

# TATA STRUCTURA HIGH STRENGTH STEEL HOLLOW SECTIONS

355



355

## Marketing Headquarter

Tata Centre, 43, J. L. Nehru Road, Kolkata - 700 071

Telephone: 033 2288-7051/9251/8106

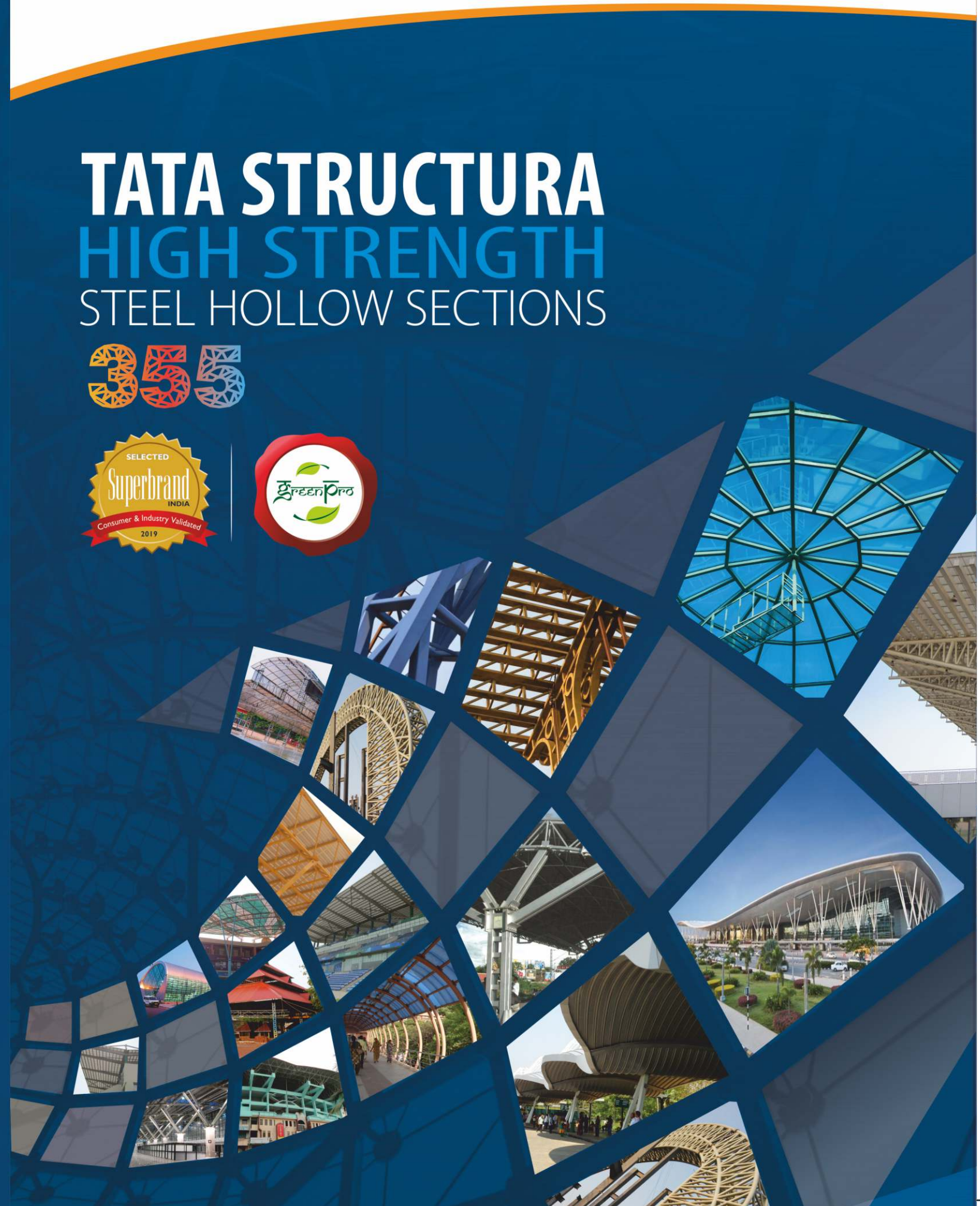
For more information contact  
Toll free: 1800 108 8282

Website: [www.tatastructura.com](http://www.tatastructura.com) Email: [tubessupport@tatasteel.com](mailto:tubessupport@tatasteel.com)

[www.facebook.com/tatastructura](https://www.facebook.com/tatastructura)

[www.tatastructura.com](http://www.tatastructura.com)

Care has been taken to ensure that this information is accurate but Tata Steel does not accept responsibility or liability for errors or information which is found to be misleading





# TATA STEEL TUBES SBU



# PROFILE

Established in Jamshedpur, India in the year 1907, Tata Steel is part of the 150-year-old Tata group. Bringing to reality the vision of its founder, J. N. Tata, who inspired the steel and power industry in India, the Tata Steel Group is amongst the top 10 largest steel manufacturers in the world and is known to be the hallmark of corporate citizenship and business ethics. With operations in 26 countries and commercial presence in 50 countries, the Tata Steel Group has a steel production capacity of 27.5 MnTPA (as on March 31, 2018) and registered a turnover of US \$9310 Mn in FY 2018. Tata Steel India has manufacturing units at Jamshedpur, Jharkhand, with a production capacity of 10 MnTPA and at Kalinganagar, Odisha, with a production capacity of 3 MnTPA. In FY 2017-18, our Kalinganagar unit received approvals for expansion to 8 MnTPA. Tata Steel operates with a completely integrated value chain that extends from mining to finished steel goods.

In 2018, Tata Steel acquired erstwhile Bhushan Steel Limited renamed as Tata Steel BSL Limited which was India's fifth largest flat steel producing company with an existing steel production capacity of 5.6 million tonnes per annum (MTPA) as on March 31, 2018. It has India's largest Cold Rolled Steel Plant and is one of the largest suppliers of automotive grade and high carbon special steel in the country.

# CONTENTS

- 02 Tata Steel- Tubes Division
- 03 Business Verticals
- 04 Heights of Excellence & Engineered For Admiration
- 05 Yst 355 High Strength Steel Hollow Sections
- 06 Product Attributes
- 07 Process of Manufacturing  
Quality Control
- 08 Section Properties & Product Range
  - 1. Circular Hollow Sections
  - 2. Square Hollow Sections
  - 3. Rectangular Hollow Sections
- 15 Tata Structura 355  
General Technical Specifications And Tolerances
- 16 Fabrication And Connection Details
- 17 Mild Steel Electrode For General Purpose Welding





# Tata Steel - Tubes Division

A new dimension in steel tube technology opened in India in the early 50's - with the establishment of the Indian Tube Company Limited (ITC), on the 17th of December 1954. It was the outcome of a joint venture between Tata Steel and Stewarts and Lloyds of UK. In 1985, the Indian Tube Company merged with Tata Steel to form the Tata Steel- Tubes Division. The Tubes Strategic Business Unit (SBU), has retained its leadership position in the segments it operates, and it has an installed capacity of over 6,00,000tons per annum. The Tubes Division manufactures commercial, structural and precision tubes at its Jamshedpur - Tubes Division Plant. The SBU has a network of sales offices across the country with marketing headquarters in Kolkata to provide better customer service. In 2018, Tata Steel acquired the erstwhile Bhushan Steel, now known as Tata Steel BSL (TSBSL), having installed tube manufacturing capacity of 8,50,000 tons at its Sahibabad, Hosur & Khopoli plants located in key consumption hubs of India. The Khopoli plant of TSBSL has two large diameter ERW pipe mills of 5,50,000 tons/annum capacity capable of producing pipes for conveyance, structural as well as the Oil & Gas segment thus making Tata Steel the most diversified tube & pipe manufacturer in India.

## State-of-the-art Technology

The Tubes SBU has embraced the culture of business excellence reflected through a leading presence across several lines of business. A high degree of customisation has been achieved through a comprehensive plant modernisation programme, involving upgradation of the plant, technology and process control.

