

# TATA STRUCTURA HIGH STRENGTH STEEL HOLLOW SECTIONS

355



# TATA STEEL TUBES SBU



## 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

# 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.



# 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 6,00,000 tons 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

## Conveyance Tubes

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.

**TATA  
PIPES**  
FLOW OF LIFE

2

## Structural Tubes

High Strength steel hollow sections (Yst 355) under the brand name Tata Structura cater to construction segment and for various aesthetic applications

**TATA  
STRUCTURA**  
STRUCTURAL SECTIONS  
THE SHAPE OF THINGS TO COME

3

## Precision Tubes

Manufactured with utmost precision these tubes cater to the high end-Automotive, Boiler & Eeneral Engineering segments.

**TATA  
PRECISION TUBES**

4

## Pipes for Oil & Gas

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.

**TATA STEEL BSL  
PIPES FOR OIL & GAS**



Chhatrapati Shivaji International Airport, Mumbai

# 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.



Convention Center, Patna

## 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.



CWG Stadium, Delhi

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



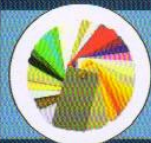
**GLOBAL STANDARDIZED  
GRADE FOR CONSTRUCTION**

Yst 355 grade have widely been used internationally for various iconic and critical projects



**SUSTAINABLE  
CONSTRUCTION**

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



**FULL PRODUCT RANGE**

Along with TSBSL facilities, upto 500mmx500mm, 600NB and 700mm x 300mm sections can be manufactured in a wide thickness range from 2mm to 20mm



**RELIABILITY**

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.

## 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

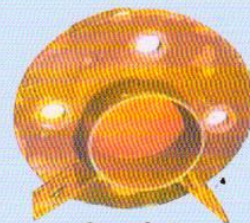
the original mill scale was still visible. A light rust in the centre of the sample developed after the tube was cut open for examination.

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

- 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



## Fabrication & Maintenance:

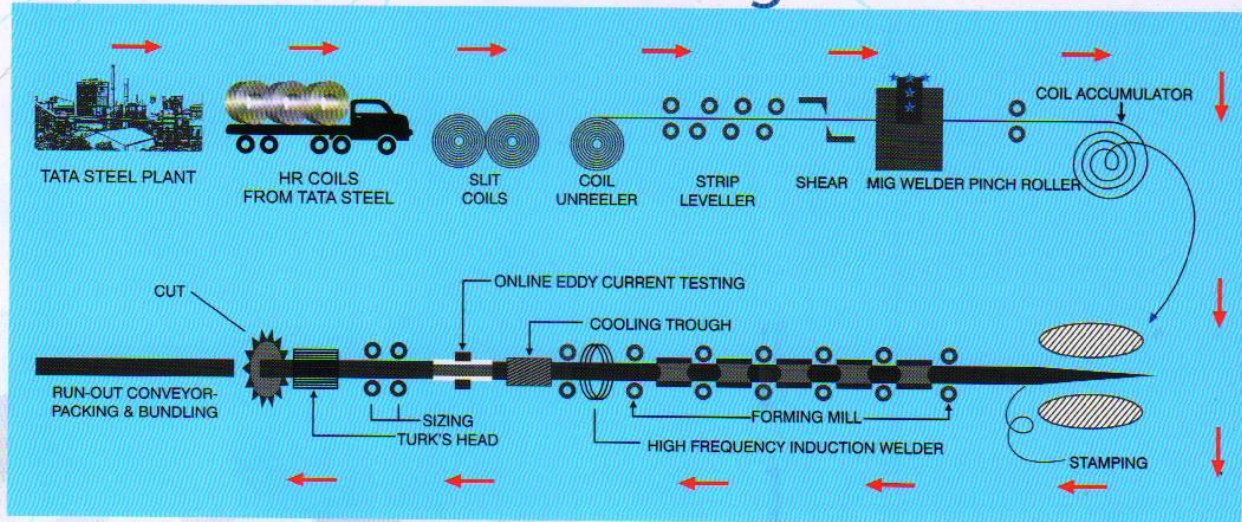
- Material savings due to higher grade (Yst 355) which results in lesser cost for fabrication & erection
- Elimination of gusset plates & direct member to member connections
- Well rounded corners ensure maintaining uniform coating thickness
- No dust accumulation, unlike open sections which has exposed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



Infosys, Pune



# 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

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.

Ref :IS 4923:1997



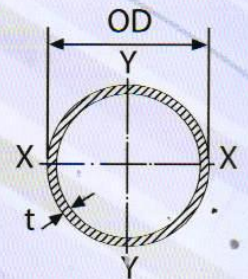
# Circular Hollow Sections – Section Properties

