



THE GAME CHANGER
IN CONSTRUCTION IS HERE !



Scan to know more

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*India's No. 1 by Market Share

THE BIG JUST GOT

BIGGER & STRONGER

INTRODUCING

INDIA'S FIRST 1000X1000MM

BOX SECTION Thickness: upto 40mm



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ABOUT APL APOLLO

Welcome to APL Apollo, where innovation, excellence, and reliability converge to revolutionize the steel industry. As a premier manufacturer and supplier of high-quality steel products, we take immense pride in our unwavering commitment to pushing boundaries and setting new standards in the industry.

APL Apollo Tubes Limited stands tall as the largest producer of Structural Steel Tubes in India.

Our Legacy of Excellence:

With a legacy spanning over a decade, APL APOLLO has emerged as a global leader in the production of structural steel tubes. Our unwavering dedication to quality and customer satisfaction has propelled us to the forefront of the industry, earning us recognition as one of the largest players worldwide.

Innovative Capacity Investment:

We believe in investing in the future. Through consistent investment in our manufacturing capacities, we have positioned ourselves as pioneers in the industry. Our strategic approach to capacity creation ensures a balanced manufacturing infrastructure across regions, enabling us to meet demand with precision and efficiency.

Pioneering Technology Adoption:

At APL APOLLO, innovation is ingrained in our DNA. For the past two decades, we have been at the forefront of bringing cutting-edge technology to India's shores. From groundbreaking manufacturing processes to state-of-the-art machinery, we continuously push boundaries to create new products and markets.

Expansive Product Portfolio:

Our commitment to innovation is reflected in our expansive product

portfolio, comprising over 2,000 SKUs. From structural tubes to hollow sections, pre-galvanized tubes to precision tubes, we offer a diverse range of products that cater to a multitude of applications and sectors.

Robust Distribution Network:

We understand the importance of accessibility. That's why we have developed the largest and most expansive distribution network in the industry. Supported by robust supply chain solutions, our multi-layer network ensures that our products are readily available across India.

Driving Trade Transformation:

We are not content with just meeting benchmarks; we strive to set them. By providing innovative products, rapid delivery, and growth opportunities to our channel partners, we have revolutionized trade practices within the industry.

A Commitment to Innovation:

Innovation is at the heart of everything we do. We remain steadfast in our commitment to developing innovative solutions that address evolving customer needs and deliver increased value. Our cutting-edge facility near Raipur is a testament to this commitment, where we manufacture value-added products that are firsts for the Indian markets.



5 Mn T
Steel products

13
Manufacturing units

30
Countries across the Globe

SUSTAINABILITY IS AT THE CORE OF APL APOLLO

Our environmental management is not a strategy but a philosophy embedded in the substrata of the enterprise. It allows us to reduce our carbon footprint and also inspires our customers to meet their own environmental management aspirations. By championing sustainable practices, we create a ripple effect that benefits the entire ecosystem.

PRODUCTS:

We are the first and pioneering Company to innovate readymade Chaukhat, Fence, Plank, and Hand rails under the Steel for Green concept which replaced conventional wood applications in building construction. Our product saves approximately 250,000 trees every year, making a significant contribution to forest conservation. This translates to preserving vital habitats for countless species and promoting biodiversity.

ENERGY:

Our total renewable energy stood at 49,618 MW, which is 38% of APL Apollo's total energy consumption. To achieve its near-term emissions reduction targets, APL Apollo plans to increase the use of renewable energy. At two of APL Apollo's plants (in Malur, Karnataka and Hosur, Tamil Nadu), over 85% of energy needs were met through renewable energy, demonstrating the feasibility of a sustainable future and paving the way for a cleaner and healthier planet.

GREEN COVER:

We have planted 5,000 plants on 3.1 acres of government-provided land in Gendupur Village, Sikandrabad, close to our AMPL (A25/Plot 22) and APL A19 manufacturing plants. Furthermore, we have undertaken a large number of plantation activities in our plants at APL Apollo Building Products Private Limited (ABPL). For the plantation of thick, natural mini-forests, we have adapted the Miyawaki technique pioneered by the Japanese botanist Akira Miyawaki. The method will result in ten times faster plant growth and a plantation that is 30 times denser than typical, creating a valuable habitat for local wildlife and contributing to improved air quality through increased carbon sequestration.

WATER:

Over the years, we have persevered to optimise water consumption at our facilities by strengthening our shop-floor processes. Our patient efforts have yielded heartening results. Over the last three years (FY20-FY23), our total water consumption declined by 9% YoY despite a 30% jump in production. Our two facilities at Murbad and Malur are Zero-Liquid Discharge certified. To rejuvenate the groundwater table, we have created rainwater harvesting pits of around 353 cubic meters. This commitment to water conservation ensures a vital resource for future generations.

MEMBER OF
**Dow Jones
Sustainability Indices**
In Collaboration with RobecoSAM



DJSI FY2025 SCORE

**APL APOLLO TUBES
STANDS AT**

91
PERCENTILE

(IN THE PEER INDUSTRY COMPRISING OF GLOBAL COMPANIES)

SCORE REACHED A HIGH OF 59 POINTS

IMPROVEMENT ACROSS AREAS



Social
Dimension



Governance &
Economic Dimension



Environmental
Dimension

THE RAIPUR FACILITY

Driving Innovation and Sustainable Growth

MANUFACTURING PLANT OVERVIEW

APL Apollo's manufacturing facility located at Simga, Raipur spans across a vast 600-acre landscape, our facility stands as a testament to our commitment to excellence in the manufacturing of steel tubes and building products.

With a current annual capacity of 1.5 million tons, our facility is equipped to meet the growing demands of various industries.

Our operations prioritize environmental sustainability, with features such as:

0

A Zero Discharge Plant, ensuring minimal environmental impact.



Implementation of an Acid Regeneration Plant, promoting eco-friendly practices.



Our facility boasts a range of ground breaking product innovations, including :



India's first 20 mm HR Slitting Line



First to introduce 500 x 500mm Structure Tube Section in India and introduced the 1000 x 1000mm Structure Tube a pioneering feat in India.



Implementation of India's first Thicker Colour Coating Line, offering superior coating thickness ranging from 1.60mm to 3.00mm

OUR CERTIFICATIONS



ISO CERTIFICATE-14001-2015



CE EN 10219



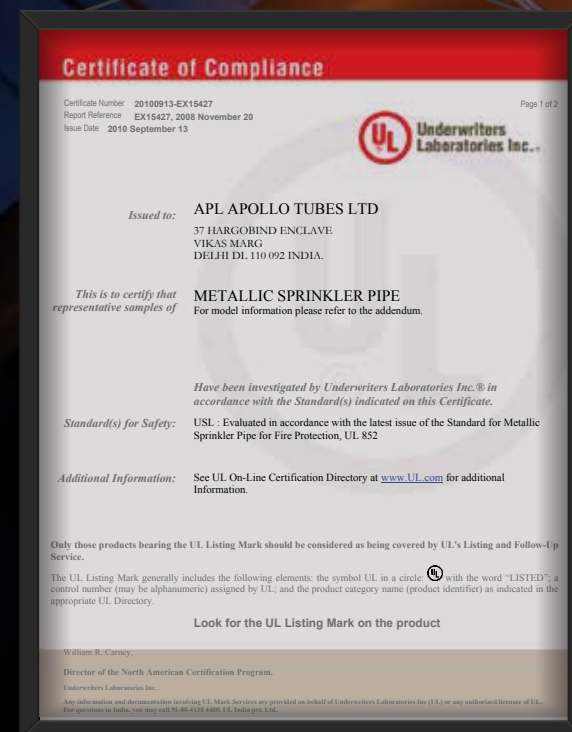
CE EN 10255



ISO CERTIFICATE-45001-2018



ISO CERTIFICATE-9001-2015



UL CERTIFICATE



NABL'S CERTIFICATE OF ACCREDITATION
ISO/IEC 17025:2017



THREE STAR EXPORT HOUSE
CERTIFICATE

BIG SHIFT IN PRE-ENGINEERED BUILDING

Use Of Hollow Steel Sections (HSS)

Around the world, there is a shift toward high-performance materials in structural engineering. In the steel construction sector, this has been more evident with built-up sections, but hollow sections are now in the process of raising the strength levels of their products. The use of HSS has the potential to reduce material costs and project cost.

The popularity of HSS in construction has increased dramatically over the years as engineers have become aware of the advantages of steel tubes. The incorporation of HSS connections in the AISC standard have simplified connection design and contributed to the rise in use of hollow structural steel. HSS are very efficient sections and their major benefits are inherent in their shape and engineering properties. The closed shape and relatively large moment of inertia about the weak axis make them highly resistant against the torsional effects. Architects & Engineers can take advantage of the modern and aesthetically pleasing appearance of exposed HSS structures.



WHY HSS IN PEB?

PEB has seen tremendous growth in the last decade over the conventional steel building. Currently PEB manufacturers are using built-up sections manufactured by welded plates.

Constraints of PEB



Higher Steel Consumption



High Project Costs



Long Project Duration



Higher Wastage

CAN WE MAKE PEB BETTER?

Advantages of using HSS in PEB



Lower Steel Consumption



Low Project Costs



Short Project Duration



Lower Wastage

Comparison of structural properties between HSS and Built-Up Section

	I Shape	C Shape	L Shape	T Shape	HSS
Axial - Axial Strength	Good	Moderate	Moderate	Moderate	Good
Flexure X-X - Bending capacity of steel in X-X direction	Poor	Poor	Moderate	Poor	Good
Flexure Y-Y - Bending capacity of steel in Y-Y direction	Good	Moderate	Poor	Moderate	Good
Buckling - Bending due to stress	Poor	Poor	Poor	Poor	Moderate
Torsion - Twisting of steel	Poor	Poor	Poor	Poor	Good
Shear - shearing steel into short lengths to a high heat	Good	Moderate	Moderate	Moderate	Good
Example[s]	Steel Girders/ Floor Beams/ Columns	Joints in roof framing system	Truss bracing members	Truss chord members	Columns

The Game Changer In Construction

Introducing APL Apollo Column

Apollo Column is a range of hollow structural sections that gives a futuristic edge to construct structures of any design & elevation. It offers India's largest range of hollow structural sections ranging from 12x12 mm to 300x300 mm in size. Apollo Columns are suitable building material for infrastructure, commercial as well as residential projects.

Apollo Column is the irreplaceable member of structural buildings due to its high load bearing capacity & strength-to-weight ratio. It offers higher radii of gyration about both axis providing superior compression performance and significant weight savings.

Advantages



Flexibility in design

Gives the engineer & architects enough flexibility to create unique structures



Environmental friendly

Conventional construction methodology causes severe pollution



Uniform strength

No weaker axis due to uniform distribution of material around its axis



Less consumption of steel

Use of HSS sections reduces the weight of steel structure



Aesthetically pleasing

Smooth profile of Apollo Columns enhances the aesthetic appeal of the structures



Lower project cost

Low erection & Low transportation cost saves overall project cost



Easy to paint

Apollo Columns are easily painted due to uniform & smooth shape



Easy to install

Use of conventional bolting system makes the installation easier



Higher torsional strength

Apollo Columns delivers exceptional torsional resistance. 200 times greater torsion than open sections



Ease of fabrication

Ease of welding, punching, bending & drilling makes Apollo Column a perfect choice



Less wastage of material

APL Apollo Column provides cut to length sizes from 4 to 12 mm to avoid wastage



High strength-to-weight ratio

High Strength to weight ratio results savings in steel consumption



SAVE MORE, BUILD MORE

Up To **20%** Lower Costs
With **APL Apollo's PEB Solutions.**

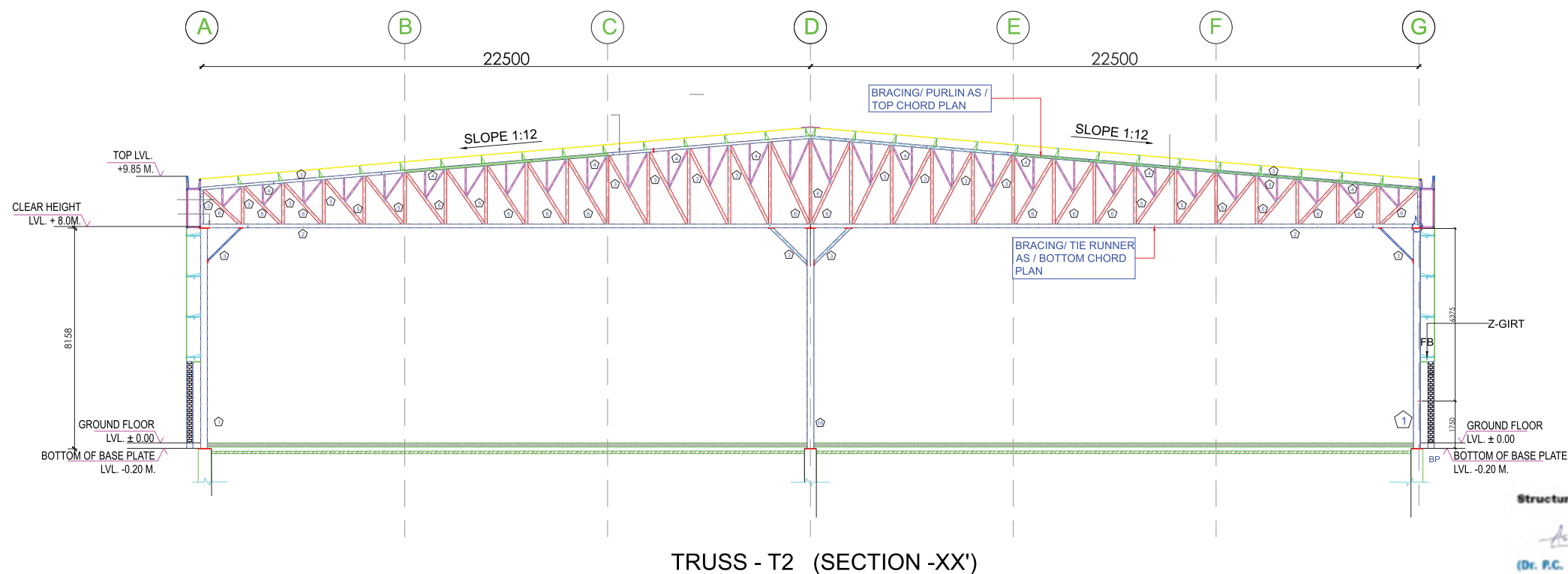
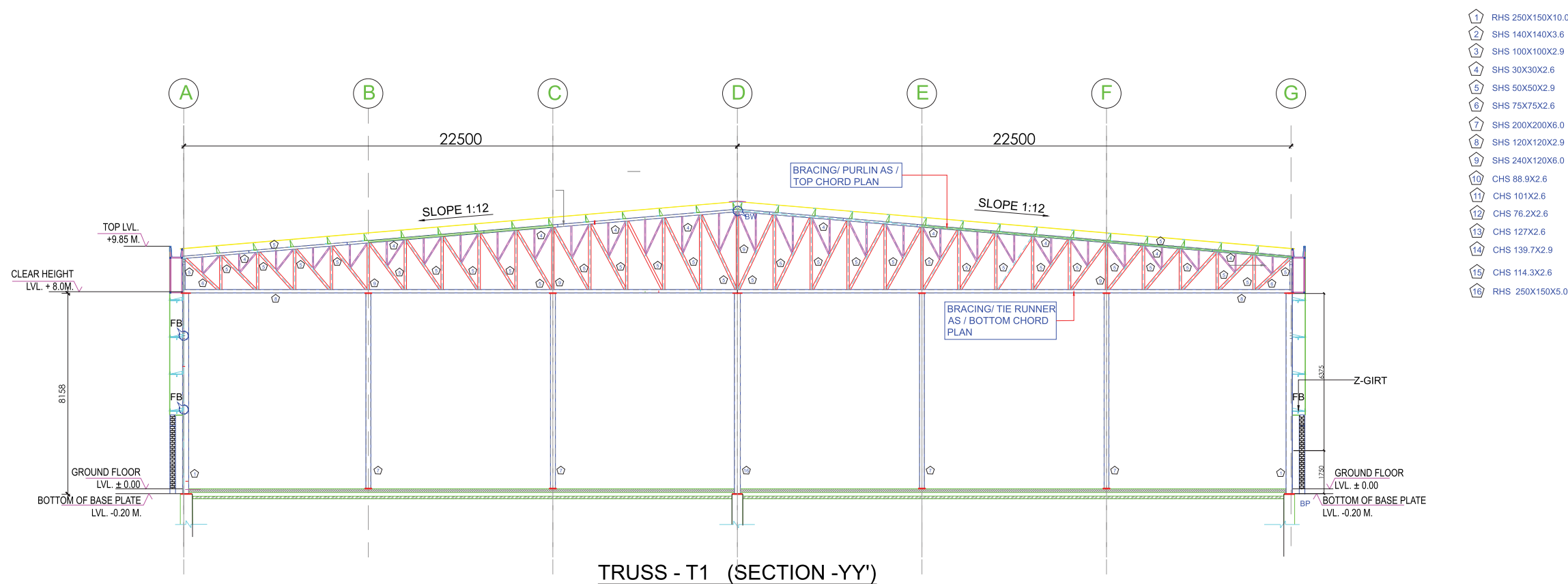
HSS STRUCTURES REDUCE OVERALL PROJECT COST

The unit material cost of HSS is higher than that of open built-up sections, but that's not the whole story. The additional strength of steel tube permits an optimum design. Use of HSS sections against Built-up sections significantly reduces weight. Reducing the weight also saves in transportation and erection cost. In those applications where paint is required, the fact that hollow sections have 30-40% less surface area than equivalent built-up sections can result in using less material and reducing application time, both of which reduce costs. Furthermore, the smooth corners in HSS structures reduce susceptibility to corrosion which lessens the life cycle cost.

RESEARCH WORK WITH IIT ROORKEE

To understand & advocate the benefits of Hollow Steel sections in steel structures, APL Apollo has done extensive research work with Indian Institute of Technology, Roorkee. The research work comprises of the case studies intended to compare the tonnage and indicative costing of HSS & Built-up Sections Steel Structures for Industrial Shed, Warehouse Shed and Commercial Multi-Storey Building. Our extensive research shows that use of HSS sections in structural buildings reduces the consumption of steel by 15-25% and ultimately reduces the project cost.

APL Apollo has done a live project to build an Industrial shed using Apollo Column at Dujana Plant to put all the research findings into a real-time activity.



Structure Design Vetted by:

(Dr. P.C. Ashwin Kumar)
Assistant Professor
Dept. of Earthquake
Engg.
IIT Roorkee, Roorkee -
247667

- 1 RHS 250X150X10.0
- 2 SHS 140X140X3.6
- 3 SHS 100X100X2.9
- 4 SHS 30X30X2.6
- 5 SHS 50X50X2.9
- 6 SHS 75X75X2.6
- 7 SHS 200X200X6.0
- 8 SHS 120X120X2.9
- 9 SHS 240X120X6.0
- 10 CHS 88.9X2.6
- 11 CHS 101X2.6
- 12 CHS 76.2X2.6
- 13 CHS 127X2.6
- 14 CHS 139.7X2.9
- 15 CHS 114.3X2.6
- 16 RHS 250X150X5.0

PROJECT :::

WAREHOUSE CASE STUDY

CLIENT :::

GENERAL NOTES :::

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ALL DIMENSIONS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED.

DRAWING NOT TO BE MEASURED, WRITTEN DIMENSIONS TO BE FOLLOWED.

NOTE:

GRADE OF PLATES - YST 345
(YIELD STRENGTH F_y - 345 N/MM²)

GRADE OF PIPES - YST210,

THE SHED IS SYMMETRIC ABOUT GRID 'D'

FB	FLANGE BRACING
BW	BUTT WELDING
CP	CONNECTION PLATE
TP	TOP PLATE
SP	SPLICE PLATE
BP	BASE PLATE

RO	22.09.2020	TAPESH	
REV NO.	DATE	DESCRIPTION	ISSUED BY

REVISIONS

DEALT	...	CHECKED	...
DESIGN	...	APPROVED	...

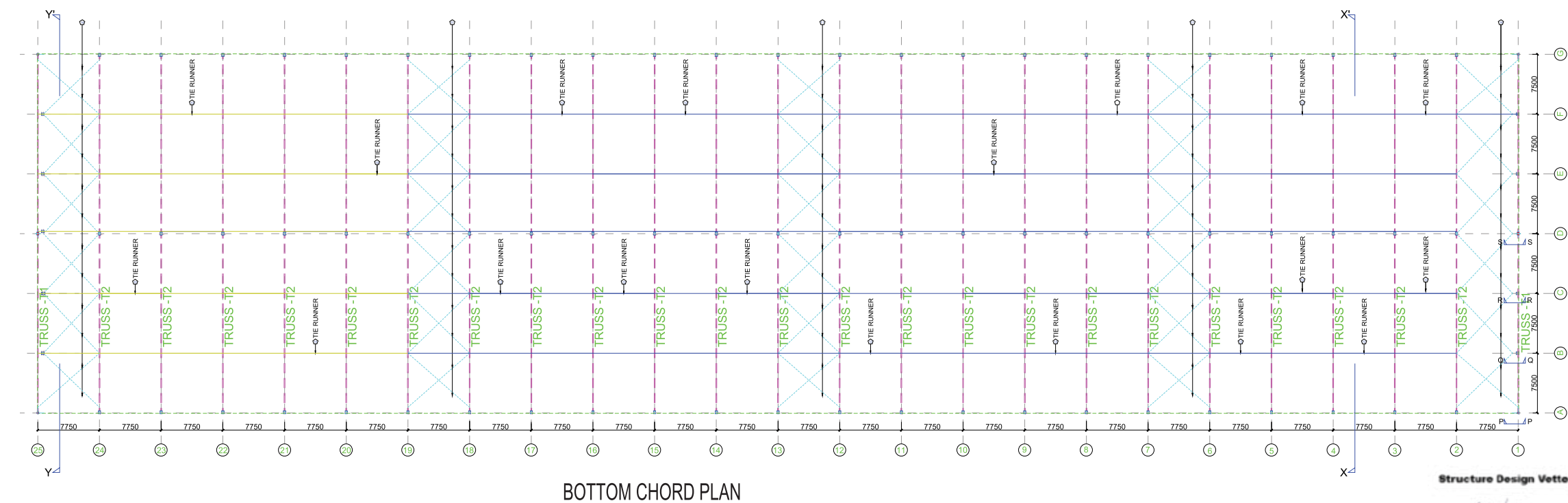
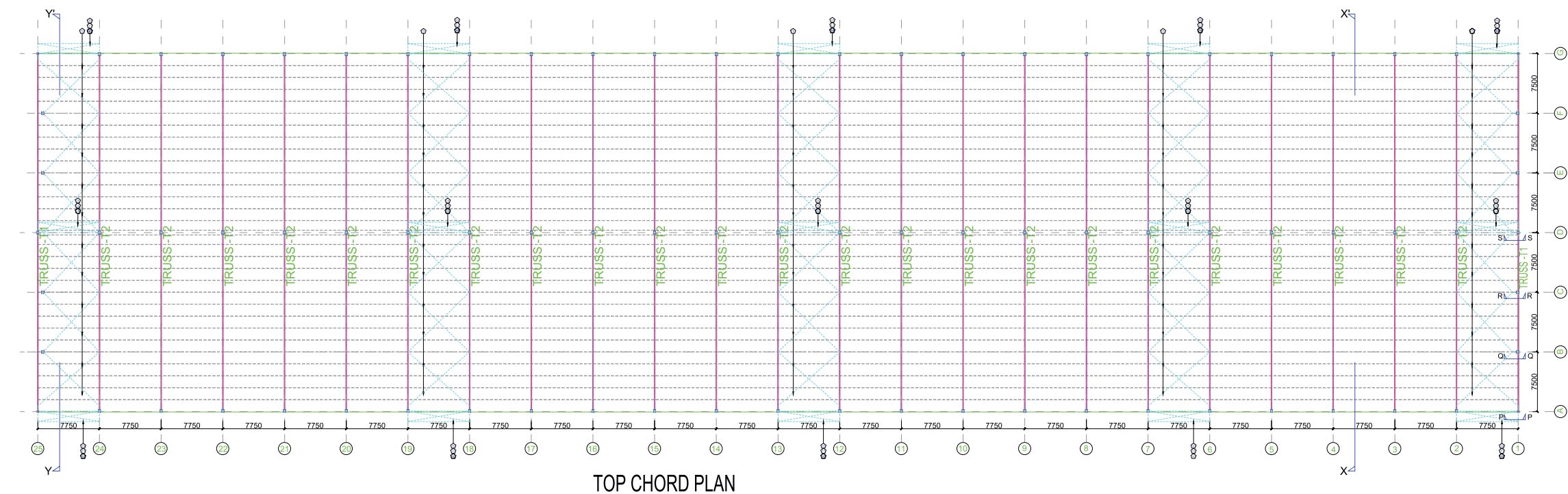
DRAWING TITLE:

TRUSS SECTIONS & DETAILS

WAREHOUSE

APL APOLLO TUBES LTD

Cor. Office : 3B, Neelam, Near Anand Chur Temple, Delhi (NCT) - 110015, India. Tel: 011-120 4041 402 Fax: +91-120 4041 444



Structure Design Vetted by:

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Dept. of Earthquake
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IIT Roorkee, Roorkee -
247667

PROJECT :
WAREHOUSE CASE STUDY

CLIENT :



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S.No	Section Sizes	Quantity	Total Weight	Grade
1	250X150X10.0RH5			YST210
2	140X140X3.6SH5			YST210
3	200X200X6.0SH5			YST210
4	250X150X5.0RH5			YST210
5	240X120X6.0RH5			YST210
6	100X100X2.9SH5			YST210
7	80X80X2.6SH5			YST210
8	50X50X2.9SH5			YST210
9	75X75X2.6SH5			YST210
10	120X120X2.9SH5			YST210
11	88.9X2.6CH5			YST210
12	101.6X2.6CH5			YST210
13	76.2X2.6CH5			YST210
14	127X2.6CH5			YST210
15	139.7X2.9CH5			YST210
16	Purlin			
17	Girt			

REV NO.	DATE	DESCRIPTION	ISSUED BY
R0	22.09.2020	TAPESH	

DEALT	CHECKED
DESIGN	TAPESH
APPROVED	PRO. ASWHIN

DRAWING TITLE:
TRUSS SECTIONS & DETAILS
WAREHOUSE

APL APOLLO TUBES LTD



1

CASE STUDY

USE OF HOLLOW STEEL SECTIONS (HSS)

Cost Comparison Of Warehouse Shed

Particulars	PEB - Using Built - Up Section	PEB - using Apollo Column
Total Steel consumption (Ton)	161.1	120.5 25%
Raw Material (₹/kg)	41.5	46.5
Conversion Cost (₹/kg)	15	16
Transportation (₹/kg)	1	1.2
Erection (₹/kg)	5	5
Total cost (₹/kg)	62.5	68.7
Project Cost (₹ Cr)*	1.01	0.83 18%

*Common material such as purlins and girts are not included in above comparison.



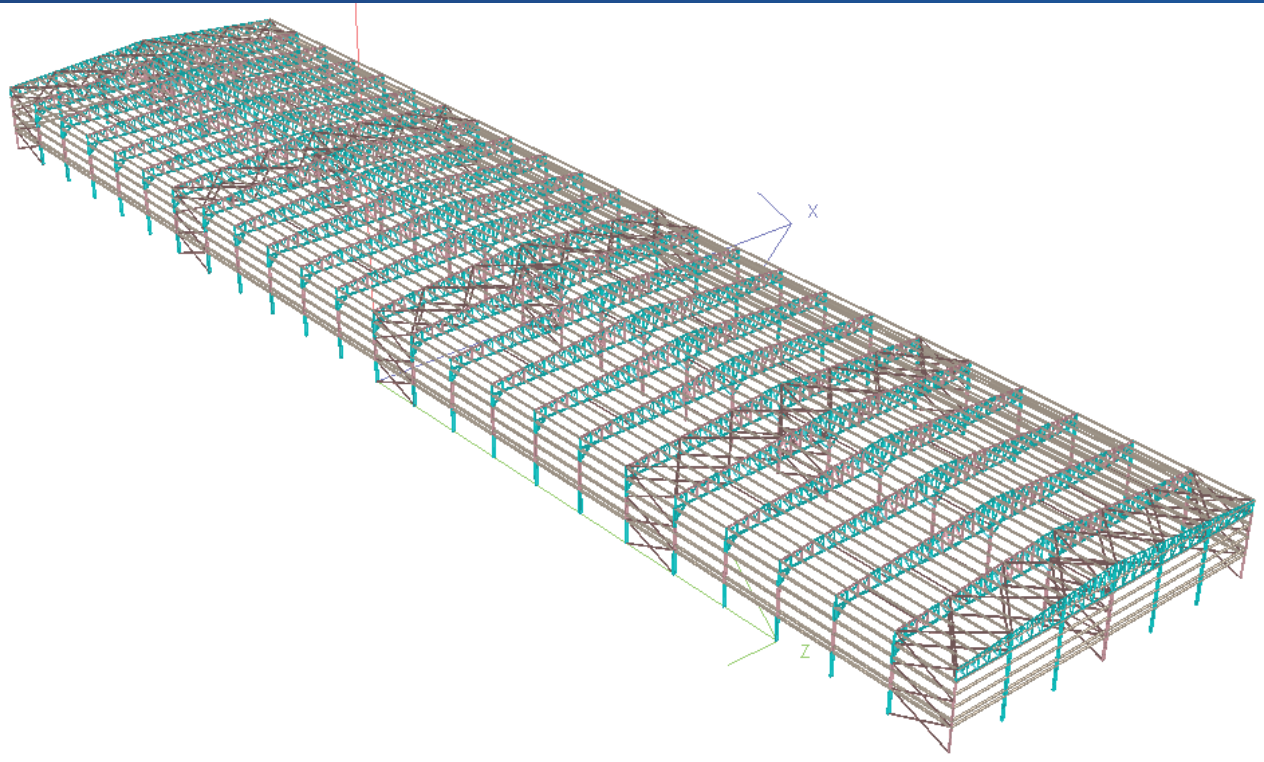
Warehouse Shed

Overview

The Warehouse Shed of 9000 sq. m designed having with equal bays and single pitched roof. The structure designed with 2 configurations, one using Built-up I sections and another using Hollow steel section (HSS). The structures are designed for the Dead Load, Live Load, Wind Load & Seismic Load.

Approach

The building is designed with the two structural configurations for optimizing the material consumption while meeting structural strength requirements. After preliminary sizing of various structural members, 3-D CAD Model of the structural frame of the building has been generated using STAAD-Pro Connect The permissible values of the load factors and stresses has been considered as per guidelines of Indian Standards.



ISOMETRIC VIEW

Material

- Tubular sections

Built-up sections

Roofing Sheet

Wall Cladding
- : Conforming to IS:4923 & IS 1161

: Conforming to IS:2062 for HR plates

: 0.47 mm thick (TCT) Bare Galvalume Sheet of 550 MPa Grade

: 0.5 mm thick (TCT) Colour Coated Sheet of 550 MPa Grade

Load Calculations

(I) Dead Load

The dead load on structure includes all the permanent loads attached with structure i.e. selfweight of structure, roofing sheet. Following are the permanent loads which have been considered in design & analysis.

Weight of structure	: Self weight
Weight of connections	: 15 % of self-weight
Weight of roof sheeting	: 4.5 kg/sqm
Weight of wall cladding	: 4.5 kg/sqm
Load on purlins	: (.03+0.045)*1.42 = 0.1065 kN/

(II) Imposed Loads

Imposed loads as per IS: 875 (Part-2), acting on the structure have been considered

Roof live load	: 0.75 kN/sqm
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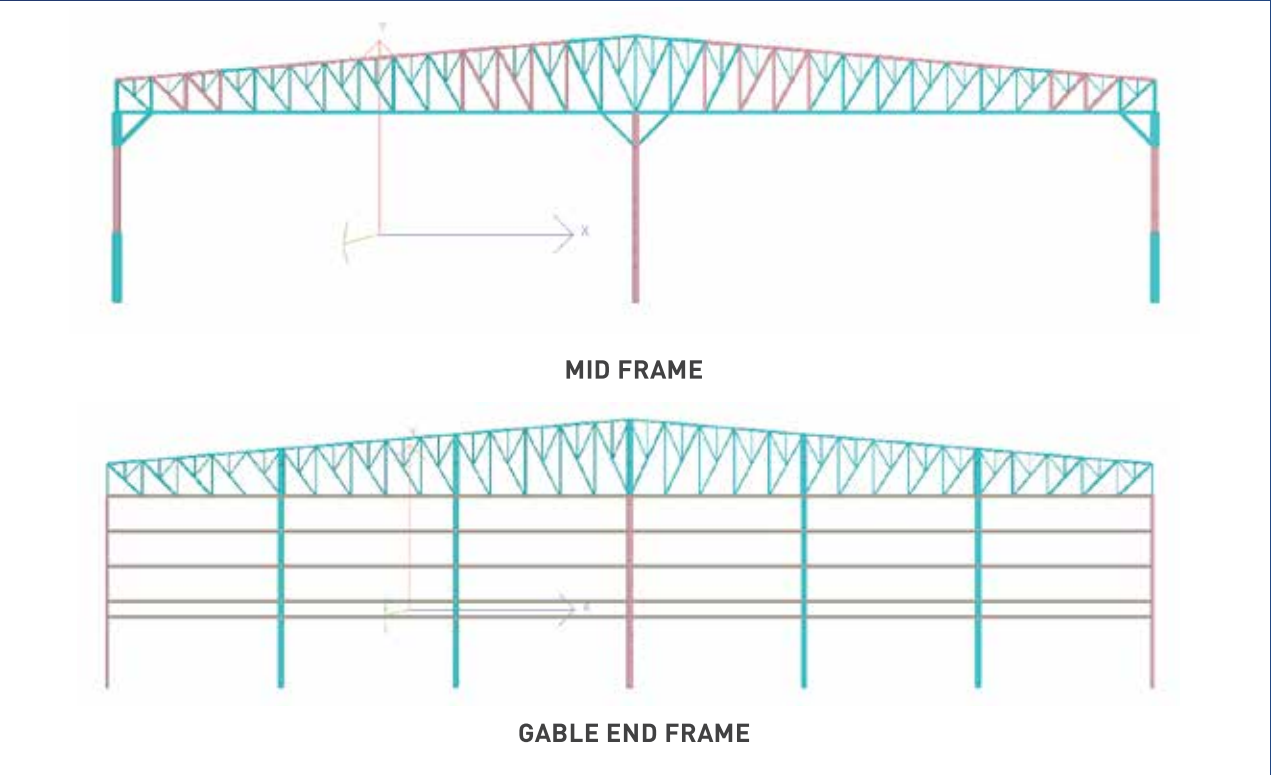
(I) Wind Load

Wind loads has been calculated as per IS:875 part 3-2015.

Basic wind speed of	: 47 m/s, (as per NBC 2016)
Terrain category	: 2
Design Life	: 50 years
Percentage openings	: 5 to 20% of wall

(IV) Seismic Load

In light weight low-rise structures such as the proposed building, seismic loads are inconsequential while wind load affects are pre-dominant, still seismic loads as per IS 1893 have been evaluated by static method and the structure have been checked for adequacy for relevant seismic load combinations.



Comparison Of Steel Consumption

Element	Tonnage (MT)	
	Built-up Sections	Apollo Column
HR Plate sections with web stiffeners	122.2	-
Pipe/Tube sections	9.2	95.5
Connection plates and stiffeners	11.3	10
Anchor bolts & connection bolts	10.8	12.5
Flange brace angles	7.6	2.5
Total Steel Consumption(MT)	161.1	120.5

Design documents for above case study are available on our website

25%
Less Steel Consumption

18%
Saving In Total Project Cost

Cost Comparison Of Cold Storage Shed

Particulars	PEB - Using Built - Up Section	PEB - using Apollo Column
Total Steel consumption (Ton)	2938	2290 23%
Raw Material (₹/kg)	60	65
Conversion Cost (₹/kg)	20	15
Transportation (₹/kg)	1	2
Erection (₹/kg)	20	20
Total cost (₹/kg)	101	102
Project Cost (₹ Cr)*	29.7	23.4 21.3%

*Common material such as purlins and girts are not included in above comparison.



