	3.00	6.13	7.81	57.5	2.71	16.4	19.4	92.4	24.7
	3.60	7.24	9.23	66.5	2.69	19.0	22.7	108	28.7
	4.00	7.97	10.1	72.1	2.67	20.6	24.8	119	31.1
	5.00	9.70	12.4	84.6	2.62	24.2	29.6	142	36.7
	6.00	11.3	14.4	95.2	2.57	27.2	33.8	163	41.4
80 x 80	3.00	7.07	9.01	87.8	3.12	22.0	25.8	140	33.0
	3.60	8.37	10.7	102	3.09	25.5	30.2	165	38.4
	4.00	9.22	11.7	111	3.07	27.8	33.1	180	41.8
	5.00	11.3	14.4	131	3.03	32.9	39.7	218	49.7
	6.00	13.2	16.8	149	2.98	37.3	45.8	252	56.6
	8.00	16.4	20.8	168	2.84	42.1	53.9	307	66.6
90 x 90	3.60	9.50	12.1	149	3.50	33.0	38.9	238	49.6
	4.00	10.5	13.3	162	3.48	36.0	42.6	261	54.2
	5.00	12.8	16.4	193	3.43	42.9	51.4	316	64.7
	6.00	15.1	19.2	220	3.39	49.0	59.5	368	74.2
	8.00	18.9	24.0	255	3.25	56.6	71.3	456	88.8
100 x 100	3.00	8.96	11.4	177	3.94	35.4	41.2	279	53.2
	4.00	11.7	14.9	226	3.89	45.3	53.3	362	68.1
	5.00	14.4	18.4	271	3.84	54.2	64.6	441	81.7
	6.00	17.0	21.6	311	3.79	62.3	75.1	514	94.1
	7.10	19.4	24.7	340	3.71	68.0	83.6	589	106
	8.00	21.4	27.2	366	3.67	73.2	91.1	645	114
	10.00	25.6	32.6	411	3.55	82.2	105	750	130
	12.50	29.1	37.0	410	3.33	82.1	111	804	137
110 x 110	6.00	18.9	24.0	425	4.20	77.2	92.5	695	116
	8.00	23.9	30.4	506	4.08	91.9	113	879	143
	10.00	28.7	36.6	575	3.96	105	132	1032	164



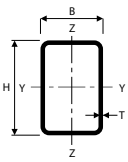
Outside dimension B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _p cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
120 x 120	4.00	14.2	18.1	402	4.71	67.0	78.3	637	101
	5.00	17.5	22.4	485	4.66	80.9	95.4	778	122
	6.00	20.7	26.4	562	4.61	93.7	112	913	141
	8.00	26.4	33.6	677	4.49	113	138	1163	175
	10.00	31.8	40.6	777	4.38	129	162	1376	203
	12.50	36.9	47.0	817	4.17	136	178	1551	223
140 x 140	5.00	20.7	26.4	791	5.48	113	132	1256	170
	6.00	24.5	31.2	920	5.43	131	155	1479	198
	7.10	28.3	36.0	1032	5.35	147	176	1719	226
	8.00	31.4	40.0	1127	5.30	161	194	1901	248
	10.00	38.1	48.6	1312	5.20	187	230	2274	291
	12.50	44.8	57.0	1425	5.00	204	259	2634	329
150 x 150	5.00	22.3	28.4	982	5.89	131	153	1554	197
	6.00	26.4	33.6	1146	5.84	153	180	1833	230
	7.10	30.5	38.9	1290	5.76	172	205	2134	263
	8.00	33.9	43.2	1412	5.71	188	226	2364	289
	10.00	41.3	52.6	1653	5.61	220	269	2839	341
160 x 160	4.00	19.3	24.5	987	6.34	123	143	1541	185
	5.00	23.8	30.4	1202	6.29	150	175	1896	226
	6.00	28.3	36.0	1405	6.25	176	206	2239	264
	8.00	36.5	46.4	1741	6.12	218	260	2897	334
	10.00	44.4	56.6	2048	6.02	256	311	3490	395
180 x 180	5.00	27.0	34.4	1737	7.11	193	224	2724	290
	6.30	33.3	42.4	2096	7.03	233	273	3383	354
	8.00	41.5	52.8	2546	6.94	283	336	4189	432
	10.00	50.7	64.6	3017	6.84	335	404	5074	515
	12.50	60.5	77.0	3406	6.65	378	467	6050	600
	14.20	67.1	85.5	3663	6.54	407	510	6635	651
16.00	73.8	94.0	3887	6.43	432	550	7178	698	
200 x 200	4.00	24.3	30.9	1968	7.97	197	226	3049	295
	5.00	30.1	38.4	2410	7.93	241	279	3763	362
	6.00	35.8	45.6	2833	7.88	283	330	4459	426
	8.00	46.5	59.2	3566	7.76	357	421	5815	544
	10.00	57.0	72.6	4251	7.65	425	508	7072	651
	12.50	68.3	87.0	4859	7.47	486	594	8502	765
	16.00	83.8	107	5625	7.26	562	706	10210	901



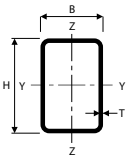
Outside dimension B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _p cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
220 x 220	6.00	39.6	50.4	3813	8.70	347	402	5976	521
	8.00	51.5	65.6	4828	8.58	439	516	7815	668
	10.00	63.2	80.6	5782	8.47	526	625	9533	804
	12.50	76.2	97.0	6674	8.29	607	735	11530	951
	14.20	85.0	108	7264	8.19	660	809	12770	1042
250 x 250	5.00	38.0	48.4	4805	9.97	384	442	7443	577
	6.30	47.1	60.0	5873	9.89	470	544	9290	711
	8.00	59.1	75.2	7229	9.80	578	676	11600	878
	10.00	72.7	92.6	8707	9.70	697	822	14200	1062
	12.50	88.0	112	10160	9.52	813	975	17280	1266
	14.20	98.3	125	11130	9.42	890	1078	19220	1395
260 x 260	8.00	61.6	78.4	8178	10.2	629	734	13087	955
	10.00	75.8	96.6	9865	10.1	759	894	16035	1156
	12.50	91.9	117	11550	9.93	888	1063	19553	1381
300 x 300	6.00	54.7	69.6	9964	12.0	664	764	15434	997
	8.00	71.6	91.2	12800	11.8	853	991	20312	1293
	10.00	88.4	113	15520	11.7	1035	1211	24966	1572
	12.50	108	137	18350	11.6	1223	1451	30601	1892
350 x 350	16.00	134	171	22080	11.4	1472	1774	37837	2299
	6.30	66.9	85.2	16640	14.0	951	1093	25939	1436
	8.00	84.2	107	20680	13.9	1182	1366	32557	1787
	10.00	104	133	25190	13.8	1439	1675	40127	2182
	12.50	127	162	30040	13.6	1717	2020	49393	2642
400 x 400	16.00	159	203	36510	13.4	2086	2488	61481	3238
	8.00	96.7	123	31270	15.9	1563	1800	48934	2362
	10.00	120	153	38220	15.8	1911	2214	60431	2892
	12.50	147	187	45880	15.7	2294	2683	74598	3518
	16.00	184	235	56150	15.5	2808	3322	93279	4336
500 x 500	20.00	225	287	66590	15.2	3330	3994	113264	5187
	8.00	122	155	62170	20.0	2487	2850	96483	3750
	10.00	151	193	76340	19.9	3054	3517	119469	4612
	12.50	186	237	92440	19.7	3698	4290	147994	5643
	16.00	235	299	114300	19.6	4570	5350	186135	7013
500 x 500	20.00	288	367	137100	19.3	5484	6488	227732	8469