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	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	2.9	3.25	4.14	3.36	1.99	0.90	1517	307.9
		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	2.9	4.11	5.23	21.60	7.16	2.02	1895	243.5
		3.6	5.04	6.42	25.88	8.59	2.01		198.6
		4.5	6.9	7.89	30.91	10.25	1.98		161.4
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
		3.6	6.44	8.20	54.03	14.20	2.57		155.3
80	88.9	4.5	7.95	10.13	65.15	17.12	2.54	2793	125.8
		4.8	8.44	10.76	68.66	18.04	2.53		118.4
		3.2	6.77	8.62	79.24	17.83	3.03		147.8
100	114.3	4.0	8.38	10.67	96.38	21.68	3.00	3591	119.4
		4.8	9.96	12.69	112.53	25.32	2.98		100.4
		5.4	11.12	14.17	124.02	27.90	2.96		89.9
115	127	6.0	12.27	15.63	135.00	30.37	2.94	3990	81.5
		8.0	15.97	20.34	168.03	37.80	2.87		62.6
		3.6	9.83	12.52	192.06	33.61	3.92		101.7
125	139.7	4.5	12.19	15.53	234.41	41.02	3.89	4389	82.0
		4.8	12.97	16.52	248.06	43.40	3.88		77.1
		6.0	16.03	20.42	300.33	52.55	3.83		62.4
150	165.1	8.0	20.98	26.73	379.64	66.43	3.77	5187	47.7
		3.2	9.77	12.45	238.69	37.59	4.38		102.3
		3.6	10.96	13.96	265.98	41.89	4.36		91.2
150	168.3	4.0	12.14	15.46	292.73	46.10	4.35	5287	82.4
		4.8	14.47	18.43	344.63	54.27	4.32		69.1
		5.4	16.20	20.64	382.19	60.19	4.30		61.7
175	197.3	6.0	17.91	22.82	418.61	65.92	4.28	6198	55.8
		8.0	23.49	29.92	532.02	83.78	4.22		42.6
		10.0	28.87	36.77	633.80	99.81	4.15		34.6
200	219.1	4.5	15.01	19.12	437.38	62.62	4.78	6879	66.6
		4.8	15.98	20.35	463.51	66.36	4.77		62.6
		5.4	17.89	22.79	514.70	73.69	4.75		55.9
250	273.1	6.0	19.79	25.21	564.49	80.81	4.73	8575	50.5
		8.0	25.99	33.11	720.58	103.16	4.66		38.5
		10.0	32.00	40.76	862.24	123.44	4.60		31.3
300	323.9	4.5	15.01	19.12	437.38	62.62	4.78	10170	66.6
		4.8	18.98	24.18	777.44	94.18	5.67		52.7
		5.4	21.28	27.10	865.05	104.79	5.65		47.0
150	168.3	6.0	23.55	30.00	950.63	115.16	5.63	5287	42.5
		4.5	18.19	23.17	777.53	92.40	5.79		55.0
		4.8	19.36	24.67	824.90	98.03	5.78		51.6
175	197.3	5.4	21.70	27.65	918.05	109.10	5.76	6198	46.1
		6.0	24.03	30.61	1009.10	119.92	5.74		41.6
		8.0	31.64	40.30	1297.79	154.22	5.67		31.6
200	219.1	10.0	39.05	49.75	1564.61	185.93	5.61	6879	25.6
		4.0	19.08	24.30	1135.47	115.10	6.84		52.4
		4.8	22.80	29.04	1345.98	136.44	6.81		43.9
250	273.1	5.4	25.57	32.57	1500.37	152.09	6.79	8575	39.1
		6.0	28.32	36.07	1651.80	167.44	6.77		35.3
		8.0	37.36	47.60	2135.76	216.50	6.70		26.8
300	323.9	10.0	46.21	58.87	2588.71	262.41	6.63	10170	21.6
		4.8	25.38	32.33	1856.78	169.49	7.58		39.4
		5.4	28.47	36.27	2071.66	189.11	7.56		35.1
200	219.1	6.0	31.54	40.18	2282.87	208.39	7.54	6879	31.7
		8.0	41.67	53.08	2960.82	270.27	7.47		24.0
		10.0	51.59	65.72	3599.89	328.61	7.40		19.4
250	273.1	12.0	61.31	78.11	4201.57	383.53	7.33	8575	16.3
		6.0	39.54	50.37	4493.93	329.11	9.45		25.3
		8.0	52.32	66.65	5860.70	429.20	9.38		19.1
300	323.9	10.0	64.91	82.69	7165.13	524.73	9.31	10170	15.4
		12.0	77.30	98.47	8409.17	615.83	9.24		12.9
		6.3	49.36	62.88	7932.09	489.79	11.23		20.3
300	323.9	8.0	62.35	79.43	9914.07	612.17	11.17	10170	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

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
350	355.6	5.4	46.66	59.43	9113.39	512.56	12.38	11172	21.4
		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
		10.0	85.26	108.62	16230.03	912.83	12.22		11.7
		12.0	101.73	129.59	19147.18	1076.89	12.16		9.8
400	406.4	6.0	59.27	75.50	15134.41	744.80	14.16	12767	16.9
		8.0	78.63	100.17	19881.89	978.44	14.09		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
		16.0	154.11	196.32	37463.89	1843.70	13.81		6.5
450	457.2	6.0	66.79	85.08	21655.59	947.31	15.95	14363	15.0
		8.0	88.66	112.94	28495.85	1246.54	15.88		11.3
		10.0	110.33	140.55	35152.58	1537.73	15.81		9.1
		12.0	131.8	167.90	41629.08	1821.04	15.75		125.0
		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
		10.0	122.86	156.51	48539.78	1911.01	17.61		8.1
		12.0	146.84	187.06	57559.24	2266.11	17.54		6.8
		16.0	194.21	247.41	74939.19	2950.36	17.40		5.1
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
		10.0	135.40	172.48	64956.28	2324.85	19.41		7.4
		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
		20.0	290.93	370.61	161226.5	5289.58	20.86		3.4

## Product Range

SECTION SIZE		Wall Thickness mm = t																	
Tube Dimension (mm)	NB	OD	2.6	2.9	3.2	3.6	4.0	4.5	4.8	5.4	6.0	6.3	8.0	10.0	12.0	16.0	18.0	20.0	
25	33.7		■		■		■												
32	42.4		■		■		■												
40	48.3			■	■		■												
50	60.3			■		■		■	■										
65	76.1				■		■	■	■										
80	88.9				■		■	■	■	■			■						
100	114.3					■		■	■	■	■		■	■					
115	127				■	■		■	■	■	■		■	■					
125	139.7							■	■	■	■		■	■					
150	165.1								■	■	■		■	■					
150	168.3								■	■	■		■	■					
175	197.3									■	■		■	■					
200	219.1										■		■	■					
250	273.1												■	■					
300	323.9													■	■				
350	355.6														■	■			
400	406.4															■	■		
450	457.2																■	■	
500	508																	■	■
550	558.8																		■
600	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