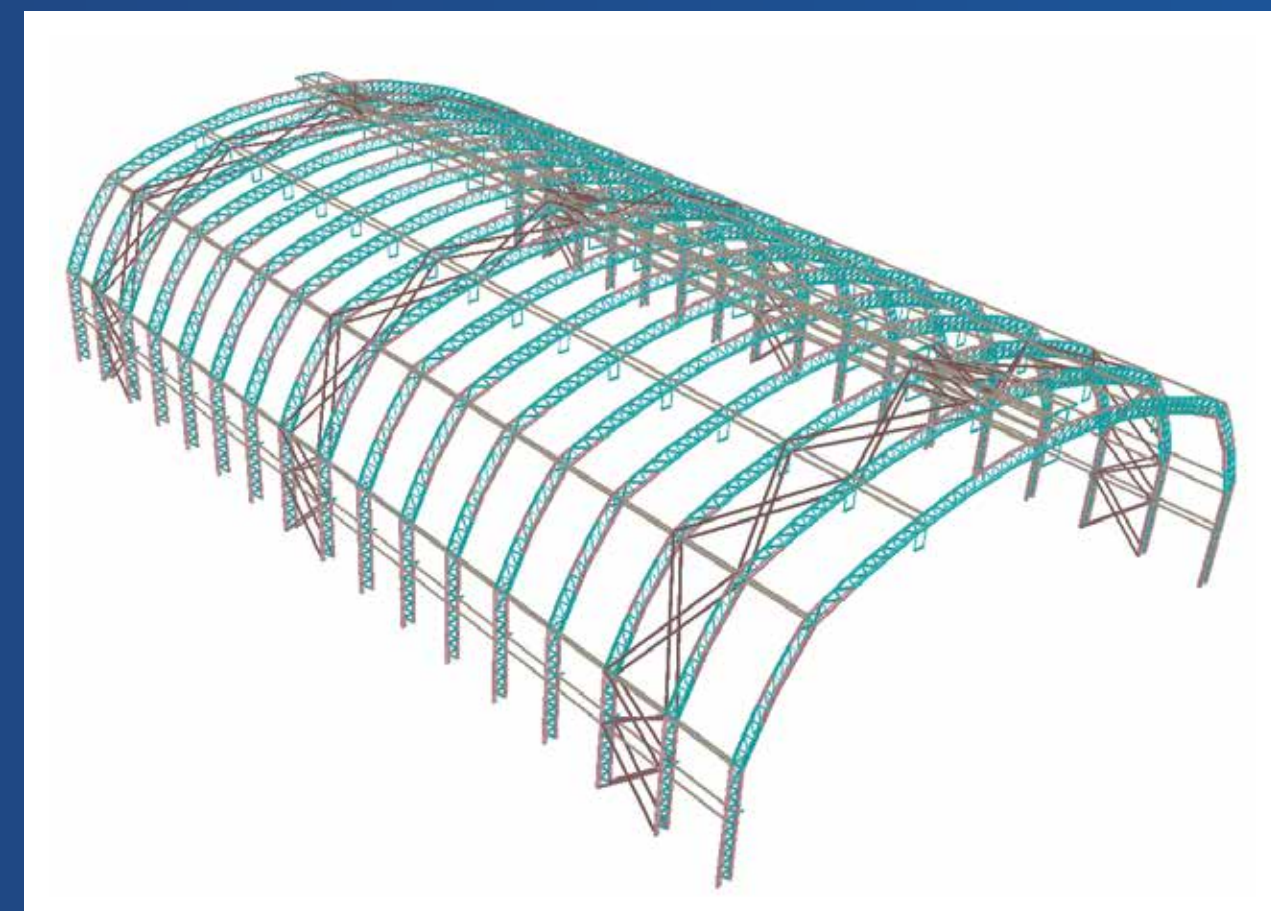
Industrial Shed

Overview

The Cold storage shed of built -up area 32475 sqm. Clear Span Building with 86.6m clear span, 35m height (ridge location) & 375m length shed designed using IS800, IS 875, IS 1893 using structural steel tubes sing STAAD-Pro Connect. The structure designed with two configurations, one using built-up sections and another using hollow section (HSS).The structures are designed for the dead load, live load, wind load and seismic load.

Approach

The building is designed with the two structural configurations for optimizing the material consumption while meeting structural strength requirements. After preliminary sizing of various structural members, 3-D CAD Model of the structural frame of the building has been generated using STAAD-Pro Connect The permissible values of the load factors and stresses has been considered as per guidelines of Indian Standards.



ISOMETRIC VIEW

Material

Tubular sections	: Conforming to IS:4923 & IS 1161
Built-up sections	: Conforming to IS:2062 for HR plates
Roofing Sheet	: 0.47 mm thick (TCT) Bare Galvalume Sheet of 550 MPa Grade
Wall Cladding	: 0.5 mm thick (TCT) Colour Coated Sheet of 550 MPa Grade

Load Calculations

(I) Dead Load

The dead load on structure includes all the permanent loads attached with structure i.e. selfweight of structure, roofing sheet. Following are the permanent loads which have been considered in design & analysis.

Structural load	: Self weight of structure
Connections load	: 15% of weight of structure
Dead weight of roof sheeting	: 4.5kg/sqm
Dead weight of wall cladding	: 4.5kg/sqm
Load on purlins	: $(0.03 + 0.045) \times 1.5 = 0.1125\text{kN/m}$
Load on girts	: $0.045 \times 1.5 = 0.0675\text{kN/m}$

(II) Imposed Loads

Imposed loads as per IS: 875 (Part-2), acting on the structure have been considered

Roof live load	: 0.75kN/sqm
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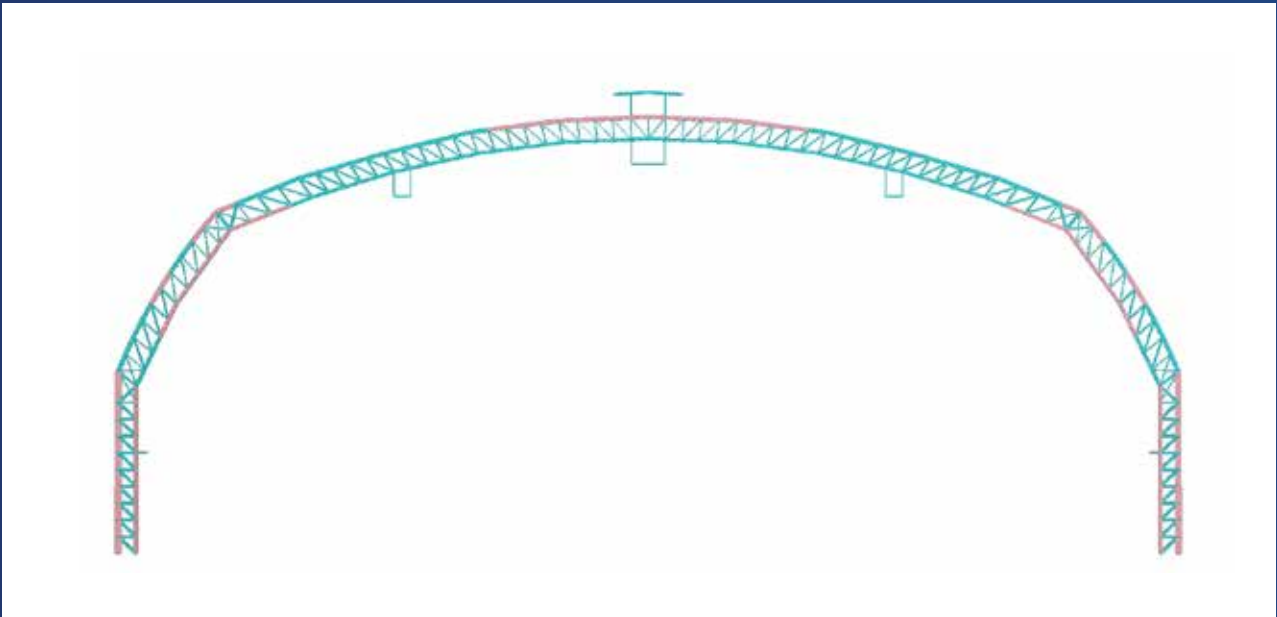
(I) Wind Load

Wind loads has been calculated as per IS:875 part 3-2015.

Basic wind speed of	: 33 m/s, (as per NBC 2016)
Terrain category	: 2
Design Life	: 50yrs
Percentage openings	: 5-20% opening

(IV) Seismic Load

In light weight High-rise structures such as the proposed building, seismic loads are Inconsequential as seismic mass is lower than wind loads. So in these structure, while wind load affects are pre-dominant still we have considered seismic loads as per IS 1893 (evaluated by static method) and the structure have been checked for adequacy for relevant seismic load combinations.



Comparison Of Steel Consumption

Element	Tonnage (MT)	
	Built-up Sections	Apollo Column
HR Plate sections with web stiffeners	2318.2	-
Pipe/Tube sections	-	1916.2
Connection plates and stiffeners	417.3	249.1
Anchor bolts & connection bolts	185.4	124.7
Flange brace angles	17.2	-
Total Steel Consumption(MT)	2938	2290

23%

Less Steel Consumption

21.3%

Saving In Total Project Cost

Results & Conclusions

- In conventional Steel building, Steel column need to get encased with concrete/Gypsum board to the shed area Dust-free, germs-free, bacteria-free pleasing and aesthetic appearance while in case of Structure tube such encasing is not required, lead to smothering area around column corners i.e. dust, germs & bacteria does not have space to survive around the column as well as in tubular column higher carpet area with reducing finishing work & cost can be achieved easily.
- Wastage of steel in Conventional steel building is approx. 5-6% while in Structural Tube building it is ranging 0.5-1.0 % max zero.
- Structural tubes will be supplied in cut-to-length sizes lead faster fabrication at lower cost while in conventional steel huge fabrication work is required.

Cost Comparison Of Commercial Building

Particulars	PEB - Using Built - Up Section	PEB - using Apollo Column
Total Steel consumption (Ton)	1100	800. 27%
Raw Material (₹/kg)	60	65
Conversion Cost (₹/kg)	20	15
Transportation (₹/kg)	1.5	2.5
Erection (₹/kg)	20	20
Total cost (₹/kg)	101.5	102.5
Project Cost (₹ Cr)*	11.165	8.20 26.5%

*Common material such as purlins and girts are not included in above comparison.

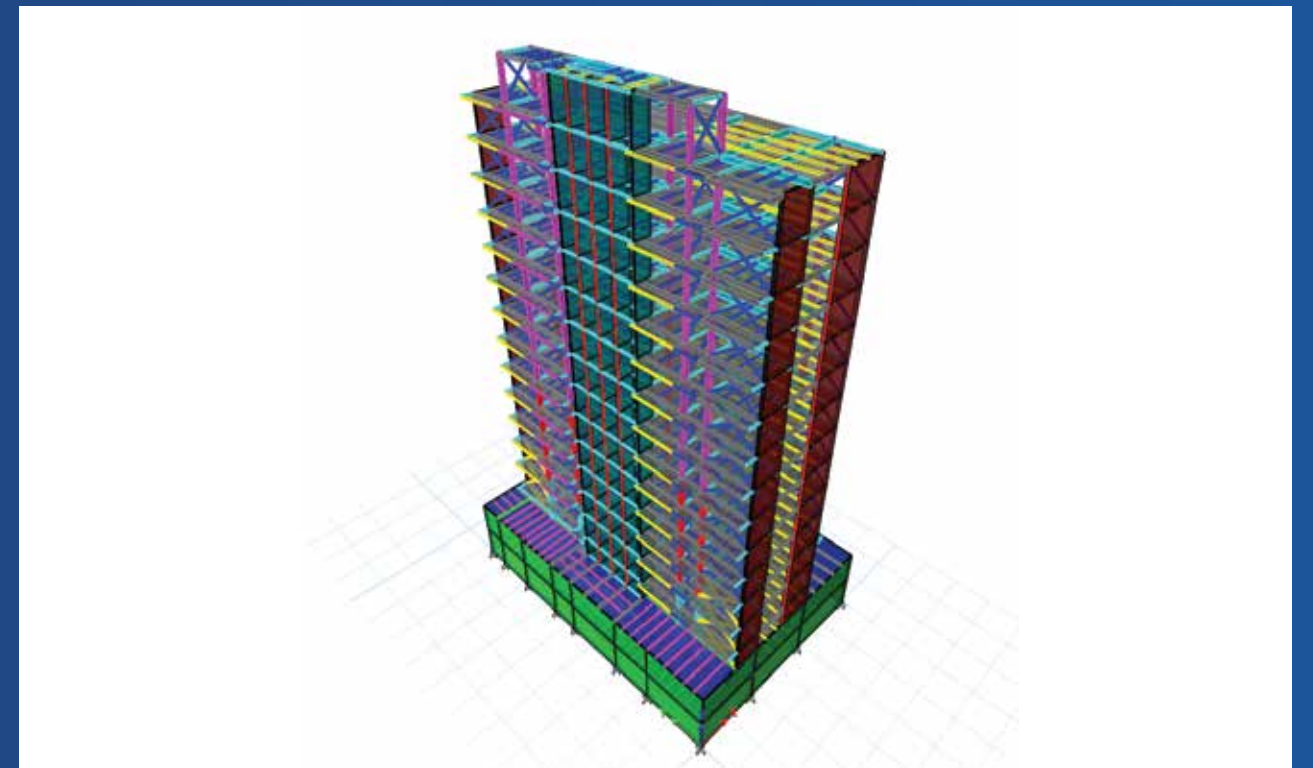
Commercial Building

Overview

The two basement, ground floor+12 floor (15 Floor) Commercial building with built-up area 10684 sqm. Designed using IS800, IS 875, IS 1893 & AISC-360-16. The structure designed with two configurations, one using built-up sections and another using hollow section (HSS). The structures are designed for the dead load, live load, wind load and seismic load. With APL Apollo big sizes section customer will get 2% extra carpet area/seller area because of tubes only. Wastage of steel in peb steel building is approx. 5-6% while in Structural Tube building it is ranging 0.5-1.0 % max. Structural tubes will be supplied in cut-to-length sizes lead faster fabrication at lower cost while in conventional steel huge fabrication work is required.

Approach

The building is designed with the two structural system using Etab software considered. In this building design one structural system is composite design with CFT and second structural system is standard built up section. We have found that composite beam with CFT columns are getting better response in comparison of standard built up sections.



Material

Tubular sections	: Conforming to IS:4923 & IS 1161
Built-up sections	: Conforming to IS:2062 for HR plates
Roofing Sheet	: 0.47 mm thick (TCT) Bare Galvalume Sheet of 550 MPa Grade
Wall Cladding	: 0.5 mm thick (TCT) Colour Coated Sheet of 550 MPa Grade



Load Calculations

(I) Dead Load

The dead load on structure includes all the permanent loads attached with structure i.e. selfweight of structure, roofing sheet. Following are the permanent loads which have been considered In design & analysis.

Weight of structure -	: Self weight of structure
Weight of connections -	: 15% of weight of structure
Weight of deck sheeting -	: 4.5kg/sqm
Weight of ACC wall cladding -	: 4.5kg/sqm

(II) Imposed Loads

Imposed loads as per IS: 875 (Part-2), acting on the structure have been considered

Roof live load	: 4kN/sqm
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(I) Wind Load

For multi-story buildings as the proposed building, wind loads are inconsequential as seismic mass is higher than win loads. So in these structure, seismic load affects are pre-dominant still we have considered wind load as per IS: 875 part 3-2015 and the struc-ture have been checked for adequacy for relevant wind load combinations. Wind loads have been calculated as per IS: 875 part 3-2015.

Basic wind speed of	: 47 m/s, (as per NBC 2016)
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(IV) Seismic Load

For multi-story building seismic loads are critical. Seismic loads as per IS 1893 have been evaluated by dynamic method and the structure have been checked for adequacy for relevant seismic load combinations.

Comparison Of Steel Consumption

Element	Tonnage (MT)	
	Built-up Sections	Apollo Column
HR Plate sections with web stiffeners	907.5	-
Pipe/Tube sections	-	620
Connection plates and stiffeners	165	160
Anchor bolts & connection bolts	185.4	124.7
Flange brace angles	27.5	-
Total Steel Consumption(MT)	1100	800



Results & Conclusions

- Building have 2 basements, as need to complete project faster, so basement struc-ture is take up in steel.
- With APL Apollo big sizes section, customer will get 2% extra carpet area/seller area because of tubes only.
- Building will have deck slab with minimum reinforcement.
- Zero shuttering work for encasing column, as required in built-up sections, lead to same time & cost.
- Wastage of steel in peb steel building is approx. 5-6% while in Structural Tube build-ing it is ranging 0.5-1.0 % max.

Cost Comparison Of Warehouse Shed

Particulars	PEB - Using Built - Up Section	PEB - using Apollo Column
Total Steel consumption (Ton)	719.4	608.6 15.4%
Raw Material (₹/kg)	60	65
Conversion Cost (₹/kg)	20	15
Transportation (₹/kg)	1	2
Erection (₹/kg)	10	10
Total cost (₹/kg)	91	92
Project Cost (₹ Cr)*	6.6	5.6 14.5%

*Common material such as purlins and girts are not included in above comparison.



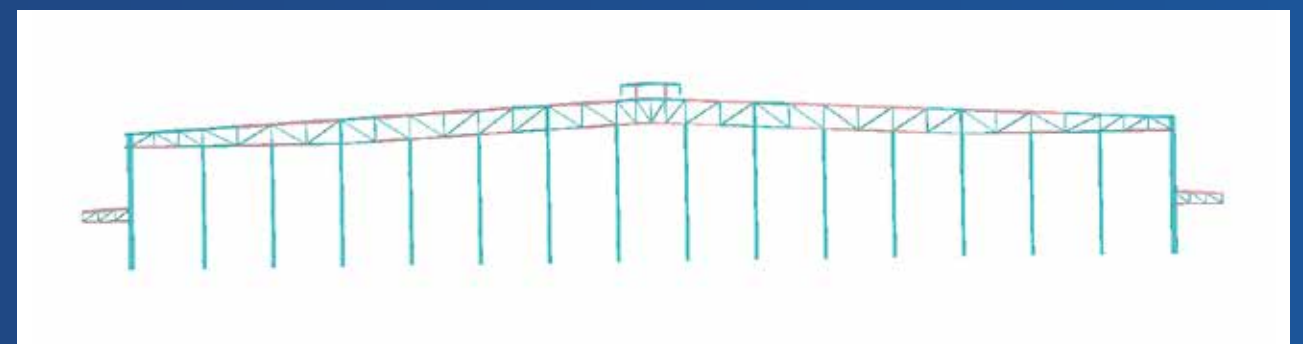
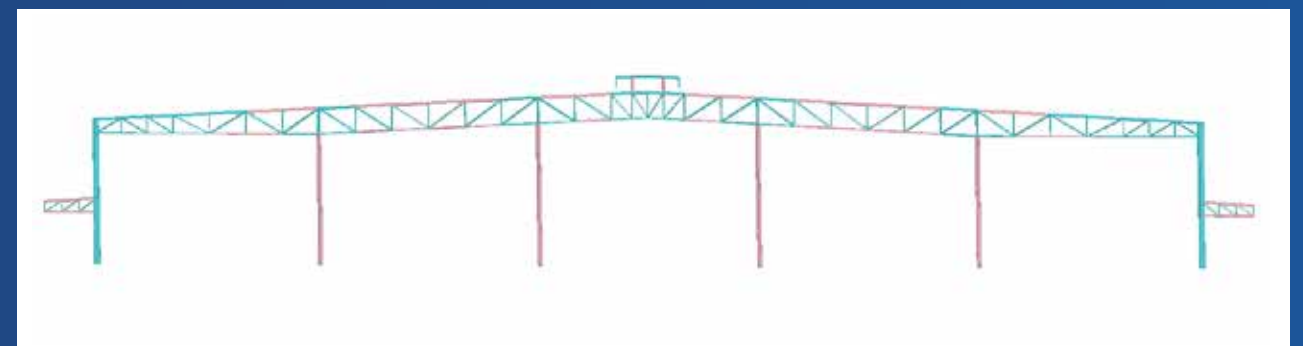
Warehouse Shed

Overview

The Warehouse shed of built-up area 30937 sqm. Shed Building have 4.5m wide canopy along length on both sides, Designed using ASIC, MBMA & AISI-96 by staad pro software. The structure designed with two configurations, one using built-up sections and another using hollow section (HSS).The structures are designed for the dead load, live load, wind load and seismic load.

Approach

The building is designed with the two structural configurations for optimizing the material consumption while meeting structural strength requirements. After preliminary sizing of various structural members, 3-D CAD Model of structural frame of building has been generated using staad-pro connect the permissible values of the load factors and stresses has been considered as per guidelines of reference standard.



ISOMETRIC VIEW

Material

Tubular sections	: Conforming to IS: 4923 & IS 1161
Built-up sections	: Conforming to IS:2062 for HR plates
Roofing Sheet	: 0.47 mm thick (TCT) Bare Galvalume Sheet of 550 MPa Grade
Wall Cladding	: 0.5 mm thick (TCT) Colour Coated Sheet of 550 MPa Grade

Load Calculations

(I) Dead Load

The dead load on structure includes all the permanent loads attached with structure i.e. selfweight of structure, roofing sheet. Following are the permanent loads which have been considered in design & analysis.

Structural load	: Self weight of structure
Connections load	: 15% of weight of structure
Dead weight of roof sheeting	: 4.5kg/sqm
Dead weight of wall cladding	: 4.5kg/sqm
Load on purlins	: (0.03 + 0.045) x 1.5 = 0.1125kN/m
Load on girts	: 0.045 x 1.5 = 0.0675kN/m

(II) Imposed Loads

Imposed loads as per MBMA-2012

Roof live load	: 0.57kN/sqm
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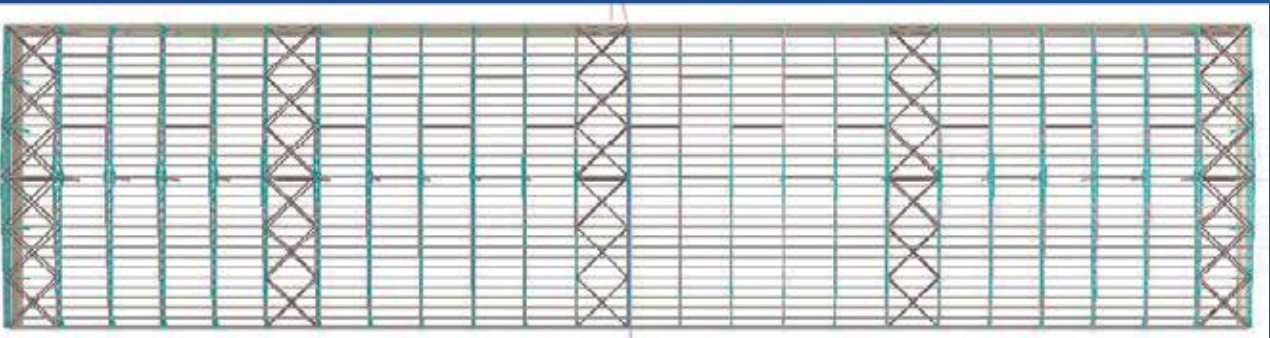
(I) Wind Load

Wind loads has been calculated as per MBMA-2012

Basic wind speed of	: 47 m/s, (as per NBC 2016)
Exposure category	: C
Design Life	: 50yrs
Enclosure Condition	: Enclosed

(IV) Seismic Load

In light weight low-rise structures such as the proposed building, seismic loads are Inconsequential while wind load affects are pre-dominant, still seismic loads as per IS 1893 have been evaluated by static method and the structure have been checked for adequacy for relevant seismic load combinations.



PLAN

Results & Conclusions

- Wastage of steel in peb steel building is approx. 5-6% while in Structural Tube building it is ranging 0.3-0.5 % max
- Almost Zero waste as Apl Apollo will supply Cut-to-length sizes lead less fabrication time as well as zero wastage
- With APL Apollo DFT sizes, customer will get 5%-10% saving due to customized sizes

Comparison Of Steel Consumption

Element	Tonnage (MT)	
	Built-up Sections	Apollo Column
HR Plate sections with web stiffeners	576	-
Pipe/Tube sections	-	503
Connection plates and stiffeners	76.7	65.4
Anchor bolts & connection bolts	45.5	40.2
Flange brace angles	21.2	-
Total Steel Consumption(MT)	719.4	608.6

15.4%

Less Steel Consumption

14.5%

Saving In Total Project Cost

APL Apollo Project Dujana Industrial Shed

About The Project

Apollo Tubes Ltd has a Greenfield Project at Dujana, UP. The Industrial Structure of 78000 sq. ft. consists of 146 m long shed having 49 m width with clear height of 11 m and 15 MT crane. The shed is constructed using APL Apollo Steel Tube. The structure is well designed for the Dead Load, Live Load, Wind Load, Earthquake Load and Crane Load.

Challenges

The challenge was to reduce the weight and cost of the industrial shed. Our findings in the research work showed a significant reduction in steel consumption in HSS structures as compared to builtup structures. The project aimed at developing an optimised industrial shed with minimum construction time and zero onsite fabrication.

Solution

APL Apollo Tubes has worked to achieve the results received from the research work & put it in a real time project. The optimised steel structure was designed & constructed using APL Apollo Tubes.

Results & Conclusions

340^{MT}

Steel
Consumption

25%

Less Steel
Consumption

15%

Saving in total
project cost



Myths and Facts About HSS Building



Myth

Bolted connections are difficult in HSS structure

Fact

Bolted connections are easily implementable in HSS structure as per code compliance. Extended end plate to HSS beam permits the use of conventional bolted connection.



Myth

High raw material cost increases the project cost

Fact

Use of HSS sections against Builtup sections in steel structures significantly reduces weight which decreases the overall project cost.



Myth

Unavailability of bigger sizes in the market

Fact

Use of HSS sections against Builtup sections in steel structures significantly reduces weight which decreases the overall project cost.



Myth

HSS structures need site fabrication

Fact

Zero onsite fabrication using automatic welding equipment is possible.



Myth

HSS structures are architecturally boring

Fact

Ease of fabrication using HSS sections provides flexibility to the architects to shape their structures and express their creativity.



Myth

Wastage of material is high

Fact

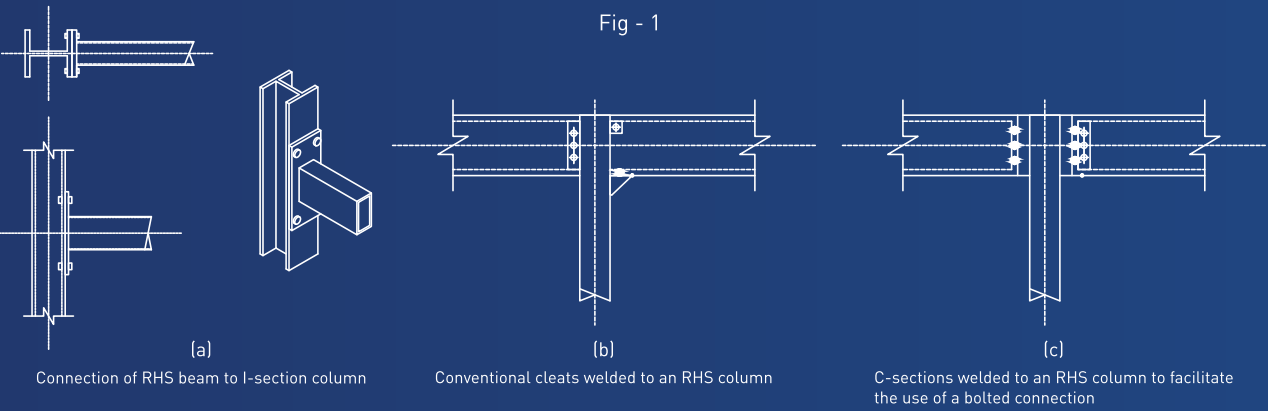
APL Apollo provides cut to length sizes from 4mm to 12mm to avoid wastage.

How To Make A Successful Building Using HSS?

1. HSS CONNECTIONS

WELDED AND BOLTED CONNECTION

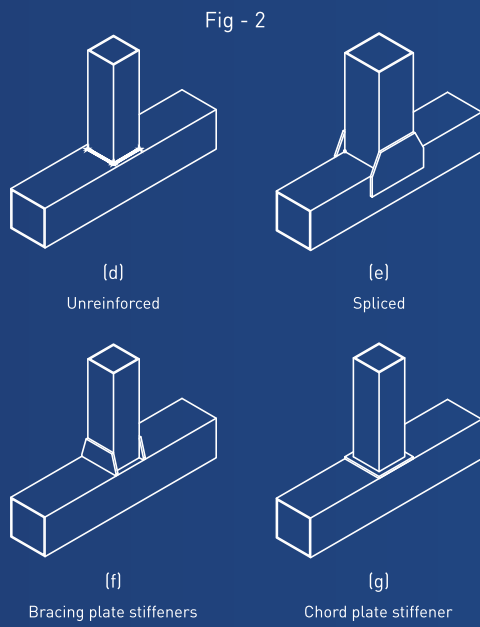
Beams and columns are usually connected on site by bolting. In the case of an RHS beam connection to an I-section column, a welded extended end-plate to the RHS beam permits the use of a conventional bolted connection to the column flange or web (see Figure 1.a). The bolts may be countersunk into the thick endplate if the connection is important visually. A number of typical simple connections using cleats welded to an RHS column are shown in Figures 1.b to c. Figure 1(b) shows a fin plate welded to the face of the column and the supporting bracket can be detailed to be visually interesting. Figure 1(c) shows the use of channels welded at the tips of their flanges.



VIERENDEEL TRUSSES

are relatively inefficient at resisting high shearforces because of the lack of diagonal bracing and, therefore, it is necessary to use thicker or larger chord members than in triangulated trusses. Ideally, the chord and vertical members should be the same external size. If not, stiffening elements are generally inserted to increase the local bending resistance of the connections. Figure 2 shows various ways in which nominally pinned connections can be strengthened in Vierendeel trusses.

Various ways in which normally pinned connection can be strength Fig - 6 (c)(d)(e)(f)(g)

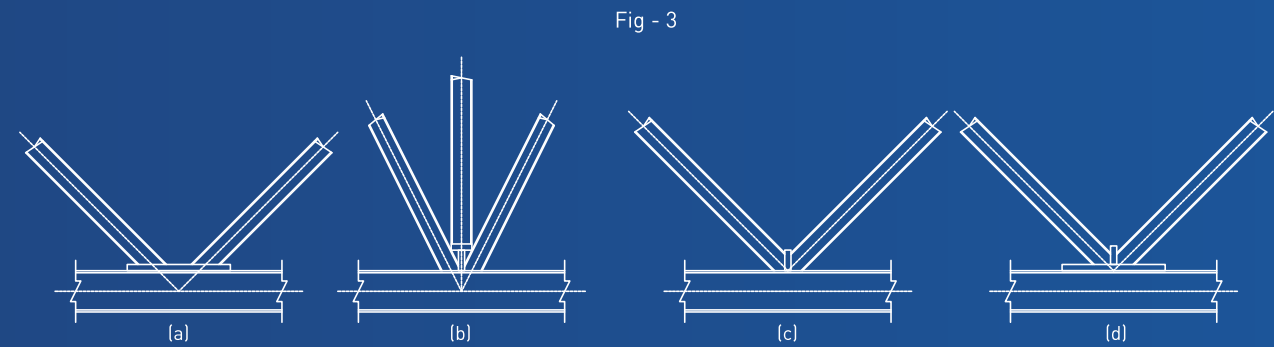


REINFORCEMENT OF CONNECTIONS

For maximum resistance of the members, it is usually more efficient to select larger HSS sections with thin walls. However, when designing the connections, it is more advantageous to use chord members that are thicker and smaller in section (provided that they are not smaller than the bracing members). Therefore, a compromise is necessary for overall design and fabrication efficiency.

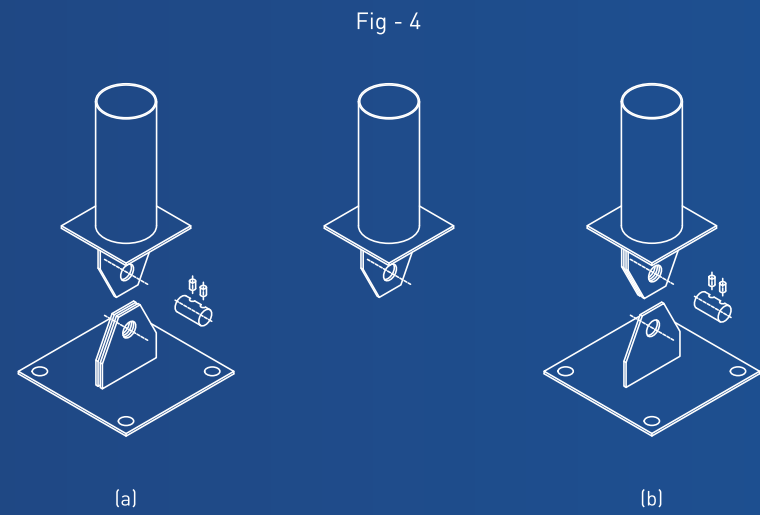
In some cases, connections may have to be strengthened locally to resist the applied forces, if it is not possible to increase the member size or thickness. This can be achieved by welding plates to the chord face (see Figure 3(a)). It should also be noted that overlaps will also increase the connection resistance, especially for RHS members. When a third member is required at the intersection, a 'T' piece can also be used (see Figure 3(b)).

Other non-standard stiffened K connections can be used to increase the load capacity of the connection, as illustrated in Figure 3(c&d).



COLUMN BASES

Bases to HSS columns take two basic forms: pinned and rigid (or moment-resisting). The details employed reflect the transfer of forces and moments. A genuine pinned connection can be achieved by a single pin from a projecting plate, as shown in Figure 4.

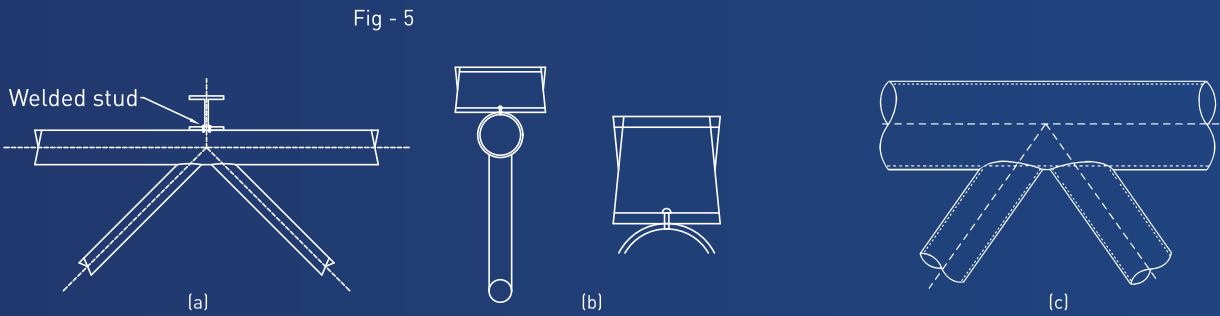


Some examples of HSS connections with pinned ends

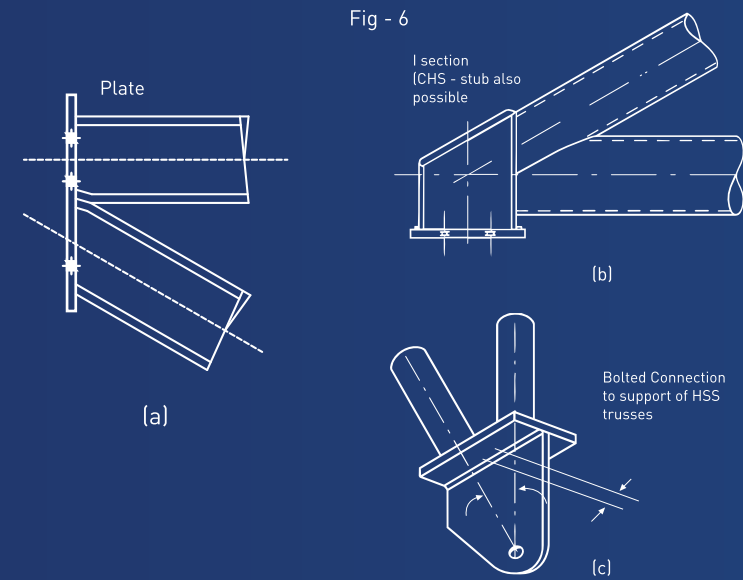
WELDED FINS

Fins or brackets may be welded to the side of CHS or SHS/RHS sections to provide direct attachment of secondary members such as purlins (see Figure 5). Connections of this type require careful design because of the possible local distortion of the walls of larger hollow sections. Alternatively, welded threaded studs with extended washers may be used to attach the purlins to the section.