# Business Verticals

The four main lines of business are

1	2	3	4
<b>Conveyance Tubes</b>	<b>Structural Tubes</b>	<b>Precision Tubes</b>	<b>Pipes for Oil &amp; Gas</b>
Galvanized & MS tubes under the brand "Tata Pipes" cater to conveyance requirements of process industries, rehydrants and HVAC, irrigation borewell segment as well as plumbing applications for water supply.	High Strength steel hollow sections (Yst 355) under the brand name Tata Structura cater to construction segment and for various aesthetic applications	Manufactured with utmost precision these tubes cater to the high end- Automotive, Boiler & Eeneral Engineering segments.	TSBSL is a leading supplier of high quality ERW pipes to the Oil & Gas industry around the world with a complete range of tubes required for the same.
<b>TATA PIPES</b> FLOW OF LIFE	<b>TATA STRUCTURA</b> STRUCTURAL SECTIONS THE SHAPE OF THINGS TO COME	<b>TATA PRECISION TUBES</b>	<b>TATA STEEL BSL PIPES FOR OIL &amp; GAS</b>



Pictorial representation of Kolkata Airport



# Engineered for Excellence & Admiration

## Steel hollow sections are an integral part of Modern steel construction

Steel hollow sections are proving to be the most versatile and efficient form of structural steel for construction and mechanical applications. Many of the iconic and most impressive structures in the world would not have been possible without hollow sections.

Now-a-days, steel is being exposed more in its applications to reveal its essence. This requires it to be aesthetically appealing along with the needed strength. The tubular form is most suitable for such applications which gives structures a better strength to weight ratio and aesthetic appeal as compared to conventional steel sections, concrete and timber products.



## Tata Structura Yst 355

Tata Structura was launched in 2005 and is currently the leading hollow section brand in Project construction in India. Tata Structura has been used in more than 30 airports, 20 stadiums, 7 metro projects and many more iconic projects across India. Tata Structura YST 355 was launched in 2016 and was the first brand to launch YST 355 grade hollow section in India.

Tubes SBU manufactures structural tubes under the brand name Tata Structura conforming to IS:4923 and IS:1161 for Square/ Rectangular and Circular Hollow sections respectively. Tata Structura-Yst 355 High Strength Steel Hollow sections are superior in quality and are manufactured using best grade raw materials (HR Coils) from Tata Steel's world-class Hot Strip Mill. The Tata Structura-Yst 355 comes with yield strength of 355MPa and UTS of 490 MPa, providing better strength to weight ratio and sectional properties. This in turn helps in steel savings upto 40% as compared to conventional angles/channels and upto 20% compared to local steel hollow sections. This steel savings ultimately leads to more economical project execution.

Tata Structura (Yst-355) sections can be manufactured up to a maximum size of 500x500 mm for square sections, 700x300 mm for rectangular sections and 600 NB for circular sections. These sections can be rolled in wide thickness range from 2mm to 20mm. Tata Structura has multiple applications like Airports, Stadiums, Foot Over Bridges (FOB), Industrial sheds, Railway Platform sheds, Bridges, Metro, Steel Buildings etc.



The usage of Tata Structura – Yst 355 results in making projects economical, sustainable, aesthetic & safe structure

# Tata Structura (Yst 355)

## High Strength Steel Hollow Sections

<p><b>GLOBAL STANDARDIZED GRADE FOR CONSTRUCTION</b></p>	<p>Yst 355 grade have widely been used internationally for various iconic and critical projects</p>
<p><b>SUSTAINABLE CONSTRUCTION</b></p>	<p>Tata Structura is Green-Pro certified product by CII-IGBC and these high strength steel sections leads to material savings which makes the projects economical and sustainable</p>
<p><b>FULL PRODUCT RANGE</b></p>	<p>Along with TSBSL facilities, upto 500mmx500mm, 600NB and 700mm x 300mm sections can be manufactured in a wide thickness range from 2mm to 20mm</p>
<p><b>RELIABILITY</b></p>	<p>By using High grade quality HR coils (produced from own Tata Steel plant) as raw material, we ensure the best quality product which can be used for applications ranging from Industrial, Infrastructural, residential, General engineering, architectural etc.</p>

## Internal Corrosion - A Case Study

**Objective:** Identify the possibility of corrosion in the internal surface of steel hollow sections

**Details of the study conducted:**

Two of the original 'Tubewrights' erected in 1954 at Stanford Bridge, Chelsea were replaced in 1975, taken down and the used sections were cut and despatched to the Corby Works of British Steel for examination.

Sample No. 1 of the 139.7 mm o.d. CHS was cut lengthwise to expose the internal surfaces for examination. Little evidence of internal corrosion was found other than a discolouration of the surface caused by the oxygen and moisture in the entrapped air, much of

the original mill scale was still visible. A light rust in the centre of the sample developed after the tube was cut open for examination.

Sample No. 2 of the 139.7 mm o.d. CHS incorporating an intermediate flanged joint was examined and the condition of the internal flange face, which had been enclosed and thus hermetically sealed by welding to the CHS, was still comparatively bright, with the original marking-off lines clearly visible.

**Outcome & Recommendation:** All the free ends of the steel hollow sections should be properly sealed by welding end plates.



**Sample 1**



**Sample 2**

Source: The above report is from British Steel Publication No. TD 347/10E/91 titled – CORROSION, THE CASE FOR STRUCTURAL HOLLOW SECTIONS.



# Product Attributes:



### Sustainable:

- "Tata Structura" is now Green-Pro certified by CII-IGBC.
- We are the only player in this structural steel segment in India to have this certification.



### Architectural:

- Smooth profile of hollow sections enhances the aesthetic appeal
- High quality surface finish
- Best suited for architecturally exposed steel
- Easy to bend into various forms and shapes
- Clutter-free fabrication for visually appealing look



### Structural:

- Superior sectional properties of Tata-Structura allow better use of material which results in material savings.
  - Up to 40% as compared to conventional angles/ channels sections

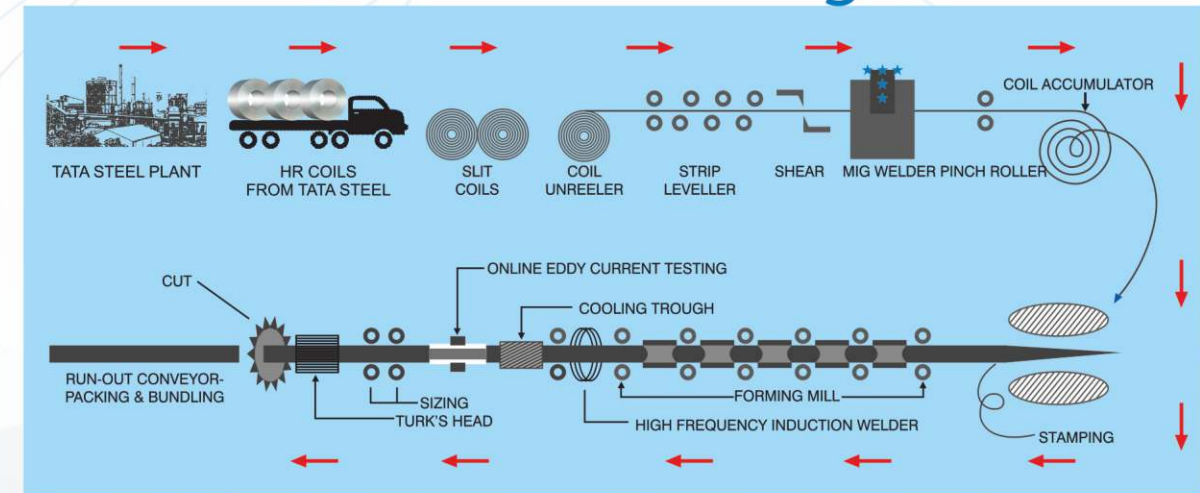


### Fabrication & Maintenance:

- Material savings due to higher grade (Yst 355) which results in lesser cost for fabrication & erection
- Elimination of gusset plates & direct member to member connections
- Well rounded corners ensure maintaining uniform coating thickness
- No dust accumulation, unlike open sections which has exposed internal surfaces

- Up to 20% as compared to local steel hollow sections
- High grade of steel and better ductility ensures lighter weight of structural system
- Encourages use of long Unsupported lengths for Columns and Beams
- High torsional rigidity

# Process of Manufacturing



# Quality Control

The quality of our product is controlled during the manufacturing process. It starts with slitting the HR coils, continues with speed, temperature control during the High Frequency Induction Welding (HFIW) and is followed by online Non-Destructive (NDT) eddy current testing directly after welding. Off-line drift and flattening tests are conducted. This is all within our ISO 9000 Quality Management System.