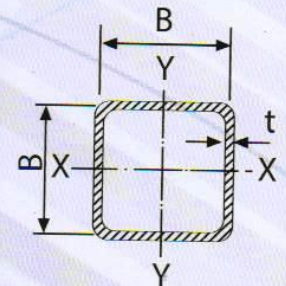
SHS B x B mm	B		t	Sec Area	Weight	Moment of Inertia		Radius of Gyration		Elastic Modulus		Torsional Constants		Outer Surface Area	Nominal Length per tonne
	mm	mm				cm <sup>4</sup>	cm <sup>4</sup>	Rxx cm	Ryy cm	Zxx cm <sup>3</sup>	Zyy cm <sup>3</sup>	J cm <sup>4</sup>	B cm <sup>3</sup>		
25x25	25	25	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	0.87	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
	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
38x38	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
	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	3.3.95
	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	253.3
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	2.9	5.25	4.12	18.98	18.98	1.90	1.90	7.59	7.59	31.24	11.47	0.185	242.77
	50	50	3.6	6.35	4.98	22.15	22.15	1.87	1.87	8.86	8.86	37.25	13.43	0.181	200.66
60x60	50	50	4.5	7.67	6.02	25.50	25.50	1.82	1.82	10.20	10.20	44.09	15.56	0.177	166.10
	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
72x72	60	60	4.0	8.55	6.71	43.55	43.55	2.26	2.26	14.52	14.52	72.64	21.97	0.219	149.02
	60	60	4.8	10.1	7.85	49.22	49.22	2.22	2.22	16.41	16.41	83.81	24.94	0.215	127.31
	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
80x80	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	4.8	12.31	9.66	90.31	90.31	2.71	2.71	25.09	25.09	150.63	37.97	0.263	103.48
	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
91.5x91.5	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	4.0	11.75	9.22	111.04	111.04	3.07	3.07	27.76	27.76	180.43	41.84	0.299	108.43
	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
100x100	80	80	6.0	16.83	13.21	149.18	149.18	2.98	2.98	37.29	37.29	252.06	55.59	0.289	75.67
	91.5	91.5	3.6	12.32	9.67	156.499	156.49	3.56	3.56	34.21	34.21	250.02	51.45	0.347	103.36
	91.5	91.5	4.5	15.14	11.88	187.57	187.57	3.52	3.52	41.00	41.00	304.39	61.79	0.343	84.14
113.5x113.5	91.5	91.5	5.4	17.85	14.01	215.68	215.68	3.48	3.48	47.14	47.14	355.46	71.21	0.338	71.38
	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
	100	100	4.0	14.95	11.73	226.35	226.35	3.89	3.89	45.27	45.27	362.00	68.10	0.379	85.22
132x132	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	16.63	311.47	311.47	3.79	3.79	62.29	62.29	514.14	94.12	0.369	58.88
	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
150x150	113.5	113.5	5.4	22.60	17.74	432.58	432.58	4.38	4.38	76.23	76.23	700.20	114.83	0.426	56.37
	113.5	113.5	6.0	24.87	19.87	469.81	469.81	4.35	4.35	82.79	82.79	766.84	124.86	0.423	51.21
	132	132	4.8	23.83	18.71	634.39	634.39	5.16	5.16	96.12	96.12	1008.71	144.51	0.50	53.46
180x180	132	132	5.4	20.60	20.88	700.11	700.11	5.13	5.13	106.08	106.08	1121.29	159.60	0.500	47.90
	132	132	6.0	29.31	23.1	762.98	762.98	5.10	5.10	115.60	115.60	1230.84	174.08	0.497	43.66
	150	150	4.0	22.95	18.01	807.82	807.82	5.93	5.93	107.71	107.71	1264.73	161.73	0.575	55.51
200x200	150	150	5.0	28.36	22.26	982.12	982.12	5.89	5.89	130.95	130.95	1554.09	196.79	0.574	44.82
	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	8.0	43.79	34.38	1443.00	1443.00	5.74	5.74	192.40	192.40	2357.04	290.22	0.559	29.09
220x220	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
	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
250x250	180	180	5.0	34.36	26.97	1736.87	1736.87	7.11	7.11	192.99	192.99	2724.10	289.81	0.694	37.08
	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
300x300	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
	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	5.4	41.28	32.41	2581.45	2581.45	7.91	7.91	258.14	258.14	4043.71	387.62	0.772	30.86
350x350	200	200	6.0	45.63	35.82	2832.75	2832.75	7.88	7.88	283.27	283.27	4458.70	425.51	0.769	27.92
	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
400x400	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
	220	220	5.0	33.25	33.25	3238.02	3238.02	8.74	8.74	294.37	294.37	5037.62	441.83	0.854	30.07
	220	220	6.0	50.43	39.59	3831.36	3831.36	8.70	8.70	346.67	346.67	5976.05	520.57	0.849	25.26
450x450	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
500x500	250	250	6.0	57.63	45.24	5672.00	5672.00	9.92	9.92	453.76	453.76	8842.34	681.15	0.969	22.10
	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	75.34	8841.86	8841.86	9.73	9.73	707.35	707.35	14140.66	1064.09	0.948	13.63
550x550	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
	300	300	6.0	69.63	54.66	9963.67	9963.67	11.96	11.96	664.24	664.24	15433.55	996.78	1.169	18.29
	300	300	8.0	91.79	72.06	12925.07	12925.07	11.87	11.87	861.67	861.67	20235.69	1293.82	1.159	13.88
600x600	300	300	10.0	113.43	89.04	15713.90	15713.90	11.77	11.77	1047.6</					