The attachment of tension-ties or rod-bracing members requires similar details. High local forces from ties may also be transferred by 'patch-type' connections, which may be profiled around the circular section so that weld forces are transferred smoothly to the walls of the section. Multiple welded fin connections have been used successfully on a number of major projects, such as at the column bases at the Cologne Airport terminal, as shown in Figure 5(d]

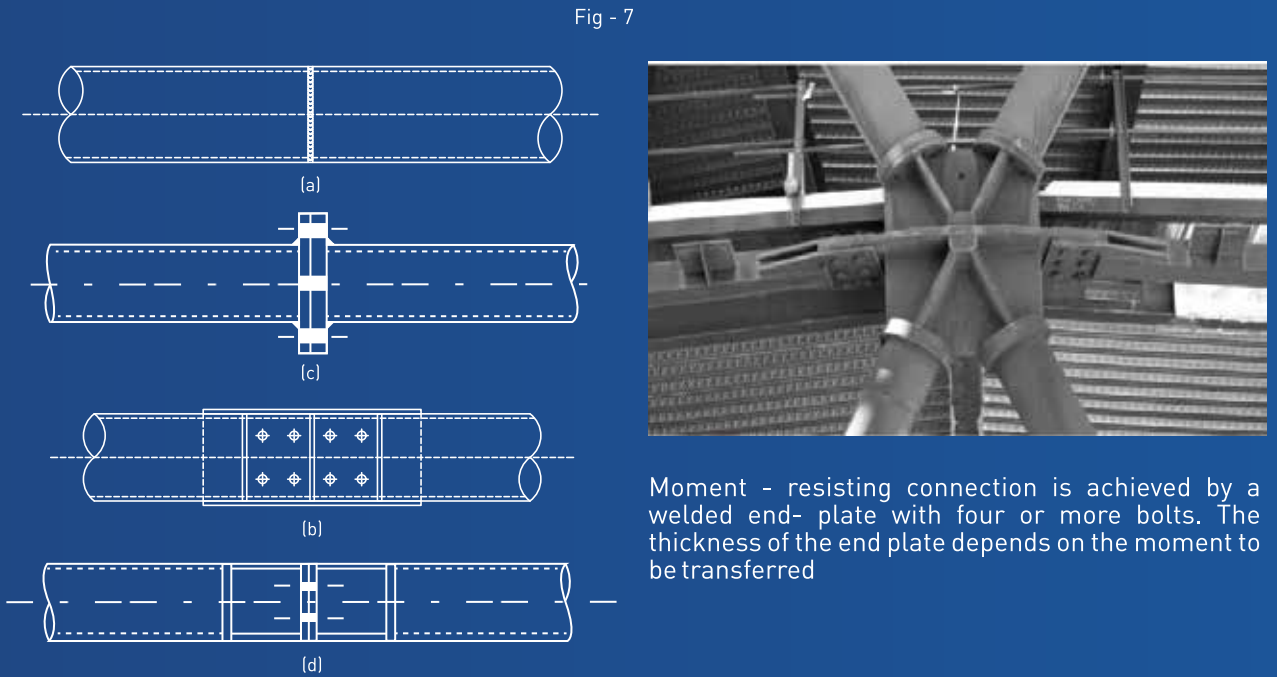


Bolted connections are desirable for site assembly, and large welded sub-assemblies that are prefabricated and bolted together on site at suitable locations. The practical aspects of installation should be considered in the design process. For example, Figure 6 shows



HSS SPLICE CONNECTION

FLANGE PLATES (Figure - 7] are simple to make but are not aesthetically pleasing. They are suitable for compression but are less efficient for tension because of bending in the end plate, requiring thicker plates and more bolts. Fillet welding around the section could cause distortion of thin flange plates.



Moment - resisting connection is achieved by a welded end- plate with four or more bolts. The thickness of the end plate depends on the moment to be transferred

SPLICE CONNECTION WITH PLUG WELDING

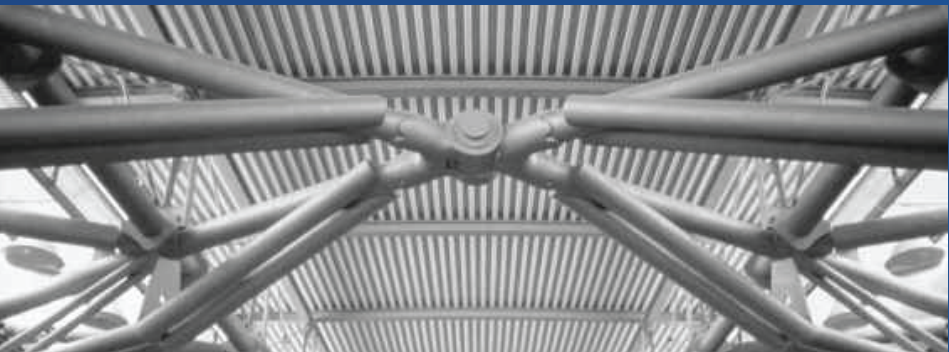
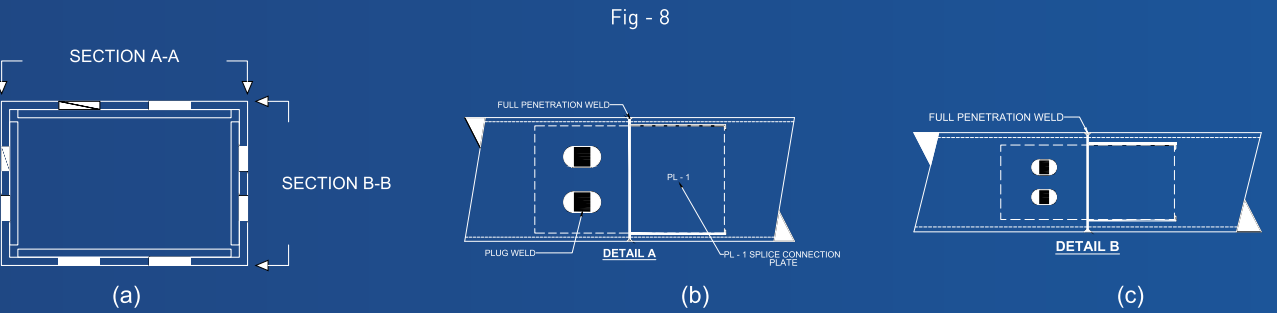


Fig - 9

Interesting details can be created using cast iron or cast steel nodes in a pinned connection

HSS TRUSS

For the connection of HSS trusses to RHS columns, typical bolted details are shown in Figure 10. High shear-forces may require the use of more bolts than shown. The sharing of load between the upper and lower chords in the connection depends on the presence of a vertical bracing member at the end of the truss. In the detail of Figure 11(a), the upper connection will resist all of the applied shear-force. In Figure 10(b), the upper and lower parts of the connections may be assumed to resist equal shear-force.

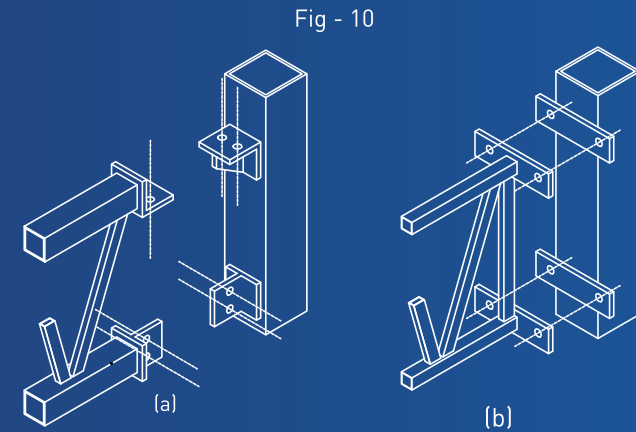
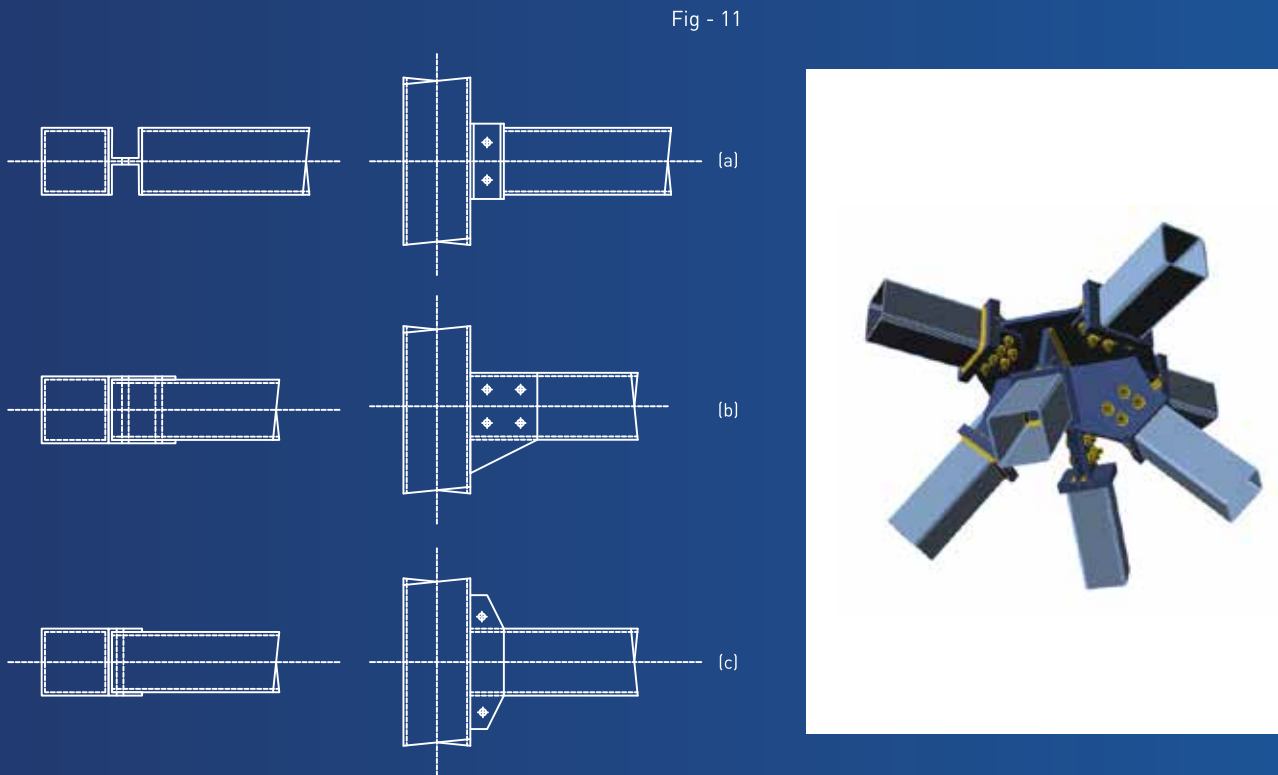


Figure 10(a&b) - Truss to SHS/RHS column connection

HSS BEAM TO AN HSS COLUMN

Figure 11 shows other typical connections of an RHS beam to an RHS column. For lightly loaded connections, the T-section shown in Figure 11(a) may be replaced with a fin plate. Where through bolting is used (as in Figure 11(b) and Figure 11(c)), spacer tubes



Typical connection of an RHS beam to an RHS column a,b&c

2. FACTORY CONTROLLED FABRICATION

Prefabrication is the singled out approach to build steel structures using HSS because it allows the considerable part of the process to happen on the workshop floor where more tools and materials are readily available, thus reducing the costs of transportation and enabling for faster modification & conversion. Fabrication of hollow steel sections carried out in shops is precise and of assured quality.



3. AUTOMATION IN WELDING

With advancement in engineering & technology, automatic weld beam welding lines are available for fabrication of HSS structures. The automated process ensures superior weld quality due to the electronic controller and also the results are much more consistent than in manual welding.

Benefits



1. Cost reduction



2. Increased productivity



3. Consistent accuracy



4. Minimum wastage



5. Lower labour cost

4. ERECTION USING BOLTING CONNECTION

Erection involves the assembly of HSS components into a desired frame at site. Hollow steel sections are fabricated at the factory to the exact size, transported to site and assembled at site using bolted connections. Bolted connections are easily implementable in HSS structure (Refer: HSS connections). Extended end plate to HSS components permits the use of conventional bolted connections.

SQUARE HOLLOW SECTION

Square Size Range
12mm X 12mm to 500mm X 500mm

Thickness
1mm to 20mm

SQUARE HOLLOW SECTION (SHS) - IS 4923 : 2017 / IS 18573 : 2024 / EN 10219-1 : 2006* / ASTM A-500

Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
			I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
mm	kg/m	cm ²	cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
12X12X1.6	0.47	0.60	0.10	0.10	0.41	0.41	0.17	0.17	0.22	0.22	0.12	0.18
12X12X2.0	0.55	0.70	0.11	0.11	0.40	0.40	0.19	0.19	0.25	0.25	0.07	0.13
15X15X1.6	0.62	0.79	0.23	0.23	0.54	0.54	0.31	0.31	0.39	0.39	0.32	0.38
15X15X2.0	0.74	0.94	0.25	0.25	0.52	0.52	0.34	0.34	0.44	0.44	0.28	0.35
15X15X2.2	0.79	1.00	0.25	0.25	0.50	0.50	0.34	0.34	0.46	0.46	0.24	0.32
20X20X1.6	0.87	1.11	0.61	0.61	0.74	0.74	0.61	0.61	0.75	0.75	0.95	0.84
20X20X2.0	1.05	1.34	0.69	0.69	0.72	0.72	0.69	0.69	0.88	0.88	1.01	0.90
20X20X2.2	1.13	1.44	0.73	0.73	0.71	0.71	0.73	0.73	0.93	0.93	1.00	0.90
20X20X2.5	1.25	1.59	0.77	0.77	0.70	0.70	0.77	0.77	1.00	1.00	0.95	0.87
25X25X1.6	1.12	1.43	1.28	1.28	0.95	0.95	1.03	1.03	1.24	1.24	2.05	1.46
25X25X2.0	1.37	1.74	1.48	1.48	0.92	0.92	1.19	1.19	1.47	1.47	2.32	1.64
25X25X2.2	1.48	1.88	1.57	1.57	0.91	0.91	1.26	1.26	1.57	1.57	2.40	1.70
25X25X2.5	1.64	2.09	1.69	1.69	0.90	0.90	1.36	1.36	1.71	1.71	2.46	1.75
25X25X2.8	1.79	2.28	1.79	1.79	0.89	0.89	1.44	1.44	1.84	1.84	2.44	1.76
30X30X1.6	1.37	1.75	2.31	2.31	1.15	1.15	1.54	1.54	1.84	1.84	3.73	2.24
30X30X2.0	1.68	2.14	2.72	2.72	1.13	1.13	1.82	1.82	2.21	2.21	4.35	2.59
30X30X2.2	1.82	2.32	2.91	2.91	1.12	1.12	1.94	1.94	2.37	2.37	4.60	2.72
30X30X2.5	2.03	2.59	3.16	3.16	1.10	1.10	2.11	2.11	2.61	2.61	4.89	2.89
30X30X2.8	2.23	2.84	3.37	3.37	1.09	1.09	2.25	2.25	2.83	2.83	5.06	2.99
30X30X3.2	2.49	3.17	3.62	3.62	1.07	1.07	2.42	2.42	3.08	3.08	5.10	3.05
30X30X3.6	2.72	3.47	3.82	3.82	1.05	1.05	2.55	2.55	3.31	3.31	4.92	2.99
30X30X4.0	2.94	3.75	3.97	3.97	1.03	1.03	2.65	2.65	3.50	3.50	4.52	2.84
30X30X4.5	3.19	4.07	4.09	4.09	1.00	1.00	2.73	2.73	3.70	3.70	3.72	2.49
30X30X5.0	3.42	4.36	4.16	4.16	0.98	0.98	2.78	2.78	3.84	3.84	2.69	1.98
30X30X5.4	3.58	4.56	4.17	4.17	0.96	0.96	2.78	2.78	3.93	3.93	1.80	1.49
30X30X6.0	3.79	4.83	4.12	4.12	0.92	0.92	2.75	2.75	4.01	4.01	0.69	0.76
32X32X1.6	1.48	1.88	2.84	2.84	1.23	1.23	1.78	1.78	2.12	2.12	4.59	2.60
32X32X2.0	1.81	2.30	3.36	3.36	1.21	1.21	2.10	2.10	2.54	2.54	5.40	3.02
32X32X2.2	1.96	2.50	3.60	3.60	1.20	1.20	2.25	2.25	2.74	2.74	5.74	3.19
32X32X2.5	2.19	2.79	3.92	3.92	1.19	1.19	2.45	2.45	3.02	3.02	6.15	3.41
32X32X2.8	2.41	3.07	4.21	4.21	1.17	1.17	2.64	2.64	3.28	3.28	6.44	3.56
32X32X3.2	2.68	3.42	4.54	4.54	1.15	1.15	2.84	2.84	3.59	3.59	6.62	3.68
38X38X1.6	1.77	2.26	4.92	4.92	1.48	1.48	2.59	2.59	3.06	3.06	7.93	3.82
38X38X2.0	2.18	2.78	5.88	5.88	1.45	1.45	3.10	3.10	3.70	3.70	9.49	4.51
38X38X2.2	2.38	3.03	6.32	6.32	1.44	1.44	3.33	3.33	4.00	4.00	10.19	4.81
38X38X2.5	2.66	3.39	6.94	6.94	1.43	1.43	3.66	3.66	4.44	4.44	11.11	5.21
38X38X2.8	2.94	3.74	7.51	7.51	1.42	1.42	3.96	3.96	4.84	4.84	11.88	5.55
38X38X3.2	3.29	4.19	8.18	8.18	1.40	1.40	4.31	4.31	5.34	5.34	12.64	5.89
38X38X3.6	3.63	4.62	8.76	8.76	1.38	1.38	4.62	4.62	5.80	5.80	13.07	6.10
40X40X1.6	1.88	2.39	5.79	5.79	1.56	1.56	2.90	2.90	3.41	3.41	9.32	4.28
40X40X2.0	2.31	2.94	6.94	6.94	1.54	1.54	3.47	3.47	4.13	4.13	11.20	5.07
40X40X2.2	2.51	3.20	7.47	7.47	1.53	1.53	3.74	3.74	4.48	4.48	12.05	5.42

SQUARE HOLLOW SECTION (SHS) - IS 4923 : 2017 / IS 18573 : 2024 / EN 10219-1 : 2006* / ASTM A-500

Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
40X40X2.5	2.82	3.59	8.22	8.22	1.51	1.51	4.11	4.11	4.97	4.97	13.19	5.90
40X40X2.8	3.11	3.96	8.90	8.90	1.50	1.50	4.45	4.45	5.43	5.43	14.17	6.30
40X40X3.2	3.49	4.45	9.72	9.72	1.48	1.48	4.86	4.86	6.01	6.01	15.19	6.73
40X40X3.6	3.85	4.91	10.45	10.45	1.46	1.46	5.23	5.23	6.53	6.53	15.86	7.02
40X40X4.0	4.20	5.35	11.07	11.07	1.44	1.44	5.54	5.54	7.01	7.01	16.15	7.19
40X40X4.5	4.61	5.87	11.73	11.73	1.41	1.41	5.87	5.87	7.55	7.55	15.97	7.20
40X40X5.0	4.99	6.36	12.26	12.26	1.39	1.39	6.13	6.13	8.02	8.02	15.15	6.99
40X40X5.4	5.28	6.72	12.59	12.59	1.37	1.37	6.30	6.30	8.35	8.35	14.06	6.66
40X40X6.0	5.68	7.23	12.94	12.94	1.34	1.34	6.47	6.47	8.76	8.76	11.76	5.89
40X40X8.0	6.74	8.59	13.03	13.03	1.23	1.23	6.52	6.52	9.50	9.50	2.17	1.81
45X45X1.6	2.13	2.71	8.41	8.41	1.76	1.76	3.74	3.74	4.38	4.38	13.47	5.54
45X45X2.0	2.62	3.34	10.12	10.12	1.74	1.74	4.50	4.50	5.32	5.32	16.31	6.61
45X45X2.2	2.86	3.64	10.92	10.92	1.73	1.73	4.86	4.86	5.78	5.78	17.63	7.10
45X45X2.5	3.21	4.09	12.06	12.06	1.72	1.72	5.36	5.36	6.43	6.43	19.45	7.77
45X45X2.8	3.55	4.52	13.12	13.12	1.70	1.70	5.84	5.84	7.05	7.05	21.07	8.37
45X45X3.2	4.00	5.09	14.41	14.41	1.68	1.68	6.41	6.41	7.83	7.83	22.91	9.05
45X45X3.6	4.42	5.63	15.57	15.57	1.66	1.66	6.92	6.92	8.55	8.55	24.33	9.58
45X45X4.0	4.83	6.15	16.61	16.61	1.64	1.64	7.39	7.39	9.22	9.22	25.31	9.96
50X50X1.6	2.38	3.03	11.71	11.71	1.97	1.97	4.69	4.69	5.46	5.46	18.68	6.95
50X50X2.0	2.94	3.74	14.15	14.15	1.95	1.95	5.66	5.66	6.66	6.66	22.75	8.35
50X50X2.2	3.20	4.08	15.30	15.30	1.94	1.94	6.12	6.12	7.24	7.24	24.66	9.00
50X50X2.5	3.60	4.59	16.94	16.94	1.92	1.92	6.78	6.78	8.07	8.07	27.35	9.90
50X50X2.8	3.99	5.08	18.49	18.49	1.91	1.91	7.40	7.40	8.87	8.87	29.81	10.72
50X50X3.2	4.50	5.73	20.40	20.40	1.89	1.89	8.16	8.16	9.89	9.89	32.72	11.68
50X50X3.6	4.98	6.35	22.15	22.15	1.87	1.87	8.86	8.86	10.84	10.84	35.16	12.49
50X50X4.0	5.46	6.95	23.74	23.74	1.85	1.85	9.50	9.50	11.73	11.73	37.09	13.14
50X50X4.5	6.02	7.67	25.50	25.50	1.82	1.82	10.20	10.20	12.76	12.76	38.72	13.72
50X50X5.0	6.56	8.36	27.04	27.04	1.80	1.80	10.82	10.82	13.70	13.70	39.43	14.04
50X50X5.4	6.97	8.88	28.11	28.11	1.78	1.78	11.25	11.25	14.39	14.39	39.32	14.10
50X50X6.0	7.56	9.63	29.45	29.45	1.75	1.75	11.78	11.78	15.32	15.32	37.97	13.86
50X50X8.0	9.26	11.79	31.94	31.94	1.65	1.65	12.78	12.78	17.55	17.55	24.10	10.19
60X60X2.0	3.56	4.54	25.14	25.14	2.35	2.35	8.38	8.38	9.79	9.79	40.19	12.44
60X60X2.2	3.89	4.96	27.27	27.27	2.34	2.34	9.09	9.09	10.66	10.66	43.74	13.46
60X60X2.5	4.39	5.59	30.34	30.34	2.33	2.33	10.12	10.12	11.93	11.93	48.84	14.91
60X60X2.8	4.87	6.20	33.27	33.27	2.32	2.32	11.09	11.09	13.16	13.16	53.66	16.26
60X60X3.2	5.50	7.01	36.94	36.94	2.30	2.30	12.32	12.32	14.73	14.73	59.61	17.92
60X60X3.6	6.12	7.79	40.37	40.37	2.28	2.28	13.46	13.46	16.22	16.22	64.96	19.39
60X60X4.0	6.71	8.55	43.55	43.55	2.26	2.26	14.52	14.52	17.64	17.64	69.66	20.68
60X60X4.5	7.43	9.47	47.20	47.20	2.23	2.23	15.74	15.74	19.32	19.32	74.54	22.04
60X60X5.0	8.13	10.36	50.49	50.49	2.21	2.21	16.83	16.83	20.88	20.88	78.24	23.09
60X60X5.4	8.67	11.04	52.88	52.88	2.19	2.19	17.63	17.63	22.05	22.05	80.29	23.71
60X60X6.0	9.44	12.03	56.07	56.07	2.16	2.16	18.69	18.69	23.68	23.68	81.77	24.26

SQUARE HOLLOW SECTION (SHS) - IS 4923 : 2017 / IS 18573 : 2024 / EN 10219-1 : 2006* / ASTM A-500

Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
60X60X8.0	11.77	14.99	63.48	63.48	2.06	2.06	21.16	21.16	28.01	28.01	72.24	22.68
72X72X2.0	4.32	5.50	44.46	44.46	2.84	2.84	12.35	12.35	14.34	14.34	70.60	18.39
72X72X2.2	4.73	6.02	48.35	48.35	2.83	2.83	13.44	13.44	15.64	15.64	77.05	19.96
72X72X2.5	5.33	6.79	53.99	53.99	2.82	2.82	15.00	15.00	17.55	17.55	86.43	22.23
72X72X2.8	5.93	7.55	59.42	59.42	2.81	2.81	16.51	16.51	19.41	19.41	95.47	24.39
72X72X3.2	6.70	8.54	66.32	66.32	2.79	2.79	18.43	18.43	21.80	21.80	106.90	27.08
72X72X3.6	7.47	9.52	72.86	72.86	2.77	2.77	20.24	20.24	24.11	24.11	117.58	29.57
72X72X4.0	8.22	10.47	79.03	79.03	2.75	2.75	21.96	21.96	26.32	26.32	127.44	31.84
72X72X4.5	9.13	11.63	86.24	86.24	2.72	2.72	23.96	23.96	28.97	28.97	138.51	34.38
72X72X5.0	10.02	12.76	92.91	92.91	2.70	2.70	25.81	25.81	31.47	31.47	148.08	36.58
72X72X5.4	10.70	13.63	97.87	97.87	2.68	2.68	27.19	27.19	33.38	33.38	154.57	38.08
72X72X6.0	11.70	14.91	104.71	104.71	2.65	2.65	29.09	29.09	36.08	36.08	162.23	39.90
72X72X8.0	14.78	18.83	122.48	122.48	2.55	2.55	34.03	34.03	43.72	43.72	168.14	42.04
75X75X2.0	4.51	5.74	50.49	50.49	2.97	2.97	13.47	13.47	15.61	15.61	80.04	20.06
75X75X2.2	4.93	6.28	54.93	54.93	2.96	2.96	14.65	14.65	17.03	17.03	87.39	21.79
75X75X2.5	5.57	7.09	61.38	61.38	2.94	2.94	16.37	16.37	19.12	19.12	98.13	24.29
75X75X2.8	6.19	7.88	67.60	67.60	2.93	2.93	18.03	18.03	21.16	21.16	108.48	26.67
75X75X3.2	7.01	8.93	75.53	75.53	2.91	2.91	20.15	20.15	23.79	23.79	121.65	29.66
75X75X3.6	7.81	9.95	83.06	83.06	2.89	2.89	22.15	22.15	26.32	26.32	134.02	32.44
75X75X4.0	8.60	10.95	90.19	90.19	2.87	2.87	24.06	24.06	28.76	28.76	145.52	34.99
75X75X4.5	9.55	12.17	98.55	98.55	2.85	2.85	26.28	26.28	31.68	31.68	158.59	37.87
75X75X5.0	10.49	13.36	106.33	106.33	2.82	2.82	28.36	28.36	34.46	34.46	170.06	40.40
75X75X5.4	11.21	14.28	112.13	112.13	2.80	2.80	29.91	29.91	36.58	36.58	178.01	42.15
75X75X6.0	12.27	15.63	120.16	120.16	2.77	2.77	32.05	32.05	39.58	39.58	187.76	44.34
80X80X2.0	4.82	6.14	61.70	61.70	3.17	3.17	15.43	15.43	17.85	17.85	97.58	23.00
80X80X2.2	5.28	6.72	67.17	67.17	3.16	3.16	16.80	16.80	19.49	19.49	106.61	25.01
80X80X2.5	5.96	7.59	75.15	75.15	3.15	3.15	18.79	18.79	21.90	21.90	119.85	27.91
80X80X2.8	6.63	8.44	82.85	82.85	3.13	3.13	20.72	20.72	24.25	24.25	132.67	30.70
80X80X3.2	7.51	9.57	92.71	92.71	3.11	3.11	23.18	23.18	27.29	27.29	149.08	34.21
80X80X3.6	8.38	10.67	102.11	102.11	3.09	3.09	25.53	25.53	30.23	30.23	164.62	37.50
80X80X4.0	9.22	11.75	111.04	111.04	3.07	3.07	27.76	27.76	33.07	33.07	179.21	40.56
80X80X4.5	10.26	13.07	121.58	121.58	3.05	3.05	30.40	30.40	36.48	36.48	196.03	44.05
80X80X5.0	11.27	14.36	131.44	131.44	3.03	3.03	32.86	32.86	39.74	39.74	211.11	47.16
80X80X5.4	12.06	15.36	138.85	138.85	3.01	3.01	34.72	34.72	42.23	42.23	221.85	49.38
80X80X6.0	13.21	16.83	149.18	149.18	2.98	2.98	37.30	37.30	45.79	45.79	235.58	52.23
91.5X91.5X2.0	5.54	7.06	93.52	93.52	3.64	3.64	20.45	20.45	23.57	23.57	147.16	30.52
91.5X91.5X2.2	6.07	7.73	101.95	101.95	3.63	3.63	22.29	22.29	25.76	25.76	160.99	33.24
91.5X91.5X2.5	6.86	8.74	114.29	114.29	3.62	3.62	24.99	24.99	28.98	28.98	181.36	37.20
91.5X91.5X2.8	7.64	9.73	126.27	126.27	3.60	3.60	27.60	27.60	32.14	32.14	201.23	41.03
91.5X91.5X3.2	8.67	11.04	141.69	141.69	3.58	3.58	30.98	30.98	36.25	36.25	226.89	45.90
91.5X91.5X3.6	9.67	12.32	156.49	156.49	3.56	3.56	34.21	34.21	40.24	40.24	251.52	50.52
91.5X91.5X4.0	10.67	13.59	170.68	170.68	3.54	3.54	37.31	37.31	44.12	44.12	275.03	54.88

SQUARE HOLLOW SECTION (SHS) - IS 4923 : 2017 / IS 18573 : 2024 / EN 10219-1 : 2006* / ASTM A-500												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
91.5X91.5X4.5	11.88	15.14	187.57	187.57	3.52	3.52	41.00	41.00	48.79	48.79	302.71	59.96
91.5X91.5X5.0	13.08	16.66	203.55	203.55	3.50	3.50	44.50	44.50	53.29	53.29	328.34	64.62
91.5X91.5X5.4	14.01	17.85	215.68	215.68	3.48	3.48	47.15	47.15	56.77	56.77	347.27	68.04
91.5X91.5X6.0	15.38	19.59	232.81	232.81	3.45	3.45	50.89	50.89	61.76	61.76	372.82	72.65
100X100X2.2	6.66	8.48	134.20	134.20	3.98	3.98	26.84	26.84	30.95	30.95	211.23	40.07
100X100X2.5	7.53	9.59	150.63	150.63	3.96	3.96	30.13	30.13	34.86	34.86	238.22	44.92
100X100X2.8	8.38	10.68	166.62	166.62	3.95	3.95	33.33	33.33	38.69	38.69	264.65	49.61
100X100X3.2	9.52	12.13	187.28	187.28	3.93	3.93	37.46	37.46	43.69	43.69	298.95	55.63
100X100X3.6	10.64	13.55	207.19	207.19	3.91	3.91	41.44	41.44	48.56	48.56	332.08	61.37
100X100X4.0	11.74	14.95	226.35	226.35	3.89	3.89	45.27	45.27	53.30	53.30	363.96	66.82
100X100X4.5	13.09	16.67	249.29	249.29	3.87	3.87	49.86	49.86	59.04	59.04	401.89	73.25
100X100X5.0	14.41	18.36	271.10	271.10	3.84	3.84	54.22	54.22	64.59	64.59	437.53	79.22
100X100X5.4	15.45	19.68	287.77	287.77	3.82	3.82	57.56	57.56	68.89	68.89	464.27	83.66
100X100X6.0	16.98	21.63	311.47	311.47	3.79	3.79	62.30	62.30	75.10	75.10	501.21	89.77
100X100X8.0	21.82	27.79	379.77	379.77	3.70	3.70	75.96	75.96	93.83	93.83	593.41	105.11
110X110X2.5	8.31	10.59	202.38	202.38	4.37	4.37	36.80	36.80	42.47	42.47	318.92	54.92
110X110X2.8	9.26	11.80	224.13	224.13	4.36	4.36	40.76	40.76	47.18	47.18	354.70	60.75
110X110X3.2	10.53	13.41	252.31	252.31	4.34	4.34	45.88	45.88	53.33	53.33	401.33	68.25
110X110X3.6	11.77	14.99	279.58	279.58	4.32	4.32	50.84	50.84	59.34	59.34	446.64	75.46
110X110X4.0	12.99	16.55	305.94	305.94	4.30	4.30	55.63	55.63	65.21	65.21	490.52	82.35
110X110X4.5	14.50	18.47	337.63	337.63	4.28	4.28	61.39	61.39	72.35	72.35	543.21	90.54
110X110X5.0	15.98	20.36	367.95	367.95	4.25	4.25	66.90	66.90	79.27	79.27	593.30	98.24
110X110X5.4	17.14	21.84	391.23	391.23	4.23	4.23	71.14	71.14	84.65	84.65	631.37	104.04
110X110X6.0	18.86	24.03	424.57	424.57	4.20	4.20	77.20	77.20	92.46	92.46	684.89	112.13
110X110X8.0	24.33	30.99	522.39	522.39	4.11	4.11	94.98	94.98	116.29	116.29	828.32	133.69
120X120X2.8	10.14	12.92	293.54	293.54	4.77	4.77	48.93	48.93	56.50	56.50	463.02	73.00
120X120X3.2	11.53	14.69	330.88	330.88	4.75	4.75	55.15	55.15	63.93	63.93	524.57	82.16
120X120X3.6	12.90	16.43	367.12	367.12	4.73	4.73	61.19	61.19	71.21	71.21	584.63	90.98
120X120X4.0	14.25	18.15	402.28	402.28	4.71	4.71	67.05	67.05	78.33	78.33	643.08	99.48
120X120X4.5	15.91	20.27	444.70	444.70	4.68	4.68	74.12	74.12	87.01	87.01	713.71	109.63
120X120X5.0	17.55	22.36	485.47	485.47	4.66	4.66	80.92	80.92	95.45	95.45	781.43	119.26
120X120X5.4	18.84	24.00	516.92	516.92	4.64	4.64	86.16	86.16	102.03	102.03	833.37	126.57
120X120X6.0	20.75	26.43	562.16	562.16	4.61	4.61	93.70	93.70	111.61	111.61	907.27	136.89
120X120X8.0	26.84	34.19	696.82	696.82	4.51	4.51	116.14	116.14	141.14	141.14	1114.50	165.47
125X125X2.8	10.58	13.48	333.05	333.05	4.97	4.97	53.29	53.29	61.48	61.48	524.57	79.55
125X125X3.2	12.03	15.33	375.64	375.64	4.95	4.95	60.11	60.11	69.59	69.59	594.61	89.59
125X125X3.6	13.46	17.15	417.03	417.03	4.93	4.93	66.73	66.73	77.54	77.54	663.08	99.29
125X125X4.0	14.88	18.95	457.23	457.23	4.91	4.91	73.16	73.16	85.33	85.33	729.85	108.65
125X125X4.5	16.62	21.17	505.83	505.83	4.89	4.89	80.94	80.94	94.84	94.84	810.75	119.85
125X125X5.0	18.34	23.36	552.62	552.62	4.86	4.86	88.42	88.42	104.10	104.10	888.58	130.52
125X125X5.4	19.69	25.08	588.77	588.77	4.85	4.85	94.21	94.21	111.33	111.33	948.47	138.65
125X125X6.0	21.69	27.63	640.89	640.89	4.82	4.82	102.55	102.55	121.87	121.87	1034.09	150.16