Control Room for On-line Non Destructive Testing

**18.3** If sections supplied in cold formed condition without any heat treatment are subjected to stress relieving, annealing, brazing, welding or similar heating, the mechanical properties may be reduced at the heated parts as follows :

Grade	Tensile Strength, Min, MPa	Yield Stress, Min, MPa
YSt 210	230	140
YSt 240	310	170
YSt 310	350	240

Ref :IS 4923:1997

To ensure the design strength of the joints in the tubular structures post fabrication, it is important that yield strength of parent Hot Rolled Coils (HRC) should conform to same specifications of finished hollow sections. Tata Structura ensures that all sections supplied conform to these conditions.



Dakshineswar Skywalk , Kolkata



Biswa Bangla Gate, Kolkata



# Circular Hollow Sections

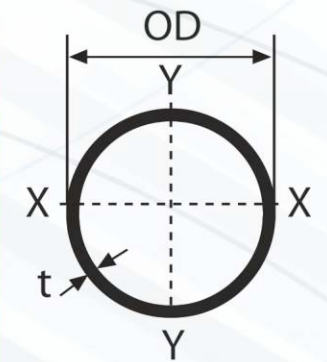
## Section Properties

Nominal Bore (NB)	Outside Diameter (OD)	Thickness (t)	Weight	Area of Cross Section	Moment of Inertia	Section Modulus	Radius of Gyration	Outer Surface Area/M	Nominal Length per tonne
mm	mm	mm	kg/m	cm <sup>2</sup>	cm <sup>4</sup>	cm <sup>3</sup>	cm	cm <sup>2</sup> / m	m
25	33.7	2.6	1.99	2.54	3.09	1.84	1.10	1059	501.3
		3.2	2.41	3.07	3.61	2.14	1.08		415.3
		4.0	2.93	3.73	4.19	2.49	1.06		341.2
32	42.4	2.6	2.55	3.25	6.47	3.05	1.41	1332	391.7
		3.2	3.09	3.94	7.62	3.60	1.39		323.1
		4.0	3.79	4.83	8.99	4.24	1.36		263.9
40	48.3	2.6	2.93	3.73	3.09	1.84	0.91	1517	341.1
		3.2	3.56	4.54	3.61	2.14	0.89		280.9
		4.0	4.37	5.57	4.19	2.49	0.87		228.7
50	60.3	2.6	3.70	4.71	19.66	6.52	2.04	1894	270.2
		3.2	4.51	5.74	23.48	7.79	2.02		221.8
		4.0	5.56	7.08	28.18	9.35	2.00		180.0
65	76.1	4.8	6.57	8.37	32.48	10.77	1.97	2391	152.1
		3.2	5.76	7.33	48.80	12.82	2.58		173.8
		4.0	7.12	9.06	59.08	15.53	2.55		140.5
80	88.9	4.8	8.44	10.76	68.66	18.04	2.53	2793	118.4
		3.2	6.77	8.62	79.24	17.83	3.03		147.8
		4.0	8.38	10.67	96.38	21.68	3.00		119.4
100	114.3	6.0	12.27	15.63	135.00	30.37	2.94	3591	81.5
		8.0	15.97	20.34	168.03	37.80	2.87		62.6
		10.0	19.47	24.80	196.06	44.11	2.81		51.4
115	127	3.2	8.77	11.17	172.54	30.19	3.93	3990	114.0
		4.0	10.89	13.87	211.15	36.95	3.90		91.9
		6.0	16.03	20.42	300.33	52.55	3.83		62.4
125	139.7	8.0	20.98	26.73	379.64	66.43	3.77	4389	47.7
		10.0	25.73	32.78	449.84	78.71	3.70		38.9
		3.2	9.77	12.45	238.69	37.59	4.38		102.3
150	165.1	4.0	12.14	15.46	292.73	46.10	4.35	5187	82.4
		6.0	17.91	22.82	418.61	65.92	4.28		55.8
		8.0	23.49	29.92	532.02	83.78	4.22		42.6
150	168.3	10.0	28.87	36.77	633.80	99.81	4.15	5287	34.6
		3.2	10.78	13.73	319.91	45.80	4.83		92.8
		4.0	13.39	17.06	393.02	56.27	4.80		74.7
175	197.3	6.0	19.79	25.21	564.49	80.81	4.73	6198	50.5
		10.0	32.00	40.76	862.24	123.44	4.60		31.3
		12.0	37.81	48.16	990.39	141.79	4.53		26.5
175	197.3	4.8	18.98	24.18	777.44	94.18	5.67	6198	52.7
		5.4	21.28	27.10	865.05	104.79	5.65		47.0
		6.0	23.55	30.00	950.63	115.16	5.63		42.5
300	323.9	3.2	13.03	16.60	565.96	67.26	5.84	10176	76.7
		4.0	16.21	20.65	697.37	82.87	5.81		61.7
		4.8	19.36	24.67	824.90	98.03	5.78		51.6
300	323.9	6.0	24.03	30.61	1009.10	119.92	5.74	10176	41.6
		10.0	39.05	49.75	1564.61	185.93	5.61		25.6
		12.0	46.27	58.95	1810.69	215.17	5.54		21.6
350	355.6	3.6	17.20	21.92	1028.20	104.23	6.85	11172	58.1
		4.8	22.80	29.04	1345.98	136.44	6.81		43.9
		8.0	37.36	47.60	2135.76	216.50	6.70		26.8
350	355.6	10.0	46.21	58.87	2588.71	262.41	6.63	11172	21.6
		4.0	31.57	40.22	5145.24	317.71	11.31		31.7
		6.0	47.06	59.95	7575.52	467.77	11.24		21.3
400	406.4	8.0	62.35	79.43	9914.07	612.17	11.17	12767	16.0
		10.0	77.44	98.65	12163.24	751.05	11.10		12.9
		12.0	92.34	117.63	14325.32	884.55	11.04		10.8
450	457.2	4.8	41.54	52.92	8142.09	457.94	12.40	14363	24.1
		6.0	51.75	65.92	10074.61	566.63	12.36		19.3
		8.0	68.61	87.40	13206.69	742.78	12.29		14.6
450	457.2	10.0	85.26	108.62	16230.03	912.83	12.22	14363	11.7
		12.0	101.73	129.59	19147.18	1076.89	12.16		9.8
		4.8	47.56	60.58	12215.72	601.17	14.20		21.0
500	508	8.0	78.63	100.17	19881.89	978.44	14.09	15959	12.7
		10.0	97.80	124.58	24485.66	1205.00	14.02		10.2
		12.0	116.76	148.75	28948.66	1424.64	13.95		8.6
500	508	16.0	154.11	196.32	37463.89	1843.70	13.81	15959	6.5
		5.4	60.19	76.68	19567.22	855.96	15.97		16.6
		6.0	66.79	85.08	21655.59	947.31	15.95		15.0
500	508	8.0	88.66	112.94	28495.85	1246.54	15.88	15959	11.3
		12.0	131.80	167.90	41629.08	1821.04	15.75		7.6
		16.0	174.16	221.86	54054.51	2364.59	15.61		5.7
500	508	6.0	74.31	94.66	29823.53	1174.15	17.75	15959	13.5
		8.0	98.69	125.71	39295.77	1547.08	17.68		10.1
		12.0	146.84	187.06	57559.24	2266.11	17.54		6.8
500	508	16.0	194.21	247.41	74939.19	2950.36	17.40	15959	5.1