SHS B x B mm	B		t	Sec Area	Weight	Moment of Inertia		Radius of Gyration		Elastic Modulus		Torsional Constants		Outer Surface Area	Nominal Length per tonne
	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>		
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	2.36	2.36	23.51	23.51	137.66	35.61	0.225	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
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	8.0	30.99	24.33	522.39	522.39	4.11	4.11	94.98	94.98	879.57	144.02	0.399	41.10
	110	110	10.0	34.43	29.38	600.90	600.90	4.01	4.01	109.25	109.25	1040.35	166.71	0.388	34.04
	110	110	12.0	43.24	34.20	661.57	661.57	3.91	3.91	120.28	120.28	117.86	184.90	0.378	29.39
130x130*	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	4.8	23.45	18.41	604.56	604.56	5.08	5.08	93.01	93.01	962.14	139.85	0.495	54.33
	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
	130	130	8.0	37.39	29.35	906.26	906.26	4.92	4.92	139.43	139.43	1499.54	210.74	0.479	34.07
	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
140x140*	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
	140	140	4.8	25.37	19.91	763.50	763.50	5.49	5.49	109.07	109.07	1210.00	163.93	0.535	50.22
	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	8.0	40.59	31.87	1153.92	1153.92	5.33	5.33	164.85	164.85	1896.20	248.88	0.519	31.38
	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	5.77
	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
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	5.4	35.88	28.17	1701.86	1701.86	6.89	6.89	194.50	194.50	2682.37	292.91	0.672	35.50
	175	175	6.0	39.63	31.11	1864.03	1864.03	6.86	6.86	213.03	213.03	2945.09	320.18	0.669	32.14
	175	175	8.0	51.79	40.66	2367.89	2367.89	6.76	6.76	270.62	270.62	3821.46	407.53	0.659	24.60
	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	20.8
	175	175	12.0	74.54	58.51	3214.39	3214.39	6.57	6.57	367.36	367.36	5773.55	556.35	0.638	17.09

\*ASTM A 500 grade sizes, Kindly contact for MOQ before incorporating into designs

## Product Range

SECTION SIZE		Wall Thickness mm = t																
Tube Dimension (mm)																		
B	B	2.0	2.6	2.9	3.2	3.6	4.0	4.5	4.8	5.0	5.4	6.0	8.0	10.0	12.0	16.0	18.0	20.0
25	25	■	■															
32	32	■	■	■														
38	38	■	■	■	■													
40	40			■	■	■												
50	50	■	■	■	■	■	■											
60	60	■	■	■	■	■	■	■										
70	70	■	■	■	■	■	■	■	■									
72	72			■	■	■	■	■	■	■								
80	80			■	■	■	■	■	■	■	■							
91.5	91.5				■	■	■	■	■	■	■	■						
100	100					■	■	■	■	■	■	■	■					
110	110				■	■	■	■	■	■	■	■	■	■				
113.5	113.5						■	■	■	■	■	■	■	■	■			
130	130					■	■	■	■	■	■	■	■	■	■	■		
132	132						■	■	■	■	■	■	■	■	■	■		
140	140							■	■	■	■	■	■	■	■	■	■	
150	150								■	■	■	■	■	■	■	■	■	■
175	175									■	■	■	■	■	■	■	■	■
180	180										■	■	■	■	■	■	■	■
200	200											■	■	■	■	■	■	■
220	220												■	■	■	■	■	■
250	250													■	■	■	■	■
300	300														■	■	■	■
350	350															■	■	■
400	400																■	■
450	450																	■
500	500																	■



Specification:  
**IS : 4923**

- Presently rolled sections
- ASTM Grade Sizes
- Sections Under development

Note:

For Intermediate thicknesses, Please contact before incorporating into designs

# Rectangular Hollow Sections – Section Properties

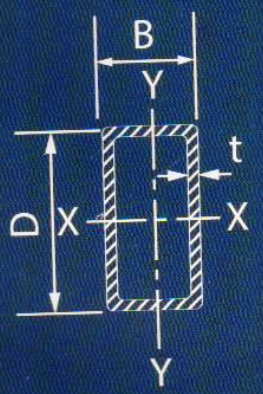
RHS B x B mm	B		t	Sec Area	Weight	Moment of Inertia		Radius of Gyration		Elastic Modulus		Torsional Constants		Outer Surface Area	Nominal Length per tonne
	mm	mm				cm <sup>4</sup>	cm <sup>4</sup>	Rxx cm	Ryy cm	Zxx cm <sup>2</sup>	Zyy cm <sup>2</sup>	J cm <sup>4</sup>	B cm <sup>2</sup>		
50x25	50	25	2.0	2.74	2.15	8.38	2.81	1.75	1.01	3.35	2.25	7.06	3.92	0.140	465.41
	50	25	2.6	3.46	2.71	10.16	3.36	1.71	0.99	4.06	2.69	8.68	4.72	0.137	368.63
	50	25	3.2	4.13	3.24	11.63	3.80	1.68	0.96	4.65	3.04	10.08	5.38	0.134	308.66
	50	25	4.0	4.95	3.88	13.13	4.23	1.63	0.92	5.25	3.38	11.57	6.05	0.129	257.42
60x40	60	40	2.6	4.76	3.73	22.76	12.09	2.19	1.59	7.59	6.05	25.99	10.02	0.187	267.86
	60	40	2.9	5.25	4.12	24.74	13.11	2.17	1.58	8.25	6.56	28.48	10.90	0.185	242.77
	60	40	3.6	6.35	4.98	28.90	15.23	2.13	1.55	9.63	7.62	33.86	12.73	0.181	200.66
	60	40	4.5	7.67	6.02	33.31	17.44	2.08	1.51	11.10	8.72	39.91	14.69	0.177	166.10
66x33	66	33	2.6	4.70	3.69	25.15	8.43	2.31	1.34	7.62	5.11	21.17	8.91	0.185	270.82
	66	33	2.9	5.19	4.07	27.33	9.12	2.29	1.33	8.28	5.53	23.13	9.66	0.183	245.48
	66	33	3.6	6.28	4.93	31.87	10.52	2.25	1.29	9.66	6.37	27.32	11.21	0.179	202.97
	66	33	4.5	7.58	5.95	36.64	11.93	2.20	1.25	11.10	7.23	31.90	12.84	0.175	168.07
	66	33	4.8	7.99	6.22	37.98	12.31	2.81	1.24	11.51	7.46	33.22	13.29	0.173	159.44
80x40	80	40	2.6	5.80	4.55	46.58	15.74	2.84	1.65	11.65	7.87	38.87	13.66	0.227	219.80
	80	40	3.2	7.01	5.50	54.94	18.41	2.80	1.62	13.74	9.21	46.28	16.05	0.224	181.80
	80	40	4.0	8.55	6.71	64.79	21.49	2.75	1.59	16.20	10.74	55.24	18.84	0.229	149.02
	80	40	4.8	10.01	7.85	73.22	24.03	2.71	1.55	18.30	12.02	63.16	21.21	0.215	127.31
96x48	96	48	3.2	8.54	6.71	98.61	33.28	3.40	1.97	20.54	13.87	82.38	24.09	0.272	149.11
	96	48	4.0	10.47	8.22	117.54	39.32	3.35	1.94	24.49	16.38	99.22	28.59	0.267	121.69
	96	48	4.8	12.31	9.66	134.35	44.55	3.30	1.90	27.99	18.56	114.55	32.56	0.263	103.48
	96	48	6.0	14.91	11.71	155.75	51.00	3.23	1.85	32.45	21.25	134.73	37.57	0.257	85.41
	96	48	8.0	18.83	14.78	181.83	58.38	3.11	1.76	37.88	24.33	160.83	43.64	0.247	67.64
122x61	122	61	3.6	12.32	9.67	232.61	78.83	4.34	2.53	38.13	25.84	193.39	44.81	0.347	103.36
	122	61	4.5	15.14	11.88	278.94	93.78	4.29	2.49	45.73	30.75	234.06	53.52	0.343	84.14
	122	61	5.4	17.86	14.01	320.83	107.03	4.24	2.45	52.60	35.09	271.66	61.34	0.338	71.38
	122	61	6.0	19.59	15.38	346.36	114.95	4.20	2.42	56.78	37.69	295.02	66.08	0.335	65.01
145x82	145	82	4.8	20.28	15.92	555.16	228.50	5.23	3.36	76.57	55.73	529.61	94.86	0.429	62.82
	145	82	5.4	22.60	17.74	610.85	250.59	5.20	3.33	84.26	61.12	586.17	104.24	0.426	56.37
	145	82	6.0	24.87	19.53	663.66	271.37	5.17	3.03	91.54	66.19	640.57	113.12	0.423	51.21
172x92	172	92	4.8	23.83	18.71	917.13	346.91	6.20	3.82	106.64	75.14	818.93	129.26	0.503	53.46
	172	92	5.4	26.60	20.88	1012.47	381.74	6.17	3.79	117.73	82.99	908.38	142.47	0.500	47.90
	172	92	6.0	29.31	23.01	1103.73	414.82	6.14	3.76	128.34	90.18	994.95	155.08	0.497	43.46
200x100	200	100	4.0	22.95	18.01	1199.71	410.78	7.23	4.23	119.97	82.16	985.36	141.81	0.579	55.51
	200	100	5.0	28.36	22.26	1459.25	496.94	7.17	4.19	145.93	99.39	1206.26	171.94	0.574	44.92