SQUARE HOLLOW SECTION (SHS) - IS 4923 : 2017 / IS 18573 : 2024 / EN 10219-1 : 2006* / ASTM A-500												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
125X125X8.0	28.10	35.79	796.96	796.96	4.72	4.72	127.52	127.52	154.47	154.47	1278.30	182.55
140X140X3.2	13.54	17.25	533.76	533.76	5.56	5.56	76.26	76.26	88.01	88.01	841.30	113.80
140X140X3.6	15.16	19.31	593.44	593.44	5.54	5.54	84.78	84.78	98.18	98.18	939.53	126.36
140X140X4.0	16.76	21.35	651.62	651.62	5.52	5.52	93.09	93.09	108.15	108.15	1035.76	138.54
140X140X4.5	18.74	23.87	722.24	722.24	5.50	5.50	103.18	103.18	120.37	120.37	1153.06	153.21
140X140X5.0	20.69	26.36	790.56	790.56	5.48	5.48	112.94	112.94	132.30	132.30	1266.79	167.29
140X140X5.4	22.23	28.32	843.58	843.58	5.46	5.46	120.52	120.52	141.65	141.65	1355.03	178.10
140X140X6.0	24.52	31.23	920.43	920.43	5.43	5.43	131.49	131.49	155.33	155.33	1482.50	193.59
140X140X8.0	31.86	40.59	1153.92	1153.92	5.33	5.33	164.85	164.85	198.05	198.05	1859.75	238.59
150X150X3.6	16.29	20.75	735.09	735.09	5.95	5.95	98.02	98.02	113.28	113.28	1160.76	146.21
150X150X4.0	18.02	22.95	807.82	807.82	5.93	5.93	107.71	107.71	124.87	124.87	1280.69	160.46
150X150X4.5	20.15	25.67	896.30	896.30	5.91	5.91	119.51	119.51	139.08	139.08	1427.31	177.70
150X150X5.0	22.26	28.36	982.12	982.12	5.88	5.88	130.95	130.95	152.98	152.98	1570.02	194.30
150X150X5.4	23.93	30.48	1048.88	1048.88	5.87	5.87	139.86	139.86	163.89	163.89	1681.17	207.11
150X150X6.0	26.40	33.63	1145.91	1145.91	5.84	5.84	152.79	152.79	179.88	179.88	1842.55	225.53
150X150X8.0	34.38	43.79	1443.00	1443.00	5.74	5.74	192.40	192.40	230.11	230.11	2328.39	279.93
150X150X10.0	41.93	53.42	1701.21	1701.21	5.64	5.64	226.83	226.83	275.67	275.67	2720.95	323.18
175X175X4.0	21.16	26.95	1303.12	1303.12	6.95	6.95	148.93	148.93	171.90	171.90	2053.97	222.27
175X175X4.5	23.68	30.17	1448.83	1448.83	6.93	6.93	165.59	165.59	191.75	191.75	2293.76	246.80
175X175X5.0	26.19	33.36	1590.86	1590.86	6.91	6.91	181.82	181.82	211.24	211.24	2528.72	270.58
175X175X5.4	28.17	35.88	1701.86	1701.86	6.89	6.89	194.50	194.50	226.57	226.57	2712.97	289.06
175X175X6.0	31.11	39.63	1864.03	1864.03	6.86	6.86	213.04	213.04	249.15	249.15	2982.78	315.88
175X175X8.0	40.66	51.79	2367.89	2367.89	6.76	6.76	270.62	270.62	320.75	320.75	3818.44	397.28
175X175X10.0	49.78	63.42	2817.20	2817.20	6.66	6.66	321.97	321.97	386.83	386.83	4540.40	465.99
180X180X4.0	21.78	27.75	1421.74	1421.74	7.16	7.16	157.98	157.98	182.21	182.21	2238.61	235.83
180X180X4.5	24.39	31.07	1581.26	1581.26	7.13	7.13	175.70	175.70	203.30	203.30	2500.75	261.96
180X180X5.0	26.97	34.36	1736.87	1736.87	7.11	7.11	192.99	192.99	224.02	224.02	2757.85	287.33
180X180X6.0	32.05	40.83	2036.52	2036.52	7.06	7.06	226.28	226.28	264.35	264.35	3255.59	335.75
180X180X8.0	41.91	53.39	2590.73	2590.73	6.97	6.97	287.86	287.86	340.68	340.68	4175.84	423.14
180X180X10.0	51.35	65.42	3086.93	3086.93	6.87	6.87	343.00	343.00	411.31	411.31	4978.18	497.54
200X200X4.5	27.22	34.67	2191.54	2191.54	7.95	7.95	219.16	219.16	252.86	252.86	3452.29	327.13
200X200X5.0	30.11	38.36	2410.09	2410.09	7.93	7.93	241.01	241.01	278.87	278.87	3811.54	359.35
200X200X5.4	32.40	41.28	2581.45	2581.45	7.91	7.91	258.15	258.15	299.39	299.39	4094.48	384.51
200X200X6.0	35.82	45.63	2832.75	2832.75	7.88	7.88	283.28	283.28	329.67	329.67	4511.01	421.22
200X200X8.0	46.94	59.79	3621.63	3621.63	7.78	7.78	362.17	362.17	426.39	426.39	5823.37	534.59
200X200X10.0	57.63	73.42	4337.63	4337.63	7.69	7.69	433.77	433.77	516.73	516.73	7000.54	633.74
200X200X12.0	67.93	86.53	4983.59	4983.59	7.59	7.59	498.36	498.36	600.81	600.81	8019.34	718.18
200X200X14.0	77.80	99.11	5562.26	5562.26	7.49	7.49	556.23	556.23	678.74	678.74	8857.57	787.40
220X220X5.0	33.25	42.36	3238.02	3238.02	8.74	8.74	294.37	294.37	339.73	339.73	5102.67	439.36
220X220X5.4	35.80	45.60	3470.96	3470.96	8.72	8.72	315.55	315.55	364.93	364.93	5485.51	470.58
220X220X6.0	39.59	50.43	3813.36	3813.36	8.70	8.70	346.67	346.67	402.18	402.18	6050.76	516.29
220X220X8.0	51.96	66.19	4894.99	4894.99	8.60	8.60	445.00	445.00	521.70	521.70	7848.38	658.83

SQUARE HOLLOW SECTION (SHS) - IS 4923 : 2017 / EN 10219-1 : 2006* / ASTM A-500												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
220X220X10.0	63.91	81.42	5887.19	5887.19	8.50	8.50	535.20	535.20	634.16	634.16	9492.81	785.91
220X220X12.0	75.46	96.13	6793.08	6793.08	8.41	8.41	617.56	617.56	739.66	739.66	10958.24	897.07
225X225X5.0	34.04	43.36	3471.05	3471.05	8.95	8.95	308.54	308.54	355.88	355.88	5465.36	460.61
225X225X5.4	36.64	46.68	3721.40	3721.40	8.93	8.93	330.80	330.80	382.32	382.32	5876.33	493.45
225X225X6.0	40.53	51.63	4089.57	4089.57	8.90	8.90	363.52	363.52	421.43	421.43	6483.49	541.55
225X225X8.0	53.22	67.79	5254.21	5254.21	8.80	8.80	467.05	467.05	547.03	547.03	8418.11	691.89
225X225X10.0	65.48	83.42	6325.02	6325.02	8.71	8.71	562.23	562.23	665.39	665.39	10194.92	826.45
225X225X12.0	77.35	98.53	7305.19	7305.19	8.61	8.61	649.36	649.36	776.62	776.62	11787.46	944.78
250X250X6.0	45.24	57.63	5672.00	5672.00	9.92	9.92	453.76	453.76	524.45	524.45	8956.46	676.88
250X250X8.0	59.50	75.79	7315.65	7315.65	9.82	9.82	585.26	585.26	682.67	682.67	11677.65	869.16
250X250X10.0	73.33	93.42	8841.86	8841.86	9.73	9.73	707.35	707.35	832.79	832.79	14217.20	1044.13
250X250X12.0	86.77	110.53	10254.21	10254.21	9.63	9.63	820.34	820.34	974.94	974.94	16545.51	1201.32
250X250X14.0	99.78	127.11	11556.23	11556.23	9.53	9.53	924.50	924.50	1109.22	1109.22	18633.47	1340.24
275X275X6.0	49.95	63.63	7617.53	7617.53	10.94	10.94	554.01	554.01	638.71	638.71	11986.16	827.20
275X275X8.0	65.78	83.79	9855.94	9855.94	10.85	10.85	716.80	716.80	833.31	833.31	15676.96	1066.43
275X275X10.0	81.18	103.42	11950.66	11950.66	10.75	10.75	869.14	869.14	1018.95	1018.95	19161.08	1286.77
275X275X12.0	96.19	122.53	13905.64	13905.64	10.65	10.65	1011.32	1011.32	1195.75	1195.75	22405.82	1487.80
275X275X14.0	110.77	141.11	15724.81	15724.81	10.56	10.56	1143.63	1143.63	1363.84	1363.84	25378.84	1669.04
275X275X16.0	124.95	159.17	17412.02	17412.02	10.46	10.46	1266.33	1266.33	1523.33	1523.33	28048.45	1829.99
300X300X8.0	72.06	91.79	12925.07	12925.07	11.87	11.87	861.68	861.68	998.95	998.95	20491.03	1283.68
300X300X10.0	89.03	113.42	15713.90	15713.90	11.77	11.77	1047.60	1047.60	1223.86	1223.86	25120.26	1554.40
300X300X12.0	105.61	134.53	18334.49	18334.49	11.67	11.67	1222.30	1222.30	1439.07	1439.07	29480.79	1804.25
300X300X14.0	121.76	155.11	20791.11	20791.11	11.58	11.58	1386.08	1386.08	1644.70	1644.70	33537.11	2032.77
300X300X16.0	137.51	175.17	23088.02	23088.02	11.48	11.48	1539.21	1539.21	1840.89	1840.89	37254.21	2239.48
300X300X18.0	152.84	194.70	25229.41	25229.41	11.38	11.38	1681.97	1681.97	2027.73	2027.73	40597.89	2423.87
325X325X6.0	59.37	75.63	12747.91	12747.91	12.98	12.98	784.49	784.49	901.00	901.00	19940.76	1172.84
325X325X8.0	78.34	99.79	16573.06	16573.06	12.89	12.89	1019.89	1019.89	1179.59	1179.59	26194.87	1520.93
325X325X10.0	96.88	123.42	20194.10	20194.10	12.79	12.79	1242.72	1242.72	1447.51	1447.51	32188.47	1847.01
325X325X12.0	115.03	146.53	23615.74	23615.74	12.70	12.70	1453.28	1453.28	1704.88	1704.88	37882.85	2150.67
325X325X14.0	132.75	169.11	26842.64	26842.64	12.60	12.60	1651.86	1651.86	1951.82	1951.82	43239.38	2431.45
325X325X16.0	150.07	191.17	29879.43	29879.43	12.50	12.50	1838.74	1838.74	2188.44	2188.44	48219.82	2688.89
325X325X18.0	166.97	212.70	32730.67	32730.67	12.40	12.40	2014.20	2014.20	2414.87	2414.87	52786.57	2922.49
325X325X20.0	183.45	233.70	35400.89	35400.89	12.31	12.31	2178.52	2178.52	2631.23	2631.23	56902.95	3131.74
350X350X6.0	64.08	81.63	16007.75	16007.75	14.00	14.00	914.73	914.73	1049.01	1049.01	24978.15	1368.15
350X350X8.0	84.62	107.79	20849.89	20849.89	13.91	13.91	1191.43	1191.43	1375.23	1375.23	32863.45	1778.17
350X350X10.0	104.73	133.42	25453.75	25453.75	13.81	13.81	1454.50	1454.50	1689.92	1689.92	40459.45	2164.61
350X350X12.0	124.45	158.53	29824.41	29824.41	13.72	13.72	1704.26	1704.26	1993.20	1993.20	47724.46	2527.06
350X350X14.0	143.74	183.11	33966.90	33966.90	13.62	13.62	1940.97	1940.97	2285.19	2285.19	54616.80	2865.08
350X350X16.0	162.63	207.17	37886.23	37886.23	13.52	13.52	2164.93	2164.93	2566.00	2566.00	61095.07	3178.23
350X350X18.0	181.10	230.70	41587.35	41587.35	13.43	13.43	2376.42	2376.42	2835.77	2835.77	67118.34	3466.01
350X350X20.0	199.15	253.70	45075.16	45075.16	13.33	13.33	2575.73	2575.73	3094.60	3094.60	72646.48	3727.92
400X400X6.0	73.50	93.63	24104.23	24104.23	16.04	16.04	1205.22	1205.22	1378.79	1378.79	37454.37	1803.77

SQUARE HOLLOW SECTION (SHS) - IS 4923 : 2017 / EN 10219-1 : 2006* / ASTM A-500												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
400X400X8.0	97.18	123.79	31490.11	31490.11	15.95	15.95	1574.51	1574.51	1811.51	1811.51	49394.86	2352.64
400X400X10.0	120.43	153.42	38561.41	38561.41	15.85	15.85	1928.08	1928.08	2230.98	2230.98	60984.67	2874.77
400X400X12.0	143.29	182.53	45323.97	45323.97	15.76	15.76	2266.20	2266.20	2637.33	2637.33	72176.20	3369.78
400X400X14.0	165.72	211.11	51783.59	51783.59	15.66	15.66	2589.18	2589.18	3030.67	3030.67	82921.80	3837.25
400X400X16.0	187.75	239.17	57946.03	57946.03	15.57	15.57	2897.31	2897.31	3411.12	3411.12	93173.85	4276.74
400X400X18.0	209.36	266.70	63816.99	63816.99	15.47	15.47	3190.85	3190.85	3778.81	3778.81	102885.06	4687.80
400X400X20.0	230.55	293.70	69402.13	69402.13	15.37	15.37	3470.11	3470.11	4133.85	4133.85	112008.61	5069.94
450X450X8.0	109.74	139.79	45245.73	45245.73	17.99	17.99	2010.93	2010.93	2307.79	2307.79	70685.24	3007.10
450X450X10.0	136.13	173.42	55536.88	55536.88	17.90	17.90	2468.31	2468.31	2847.04	2847.04	87445.83	3684.90
450X450X12.0	162.13	206.53	65433.18	65433.18	17.80	17.80	2908.15	2908.15	3371.45	3371.45	103735.86	4332.43
450X450X14.0	187.70	239.11	74941.19	74941.19	17.70	17.70	3330.72	3330.72	3881.15	3881.15	119501.71	4949.30
450X450X16.0	212.87	271.17	84067.43	84067.43	17.61	17.61	3736.34	3736.34	4376.24	4376.24	134689.76	5535.09
450X450X18.0	237.62	302.70	92818.34	92818.34	17.51	17.51	4125.26	4125.26	4856.85	4856.85	149246.49	6089.34
450X450X20.0	262.00	333.70	101200.35	101200.35	17.41	17.41	4497.80	4497.80	5323.10	5323.10	163118.70	6611.61
500X500X8.0	122.30	155.79	62516.74	62516.74	20.03	20.03	2500.67	2500.67	2864.07	2864.07	97334.59	3741.54
500X500X10.0	151.83	193.42	76880.16	76880.16	19.94	19.94	3075.21	3075.21	3538.10	3538.10	120592.92	4595.01
500X500X12.0	181.0	230.53	90752.04	90752.04	19.84	19.84	3630.09	3630.09	4195.58	4195.58	143303.32	5415.05
500X500X14.0	209.7	267.11	104139.70	104139.70	19.75	19.75	4165.59	4165.59	4836.63	4836.63	165406.33	6201.28
500X500X16.0	238.0	303.17	117050.41	117050.41	19.65	19.65	4682.02	4682.02	5461.36	5461.36	186842.34	6953.31
500X500X18.0	265.9	338.70	129491.39	129491.39	19.55	19.55	5179.66	5179.66	6069.89	6069.89	207551.78	7670.70
500X500X20.0	293.4	373.70	141469.80	141469.80	19.46	19.46	5658.80	5658.80	6662.35	6662.35	227475.22	8353.01

ALLOWABLE STRESS VALUES (IN MPA) AND DIMENSIONAL TOLERANCE IS 4923:2017, TABLE 4, (Clauses 19.2)										
S. No.	Grade	Tensile Strength	Yield Strength	Elongation	DIMENSIONAL TOLERANCE					
		Min	Min	Min	Outside Dimensional	Thickness	Squareness	Corner radius	Weight	
	MPa	MPa	Percent	Individual Lengths					On lot of 10 MT	
1	YSt 210	330	210	20	+/-1% with a minimum of +/-0.50 min	±7.5%	90 deg. +/-2 deg.	3t max	10% -8%	±7%
2	YSt 240	410	240	15						
3	YSt 310	450	310	10						
4	YSt 355	490	355	10						
5	YSt 420	500	420	10						

RECTANGULAR HOLLOW SECTION

Rectangular Size Range
26mm X 13mm to 600mm X 400mm

Thickness
1mm to 20mm

RECTANGULAR HOLLOW SECTION (SHS) - IS 4923 : 2017 / IS 18573 : 2024 / EN 10219-1 : 2006* / ASTM A-500

Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
			I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
mm	kg/m	cm ²	cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
26 X 13 X 1.6	0.85	1.08	0.83	0.27	0.88	0.50	0.64	0.42	0.84	0.51	0.63	0.66
26 X 13 X 2.0	1.02	1.30	0.94	0.30	0.85	0.48	0.73	0.47	0.98	0.59	0.64	0.67
30 X 20 X 1.6	1.12	1.43	1.66	0.88	1.08	0.78	1.11	0.88	1.39	1.05	1.85	1.38
30 X 20 X 2.0	1.37	1.74	1.94	1.02	1.06	0.77	1.30	1.02	1.65	1.24	2.08	1.55
30 X 20 X 2.2	1.48	1.88	2.05	1.08	1.04	0.76	1.37	1.08	1.76	1.32	2.15	1.60
40 X 10 X 1.6	1.12	1.43	2.25	0.22	1.25	0.39	1.13	0.44	1.57	0.54	0.65	0.76
40 X 10 X 2.0	1.37	1.74	2.60	0.25	1.22	0.38	1.30	0.50	1.85	0.63	0.65	0.78
40 X 20 X 1.6	1.37	1.75	3.43	1.15	1.40	0.81	1.72	1.15	2.18	1.34	2.83	1.92
40 X 20 X 2.0	1.68	2.14	4.05	1.34	1.38	0.79	2.03	1.34	2.61	1.60	3.25	2.19
40 X 20 X 2.2	1.82	2.32	4.32	1.43	1.36	0.79	2.16	1.43	2.81	1.71	3.40	2.29
40 X 20 X 2.5	2.03	2.59	4.69	1.54	1.35	0.77	2.35	1.54	3.09	1.88	3.55	2.40
40 X 25 X 1.6	1.50	1.91	4.02	1.93	1.45	1.01	2.01	1.55	2.49	1.80	4.25	2.51
40 X 25 X 2.0	1.84	2.34	4.77	2.28	1.43	0.99	2.39	1.83	2.99	2.16	4.99	2.91
40 X 25 X 2.2	1.99	2.54	5.11	2.43	1.42	0.98	2.56	1.95	3.23	2.32	5.28	3.07
40 X 25 X 2.5	2.23	2.84	5.57	2.64	1.40	0.96	2.79	2.12	3.56	2.56	5.64	3.27
50 X 25 X 1.6	1.75	2.23	7.02	2.37	1.77	1.03	2.81	1.90	3.53	2.17	5.83	3.21
50 X 25 X 2.0	2.15	2.74	8.38	2.81	1.75	1.01	3.36	2.25	4.26	2.62	6.90	3.76
50 X 25 X 2.2	2.34	2.98	9.01	3.01	1.74	1.01	3.61	2.41	4.61	2.82	7.35	3.99
50 X 25 X 2.5	2.62	3.34	9.89	3.28	1.72	0.99	3.96	2.63	5.11	3.12	7.93	4.29
50 X 30 X 1.6	1.88	2.39	7.96	3.60	1.82	1.23	3.19	2.40	3.91	2.75	8.07	3.96
50 X 30 X 2.0	2.31	2.94	9.54	4.29	1.80	1.21	3.82	2.86	4.74	3.33	9.65	4.67
50 X 30 X 2.2	2.51	3.20	10.27	4.61	1.79	1.20	4.11	3.08	5.14	3.60	10.35	4.99
50 X 30 X 2.5	2.82	3.59	11.30	5.05	1.77	1.19	4.52	3.37	5.70	3.98	11.28	5.40
50 X 30 X 2.8	3.11	3.96	12.24	5.45	1.76	1.17	4.90	3.64	6.23	4.35	12.05	5.75
50 X 30 X 3.2	3.49	4.45	13.38	5.93	1.73	1.15	5.36	3.96	6.89	4.80	12.81	6.11
50 X 30 X 3.6	3.85	4.91	14.38	6.34	1.71	1.14	5.76	4.23	7.50	5.21	13.25	6.33
50 X 30 X 4.0	4.20	5.35	15.25	6.69	1.69	1.12	6.10	4.46	8.05	5.58	13.33	6.42
50 X 30 X 4.5	4.61	5.87	16.16	7.05	1.66	1.10	6.47	4.70	8.67	5.99	12.94	6.35
50 X 30 X 5.0	4.99	6.36	16.87	7.33	1.63	1.07	6.75	4.89	9.20	6.34	12.00	6.06
50 X 30 X 6.0	5.68	7.23	17.77	7.65	1.57	1.03	7.11	5.10	10.04	6.89	8.67	4.86
50 X 30 X 8.0	6.74	8.59	17.66	7.57	1.43	0.94	7.07	5.05	10.83	7.36	1.34	1.45
60 X 40 X 1.6	2.38	3.03	15.22	8.16	2.24	1.64	5.08	4.08	6.12	4.64	17.10	6.63
60 X 40 X 2.0	2.94	3.74	18.41	9.83	2.22	1.62	6.14	4.92	7.47	5.65	20.77	7.96
60 X 40 X 2.2	3.20	4.08	19.92	10.62	2.21	1.61	6.64	5.31	8.12	6.14	22.49	8.56
60 X 40 X 2.5	3.60	4.59	22.07	11.74	2.19	1.60	7.36	5.87	9.06	6.84	24.89	9.41
60 X 40 X 2.8	3.99	5.08	24.10	12.78	2.18	1.59	8.04	6.39	9.95	7.51	27.08	10.17
60 X 40 X 3.2	4.50	5.73	26.61	14.07	2.15	1.57	8.87	7.04	11.09	8.36	29.63	11.05
60 X 40 X 3.6	4.98	6.35	28.90	15.23	2.13	1.55	9.64	7.62	12.16	9.15	31.72	11.79
60 X 40 X 4.0	5.46	6.95	30.99	16.28	2.11	1.53	10.33	8.14	13.16	9.89	33.31	12.36
60 X 40 X 4.5	6.02	7.67	33.31	17.44	2.08	1.51	11.11	8.72	14.32	10.75	34.57	12.85
60 X 40 X 5.0	6.56	8.36	35.33	18.43	2.06	1.48	11.78	9.22	15.38	11.52	34.95	13.08
60 X 40 X 6.0	7.56	9.63	38.50	19.95	2.00	1.44	12.84	9.98	17.20	12.84	33.01	12.74

RECTANGULAR HOLLOW SECTION (SHS) - IS 4923 : 2017 / IS 18573 : 2024 / EN 10219-1 : 2006* / ASTM A-500

Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
60 X 40 X 8.0	9.26	11.79	41.68	21.39	1.88	1.35	13.90	10.70	19.69	14.62	19.37	8.85
66 X 33 X 1.6	2.36	3.00	16.85	5.74	2.37	1.38	5.11	3.48	6.34	3.92	14.01	5.94
66 X 33 X 2.0	2.90	3.70	20.37	6.90	2.35	1.37	6.18	4.19	7.73	4.77	16.94	7.09
66 X 33 X 2.2	3.17	4.04	22.03	7.43	2.34	1.36	6.68	4.51	8.40	5.17	18.28	7.61
66 X 33 X 2.5	3.56	4.54	24.40	8.19	2.32	1.34	7.40	4.97	9.37	5.75	20.14	8.33
66 X 33 X 2.8	3.95	5.03	26.62	8.90	2.30	1.33	8.07	5.40	10.29	6.31	21.80	8.97
66 X 33 X 3.2	4.44	5.66	29.37	9.75	2.28	1.31	8.90	5.91	11.46	7.01	23.67	9.70
70 X 30 X 3.0	4.25	5.41	30.57	7.90	2.38	1.21	8.74	5.27	11.38	6.20	20.51	8.87
70 X 30 X 3.2	4.50	5.73	32.04	8.24	2.36	1.20	9.16	5.50	11.98	6.51	21.26	9.18
70 X 30 X 3.6	4.98	6.35	34.76	8.87	2.34	1.18	9.94	5.92	13.12	7.11	22.45	9.69
70 X 30 X 4.0	5.46	6.95	37.23	9.42	2.31	1.16	10.64	6.28	14.20	7.66	23.22	10.04
70 X 30 X 4.5	6.02	7.67	39.95	10.01	2.28	1.14	11.42	6.68	15.43	8.29	23.55	10.27
70 X 30 X 5.0	6.56	8.36	42.30	10.49	2.25	1.12	12.09	7.00	16.56	8.84	23.16	10.25
70 X 30 X 6.0	7.56	9.63	45.88	11.18	2.18	1.08	13.11	7.46	18.47	9.77	20.29	9.46
70 X 30 X 8.0	9.26	11.79	48.98	11.61	2.04	0.99	14.00	7.74	21.02	10.88	8.59	5.18
70 X 50 X 3.0	5.19	6.61	44.05	26.10	2.58	1.99	12.59	10.44	15.40	12.21	53.15	16.52
70 X 50 X 3.2	5.50	7.01	46.33	27.42	2.57	1.98	13.24	10.97	16.25	12.88	55.82	17.28
70 X 50 X 3.6	6.12	7.79	50.65	29.92	2.55	1.96	14.48	11.97	17.91	14.18	60.72	18.68
70 X 50 X 4.0	6.71	8.55	54.67	32.22	2.53	1.94	15.62	12.89	19.48	15.41	64.99	19.90
70 X 50 X 5.0	8.13	10.36	63.46	37.20	2.47	1.89	18.14	14.88	23.06	18.20	72.57	22.12
70 X 50 X 6.0	9.44	12.03	70.52	41.14	2.42	1.85	20.15	16.46	26.15	20.60	75.26	23.11
70 X 50 X 8.0	11.77	14.99	79.91	46.23	2.31	1.76	22.84	18.50	30.94	24.27	64.82	21.23
75 X 25 X 1.6	2.38	3.03	19.74	3.47	2.55	1.07	5.27	2.78	6.81	3.11	9.94	4.97
75 X 25 X 2.0	2.94	3.74	23.84	4.14	2.52	1.05	6.36	3.32	8.31	3.77	11.88	5.88
75 X 25 X 2.2	3.20	4.08	25.77	4.44	2.51	1.04	6.88	3.56	9.02	4.08	12.75	6.28
75 X 25 X 2.6	3.74	4.76	29.40	5.00	2.49	1.02	7.84	4.00	10.40	4.67	14.26	6.99
75 X 50 X 1.6	3.01	3.83	30.51	16.39	2.82	2.07	8.14	6.56	9.75	7.40	34.07	10.70
75 X 50 X 2.0	3.72	4.74	37.16	19.91	2.80	2.05	9.91	7.97	11.96	9.06	41.75	12.96
75 X 50 X 2.2	4.07	5.18	40.35	21.59	2.79	2.04	10.76	8.64	13.03	9.87	45.43	14.02
75 X 50 X 2.5	4.58	5.84	44.95	24.00	2.77	2.03	11.99	9.60	14.59	11.04	50.72	15.54
75 X 50 X 2.8	5.09	6.48	49.35	26.30	2.76	2.01	13.16	10.52	16.10	12.18	55.71	16.96
75 X 50 X 3.2	5.75	7.33	54.90	29.18	2.74	2.00	14.64	11.68	18.04	13.63	61.88	18.69
75 X 50 X 3.6	6.40	8.15	60.10	31.86	2.72	1.98	16.03	12.75	19.90	15.01	67.44	20.23
75 X 50 X 4.0	7.03	8.95	64.96	34.34	2.69	1.96	17.33	13.74	21.66	16.33	72.33	21.59
80 X 40 X 1.6	2.88	3.67	30.71	10.52	2.89	1.69	7.68	5.26	9.47	5.87	25.48	8.99
80 X 40 X 2.0	3.56	4.54	37.36	12.72	2.87	1.67	9.34	6.36	11.61	7.17	31.08	10.84
80 X 40 X 2.2	3.89	4.96	40.53	13.76	2.86	1.67	10.14	6.88	12.64	7.80	33.72	11.71
80 X 40 X 2.5	4.39	5.59	45.11	15.26	2.84	1.65	11.28	7.63	14.15	8.72	37.49	12.92
80 X 40 X 2.8	4.87	6.20	49.46	16.66	2.82	1.64	12.37	8.33	15.60	9.60	40.99	14.05
80 X 40 X 3.2	5.50	7.01	54.94	18.41	2.80	1.62	13.74	9.21	17.46	10.72	45.21	15.39
80 X 40 X 3.6	6.12	7.79	60.05	20.02	2.78	1.60	15.02	10.01	19.23	11.77	48.88	16.56
80 X 40 X 4.0	6.71	8.55	64.79	21.49	2.75	1.59	16.20	10.75	20.91	12.77	51.97	17.55

RECTANGULAR HOLLOW SECTION (SHS) - IS 4923 : 2017 / IS 18573 : 2024 / EN 10219-1 : 2006* / ASTM A-500

Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
96 X 48 X 1.6	3.49	4.44	54.03	18.57	3.49	2.05	11.26	7.74	13.82	8.58	44.69	13.26
96 X 48 X 2.0	4.32	5.50	66.04	22.59	3.47	2.03	13.76	9.42	17.00	10.52	54.83	16.09
96 X 48 X 2.2	4.73	6.02	71.82	24.51	3.45	2.02	14.97	10.22	18.54	11.47	59.70	17.44
96 X 48 X 2.5	5.33	6.79	80.23	27.29	3.44	2.00	16.72	11.38	20.81	12.85	66.75	19.37
96 X 48 X 2.8	5.93	7.55	88.32	29.94	3.42	1.99	18.40	12.48	23.01	14.19	73.46	21.19
96 X 48 X 3.2	6.70	8.54	98.61	33.28	3.40	1.97	20.55	13.87	25.85	15.91	81.83	23.43
96 X 48 X 3.6	7.47	9.52	108.35	36.40	3.37	1.96	22.58	15.17	28.58	17.56	89.50	25.47
96 X 48 X 4.0	8.22	10.47	117.54	39.32	3.35	1.94	24.49	16.39	31.21	19.14	96.41	27.30
96 X 48 X 4.5	9.13	11.63	128.30	42.68	3.32	1.92	26.73	17.79	34.34	21.01	103.91	29.30
100 X 50 X 1.6	3.63	4.63	61.29	21.08	3.64	2.13	12.26	8.44	15.04	9.33	50.65	14.45
100 X 50 X 2.0	4.51	5.74	74.98	25.67	3.61	2.11	15.00	10.27	18.50	11.46	62.21	17.57
100 X 50 X 2.2	4.93	6.28	81.59	27.87	3.60	2.11	16.32	11.15	20.19	12.50	67.79	19.05
100 X 50 X 2.5	5.57	7.09	91.20	31.06	3.59	2.09	18.24	12.43	22.67	14.01	75.87	21.18
100 X 50 X 2.8	6.19	7.88	100.47	34.10	3.57	2.08	20.10	13.64	25.09	15.48	83.59	23.19
100 X 50 X 3.2	7.01	8.93	112.29	37.95	3.55	2.06	22.46	15.18	28.20	17.37	93.28	25.70
100 X 50 X 3.6	7.81	9.95	123.51	41.56	3.52	2.04	24.71	16.63	31.21	19.19	102.23	27.99
100 X 50 X 4.0	8.60	10.95	134.14	44.95	3.50	2.03	26.83	17.98	34.10	20.93	110.37	30.06
100 X 50 X 4.5	9.55	12.17	146.61	48.87	3.47	2.00	29.33	19.55	37.56	23.00	119.34	32.35
100 X 50 X 5.0	10.49	13.36	158.19	52.45	3.44	1.98	31.64	20.98	40.84	24.95	126.87	34.28
100 X 50 X 6.0	12.27	15.63	178.75	58.67	3.38	1.94	35.75	23.47	46.90	28.52	137.24	37.07
100 X 50 X 8.0	15.54	19.79	210.07	67.65	3.26	1.85	42.02	27.06	57.03	34.35	137.46	38.16
120 X 60 X 1.6	4.39	5.59	107.43	37.05	4.38	2.57	17.91	12.35	21.89	13.60	88.45	21.18
120 X 60 X 2.0	5.45	6.94	131.92	45.33	4.36	2.56	21.99	15.11	27.00	16.75	109.10	25.89
120 X 60 X 2.2	5.97	7.60	143.82	49.33	4.35	2.55	23.97	16.45	29.51	18.29	119.15	28.15
120 X 60 X 2.5	6.74	8.59	161.23	55.15	4.33	2.53	26.88	18.39	33.20	20.56	133.86	31.43
120 X 60 X 2.8	7.50	9.56	178.13	60.77	4.32	2.52	29.69	20.26	36.81	22.77	148.10	34.58
120 X 60 X 3.2	8.52	10.85	199.88	67.95	4.29	2.50	33.32	22.65	41.51	25.63	166.31	38.56
120 X 60 X 3.6	9.51	12.11	220.75	74.77	4.27	2.48	36.80	24.93	46.07	28.40	183.57	42.29
120 X 60 X 4.0	10.48	13.35	240.74	81.25	4.25	2.47	40.13	27.09	50.49	31.08	199.79	45.76
120 X 60 X 4.5	11.67	14.87	264.52	88.88	4.22	2.44	44.09	29.63	55.82	34.30	218.51	49.75
120 X 60 X 5.0	12.84	16.36	286.97	95.99	4.19	2.42	47.83	32.00	60.95	37.38	235.39	53.33
120 X 60 X 6.0	15.10	19.23	328.01	108.77	4.13	2.38	54.67	36.26	70.57	43.12	263.07	59.24
150 X 25 X 1.6	4.26	5.43	124.73	6.76	4.79	1.12	16.64	5.41	22.68	5.92	22.78	10.23
150 X 25 X 2.0	5.29	6.74	152.77	8.11	4.76	1.10	20.37	6.49	27.95	7.22	27.42	12.24
150 X 25 X 2.2	5.79	7.38	166.32	8.74	4.75	1.09	22.18	7.00	30.52	7.84	29.56	13.16
150 X 25 X 2.6	6.80	8.66	192.52	9.91	4.71	1.07	25.67	7.93	35.54	9.04	33.47	14.85
150 X 50 X 1.6	4.89	6.23	168.78	30.45	5.20	2.21	22.51	12.18	28.62	13.21	85.50	21.95
150 X 50 X 2.0	6.08	7.74	207.53	37.20	5.18	2.19	27.68	14.88	35.35	16.26	105.19	26.79
150 X 50 X 2.2	6.66	8.48	226.40	40.45	5.17	2.18	30.19	16.18	38.65	17.75	114.73	29.11
150 X 50 X 2.5	7.53	9.59	254.08	45.17	5.15	2.17	33.88	18.07	43.52	19.95	128.65	32.47
150 X 50 X 2.8	8.38	10.68	281.01	49.72	5.13	2.16	37.47	19.89	48.30	22.09	142.06	35.68
150 X 50 X 3.2	9.52	12.13	315.76	55.50	5.10	2.14	42.11	22.20	54.52	24.86	159.12	39.73