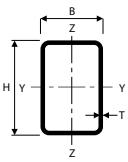
Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I _{yy} cm ⁴	Second moment of area I _{zz} cm ⁴	Radius of gyration I _{yy} cm	Radius of gyration I _{zz} cm	Elastic section modulus W _{el,yy} cm ³	Elastic section modulus W _{el,zz} cm ³	Plastic section modulus W _{pl,yy} cm ³	Plastic section modulus W _{pl,zz} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
50 x 30	2.50	2.82	3.59	11.3	5.05	1.77	1.19	4.52	3.37	5.7	3.98	11.7	5.72
	3.00	3.30	4.21	12.8	5.70	1.75	1.16	5.13	3.80	6.57	4.58	13.5	6.49
	4.00	4.20	5.35	15.3	6.69	1.69	1.12	6.10	4.46	8.05	5.58	16.5	7.71
60 x 40	3.00	4.25	5.41	25.4	13.4	2.17	1.58	8.46	6.72	10.5	7.94	29.3	11.2
	4.00	5.45	6.95	31.0	16.3	2.11	1.53	10.3	8.14	13.2	9.89	36.7	13.7
	5.00	6.56	8.36	35.3	18.4	2.06	1.48	11.8	9.21	15.4	11.5	42.8	15.6
70 x 50	4.00	6.71	8.55	54.7	32.2	2.53	1.94	15.6	12.9	19.5	15.4	68.1	21.2
	5.00	8.13	10.4	63.5	37.2	2.48	1.90	18.1	14.9	23.1	18.2	80.8	24.6
80 x 40	3.00	5.19	6.61	52.3	17.6	2.81	1.63	13.1	8.78	16.5	10.2	43.9	15.3
	4.00	6.71	8.55	64.8	21.5	2.75	1.59	16.2	10.7	20.9	12.8	55.2	18.8
	5.00	8.13	10.4	75.1	24.6	2.69	1.54	18.8	12.3	24.7	15	65.0	21.7
80 x 50	4.00	7.34	9.35	76.4	36.5	2.86	1.98	19.1	14.6	24	17.2	82.7	24.6
	5.00	8.91	11.4	89.2	42.3	2.80	1.93	22.3	16.9	28.5	20.5	98.4	28.7
80 x 60	4.00	7.97	10.1	87.9	56.1	2.94	2.35	22.0	18.7	27	22.1	113	30.3
	5.00	9.70	12.4	103	65.7	2.89	2.31	25.8	21.9	32.2	26.4	136	35.7
	6.00	11.3	14.4	116	73.6	2.84	2.26	29.1	24.5	36.9	30.2	156	40.3
90 x 50	3.60	7.24	9.23	94.7	37.7	3.20	2.02	21.1	15.1	26.4	17.5	89.6	25.8
	4.00	7.97	10.1	103	40.7	3.18	2.00	22.8	16.3	28.8	19.1	97.7	28.0
	5.00	9.70	12.4	121	47.4	3.12	1.96	26.8	18.9	34.4	22.7	116	32.7
100 x 40	4.00	7.97	10.1	116	26.7	3.38	1.62	23.1	13.3	30.3	15.7	74.5	24.0
	5.00	9.70	12.4	136	30.8	3.31	1.58	27.1	15.4	36.1	18.5	87.9	27.9
	6.00	11.3	14.4	152	34.0	3.25	1.53	30.4	17.0	41.3	21	99.3	31.0
100 x 50	3.00	6.60	8.41	106	36.1	3.56	2.07	21.3	14.4	26.7	16.4	88.6	25.0
	4.00	8.59	10.9	134	44.9	3.50	2.03	26.8	18.0	34.1	20.9	113	31.3
	5.00	10.5	13.4	158	52.5	3.44	1.98	31.6	21.0	40.8	25	135	36.8
	6.00	12.3	15.6	179	58.7	3.38	1.94	35.8	23.5	46.9	28.5	154	41.4
	7.10	13.8	17.6	187	61.5	3.26	1.87	37.3	24.6	50.6	30.8	170	44.8
	8.00	15.1	19.2	196	64.3	3.19	1.83	39.2	25.7	54.3	32.9	181	47.2



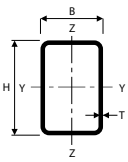
Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I _{yy} cm ⁴	Second moment of area I _{zz} cm ⁴	Radius of gyration I _{yy} cm	Radius of gyration I _{zz} cm	Elastic section modulus W _{el,yy} cm ³	Elastic section modulus W _{el,zz} cm ³	Plastic section modulus W _{pl,yy} cm ³	Plastic section modulus W _{pl,zz} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
100 x 60	3.00	7.07	9.01	121	54.6	3.66	2.46	24.1	18.2	29.6	20.8	122	30.6
	3.60	8.37	10.7	140	63.3	3.63	2.44	28.0	21.1	34.7	24.3	143	35.6
	4.00	9.22	11.7	153	68.7	3.60	2.42	30.5	22.9	37.9	26.6	156	38.7
	5.00	11.3	14.4	181	80.8	3.55	2.37	36.2	26.9	45.6	31.9	188	45.8
	6.00	13.2	16.8	205	91.2	3.49	2.33	41.1	30.4	52.5	36.6	216	51.9
	8.00	16.4	20.8	230	102	3.32	2.21	46.0	34.1	61.6	43	260	60.5
100 x 80	4.00	10.5	13.3	189	134	3.77	3.17	37.9	33.5	45.6	39.2	254	53.4
	5.00	12.8	16.4	226	160	3.72	3.12	45.2	39.9	55.1	47.2	308	63.7
	6.00	15.1	19.2	258	182	3.67	3.08	51.7	45.5	63.8	54.7	357	73.0
	8.00	18.9	24.0	298	210	3.52	2.96	59.6	52.5	76.3	65.4	442	87.3
120 x 50	5.00	12.1	15.4	254	62.6	4.07	2.02	42.3	25.0	55.2	29.5	172	44.9
	6.00	14.2	18.0	289	70.4	4.00	1.98	48.2	28.1	63.7	33.8	198	50.8
120 x 60	3.00	8.01	10.2	189	64.4	4.30	2.51	31.5	21.5	39.2	24.2	156	37.1
	3.60	9.50	12.1	221	74.8	4.27	2.48	36.8	24.9	46.1	28.4	184	43.2
	4.00	10.5	13.3	241	81.2	4.25	2.47	40.1	27.1	50.5	31.1	201	47.0
	5.00	12.8	16.4	287	96.0	4.19	2.42	47.8	32.0	60.9	37.4	242	55.8
	6.00	15.1	19.2	328	109	4.13	2.38	54.7	36.3	70.6	43.1	280	63.6
	8.00	18.9	24.0	375	124	3.95	2.27	62.6	41.3	84.1	51.3	340	75.0
120 x 80	4.00	11.7	14.9	295	157	4.44	3.24	49.1	39.3	59.8	45.2	331	64.9
	5.00	14.4	18.4	353	188	4.39	3.20	58.9	46.9	72.4	54.7	402	77.8
	6.00	17.0	21.6	406	215	4.33	3.15	67.7	53.8	84.3	63.5	469	89.4
	8.00	21.4	27.2	476	252	4.18	3.04	79.3	62.9	102	76.9	584	108
	10.00	25.6	32.6	534	281	4.05	2.94	89.0	70.3	118	88.7	676	122
	12.50	29.1	37.0	527	281	3.77	2.75	87.8	70.1	124	93.7	714	128
120 x 100	5.00	16.0	20.4	419	316	4.54	3.94	69.9	63.3	83.9	74.1	583	99.8
	6.00	18.9	24.0	484	365	4.49	3.89	80.7	72.9	97.9	86.4	682	115
	8.00	23.9	30.4	576	434	4.35	3.78	96.1	86.8	120	106	862	141
140 x 80	4.00	13.0	16.5	430	180	5.10	3.30	61.4	45.1	75.5	51.3	412	76.5
	5.00	16.0	20.4	517	216	5.04	3.26	73.9	54.0	91.8	62.2	501	91.8
	6.00	18.9	24.0	597	248	4.98	3.21	85.3	62.0	107	72.4	584	106
	8.00	23.9	30.4	708	293	4.82	3.10	101	73.3	131	88.4	731	129
	10.00	28.7	36.6	804	330	4.69	3.01	115	82.6	152	103	851	147
	12.50	33.0	42.0	814	338	4.40	2.84	116	84.5	164	111	919	157