	200	100	6.0	33.63	26.40	1703.31	576.91	7.12	4.14	170.33	115.38	1416.98	200.10	0.569	37.87
	200	100	8.0	43.79	34.38	2146.21	719.19	7.00	4.05	214.62	143.84	1807.84	250.80	0.559	29.09
	200	100	10.0	53.43	41.94	2530.97	839.27	6.88	3.96	253.10	167.15	251.87	294.43	0.548	23.84
240x120	240	120	4.0	27.75	21.78	2110.72	725.35	8.72	5.11	175.89	120.89	1726.13	208.38	0.699	45.91
	240	120	5.0	34.36	26.97	2579.67	882.47	8.67	5.07	214.97	174.08	2121.05	253.96	0.694	37.08
	240	120	6.0	40.83	32.05	3025.91	1030.45	8.61	5.02	252.16	171.74	2501.31	297.11	0.689	31.20
	240	120	8.0	53.39	41.91	3851.84	2199.95	8.49	4.93	320.99	216.66	3217.82	376.38	0.679	23.86
300x150	300	150	6.0	51.63	40.53	6073.51	2079.57	10.85	6.35	404.90	277.28	4988.36	478.60	0.869	24.67
	300	150	8.0	67.79	53.22	7807.95	2654.12	10.73	6.26	520.53	353.88	6468.03	612.69	0.859	18.79
	300	150	10.0	83.43	65.49	9403.90	3173.71	10.62	6.17	626.93	423.16	7856.00	735.12	0.848	15.27
300x200	300	200	6.0	57.63	45.24	7370.23	3926.19	11.31	8.29	491.35	396.22	8115.07	651.24	0.969	22.10
	300	200	8.0	75.79	59.50	9513.66	5097.04	11.20	8.20	634.24	509.70	10585.74	839.54	0.959	16.81
	300	200	10.0	93.43	73.34	11507.24	6144.30	11.10	8.11	767.15	614.43	12938.52	1014.48	0.948	13.88
	300	200	12.0	110.54	86.77	13354.97	7107.11	10.99	8.02	890.33	701.71	15172.94	1176.60	0.938	11.52
	300	200	16.0	175.2	137.5	34339.4	11507.0	14.0	8.1	1717.0	1150.7	28925.5	2006.4	1.1	7.3
400x200	400	200	6.0	69.6	54.7	14789.4	5091.6	14.6	8.6	739.5	509.2	12068.3	877.0	1.2	18.3
	400	200	8.0	91.8	72.1	19195.3	6572.5	14.5	8.5	959.8	657.2	15765.7	1134.5	1.2	13.9
	400	200	10.0	113.4	89.0	23348.1	7951.0	14.3	8.4	1167.4	795.1	19300.2	1375.5	1.1	11.2
	400	200	12.0	134.5	105.6	27252.9	9230.6	14.2	8.3	1362.6	923.1	22671.1	1600.8	1.1	9.5
	400	200	16.0	175.2	137.5	34339.4	11507.0	14.0	8.1	1717.0	1150.7	28925.5	2006.4	1.1	7.3
500x200	500	200	6.0	81.6	64.1	25690.1	6221.1	17.7	8.7	1027.6	622.1	16187.5	1102.9	1.4	15.6
	500	200	8.0	107.8	84.6	33466.5	8047.9	17.6	8.6	1338.7	804.8	21159.9	1429.4	1.4	11.8
	500	200	10.0	133.4	104.7	40860.2	9757.6	17.5	8.6	1634.4	975.8	25921.2	1736.6	1.3	9.5
	500	200	12.0	158.5	124.5	47877.5	11354.1	17.4	8.5	1915.1	1135.4	30471.9	2025.2	1.3	8.0
	500	200	16.0	207.2	162.6	60808.5	14222.3	17.1	8.3	2432.3	1422.2	38943.2	2548.8	1.3	6.1
500x300	500	300	6.0	93.6	73.5	33011.6	15150.5	18.8	12.7	1320.5	1010.0	32419.9	1688.2	1.6	13.6
	500	300	8.0	123.8	97.2	43149.9	19747.9	18.7	12.6	1726.0	1316.5	42634.2	2203.1	1.6	10.3
	500	300	10.0	153.4	120.4	52866.8	24127.2	18.6	12.5	2486.8	1886.2	62171.4	3165.2	1.5	7.0
	500	300	16.0	239.2	187.8	79555.8	36006.6	18.2	12.3	3182.2	2400.4	80516.4	4041.1	1.5	5.3
	500	300	18.0	266.7	209.4	87653.6	39653.2	18.1	12.2	3506.1	2637.5	89240.5	4448.1	1.5	4.8
600x200	600	200	8.0	123.8	97.2	53127.3	9523.3	20.7	8.8	1770.9	952.3	26685.3	1724.4	1.6	10.3
	600	200	10.0	153.4	120.4	65043.5	11564.3	20.6	8.7	2168.1	1156.4	32700.1	2097.8	1.5	8.3
	600	200	12.0	182.5	143.3	76428.6	13477.7	20.5	8.6	2547.6	1347.8	38454.5	2449.7	1.5	7.0
	600	200	16.0	239.2	187.8	97635.9	16937.6	20.2	8.4	3254.5	1693.8	49186.7	3091.4	1.5	5.3
	600	200	18.0	266.7	209.7	107473.1	18492.2	20.1	8.3	3582.4	1849.2	54166.8	3382.6	1.5	4.8
600x300	600	300	8.0	139.8	109.7	67146.7	23159.3	21.9	12.9	2238.2	1544.0	54673.4	2657.8	1.8	9.1
	600	300	10.0	173.4	136.1	82450.1	28333.9	21.8	12.8	27					