RECTANGULAR HOLLOW SECTION (SHS) - IS 4923 : 2017 / IS 18573 : 2024 / EN 10219-1 : 2006* / ASTM A-500

Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
150 X 50 X 3.6	10.64	13.55	349.22	60.98	5.08	2.12	46.57	24.40	60.58	27.54	175.17	43.51
150 X 50 X 4.0	11.74	14.95	381.39	66.16	5.05	2.10	50.86	26.47	66.47	30.13	190.15	47.02
150 X 50 X 4.5	13.09	16.67	419.82	72.23	5.02	2.08	55.98	28.90	73.60	33.24	207.28	51.02
150 X 50 X 5.0	14.41	18.36	456.29	77.87	4.99	2.06	60.84	31.15	80.48	36.20	222.54	54.59
150 X 75 X 2.5	8.51	10.84	322.07	110.68	5.45	3.20	42.95	29.52	52.74	32.72	266.35	50.56
150 X 75 X 2.8	9.48	12.08	356.85	122.36	5.44	3.18	47.58	32.63	58.60	36.32	295.74	55.86
150 X 75 X 3.2	10.78	13.73	401.98	137.44	5.41	3.16	53.60	36.66	66.26	41.02	333.85	62.65
150 X 75 X 3.6	12.05	15.35	445.69	151.94	5.39	3.15	59.43	40.52	73.75	45.60	370.65	69.13
150 X 75 X 4.0	13.31	16.95	488.00	165.88	5.37	3.13	65.07	44.24	81.07	50.06	406.04	75.31
150 X 75 X 5.0	16.38	20.86	587.74	198.36	5.31	3.08	78.37	52.90	98.61	60.71	487.77	89.38
150 X 75 X 6.0	19.33	24.63	679.08	227.56	5.25	3.04	90.55	60.69	115.08	70.63	558.76	101.46
150 X 100 X 2.8	10.58	13.48	432.70	232.78	5.67	4.16	57.70	46.56	68.90	52.30	481.30	76.06
150 X 100 X 3.2	12.03	15.33	488.19	262.27	5.64	4.14	65.10	52.46	78.01	59.18	545.15	85.60
150 X 100 X 3.6	13.46	17.15	542.16	290.86	5.62	4.12	72.29	58.18	86.93	65.91	607.44	94.81
150 X 100 X 4.0	14.88	18.95	594.60	318.57	5.60	4.10	79.28	63.72	95.67	72.50	668.04	103.67
150 X 100 X 5.0	18.34	23.36	719.20	384.02	5.55	4.05	95.90	76.81	116.73	88.34	811.48	124.31
150 X 100 X 6.0	21.69	27.63	834.69	444.19	5.50	4.01	111.30	88.84	136.68	103.30	941.95	142.74
150 X 100 X 8.0	28.10	35.79	1039.29	549.48	5.39	3.92	138.58	109.90	173.31	130.63	1157.28	172.73
200 X 100 X 2.8	12.78	16.28	867.33	298.93	7.30	4.29	86.74	59.79	106.12	65.91	714.79	102.51
200 X 100 X 3.2	14.55	18.53	980.69	337.26	7.27	4.27	98.07	67.46	120.32	74.67	810.37	115.59
200 X 100 X 3.6	16.29	20.75	1091.47	374.54	7.25	4.25	109.15	74.91	134.30	83.26	903.95	128.26
200 X 100 X 4.0	18.02	22.95	1199.71	410.78	7.23	4.23	119.98	82.16	148.04	91.70	995.40	140.54
200 X 100 X 5.0	22.26	28.36	1459.25	496.94	7.17	4.19	145.93	99.39	181.37	112.09	1213.91	169.44
200 X 100 X 6.0	26.40	33.63	1703.31	576.91	7.12	4.14	170.34	115.39	213.27	131.50	1416.41	195.77
200 X 100 X 8.0	34.38	43.79	2146.21	719.19	7.00	4.05	214.63	143.84	272.79	167.43	1765.96	240.49
240 X 120 X 4.0	21.78	27.75	2110.72	725.35	8.72	5.11	175.90	120.90	216.01	134.01	1745.55	207.11
200 X 100 X 6.0	26.40	33.63	1703.31	576.91	7.12	4.14	170.34	115.39	213.27	131.50	1416.41	195.77
200 X 100 X 8.0	34.38	43.79	2146.21	719.19	7.00	4.05	214.63	143.84	272.79	167.43	1765.96	240.49
240 X 120 X 4.0	21.78	27.75	2110.72	725.35	8.72	5.11	175.90	120.90	216.01	134.01	1745.55	207.11
240 X 120 X 5.0	26.97	34.36	2579.67	882.47	8.66	5.07	214.98	147.08	265.58	164.45	2141.72	251.48
240 X 120 X 6.0	32.05	40.83	3025.91	1030.45	8.61	5.02	252.16	171.75	313.41	193.69	2517.16	292.80
240 X 120 X 8.0	41.91	53.39	3851.84	1299.95	8.49	4.93	320.99	216.66	403.89	248.66	3196.64	366.11
250 X 100 X 4.0	21.16	26.95	2091.66	502.99	8.81	4.32	167.34	100.60	210.41	110.90	1335.40	177.41
250 X 100 X 5.0	26.19	33.36	2553.76	609.85	8.75	4.28	204.31	121.97	258.51	135.84	1631.59	214.59
250 X 100 X 6.0	31.11	39.63	2992.34	709.63	8.69	4.23	239.39	141.93	304.85	159.70	1908.64	248.83
250 X 100 X 8.0	40.66	51.79	3800.53	888.89	8.57	4.14	304.05	177.78	392.27	204.23	2397.53	308.31
250 X 150 X 4.0	24.30	30.95	2696.87	1234.24	9.33	6.31	215.75	164.57	259.61	183.27	2696.49	274.12
250 X 150 X 5.0	30.11	38.36	3304.18	1507.95	9.28	6.27	264.34	201.06	319.76	225.48	3322.96	334.43
250 X 150 X 6.0	35.82	45.63	3885.56	1768.35	9.23	6.23	310.85	235.78	378.05	266.28	3924.87	391.36
250 X 150 X 8.0	46.94	59.79	4972.24	2250.41	9.12	6.14	397.78	300.06	489.07	343.71	5043.97	494.90
250 X 150 X 10.0	57.63	73.42	5960.20	2682.88	9.01	6.04	476.82	357.72	592.79	415.67	6032.07	584.33
280 X 100 X 4.0	23.04	29.35	2785.31	558.32	9.74	4.36	198.96	111.67	252.63	122.42	1543.27	199.54

RECTANGULAR HOLLOW SECTION (RHS) IS : 4923 : 2017/EN 10219-1 : 2006*/ASTM A-500

Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
280 X 100 X 5.0	28.54	36.36	3406.60	677.60	9.68	4.32	243.33	135.52	310.80	150.09	1886.82	241.68
280 X 100 X 6.0	33.94	43.23	3998.76	789.27	9.62	4.27	285.63	157.86	367.00	176.62	2209.32	280.67
300 X 150 X 4.0	27.44	34.95	4196.67	1447.46	10.96	6.44	279.78	193.00	341.98	212.47	3455.16	330.97
300 X 150 X 5.0	34.04	43.36	5153.13	1770.87	10.90	6.39	343.55	236.12	421.90	261.73	4261.58	404.51
300 X 150 X 6.0	40.53	51.63	6073.51	2079.57	10.85	6.35	404.91	277.28	499.63	309.48	5039.24	474.31
300 X 150 X 8.0	53.22	67.79	7807.95	2654.12	10.73	6.26	520.53	353.89	648.55	400.51	6496.60	602.47
300 X 150 X 10.0	65.48	83.42	9403.90	3173.71	10.62	6.17	626.93	423.17	788.86	485.67	7804.31	715.07
300 X 200 X 4.0	30.58	38.95	5072.88	2736.56	11.41	8.38	338.20	273.66	401.18	304.84	5589.58	447.72
300 X 200 X 5.0	37.96	48.36	6241.05	3360.92	11.36	8.34	416.07	336.10	495.65	376.37	6919.17	549.43
300 X 200 X 6.0	45.24	57.63	7370.23	3962.19	11.31	8.29	491.35	396.22	587.83	446.07	8214.59	646.97
300 X 200 X 8.0	59.50	75.79	9513.66	5097.04	11.20	8.20	634.25	509.71	765.35	579.99	10688.71	829.36
300 X 200 X 10.0	73.33	93.42	11507.24	6144.30	11.10	8.11	767.15	614.43	933.86	706.73	12983.61	994.50
300 X 200 X 12.0	86.77	110.53	13354.97	7107.11	10.99	8.02	890.34	710.72	1093.47	826.41	15071.27	1141.95
300 X 200 X 14.0	99.78	127.11	15060.82	7988.55	10.89	7.93	1004.06	798.86	1244.30	939.14	16924.33	1271.23
300 X 600 X 10.0	136.1	173.4	28334	82450	12.8	21.8	1889	2748	2094	3375	68185	3236
300 X 600 X 12.0	162.1	206.5	33273	97176	12.7	21.7	2218	3239	2476	3997	80628	3794
300 X 600 X 14.0	187.7	239.1	37982	111333	12.6	21.6	2532	3711	2846	4601	92563	4322
300 X 600 X 16.0	212.9	271.2	42466	124927	12.5	21.5	2831	4164	3204	5188	103946	4820
300 X 600 X 18.0	237.6	302.7	46730	137968	12.4	21.4	3115	4599	3551	5758	114729	5286
300 X 600 X 20.0	262.0	333.7	50779	150462	12.3	21.2	3385	5015	3885	6311	124869	5721
350 X 250 X 5.0	45.81	58.36	10519.88	6305.84	13.43	10.39	601.14	504.47	709.04	564.76	12375.85	814.43
350 X 250 X 6.0	54.66	69.63	12457.31	7458.44	13.38	10.35	711.85	596.68	842.61	670.85	14733.26	962.58
350 X 250 X 8.0	72.06	91.79	16170.48	9659.06	13.27	10.26	924.03	772.73	1101.63	876.27	19295.99	1243.82
350 X 250 X 10.0	89.03	113.42	19672.08	11723.53	13.17	10.17	1124.12	937.89	1349.92	1072.79	23627.09	1504.66
350 X 250 X 12.0	105.61	134.53	22966.89	13655.73	13.07	10.08	1312.40	1092.46	1587.60	1260.54	27692.08	1744.69
350 X 550 X 10.0	136.1	173.4	37017	73928	14.6	20.7	2115	2688	2370	3224	78590	3485
350 X 550 X 12.0	162.1	206.5	43539	87142	14.5	20.5	2488	3169	2804	3819	93106	4093
350 X 550 X 14.0	187.7	239.1	49781	99849	14.4	20.4	2845	3631	3226	4396	107104	4671
350 X 550 X 16.0	212.9	271.2	55749	112056	14.3	20.3	3186	4075	3635	4958	120534	5217
350 X 550 X 18.0	237.6	302.7	61447	123772	14.3	20.2	3511	4501	4031	5503	133344	5732
350 X 550 X 20.0	262.0	333.7	66882	135004	14.2	20.1	3822	4909	4415	6032	145487	6215
350 X 600 X10.0	144.0	183.4	39908	91153	14.8	22.3	2280	3038	2540	3670	88689	3816
350 X 600 X 12.0	171.6	218.5	46968	107550	14.7	22.2	2684	3585	3007	4350	105121	4485
350 X 600 X 14.0	198.7	253.1	53735	123354	14.6	22.1	3071	4112	3461	5012	120996	5122
350 X 600 X 16.0	225.4	287.2	60215	138573	14.5	22.0	3441	4619	3902	5656	136263	5727
350 X 600 X 18.0	251.8	320.7	66412	153215	14.4	21.9	3795	5107	4330	6282	150870	6299
350 X 600 X 20.0	277.7	353.7	72333	167289	14.3	21.8	4133	5576	4745	6891	164766	6838
400 X 200 X 5.0	45.81	58.36	12489.82	4311.75	14.63	8.60	624.50	431.18	762.43	473.87	10269.69	739.55
400 X 200 X 6.0	54.66	69.63	14789.35	5091.63	14.57	8.55	739.47	509.17	905.99	562.47	12205.15	872.78
400 X 200 X 8.0	72.06	91.79	19195.28	6572.45	14.46	8.46	959.77	657.25	1184.31	733.59	15926.47	1124.29
400 X 200 X 10.0	89.03	113.42	23348.08	7950.97	14.35	8.37	1167.41	795.10	1450.98	896.73	19422.50	1355.55
400 X 200 X 12.0	105.61	134.53	27252.93	9230.63	14.23	8.28	1362.65	923.07	1706.13	1052.01	22662.53	1566.20

RECTANGULAR HOLLOW SECTION (RHS) IS : 4923 : 2017/EN 10219-1 : 2006*/ASTM A-500												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
400 X 200 X 14.0	121.76	155.11	30915.01	10414.85	14.12	8.19	1545.76	1041.49	1949.87	1199.54	25616.52	1755.81
400 X 200 X 16.0	137.51	175.17	34339.42	11507.00	14.00	8.10	1716.98	1150.70	2182.32	1339.45	28255.38	1923.95
400 X 300 X 6.0	64.08	81.63	19446.79	12557.11	15.43	12.40	972.34	837.15	1142.39	940.63	23929.98	1338.20
400 X 300 X 8.0	84.62	107.79	25342.70	16336.49	15.33	12.31	1267.14	1089.10	1497.91	1232.55	31464.16	1738.28
400 X 300 X 10.0	104.73	133.42	30954.74	19920.57	15.23	12.22	1547.74	1328.04	1840.98	1513.86	38709.68	2114.80
400 X 300 X 12.0	124.45	158.53	36288.45	23314.01	15.13	12.13	1814.43	1554.27	2171.73	1784.67	45625.84	2467.39
400 X 300 X 14.0	143.74	183.11	41349.30	26521.41	15.03	12.03	2067.47	1768.10	2490.27	2045.10	52172.04	2795.60
400 X 300 X 16.0	162.63	207.17	46142.73	29547.33	14.92	11.94	2307.14	1969.83	2796.72	2295.29	58308.01	3098.98
400 X 300 X 18.0	181.10	230.70	50674.11	32396.29	14.82	11.85	2533.71	2159.76	3091.21	2535.33	63994.05	3377.06
400 X 500 X 10.0	136.1	173.4	46168	64873	16.3	19.3	2308	2595	2621	3048	85188	3635
400 X 500 X 12.0	162.1	206.5	54359	76461	16.2	19.2	2718	3058	3103	3610	101025	4273
400 X 500 X 14.0	187.7	239.1	62218	87601	16.1	19.1	3111	3504	3571	4156	116339	4880
400 X 500 X 16.0	212.9	271.2	69749	98303	16.0	19.0	3487	3932	4026	4687	131077	5456
400 X 500 X 18.0	237.6	302.7	76960	108573	16.0	18.9	3848	4343	4466	5202	145187	6000
400 X 500 X 20.0	262.0	333.7	83855	118416	15.9	18.8	4193	4737	4894	5702	158616	6512
400 X 550 X 10.0	144.0	183.4	49971	81219	16.5	21.0	2499	2953	2816	3494	97810	4015
400 X 550 X 12.0	171.6	218.5	58877	95826	16.4	20.9	2944	3485	3336	4141	116067	4724
400 X 550 X 14.0	198.7	253.1	67435	109906	16.3	20.8	3372	3997	3841	4772	133761	5401
400 X 550 X 16.0	225.4	287.2	75651	123466	16.2	20.7	3783	4490	4333	5385	150838	6045
400 X 550 X 18.0	251.8	320.7	83531	136513	16.1	20.6	4177	4964	4810	5982	167242	6656
400 X 550 X 20.0	277.7	353.7	91082	149056	16.1	20.5	4554	5420	5274	6562	182919	7234
400 X 600 X 10.0	151.8	193.4	53775	99857	16.7	22.7	2689	3329	3011	3965	110707	4395
400 X 600 X 12.0	181.0	230.5	63395	117924	16.6	22.6	3170	3931	3569	4703	131433	5176
400 X 600 X 14.0	209.7	267.1	72652	135375	16.5	22.5	3633	4513	4111	5422	151557	5922
400 X 600 X 16.0	238.0	303.2	81553	152219	16.4	22.4	4078	5074	4640	6123	171019	6635
400 X 600 X 18.0	265.9	338.7	90103	168463	16.3	22.3	4505	5615	5154	6806	189765	7313
400 X 600 X 20.0	293.4	373.7	98309	184116	16.2	22.2	4915	6137	5654	7471	207738	7956
500 X 200 X 6.0	64.08	81.63	25690.13	6221.07	17.74	8.73	1027.61	622.11	1284.16	678.87	16353.70	1098.63
500 X 200 X 8.0	84.62	107.79	33466.50	8047.87	17.62	8.64	1338.66	804.79	1683.27	887.19	21366.48	1419.28
500 X 200 X 10.0	104.73	133.42	40860.16	9757.63	17.50	8.55	1634.41	975.77	2068.10	1086.73	26105.40	1716.72
500 X 200 X 12.0	124.45	158.53	47877.48	11354.15	17.38	8.46	1915.10	1135.42	2438.78	1277.61	30538.24	1990.64
500 X 200 X 14.0	143.74	183.11	54524.82	12841.14	17.26	8.37	2181.00	1284.12	2795.43	1459.94	34633.43	2240.67
500 X 200 X 16.0	162.63	207.17	60808.49	14222.30	17.13	8.29	2432.34	1422.23	3138.16	1633.85	38360.40	2466.45
500 X 300 X 8.0	97.18	123.79	43149.92	19747.90	18.67	12.63	1726.00	1316.53	2076.87	1466.15	43143.80	2192.97
500 X 300 X 10.0	120.43	153.42	52866.82	24127.24	18.56	12.54	2114.68	1608.49	2558.10	1803.86	53167.39	2675.40
500 X 300 X 12.0	143.29	182.53	62169.00	28293.53	18.46	12.45	2486.76	1886.24	3024.38	2130.27	62797.85	3130.85
500 X 300 X 14.0	165.72	211.11	71063.12	32251.70	18.35	12.36	2842.53	2150.12	3475.83	2445.50	71991.13	3558.92
500 X 300 X 16.0	187.75	239.17	79555.80	36006.64	18.24	12.27	3182.24	2400.45	3912.56	2749.69	80703.46	3959.20
500 X 300 X 18.0	209.36	266.70	87653.63	39563.17	18.13	12.18	3506.15	2637.55	4334.69	3042.93	88891.60	4331.25
500 X 300 X 20.0	230.55	293.70	95363.14	42926.09	18.02	12.09	3814.53	2861.74	4742.35	3325.36	96513.06	4674.62
600 X 200 X 6.0	73.50	93.63	40672.54	7350.51	20.84	8.86	1355.76	735.06	1722.32	795.27	20598.47	1324.49
600 X 200 X 8.0	97.18	123.79	53127.31	9523.28	20.72	8.77	1770.92	952.33	2262.23	1040.79	26928.52	1714.30

RECTANGULAR HOLLOW SECTION (RHS) IS : 4923 : 2017/EN 10219-1 : 2006*/ASTM A-500												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
600 X 200 X 10.0	120.43	153.42	65043.47	11564.30	20.59	8.68	2168.12	1156.43	2785.23	1276.73	32934.16	2077.94
600 X 200 X 12.0	143.29	182.53	76428.61	13477.67	20.46	8 59	2547.63	1347.77	3291.44	1503.21	38582.25	2415.16
600 X 200 X 14.0	165.72	211.11	87290.27	15267.43	20.33	8.50	2909.68	1526.75	3780.99	1720.34	43840.48	2725.67
600 X 200 X 16.0	187.75	239.17	97635.94	16937.61	20.20	8.42	3254.54	1693.77	4254.00	1928.25	48677.53	3009.14
600 X 300 X 8.0	109.74	139.79	67146.73	23159.31	21.92	12.87	2238.23	1543.96	2735.83	1699.75	55282.51	2647.72
600 X 300 X 10.0	136.13	173.42	82450.14	28333.90	21.80	12.78	2748.34	1888.93	3375.23	2093.86	68185.35	3236.10
600 X 300 X 12.0	162.13	206.53	97176.13	33273.05	21.69	12.69	3239.21	2218.21	3997.04	2475.87	80627.77	3794.47
600 X 300 X 14.0	187.70	239.11	111332.56	37981.99	21.58	12.60	3711.09	2532.14	4601.39	2845.90	92563.22	4322.49
600 X 300 X 16.0	212.87	271.17	124927.25	42465.94	21.46	12.51	4164.25	2831.07	5188.40	3204.09	103945.54	4819.77
600 X 300 X 18.0	237.62	302.70	137967.96	46730.05	21.35	12.42	4598.94	3115.34	5758.17	3550.53	114729.07	5285.92
600 X 300 X 20.0	261.95	333.70	150462.43	50779.42	21.23	12.34	5015.42	3385.30	6310.84	3885.36	124868.90	5720.52
600 X 400 X 8.0	122.30	155.79	81166.14	43784.94	22.83	16.76	2705.54	2189.25	3209.43	2438.71	89433.21	3581.75
600 X 400 X 10.0	151.83	193.42	99856.81	53774.74	22.72	16.67	3328.57	2688.74	3965.23	3010.98	110706.68	4395.41
600 X 400 X 12.0	180.97	230.53	117923.65	63395.01	22.62	16.58	3930.79	3169.76	4702.64	3568.53	131433.38	5175.73
600 X 400 X 14.0	209.68	267.11	135374.85	72652.18	22.51	16.49	4512.50	3632.61	5421.79	4111.47	151556.54	5922.35
600 X 400 X 16.0	237.99	303.17	152218.55	81552.65	22.41	16.40	5073.96	4077.64	6122.80	4639.92	171019.37	6634.88
600 X 400 X 18.0	265.88	338.70	168462.84	90102.75	22.30	16.31	5615.43	4505.14	6805.77	5154.01	189765.23	7312.91
600 X 400 X 20.0	293.35	373.70	184115.76	98308.80	22.20	16.22	6137.20	4915.44	7470.84	5653.85	207737.81	7956.01

ALLOWABLE STRESS VALUES (IN MPA) AND DIMENSIONAL TOLERANCE IS 4923:2017, TABLE 4, (Clauses 19.2)										
S. No.	Grade	Tensile Strength	Yield Strength	Elongation	DIMENSIONAL TOLERANCE					
		<i>Min</i>	<i>Min</i>	<i>Min</i>	Outside Dimensional	Thickness	Squareness	Corner radius	Weight	
	MPa	MPa	Percent	Individual Lengths					On lot of 10 MT	
1	YSt 210	330	210	20	+/-1% with a minimum of +/-0.50 min	±7.5%	90 deg. +/-2 deg.	3t max	10% -8%	±7%
2	YSt 240	410	240	15						
3	YSt 310	450	310	10						
4	YSt 355	490	355	10						
5	YSt 420	500	420	10						

*Galvanised sections can also be manufactured

*Customised sections can also be manufactured.

THE BIG JUST GOT
BIGGER & STRONGER

Introducing
INDIA'S FIRST
1000MM X 1000MM BOX SECTION
Thickness: upto 40mm



SIZE RANGE

Dim.(mm)	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
300							10-22	10-22	10-22	10-22	10-22	10-22	10-22	10-22	10-22
350						10-25	10-25	10-25	10-25	10-25	10-25	10-25	10-25	10-25	10-25
400					10-28	10-28	10-28	10-28	10-28	10-28	10-28	10-28	10-28	10-28	10-28
450				10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30
500					10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32
550						10-35	10-35	10-35	10-35	10-35	10-35	10-35	10-35	10-35	10-35
600							10-36	10-36	10-36	10-36	10-36	10-36	10-36	10-36	10-36
650								10-38	10-38	10-38	10-38	10-38	10-38	10-38	10-38
700									10-40	10-40	10-40	10-40	10-40	10-40	10-40
750										10-40	10-40	10-40	10-40	10-40	10-40
800											10-40	10-40	10-40	10-40	10-40
850												10-40	10-40	10-40	10-40
900													10-40	10-40	10-40
950														10-40	10-40
1000															10-40

Thickness less than 30mm corresponds to yield strength of 500MPa, Thickness 40mm corresponds to yield strength of 350MPa.
Length of steel pipe: 8000~12000mm

SQUARE HOLLOW SECTION (SHS)

Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
			I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
mm	kg/m	cm ²	cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
450 X 450 X 22.0	285.9	364.2	109219.83	109219.83	17.3	17.3	4854.22	4854.22	5775.11	5775.11	176253.69	7101.41
450 X 450 X 25.0	321.0	408.9	120583.14	120583.14	17.2	17.2	5359.26	5359.26	6426.67	6426.67	194460.34	7774.14
450 X 450 X 28.0	355.2	452.5	131166.14	131166.14	17.0	17.0	5829.61	5829.61	7046.85	7046.85	210720.07	8370.97
450 X 450 X 30.0	377.4	480.8	137798.32	137798.32	16.9	16.9	6124.37	6124.37	7443.08	7443.08	220396.57	8725.84
500 X 500 X 22.0	320.4	408.2	152992.79	152992.79	19.4	19.4	6119.72	6119.72	7238.85	7238.85	246553.56	8999.78
500 X 500 X 25.0	360.2	458.9	169438.81	169438.81	19.2	19.2	6777.56	6777.56	8073.93	8073.93	273458.51	9902.23
500 X 500 X 28.0	399.1	508.5	184899.74	184899.74	19.1	19.1	7395.99	7395.99	8873.78	8873.78	298135.59	10721.96
500 X 500 X 30.0	424.5	540.8	194671.36	194671.36	19.0	19.0	7786.86	7786.86	9387.64	9387.64	313255.32	11221.63
500 X 500 X 32.0	449.6	572.7	204022.51	204022.51	18.9	18.9	8160.91	8160.91	9886.13	9886.13	327245.81	11683.25
550 X 550 X 10.0	167.5	213.4	103091.24	103091.24	22.0	22.0	3748.78	3748.78	4304.17	4304.17	161175.90	5605.10
550 X 550 X 12.0	199.8	254.5	121880.54	121880.54	21.9	21.9	4432.02	4432.02	5109.71	5109.71	191778.54	6617.62
550 X 550 X 14.0	231.7	295.1	140079.12	140079.12	21.8	21.8	5093.79	5093.79	5897.11	5897.11	221685.52	7593.20
550 X 550 X 16.0	263.1	335.2	157694.99	157694.99	21.7	21.7	5734.37	5734.37	6666.48	6666.48	250831.33	8531.43
550 X 550 X 18.0	294.1	374.7	174736.14	174736.14	21.6	21.6	6354.05	6354.05	7417.93	7417.93	279150.40	9431.90
550 X 550 X 20.0	324.8	413.7	191210.50	191210.50	21.5	21.5	6953.11	6953.11	8151.60	8151.60	306577.23	10294.20
550 X 550 X 22.0	355.0	452.2	207125.94	207125.94	21.4	21.4	7531.86	7531.86	8867.59	8867.59	333046.47	11117.86
550 X 550 X 25.0	399.5	508.9	229968.28	229968.28	21.3	21.3	8362.49	8362.49	9908.69	9908.69	370812.82	12279.89
550 X 550 X 28.0	443.1	564.5	251596.96	251596.96	21.1	21.1	9148.99	9148.99	10910.71	10910.71	406061.42	13352.31
550 X 550 X 30.0	471.6	600.8	265354.69	265354.69	21.0	21.0	9649.27	9649.27	11557.19	11557.19	428056.21	14016.66
550 X 550 X 32.0	499.8	636.7	278592.25	278592.25	20.9	20.9	10130.63	10130.63	12186.61	12186.61	448775.13	14639.93
550 X 550 X 36.0	554.8	706.8	303537.24	303537.24	20.7	20.7	11037.72	11037.72	13394.67	13394.67	486143.95	15761.14
600 X 600 X 10.0	183.2	233.4	134670.14	134670.14	24.0	24.0	4489.01	4489.01	5145.23	5145.23	209944.77	6715.17
600 X 600 X 12.0	218.7	278.5	159418.69	159418.69	23.9	23.9	5313.96	5313.96	6113.84	6113.84	250061.48	7940.17
600 X 600 X 14.0	253.6	323.1	183459.44	183459.44	23.8	23.8	6115.32	6115.32	7062.59	7062.59	289389.19	9125.07
600 X 600 X 16.0	288.2	367.2	206801.17	206801.17	23.7	23.7	6893.38	6893.38	7991.60	7991.60	327856.54	10269.47
600 X 600 X 18.0	322.4	410.7	229452.60	229452.60	23.6	23.6	7648.42	7648.42	8900.97	8900.97	365392.03	11373.00
600 X 600 X 20.0	356.2	453.7	251422.43	251422.43	23.5	23.5	8380.75	8380.75	9790.84	9790.84	401924.14	12435.22
600 X 600 X 22.0	389.5	496.2	272719.29	272719.29	23.4	23.4	9090.65	9090.65	10661.33	10661.33	437381.41	13455.70
600 X 600 X 25.0	438.7	558.9	303421.57	303421.57	23.3	23.3	10114.06	10114.06	11930.95	11930.95	488396.27	14907.18
600 X 600 X 28.0	487.1	620.5	332657.81	332657.81	23.2	23.2	11088.60	11088.60	13157.63	13157.63	536593.76	16262.16
600 X 600 X 30.0	518.7	660.8	351348.31	351348.31	23.1	23.1	11711.62	11711.62	13951.75	13951.75	567043.57	17111.06
600 X 600 X 32.0	550.0	700.7	369408.36	369408.36	23.0	23.0	12313.62	12313.62	14727.08	14727.08	596067.36	17915.83
600 X 600 X 36.0	611.4	778.8	403670.54	403670.54	22.8	22.8	13455.69	13455.69	16221.84	16221.84	649566.23	19390.98
650 X 650 X 10.0	198.9	253.4	172116.85	172116.85	26.1	26.1	5295.91	5295.91	6061.29	6061.29	267649.51	7925.23
650 X 650 X 12.0	237.5	302.5	203966.48	203966.48	26.0	26.0	6275.90	6275.90	7207.97	7207.97	319052.11	9382.70
650 X 650 X 14.0	275.6	351.1	234980.67	234980.67	25.9	25.9	7230.18	7230.18	8333.07	8333.07	369567.28	10796.90
650 X 650 X 16.0	313.4	399.2	265168.93	265168.93	25.8	25.8	8159.05	8159.05	9436.72	9436.72	419117.86	12167.46
650 X 650 X 18.0	350.7	446.7	294540.76	294540.76	25.7	25.7	9062.80	9062.80	10519.01	10519.01	467626.45	13493.99
650 X 650 X 20.0	387.6	493.7	323105.60	323105.60	25.6	25.6	9941.72	9941.72	11580.09	11580.09	515015.57	14776.10
650 X 650 X 22.0	424.0	540.2	350872.84	350872.84	25.5	25.5	10796.09	10796.09	12620.06	12620.06	561207.74	16013.36
650 X 650 X 25.0	478.0	608.9	391048.66	391048.66	25.3	25.3	12032.27	12032.27	14140.72	14140.72	628082.52	17784.19
650 X 650 X 28.0	531.0	676.5	429482.29	429482.29	25.2	25.2	13214.84	13214.84	15614.56	15614.56	691830.11	19451.59

Square Hollow Section (SHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
650 X 650 X 30.0	565.8	720.8	454152.21	454152.21	25.1	25.1	13973.92	13973.92	16571.31	16571.31	732463.73	20504.92
650 X 650 X 32.0	600.3	764.7	478070.84	478070.84	25.0	25.0	14709.88	14709.88	17507.55	17507.55	771517.18	21511.09
650 X 650 X 36.0	667.9	850.8	523690.65	523690.65	24.8	24.8	16113.56	16113.56	19319.00	19319.00	844585.06	23379.90
700 X 700 X 10.0	214.6	273.4	215931.36	215931.36	28.1	28.1	6169.47	6169.47	7052.35	7052.35	335040.11	9235.29
700 X 700 X 12.0	256.3	326.5	256123.93	256123.93	28.0	28.0	7317.83	7317.83	8392.10	8392.10	399650.41	10945.21
700X700X14.0	297.6	379.1	295342.80	295342.80	27.9	27.9	8438.37	8438.37	9708.56	9708.56	463269.76	12608.70
700 X 700 X 16.0	338.5	431.2	333598.29	333598.29	27.8	27.8	9531.38	9531.38	11001.83	11001.83	525815.21	14225.39
700 X 700 X 18.0	378.9	482.7	370900.62	370900.62	27.7	27.7	10597.17	10597.17	12272.06	12272.06	587203.50	15794.92
700 X 700 X 20.0	419.0	533.7	407260.01	407260.01	27.6	27.6	11636.01	11636.01	13519.34	13519.34	647351.26	17316.88
700 X 700 X 22.0	458.6	584.2	442686.59	442686.59	27.5	27.5	12648.19	12648.19	14743.80	14743.80	706175.01	18790.87
700 X 700 X 25.0	517.2	658.9	494099.57	494099.57	27.4	27.4	14117.14	14117.14	16537.98	16537.98	791745.68	20910.96
700 X 700 X 28.0	575.0	732.5	543470.40	543470.40	27.2	27.2	15527.73	15527.73	18281.48	18281.48	873868.80	22920.66
700 X 700 X 30.0	612.9	780.8	575266.40	575266.40	27.1	27.1	16436.19	16436.19	19415.87	19415.87	926564.22	24198.35
700 X 700 X 32.0	650.5	828.7	606179.69	606179.69	27.1	27.1	17319.42	17319.42	20528.03	20528.03	977521.04	25425.81
700 X 700 X 36.0	724.4	922.8	665397.57	665397.57	26.9	26.9	19011.36	19011.36	22686.16	22686.16	1073893.45	27728.04
700 X 700 X 40.0	796.6	1014.8	721202.54	721202.54	26.7	26.7	20605.79	20605.79	24756.84	24756.84	1162343.62	29823.37
750 X 750 X 10.0	230.3	293.4	266613.69	266613.69	30.1	30.1	7109.70	7109.70	8118.41	8118.41	412866.57	10645.34
750 X 750 X 12.0	275.2	350.5	316491.01	316491.01	30.1	30.1	8439.77	8439.77	9666.23	9666.23	492756.37	12627.71
750 X 750 X 14.0	319.6	407.1	365245.85	365245.85	30.0	30.0	9739.89	9739.89	11189.04	11189.04	571546.60	14560.48
750 X 750 X 16.0	363.6	463.2	412889.24	412889.24	29.9	29.9	11010.38	11010.38	12686.95	12686.95	649148.52	16443.29
750 X 750 X 18.0	407.2	518.7	459432.19	459432.19	29.8	29.8	12251.53	12251.53	14160.10	14160.10	725473.08	18275.78
750 X 750 X 20.0	450.4	573.7	504885.66	504885.66	29.7	29.7	13463.62	13463.62	15608.59	15608.59	800431.00	20057.56
750 X 750 X 22.0	493.1	628.2	549260.54	549260.54	29.6	29.6	14646.95	14646.95	17032.54	17032.54	873932.90	21788.25
750 X 750 X 25.0	556.5	708.9	613824.29	613824.29	29.4	29.4	16368.65	16368.65	19122.74	19122.74	981260.11	24287.53
750X750X28.0	618.9	788.5	676022.13	676022.13	29.3	29.3	18027.26	18027.26	21158.41	21158.41	1084808.62	26669.44
750 X 750 X 30.0	660.0	840.8	716190.88	716190.88	29.2	29.2	19098.43	19098.43	22485.42	22485.42	1151593.29	28191.41
750 X 750 X 32.0	700.8	892.7	755334.91	755334.91	29.1	29.1	20142.27	20142.27	23788.50	23788.50	1216476.44	29660.06
750X750X36.0	780.9	994.8	830591.31	830591.31	28.9	28.9	22149.11	22149.11	26323.33	26323.33	1340186.55	32435.51
750X750X40.0	859.4	1094.8	901875.87	901875.87	28.7	28.7	24050.03	24050.03	28763.83	28763.83	1455242.57	34991.86
800X800X10.0	246.0	313.4	324663.83	324663.83	32.2	32.2	8116.60	8116.60	9259.47	9259.47	501878.89	12155.38
800X800X12.0	294.0	374.5	385667.75	385667.75	32.1	32.1	9641.70	9641.70	11030.36	11030.36	599269.98	14430.20
800X800X14.0	341.6	435.1	445389.80	445389.80	32.0	32.0	11134.75	11134.75	12774.52	12774.52	695447.77	16652.23
800X800X16.0	388.7	495.2	503841.78	503841.78	31.9	31.9	12596.05	12596.05	14492.07	14492.07	790317.77	18821.15
800X800X18.0	435.4	554.7	561035.46	561035.46	31.8	31.8	14025.89	14025.89	16183.14	16183.14	883785.10	20936.59
800X800X20.0	481.8	613.7	616982.54	616982.54	31.7	31.7	15424.57	15424.57	17847.83	17847.83	975754.66	22998.17
800X800X22.0	527.7	672.2	671694.69	671694.69	31.6	31.6	16792.37	16792.37	19486.28	19486.28	1066131.18	25005.52
800X800X25.0	595.7	758.9	751472.82	751472.82	31.5	31.5	18786.83	18786.83	21895.00	21895.00	1198500.34	27913.94
800X800X28.0	662.9	844.5	828537.50	828537.50	31.3	31.3	20713.44	20713.44	24245.33	24245.33	1326748.72	30697.97
800X800X30.0	707.1	900.8	878425.65	878425.65	31.2	31.2	21960.65	21960.65	25779.98	25779.98	1409799.68	32484.15
800 X 800 X 32.0	751.0	956.7	927136.51	927136.51	31.1	31.1	23178.42	23178.42	27288.98	27288.98	1490781.59	34213.93
800 X 800 X 36.0	837.4	1066.8	1021071.8	1021071.8	30.9	30.9	25526.80	25526.80	30230.49	30230.49	1646160.91	37502.40
800 X 800 X 40.0	922.2	1174.8	1110434.1	1110434.1	30.7	30.7	27760.86	27760.86	33070.82	33070.82	1792137.70	40559.54