Nominal Bore (NB)	Outside Diameter (OD)	Thickness (t)	Weight	Area of Cross Section	Moment of Inertia	Section Modulus	Radius of Gyration	Outer Surface Area/M	Nominal Length per tonne
mm	mm	mm	kg/m	cm <sup>2</sup>	cm <sup>4</sup>	cm <sup>3</sup>	cm	cm <sup>2</sup> / m	m
550	558.8	6.0	81.83	104.24	39823.66	1425.33	19.55	17555	12.2
		8.0	108.71	138.49	52528.87	1880.06	19.48		9.2
		12.0	161.88	206.22	77109.97	2759.84	19.34		6.2
		16.0	214.27	272.95	100612.4	3601.02	19.20		4.7
600	609.6	6.0	89.35	113.82	51841.4	1700.83	21.34	19151	11.2
		8.0	118.74	151.26	68442.4	2245.48	21.27		8.4
		10.0	147.93	188.45	84711.1	2779.24	21.20		6.8
		12.0	176.92	225.38	100652.1	3302.23	21.13		5.7
		16.0	234.32	298.50	131568.4	4316.55	20.99		4.3
		18.0	262.72	334.68	146552.6	4808.16	20.93		3.8
600	609.6	20.0	290.93	370.61	161226.5	5289.58	20.86	19151	3.4

## Product Range

SECTION SIZE		Wall Thickness mm = t													
Tube Dimension (mm)	NB	OD	2.6	3.2	3.6	4.0	4.8	5.4	6.0	8.0	10.0	12.0	16.0	18.0	20.0
25	33.7	33.7	■	■		■									
32	42.4	42.4	■	■		■									
40	48.3	48.3	■	■		■									
50	60.3	60.3	■	■		■	■								
65	76.1	76.1		■		■	■								
80	88.9	88.9		■		■	■	■							
100	114.3	114.3		■		■	■	■	■						
115	127	127		■		■	■	■	■	■					
125	139.7	139.7		■		■	■	■	■	■	■				
150	165.1	165.1		■		■	■	■	■	■	■	■			
150	168.3	168.3		■		■	■	■	■	■	■	■	■		
175	197.3	197.3		■		■	■	■	■	■	■	■	■	■	
200	219.1	219.1		■		■	■	■	■	■	■	■	■	■	■
250	273.1	273.1		■		■	■	■	■	■	■	■	■	■	■
300	323.9	323.9		■		■	■	■	■	■	■	■	■	■	■
350	355.6	355.6		■		■	■	■	■	■	■	■	■	■	■
400	406.4	406.4		■		■	■	■	■	■	■	■	■	■	■
450	457.2	457.2		■		■	■	■	■	■	■	■	■	■	■
500	508	508		■		■	■	■	■	■	■	■	■	■	■
550	558.8	558.8		■		■	■	■	■	■	■	■	■	■	■
600	609.6	609.6		■		■	■	■	■	■	■	■	■	■	■



Specification:  
**IS: 1161**

- Presently rolled sections
- Sections Under development

Note: For Intermediate thicknesses, Please contact before incorporating into designs