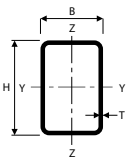
Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I _{yy} cm ⁴	Second moment of area I _{zz} cm ⁴	Radius of gyration I _{yy} cm	Radius of gyration I _{zz} cm	Elastic section modulus W _{el,yy} cm ³	Elastic section modulus W _{el,zz} cm ³	Plastic section modulus W _{pl,yy} cm ³	Plastic section modulus W _{pl,zz} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
150 x 50	4.00	14.9	15.0	381	66.2	5.05	2.10	50.9	26.5	66.5	30.1	192	48.3
	5.00	14.4	18.4	456	77.9	4.99	2.06	60.8	31.1	80.5	36.2	230	57.1
	6.00	17.0	21.6	523	87.9	4.92	2.02	69.8	35.2	93.5	41.7	264	64.8
150 x 100	4.00	14.9	19.0	595	319	5.60	4.10	79.3	63.7	95.7	72.5	662	105
	5.00	18.3	23.4	719	384	5.55	4.05	95.9	76.8	117	88.3	809	127
	6.00	21.7	27.6	835	444	5.50	4.01	111	88.8	137	103	948	147
	8.00	27.7	35.2	1008	536	5.35	3.90	134	107	169	128	1206	182
	10.00	33.4	42.6	1162	614	5.22	3.80	155	123	199	150	1426	211
	12.50	38.9	49.5	1225	651	4.97	3.63	163	130	220	166	1606	233
160 x 80	4.00	14.2	18.1	598	204	5.74	3.35	74.7	50.9	92.9	57.4	494	88.0
	5.00	17.5	22.4	722	244	5.68	3.30	90.2	61.0	113	69.7	601	106
	6.00	20.7	26.4	836	281	5.62	3.26	105	70.2	132	81.3	702	122
	8.00	26.4	33.6	1001	335	5.46	3.16	125	83.7	163	100	882	150
	10.00	31.8	40.6	1146	380	5.32	3.06	143	95.0	191	117	1031	172
	12.50	36.9	47.0	1185	396	5.02	2.90	148	98.9	208	127	1129	185
160 x 90	5.00	18.3	23.4	782	320	5.79	3.70	97.7	71.0	121	81.2	740	121
	6.30	28.5	28.6	921	376	5.68	3.63	115	83.5	145	97.2	905	145
	8.00	27.7	35.2	1094	443	5.57	3.55	137	98.5	175	117	1097	172
	10.00	33.4	42.6	1259	507	5.44	3.45	157	113	206	137	1291	199
180 x 60	6.00	20.7	26.4	946	161	5.98	2.47	105	53.8	139	62.6	477	98.7
	8.00	26.4	33.6	1125	189	5.78	2.37	125	63.1	171	76.2	586	118
180 x 80	4.00	15.5	19.7	802	227	6.37	3.39	89.1	56.7	112	63.5	578	99.6
	5.00	19.1	24.4	971	272	6.31	3.34	108	68.1	137	77.2	704	120
	6.00	22.6	28.8	1128	314	6.25	3.30	125	78.5	160	90.2	823	139
	8.00	28.9	36.8	1362	377	6.08	3.20	151	94.1	198	111	1036	170
	10.00	35.0	44.6	1570	429	5.94	3.10	174	107	234	131	1214	196
180 x 100	5.00	20.7	26.4	1124	452	6.53	4.14	125	90.4	154	103	1045	154
	6.00	24.5	31.2	1310	524	6.48	4.10	146	105	181	120	1227	179
	8.00	31.4	40.0	1598	637	6.32	3.99	178	127	226	150	1565	222
	10.00	38.1	48.6	1859	736	6.19	3.89	207	147	268	177	1859	260
	12.50	44.8	57.0	2001	796	5.92	3.74	222	159	300	199	2122	290



Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I _{yy} cm ⁴	Second moment of area I _{zz} cm ⁴	Radius of gyration I _{yy} cm	Radius of gyration I _{zz} cm	Elastic section modulus W _{el,yy} cm ³	Elastic section modulus W _{el,zz} cm ³	Plastic section modulus W _{pl,yy} cm ³	Plastic section modulus W _{pl,zz} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
180 x 120	6.00	26.4	33.6	1491	796	6.66	4.87	166	133	202	153	1677	219
	8.00	33.9	43.2	1835	978	6.51	4.76	204	163	253	192	2156	275
	10.00	41.3	52.6	2149	1141	6.39	4.66	239	190	302	228	2582	323
200 x 100	4.00	18.0	22.9	1200	411	7.23	4.23	120	82.2	148	91.7	985	142
	5.00	22.3	28.4	1459	497	7.17	4.19	146	99.4	181	112	1206	172
	6.00	26.4	33.6	1703	577	7.12	4.14	170	115	213	132	1417	200
	8.00	33.9	43.2	2091	705	6.95	4.04	209	141	267	165	1811	250
	10.00	41.3	52.6	2444	818	6.82	3.94	244	164	318	195	2154	292
	12.50	48.7	62.0	2659	892	6.55	3.79	266	178	359	221	2474	329
14.20	53.8	68.5	2805	939	6.40	3.70	281	188	387	237	2647	349	
200 x 120	4.00	19.3	24.5	1353	618	7.43	5.02	135	103	164	115	1345	172
	5.00	23.8	30.4	1649	750	7.37	4.97	165	125	201	141	1652	210
	6.00	28.3	36.0	1929	874	7.32	4.93	193	146	237	166	1947	245
	8.00	36.5	46.4	2386	1079	7.17	4.82	239	180	298	209	2507	308
	10.00	44.4	56.6	2806	1262	7.04	4.72	281	210	356	250	3007	364
	12.50	52.6	67.0	3099	1397	6.80	4.57	310	233	406	285	3514	416
14.20	58.2	74.2	3297	1484	6.67	4.47	330	247	440	309	3803	446	
200 x 150	4.00	21.2	26.9	1584	1021	7.67	6.16	158	136	187	154	1942	219
	5.00	26.2	33.4	1935	1245	7.62	6.11	193	166	230	189	2391	267
	6.00	31.1	39.6	2268	1457	7.56	6.06	227	194	271	223	2826	313
	8.00	40.2	51.2	2829	1816	7.43	5.95	283	242	344	283	3665	396
	10.00	49.1	62.6	3348	2143	7.31	5.85	335	286	413	339	4428	471
	12.50	58.5	74.5	3759	2410	7.10	5.69	376	321	476	392	5255	547
14.20	64.9	82.7	5198	2583	6.98	5.59	403	344	519	426	5745	591	
250 x 100	4.00	21.2	26.9	2092	503	8.81	4.32	167	101	210	111	1323	179
	5.00	26.2	33.4	2554	610	8.75	4.28	204	122	259	136	1620	217
	6.00	31.1	39.6	2992	710	8.69	4.23	239	142	305	160	1905	253
	7.10	36.1	46.0	3380	801	8.58	4.17	270	160	348	183	2208	289
	8.00	40.2	51.2	3714	875	8.51	4.13	297	175	385	201	2439	317
	10.00	49.1	62.6	4384	1021	8.37	4.04	351	204	462	240	2910	373
	12.50	58.5	74.5	4868	1133	8.08	3.90	389	227	530	275	3373	425
14.20	64.9	82.7	4679	1202	7.93	3.81	416	240	576	298	3633	454	



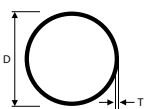
Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I _{yy} cm ⁴	Second moment of area I _{zz} cm ⁴	Radius of gyration I _{yy} cm	Radius of gyration I _{zz} cm	Elastic section modulus W _{el,yy} cm ³	Elastic section modulus W _{el,zz} cm ³	Plastic section modulus W _{pl,yy} cm ³	Plastic section modulus W _{pl,zz} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
250 x 150	5.00	30.1	38.4	3304	1508	9.28	6.27	264	201	320	225	3285	337
	6.00	35.8	45.6	3886	1768	9.23	6.23	311	236	378	266	3886	396
	8.00	46.5	59.2	4886	2219	9.08	6.12	391	296	482	340	5050	504
	10.00	57.0	72.6	5825	2634	8.96	6.02	466	351	582	409	6121	602
	12.50	68.3	87.0	6633	3002	8.73	5.87	531	400	678	477	7315	704
	16.00	83.8	107	7660	3453	8.47	5.69	613	460	805	566	8713	823
300 x 150	5.00	34.0	43.4	5153	1771	10.9	6.39	344	236	422	262	4214	407
	6.00	40.5	51.6	6074	2080	10.8	6.35	405	277	500	309	4988	479
	8.00	52.8	67.2	7684	2623	10.7	6.25	512	350	640	396	6491	612
	10.00	64.8	82.6	9209	3125	10.6	6.15	614	417	776	479	7879	733
	12.50	78.1	99.5	10590	3595	10.3	6.01	706	479	912	563	9452	862
	14.20	87.2	111	11530	3897	10.2	5.92	768	520	1003	619	10410	941
16.00	96.4	123	12390	4174	10.0	5.83	826	557	1092	673	11330	1015	
300 x 200	5.00	38.0	48.4	6241	3361	11.4	8.34	416	336	496	376	6836	552
	6.30	47.1	60.0	7624	4104	11.3	8.27	508	410	610	463	8524	680
	8.00	59.1	75.2	9389	5042	11.2	8.19	626	504	757	574	10630	838
	10.00	72.7	92.6	11310	6058	11.1	8.09	754	606	921	698	12990	1012
	12.50	88.0	112	13180	7060	10.8	7.94	879	706	1091	828	15770	1204
	14.20	98.3	125	14430	7717	10.7	7.85	962	772	1206	915	17510	1325
16.00	109	139	15620	8340	10.6	7.75	1041	834	1319	1000	19220	1442	
350 x 250	8.00	71.6	91.2	16000	9573	13.2	10.2	914	766	1092	869	19140	1253
	10.00	88.4	113	19410	11590	13.1	10.1	1109	927	1335	1062	23500	1522
	12.50	108	137	22920	13690	12.9	9.99	1310	1095	1598	1272	28760	1830
400 x 150	8.00	65.3	83.2	15900	3430	13.8	6.42	795	457	1016	510	9472	827
	10.00	80.5	103	19200	4107	13.7	6.33	960	548	1239	619	11510	994
	12.50	97.8	125	22410	4780	13.4	6.19	1120	637	1472	735	13870	1177
400 x 200	6.00	54.7	69.6	14790	5092	14.6	8.55	739	509	906	562	12070	877
	8.00	71.6	91.2	18970	6517	14.4	8.45	949	652	1173	728	15820	1133
	10.00	88.4	113	23000	7864	14.3	8.36	1150	786	1434	888	19370	1373
	12.50	108	137	27100	9260	14.1	8.22	1355	926	1714	1062	23590	1644
	16.00	134	171	32550	11060	13.8	8.05	1627	1106	2093	1294	28930	1984