RHS D x B mm	D	B	t	Sec Area	Weight	Moment of Inertia		Radius of Gyrat		Elastic 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
80x60*	80	60	3.2	8.29	6.51	73.83	47.28	2.98	2.39	18.46	15.76	93.49	25.45	0.264	153.72
	80	60	4.0	10.15	7.97	87.92	56.12	2.94	2.35	21.98	18.71	113.12	30.32	0.259	88.25
	80	60	6.0	14.43	11.33	116.25	73.63	2.84	2.26	29.06	24.54	155.55	40.25	0.249	88.23
	80	60	8.0	18.19	14.28	135.55	8528	2.73	2.17	33.89	28.43	188.32	47.27	0.239	70.02
90x50*	90	50	3.2	8.29	6.51	86.27	34.44	3.23	2.04	19.17	13.78	81.05	23.55	0.264	153.72
	90	50	4.0	10.15	7.97	102.71	40.71	3.18	2.00	22.82	16.28	97.70	27.96	0.259	125.52
	90	50	6.0	14.43	11.33	135.66	52.83	3.07	1.91	30.15	21.13	132.94	36.77	0.249	88.25
	90	50	8.0	18.19	14.28	157.85	60.51	2.95	1.82	35.08	24.20	159.02	42.75	0.239	70.02
90x70*	90	70	3.2	9.57	7.51	110.39	74.91	3.40	2.00	24.53	21.40	145.28	34.23	0.304	133.15
	90	70	4.0	11.75	9.22	132.32	89.57	3.36	2.76	29.40	25.59	174.22	41.05	0.299	108.43
	90	70	6.0	16.83	13.21	178.07	119.82	3.25	2.67	39.57	34.23	242.90	55.42	0.289	75.67
	90	70	8.0	21.39	16.79	211.81	141.75	3.15	2.57	47.07	40.50	299.01	66.30	0.279	59.54
100x40*	100	40	3.2	8.29	6.51	97.29	22.76	3.43	1.68	19.46	11.38	62.31	20.39	0.264	153.72
	100	40	4.0	10.15	7.97	115.70	26.69	3.38	1.62	23.14	13.35	74.52	24.04	0.259	125.52
	100	40	6.0	14.43	11.33	152.21	33.96	3.25	1.53	30.44	16.98	99.25	31.02	0.249	88.25
	100	40	8.0	18.19	14.28	176.13	38.11	3.11	1.45	35.23	19.06	115.82	35.31	0.239	70.02
100x60*	100	60	3.2	9.57	7.51	127.39	57.61	3.65	2.45	25.46	19.20	128.83	32.33	0.304	133.15
	100	60	4.0	11.75	9.22	152.58	68.68	3.60	2.42	30.52	22.89	156.26	38.68	0.299	108.43
	100	60	6.0	16.83	13.21	205.30	91.20	3.49	2.33	41.06	30.40	216.43	51.92	0.289	75.67
	100	60	8.0	21.39	16.79	244.01	107.08	3.38	2.24	48.80	35.69	264.47	61.71	0.279	59.54
100x80*	100	80	3.2	10.85	8.51	157.28	111.60	3.81	3.21	31.46	27.90	207.96	44.30	0.344	117.44
	100	80	4.0	13.35	10.48	189.47	134.17	3.77	3.17	37.89	33.54	253.78	53.38	0.339	95.43
	100	80	6.0	19.23	15.10	258.39	182.10	3.67	3.08	51.68	45.53	357.36	72.98	0.329	66.23
	100	80	8.0	24.59	19.31	311.89	218.84	3.56	2.98	62.38	54.71	445.10	88.51	0.319	51.80
110x50*	110	50	3.2	9.57	7.51	142.78	41.46	3.86	2.08	25.96	16.58	106.44	29.16	0.304	133.15
	110	50	4.0	11.75	9.22	171.04	49.19	3.82	2.05	31.10	19.68	128.51	34.74	0.299	108.43
	110	50	6.0	16.83	13.21	229.66	64.52	3.69	1.96	41.76	25.81	175.74	46.10	0.289	75.67
	110	50	8.0	21.39	16.79	272.18	74.79	3.57	1.87	49.49	29.92	211.70	54.12	0.279	59.54
110x70*	110	70	3.2	10.85	8.51	179.29	89.20	4.07	2.87	32.60	25.49	191.50	42.39	0.344	117.44
	110	70	4.0	13.35	10.48	216.01	107.01	4.02	2.83	39.27	30.57	233.31	51.00	0.339	95.43
	110	70	6.0	19.23	15.10	294.63	144.47	3.91	2.74	53.57	41.28	327.10	69.46	0.329	66.23
	110	70	8.0	24.59	19.31	355.58	172.67	3.80	2.65	64.65	49.34	405.44	83.88	0.319	51.80
110x90*	110	90	3.2	12.13	9.52	215.80	158.63	4.22	3.62	39.24	35.25	289.44	55.64	0.384	105.04
	110	90	4.0	14.95	11.73	260.97	191.53	4.18	3.58	47.45	42.56	354.18	67.31	0.379	85.22
	110	90	6.0	21.63	16.98	359.60	262.89	4.08	3.49	65.38	58.42	525.53	92.94	0.369	58.88
	110	90	8.0	27.79	21.82	438.98	319.74	3.97	3.39	79.82	71.05	631.39	113.89	0.359	45.83
130x50*	130	50	3.2	10.85	8.51	218.43	48.48	4.49	2.11	33.80	19.39	132.46	34.77	0.334	177.44
	130	50	4.8	13.35	10.48	262.87	57.68	4.44	2.08	40.44	23.07	160.07	41.52	0.339	95.43
	130	50	6.0	19.23	15.10	357.33	76.21	4.31	1.99	54.97	30.48	219.53	55.43	0.329	66.23
	130	50	8.0	24.59	19.31	429.29	89.08	4.18	1.90	66.04	35.63	265.53	65.51	0.319	51.80
130x70*	130	70	3.2	12.13	9.52	269.89	133.49	4.72	2.92	41.52	29.57	241.61	50.55	0.384	105.04
	130	70	4.8	14.95	11.73	326.39	124.46	4.67	2.89	50.21	35.56	294.68	60.96	0.379	85.22
	130	70	6.0	21.63	16.98	449.66	169.12	4.56	2.80	69.18	48.32	414.50	83.51	0.369	58.88
	130	70	8.0	27.79	21.82	548.53	203.60	4.44	2.71	84.39	58.17	515.84	101.48	0.359	45.83
130x90*	130	90	3.2	13.41	10.52	321.35	182.75	4.90	3.69	49.44	40.61	369.22	66.35	0.424	95.02
	130	90	4.0	16.55	12.99	389.92	221.13	4.85	3.66	59.99	49.14	452.41	80.45	0.419	76.98
	130	90	6.0	24.03	18.87	541.99	305.29	4.75	3.56	83.38	67.84	644.28	111.74	0.409	53.00
	130	90	8.0	30.99	24.33	667.78	373.70	4.64	3.47	102.73	83.04	812.96	137.78	0.399	41.10
140x60*	140	60	3.6	13.55	10.64	325.47	86.24	4.90	2.52	46.50	28.75	225.56	50.86	0.381	94.03
	140	60	4.0	14.95	11.73	355.59	93.81	4.88	2.51	50.80	31.27	247.12	55.42	0.379	85.22
	140	60	6.0	21.63	16.98	489.19	126.34	4.76	2.42	69.88	42.11	344.45	75.29	0.369	58.88
	140	60	8.0	27.79	21.82	595.67	150.69	4.63	2.33	85.10	50.23	424.41	90.68	0.359	45.83
140x80*	140	80	3.2	13.41	10.52	354.07	149.37	5.14	3.34	50.58	37.34	336.42	63.17	0.424	95.02
	140	80	4.0	16.55	12.99	429.60	180.42	5.10	3.30	61.37	45.10	411.59	76.48	0.419	76.98
	140	80	6.0	24.03	18.87	597.00	247.96	4.98	3.21	85.29	61.99	583.78	105.83	0.409	53.00
	140	80	8.0	30.99	24.33	735.24	302.12	4.87	3.12	105.03	75.53	733.42	129.98	0.399	41.10
150x50*	150	50	3.2	13.41	10.52	354.07	149.37	5.14	3.34	50.58	37.34	336.42	63.17	0.424	95.02
	150	50	4.0	16.55	12.99	429.60	180.42	5.10	3.30	61.37	45.10	411.59	76.48	0.419	76.98
	150	50	6.0	21.63	16.98	523.47	187.89	4.92	3.02	69.80	35.16	263.98	64.77	0.369	58.88
	150	50	8.0	27.79	21.82	635.59	103.36	4.78	1.93	84.75	41.34	320.12	76.91	0.359	45.83
150x70*	150	70	3.2	13.41	10.52	384.74	117.78	5.36	2.96	51.30	33.65	293.06	58.71	0.424	95.02
	150	70	4.0	16.55	12.99	466.88	141.90	5.31	2.93	62.22	40.54	357.68	70.92	0.419	76.98
	150	70	6.0	24.03	18.87	647.95	193.76	5.19	2.84	86.39	55.36	504.13	97.57	0.409	53.00
	150	70	8.0	30.99	24.33	797.07	234.52	5.07	2.75	106.28	67.01	628.99	119.10	0.399	41.10
150x110*	150	110	3.2	13.41	10.52	384.74	117.78	5.36	2.96	51.30	33.65	293.06	58.71	0.424	95.02
	150	110	4.0	16.55	12.99	466.88	141.90	5.31	2.93	62.22	40.54	357.68	70.92	0.419	76.98
	150	110	6.0	24.03	18.87	647.95	193.76	5.19	2.84	86.39	55.36	504.13	97.57	0.409	53.00
	150	110	8.0	30.99	24.33	797.07	234.52	5.07	2.75	106.28	67.01	628.99	119.10	0.399	41.10
150x130*	150	130	3.6	15.16	11.73	467.92	158.92	5.84	5.23	87.72	81.35	917.73	126.56	0.541	65.98
	150	130	4.0	16.55	12.99	523.47	187.89	5.82	5.21	96.34	89.31	1012.25	139.01	0.539	59.67
	150	130	6.0	24.03	18.87	722.53	245.52	5.72	5.12	136.19	126.00	1462.28	196.72	0.529	40.78