SQUARE HOLLOW SECTION (SHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
850 X 850 X 10.0	261.7	333.4	390581.77	390581.77	34.2	34.2	9190.16	9190.16	10475.54	10475.54	602827.06	13765.42
850 X 850 X 12.0	312.9	398.5	464254.12	464254.12	34.1	34.1	10923.63	10923.63	12484.49	12484.49	720091.23	16352.68
850 X 850 X 14.0	363.5	463.1	536474.65	536474.65	34.0	34.0	12622.94	12622.94	14465.00	14465.00	836023.27	18883.97
850 X 850 X 16.0	413.8	527.2	607255.92	607255.92	33.9	33.9	14288.38	14288.38	16417.19	16417.19	950522.90	21358.98
850 X 850 X 18.0	463.7	590.7	676610.44	676610.44	33.8	33.8	15920.25	15920.25	18341.18	18341.18	1063489.50	23777.35
850 X 850 X 20.0	513.2	653.7	744550.67	744550.67	33.8	33.8	17518.84	17518.84	20237.08	20237.08	1174822.14	26138.72
850 X 850 X 22.0	562.2	716.2	811089.04	811089.04	33.7	33.7	19084.45	19084.45	22105.02	22105.02	1284419.66	28442.70
850 X 850 X 25.0	635.0	808.9	908295.16	908295.16	33.5	33.5	21371.66	21371.66	24854.77	24854.77	1445341.03	31790.20
850 X 850 X 28.0	706.9	900.5	1002416.4	1002416.4	33.4	33.4	23586.28	23586.28	27542.26	27542.26	1601788.47	35006.28
850 X 850 X 30.0	754.2	960.8	1063470.7	1063470.7	33.3	33.3	25022.84	25022.84	29299.54	29299.54	1703432.47	37076.62
850 X 850 X 32.0	801.2	1020.7	1123184.4	1123184.4	33.2	33.2	26427.87	26427.87	31029.45	31029.45	1802835.15	39087.46
850 X 850 X 36.0	894.0	1138.8	1238639.2	1238639.2	33.0	33.0	29144.46	29144.46	34407.65	34407.65	1994513.98	42928.79
850 X 850 X 40.0	985.0	1254.8	1348877.4	1348877.4	32.8	32.8	31738.30	31738.30	37677.81	37677.81	2176024.40	46526.52
900 X 900 X 10.0	277.4	353.4	464867.53	464867.53	36.3	36.3	10330.39	10330.39	11766.60	11766.60	716461.08	15475.45
900 X 900 X 12.0	331.7	422.5	552850.15	552850.15	36.2	36.2	12285.56	12285.56	14028.62	14028.62	856120.12	18395.14
900 X 900 X 14.0	385.5	491.1	639200.42	639200.42	36.1	36.1	14204.46	14204.46	16260.48	16260.48	994323.06	21255.70
900 X 900 X 16.0	439.0	559.2	723931.65	723931.65	36.0	36.0	16087.37	16087.37	18462.31	18462.31	1130963.91	24056.79
900 X 900 X 18.0	492.0	626.7	807057.12	807057.12	35.9	35.9	17934.61	17934.61	20634.22	20634.22	1265936.24	26798.08
900 X 900 X 20.0	544.6	693.7	888590.04	888590.04	35.8	35.8	19746.45	19746.45	22776.33	22776.33	1399133.35	29479.21
900 X 900 X 22.0	596.7	760.2	968543.59	968543.59	35.7	35.7	21523.20	21523.20	24888.76	24888.76	1530448.23	32099.80
900 X 900 X 25.0	674.2	858.9	1085541.3	1085541.3	35.6	35.6	24123.15	24123.15	28002.03	28002.03	1723656.92	35916.33
900 X 900 X 28.0	750.8	956.5	1199059.1	1199059.1	35.4	35.4	26645.76	26645.76	31049.19	31049.19	1912027.38	39594.42
900 X 900 X 30.0	801.3	1020.8	1272826.0	1272826.0	35.3	35.3	28285.03	28285.03	33044.10	33044.10	2034740.96	41968.86
900 X 900 X 32.0	851.5	1084.7	1345078.8	1345078.8	35.2	35.2	29890.65	29890.65	35009.93	35009.93	2155036.13	44280.69
900 X 900 X 36.0	950.5	1210.8	1485093.4	1485093.4	35.0	35.0	33002.08	33002.08	38854.81	38854.81	2387943.84	48714.75
900 X 900 X 40.0	1047.8	1334.8	1619205.6	1619205.6	34.8	34.8	35982.35	35982.35	42584.80	42584.80	2609899.25	52892.89
950 X 950 X 10.0	293.1	373.4	548021.09	548021.09	38.3	38.3	11537.29	11537.29	13132.66	13132.66	843530.95	17285.48
950 X 950 X 12.0	350.5	446.5	652055.82	652055.82	38.2	38.2	13727.50	13727.50	15662.75	15662.75	1008256.64	20557.61
950 X 950 X 14.0	407.5	519.1	754267.09	754267.09	38.1	38.1	15879.31	15879.31	18160.96	18160.96	1171397.16	23767.41
950 X 950 X 16.0	464.1	591.2	854668.98	854668.98	38.0	38.0	17993.04	17993.04	20627.43	20627.43	1332840.76	26914.58
950 X 950 X 18.0	520.2	662.7	953275.50	953275.50	37.9	37.9	20068.96	20068.96	23062.26	23062.26	1492475.29	29998.78
950 X 950 X 20.0	576.0	733.7	1050100.6	1050100.6	37.8	37.8	22107.39	22107.39	25465.58	25465.58	1650188.23	33019.65
950 X 950 X 22.0	631.3	804.2	1145158.3	1145158.3	37.7	37.7	24108.60	24108.60	27837.50	27837.50	1805866.77	35976.84
950 X 950 X 25.0	713.5	908.9	1284461.2	1284461.2	37.6	37.6	27041.29	27041.29	31336.79	31336.79	2035322.81	40292.37
950 X 950 X 28.0	794.8	1012.5	1419865.3	1419865.3	37.5	37.5	29891.91	29891.91	34766.11	34766.11	2259565.08	44462.40
950 X 950 X 30.0	848.4	1080.8	1507991.6	1507991.6	37.4	37.4	31747.20	31747.20	37013.65	37013.65	2405974.60	47160.90
950 X 950 X 32.0	901.7	1148.7	1594419.5	1594419.5	37.3	37.3	33566.73	33566.73	39230.40	39230.40	2549783.77	49793.68
950 X 950 X 36.0	1007.0	1282.8	1762234.4	1762234.4	37.1	37.1	37099.68	37099.68	43571.98	43571.98	2829149.05	54860.33
950 X 950 X 40.0	1110.6	1414.8	1923418.7	1923418.7	36.9	36.9	40493.03	40493.03	47791.79	47791.79	3096759.62	59658.72
1000 X 1000 X 10.0	308.8	393.4	640542.47	640542.47	40.4	40.4	12810.85	12810.85	14573.72	14573.72	984786.67	19195.51
1000 X 1000 X 12.0	369.4	470.5	762471.14	762471.14	40.3	40.3	15249.43	15249.43	17386.88	17386.88	1177400.79	22840.06
1000 X 1000 X 14.0	429.5	547.1	882374.67	882374.67	40.2	40.2	17647.50	17647.50	20166.44	20166.44	1368295.54	26419.11

SQUARE HOLLOW SECTION (SHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm ²	I _{xx} cm ⁴	I _{yy} cm ⁴	R _{xx} cm	R _{yy} cm	Z _{xx} cm ³	Z _{yy} cm ³	S _{xx} cm ³	S _{yy} cm ³	J cm ⁴	C cm ³
1000X1000X16.0	489.2	623.2	1000267.8	1000267.8	40.1	40.1	20005.36	20005.36	22912.55	22912.55	1557353.45	29932.35
1000X1000X18.0	548.5	698.7	1116165.5	1116165.5	40.0	40.0	22323.32	22323.32	25625.30	25625.30	1744456.61	33379.45
1000X1000X20.0	607.4	773.7	1230082.4	1230082.4	39.9	39.9	24601.65	24601.65	28304.83	28304.83	1929486.73	36760.06
1000X1000X22.0	665.8	848.2	1342033.2	1342033.2	39.8	39.8	26840.67	26840.67	30951.24	30951.24	2112325.21	40073.82
1000X1000X25.0	752.7	958.9	1506305.0	1506305.0	39.6	39.6	30126.11	30126.11	34859.05	34859.05	2382213.53	44918.31
1000X1000X28.0	838.7	1068.5	1666235.2	1666235.2	39.5	39.5	33324.71	33324.71	38693.04	38693.04	2646501.27	49610.24
1000X1000X30.0	895.5	1140.8	1770468	1770468	39.4	39.4	35409	35409	41208	41208	2819383	52653
1000X1000X32.0	952.0	1212.7	1872807	1872807	39.3	39.3	37456	37456	43691	43691	2989477	55626
1000X1000X36.0	1063.5	1354.8	2071862	2071862	39.1	39.1	41437	41437	48559	48559	3320828	61366
1000X1000X40.0	1173.4	1494.8	2263517	2263517	38.9	38.9	45270	45270	53299	53299	3639603	66824

Thickness less than 30mm corresponds to yield strength of 500MPa, Thickness 40mm corresponds to yield strength of 350MPa.
Length of steel pipe: 8000-12000mm



Rectangular Hollow Section (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
300X600X22.0	285.9	364.2	54619	162418	12.3	21.1	3641	5414	4209	6847	134321	6123
300X650X10.0	144.0	183.4	30437	100431	12.9	23.4	2029	3090	2239	3821	75846	3516
300X650X12.0	171.6	218.5	35763	118477	12.8	23.3	2384	3645	2649	4528	89720	4126
300X650X14.0	198.7	253.1	40847	135863	12.7	23.2	2723	4180	3046	5217	103051	4704
300X650X16.0	225.4	287.2	45696	152597	12.6	23.1	3046	4695	3431	5886	115792	5250
300X650X18.0	251.8	320.7	50313	168688	12.5	22.9	3354	5190	3804	6537	127897	5763
300X650X20.0	277.7	353.7	54706	184144	12.4	22.8	3647	5666	4165	7170	139319	6244
300X650X22.0	303.2	386.2	58879	198973	12.4	22.7	3925	6122	4514	7784	150015	6690
300X700X10.0	151.8	193.4	32541	120705	13.0	25.0	2169	3449	2384	4292	83586	3797
300X700X12.0	181.0	230.5	38253	142510	12.9	24.9	2550	4072	2821	5090	98904	4458
300X700X14.0	209.7	267.1	43712	163558	12.8	24.8	2914	4673	3246	5867	113644	5086
300X700X16.0	238.0	303.2	48925	183857	12.7	24.6	3262	5253	3658	6624	127756	5681
300X700X18.0	265.9	338.7	53897	203417	12.6	24.5	3593	5812	4058	7362	141194	6241
300X700X20.0	293.4	373.7	58633	222247	12.5	24.4	3909	6350	4445	8079	153911	6767
300X700X22.0	320.4	408.2	63138	240355	12.4	24.3	4209	6867	4820	8777	165861	7258
300X750X10.0	159.7	203.4	34644	143396	13.1	26.6	2310	3824	2529	4788	91394	4077
300X750X12.0	190.4	242.5	40742	169424	13.0	26.4	2716	4518	2994	5681	108168	4790
300X750X14.0	220.7	281.1	46577	194591	12.9	26.3	3105	5189	3447	6552	124326	5468
300X750X16.0	250.6	319.2	52155	218906	12.8	26.2	3477	5838	3886	7402	139819	6111
300X750X18.0	280.0	356.7	57480	242380	12.7	26.1	3832	6463	4312	8231	154600	6718
300X750X20.0	309.1	393.7	62559	265021	12.6	26.0	4171	7067	4725	9039	168621	7290
300X750X22.0	337.7	430.2	67398	286839	12.5	25.8	4493	7649	5126	9825	181836	7825
300X800X10.0	167.5	213.4	36747	168630	13.1	28.1	2450	4216	2674	5309	99259	4358
300X800X12.0	199.8	254.5	43232	199370	13.0	28.0	2882	4984	3167	6302	117498	5122
300X800X14.0	231.7	295.1	49443	229138	12.9	27.9	3296	5728	3647	7273	135084	5850
300X800X16.0	263.1	335.2	55385	257945	12.9	27.7	3692	6449	4113	8220	151967	6541
300X800X18.0	294.1	374.7	61064	285801	12.8	27.6	4071	7145	4566	9145	168098	7196
300X800X20.0	324.8	413.7	66486	312716	12.7	27.5	4432	7818	5005	10048	183431	7813
300X800X22.0	355.0	452.2	71657	338700	12.6	27.4	4777	8468	5432	10928	197919	8393
300X850X10.0	175.4	223.4	38851	196533	13.2	29.7	2590	4624	2819	5856	107175	4638
300X850X12.0	209.2	266.5	45722	232498	13.1	29.5	3048	5471	3340	6954	126887	5454
300X850X14.0	242.7	309.1	52308	267375	13.0	29.4	3487	6291	3847	8028	145907	6232
300X850X16.0	275.7	351.2	58614	301174	12.9	29.3	3908	7086	4340	9078	164187	6972
300X850X18.0	308.3	392.7	64647	333906	12.8	29.2	4310	7857	4820	10104	181676	7674
300X850X20.0	340.5	433.7	70413	365582	12.7	29.0	4694	8602	5285	11107	198328	8337
300X850X22.0	372.2	474.2	75917	396213	12.7	28.9	5061	9323	5738	12086	214094	8961
300X900X10.0	183.2	233.4	40954	227228	13.3	31.2	2730	5050	2964	6427	115134	4918
300X900X12.0	218.7	278.5	48212	268957	13.2	31.1	3214	5977	3513	7635	136326	5786
300X900X14.0	253.6	323.1	55173	309475	13.1	31.0	3678	6877	4047	8818	156788	6614
300X900X16.0	288.2	367.2	61844	348792	13.0	30.8	4123	7751	4567	9976	176470	7402
300X900X18.0	322.4	410.7	68231	386920	12.9	30.7	4549	8598	5073	11109	195323	8151
300X900X20.0	356.2	453.7	74339	423870	12.8	30.6	4956	9419	5565	12216	213298	8860

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
300X900X22.0	389.5	496.2	80176	459654	12.7	30.4	5345	10215	6043	13299	230350	9528
300X950X10.0	191.1	243.4	43057	260840	13.3	32.7	2870	5491	3109	7023	123131	5199
300X950X12.0	228.1	290.5	50701	308898	13.2	32.6	3380	6503	3685	8346	145808	6118
300X950X14.0	264.6	337.1	58038	355614	13.1	32.5	3869	7487	4247	9643	167717	6996
300X950X16.0	300.8	383.2	65074	400999	13.0	32.4	4338	8442	4794	10914	188807	7833
300X950X18.0	336.5	428.7	71814	445067	12.9	32.2	4788	9370	5327	12158	209029	8629
300X950X20.0	371.9	473.7	78266	487829	12.9	32.1	5218	10270	5845	13376	228334	9383
300X950X22.0	406.8	518.2	84436	529296	12.8	32.0	5629	11143	6349	14567	246674	10096
300X1000X10.0	198.9	253.4	45161	297496	13.4	34.3	3011	5950	3254	7644	131161	5479
300X1000X12.0	237.5	302.5	53191	352471	13.3	34.1	3546	7049	3858	9088	155330	6450
300X1000X14.0	275.6	351.1	60903	405967	13.2	34.0	4060	8119	4448	10504	178690	7378
300X1000X16.0	313.4	399.2	68303	457997	13.1	33.9	4554	9160	5022	11892	201193	8263
300X1000X18.0	350.7	446.7	75398	508573	13.0	33.7	5027	10171	5581	13252	222787	9106
300X1000X20.0	387.6	493.7	82193	557709	12.9	33.6	5480	11154	6125	14585	243425	9907
300X1000X22.0	424.0	540.2	88695	605416	12.8	33.5	5913	12108	6655	15890	263059	10664
350X550X22.0	285.9	364.2	72058	145758	14.1	20.0	4118	5300	4786	6544	156912	6666
350X550X25.0	321.0	408.9	79352	161010	13.9	19.8	4534	5855	5320	7284	172601	7281
350X600X22.0	303.2	386.2	77984	180802	14.2	21.6	4456	6027	5147	7482	177900	7343
350X600X25.0	340.6	433.9	85966	200036	14.1	21.5	4912	6668	5726	8337	196066	8036
350X650X10.0	151.8	193.4	42799	110672	14.9	23.9	2446	3405	2710	4141	98944	4146
350X650X12.0	181.0	230.5	50397	130690	14.8	23.8	2880	4021	3210	4911	117318	4877
350X650X14.0	209.7	267.1	57689	150023	14.7	23.7	3297	4616	3696	5662	135097	5574
350X650X16.0	238.0	303.2	64680	168679	14.6	23.6	3696	5190	4169	6394	152226	6237
350X650X18.0	265.9	338.7	71377	186667	14.5	23.5	4079	5744	4629	7106	168654	6866
350X650X20.0	293.4	373.7	77785	203996	14.4	23.4	4445	6277	5075	7800	184328	7460
350X650X22.0	320.4	408.2	83910	220673	14.3	23.3	4795	6790	5507	8475	199196	8019
350X650X25.0	360.2	458.9	92581	244486	14.2	23.1	5290	7523	6132	9453	219877	8791
350X700X10.0	159.7	203.4	45690	132608	15.0	25.5	2611	3789	2880	4637	109329	4476
350X700X12.0	190.4	242.5	53826	156712	14.9	25.4	3076	4477	3413	5503	129669	5268
350X700X14.0	220.7	281.1	61642	180031	14.8	25.3	3522	5144	3932	6347	149373	6025
350X700X16.0	250.6	319.2	69146	202575	14.7	25.2	3951	5788	4436	7171	168387	6747
350X700X18.0	280.0	356.7	76342	224353	14.6	25.1	4362	6410	4927	7975	186657	7433
350X700X20.0	309.1	393.7	83237	245373	14.5	25.0	4756	7011	5405	8759	204129	8083
350X700X22.0	337.7	430.2	89836	265646	14.5	24.9	5134	7590	5868	9523	220751	8696
350X700X25.0	379.9	483.9	99195	294672	14.3	24.7	5668	8419	6538	10632	243978	9546
350X750X10.0	167.5	213.4	48580	157087	15.1	27.1	2776	4189	3050	5158	119828	4807
350X750X12.0	199.8	254.5	57254	185765	15.0	27.0	3272	4954	3616	6124	142152	5660
350X750X14.0	231.7	295.1	65596	213553	14.9	26.9	3748	5695	4167	7067	163799	6477
350X750X16.0	263.1	335.2	73611	240460	14.8	26.8	4206	6412	4704	7989	184715	7257
350X750X18.0	294.1	374.7	81307	266497	14.7	26.7	4646	7107	5226	8890	204844	8000
350X750X20.0	324.8	413.7	88688	291672	14.6	26.6	5068	7778	5735	9769	224132	8705
350X750X22.0	355.0	452.2	95762	315997	14.6	26.4	5472	8427	6229	10626	242526	9373

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
350X750X25.0	399.5	508.9	105810	350908	14.4	26.3	6046	9358	6945	11873	268323	10301
350X800X10.0	175.4	223.4	51471	184234	15.2	28.7	2941	4606	3220	5704	130423	5137
350X800X12.0	209.2	266.5	60683	218000	15.1	28.6	3468	5450	3818	6775	154748	6052
350X800X14.0	242.7	309.1	69550	250763	15.0	28.5	3974	6269	4402	7823	178355	6929
350X800X16.0	275.7	351.2	78077	282535	14.9	28.4	4462	7063	4971	8847	201188	7767
350X800X18.0	308.3	392.7	86272	313325	14.8	28.3	4930	7833	5525	9849	223191	8567
350X800X20.0	340.5	433.7	94140	343143	14.7	28.1	5379	8579	6065	10828	244309	9328
350X800X22.0	372.2	474.2	101688	371999	14.6	28.0	5811	9300	6590	11784	264487	10049
350X800X25.0	419.1	533.9	112425	413504	14.5	27.8	6424	10338	7351	13176	292877	11056
350X850X10.0	183.2	233.4	54362	214173	15.3	30.3	3106	5039	3390	6276	141103	5467
350X850X12.0	218.7	278.5	64112	253567	15.2	30.2	3664	5966	4021	7456	167443	6444
350X850X14.0	253.6	323.1	73503	291838	15.1	30.1	4200	6867	4637	8613	193023	7381
350X850X16.0	288.2	367.2	82543	328999	15.0	29.9	4717	7741	5238	9745	217785	8278
350X850X18.0	322.4	410.7	91237	365061	14.9	29.8	5214	8590	5824	10853	241674	9134
350X850X20.0	356.2	453.7	99592	400034	14.8	29.7	5691	9413	6395	11937	264634	9951
350X850X22.0	389.5	496.2	107614	433929	14.7	29.6	6149	10210	6951	12997	286610	10726
350X850X25.0	438.7	558.9	119039	482774	14.6	29.4	6802	11359	7757	14542	317609	11812
350X900X10.0	191.1	243.4	57253	247031	15.3	31.9	3272	5490	3560	6872	151857	5798
350X900X12.0	228.1	290.5	67541	292615	15.3	31.7	3859	6503	4224	8168	180224	6835
350X900X14.0	264.6	337.1	77457	336952	15.2	31.6	4426	7488	4872	9438	207788	7832
350X900X16.0	300.8	383.2	87008	380053	15.1	31.5	4972	8446	5505	10683	234492	8788
350X900X18.0	336.5	428.7	96202	421931	15.0	31.4	5497	9376	6123	11902	260278	9702
350X900X20.0	371.9	473.7	105043	462597	14.9	31.3	6002	10280	6725	13096	285090	10573
350X900X22.0	406.8	518.2	113540	502061	14.8	31.1	6488	11157	7311	14265	308873	11403
350X900X25.0	458.4	583.9	125654	559031	14.7	30.9	7180	12423	8163	15971	342497	12567
350X950X10.0	198.9	253.4	60144	282931	15.4	33.4	3437	5956	3730	7493	162676	6128
350X950X12.0	237.5	302.5	70970	335295	15.3	33.3	4055	7059	4427	8909	193081	7227
350X950X14.0	275.6	351.1	81411	386279	15.2	33.2	4652	8132	5108	10299	222639	8284
350X950X16.0	313.4	399.2	91474	435897	15.1	33.1	5227	9177	5772	11661	251293	9298
350X950X18.0	350.7	446.7	101167	484160	15.1	32.9	5781	10193	6421	12997	278985	10269
350X950X20.0	387.6	493.7	110495	531081	15.0	32.8	6314	11181	7055	14306	305659	11196
350X950X22.0	424.0	540.2	119466	576670	14.9	32.7	6827	12140	7672	15588	331257	12080
350X950X25.0	478.0	608.9	132268	642586	14.7	32.5	7558	13528	8570	17462	367520	13323
350X1000X10.0	206.8	263.4	63035	321999	15.5	35.0	3602	6440	3900	8139	173552	6458
350X1000X12.0	246.9	314.5	74398	381756	15.4	34.8	4251	7635	4630	9680	206005	7619
350X1000X14.0	286.6	365.1	85364	439996	15.3	34.7	4878	8800	5343	11194	237566	8736
350X1000X16.0	325.9	415.2	95940	496730	15.2	34.6	5482	9935	6040	12679	268179	9808
350X1000X18.0	364.8	464.7	106132	551973	15.1	34.5	6065	11039	6720	14136	297785	10836
350X1000X20.0	403.3	513.7	115947	605736	15.0	34.3	6626	12115	7385	15565	326327	11819
350X1000X22.0	441.3	562.2	125392	658032	14.9	34.2	7165	13161	8033	16966	353749	12757
350X1000X25.0	497.6	633.9	138883	733753	14.8	34.0	7936	14675	8976	19015	392660	14078
400X500X22.0	285.9	364.2	90442	127842	15.8	18.7	4522	5114	5308	6187	171313	6993

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
400X500X25.0	321.0	408.9	99755	141210	15.6	18.6	4988	5648	5904	6886	188873	7651
400X500X28.0	355.2	452.5	108407	153673	15.5	18.4	5420	6147	6472	7552	204503	8233
400X550X22.0	303.2	386.2	98310	161100	16.0	20.4	4915	5858	5724	7125	197815	7778
400X550X25.0	340.6	433.9	108558	178250	15.8	20.3	5428	6482	6373	7940	218579	8529
400X550X28.0	377.2	480.5	118112	194320	15.7	20.1	5906	7066	6992	8718	237290	9201
400X600X22.0	320.4	408.2	106177	199185	16.1	22.1	5309	6640	6140	8118	224881	8564
400X600X25.0	360.2	458.9	117360	220713	16.0	21.9	5868	7357	6842	9056	248921	9408
400X600X28.0	399.1	508.5	127817	240973	15.9	21.8	6391	8032	7513	9954	270789	10170
400X650X10.0	159.7	203.4	57578	120913	16.8	24.4	2879	3720	3206	4461	123836	4776
400X650X12.0	190.4	242.5	67913	142903	16.7	24.3	3396	4397	3801	5294	147074	5627
400X650X14.0	220.7	281.1	77869	164182	16.6	24.2	3893	5052	4382	6107	169668	6444
400X650X16.0	250.6	319.2	87454	184761	16.6	24.1	4373	5685	4947	6901	191557	7225
400X650X18.0	280.0	356.7	96674	204646	16.5	24.0	4834	6297	5498	7675	212684	7970
400X650X20.0	309.1	393.7	105535	223847	16.4	23.8	5277	6888	6034	8430	232991	8678
400X650X22.0	337.7	430.2	114045	242373	16.3	23.7	5702	7458	6555	9166	252421	9350
400X650X25.0	379.9	483.9	126162	268913	16.2	23.6	6308	8274	7311	10234	279796	10287
400X650X28.0	421.1	536.5	137522	293981	16.0	23.4	6876	9046	8034	11261	304881	11139
400X700X10.0	167.5	213.4	61381	144511	17.0	26.0	3069	4129	3401	4982	137164	5156
400X700X12.0	199.8	254.5	72431	170913	16.9	25.9	3622	4883	4034	5915	162950	6079
400X700X14.0	231.7	295.1	83086	196504	16.8	25.8	4154	5614	4652	6827	188048	6965
400X700X16.0	263.1	335.2	93356	221292	16.7	25.7	4668	6323	5254	7719	212397	7815
400X700X18.0	294.1	374.7	103246	245288	16.6	25.6	5162	7008	5842	8589	235939	8626
400X700X20.0	324.8	413.7	112762	268500	16.5	25.5	5638	7671	6414	9439	258613	9400
400X700X22.0	355.0	452.2	121912	290938	16.4	25.4	6096	8313	6971	10269	280361	10136
400X700X25.0	399.5	508.9	134964	323162	16.3	25.2	6748	9233	7779	11475	311120	11166
400X700X28.0	443.1	564.5	147227	353695	16.2	25.0	7361	10106	8555	12637	339472	12108
400X750X10.0	175.4	223.4	65185	170778	17.1	27.7	3259	4554	3596	5528	150665	5536
400X750X12.0	209.2	266.5	76948	202106	17.0	27.5	3847	5389	4267	6567	179029	6531
400X750X14.0	242.7	309.1	88304	232514	16.9	27.4	4415	6200	4922	7583	206660	7487
400X750X16.0	275.7	351.2	99258	262014	16.8	27.3	4963	6987	5562	8577	233498	8404
400X750X18.0	308.3	392.7	109817	290614	16.7	27.2	5491	7750	6185	9549	259482	9283
400X750X20.0	340.5	433.7	119989	318324	16.6	27.1	5999	8489	6794	10499	284551	10122
400X750X22.0	372.2	474.2	129780	345155	16.5	27.0	6489	9204	7387	11427	308645	10922
400X750X25.0	419.1	533.9	143766	383772	16.4	26.8	7188	10234	8248	12779	342828	12045
400X750X28.0	465.1	592.5	156932	420465	16.3	26.6	7847	11212	9076	14083	374487	13077
400X800X10.0	183.2	233.4	68988	199837	17.2	29.3	3449	4996	3791	6099	164315	5916
400X800X12.0	218.7	278.5	81466	236630	17.1	29.2	4073	5916	4500	7248	195282	6982
400X800X14.0	253.6	323.1	93521	272389	17.0	29.0	4676	6810	5192	8373	225473	8008
400X800X16.0	288.2	367.2	105159	307125	16.9	28.9	5258	7678	5869	9474	254824	8994
400X800X18.0	322.4	410.7	116389	340848	16.8	28.8	5819	8521	6529	10553	283273	9940
400X800X20.0	356.2	453.7	127215	373569	16.8	28.7	6361	9339	7174	11608	310760	10844
400X800X22.0	389.5	496.2	137647	405299	16.7	28.6	6882	10132	7803	12640	337223	11708

Rectangular Hollow Section (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm ²	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
400X800X25.0	438.7	558.9	152568	451056	16.5	28.4	7628	11276	8717	14145	374864	12925
400X800X28.0	487.1	620.5	166638	494640	16.4	28.2	8332	12366	9596	15599	409864	14046
400X850X10.0	191.1	243.4	72791	231814	17.3	30.9	3640	5454	3986	6696	178096	6297
400X850X12.0	228.1	290.5	85984	274635	17.2	30.8	4299	6462	4733	7959	211690	7434
400X850X14.0	264.6	337.1	98738	316302	17.1	30.6	4937	7442	5462	9198	244461	8530
400X850X16.0	300.8	383.2	111061	356825	17.0	30.5	5553	8396	6176	10412	276345	9584
400X850X18.0	336.5	428.7	122960	396216	16.9	30.4	6148	9323	6873	11602	307281	10597
400X850X20.0	371.9	473.7	134442	434486	16.9	30.3	6722	10223	7554	12767	337206	11567
400X850X22.0	406.8	518.2	145515	471645	16.8	30.2	7276	11098	8219	13908	366056	12494
400X850X25.0	458.4	583.9	161370	525326	16.6	30.0	8069	12361	9186	15574	407185	13804
400X850X28.0	509.0	648.5	176343	576571	16.5	29.8	8817	13566	10117	17185	445556	15016
400X900X10.0	198.9	253.4	76595	266834	17.4	32.5	3830	5930	4181	7317	191992	6677
400X900X12.0	237.5	302.5	90502	316273	17.3	32.3	4525	7028	4965	8701	228232	7886
400X900X14.0	275.6	351.1	103955	364429	17.2	32.2	5198	8098	5733	10058	263602	9051
400X900X16.0	313.4	399.2	116963	411315	17.1	32.1	5848	9140	6483	11390	298039	10174
400X900X18.0	350.7	446.7	129531	456943	17.0	32.0	6477	10154	7217	12696	331479	11254
400X900X20.0	387.6	493.7	141669	501323	16.9	31.9	7083	11141	7934	13976	363858	12289
400X900X22.0	424.0	540.2	153382	544469	16.9	31.8	7669	12099	8634	15231	395114	13280
400X900X25.0	478.0	608.9	170172	606895	16.7	31.6	8509	13487	9654	17065	439754	14684
400X900X28.0	531.0	676.5	186048	666607	16.6	31.4	9302	14814	10638	18841	481520	15986
400X950X10.0	206.8	263.4	80398	305022	17.5	34.0	4020	6422	4376	7963	205989	7057
400X950X12.0	246.9	314.5	95019	361691	17.4	33.9	4751	7615	5198	9472	244893	8337
400X950X14.0	286.6	365.1	109172	416945	17.3	33.8	5459	8778	6003	10954	282879	9573
400X950X16.0	325.9	415.2	122864	470795	17.2	33.7	6143	9911	6790	12408	319884	10764
400X950X18.0	364.8	464.7	136103	523253	17.1	33.6	6805	11016	7561	13835	355843	11910
400X950X20.0	403.3	513.7	148895	574332	17.0	33.4	7445	12091	8314	15236	390692	13011
400X950X22.0	441.3	562.2	161250	624044	16.9	33.3	8062	13138	9050	16609	424367	14067
400X950X25.0	497.6	633.9	178974	696076	16.8	33.1	8949	14654	10123	18618	472540	15563
400X950X28.0	553.0	704.5	195753	765099	16.7	33.0	9788	16107	11159	20567	517722	16956
400X1000X10.0	214.6	273.4	84201	346502	17.6	35.6	4210	6930	4571	8634	220077	7438
400X1000X12.0	256.3	326.5	99537	411042	17.5	35.5	4977	8221	5431	10273	261659	8789
400X1000X14.0	297.6	379.1	114389	474025	17.4	35.4	5719	9481	6273	11884	302277	10095
400X1000X16.0	338.5	431.2	128766	535464	17.3	35.2	6438	10709	7098	13466	341864	11354
400X1000X18.0	378.9	482.7	142674	595372	17.2	35.1	7134	11907	7904	15020	380355	12567
400X1000X20.0	419.0	533.7	156122	653762	17.1	35.0	7806	13075	8694	16545	417686	13734
400X1000X22.0	458.6	584.2	169117	710647	17.0	34.9	8456	14213	9466	18042	453793	14853
400X1000X25.0	517.2	658.9	187776	793180	16.9	34.7	9389	15864	10592	20234	505518	16443
400X1000X28.0	575.0	732.5	205458	872397	16.8	34.5	10273	17448	11680	22363	554135	17925
450X500X10.0	144.0	183.4	60378	70877	18.1	19.7	2683	2835	3067	3293	102538	4115
450X500X12.0	171.6	218.5	71190	83606	18.1	19.6	3164	3344	3634	3903	121743	4844
450X500X14.0	198.7	253.1	81597	95871	18.0	19.5	3627	3835	4186	4496	140384	5540
450X500X16.0	225.4	287.2	91605	107677	17.9	19.4	4071	4307	4723	5074	158403	6204