Outside dimension H x B mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I _{yy} cm ⁴	Second moment of area I _{zz} cm ⁴	Radius of gyration I _{yy} cm	Radius of gyration I _{zz} cm	Elastic section modulus W _{el,yy} cm ³	Elastic section modulus W _{el,zz} cm ³	Plastic section modulus W _{pl,yy} cm ³	Plastic section modulus W _{pl,zz} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
450 x 250	6.00	64.1	81.6	22720	9245	16.7	10.6	1010	740	1221	817	20690	1253
	8.00	84.2	107	29340	11920	16.5	10.5	1304	953	1588	1063	27220	1628
	10.00	104	133	35740	14470	16.4	10.4	1588	1158	1948	1302	33470	1983
	12.50	127	162	42540	17220	16.2	10.3	1890	1377	2346	1569	41060	2394
500 x 200	8.00	84.2	107	33120	7992	17.6	8.63	1325	799	1669	882	21230	1428
	10.00	104	133	40320	9671	17.4	8.54	1613	967	2047	1078	26000	1734
	12.50	127	162	47870	11460	17.2	8.41	1915	1146	2462	1297	31720	2084
	16.00	159	203	58020	13770	16.9	8.24	2321	1377	3027	1589	39000	2526
500 x 300	8.00	96.7	123	42810	19620	18.6	12.6	1712	1308	2063	1458	42770	2202
	10.00	120	153	52330	23930	18.5	12.5	2093	1596	2537	1791	52740	2693
	12.50	147	187	62730	28690	18.3	12.4	2509	1912	3071	2169	64950	3269
	16.00	184	235	76760	34990	18.1	12.2	3071	2333	3802	2683	80970	4019
	20.00	225	287	90990	41340	17.8	12.0	3639	2756	4568	3220	97950	4791
600 x 400	8.00	122	155	80670	43560	22.8	16.8	2689	2178	3193	2428	88670	3591
	10.00	151	193	99080	53430	22.7	16.7	3303	2671	3939	2994	109700	4413
	12.50	186	237	119900	64650	22.5	16.5	3997	3233	4803	3651	135800	5394
	16.00	235	299	148200	79760	22.3	16.3	4940	3988	5990	4551	170500	6694
	20.00	288	367	177800	95500	22.0	16.1	5928	4775	7263	5514	208300	8072

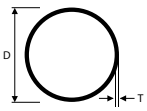
Tables report calculations from manufacturers and/or from specification EN10219-2.

COLD FORMED CIRCULAR HOLLOW
SECTIONS TO:
EN10219 S275J2H / S355J2H

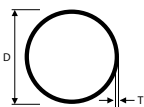


COLD FORMED CIRCULAR DIMENSIONS

Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
33.7	3.00	2.27	2.89	3.44	1.09	2.04	2.84	6.88	4.08
42.4	3.00	2.91	3.71	7.25	1.40	3.42	4.67	14.5	6.84
48.3	3.00	3.35	4.27	11.0	1.61	4.55	6.17	22.0	9.11
	4.00	4.37	5.57	13.8	1.57	5.70	7.87	27.5	11.4
60.3	3.20	4.51	5.74	23.5	2.02	7.78	10.4	46.9	15.6
	4.00	5.55	7.07	28.2	2.00	9.34	12.7	56.3	18.7
76.1	3.20	5.75	7.33	48.8	2.58	12.8	17	97.6	25.6
	4.00	7.11	9.06	59.1	2.55	15.5	20.8	118	31.0
88.9	3.20	6.76	8.62	79.2	3.03	17.8	23.5	158	35.6
	4.00	8.38	10.7	96.3	3.00	21.7	28.9	193	43.3
	5.00	10.3	13.2	116	2.97	26.2	35.2	233	52.4
	6.30	12.8	16.3	140	2.93	31.5	43.1	280	63.1
114.3	3.00	8.23	10.5	163	3.94	28.4	37.2	325	56.9
	3.50	9.56	12.2	187	3.92	32.7	43	374	65.5
	4.00	10.9	13.9	211	3.90	36.9	48.7	422	73.9
	5.00	13.5	17.2	257	3.87	45.0	59.8	514	89.9
	6.30	16.8	21.4	313	3.82	54.7	73.6	625	109
139.7	3.00	10.1	12.9	301	4.83	43.1	56.1	602	86.2
	4.00	13.4	17.1	393	4.80	56.2	73.7	786	112
	5.00	16.6	21.2	481	4.77	68.8	90.8	961	138
	6.00	19.8	25.2	564	4.73	80.8	107	1129	162
	6.30	20.7	26.4	589	4.72	84.3	112	1177	169
	8.00	26.0	33.1	720	4.66	103	139	1441	206
	10.00	32.0	40.7	862	4.60	123	169	1724	247
168.3	3.60	14.6	18.6	632	5.82	75.1	97.7	1264	150
	4.00	16.2	20.6	697	5.81	82.8	108	1394	166
	4.50	18.2	23.2	777	5.79	92.4	121	1554	185
	5.00	20.1	25.7	856	5.78	102	133	1712	203
	6.00	24.0	30.6	1009	5.74	120	158	2017	240
	6.30	25.2	32.1	1053	5.73	125	165	2107	250
	8.00	31.6	40.3	1297	5.67	154	206	2595	308
	10.00	39.0	49.7	1564	5.61	186	251	3128	372
	12.50	48.0	61.2	1868	5.53	222	304	3737	444



Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
193.7	4.00	18.7	23.8	1073	6.71	111	144	2146	222
	5.00	23.3	29.6	1320	6.67	136	178	2640	273
	6.30	29.1	37.1	1630	6.63	168	221	3260	337
	8.00	36.6	46.7	2016	6.57	208	276	4031	416
	10.00	45.3	57.7	2442	6.50	252	338	4883	504
	12.50	55.9	71.2	2934	6.42	303	411	5869	606
219.1	5.00	26.4	33.6	1928	7.57	176	229	3856	352
	6.30	33.1	42.1	2386	7.53	218	285	4772	436
	8.00	41.6	53.1	2960	7.47	270	357	5919	540
	10.00	51.6	65.7	3598	7.40	328	438	7197	657
	12.50	63.7	81.1	4345	7.32	397	534	8689	793
	16.00	80.1	102	5297	7.20	483	661	10590	967
244.5	5.00	29.5	37.6	2699	8.47	221	287	5397	441
	6.30	37.0	47.1	3346	8.42	274	358	6692	547
	8.00	46.7	59.4	4160	8.37	340	448	8321	681
	10.00	57.8	73.7	5073	8.30	415	550	10150	830
	12.50	71.5	91.1	6147	8.21	503	673	12290	1006
	16.00	90.2	115	7533	8.10	616	837	15070	1232
273.0	4.00	26.5	33.8	3058	9.51	224	289	6116	448
	5.00	33.0	42.1	3781	9.48	277	359	7562	554
	6.30	41.4	52.8	4696	9.43	344	448	9392	688
	8.00	52.3	66.6	5852	9.37	429	562	11700	857
	10.00	64.9	82.6	7154	9.31	524	692	14310	1048
	12.50	80.3	102	8697	9.22	637	849	17390	1274
323.9	5.00	39.3	50.1	6369	11.3	393	509	12740	787
	6.30	49.3	62.9	7929	11.2	490	636	15860	979
	8.00	62.3	79.4	9910	11.2	612	799	19820	1224
	10.00	77.4	98.6	12160	11.1	751	986	24320	1501
	12.50	96.0	122	14850	11.0	917	1213	29690	1833
	16.00	121	155	18390	10.9	1136	1518	36780	2271



Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
355.6	5.00	43.2	55.1	8464	12.4	476	615	16930	952
	6.30	54.3	69.1	10550	12.4	593	769	21090	1186
	8.00	68.6	87.4	13200	12.3	742	967	26400	1485
	10.00	85.2	109	16220	12.2	912	1195	32450	1825
	12.50	106	135	19850	12.1	1117	1472	39700	2233
	16.00	134	171	24660	12.0	1387	1847	49330	2774
406.4	6.30	62.2	79.2	15850	14.1	780	1009	31700	1560
	8.00	78.6	100	19870	14.1	978	1270	39750	1956
	10.00	97.8	125	24480	14.0	1205	1572	48950	2409
	12.50	121	155	30030	13.9	1478	1940	60060	2956
	16.00	154	196	37450	13.8	1843	2440	74900	3686
457.0	6.30	70.0	89.2	22650	15.9	991	1280	45310	1983
	8.00	88.6	113	28450	15.9	1245	1613	56890	2490
	10.00	110	140	35090	15.8	1536	1998	70180	3071
	12.50	137	175	43140	15.7	1888	2470	86290	3776
	16.00	174	222	53960	15.6	2361	3113	107900	4723
508.0	6.30	77.9	99.3	31250	17.7	1230	1586	62490	2460
	8.00	98.6	126	39280	17.7	1546	2000	78560	3093
	10.00	123	156	48520	17.6	1910	2480	97040	3820
	12.50	153	195	59760	17.5	2353	3070	119500	4705
	16.00	194	247	74910	17.4	2949	3874	149800	5898

OFFSHORE STRUCTURAL TUBES TO: EN10225

Dimensional tolerances to EN10210-2
SAW dimensional tolerances to API5L

Circular	
Outside dimension (D B and H):	Circular $\pm 1\%$ with a min of $\pm 0.5\text{mm}$ and maximum of $\pm 10\text{mm}$
Thickness (T):	-10% -12.5% may occur in smooth transition over <25% of circumference for Seamless Note: positive deviation limited by mass tolerance
Mass (M):	$\pm 6\%$ on individual lengths
Straightness:	Maximum 0.2% of the total length and 3mm over every 1m length
Length:	+150mm/-0mm

Welded Hollow Sections for Fixed Offshore Structures

to EN10225 S355G13+N (steel no 1.1182+N)

Chemical Composition

C	Si	Mn	P	S	Cr	Mo	Ni	Al (total)
max %	%	%	max %	max %	max %	max %	max %v	max %
0.16	0.15 to 0.55	1.60 max	0.025	0.015	0.25	0.08	0.30	0.060 max
Cu	N	Nb	V	Ti	Cr+Mo+Ni+Cu	Nb+V	Nb+V+Ti	CEV
max %	max %	max %	max %	max %	max %	max %	max %	max %
0.35	0.014	0.05	0.10	0.02	0.80	0.10	0.12	0.43

Mechanical Properties

Tensile Strength (N/mm ²)	Minimum Yield Strength R _{eh} for thickness t in mm		Minimum average Charpy V-notch impact Energy	
460 to 620	t ≤ 20	R _e /R _m max. ratio	Temp C	Energy (J) *
* For transverse weld testing, test temperature is -20° C with minimum values of 36J	355	0.88	-40	50

Seamless Hollow Sections for Fixed Offshore Structures

to EN10225 S355G15+N (steel no. 1.1190+N)

Chemical Composition

C	Si	Mn	P	S	Cr	Mo	Ni	Al (total)
max %	%	%	max %	max %	max %	max %	max %	max %
0.18	0.15 to 0.55	1.60 max	0.025	0.007	0.250	0.08	0.30	0.060 max
Cu	N	Nb	V	Ti	Cr+Mo+Ni+Cu	Nb+V	Nb+V+Ti	CEV
max %	max %	max %	max %	max %	max %	max %	max %	max %
0.35	0.014	0.05	0.10	0.020	0.80	0.10	0.12	0.43

Mechanical Properties

Tensile Strength (N/mm ²)	Minimum Yield Strength R _{eh} for thickness t in mm			Minimum average Charpy V-notch impact Energy	
460 to 620	t ≤ 20	20 < t ≤ 40	R _e /R _m max. ratio	Temp C	Energy (J) *
	355	345	0.88	-40	50

Additional Information

 Option 13 Z35 25.0mm and above } G15+N only
 3.2 certs

SAW longitudinally welded Hollow Section for Fixed Offshore Structures

to EN10225 S355G8+N (steel no 1.8810+N) and
API5L X52N PSL2 (MOD)

Chemical Composition ≤ 25mm

C	Si	Mn	P	S	Cr	Mo	Ni	Al (total)
max % a	%	max % a	max %	max %	max %	max %	max %	max %
0.14	0.15 to 0.45	1.00 to 1.4	0.020	0.007	0.250	0.08	0.50	0.015 to 0.055
Cu	N	Nb	Ti	V	Cr+Mo+Ni+Cu	Nb+V	Nb+V+Ti	
max %	max %	max %	max %	max %	max %	max %	max %	
0.30	0.010	0.04	0.03	0.060	0.90	0.06	0.08	

Mechanical Properties

Pipe Body of Welded Pipes

Minimum Tensile Strength (R_{ma}) ≤ 100		Minimum Yield Strength R_{eh} for thickness t(mm)			Minimum average Charpy V-notch impact Energy	
Min	Max	t ≤ 16	16 ≤ t ≤ 25	25 ≤ t ≤ 40	Temp C	Energy (J) *
470	630	355	355	345	-40	50

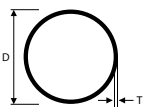
Additional Information

Option 13: Z35 TTT
Certs: 3.2

SAW longitudinally welded Hollow Section for Fixed Offshore Structures

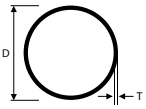
to EN10225 S355G8+N (steel no 1.8810+N) and
API5L X52N PSL2 (MOD)

Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W_{el} cm ³	Plastic section modulus W_{pl} cm ³	Torsional inertia constant I_t cm ⁴	Torsional modulus constant C_t cm ³
610.0	30.00	429	547	230500	20.5	7557	10100	461000	15110
711.0	20.60	351	447	266500	24.4	7495	9822	532900	14990
	25.40	429	547	321900	24.3	9054	11940	643800	18110
762.0	20.60	377	480	329900	26.2	8660	11330	659900	17320
	25.40	461	588	399100	26.1	10480	13790	798200	20950
	31.80	573	729	487100	25.8	12790	16970	974200	25570
813.0	25.40	493	628	487800	27.9	12000	15760	975600	24000
	31.80	613	780	596300	27.6	14670	19420	1192700	29340
914.0	25.40	557	709	700400	31.4	15330	20060	1400900	30650
	31.80	692	881	858500	31.2	18790	24760	1717000	37570



Welded Hollow Sections for Fixed Offshore Structures
to EN10225 S355G13+N (steel no 1.1182+N)

Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
273.0	12.50	80.3	102	8697	9.22	637	849	17390	1274
	16.00	101	129	10710	9.10	784	1058	21410	1569
323.9	12.50	96.0	122	14850	11.0	917	1213	29690	1833
	16.00	121	155	18390	10.9	1136	1518	36780	2271
	20.00	150	191	22140	10.8	1370	1850	44280	2730
355.6	12.50	106	135	19850	12.1	1117	1472	39700	2233
	16.00	134	171	24660	12.0	1387	1847	49330	2774
	20.00	166	211	29790	11.9	1680	2255	59580	3351
	25.00	204	260	35680	11.7	2010	2738	71350	4013
406.4	12.50	121	155	30031	13.9	1478	1940	60060	2956
	16.00	154	196	37450	13.8	1843	2440	74900	3686
	20.00	191	243	45430	13.7	2240	2989	90860	4472
	25.00	235	300	54700	13.5	2690	3642	109400	5384
457.0	12.00	132	168	41560	15.7	1819	2377	83110	3637
	16.00	174	222	53960	15.6	2361	3113	107900	4723
	20.00	216	275	65680	15.5	2870	3822	131400	5749
	25.00	266	339	79420	15.3	3480	4671	158800	6951
508.0	12.50	153	195	59760	17.5	2353	3070	119500	4705
	16.00	194	247	74910	17.4	2949	3874	149800	5898
	20.00	241	307	91430	17.3	3600	4766	182900	7199
	25.00	298	379	110900	17.1	4370	5837	221800	8734
559.0	20.00	266	339	123200	19.1	4406	5813	246300	8813
	25.00	329	419	149800	18.9	5360	7134	299600	10720
610.0	20.00	291	371	161500	20.9	5290	6965	323000	10590
	25.00	361	459	196900	20.7	6460	8561	393800	12910



Seamless Hollow Sections for Fixed Offshore Structures

to EN10225 S355G15+N (steel no. 1.1190+N)