# Rectangular Hollow Sections

## Product Range

SECTION SIZE		Wall Thickness mm = t																
Tube Dimension (mm)		2.0	2.6	2.9	3.2	3.6	4.0	4.5	4.8	5.0	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											■	■					



Specification:  
**IS : 4923**

- Presently rolled sections
- ASTM Grade Sizes
- 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 (Working Stress Method)

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	490	8	10	+/-1% with a minimum of +/-0.50 mm	+/- 7.5%	90 deg. +/-2 deg.	3t max	10% -8%	+/-7%
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%	+/-10%	NA	NA	+/- 10%	+/- 7.5%

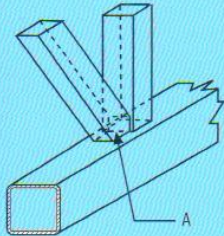
Galvanized sections can also be manufactured

<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 other wise 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

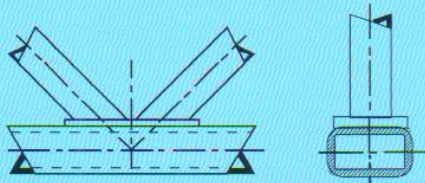
## Jointing : Workshop & Site Practice



### 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:

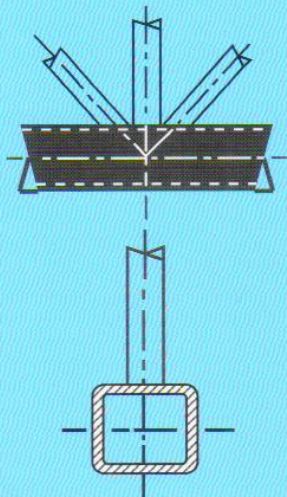
- By means of a heavy duty circular/hand saw
- By flame cutting: either manual or automatic
- The path of the cut can be marked directly on the surface of the section or on a template after shop layout
- For section thicknesses of 5 mm and above, edges may be chamfered for proper welding penetration

### 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  $> 30^\circ$  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>	EN ISO 2560-A	AWS A/ SFA 5.1	<b>APPROVALS</b>
	E 38 2 B 32	E 7018	ABS/LRA/IBR/MND

<b>WELDING POSITION</b>		
-------------------------	---	--

## TYPICAL APPLICATIONS

- Structural welding
- Storage tanks
- Boilers, Pressure vessels
- Bridges, Pipes
- Joining steel ASTM SA 414/414M Gr.C/D/E, SA 516/516M Gr.55/60

## CHEMICAL COMPOSITION OF UNDILUTED WELD METAL, Wt%

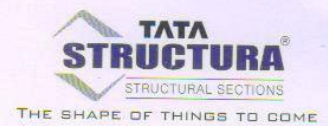
	C	Mn	Si	S	P
<b>Typical</b>	0.07	1.0	0.5	0.02	0.02
<b>Specification</b>	0.10 max	1.60 max	0.75 max	0.03 max	0.03 max

## MECHANICAL PROPERTIES OF ALL WELD METAL

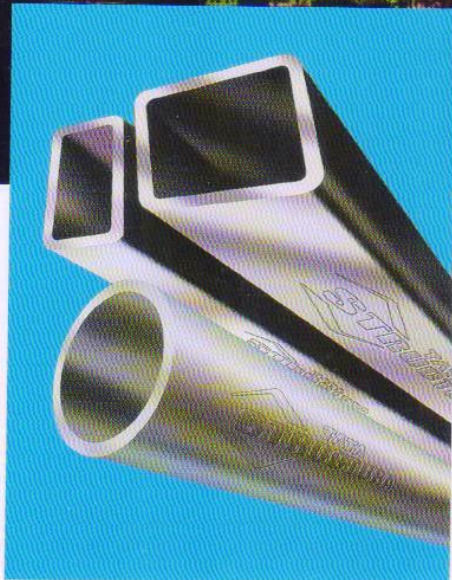
	Condition	UTS, MPa	YS at 0.2% offset, MPa	EL%	CVN Impact at 30°C, J
<b>Typical</b>	As Welded	525	440	26	55
<b>Specification</b>	As Welded	490 min	400 min	22 min	27 min



Dakshineswar Skywalk, Kolkata



Swami Vivekananda Airport, Raipur



## DID YOU KNOW?

45,000 Metric Tons of Tata Structura Hollow Steel sections have been used in 32 major airports across the country.

 WeAlsoMakeTomorrow



**H. RAJESH AND COMPANY**  
(BUSINESS DEVELOPMENT PARTNER)

**TATA RHS / SHS PIPES**

**PUNE OFFICE :**

S. No. 32/9, Old Mumbai - Pune Road, Near Dange Chowk, Tathawade, Tal. Mulshi,  
Pune - 411 033. Phones : 7900015193 / 9011007206

E-mail : [sales@hrajeshco.com](mailto:sales@hrajeshco.com) Website : [www.hrajeshco.com](http://www.hrajeshco.com)

**MUMBAI OFFICE :**

C-43, Royal Industrial Estate, 3rd Floor,  
Naigaon Cross Road, Wadala (W), Mumbai - 400 031.

Phones: 7900018878 / 022 - 24112081

E-mail : [hrajeshco@rediffmail.com](mailto:hrajeshco@rediffmail.com), [jasmin@hrajeshco.com](mailto:jasmin@hrajeshco.com)