# Square Hollow Sections

## Section Properties

SHS B x B mm	B		t	Sec Area cm <sup>2</sup>	Weight kg/m	Moment of Inertia		Radius of Gyration		Elastic Modulus		Torsional Constants		Outer Surface Area Sqm	Nominal Length per tonne m
	mm	mm				Ixx cm <sup>4</sup>	Iyy cm <sup>4</sup>	Rxx cm	Ryy cm	Zxx cm <sup>3</sup>	Zyy cm <sup>3</sup>	J cm <sup>4</sup>	B cm <sup>3</sup>		
25x25	25	25	2.0	1.74	1.36	1.48	1.48	0.92	0.92	1.19	1.19	2.53	1.80	0.090	733.32
	25	25	2.6	2.16	1.69	1.72	1.72	0.89	0.89	1.38	1.38	3.04	2.12	0.087	590.92
	25	25	3.2	2.53	1.98	1.89	1.89	0.86	0.86	1.51	1.51	3.45	2.34	0.084	504.09
32x32	32	32	2.0	2.30	1.80	3.36	3.36	1.21	1.21	2.10	2.10	5.58	3.18	0.118	554.55
	32	32	2.6	2.88	2.26	4.02	4.02	1.18	1.18	2.51	2.51	6.86	3.82	0.115	441.74
32x32	32	32	3.2	3.42	2.69	4.54	4.54	1.15	1.15	2.84	2.84	7.96	4.34	0.112	372.15
	38	38	2.6	3.51	2.75	7.14	7.14	1.43	1.43	3.76	3.76	11.93	5.69	0.139	363.16
38x38	38	38	3.2	4.19	3.29	8.18	8.18	1.40	1.40	4.30	4.30	14.01	6.55	0.136	303.95
	38	38	4.0	5.03	3.95	9.26	9.26	1.36	1.36	4.87	4.87	16.38	7.48	0.131	253.33
40x40	40	40	2.6	3.72	2.92	8.45	8.45	1.51	1.51	4.22	4.22	14.06	6.39	0.147	342.83
	40	40	3.2	4.45	3.49	9.72	9.72	1.48	1.48	4.86	4.86	16.55	7.39	0.144	286.45
	40	40	4.0	5.35	4.20	11.07	11.07	1.44	1.44	5.54	5.54	19.44	8.48	0.139	238.17
50x50	50	50	2.6	4.76	3.73	17.47	17.47	1.92	1.92	6.99	6.99	28.48	10.54	0.187	267.86
	50	50	3.2	5.73	4.50	20.40	20.40	1.89	1.89	8.16	8.16	33.89	12.34	0.184	222.43
	50	50	4.0	6.95	5.45	23.74	23.74	1.85	1.85	9.49	9.49	40.42	14.43	0.179	183.33
60x60	60	60	2.6	5.80	4.55	31.33	31.33	2.33	2.33	10.44	10.44	50.38	15.72	0.227	219.80
	60	60	3.2	7.01	5.50	36.94	36.94	2.30	2.30	12.31	12.31	60.34	18.57	0.224	181.80
	60	60	4.8	10.01	7.85	49.22	49.22	2.22	2.22	16.41	16.41	83.81	24.94	0.215	127.31
70x70	70	70	3.2	8.29	6.51	60.62	60.62	2.70	2.70	17.32	17.32	97.83	26.08	0.264	153.72
	70	70	4.8	11.93	9.36	82.29	82.29	2.63	2.63	23.51	23.51	137.66	35.61	0.255	106.82
	70	70	6.0	14.43	11.33	95.17	95.17	2.57	2.57	27.19	27.19	163.48	41.41	0.249	88.25
72x72	72	72	3.2	8.54	6.71	66.32	66.32	2.79	2.79	18.42	18.42	106.82	27.74	0.272	149.11
	72	72	4.0	10.47	8.22	79.03	79.03	2.75	2.75	21.95	21.95	129.54	33.13	0.267	121.69
	72	72	6.0	14.91	11.71	104.71	104.71	2.65	2.65	29.08	29.08	179.20	44.26	0.257	85.41
80x80	80	80	3.2	9.57	7.51	92.71	92.71	3.11	3.11	23.18	23.18	148.28	34.87	0.304	133.15
	80	80	4.8	13.85	10.87	127.58	127.58	3.04	3.04	31.89	31.89	210.59	48.19	0.295	92.00
	80	80	6.0	16.83	13.21	149.18	149.18	2.98	2.98	37.29	37.29	252.06	56.59	0.289	75.67
91.5x 91.5	91.5	91.5	3.2	11.04	8.67	141.69	141.69	3.58	3.58	30.97	30.97	224.80	46.55	0.350	115.40
	91.5	91.5	4.8	16.05	12.60	197.27	197.27	3.51	3.51	43.12	43.12	321.78	65.03	0.341	79.35
	91.5	91.5	6.0	19.59	15.38	232.81	232.81	3.45	3.45	50.89	50.89	387.66	77.00	0.335	65.01
100x100	100	100	3.2	12.13	9.52	187.28	187.28	3.93	3.93	37.46	37.46	295.72	56.28	0.384	105.04
	100	100	5.0	18.36	14.41	271.10	271.10	3.84	3.84	54.22	54.22	440.50	81.72	0.374	69.39
	100	100	6.0	21.63	16.98	311.47	311.47	3.79	3.79	62.29	62.29	514.14	94.12	0.369	58.88
110x110	110	110	3.2	13.41	10.52	252.31	252.31	4.34	4.34	45.87	45.87	396.56	68.90	0.424	95.02
	110	110	6.0	24.03	18.87	424.57	424.57	4.20	4.20	77.19	77.19	694.83	116.47	0.409	53.00
	110	110	10.0	37.43	29.38	600.90	600.90	4.01	4.01	109.25	109.25	1040.35	166.71	0.388	34.04
110x110	110	110	12.0	43.34	34.02	661.57	661.57	3.91	3.91	120.28	120.28	1176.86	184.90	0.378	29.39
	113.5	113.5	3.6	15.49	12.16	308.42	308.42	4.46	4.46	54.35	54.35	486.78	81.65	0.435	82.23
	113.5	113.5	4.8	20.28	15.92	393.30	393.30	4.40	4.40	69.30	69.30	631.30	104.30	0.429	62.82
113.5x 113.5	113.5	113.5	6.0	24.87	19.53	469.81	469.81	4.35	4.35	82.79	82.79	766.84	124.86	0.423	51.21
	130	130	3.6	17.87	14.03	471.27	471.27	5.14	5.14	72.50	72.50	739.03	108.88	0.501	71.29
	130	130	6.0	28.83	22.63	726.64	726.64	5.02	5.02	111.79	111.79	1173.52	168.36	0.489	44.18
130x130	130	130	10.0	45.43	35.66	1057.63	1057.63	4.83	4.83	162.71	162.71	1792.38	247.06	0.468	28.04
	130	130	12.0	52.94	41.56	1182.51	1182.51	4.73	4.73	181.93	181.93	2051.65	277.75	0.458	24.06
	132	132	3.2	16.22	12.74	444.84	444.84	5.24	5.24	67.40	67.40	693.75	101.18	0.512	78.52
132x132	132	132	4.8	23.83	18.71	634.39	634.39	5.16	5.16	96.12	96.12	1008.71	144.51	0.503	53.46
	132	132	6.0	29.31	23.01	762.98	762.98	5.10	5.10	115.60	115.60	1230.84	174.08	0.497	43.46
	140	140	3.6	19.31	15.16	593.44	593.44	5.54	5.54	84.78	84.78	927.68	127.28	0.541	65.98
140x140	140	140	6.0	31.23	24.52	920.43	920.43	5.43	5.43	131.49	131.49	1478.72	197.90	0.529	40.78
	140	140	10.0	49.43	38.80	1354.07	1354.07	5.23	5.23	193.44	193.44	2275.32	293.21	0.508	25.77
	140	140	12.0	57.74	45.32	1522.77	1522.77	5.14	5.14	217.54	217.54	2615.68	331.31	0.498	22.06
150x150	150	150	4.0	22.95	18.01	807.82	807.82	5.93	5.93	107.71	107.71	1264.73	161.73	0.579	55.51
	150	150	6.0	33.63	26.40	1145.91	1145.91	5.84	5.84	152.79	152.79	1832.63	229.84	0.569	37.87
	150	150	10.0	53.43	41.94	1701.21	1701.21	5.64	5.64	226.83	226.83	2837.55	343.33	0.548	23.84
	150	150	12.0	62.54	49.09	1922.61	1922.61	5.54	5.54	256.35	256.35	3273.72	389.64	0.538	20.37
175x175	175	175	4.0	26.95	21.15	1303.12	1303.12	6.95	6.95	148.93	148.93	2027.77	223.54	0.679	47.27
	175	175	6.0	39.63	31.11	1864.03	1864.03	6.86	6.86	213.03	213.03	2954.09	320.18	0.669	32.14
	175	175	10.0	63.43	49.79	2817.20	2817.20	6.66	6.66	321.97	321.97	4629.39	486.09	0.648	20.08
	175	175	12.0	74.54	58.51	3214.39	3214.39	6.57	6.57	367.36	367.36	5377.40	556.35	0.638	17.09
180x180	180	180	4.0	27.75	21.78	1421.74	1421.74	7.16	7.16	157.97	157.97	2210.12	237.10	0.699	45.91
	180	180	6.0	40.83	32.05	2036.52	2036.52	7.06	7.06	226.28	226.28	3222.56	340.05	0.689	31.20
	180	180	8.0	53.39	41.91	2590.73	2590.73	6.97	6.97	287.86	287.86	4172.68	433.39	0.679	23.86
	180	180	10.0	65.43	51.36	3086.93	3086.93	6.87	6.87	342.99	342.99	5059.98	517.64	0.668	19.47
200x200	200	200	4.0	30.95	24.29	1968.13	1968.13	7.97	7.97	196.81	196.81	3048.60	295.34	0.779	41.16
	200	200	8.0	59.79	46.94	3621.63	3621.63	7.78	7.78	362.16	362.16	5792.01	544.81	0.759	21.30
	200	200	10.0	73.43	57.64	4337.63	4337.63	7.69	7.69	433.76	433.76	7048.03	653.80	0.748	17.35
	200	200	12.0	86.54	67.93	4983.59	4983.59	7.59	7.59	498.36	498.36	8226.18	752.95	0.738	14.72

SHS B x B mm	B		t	Sec Area cm <sup>2</sup>	Weight kg/m	Moment of Inertia		Radius of Gyration		Elastic Modulus		Torsional Constants		Outer Surface Area Sqm	Nominal Length per tonne m
	mm	mm				Ixx cm <sup>4</sup>	Iyy cm <sup>4</sup>	Rxx cm	Ryy cm	Zxx cm <sup>3</sup>	Zyy cm <sup>3</sup>	J cm <sup>4</sup>	B cm <sup>3</sup>		
220x220	220	220	4.0	34.15	26.81	2639.14	2639.14	8.79	8.79	239.92	239.92	4076.07	359.99	0.859	37.30
	220	220	8.0	66.19	51.96	4894.99	4894.99	8.60	8.60	445.00	445.00	7783.28	669.03	0.839	19.24
	220	220	10.0	81.43	63.92	5887.19	5887.19	8.50	8.50	535.20	535.20	9497.22	805.93	0.828	15.64
	220	220	12.0	96.14	75.47	6793.08	6793.08	8.41	8.41	617.55	617.55	11117.25	931.78	0.818	13.25
250x250	250	250	4.8	46.49	36.49	4627.94	4627.94	9.98	9.98	370.24	370.24	7159.41	555.55	0.975	27.40
	250	250	8.0	75.79	59.50	7315.65	7315.65	9.82	9.82	585.25	585.25	11551.56	879.34	0.959	16.81
	250	250	10.0	93.43	73.34	8841.86	8841.86	9.73	9.73	707.35	707.35	14140.66	1064.09	0.948	13.63
	250	250	12.0	110.54	86.77	10254.21	10254.21	9.63	9.63	820.34	820.34	16608.97	1235.94	0.938	11.52
300x300	300														