Outside diameter D mm	W.T. T mm	Linear mass M Kg/m	Cross-sectional area A cm ²	Second moment of area I cm ⁴	Radius of gyration i cm	Elastic section modulus W _{el} cm ³	Plastic section modulus W _{pl} cm ³	Torsional inertia constant I _t cm ⁴	Torsional modulus constant C _t cm ³
219.1	12.50	63.7	81.1	4345	7.32	397	534	8689	793
	16.00	80.1	102	5297	7.20	483	661	10590	967
273.0	12.50	80.3	102	8697	9.22	637	849	17390	1274
	16.00	101	129	10710	9.10	784	1058	21410	1569
	20.00	125	159	12800	8.97	938	1283	25600	1875
	25.00	153	195	15130	8.81	1108	1543	30250	2216
323.9	12.70	97.5	124	15060	11.0	930	1231	30110	1859
	16.00	121	155	18390	10.9	1136	1518	36780	2271
	25.00	184	235	26400	10.6	1630	2239	52800	3260
	30.00	217	277	30220	10.4	1866	2600	60440	3732
355.6	20.00	166	211	29790	11.9	1676	2255	59580	3351
	25.00	204	260	35680	11.7	2007	2738	71350	4013
	30.00	241	307	41010	11.6	2307	3189	82020	4613
406.4	12.50	121	155	30030	13.9	1478	1940	60060	2956
	16.00	154	196	37450	13.8	1843	2440	74900	3686
	20.00	191	243	45430	13.7	2236	2989	90860	4472
	25.00	235	300	54700	13.5	2692	3642	109400	5384
	30.00	278	355	63220	13.3	3111	4259	126400	6223
457.0	12.50	137	175	43140	15.7	1888	2470	86290	3776
	16.00	174	222	53960	15.6	2361	3113	107900	4723
	20.00	216	275	65680	15.5	2874	3822	131400	5749
	25.00	266	339	79420	15.3	3475	4671	158800	6951
	30.00	316	402	92170	15.1	4034	5479	184300	8068
508.0	12.70	155	198	60640	17.5	2387	3116	121300	4775
	16.00	194	247	74910	17.4	2949	3874	149800	5898
	20.00	241	307	91430	17.3	3600	4766	182900	7199
	25.00	298	379	110900	17.1	4367	5837	221800	8734
	32.00	376	479	136100	16.9	5360	7261	272300	10720
610.0	20.00	291	371	161500	20.9	5295	6965	323000	10590
	25.00	361	459	196900	20.7	6456	8561	393800	12910
	30.00	429	547	230500	20.5	7557	10100	461000	15110
660.0	20.00	316	402	206100	22.6	6245	8195	412200	12490



HOT FINISHED SEAMLESS TUBES
FOR MECHANICAL AND STRUCTURAL
APPLICATIONS EN10210/EN10297

Chemical Composition for Non-Alloy Quality Tubes

Hot Finished Seamless tube to EN10297-1

STEEL GRADE	Chemical Elements (% on mass)							
	Typical ranges for information purposes only							
	C		Si		Mn		P	S
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.
E235	-	0.17	-	0.35	-	1.20	0.030	0.035
E275	-	0.21	-	0.35	-	1.40	0.030	0.035
E315	-	0.21	-	0.30	-	1.50	0.030	0.035
*S355J2H /E355¹	-	0.22	-	0.55	-	1.60	0.030	0.035
*E470²	0.16	0.22	0.10	0.50	1.30	1.70	0.030	0.035

¹ Tubes are available with double marking EN10210 S355J2H / EN10297 E355

² Al ≥ 0.010%; N ≤ 0.020%; Nb ≤ 0.07%; 0.08% ≤ V ≤ 0.15%.

Mechanical Properties for Non-Alloy Quality Tubes

Hot Finished Seamless tube to EN10297-1

STEEL GRADE	Delivery Condition	Yield Strength (R _{eh}) (N/mm ² =M _{pa})					Tensile Strength (R _m) (N/mm ² =M _{pa})				Longitudinal Elongation % min	
		for nominal W.T. in mm										
		≤ 16	> 16 ≤ 40	> 40 ≤ 65	> 65 ≤ 80	> 80 ≤ 100	≤ 16	> 16 ≤ 40	> 40 ≤ 65	> 65 ≤ 100		
E235	+AR	235	225	215	205	195	360	360	360	340	25	
E275	+AR	275	265	255	245	235	410	410	410	380	22	
E315	+AR	315	305	295	280	270	450	450	450	420	21	
*S355J2H /E355¹	+AR	355	345	335	315	295	490	490	490	470	20	
*E470	+AR	470	430	-	-	-	650	600	-	-	17	

* Standard stock

ABUS 7+71

Bianco Group



Available from Group stocks

Chemical Composition for Non-Alloy Quality Tubes with Specified Impact Properties

STEEL GRADE	Chemical Elements (% on mass)										
	Typical ranges for information purposes only										
	C		Si		Mn		P	S	Cr	Mo	
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.	Min.	Min.	Max.
E275K2	-	0.20	-	0.40	0.50	1.40	0.030	0.030	0.30	-	0.10
*E355K2 **	-	0.20	-	0.50	0.90	1.65	0.030	0.030	0.30	-	0.10
*E420J2¹	0.16	0.22	0.10	0.50	1.30	1.70	0.030	0.035	0.30	-	0.08
E460K2¹	-	0.20	-	0.60	1.00	1.70	0.030	0.030	0.30	-	0.10
*E590K2¹	0.16	0.22	0.10	0.50	1.30	1.70	0.030	0.035	0.30	-	0.08
E730K2	-	0.20	-	0.50	1.40	1.70	0.025	0.025	0.30	0.30	0.45
	Ni		Al		Cu		N	Nb	Ti	V	
	Min.	Max.	Min.	Max.	Max.	Max.	Max.	Max.	Max.	Min.	Max.
E275K2	-	0.30	0.020		0.35		0.015	0.05	0.03	-	0.05
*E355K2	-	0.50	0.020		0.35		0.015	0.05	0.05	-	0.12
*E420J2¹	-	0.40	0.010		0.30		0.020	0.07	0.05	0.08	0.15
E460K2¹	-	0.80	0.020		0.70		0.025	0.05	0.05	-	0.20
*E590K2¹	-	0.40	0.010		0.30		0.020	0.07	0.05	0.08	0.15
E730K2	0.30	0.70	0.020		0.20		0.020	0.05	0.05	-	0.12

¹ Nb + V ≤ 0.20%

Mechanical Properties for Non-Alloy Tubes with Specified Impact Properties

STEEL GRADE	Delivery Condition	Yield Strength (R _{eh}) (N/mm ² =M _{pa})					Tensile Strength (R _m) (N/mm ² =M _{pa})				Longitudinal Elongation % min	Longitudinal Impact Value -20°C (J Min)	
		for nominal W.T. in mm											
		≤ 16	> 16 ≤ 40	> 40 ≤ 65	> 65 ≤ 80	> 80 ≤ 100	≤ 16	> 16 ≤ 40	> 40 ≤ 65	> 65 ≤ 100			
E275K2	+N	275	265	255	245	235	410	410	410	380	22	40	
*E355K2	+N	355	345	335	315	295	490	490	470	470	20	40	
*E420J2	+N	420	400	390	370	360	600	560	530	500	19	27	
E460K2	+N	460	440	430	410	390	550	550	550	520	19	40	
*E590K2	+QT	590	540	480	455	420	700	650	570	520	16	40	
E730K2	+QT	730	670	620	580	540	790	750	700	680	15	40	