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
450 X 500 X 18.0	251.8	320.7	101221	119032	17.8	19.3	4499	4761	5246	5636	175744	6835
450 X 500 X 20.0	277.7	353.7	110452	129943	17.7	19.2	4909	5198	5753	6182	192352	7433
450 X 500 X 22.0	303.2	386.2	119304	140417	17.6	19.1	5302	5617	6246	6713	208170	7996
450 X 500 X 25.0	340.6	433.9	131885	155324	17.4	18.9	5862	6213	6958	7480	230296	8776
450 X 500 X 28.0	377.2	480.5	143650	169287	17.3	18.8	6384	6771	7638	8213	250339	9477
450 X 500 X 30.0	401.0	510.8	151051	178081	17.2	18.7	6713	7123	8073	8683	262457	9899
450 X 550 X 10.0	151.8	193.4	65219	88510	18.4	21.4	2899	3219	3287	3764	118082	4545
450 X 550 X 12.0	181.0	230.5	76947	104511	18.3	21.3	3420	3800	3897	4464	140288	5355
450 X 550 X 14.0	209.7	267.1	88252	119964	18.2	21.2	3922	4362	4492	5147	161887	6132
450 X 550 X 16.0	238.0	303.2	99143	134876	18.1	21.1	4406	4905	5071	5812	182821	6874
450 X 550 X 18.0	265.9	338.7	109624	149254	18.0	21.0	4872	5427	5634	6460	203030	7581
450 X 550 X 20.0	293.4	373.7	119704	163107	17.9	20.9	5320	5931	6183	7092	222457	8254
450 X 550 X 22.0	320.4	408.2	129388	176442	17.8	20.8	5751	6416	6717	7706	241042	8891
450 X 550 X 25.0	360.2	458.9	143187	195489	17.7	20.6	6364	7109	7489	8596	267216	9779
450 X 550 X 28.0	399.1	508.5	156134	213413	17.5	20.5	6939	7760	8228	9449	291175	10584
450 X 550 X 30.0	424.5	540.8	164303	224750	17.4	20.4	7302	8173	8703	9997	305826	11074
450 X 600 X 10.0	159.7	203.4	70059	108560	18.6	23.1	3114	3619	3507	4260	134009	4975
450 X 600 X 12.0	190.4	242.5	82703	128297	18.5	23.0	3676	4277	4160	5055	159287	5867
450 X 600 X 14.0	220.7	281.1	94908	147396	18.4	22.9	4218	4913	4797	5832	183916	6723
450 X 600 X 16.0	250.6	319.2	106680	165864	18.3	22.8	4741	5529	5418	6590	207834	7543
450 X 600 X 18.0	280.0	356.7	118027	183710	18.2	22.7	5246	6124	6023	7330	230981	8327
450 X 600 X 20.0	309.1	393.7	128955	200942	18.1	22.6	5731	6698	6613	8051	253295	9075
450 X 600 X 22.0	337.7	430.2	139472	217569	18.0	22.5	6199	7252	7188	8754	274716	9786
450 X 600 X 25.0	379.9	483.9	154489	241390	17.9	22.3	6866	8046	8020	9775	305042	10781
450 X 600 X 28.0	421.1	536.5	168619	263894	17.7	22.2	7494	8796	8819	10755	333025	11691
450 X 600 X 30.0	448.1	570.8	177556	278178	17.6	22.1	7891	9273	9333	11387	350281	12249
450 X 650 X 10.0	167.5	213.4	74900	131154	18.7	24.8	3329	4036	3727	4781	150265	5405
450 X 650 X 12.0	199.8	254.5	88460	155115	18.6	24.7	3932	4773	4423	5677	178676	6378
450 X 650 X 14.0	231.7	295.1	101564	178342	18.6	24.6	4514	5487	5102	6552	206394	7314
450 X 650 X 16.0	263.1	335.2	114218	200842	18.5	24.5	5076	6180	5765	7408	233355	8213
450 X 650 X 18.0	294.1	374.7	126430	222625	18.4	24.4	5619	6850	6412	8244	259496	9074
450 X 650 X 20.0	324.8	413.7	138207	243699	18.3	24.3	6143	7498	7043	9060	284755	9897
450 X 650 X 22.0	355.0	452.2	149556	264073	18.2	24.2	6647	8125	7658	9857	309070	10681
450 X 650 X 25.0	399.5	508.9	165791	293340	18.1	24.0	7369	9026	8552	11016	343635	11785
450 X 650 X 28.0	443.1	564.5	181103	321082	17.9	23.9	8049	9879	9410	12131	375728	12799
450 X 650 X 30.0	471.6	600.8	190808	338742	17.8	23.7	8480	10423	9963	12851	395650	13425
450 X 700 X 10.0	175.4	223.4	79741	156415	18.9	26.5	3544	4469	3947	5327	166805	5836
450 X 700 X 12.0	209.2	266.5	94217	185115	18.8	26.4	4187	5289	4685	6328	198400	6890
450 X 700 X 14.0	242.7	309.1	108219	212977	18.7	26.3	4810	6085	5407	7308	229257	7905
450 X 700 X 16.0	275.7	351.2	121756	240010	18.6	26.1	5411	6857	6112	8266	259311	8882
450 X 700 X 18.0	308.3	392.7	134833	266223	18.5	26.0	5993	7606	6801	9203	288496	9820
450 X 700 X 20.0	340.5	433.7	147459	291627	18.4	25.9	6554	8332	7473	10119	316749	10718

Rectangular Hollow Section (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
450X700X22.0	372.2	474.2	159640	316229	18.4	25.8	7095	9035	8129	11015	344004	11577
450X700X25.0	419.1	533.9	177094	351652	18.2	25.7	7871	10047	9083	12319	382879	12788
450X700X28.0	465.1	592.5	193587	385325	18.1	25.5	8604	11009	10001	13577	419155	13907
450X700X30.0	495.2	630.8	204061	406816	18.0	25.4	9069	11623	10593	14391	441792	14601
450X750X10.0	183.2	233.4	84582	184469	19.0	28.1	3759	4919	4167	5898	183591	6266
450X750X12.0	218.7	278.5	99974	218446	19.0	28.0	4443	5825	4948	7009	218415	7401
450X750X14.0	253.6	323.1	114875	251476	18.9	27.9	5106	6706	5712	8098	252455	8497
450X750X16.0	288.2	367.2	129293	283567	18.8	27.8	5746	7562	6459	9164	285643	9552
450X750X18.0	322.4	410.7	143236	314731	18.7	27.7	6366	8393	7190	10207	317914	10567
450X750X20.0	356.2	453.7	156710	344976	18.6	27.6	6965	9199	7903	11229	349201	11540
450X750X22.0	389.5	496.2	169724	374313	18.5	27.5	7543	9982	8600	12228	379439	12472
450X750X25.0	438.7	558.9	188396	416637	18.4	27.3	8373	11110	9614	13685	422684	13792
450X750X28.0	487.1	620.5	206071	456973	18.2	27.1	9159	12186	10592	15094	463204	15015
450X750X30.0	518.7	660.8	217313	482776	18.1	27.0	9658	12874	11223	16005	488597	15777
450X800X10.0	191.1	243.4	89423	215440	19.2	29.8	3974	5386	4387	6494	200592	6696
450X800X12.0	228.1	290.5	105731	255259	19.1	29.6	4699	6381	5211	7721	238685	7913
450X800X14.0	264.6	337.1	121531	294014	19.0	29.5	5401	7350	6018	8923	275945	9088
450X800X16.0	300.8	383.2	136831	331714	18.9	29.4	6081	8293	6807	10102	312305	10222
450X800X18.0	336.5	428.7	151639	368371	18.8	29.3	6740	9209	7578	11257	347696	11313
450X800X20.0	371.9	473.7	165962	403996	18.7	29.2	7376	10100	8333	12388	382053	12362
450X800X22.0	406.8	518.2	179808	438598	18.6	29.1	7991	10965	9071	13496	415306	13368
450X800X25.0	458.4	583.9	199698	488608	18.5	28.9	8875	12215	10145	15114	462974	14795
450X800X28.0	509.0	648.5	218555	536377	18.4	28.8	9714	13409	11182	16680	507789	16124
450X800X30.0	542.3	690.8	230566	566996	18.3	28.7	10247	14175	11853	17695	535973	16953
450X850X10.0	198.9	253.4	94264	249455	19.3	31.4	4190	5870	4607	7116	217784	7126
450X850X12.0	237.5	302.5	111487	295704	19.2	31.3	4955	6958	5474	8462	259178	8424
450X850X14.0	275.6	351.1	128186	340765	19.1	31.2	5697	8018	6323	9783	299691	9680
450X850X16.0	313.4	399.2	144369	384651	19.0	31.0	6416	9051	7154	11080	339253	10892
450X850X18.0	350.7	446.7	160042	427371	18.9	30.9	7113	10056	7967	12351	377797	12060
450X850X20.0	387.6	493.7	175214	468937	18.8	30.8	7787	11034	8763	13597	415253	13184
450X850X22.0	424.0	540.2	189892	509361	18.8	30.7	8440	11985	9542	14819	451553	14264
450X850X25.0	478.0	608.9	211000	567878	18.6	30.5	9378	13362	10677	16605	503687	15799
450X850X28.0	531.0	676.5	231040	623887	18.5	30.4	10268	14680	11773	18336	552841	17232
450X850X30.0	565.8	720.8	243818	659851	18.4	30.3	10836	15526	12483	19460	583845	18130
450X900X10.0	206.8	263.4	99104	286638	19.4	33.0	4405	6370	4827	7762	235142	7557
450X900X12.0	246.9	314.5	117244	339930	19.3	32.9	5211	7554	5737	9233	279868	8936
450X900X14.0	286.6	365.1	134842	391906	19.2	32.8	5993	8709	6628	10679	323662	10271
450X900X16.0	325.9	415.2	151906	442577	19.1	32.7	6751	9835	7501	12098	366456	11561
450X900X18.0	364.8	464.7	168445	491954	19.0	32.5	7486	10932	8356	13490	408178	12806
450X900X20.0	403.3	513.7	184465	540050	19.0	32.4	8198	12001	9193	14856	448760	14006
450X900X22.0	441.3	562.2	199976	586876	18.9	32.3	8888	13042	10012	16197	488132	15159
450X900X25.0	497.6	633.9	222302	654760	18.7	32.1	9880	14550	11208	18158	544770	16803

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
450 X 900 X 28.0	553.0	704.5	243524	719853	18.6	32.0	10823	15997	12364	20062	598300	18341
450 X 900 X 30.0	589.4	750.8	257071	761716	18.5	31.9	11425	16927	13113	21299	632149	19307
450 X 950 X 10.0	214.6	273.4	103945	327113	19.5	34.6	4620	6887	5047	8433	252650	7987
450 X 950 X 12.0	256.3	326.5	123001	388088	19.4	34.5	5467	8170	5999	10035	300733	9448
450 X 950 X 14.0	297.6	379.1	141498	447611	19.3	34.4	6289	9423	6933	11609	347834	10863
450 X 950 X 16.0	338.5	431.2	159444	505692	19.2	34.3	7086	10646	7848	13155	393882	12231
450 X 950 X 18.0	378.9	482.7	176848	562346	19.1	34.1	7860	11839	8745	14674	438807	13553
450 X 950 X 20.0	419.0	533.7	193717	617584	19.1	34.0	8610	13002	9623	16166	482538	14828
450 X 950 X 22.0	458.6	584.2	210060	671418	19.0	33.9	9336	14135	10483	17630	525004	16055
450 X 950 X 25.0	517.2	658.9	233604	749565	18.8	33.7	10382	15780	11739	19774	586179	17807
450 X 950 X 28.0	575.0	732.5	256008	824624	18.7	33.6	11378	17361	12955	21858	644118	19450
450 X 950 X 30.0	612.9	780.8	270323	872967	18.6	33.4	12014	18378	13743	23214	680834	20484
450 X 1000 X 10.0	222.5	283.4	108786	371006	19.6	36.2	4835	7420	5267	9129	270291	8417
450 X 1000 X 12.0	265.8	338.5	128758	440328	19.5	36.1	5723	8807	6262	10866	321754	9959
450 X 1000 X 14.0	308.6	393.1	148153	508054	19.4	36.0	6585	10161	7238	12574	372184	11454
450 X 1000 X 16.0	351.0	447.2	166982	574198	19.3	35.8	7421	11484	8195	14253	421509	12901
450 X 1000 X 18.0	393.1	500.7	185251	638772	19.2	35.7	8233	12775	9134	15904	469657	14300
450 X 1000 X 20.0	434.7	553.7	202969	701789	19.2	35.6	9021	14036	10053	17525	516557	15650
450 X 1000 X 22.0	475.9	606.2	220144	763263	19.1	35.5	9784	15265	10954	19117	562136	16951
450 X 1000 X 25.0	536.9	683.9	244906	852607	18.9	35.3	10885	17052	12270	21453	627877	18811
450 X 1000 X 28.0	597.0	760.5	268492	938550	18.8	35.1	11933	18771	13546	23724	690254	20559
450 X 1000 X 30.0	636.5	810.8	283576	993978	18.7	35.0	12603	19880	14373	25203	729854	21661
500 X 550 X 10.0	159.7	203.4	82883	95800	20.2	21.7	3315	3484	3783	4034	139246	5075
500 X 550 X 12.0	190.4	242.5	97898	113196	20.1	21.6	3916	4116	4488	4787	165576	5986
500 X 550 X 14.0	220.7	281.1	112409	130021	20.0	21.5	4496	4728	5177	5522	191256	6862
500 X 550 X 16.0	250.6	319.2	126424	146285	19.9	21.4	5057	5319	5849	6239	216222	7702
500 X 550 X 18.0	280.0	356.7	139951	161995	19.8	21.3	5598	5891	6504	6939	240413	8506
500 X 550 X 20.0	309.1	393.7	152996	177159	19.7	21.2	6120	6442	7142	7622	263766	9274
500 X 550 X 22.0	337.7	430.2	165568	191784	19.6	21.1	6623	6974	7765	8287	286218	10004
500 X 550 X 25.0	379.9	483.9	183553	212729	19.5	21.0	7342	7736	8668	9252	318076	11029
500 X 550 X 28.0	421.1	536.5	200513	232505	19.3	20.8	8021	8455	9535	10180	347564	11968
500 X 550 X 30.0	448.1	570.8	211261	245052	19.2	20.7	8450	8911	10093	10777	365808	12545
500 X 550 X 32.0	474.7	604.7	221572	257099	19.1	20.6	8863	9349	10635	11358	382852	13082
500 X 600 X 10.0	167.5	213.4	88887	117263	20.4	23.4	3555	3909	4028	4555	158412	5555
500 X 600 X 12.0	199.8	254.5	105044	138671	20.3	23.3	4202	4622	4781	5408	188459	6558
500 X 600 X 14.0	231.7	295.1	120678	159417	20.2	23.2	4827	5314	5517	6242	217811	7523
500 X 600 X 16.0	263.1	335.2	135798	179510	20.1	23.1	5432	5984	6236	7057	246403	8452
500 X 600 X 18.0	294.1	374.7	150410	198958	20.0	23.0	6016	6632	6937	7853	274170	9342
500 X 600 X 20.0	324.8	413.7	164523	217769	19.9	22.9	6581	7259	7622	8631	301046	10195
500 X 600 X 22.0	355.0	452.2	178144	235952	19.9	22.8	7126	7865	8290	9390	326968	11009
500 X 600 X 25.0	399.5	508.9	197668	262067	19.7	22.7	7907	8736	9261	10493	363921	12156
500 X 600 X 28.0	443.1	564.5	216126	286815	19.6	22.5	8645	9561	10195	11556	398367	13214

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
500X600X30.0	471.6	600.8	227851	302568	19.5	22.4	9114	10086	10798	12242	419834	13869
500X600X32.0	499.8	636.7	239121	317734	19.4	22.3	9565	10591	11384	12909	440033	14482
500X650X10.0	175.4	223.4	94890	141394	20.6	25.2	3796	4351	4273	5101	178021	6035
500X650X12.0	209.2	266.5	112189	167328	20.5	25.1	4488	5149	5074	6060	211868	7129
500X650X14.0	242.7	309.1	128947	192502	20.4	25.0	5158	5923	5857	6997	244974	8185
500X650X16.0	275.7	351.2	145171	216924	20.3	24.9	5807	6675	6623	7915	277272	9201
500X650X18.0	308.3	392.7	160870	240604	20.2	24.8	6435	7403	7371	8813	308694	10178
500X650X20.0	340.5	433.7	176050	263551	20.2	24.7	7042	8109	8102	9690	339174	11116
500X650X22.0	372.2	474.2	190719	285773	20.1	24.6	7629	8793	8816	10548	368645	12013
500X650X25.0	419.1	533.9	211783	317767	19.9	24.4	8471	9777	9855	11797	410813	13283
500X650X28.0	465.1	592.5	231739	348182	19.8	24.2	9270	10713	10856	13002	450337	14461
500X650X30.0	495.2	630.8	244441	367595	19.7	24.1	9778	11311	11503	13781	475110	15193
500X650X32.0	524.9	668.7	256670	386327	19.6	24.0	10267	11887	12133	14541	498548	15883
500X700X10.0	183.2	233.4	100893	168318	20.8	26.9	4036	4809	4518	5672	198014	6515
500X700X12.0	218.7	278.5	119335	199317	20.7	26.8	4773	5695	5367	6741	235732	7701
500X700X14.0	253.6	323.1	137216	229450	20.6	26.7	5489	6556	6197	7788	272663	8846
500X700X16.0	288.2	367.2	154545	258728	20.5	26.6	6182	7392	7010	8813	308736	9951
500X700X18.0	322.4	410.7	171329	287159	20.4	26.4	6853	8205	7805	9817	343882	11015
500X700X20.0	356.2	453.7	187576	314753	20.3	26.3	7503	8993	8582	10799	378034	12037
500X700X22.0	389.5	496.2	203295	341521	20.2	26.2	8132	9758	9342	11761	411120	13018
500X700X25.0	438.7	558.9	225897	380141	20.1	26.1	9036	10861	10449	13163	458604	14411
500X700X28.0	487.1	620.5	247352	416954	20.0	25.9	9894	11913	11517	14518	503308	15708
500X700X30.0	518.7	660.8	261031	440506	19.9	25.8	10441	12586	12208	15396	531455	16518
500X700X32.0	550.0	700.7	274219	463279	19.8	25.7	10969	13237	12881	16253	558201	17284
500X750X10.0	191.1	243.4	106897	198160	21.0	28.5	4276	5284	4763	6268	218343	6996
500X750X12.0	228.1	290.5	126481	234787	20.9	28.4	5059	6261	5660	7452	259995	8272
500X750X14.0	264.6	337.1	145485	270438	20.8	28.3	5819	7212	6538	8613	300810	9507
500X750X16.0	300.8	383.2	163919	305121	20.7	28.2	6557	8137	7397	9751	340718	10700
500X750X18.0	336.5	428.7	181789	338847	20.6	28.1	7272	9036	8239	10866	379648	11851
500X750X20.0	371.9	473.7	199103	371627	20.5	28.0	7964	9910	9062	11959	417528	12959
500X750X22.0	406.8	518.2	215870	403471	20.4	27.9	8635	10759	9868	13029	454287	14024
500X750X25.0	458.4	583.9	240012	449501	20.3	27.8	9600	11987	11043	14591	507172	15539
500X750X28.0	509.0	648.5	262966	493481	20.1	27.6	10519	13160	12178	16104	557142	16955
500X750X30.0	542.3	690.8	277621	521678	20.1	27.5	11105	13911	12913	17085	588722	17843
500X750X32.0	575.2	732.7	291769	548989	20.0	27.4	11671	14640	13630	18045	618834	18685
500X800X10.0	198.9	253.4	112900	231044	21.1	30.2	4516	5776	5008	6889	238968	7476
500X800X12.0	237.5	302.5	133627	273889	21.0	30.1	5345	6847	5952	8194	284607	8844
500X800X14.0	275.6	351.1	153755	315639	20.9	30.0	6150	7891	6878	9473	329361	10168
500X800X16.0	313.4	399.2	173292	356304	20.8	29.9	6932	8908	7785	10729	373155	11450
500X800X18.0	350.7	446.7	192248	395895	20.8	29.8	7690	9897	8673	11960	415918	12687
500X800X20.0	387.6	493.7	210630	434423	20.7	29.7	8425	10861	9542	13168	457577	13880
500X800X22.0	424.0	540.2	228446	471898	20.6	29.6	9138	11797	10394	14351	498059	15029

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
500X800X25.0	478.0	608.9	254126	526160	20.4	29.4	10165	13154	11636	16083	556419	16667
500X800X28.0	531.0	676.5	278579	578114	20.3	29.2	11143	14453	12839	17761	611728	18203
500X800X30.0	565.8	720.8	294211	611486	20.2	29.1	11768	15287	13618	18850	646788	19168
500X800X32.0	600.3	764.7	309318	643857	20.1	29.0	12373	16096	14379	19916	680316	20087
500X850X10.0	206.8	263.4	118903	267096	21.3	31.8	4756	6285	5253	7536	259854	7956
500X850X12.0	246.9	314.5	140772	316773	21.2	31.7	5631	7453	6245	8965	309529	9415
500X850X14.0	286.6	365.1	162024	365229	21.1	31.6	6481	8594	7218	10369	358267	10830
500X850X16.0	325.9	415.2	182666	412476	21.0	31.5	7307	9705	8172	11747	405993	12199
500X850X18.0	364.8	464.7	202707	458526	20.9	31.4	8108	10789	9106	13100	452633	13523
500X850X20.0	403.3	513.7	222156	503389	20.8	31.3	8886	11844	10022	14427	498114	14802
500X850X22.0	441.3	562.2	241021	547077	20.7	31.2	9641	12872	10919	15729	542362	16034
500X850X25.0	497.6	633.9	268241	610431	20.6	31.0	10730	14363	12230	17636	606259	17795
500X850X28.0	553.0	704.5	294192	671203	20.4	30.9	11768	15793	13499	19487	666970	19450
500X850X30.0	589.4	750.8	310801	710303	20.4	30.8	12432	16713	14323	20690	705552	20494
500X850X32.0	625.4	796.7	326867	748284	20.3	30.7	13075	17607	15128	21868	742539	21489
500X900X10.0	214.6	273.4	124907	306441	21.4	33.5	4996	6810	5498	8207	280973	8436
500X900X12.0	256.3	326.5	147918	363588	21.3	33.4	5917	8080	6538	9766	334725	9987
500X900X14.0	297.6	379.1	170293	419383	21.2	33.3	6812	9320	7558	11299	387487	11491
500X900X16.0	338.5	431.2	192040	473838	21.1	33.2	7682	10530	8559	12805	439185	12949
500X900X18.0	378.9	482.7	213167	526966	21.0	33.0	8527	11710	9540	14284	489742	14360
500X900X20.0	419.0	533.7	233683	578777	20.9	32.9	9347	12862	10502	15736	539083	15724
500X900X22.0	458.6	584.2	253597	629284	20.8	32.8	10144	13984	11445	17162	587133	17040
500X900X25.0	517.2	658.9	282355	702625	20.7	32.7	11294	15614	12824	19252	656623	18924
500X900X28.0	575.0	732.5	309805	773098	20.6	32.5	12392	17180	14160	21283	722789	20698
500X900X30.0	612.9	780.8	327391	818506	20.5	32.4	13096	18189	15028	22604	764931	21820
500X900X32.0	650.5	828.7	344416	862669	20.4	32.3	13777	19170	15877	23900	805413	22892
500X950X10.0	222.5	283.4	130910	349204	21.5	35.1	5236	7352	5743	8903	302299	8916
500X950X12.0	265.8	338.5	155064	414485	21.4	35.0	6203	8726	6831	10598	360165	10558
500X950X14.0	308.6	393.1	178562	478276	21.3	34.9	7142	10069	7898	12264	416989	12152
500X950X16.0	351.0	447.2	201413	540590	21.2	34.8	8057	11381	8946	13903	472693	13699
500X950X18.0	393.1	500.7	223626	601439	21.1	34.7	8945	12662	9974	15513	527200	15196
500X950X20.0	434.7	553.7	245210	660836	21.0	34.6	9808	13912	10982	17096	580434	16645
500X950X22.0	475.9	606.2	266172	718792	21.0	34.4	10647	15132	11971	18650	632320	18045
500X950X25.0	536.9	683.9	296470	803055	20.8	34.3	11859	16906	13418	20931	707451	20052
500X950X28.0	597.0	760.5	325418	884148	20.7	34.1	13017	18614	14821	23149	779120	21946
500X950X30.0	636.5	810.8	343981	936469	20.6	34.0	13759	19715	15733	24594	824852	23146
500X950X32.0	675.6	860.7	361966	987412	20.5	33.9	14479	20788	16625	26011	868860	24294
500X1000X10.0	230.3	293.4	136913	395509	21.6	36.7	5477	7910	5988	9624	323811	9397
500X1000X12.0	275.2	350.5	162210	469614	21.5	36.6	6488	9392	7124	11459	385825	11130
500X1000X14.0	319.6	407.1	186831	542083	21.4	36.5	7473	10842	8239	13264	446741	12814
500X1000X16.0	363.6	463.2	210787	612931	21.3	36.4	8431	12259	9333	15041	506482	14448
500X1000X18.0	407.2	518.7	234086	682171	21.2	36.3	9363	13643	10408	16787	564971	16033

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
500X1000X20.0	450.4	573.7	256736	749816	21.2	36.2	10269	14996	11462	18505	622128	17567
500X1000X22.0	493.1	628.2	278748	815878	21.1	36.0	11150	16318	12497	20193	677877	19051
500X1000X25.0	556.5	708.9	310585	912034	20.9	35.9	12423	18241	14011	22672	758691	21181
500X1000X28.0	618.9	788.5	341031	1004704	20.8	35.7	13641	20094	15482	25085	835905	23194
500X1000X30.0	660.0	840.8	360571	1064568	20.7	35.6	14423	21291	16438	26658	885255	24472
500X1000X32.0	700.8	892.7	379515	1122914	20.6	35.5	15181	22458	17374	28203	932817	25697
550X600X10.0	175.4	223.4	110382	125967	22.2	23.7	4014	4199	4574	4850	183766	6135
550X600X12.0	209.2	266.5	130565	149045	22.1	23.7	4748	4968	5433	5761	218768	7249
550X600X14.0	242.7	309.1	150137	171438	22.0	23.6	5460	5715	6272	6652	253028	8324
550X600X16.0	275.7	351.2	169105	193156	21.9	23.5	6149	6439	7094	7524	286478	9361
550X600X18.0	308.3	392.7	187477	214205	21.9	23.4	6817	7140	7897	8377	319050	10358
550X600X20.0	340.5	433.7	205262	234596	21.8	23.3	7464	7820	8682	9211	350675	11315
550X600X22.0	372.2	474.2	222468	254336	21.7	23.2	8090	8478	9448	10026	381286	12232
550X600X25.0	419.1	533.9	247208	282744	21.5	23.0	8989	9425	10565	11212	425149	13531
550X600X28.0	465.1	592.5	270689	309737	21.4	22.9	9843	10325	11642	12357	466349	14738
550X600X30.0	495.2	630.8	285657	326958	21.3	22.8	10388	10899	12337	13097	492225	15489
550X600X32.0	524.9	668.7	300085	343571	21.2	22.7	10912	11452	13015	13818	516753	16199
550X600X36.0	583.1	742.8	327354	375003	21.0	22.5	11904	12500	14320	15207	561505	17487
550X650X10.0	183.2	233.4	117673	151635	22.5	25.5	4279	4666	4844	5421	206929	6665
550X650X12.0	218.7	278.5	139250	179541	22.4	25.4	5064	5524	5755	6442	246440	7880
550X650X14.0	253.6	323.1	160194	206661	22.3	25.3	5825	6359	6648	7443	285161	9055
550X650X16.0	288.2	367.2	180514	233006	22.2	25.2	6564	7169	7521	8422	323022	10190
550X650X18.0	322.4	410.7	200218	258583	22.1	25.1	7281	7956	8376	9381	359953	11283
550X650X20.0	356.2	453.7	219314	283402	22.0	25.0	7975	8720	9212	10320	395883	12336
550X650X22.0	389.5	496.2	237810	307473	21.9	24.9	8648	9461	10029	11238	430740	13346
550X650X25.0	438.7	558.9	264447	342195	21.8	24.7	9616	10529	11221	12578	480860	14783
550X650X28.0	487.1	620.5	289781	375282	21.6	24.6	10538	11547	12372	13873	528172	16124
550X650X30.0	518.7	660.8	305960	396447	21.5	24.5	11126	12198	13117	14711	558038	16963
550X650X32.0	550.0	700.7	321579	416908	21.4	24.4	11694	12828	13844	15530	586484	17758
550X650X36.0	611.4	778.8	351170	455754	21.2	24.2	12770	14023	15245	17109	638848	19214
550X700X10.0	191.1	243.4	124964	180221	22.7	27.2	4544	5149	5114	6017	230595	7195
550X700X12.0	228.1	290.5	147935	213519	22.6	27.1	5379	6101	6078	7154	274708	8512
550X700X14.0	264.6	337.1	170252	245923	22.5	27.0	6191	7026	7023	8268	317984	9786
550X700X16.0	300.8	383.2	191924	277445	22.4	26.9	6979	7927	7948	9360	360349	11019
550X700X18.0	336.5	428.7	212959	308094	22.3	26.8	7744	8803	8854	10431	401730	12209
550X700X20.0	371.9	473.7	233366	337880	22.2	26.7	8486	9654	9742	11479	442054	13357
550X700X22.0	406.8	518.2	253152	366812	22.1	26.6	9206	10480	10610	12506	481248	14461
550X700X25.0	458.4	583.9	281687	408631	22.0	26.5	10243	11675	11877	14007	537760	16035
550X700X28.0	509.0	648.5	308873	448583	21.8	26.3	11232	12817	13103	15459	591320	17510
550X700X30.0	542.3	690.8	326262	474196	21.7	26.2	11864	13548	13897	16401	625267	18437
550X700X32.0	575.2	732.7	343072	499004	21.6	26.1	12475	14257	14673	17322	657724	19318
550X700X36.0	639.6	814.8	374987	546239	21.5	25.9	13636	15607	16170	19101	717890	20941

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
550 X 750 X 10.0	198.9	253.4	132255	211850	22.8	28.9	4809	5649	5384	6638	254701	7725
550 X 750 X 12.0	237.5	302.5	156620	251128	22.8	28.8	5695	6697	6401	7895	303500	9143
550 X 750 X 14.0	275.6	351.1	180310	289399	22.7	28.7	6557	7717	7398	9128	351412	10518
550 X 750 X 16.0	313.4	399.2	203334	326675	22.6	28.6	7394	8711	8375	10338	398360	11848
550 X 750 X 18.0	350.7	446.7	225700	362964	22.5	28.5	8207	9679	9333	11525	444271	13135
550 X 750 X 20.0	387.6	493.7	247417	398279	22.4	28.4	8997	10621	10272	12689	489068	14378
550 X 750 X 22.0	424.0	540.2	268494	432629	22.3	28.3	9763	11537	11191	13829	532676	15576
550 X 750 X 25.0	478.0	608.9	298927	482366	22.2	28.2	10870	12863	12534	15498	595695	17288
550 X 750 X 28.0	531.0	676.5	327966	529989	22.0	28.0	11926	14133	13834	17115	655619	18896
550 X 750 X 30.0	565.8	720.8	346565	560581	21.9	27.9	12602	14949	14677	18165	693726	19911
550 X 750 X 32.0	600.3	764.7	364565	590258	21.8	27.8	13257	15740	15502	19193	730273	20878
550 X 750 X 36.0	667.9	850.8	398803	646909	21.7	27.6	14502	17251	17095	21183	798402	22670
550 X 800 X 10.0	206.8	263.4	139545	246647	23.0	30.6	5074	6166	5654	7284	279198	8256
550 X 800 X 12.0	246.9	314.5	165304	292519	22.9	30.5	6011	7313	6724	8666	332756	9775
550 X 800 X 14.0	286.6	365.1	190367	337264	22.8	30.4	6922	8432	7773	10024	385374	11249
550 X 800 X 16.0	325.9	415.2	214743	380894	22.7	30.3	7809	9522	8802	11356	436976	12678
550 X 800 X 18.0	364.8	464.7	238441	423418	22.7	30.2	8671	10585	9812	12664	487484	14061
550 X 800 X 20.0	403.3	513.7	261469	464849	22.6	30.1	9508	11621	10802	13948	536822	15399
550 X 800 X 22.0	441.3	562.2	283836	505197	22.5	30.0	10321	12630	11772	15207	584912	16691
550 X 800 X 25.0	497.6	633.9	316166	563712	22.3	29.8	11497	14093	13190	17051	654538	18540
550 X 800 X 28.0	553.0	704.5	347058	619852	22.2	29.7	12620	15496	14565	18841	720926	20283
550 X 800 X 30.0	589.4	750.8	366867	655976	22.1	29.6	13341	16399	15457	20005	763259	21385
550 X 800 X 32.0	625.4	796.7	386058	691070	22.0	29.5	14038	17277	16331	21145	803963	22439
550 X 800 X 36.0	696.1	886.8	422620	758214	21.8	29.2	15368	18955	18021	23354	880192	24398
550 X 850 X 10.0	214.6	273.4	146836	284737	23.2	32.3	5340	6700	5924	7956	304042	8786
550 X 850 X 12.0	256.3	326.5	173989	337842	23.1	32.2	6327	7949	7047	9468	362422	10406
550 X 850 X 14.0	297.6	379.1	200425	389693	23.0	32.1	7288	9169	8148	10954	419809	11980
550 X 850 X 16.0	338.5	431.2	226153	440302	22.9	32.0	8224	10360	9230	12414	476126	13507
550 X 850 X 18.0	378.9	482.7	251182	489681	22.8	31.9	9134	11522	10291	13848	531293	14988
550 X 850 X 20.0	419.0	533.7	275521	537841	22.7	31.8	10019	12655	11332	15257	585231	16420
550 X 850 X 22.0	458.6	584.2	299178	584793	22.6	31.6	10879	13760	12352	16640	637861	17806
550 X 850 X 25.0	517.2	658.9	333406	652983	22.5	31.5	12124	15364	13846	18667	714182	19793
550 X 850 X 28.0	575.0	732.5	366150	718519	22.4	31.3	13315	16906	15296	20637	787120	21670
550 X 850 X 30.0	612.9	780.8	387170	760756	22.3	31.2	14079	17900	16237	21920	833736	22860
550 X 850 X 32.0	650.5	828.7	407552	801841	22.2	31.1	14820	18867	17159	23177	878655	24000
550 X 850 X 36.0	724.4	922.8	446436	880604	22.0	30.9	16234	20720	18946	25616	963100	26128
550 X 900 X 10.0	222.5	283.4	154127	326244	23.3	33.9	5605	7250	6194	8652	329195	9316
550 X 900 X 12.0	265.8	338.5	182674	387246	23.2	33.8	6643	8605	7369	10299	392454	11038
550 X 900 X 14.0	308.6	393.1	210483	446860	23.1	33.7	7654	9930	8524	11919	454667	12711
550 X 900 X 16.0	351.0	447.2	237563	505100	23.1	33.6	8639	11224	9657	13512	515752	14337
550 X 900 X 18.0	393.1	500.7	263923	561977	23.0	33.5	9597	12488	10770	15078	575630	15914
550 X 900 X 20.0	434.7	553.7	289572	617503	22.9	33.4	10530	13722	11862	16616	634221	17442