# Rectangular Hollow Sections

## Section Properties

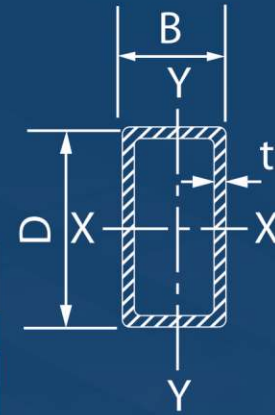
RHS D x B mm	D	B	t	Sec Area	Weight	Moment of Inertia		Radius of Gyration		Ealstic Modulus		Torsional Constants		Outer Surface Area	Nominal Length per tonne
	mm	mm	mm	cm <sup>2</sup>	kg/m	Ixx cm <sup>4</sup>	Iyy cm <sup>4</sup>	Rxx cm	Ryy cm	Zxx cm <sup>3</sup>	Zyy cm <sup>3</sup>	J cm <sup>4</sup>	B cm <sup>3</sup>	Sqm	m
50x25	50	25	2.0	2.74	2.15	2.81	8.38	1.01	1.75	2.25	3.35	7.06	3.92	0.140	465.41
	50	25	2.6	3.46	2.71	3.36	10.16	0.99	1.71	2.69	4.06	8.68	4.72	0.137	368.63
	50	25	3.2	4.13	3.24	3.80	11.63	0.96	1.68	3.04	4.65	10.08	5.38	0.134	308.66
60x40	60	40	2.6	4.76	3.73	12.09	22.76	1.59	2.19	6.05	7.59	25.99	10.02	0.187	267.86
	60	40	2.9	5.25	4.12	13.11	24.74	1.58	2.17	6.56	8.25	28.48	10.90	0.185	242.77
	60	40	3.6	6.35	4.98	15.23	28.90	1.55	2.13	7.62	9.63	33.86	12.73	0.181	200.66
66x33	66	33	2.6	4.70	3.69	8.43	25.15	1.34	2.31	5.11	7.62	21.17	8.91	0.185	270.82
	66	33	3.6	6.28	4.93	10.52	31.87	1.29	2.25	6.37	9.66	27.32	11.21	0.179	202.97
	66	33	4.8	7.99	6.27	12.31	37.98	1.24	2.18	7.46	11.51	33.22	13.29	0.173	159.44
80x40	80	40	2.9	6.41	5.03	17.11	50.87	1.63	2.82	8.56	12.72	42.65	14.89	0.225	198.82
	80	40	3.6	7.79	6.11	20.02	60.05	1.60	2.78	10.01	15.01	50.89	17.50	0.221	163.56
	80	40	4.8	10.01	7.85	24.03	73.22	1.55	2.71	12.02	18.30	63.16	21.21	0.215	127.31
80x60	80	60	3.2	8.29	6.51	47.28	73.83	2.39	2.98	15.76	18.46	93.49	25.45	0.264	153.72
	80	60	4.0	10.15	7.97	56.12	87.92	2.35	2.94	18.71	21.98	113.12	30.32	0.259	125.52
	80	60	5.4	13.20	10.36	69.03	108.74	2.29	2.87	23.01	27.19	143.82	37.59	0.252	96.48
	80	60	8.0	18.19	14.28	85.28	135.55	2.17	2.73	28.43	33.89	188.32	47.27	0.239	70.02
90x50	90	50	3.2	8.29	6.51	34.44	86.27	2.04	3.23	13.78	19.17	81.05	23.55	0.264	153.72
	90	50	4.0	10.15	7.97	40.71	102.71	2.00	3.18	16.28	22.82	97.70	27.96	0.259	125.52
	90	50	6.0	14.43	11.33	52.83	135.66	1.91	3.07	21.13	30.15	132.94	36.77	0.249	88.25
90x70	90	70	3.2	9.57	7.51	74.91	110.39	2.80	3.40	21.40	24.53	143.28	34.23	0.304	133.15
	90	70	4.0	11.75	9.22	89.57	132.32	2.76	3.36	25.59	29.40	174.22	41.05	0.299	108.43
	90	70	6.0	16.83	13.21	119.82	178.07	2.67	3.25	34.23	39.57	242.90	55.42	0.289	75.67
96x48	96	48	3.2	8.54	6.71	33.28	98.61	1.97	3.40	13.87	20.54	82.38	24.09	0.272	149.11
	96	48	4.0	10.47	8.22	39.32	117.54	1.94	3.35	16.38	24.49	99.22	28.59	0.267	121.69
	96	48	6.0	14.91	11.71	51.00	155.75	1.85	3.23	21.25	32.45	134.73	37.57	0.257	85.41
	96	48	8.0	18.83	14.78	58.38	181.83	1.76	3.11	24.33	37.88	160.83	43.64	0.247	67.64
100x40	100	40	3.2	8.29	6.51	22.76	97.29	1.66	3.43	11.38	19.46	62.31	20.39	0.264	153.72
	100	40	4.0	10.15	7.97	26.69	115.70	1.62	3.38	13.35	23.14	74.52	24.04	0.259	125.52
	100	40	6.0	14.43	11.33	33.96	152.21	1.53	3.25	16.98	30.44	99.25	31.02	0.249	88.25
	100	40	8.0	18.19	14.28	38.11	176.13	1.45	3.11	19.06	35.23	115.82	35.31	0.239	70.02
100x60	100	60	3.2	9.57	7.51	57.61	127.29	2.45	3.65	19.20	25.46	128.83	32.33	0.304	133.15
	100	60	4.0	11.75	9.22	68.68	152.58	2.42	3.60	22.89	30.52	156.26	38.68	0.299	108.43
	100	60	6.0	16.83	13.21	91.20	205.30	2.33	3.49	30.40	41.06	216.43	51.92	0.289	75.67
	100	60	8.0	21.39	16.79	107.08	244.01	2.24	3.38	35.69	48.80	264.47	61.71	0.279	59.54
100x80	100	80	3.2	10.85	8.51	111.60	157.28	3.21	3.81	27.90	31.46	207.96	44.30	0.344	117.44
	100	80	4.0	13.35	10.48	134.17	189.47	3.17	3.77	33.54	37.89	253.78	53.38	0.339	95.43
	100	80	6.0	19.23	15.10	182.10	258.39	3.08	3.67	45.53	51.68	357.36	72.98	0.329	66.23
	100	80	10.0	29.43	23.10	245.48	351.27	2.89	3.45	61.37	70.25	516.76	100.33	0.308	43.29
110x50	110	50	3.2	9.57	7.51	41.46	142.78	2.08	3.86	16.58	25.96	106.44	29.16	0.304	133.15
	110	50	4.0	11.75	9.22	49.19	171.04	2.05	3.82	19.68	31.10	128.51	34.74	0.299	108.43
	110	50	6.0	16.83	13.21	64.52	229.66	1.96	3.69	25.81	41.76	175.74	46.10	0.289	75.67
110x70	110	70	3.2	10.85	8.51	89.20	179.29	2.87	4.07	25.49	32.60	191.50	42.39	0.344	117.44
	110	70	4.0	13.35	10.48	107.01	216.01	2.83	4.02	30.57	39.27	233.31	51.00	0.339	95.43
	110	70	6.0	19.23	15.10	144.47	294.63	2.74	3.91	41.28	53.57	327.10	69.46	0.329	66.23
110x90	110	70	10.0	29.43	23.10	192.65	400.23	2.56	3.69	55.04	72.77	468.18	94.65	0.308	43.29
	110	90	3.2	12.13	9.52	158.63	215.80	3.62	4.22	35.25	39.24	289.44	55.64	0.384	105.04
	110	90	4.0	14.95	11.73	191.53	260.97	3.58	4.18	42.56	47.45	354.18	67.31	0.379	85.22
	110	90	6.0	21.63	16.98	262.89	359.60	3.49	4.08	58.42	65.38	502.53	92.94	0.369	58.88
122x61	122	61	2.6	9.07	7.12	60.09	175.75	2.57	4.40	19.70	28.81	144.59	34.03	0.353	140.42
	122	61	3.6	12.32	9.12	78.83	232.61	2.53	4.34	25.84	38.13	193.39	44.81	0.347	103.36
	122	61	4.8	16.05	12.60	98.38	293.39	2.48	4.27	32.26	48.10	246.94	56.22	0.341	79.35
	122	61	6.0	19.59	15.38	114.95	346.36	2.42	4.20	37.69	56.78	295.02	66.08	0.335	65.01
130x50	130	50	3.2	10.85	8.51	48.48	218.43	2.11	4.49	19.39	33.60	132.46	34.77	0.344	117.44
	130	50	4.8	15.77	12.38	65.82	303.45	2.04	4.39	26.33	46.69	185.48	47.57	0.335	80.80
	130	50	6.0	19.23	15.10	76.21	357.33	1.99	4.31	30.48	54.97	219.53	55.43	0.329	66.23
130x70	130	50	10.0	29.43	23.10	97.14	480.30	1.82	4.04	38.85	73.89	298.32	72.21	0.308	43.29
	130	70	3.2	12.13	9.52	103.49	269.89	2.92	4.72	29.57	41.52	241.61	50.55	0.384	105.04
	130	70	4.8	17.69	13.88	143.61	378.73	2.85	4.63	41.03	58.27	344.82	70.56	0.375	72.03
	130	70	6.0	21.63	16.98	169.12	449.66	2.80	4.56	48.32	69.18	414.50	83.51	0.369	58.88
130x90	130	70	10.0	33.43	26.24	228.99	624.63	2.62	4.32	65.42	96.10	598.66	115.30	0.348	38.11
	130	90	3.2	13.41	10.52	182.75	321.35	3.69	4.90	40.61	49.44	369.22	66.35	0.424	95.02
	130	90	6.0	24.03	18.87	305.29	541.99	3.56	4.75	67.84	83.38	644.28	111.74	0.409	53.00
	130	90	10.0	37.43	29.38	427.69	768.97	3.38	4.53	95.04	118.30	958.22	158.99	0.388	34.04
140x60	140	60	2.6	9.96	7.82	65.62	245.00	2.57	4.96	21.87	35.00	168.60	38.56	0.387	127.95
	140	60	4.0	14.95	11.73	93.81	355.59	2.51	4.88	31.27	50.80	247.12	55.42	0.379	85.22
	140	60	6.0	21.63	16.98	126.34	489.19	2.42	4.76	42.11	69.88	344.45	75.29	0.369	58.88
140x80	140	60	10.0	33.43	26.24	167.87	676.73	2.24	4.50	55.96	96.68	487.14	102.05	0.348	38.11
	140	80	3.2	13.41	10.52	149.37	354.07	3.34	5.14	37.34	50.58	336.42	63.17	0.424	95.02
	140	80	4.8	19.61	15.39	209.12	500.18	3.27	5.05	52.28	71.45	483.16	88.87	0.415	64.97
	140	80	6.0	24.03	18.87	247.96	597.00	3.21	4.98	61.99	85.29	583.78	105.83	0.409	53.00
145x82	140	80	10.0	37.43	29.38	344.15	846.07	3.03	4.75	86.04	120.87	860.35	149.38	0.388	34.04
	140	80	12.0	43.34	34.02	375.23	931.22	2.94	4.64	93.81	133.03	964.50	164.41	0.378	29.39
	145	82	2.6	11.36	8.92	135.65	325.56	3.46	5.35	33.09	44.90	303.85	55.96	0.441	112.14
	145	82	3.6	15.49	12.16	180.23	434.96	3.41	5.30	43.96	59.99	410.04	74.55	0.435	82.23
150x50	145	82	6.0	24.87	19.53	271.37	663.66	3.30	5.17	66.19	91.54	640.57	113.12	0.423	51.21
	150	50	3.2	12.13	9.52	55.50	315.76	2.14	5.10	22.20	42.10	158.92	40.38	0.384	105.04
	150	50	8.0	27.79	21.82	103.36	635.59	1.93	4.78	41.34	84.75	320.12	76.91	0.359	45.83
150x70	150	50	10.0	33.43	26.24	113.47	719.55	1.84	4.64	45.39	95.94	360.99	85.24	0.348	38.11
	150	70	3.2	13.41	10.52	117.78	384.74	2.96	5.36	33.65	51.30	293.06	58.71	0.424	95.02
	150	70	4.8												