* Standard Group Stock

** Impact Tested to 34J min @ - 40°C - available on request.

Wall Thickness (T) mm

45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	100.0	O. D. mm
											26.9
											33.7
											38.0
											42.4
											44.5
											48.3
											51.0
											54.0
											57.0
											60.3
											63.5
											67.0
											70.0
											73.0
											76.1
											82.5
											88.9
											95.0
											101.6
											108.0
											114.3
											121.0
											127.0
											133.0
91.0											139.7
97.7											146.0
105.0	110.6										152.4
112.0	118.4										159.0
119.2	126.3										165.1
126.5	134.4	141.1	146.5								168.3
133.3	141.9	149.3	155.5								171.0
136.8	145.8	153.7	160.3								177.8
1398	149.2	157.3	164.2								191.0
147.3	157.5	166.6	174.3								193.7
162.0	173.9	184.5	193.8								203.0
167.0	179.0	188.1	197.8								219.1
178.0	191.0	200.7	211.6								229.0
196.0	211.0	222.6	235.0	247.0							244.5
204.0	220.0	236.0	250.0	262.9	274.5						254.0
224.0	243.0	257.0	273.0	287.7	301.2						267.0
232.0	251.5	270.0	287.0	303.0	317.6						273.0
250.0	271.0	287.6	306.0	323.8	340.0	355.1					279.0
256.0	275.0	296.0	315.0	333.4	350.4	366.2	380.8	394.1			292.0
259.7	282.4	303.8	324.0	343.0	360.8	377.3	392.6	406.7			298.5
193.8	221.8	321.5	343.3	363.9	383.2	401.4	418.2	433.9			305.0
285.0	306.0	330.3	353.0	374.3	394.5	413.4	431.0	447.5			323.9
288.0	314.0	338.0	362.0	384.7	405.7	425.4	444.0	461.2	477.2		330.0
313.0	338.0	370.0	390.0	415.0	438.3	460.4	481.2	500.8	519.1	552.2	339.7
316.0	345.0	372.0	399.0	425.0	449.0	471.6	493.2	513.6	532.7	567.2	343.0
327.0	357.2	386.2	413.9	440.3	465.6	489.6	512.4	533.9	554.2	591.1	355.6
330.0	361.0	390.0	418.0	446.0	471.0	496.0	518.9	540.8	561.5	599.3	368.0
349.0	377.0	413.0	437.0	466.0	493.0	519.0	543.7	567.2	589.5	630.3	381.0
358.5	392.0	424.5	455.7	485.0	514.0	541.9	568.2	593.2	617.0	660.9	394.0
372.9	408.0	442.0	475.0	506.0	537.0	566.0	593.8	620.5	645.9	693.0	406.4
387.0	423.0	459.0	493.0	527.0	559.0	590.0	619.5	647.7	674.7	725.0	419.0
406.0	439.0	483.0	513.0	547.0	581.0	613.0	644.0	673.7	702.3	756.0	431.8
421.0	455.0	500.0	531.0	567.0	603.0	636.3	669.0	700.0	730.2	786.7	445.0
430.0	471.0	512.0	551.0	588.0	625.0	660.0	668.0	727.0	758.6	818.3	457.2
443.0	486.0	528.0	569.0	609.0	647.0	684.0	720.0	754.6	787.9	850.8	470.0
464.0	502.0	553.0	587.7	628.7	668.4	707.0	744.0	780.2	815.0	881.0	482.6
471.7	517.9	562.9	606.7	649.2	690.5	730.6	769.4	807.0	843.4	912.5	508.0
486.0	533.0	580.0	625.0	669.0	712.3	754.0	794.3	833.5	871.4	943.5	521.0
521.0	565.0	614.0	663.0	710.0	756.0	801.0	844.0	886.7	927.8	1006.0	530.0
527.0	580.0	631.0	681.0	731.0	778.0	825.0	870.0	914.0	956.6	1038.2	559.0
538.0	592.0	644.0	695.0	745.0	794.0	842.0	887.8	932.8	976.6	1060.4	570.0
570.2	627.3	693.3	738.0	791.6	843.8	894.8	944.6	993.2	1040.5	1131.5	584.2
582.6	641.2	698.5	754.6	809.5	863.1	915.5	966.7	1016.6	1065.4	1159.1	610.0
598.4	658.7	717.8	775.7	832.3	887.7	941.8	994.7	1046.4	1096.9	1194.0	622.0
626.6	690.0	752.2	813.2	873.0	931.5	988.8	1044.9	1100.0	1153.0	1257.0	635.0
640.3	705.3	769.1	831.6	892.8	952.9	1011.7	1069.3	1125.6	1180.8	1287.0	660.4
654.8	721.3	786.7	850.8	913.7	975.4	1035.8	1095.0	1152.9	1209.6	1319.4	711.2
683.0	752.7	821.2	888.4	954.4	1019.2	1082.8	1145.0	1206.0	1266.0	1382.0	762.0
739.3	815.3	890.0	963.6	1035.8	1106.9	1176.7	1245.3	1312.6	1378.7	1507.3	812.0
795.7	877.9	958.9	1038.7	1117.3	1194.6	1270.7	1345.5	1419.1	1491.5	1632.5	
851.2	939.6	1026.8	1112.7	1197.4	1280.9	1363.1	1444.1	1523.9	1602.5	1755.9	
45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	100.0	

TOLERANCES

Wall Thickness (T) mm

± 12.5%

± 15%

± 20%

OUTSIDE DIAMETER (OD)

± 1% on the nominal size, with a minimum ± 0.5 mm.

STRAIGHTNESS

For OD ≥ 33.7 mm, the maximum allowed deviation on straightness (in mm) corresponds to 0.15% on the total tube length.

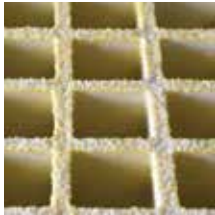
NOTE: the norm EN10297 does not state any tolerance on ovality, eccentricity or inner diameter: these parameters are settled by the Outside Diameter (OD) and Wall Thickness (T) tolerances.

HIGH PERFORMANCE PRODUCTS
CORE6
COMPOSITES



Through our sister company John Bell Pipeline Equipment Company we offer quality GRP components ex-stock in addition to bespoke design and fully fabricated GRP non-slip flooring and access solutions across a wide array of industries. Core6 products are designed to offer fast, safe, effective and economic flooring and access solutions.

MOULDED GRATING



Core6 Moulded grating is an ideal flooring solution to walkway and access areas where slips, trips and falls are a potential hazard.

STRUCTURAL PROFILES



We supply a range of Core6 GRP Structural Profiles including Core6 GRP Tube, I-Beam, Channel, Box and Angle Sections.

These offer a unique combination of chemical resistance, size stability, high strength, thermal and electric non-conductivity.

PULTRUDED GRATING



Core6 Pultruded grating is the best suited flooring solution to high load capacity access areas.

The manufacturing process produces the strongest composite gratings which are often specified in high-traffic areas.

TREAD COVERS & GRIT PLATES



Core6 GRP non-slip stair tread covers provide an effective solution to slippery, worn or uneven stair treads.

They can be installed to existing concrete, wood or steel stair treads and are highly visible, robust, durable and resistant to most chemicals.

HANDRAILS/LADDERS



We design and fabricate bespoke Core6 GRP handrail systems delivered to your exact requirements and provide a virtually maintenance free alternative to conventional handrail systems.

ACCESSORIES



We offer a full range of 316 grade stainless steel fixing clips, clamps, panel-to-panel joiners, pedestals and ramps available to secure all types of Core6 GRP panels.

VERTICAL SAW

Provides customers with custom size components to their exact specification.



CORE6 WORKSHOP

Our fully equipped workshop and extensive stocks enables us to fabricate Core6 components to clients precise requirements on short lead times.



OIL & GAS



CIVILS



PHARMACEUTICALS



PROCESSING



RAIL



UTILITIES

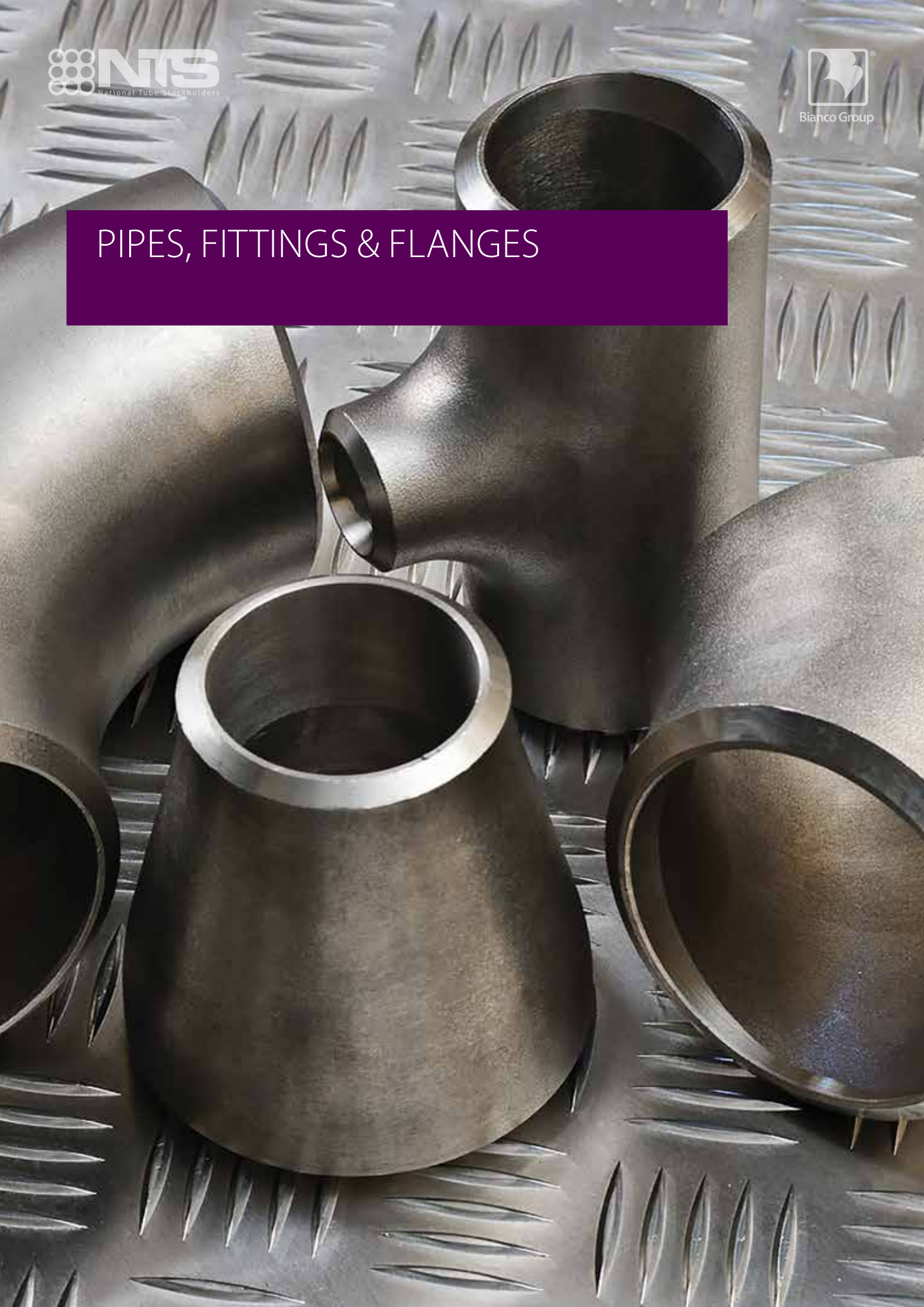


AUTOMOTIVE

Composites 
Trade Association
Member Company

For Core6 product information ☎ 0800 8766668 ✉ sales@core-6.co.uk

PIPES, FITTINGS & FLANGES



At NTS we hold a comprehensive stock of Pipes, Fittings and Flanges for the Process and Petro-chemical Sectors. Our size range covers ¼"NB to 24"NB in Seamless and from 6"NB to 48"NB in Welded API 5L Grade B.

We can offer stock availability for immediate delivery and complete support for complex major global infrastructure projects.

PRODUCT	MANUFACTURE	TYPE	SPECIFICATION	SIZE RANGE
PIPE	SEAMLESS		API 5L GRADE B API 5L X 52 API 5L X 65 ASTM A106 GRADE B ASTM A333 GRADE 6 ASTM A53	½" NB TO 24" NB ½" NB TO 12" NB 2"NB TO 8" NB ½" NB TO 24" ½"NB TO 12" ½"NB TO 24" NB
		ALLOY STEEL	ASTM A335 P11* ASTM A335 P22 ASTM A335 P5 ASTM A335 P9 ASTM A335 P91	½"NB TO 10" NB
		GALVANISED THREADED AND COUPLED	ASTM A106/A53 GRADE B	½"NB TO 4" NB
	WELDED	ELECTRIC (ERW) & HFI (HIGH FREQUENCY INDUCTION) (Multi Certified/ aligned or equivalent standards)	API 5L GRADE B/EN10217-2 P265GH TC1	6"NB TO 24" NB
SUBMERGED ARC (SAW)		API 5L GRADE B	24"NB TO 48" NB	
FITTINGS	SEAMLESS	BUTT WELD	ASME B16.9/ ASME SA234 WPB ASTM A420 WPL6* ASTM A350 LF2	1/2"NB TO 24" NB
FLANGES	PLATE		BS4504 PN10 & PN16*	½"NB TO 24" NB
	FORGED		ASTM A105 Normalised ASTM A350 LF2*	½"NB TO 24" NB

NTS hold pipe in single and double random lengths as below:

Single random lengths ¼" - 12" pipe

Double random lengths 2" - 48" pipe

API 5L GR B PSL1. API 5L X42 PSL1 (≥OD 219.1mm). ISO 3183 L245. EN10208-10L245GA

Generally Equivalent to seamless ASTM A106 Grade B&C, ASTM A53 Grade B, EN10216-2 P265GH

EN10208-1 L245GA, ISO 3183 L245 & API 5L Grade B

This dual certification is applicable to 90% of our welded stock subject to supplier at the time of order.

ASTM A335 P11 P22 P5 P9 P91 Mill Production.

* Group Stock



OIL & GAS



PHARMACEUTICALS



PROCESSING



UTILITIES

For product information ☎ 01845 577440 ✉ sales@nationaltube.co.uk



CLIENT ENDORSEMENTS

Over the decades NTS customers have always been the principal focus of our business and we pride ourselves in continually providing outstanding customer service. Customer service really does matter to us but don't just take our word for it - here is what our customers have to say...



"John Reid and Sons have enjoyed an excellent working relationship with NTS over a number of years. Their depth of stock and extensive range of sizes has proved to be invaluable to us and their overall service from initial contact to final delivery makes them a very important part of our supply chain."

"All the sales people are extremely professional. They are all well informed with great product knowledge and the stock accuracy is a major plus. The warehouse team are also great, cutting materials and dispatching on the same day."

"They give me confidence in what they are saying. I feel like I can rely on them. If there were a problem, they would be there to support us."

"Snashall Steel have traded with NTS for many years. This continued working relationship has been maintained due to the knowledge and helpfulness of the sales personnel combined with an extensive range of stock at a competitive rate, the final contributing factor as a customer of NTS is the reliability of the delivery service they offer."




A member of the Bianco Group 



CUSTOMER SERVICE

NTS employs over one hundred people at our sites in the UK and Ireland offering a wide range of services. The quality of our workforce is something we are extremely proud of. Whilst we are always seeking to increase our customer base, our philosophy, first and foremost, is to retain our existing customers through exemplary service. We have an experienced and knowledgeable team who are committed to dealing with your enquiry and fulfilling every order in a way that reflects the professionalism of our business. For us, customer service means having a detailed technical knowledge of our products and knowing how this specification will perform for our customers in their sector.

FROM SALE TO CUSTOMER

NTS is committed to excellence in customer service – we work in partnership with our customers to achieve the best results on every project. From the first enquiry, our experienced team can assist in specification with detailed product and application knowledge. We have specialist teams to meet the exacting demands of individual markets and experts who can talk your language. We are also able to offer a large range of in-house processing and ensure that every order is accompanied with the correct documentation. With our continual commitment to health and safety, quality and the environment, NTS is proud to be certified by LRQA to ISO 9001, OHSAS 18001 and ISO 14001.



GUARANTEED DELIVERY

Based in Thirsk, North Yorkshire, our stockholding facility is ideally placed for swift fulfilment and delivery of your orders. Our logistical expertise facilitates sourcing, storage, processing and delivery of products exactly when they are needed, including goods required on a just-in-time basis. NTS operates a fleet of vehicles including rigids, artics and extenders that are employee driven. The flexibility to utilise these vehicles to suit the delivery requirements of individual customers combined with in-cab satellite tracking systems enables us to track consignments and offer guaranteed delivery dates. NTS also has the ability to handle export requirements, with excellent worldwide links as part of the Bianco Group.





MEET THE TEAM





THE BIANCO GROUP

The Bianco Group consists of over 20 steel stockholding, distribution, processing and trading companies. Situated throughout the UK, Europe, the US & Canada and with over 800 people we serve more than 80,000 customers worldwide. As a family owned and managed group we remain committed to our founding principles of developing long term relationships and ensuring excellence in service, unrivalled reliability and the highest quality all geared to adding value for our customers.



The first company of the Bianco Group, F. G. Bianco, was founded in northern Italy in 1958. Today this company is still trading under the name of Tubindustria in Brescia. In the late 1960's and early 1970's SICAM in Italy, STAD in France and Cleveland Steel and Tubes in the UK were established, creating the foundations that would later support the Group to grow into our current international steel distribution network. The 1980's and 1990's saw rapid expansion across Europe and North America. In the main from organic growth but supported by strategic acquisitions with the most recent being Sidergamma in Italy during 2015.

The Group specialises in providing seamless and welded tubes to the construction, process and energy

industries as well as providing hot finished and cold drawn tubes and solid bars to the mechanical and fluid power markets.

Today the Bianco Group is a large organisation but we continue to maintain our focus on the principles of efficiency, value and service. Our commitment to this can be seen both in the supply chain relationships we have, some of which date back to 1958, and by our continued financial investment in the businesses. We have in excess of 220,000m² of covered warehousing and stocks of over 350,000 tonnes to help us meet and exceed the ever increasing demands of customers and sectors we supply. With a growing customer base, we welcome the opportunity to show you what we can do for your business.





Bianco Group

FOR TECHNICAL & SALES ADVICE
CALL **01845 577440**

www.nationaltube.co.uk

A member of the Bianco Group



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