# Rectangular Hollow Sections

## Product Range

Specification:  
**IS : 4923**



SECTION SIZE		Wall Thickness mm = t														
Tube Dimension (mm)		2.0	2.6	2.9	3.2	3.6	4.0	4.8	5.4	6.0	8.0	10.0	12.0	16.0	18.0	20.0
D	B															
50	25	■	■		■											
60	40		■	■		■										
66	33		■			■		■								
80	40			■		■		■								
80	60				■		■		■							
90	50				■		■			■						
90	70				■		■			■						
96	48				■		■			■						
100	40				■		■			■						
100	60				■		■			■						
100	80				■		■			■						
110	50				■		■			■						
110	70				■		■			■						
110	90				■		■			■						
122	61		■			■		■								
130	50				■		■			■						
130	70				■		■			■						
130	90				■		■			■						
140	60		■			■		■								
140	80				■		■			■						
145	82		■			■		■								
150	50				■		■			■						
150	70				■		■			■						
150	110				■		■			■						
150	130				■		■			■						
172	92		■			■		■								
200	100				■		■			■						
200	150				■		■			■						
240	120					■		■								
250	150				■		■			■						
300	150					■		■								
300	200						■			■						
400	200							■						■		
500	200								■					■		
500	300									■				■		
600	200										■			■		
600	300											■		■		

- Presently rolled sections
- Sections Under development

Note: For Intermediate thicknesses, Please contact before incorporating into designs

# Tata Structura 355

## General Technical Specifications and Tolerances

### Other Allowable stress values (Mpa)

Steel Grade	Min Yst	Min UTS	Axial Stress in tension	Bending Stress in tension/ Compression	Shear	Equivalent Shear
Yst-355	355	490	213	234	160	319

### Permissible Axial Compressive Stress (Mpa) for Yst 355 Grade

l/r	10	20	30	40	50	60	70	80	90	100	110	120	130
Ac	212	209	202	190	174	157	138	120	105	92	80	70	61
l/r	140	150	160	170	180	190	200	210	220	230	240	250	
Ac	54	48	43	38	35	31	28	26	24	22	20	19	

Section Type	Grade	Mechanical Properties				Dimensional Tolerance					
		YST MPa	UTS MPa	% of Elongation		Outside dimension	Thickness	Squareness	Corner radius	Weight	
				< 25.4 mm	> 25.4 mm					Individual Lengths	On lot of 10 MT
RHS/SHS IS : 4923	YST 355	355	496	8	10	+/-1% with a minimum of +/-0.50 mm	+/-10%	90 deg. +/-2 deg.	3t max	10% -8%	+/-7.5%
CHS IS : 1161	YST 355	355	490	14	14	OD upto and incl 48.3+0.4/-0.8mm. Over 48.3 mm +/-1.0%	+ no limit -10%	NA	NA	L +10%, -8% M & H +/-10%	L +/-5% M & H +/-7.5%

Galvanized sections can also be manufactured

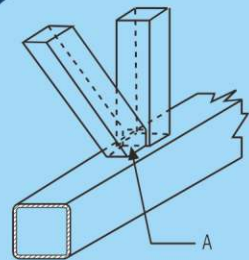
<b>Length</b>	6.0m±0.05m Customized length ranging from 6m to 12m can be supplied.
<b>Straightness</b>	Minimum 1: 200th of any length measured along the centre line (mill straightened condition) unless otherwise specifically arranged.
<b>Twist Tolerance</b>	Maximum 2 mm ± 0.05 mm/m length-measured relative vertical shift of any adjacent corner of the section, measured by keeping one side on flat surface.
<b>End Finish</b>	Plain ended-Mechanically sheared, mill-cut finish without further machining.
<b>Surface Finish / Chemical Properties</b>	Black without any surface treatment of oiling or varnishing.
<b>Raw Material</b>	Sulphur content: 0.04% max, phosphorus content: 0.04% max, carbon equivalent percentage within limits for better weldability.
<b>Weldability</b>	Tata Structura Steel Hollow Sections are weldable with standard M.S. Electrodes without any pre-heating.
<b>Packing</b>	Bundled by sealing metal strap and each bundle is labelled for size, measurement, lot number etc. Approximate weight of each bundle is 1.5 Mt (+/-500 kg).
<b>Identification</b>	Marking of 'TATA STRUCTURA' emblem on surface, punched/stenciled/sticker pasted, on all Steel Hollow Sections. Standard BIS mark is also put on the sections.
<b>Note</b>	Tata Structura Hollow Sections in customized size, grade, length, surface finish and end finish may be delivered as per agreed supply conditions.

\*Conditions apply



# Fabrication and Connection Details

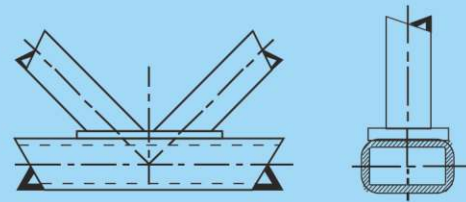
## Jointing : Workshop & Site Practice



### OVERLAP JOINTS

The weld seam 'A' can be omitted without affecting the behaviour of the joint.

## POSSIBLE REINFORCEMENTS



In certain cases reinforced joints are preferred for improved joint rigidity.

### CUTTING

Tata Structura Steel Hollow Sections can be cut:

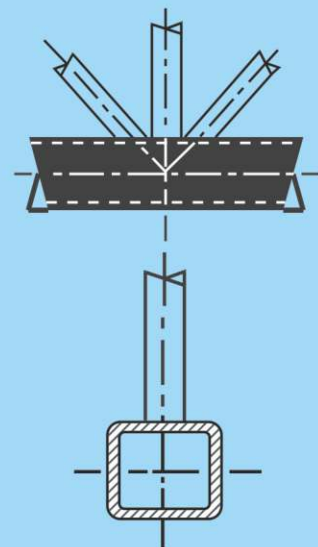
- By means of a heavy duty circular/hand saw
- By flame cutting: either manual or automatic
- The path of the cut can be marked directly on the surface of the section or on a template after shop layout
- For section thicknesses of 5 mm and above, edges may be chamfered for proper welding penetration

### BENDING

- Axial cold bending of Tata Structura Steel Hollow Sections is possible by using an internal mandrel and the roller must be adapted to the shape and size of the section
- Three roll bending machine may be adapted - bend by slow multiple pass, through trial and error method
- Thicker or larger sections are recommended to be preheated in a normalising furnace before bending in hot condition for better formation

## Jointing : Workshop & Site Practice

### GAP JOINTS



This arrangement is often the simplest and most economical and the joints are sufficiently strong. Joining member alignments should be at > 30° with respect to the other.

### WELDING

Technique in principle is similar for that of conventional sections. Follow relevant BIS code of practice and design conditions.

- **Electrodes:** Low hydrogen electrodes are suggested for use.
- **Butt welds:** The throat thickness of the seam:
  - a) Wall thickness of the section when joining members are of equal thickness
  - b) Wall thickness of thinner section, If thicknesses are different. Backing strip may be provided to ensure total root penetration in case of thicker section design size.
- **Fillet welds:** Various types may be provided. Size of the fillet is guided by the throat thickness as explained above.
- **NOTE:** All free ends of Tata Structure Steel Hollow Sections should be sealed properly by welding, to prevent internal corrosion.
- Normal M. S. electrodes of reputed brands are recommended. Moisture from electrode should be removed by baking before welding.
- **Sequence:** Edges are to be tack welded to maintain uniform gap during welding to minimise residual stress:
  - Transverse weld before longitudinal one
  - Fillet weld following butt weld
  - Starting from inside to outwards.

# Mild Steel Electrode for General Purpose Welding

<b>CLASSIFICATION:</b>	AWS A/ SFA 5.1	IS 814	<b>APPROVALS:</b>
	E 6013	ER 4212X	ABS/BV/DNV/IRS/LRA/IBR/BIS/NKK/MND

### KEY FEATURES:

- Rutile Coated
- Suitable for general purpose structural steels
- All position operating characteristics
- X-ray quality weld deposit

**WELDING POSITION:** AC (50 OCVmin.)/DCEN

### TYPICAL APPLICATION:

- Steel Structures
- Tanks
- Truck frames and bodies
- Ships, Pipelines
- Bridges
- Joining ASTM SA 283 Gr.A/B/C/D

### CHEMICAL COMPOSITION OF UNDILUTED WELD METAL, WT%:

	C	Mn	Si	S	P
<b>Typical</b>	0.07	0.5	0.2	0.02	0.02
<b>Specification</b>	0.10 max	0.60 max	0.30 max	0.30 max	0.30 max

### MECHANICAL PROPERTIES OF ALL WELD METAL:

	Condition	UTS, Mpa	YS, Mpa	EL%	CVN Impact at 0°C, J
<b>Typical</b>	As Welded	500	430	25	60
<b>Specification</b>	As Welded	460 - 550	370 - 480	22 - 28	50 min





# Contact Details

## WORKS

Burma Mines, Jamshedpur-831 007  
Tel: 0657 2270561, Fax: 0657 2270304

## MARKETING HEADQUARTERS

Tata Centre, 43, J. L. Nehru Road  
Kolkata-700 071  
Tel: 033 2288-7051/9251/8106  
Fax: 033 2288-6996



## NORTH ZONE

### Zonal Head Office

Tata Steel - Tubes Division  
Marketing & Sales  
Hindustan Times House  
15th Floor, 18-20, Kasturba  
Gandhi Marg  
New Delhi - 110 001  
Tel +91 011 66768792  
Tel +91 011 6128 8700

Tata Steel - Tubes Division  
Marketing & Sales  
Divison, Navroz  
Building, The Mall  
Kanpur - 208001  
Tel +91 0512 231 2870  
/2298/234 8979

Tata Steel - Tubes Division  
Marketing & Sales  
G-Business Park, (6th Floor)  
D-34, Near Agrasen  
Circle, Subhash Marg  
C-Scheme,  
Jaipur - 302 001  
(Shahjahanpur)  
Tel +91 0141 2364 747/  
404 2160/2161

Tata Steel - Tubes Division  
Marketing & Sales  
C-44 to 47, Hero Majestic  
Road, Phase - 2  
Focal point  
Ludhiana- 141010  
Tel +91 0161 267 0504

## EAST ZONE

### Zonal Head Office

Tata Steel - Tubes Division  
Marketing & Sales  
52 Jawaharlal Nehru Road  
Kolkata - 700071  
Tel +91 033 2282 4299  
6550 8020/21/23/24

Tata Steel - Tubes Division  
Marketing & Sales  
Marketing and Sales  
P.O.-Burmamines  
Jamshedpur - 831007  
Tel +91 0657 651 2063

Tata Steel - Tubes Division  
Marketing & Sales  
2-B, Fortune Towers  
Chandrashekharpur  
Bhubaneswar - 751 023  
Tel +91 0674 665 5269

Tata Steel - Tubes Division  
Marketing & Sales  
4th floor, Subham Velocity  
Honuram Boro Path,  
Opp. Wallford, G.S. Road  
Guwahati - 781005  
Tel +91 0361 252 6582

Tata Steel - Tubes Division  
Marketing & Sales  
401, Orchid Mall, 4th Floor  
(Opp. A N College)  
Boring Road, Patna-800001  
Tel +91 0612 257 0094/95/96

## WEST ZONE

### Zonal Head Office

Tata Steel - Tubes Division  
Marketing & Sales  
One Forbes, D1- 3rd Floor  
1 Dr. V.B. Gandhi Marg  
Fort Mumbai - 400 001  
Tel +91 022 67494664  
Tel +91 022 6749 4663

Tata Steel - Tubes Division  
Marketing & Sales  
Premchand House Annex  
Highcourt Way172/2  
Ashram Road  
Ahmedabad - 380 009  
Tel +91 079 6661 2608

Tata Steel - Tubes Division  
Marketing & Sales  
3rd Floor, NRK Business  
Park,B1 Scheme No. 54  
PU-4 A B Road, Vijay Nagar  
Indore - 452010  
Tel +91 0731 645 0691/  
253 8595

Tata Steel - Tubes Division  
Marketing & Sales  
Museum Road, Civil Lines  
Nagpur - 440001  
Tel +91 712 645 7677

## SOUTH ZONE

### Zonal Head Office

Tata Steel - Tubes Division  
Marketing & Sales  
Chettinad Sigapi Achi  
Building,18/3, 8th Floor  
Rukmini Lakshmi Pathy Road  
Egmore, Chennai - 600008  
Tel +91 044 66960016  
Tel +91 044 6696 0008

Tata Steel - Tubes Division  
Marketing & Sales  
Jubilee Building, 2nd floor  
45 Museum Road  
Bangalore-560025  
Tel +91 080 6695 0001

Tata Steel - Tubes Division  
Marketing & Sales  
6B, 6th Floor, Gumidelli  
Towers, Begumpet,  
Hyderabad-500 016