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
550 X 900 X 22.0	475.9	606.2	314520	671691	22.8	33.3	11437	14926	12933	18128	691443	18921
550 X 900 X 25.0	536.9	683.9	350645	750489	22.6	33.1	12751	16678	14502	20346	774534	21046
550 X 900 X 28.0	597.0	760.5	385242	826343	22.5	33.0	14009	18363	16026	22504	854097	23057
550 X 900 X 30.0	636.5	810.8	407472	875296	22.4	32.9	14817	19451	17017	23909	905047	24335
550 X 900 X 32.0	675.6	860.7	429045	922970	22.3	32.8	15602	20510	17988	25288	954231	25561
550 X 900 X 36.0	752.7	958.8	470253	1014529	22.2	32.5	17100	22545	19871	27968	1046994	27857
550 X 950 X 10.0	230.3	293.4	161418	371294	23.5	35.6	5870	7817	6464	9373	354626	9846
550 X 950 X 12.0	275.2	350.5	191359	440882	23.4	35.5	6959	9282	7692	11160	422815	11669
550 X 950 X 14.0	319.6	407.1	220540	508942	23.3	35.4	8020	10715	8899	12919	489901	13443
550 X 950 X 16.0	363.6	463.2	248972	575488	23.2	35.3	9054	12116	10084	14650	555804	15166
550 X 950 X 18.0	407.2	518.7	276664	640532	23.1	35.1	10061	13485	11248	16352	620441	16840
550 X 950 X 20.0	450.4	573.7	303624	704087	23.0	35.0	11041	14823	12392	18026	683730	18463
550 X 950 X 22.0	493.1	628.2	329862	766166	22.9	34.9	11995	16130	13514	19671	745588	20036
550 X 950 X 25.0	556.5	708.9	367885	856545	22.8	34.8	13378	18033	15159	22087	835517	22299
550 X 950 X 28.0	618.9	788.5	404334	943672	22.7	34.6	14703	19867	16757	24440	921771	24445
550 X 950 X 30.0	660.0	840.8	427775	999972	22.6	34.5	15555	21052	17797	25974	977098	25810
550 X 950 X 32.0	700.8	892.7	450538	1054858	22.5	34.4	16383	22208	18817	27480	1030591	27122
550 X 950 X 36.0	780.9	994.8	494069	1160438	22.3	34.2	17966	24430	20796	30410	1131760	29587
550 X 1000 X 10.0	238.2	303.4	168709	420012	23.6	37.2	6135	8400	6734	10119	380306	10376
550 X 1000 X 12.0	284.6	362.5	200043	498899	23.5	37.1	7274	9978	8015	12052	453470	12301
550 X 1000 X 14.0	330.6	421.1	230598	576112	23.4	37.0	8385	11522	9274	13955	525475	14174
550 X 1000 X 16.0	376.2	479.2	260382	651665	23.3	36.9	9468	13033	10511	15828	596238	15996
550 X 1000 X 18.0	421.3	536.7	289405	725571	23.2	36.8	10524	14511	11727	17671	665675	17766
550 X 1000 X 20.0	466.1	593.7	317676	797842	23.1	36.7	11552	15957	12922	19485	733703	19485
550 X 1000 X 22.0	510.4	650.2	345204	868494	23.0	36.6	12553	17370	14095	21269	800239	21151
550 X 1000 X 25.0	576.1	733.9	385125	971461	22.9	36.4	14005	19429	15815	23890	897064	23552
550 X 1000 X 28.0	640.9	816.5	423427	1070857	22.8	36.2	15397	21417	17488	26446	990067	25832
550 X 1000 X 30.0	683.6	870.8	448077	1135158	22.7	36.1	16294	22703	18577	28113	1049810	27285
550 X 1000 X 32.0	725.9	924.7	472031	1197904	22.6	36.0	17165	23958	19646	29752	1107649	28684
550 X 1000 X 36.0	809.2	1030.8	517886	1318783	22.4	35.8	18832	26376	21721	32942	1217301	31317
600 X 650 X 10.0	191.1	243.4	143373	161876	24.3	25.8	4779	4981	5440	5741	236846	7295
600 X 650 X 12.0	228.1	290.5	169792	191754	24.2	25.7	5660	5900	6467	6825	282216	8631
600 X 650 X 14.0	264.6	337.1	195481	220821	24.1	25.6	6516	6795	7473	7888	326749	9926
600 X 650 X 16.0	300.8	383.2	220447	249087	24.0	25.5	7348	7664	8459	8930	370370	11179
600 X 650 X 18.0	336.5	428.7	244700	276562	23.9	25.4	8157	8510	9425	9950	413005	12389
600 X 650 X 20.0	371.9	473.7	268249	303254	23.8	25.3	8942	9331	10371	10950	454580	13556
600 X 650 X 22.0	406.8	518.2	291103	329173	23.7	25.2	9703	10128	11297	11929	495020	14680
600 X 650 X 25.0	458.4	583.9	324099	366622	23.6	25.1	10803	11281	12650	13359	553390	16283
600 X 650 X 28.0	509.0	648.5	355579	402382	23.4	24.9	11853	12381	13958	14744	608791	17787
600 X 650 X 30.0	542.3	690.8	375738	425300	23.3	24.8	12525	13086	14807	15641	643954	18733
600 X 650 X 32.0	575.2	732.7	395246	447490	23.2	24.7	13175	13769	15636	16519	677616	19634
600 X 650 X 36.0	639.6	814.8	432338	489722	23.0	24.5	14411	15068	17237	18214	740151	21296

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
600 X 700 X 10.0	198.9	253.4	152077	192125	24.5	27.5	5069	5489	5735	6362	264382	7875
600 X 700 X 12.0	237.5	302.5	180166	227720	24.4	27.4	6006	6506	6819	7567	315128	9323
600 X 700 X 14.0	275.6	351.1	207502	262397	24.3	27.3	6917	7497	7883	8748	364986	10727
600 X 700 X 16.0	313.4	399.2	234092	296163	24.2	27.2	7803	8462	8926	9907	413879	12088
600 X 700 X 18.0	350.7	446.7	259947	329030	24.1	27.1	8665	9401	9949	11044	461731	13404
600 X 700 X 20.0	387.6	493.7	285076	361007	24.0	27.0	9503	10314	10951	12159	508466	14677
600 X 700 X 22.0	424.0	540.2	309486	392104	23.9	26.9	10316	11203	11933	13252	554005	15904
600 X 700 X 25.0	478.0	608.9	344776	437120	23.8	26.8	11493	12489	13368	14850	619905	17660
600 X 700 X 28.0	531.0	676.5	378500	480212	23.7	26.6	12617	13720	14759	16400	682686	19313
600 X 700 X 30.0	565.8	720.8	400128	507886	23.6	26.5	13338	14511	15662	17406	722680	20356
600 X 700 X 32.0	600.3	764.7	421083	534729	23.5	26.4	14036	15278	16545	18390	761100	21353
600 X 700 X 36.0	667.9	850.8	461006	585959	23.3	26.2	15367	16742	18252	20296	832917	23202
600 X 750 X 10.0	206.8	263.4	160780	225541	24.7	29.3	5359	6014	6030	7008	292480	8455
600 X 750 X 12.0	246.9	314.5	190540	267469	24.6	29.2	6351	7133	7172	8338	348707	10014
600 X 750 X 14.0	286.6	365.1	219523	308361	24.5	29.1	7317	8223	8293	9643	403995	11528
600 X 750 X 16.0	325.9	415.2	247738	348228	24.4	29.0	8258	9286	9393	10925	458264	12997
600 X 750 X 18.0	364.8	464.7	275195	387081	24.3	28.9	9173	10322	10472	12184	511437	14420
600 X 750 X 20.0	403.3	513.7	301902	424931	24.2	28.8	10063	11331	11531	13419	563432	15797
600 X 750 X 22.0	441.3	562.2	327870	461787	24.2	28.7	10929	12314	12569	14630	614172	17128
600 X 750 X 25.0	497.6	633.9	365453	515231	24.0	28.5	12182	13739	14087	16404	687754	19037
600 X 750 X 28.0	553.0	704.5	401421	566498	23.9	28.4	13381	15107	15560	18126	758066	20839
600 X 750 X 30.0	589.4	750.8	424518	599483	23.8	28.3	14151	15986	16517	19245	802993	21980
600 X 750 X 32.0	625.4	796.7	446920	631527	23.7	28.2	14897	16841	17453	20342	846273	23072
600 X 750 X 36.0	696.1	886.8	489673	692830	23.5	28.0	16322	18475	19267	22468	927580	25109
600 X 800 X 10.0	214.6	273.4	169483	262250	24.9	31.0	5649	6556	6325	7679	321077	9035
600 X 800 X 12.0	256.3	326.5	200914	311149	24.8	30.9	6697	7779	7525	9139	382880	10706
600 X 800 X 14.0	297.6	379.1	231544	358889	24.7	30.8	7718	8972	8703	10574	443690	12329
600 X 800 X 16.0	338.5	431.2	261384	405483	24.6	30.7	8713	10137	9860	11983	503426	13906
600 X 800 X 18.0	378.9	482.7	290442	450942	24.5	30.6	9681	11274	10996	13368	562009	15436
600 X 800 X 20.0	419.0	533.7	318729	495276	24.4	30.5	10624	12382	12111	14728	619355	16918
600 X 800 X 22.0	458.6	584.2	346253	538497	24.4	30.4	11542	13462	13205	16063	675384	18353
600 X 800 X 25.0	517.2	658.9	386130	601264	24.2	30.2	12871	15032	14806	18020	756778	20414
600 X 800 X 28.0	575.0	732.5	424343	661589	24.1	30.1	14145	16540	16361	19922	834753	22365
600 X 800 X 30.0	612.9	780.8	448908	700466	24.0	30.0	14964	17512	17372	21160	884701	23603
600 X 800 X 32.0	650.5	828.7	472757	738284	23.9	29.9	15759	18457	18362	22374	932928	24792
600 X 800 X 36.0	724.4	922.8	518341	810786	23.7	29.6	17278	20270	20283	24730	1023905	2

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
600X850X22.0	475.9	606.2	364637	622509	24.5	32.1	12155	14647	13840	17551	737521	19578
600X850X25.0	536.9	683.9	406807	695535	24.4	31.9	13560	16366	15525	19699	826844	21791
600X850X28.0	597.0	760.5	447264	765836	24.3	31.7	14909	18020	17162	21788	912595	23891
600X850X30.0	636.5	810.8	473298	811208	24.2	31.6	15777	19087	18227	23150	967640	25227
600X850X32.0	675.6	860.7	498594	855398	24.1	31.5	16620	20127	19271	24485	1020892	26512
600X850X36.0	752.7	958.8	547008	940277	23.9	31.3	18234	22124	21298	27082	1121692	28924
600X900X10.0	230.3	293.4	186890	346048	25.2	34.3	6230	7690	6915	9097	379562	10196
600X900X12.0	275.2	350.5	221661	410904	25.2	34.2	7389	9131	8231	10832	452756	12088
600X900X14.0	319.6	407.1	255586	474338	25.1	34.1	8520	10541	9524	12539	524847	13932
600X900X16.0	363.6	463.2	288675	536362	25.0	34.0	9623	11919	10795	14219	595751	15725
600X900X18.0	407.2	518.7	320937	596988	24.9	33.9	10698	13266	12044	15871	665381	17468
600X900X20.0	450.4	573.7	352382	656230	24.8	33.8	11746	14583	13271	17496	733654	19161
600X900X22.0	493.1	628.2	383020	714099	24.7	33.7	12767	15869	14476	19094	800484	20802
600X900X25.0	556.5	708.9	427484	798354	24.6	33.6	14249	17741	16243	21440	897837	23169
600X900X28.0	618.9	788.5	470185	879588	24.4	33.4	15673	19546	17962	23724	991464	25418
600X900X30.0	660.0	840.8	497688	932086	24.3	33.3	16590	20713	19082	25214	1051673	26852
600X900X32.0	700.8	892.7	524432	983271	24.2	33.2	17481	21850	20180	26677	1110015	28232
600X900X36.0	780.9	994.8	575676	1081752	24.1	33.0	19189	24039	22313	29524	1220773	30833
600X950X10.0	238.2	303.4	195593	393385	25.4	36.0	6520	8282	7210	9843	409362	10776
600X950X12.0	284.6	362.5	232035	467279	25.3	35.9	7735	9837	8583	11723	488356	12780
600X950X14.0	330.6	421.1	267607	539608	25.2	35.8	8920	11360	9934	13575	566189	14733
600X950X16.0	376.2	479.2	302321	610385	25.1	35.7	10077	12850	11262	15397	642776	16634
600X950X18.0	421.3	536.7	336185	679625	25.0	35.6	11206	14308	12568	17191	718029	18484
600X950X20.0	466.1	593.7	369209	747339	24.9	35.5	12307	15733	13851	18956	791861	20282
600X950X22.0	510.4	650.2	401404	813540	24.9	35.4	13380	17127	15112	20692	864186	22027
600X950X25.0	576.1	733.9	448161	910034	24.7	35.2	14939	19159	16962	23243	969658	24546
600X950X28.0	640.9	816.5	493106	1003196	24.6	35.1	16437	21120	18763	25731	1071250	26944
600X950X30.0	683.6	870.8	522078	1063474	24.5	35.0	17403	22389	19937	27354	1136681	28476
600X950X32.0	725.9	924.7	550269	1122303	24.4	34.8	18342	23627	21089	28949	1200173	29953
600X950X36.0	809.2	1030.8	604343	1235663	24.2	34.6	20145	26014	23328	32056	1321005	32741
600X1000X10.0	246.0	313.4	204297	444516	25.5	37.7	6810	8890	7505	10614	439487	11356
600X1000X12.0	294.0	374.5	242409	528185	25.4	37.6	8080	10564	8936	12644	524340	13471
600X1000X14.0	341.6	435.1	279629	610142	25.4	37.5	9321	12203	10344	14645	607974	15534
600X1000X16.0	388.7	495.2	315966	690399	25.3	37.3	10532	13808	11729	16615	690301	17544
600X1000X18.0	435.4	554.7	351432	768970	25.2	37.2	11714	15379	13091	18555	771232	19500
600X1000X20.0	481.8	613.7	386036	845869	25.1	37.1	12868	16917	14431	20465	850678	21403
600X1000X22.0	527.7	672.2	419787	921109	25.0	37.0	13993	18422	15748	22345	928552	23252
600X1000X25.0	595.7	758.9	468838	1030888	24.9	36.9	15628	20618	17681	25109	1042222	25924
600X1000X28.0	662.9	844.5	516027	1137010	24.7	36.7	17201	22740	19564	27807	1151858	28471
600X1000X30.0	707.1	900.8	546468	1205748	24.6	36.6	18216	24115	20792	29568	1222562	30100
600X1000X32.0	751.0	956.7	576106	1272893	24.5	36.5	19204	25458	21997	31300	1291255	31674
600X1000X36.0	837.4	1066.8	633011	1402458	24.4	36.3	21100	28049	24343	34678	1422266	34650

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
650 X 700 X 10.0	206.8	263.4	182358	204028	26.3	27.8	5611	5829	6381	6707	299237	8555
650 X 700 X 12.0	246.9	314.5	216179	241922	26.2	27.7	6652	6912	7591	7979	356823	10134
650 X 700 X 14.0	286.6	365.1	249140	278870	26.1	27.6	7666	7968	8778	9228	413470	11668
650 X 700 X 16.0	325.9	415.2	281251	314881	26.0	27.5	8654	8997	9944	10455	469099	13156
650 X 700 X 18.0	364.8	464.7	312520	349965	25.9	27.4	9616	9999	11088	11658	523629	14600
650 X 700 X 20.0	403.3	513.7	342957	384133	25.8	27.4	10553	10975	12210	12839	576979	15997
650 X 700 X 22.0	441.3	562.2	372573	417395	25.7	27.3	11464	11926	13311	13998	629071	17347
650 X 700 X 25.0	497.6	633.9	415476	465610	25.6	27.1	12784	13303	14922	15694	704671	19285
650 X 700 X 28.0	553.0	704.5	456582	511841	25.5	27.0	14049	14624	16485	17341	776986	21116
650 X 700 X 30.0	589.4	750.8	483005	541576	25.4	26.9	14862	15474	17501	18411	823240	22277
650 X 700 X 32.0	625.4	796.7	508652	570454	25.3	26.8	15651	16299	18496	19459	867836	23389
650 X 700 X 36.0	696.1	886.8	557659	625678	25.1	26.6	17159	17877	20424	21491	951742	25465
650 X 750 X 10.0	214.6	273.4	192599	239232	26.5	29.6	5926	6380	6701	7378	331522	9185
650 X 750 X 12.0	256.3	326.5	228392	283809	26.5	29.5	7027	7568	7974	8781	395424	10885
650 X 750 X 14.0	297.6	379.1	263300	327323	26.4	29.4	8102	8729	9223	10159	458335	12539
650 X 750 X 16.0	338.5	431.2	297332	369782	26.3	29.3	9149	9861	10451	11513	520172	14146
650 X 750 X 18.0	378.9	482.7	330499	411198	26.2	29.2	10169	10965	11657	12843	580853	15705
650 X 750 X 20.0	419.0	533.7	362809	451582	26.1	29.1	11163	12042	12840	14149	640294	17217
650 X 750 X 22.0	458.6	584.2	394273	490945	26.0	29.0	12131	13092	14002	15431	698413	18681
650 X 750 X 25.0	517.2	658.9	439903	548095	25.8	28.8	13535	14616	15703	17310	782930	20787
650 X 750 X 28.0	575.0	732.5	483683	603006	25.7	28.7	14883	16080	17356	19137	864006	22782
650 X 750 X 30.0	612.9	780.8	511857	638386	25.6	28.6	15749	17024	18431	20325	916007	24050
650 X 750 X 32.0	650.5	828.7	539233	672796	25.5	28.5	16592	17941	19485	21491	966275	25267
650 X 750 X 36.0	724.4	922.8	591628	738750	25.3	28.3	18204	19700	21529	23753	1061284	27550
650 X 800 X 10.0	222.5	283.4	202839	277854	26.8	31.3	6241	6946	7021	8074	364428	9815
650 X 800 X 12.0	265.8	338.5	240605	329778	26.7	31.2	7403	8244	8356	9612	434765	11637
650 X 800 X 14.0	308.6	393.1	277460	380514	26.6	31.1	8537	9513	9669	11124	504057	13410
650 X 800 X 16.0	351.0	447.2	313414	430073	26.5	31.0	9644	10752	10958	12610	572218	15135
650 X 800 X 18.0	393.1	500.7	348478	478465	26.4	30.9	10722	11962	12225	14072	639164	16811
650 X 800 X 20.0	434.7	553.7	382661	525703	26.3	30.8	11774	13143	13470	15508	704808	18438
650 X 800 X 22.0	475.9	606.2	415973	571796	26.2	30.7	12799	14295	14692	16919	769067	20016
650 X 800 X 25.0	536.9	683.9	464330	638817	26.1	30.6	14287	15970	16484	18989	862669	22288
650 X 800 X 28.0	597.0	760.5	510783	703326	25.9	30.4	15716	17583	18227	21003	952672	24447
650 X 800 X 30.0	636.5	810.8	540710	744956	25.8	30.3	16637	18624	19361	22315	1010534	25823
650 X 800 X 32.0	675.6	860.7	569815	785497	25.7	30.2	17533	19637	20474	23603	1066586	27146
650 X 800 X 36.0	752.7	958.8	625596	863357	25.5	30.0	19249	21584	22635	26105	1172925	29636
650 X 850 X 10.0	230.3	293.4	213080	320018	27.0	33.0	6556	7530	7341	8796	397891	10446
650 X 850 X 12.0	275.2	350.5	252818	379979	26.9	32.9	7779	8941	8739	10473	474769	12388
650 X 850 X 14.0	319.6	407.1	291619	438620	26.8	32.8	8973	10320	10114	12124	550545	14281
650 X 850 X 16.0	363.6	463.2	329496	495953	26.7	32.7	10138	11669	11466	13748	625133	16124
650 X 850 X 18.0	407.2	518.7	366457	551991	26.6	32.6	11276	12988	12794	15346	698445	17917
650 X 850 X 20.0	450.4	573.7	402512	606744	26.5	32.5	12385	14276	14100	16917	770393	19659

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
650 X 850 X 22.0	493.1	628.2	437673	660225	26.4	32.4	13467	15535	15383	18462	840891	21350
650 X 850 X 25.0	556.5	708.9	488757	738087	26.3	32.3	15039	17367	17266	20730	943725	23790
650 X 850 X 28.0	618.9	788.5	537883	813152	26.1	32.1	16550	19133	19098	22939	1042803	26113
650 X 850 X 30.0	660.0	840.8	569562	861661	26.0	32.0	17525	20274	20291	24380	1106623	27596
650 X 850 X 32.0	700.8	892.7	600396	908956	25.9	31.9	18474	21387	21463	25794	1168557	29025
650 X 850 X 36.0	780.9	994.8	659565	999949	25.8	31.7	20294	23528	23740	28547	1286424	31723
650 X 900 X 10.0	238.2	303.4	223321	365851	27.1	34.7	6871	8130	7661	9542	431856	11076
650 X 900 X 12.0	284.6	362.5	265030	434561	27.0	34.6	8155	9657	9122	11365	515369	13139
650 X 900 X 14.0	330.6	421.1	305779	501815	27.0	34.5	9409	11151	10559	13159	597723	15152
650 X 900 X 16.0	376.2	479.2	345577	567623	26.9	34.4	10633	12614	11973	14926	678828	17113
650 X 900 X 18.0	421.3	536.7	384435	632000	26.8	34.3	11829	14044	13363	16665	758596	19023
650 X 900 X 20.0	466.1	593.7	422364	694957	26.7	34.2	12996	15443	14730	18376	836937	20880
650 X 900 X 22.0	510.4	650.2	459373	756506	26.6	34.1	14135	16811	16074	20060	913761	22685
650 X 900 X 25.0	576.1	733.9	513184	846218	26.4	34.0	15790	18805	18047	22533	1025959	25292
650 X 900 X 28.0	640.9	816.5	564983	932833	26.3	33.8	17384	20730	19969	24945	1134241	27779
650 X 900 X 30.0	683.6	870.8	598415	988876	26.2	33.7	18413	21975	21221	26519	1204105	29369
650 X 900 X 32.0	725.9	924.7	630977	1043573	26.1	33.6	19415	23191	22452	28066	1272007	30905
650 X 900 X 36.0	809.2	1030.8	693533	1148976	25.9	33.4	21339	25533	24845	31079	1401575	33810
650 X 950 X 10.0	246.0	313.4	233562	415476	27.3	36.4	7187	8747	7981	10313	466274	11706
650 X 950 X 12.0	294.0	374.5	277243	493675	27.2	36.3	8531	10393	9505	12286	556506	13891
650 X 950 X 14.0	341.6	435.1	319939	570273	27.1	36.2	9844	12006	11004	14230	645521	16023
650 X 950 X 16.0	388.7	495.2	361659	645283	27.0	36.1	11128	13585	12480	16144	733225	18103
650 X 950 X 18.0	435.4	554.7	402414	718718	26.9	36.0	12382	15131	13932	18029	819530	20129
650 X 950 X 20.0	481.8	613.7	442216	790591	26.8	35.9	13607	16644	15360	19886	904343	22101
650 X 950 X 22.0	527.7	672.2	481073	860914	26.8	35.8	14802	18125	16765	21713	987573	24019
650 X 950 X 25.0	595.7	758.9	537611	963524	26.6	35.6	16542	20285	18828	24399	1109249	26794
650 X 950 X 28.0	662.9	844.5	592083	1062720	26.5	35.5	18218	22373	20839	27021	1226850	29445
650 X 950 X 30.0	707.1	900.8	627267	1126977	26.4	35.4	19301	23726	22151	28734	1302835	31143
650 X 950 X 32.0	751.0	956.7	661558	1189748	26.3	35.3	20356	25047	23440	30418	1376781	32785
650 X 950 X 36.0	837.4	1066.8	727502	1310887	26.1	35.1	22385	27598	25950	33701	1518201	35897
650 X 1000 X 10.0	253.9	323.4	243803	449019	27.5	38.1	7502	9380	8301	11109	501102	12336
650 X 1000 X 12.0	303.4	386.5	289456	557471	27.4	38.0	8906	11149	9888	13237	598131	14642
650 X 1000 X 14.0	352.6	449.1	334098	644171	27.3	37.9	10280	12883	11449	15335	693880	16894
650 X 1000 X 16.0	401.3	511.2	377741	729132	27.2	37.8	11623	14583	12987	17402	788258	19092
650 X 1000 X 18.0	449.6	572.7	420393	812370	27.1	37.7	12935	16247	14501	19439	881172	21235
650 X 1000 X 20.0	497.5	633.7	462067	893896	27.0	37.6	14217	17878	15990	21445	972528	23322
650 X 1000 X 22.0	544.9	694.2	502773	973725	26.9	37.5	15470	19475	17456	23421	1062233	25354
650 X 1000 X 25.0	615.4	783.9	562038	1090315	26.8	37.3	17293	21806	19609	26328	1193492	28296
650 X 1000 X 28.0	684.9	872.5	619184	1203163	26.6	37.1	19052	24063	21710	29167	1320513	31112
650 X 1000 X 30.0	730.7	930.8	656120	1276338	26.6	37.0	20188	25527	23081	31023	1402686	32917
650 X 1000 X 32.0	776.1	988.7	692139	1347882	26.5	36.9	21297	26958	24429	32849	1482744	34665
650 X 1000 X 36.0	865.7	1102.8	761470	1486134	26.3	36.7	23430	29723	27055	36413	1636151	37985

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
600 X 700 X 10.0	198.9	253.4	152077	192125	24.5	27.5	5069	5489	5735	6362	264382	7875
600 X 700 X 12.0	237.5	302.5	180166	227720	24.4	27.4	6006	6506	6819	7567	315128	9323
600 X 700 X 14.0	275.6	351.1	207502	262397	24.3	27.3	6917	7497	7883	8748	364986	10727
600 X 700 X 16.0	313.4	399.2	234092	296163	24.2	27.2	7803	8462	8926	9907	413879	12088
600 X 700 X 18.0	350.7	446.7	259947	329030	24.1	27.1	8665	9401	9949	11044	461731	13404
600 X 700 X 20.0	387.6	493.7	285076	361007	24.0	27.0	9503	10314	10951	12159	508466	14677
600 X 700 X 22.0	424.0	540.2	309486	392104	23.9	26.9	10316	11203	11933	13252	554005	15904
600 X 700 X 25.0	478.0	608.9	344776	437120	23.8	26.8	11493	12489	13368	14850	619905	17660
600 X 700 X 28.0	531.0	676.5	378500	480212	23.7	26.6	12617	13720	14759	16400	682686	19313
600 X 700 X 30.0	565.8	720.8	400128	507886	23.6	26.5	13338	14511	15662	17406	722680	20356
600 X 700 X 32.0	600.3	764.7	421083	534729	23.5	26.4	14036	15278	16545	18390	761100	21353
600 X 700 X 36.0	667.9	850.8	461006	585959	23.3	26.2	15367	16742	18252	20296	832917	23202
600 X 750 X 10.0	206.8	263.4	160780	225541	24.7	29.3	5359	6014	6030	7008	292480	8455
600 X 750 X 12.0	246.9	314.5	190540	267469	24.6	29.2	6351	7133	7172	8338	348707	10014
600 X 750 X 14.0	286.6	365.1	219523	308361	24.5	29.1	7317	8223	8293	9643	403995	11528
600 X 750 X 16.0	325.9	415.2	247738	348228	24.4	29.0	8258	9286	9393	10925	458264	12997
600 X 750 X 18.0	364.8	464.7	275195	387081	24.3	28.9	9173	10322	10472	12184	511437	14420
600 X 750 X 20.0	403.3	513.7	301902	424931	24.2	28.8	10063	11331	11531	13419	563432	15797
600 X 750 X 22.0	441.3	562.2	327870	461787	24.2	28.7	10929	12314	12569	14630	614172	17128
600 X 750 X 25.0	497.6	633.9	365453	515231	24.0	28.5	12182	13739	14087	16404	687754	19037
600 X 750 X 28.0	553.0	704.5	401421	566498	23.9	28.4	13381	15107	15560	18126	758066	20839
600 X 750 X 30.0	589.4	750.8	424518	599483	23.8	28.3	14151	15986	16517	19245	802993	21980
600 X 750 X 32.0	625.4	796.7	446920	631527	23.7	28.2	14897	16841	17453	20342	846273	23072
600 X 750 X 36.0	696.1	886.8	489673	692830	23.5	28.0	16322	18475	19267	22468	927580	25109
600 X 800 X 10.0	214.6	273.4	169483	262250	24.9	31.0	5649	6556	6325	7679	321077	9035
600 X 800 X 12.0	256.3	326.5	200914	311149	24.8	30.9	6697	7779	7525	9139	382880	10706
600 X 800 X 14.0	297.6	379.1	231544	358889	24.7	30.8	7718	8972	8703	10574	443690	12329
600 X 800 X 16.0	338.5	431.2	261384	405483	24.6	30.7	8713	10137	9860	11983	503426	13906
600 X 800 X 18.0	378.9	482.7	290442	450942	24.5	30.6	9681	11274	10996	13368	562009	15436
600 X 800 X 20.0	419.0	533.7	318729	495276	24.4	30.5	10624	12382	12111	14728	619355	16918
600 X 800 X 22.0	458.6	584.2	346253	538497	24.4	30.4	11542	13462	13205	16063	675384	18353
600 X 800 X 25.0	517.2	658.9	386130	601264	24.2	30.2	12871	15032	14806	18020	756778	20414
600 X 800 X 28.0	575.0	732.5	424343	661589	24.1	30.1	14145	16540	16361	19922	834753	22365
600 X 800 X 30.0	612.9	780.8	448908	700466	24.0	30.0	14964	17512	17372	21160	884701	23603
600 X 800 X 32.0	650.5	828.7	472757	738284	23.9	29.9	15759	18457	18362	22374	932928	24792
600 X 800 X 36.0	724.4	922.8	518341	810786	23.7	29.6	17278	20270	20283	24730	1023905	27017
600 X 850 X 10.0	222.5	283.4	178187	302378	25.1	32.7	5940	7115	6620	8376	350120	9616
600 X 850 X 12.0	265.8	338.5	211287	358910	25.0	32.6	7043	8445	7878	9970	417581	11397
600 X 850 X 14.0	308.6	393.1	243565	414156	24.9	32.5	8119	9745	9114	11539	483995	13130
600 X 850 X 16.0	351.0	447.2	275029	468128	24.8	32.4	9168	11015	10328	13081	549280	14816
600 X 850 X 18.0	393.1	500.7	305690	520836	24.7	32.3	10190	12255	11520	14597	613351	16452
600 X 850 X 20.0	434.7	553.7	335556	572292	24.6	32.2	11185	13466	12691	16087	676126	18040

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
700 X 900 X 16.0	388.7	495.2	408469	598885	28.7	34.8	11671	13309	13191	15634	764679	18502
700 X 900 X 18.0	435.4	554.7	454642	667011	28.6	34.7	12990	14822	14727	17459	854928	20577
700 X 900 X 20.0	481.8	613.7	499767	733683	28.5	34.6	14279	16304	16239	19256	943681	22599
700 X 900 X 22.0	527.7	672.2	543853	798914	28.4	34.5	15539	17754	17727	21026	1030845	24567
700 X 900 X 25.0	595.7	758.9	608058	894083	28.3	34.3	17373	19869	19913	23627	1158406	27416
700 X 900 X 28.0	662.9	844.5	669987	986078	28.2	34.2	19142	21913	22045	26166	1281866	30141
700 X 900 X 30.0	707.1	900.8	710026	1045666	28.1	34.1	20286	23237	23436	27824	1361738	31888
700 X 900 X 32.0	751.0	956.7	749081	1103874	28.0	34.0	21402	24531	24803	29455	1439554	33579
700 X 900 X 36.0	837.4	1066.8	824276	1216199	27.8	33.8	23551	27027	27467	32634	1588649	36789
700 X 900 X 40.0	922.2	1174.8	895656	1323152	27.6	33.6	25590	29403	30037	35705	1728420	39768
700 X 950 X 10.0	253.9	323.4	275448	437567	29.2	36.8	7870	9212	8777	10783	525157	12636
700 X 950 X 12.0	303.4	386.5	327133	520072	29.1	36.7	9347	10949	10456	12849	627019	15002
700 X 950 X 14.0	352.6	449.1	377709	600939	29.0	36.6	10792	12651	12110	14885	727605	17314
700 X 950 X 16.0	401.3	511.2	427187	680181	28.9	36.5	12205	14320	13738	16891	826819	19571
700 X 950 X 18.0	449.6	572.7	475578	757811	28.8	36.4	13588	15954	15341	18868	924566	21773
700 X 950 X 20.0	497.5	633.7	522893	833842	28.7	36.3	14940	17555	16919	20816	1020752	23920
700 X 950 X 22.0	544.9	694.2	569144	908288	28.6	36.2	16261	19122	18473	22734	1115279	26011
700 X 950 X 25.0	615.4	783.9	636547	1017013	28.5	36.0	18187	21411	20757	25556	1253752	29043
700 X 950 X 28.0	684.9	872.5	701616	1122244	28.4	35.9	20046	23626	22985	28312	1387957	31947
700 X 950 X 30.0	730.7	930.8	743716	1190479	28.3	35.8	21249	25063	24441	30114	1474897	33811
700 X 950 X 32.0	776.1	988.7	784806	1257193	28.2	35.7	22423	26467	25872	31886	1559701	35618
700 X 950 X 36.0	865.7	1102.8	863995	1386112	28.0	35.5	24686	29181	28662	35346	1722527	39055
700 X 950 X 40.0	953.6	1214.8	939269	1509102	27.8	35.3	26836	31771	31357	38692	1875686	42256
700 X 1000 X 10.0	261.7	333.4	287351	493522	29.4	38.5	8210	9870	9122	11604	564929	13316
700 X 1000 X 12.0	312.9	398.5	341334	586757	29.3	38.4	9752	11735	10869	13830	674573	15813
700 X 1000 X 14.0	363.5	463.1	394182	678200	29.2	38.3	11262	13564	12590	16025	782878	18255
700 X 1000 X 16.0	413.8	527.2	445904	767866	29.1	38.2	12740	15357	14285	18189	889748	20640
700 X 1000 X 18.0	463.7	590.7	496513	855769	29.0	38.1	14186	17115	15955	20323	995085	22969
700 X 1000 X 20.0	513.2	653.7	546020	941922	28.9	38.0	15601	18838	17599	22425	1098792	25241
700 X 1000 X 22.0	562.2	716.2	594436	1026340	28.8	37.9	16984	20527	19219	24496	1200772	27456
700 X 1000 X 25.0	635.0	808.9	665037	1149743	28.7	37.7	19001	22995	21600	27547	1350288	30670
700 X 1000 X 28.0	706.9	900.5	733245	1269316	28.5	37.6	20950	25386	23926	30528	1495368	33753
700 X 1000 X 30.0	754.2	960.8	777406	1346928	28.4	37.4	22212	26939	25446	32478	1589461	35735
700 X 1000 X 32.0	801.2	1020.7	820531	1422871	28.4	37.3	23444	28457	26941	34398	1681340	37657
700 X 1000 X 36.0	894.0	1138.8	903715	1569809	28.2	37.1	25820	31396	29857	38148	1858067	41322
700 X 1000 X 40.0	985.0	1254.8	982883	1710237	28.0	36.9	28082	34205	32677	41779	2024786	44745
750 X 800 X 10.0	238.2	303.4	280305	309060	30.4	31.9	7475	7727	8488	8864	454952	11375
750 X 800 X 12.0	284.6	362.5	332832	367038	30.3	31.8	8876	9176	10109	10558	543109	13499
750 X 800 X 14.0	330.6	421.1	384207	423765	30.2	31.7	10246	10594	11704	12224	630110	15571
750 X 800 X 16.0	376.2	479.2	434443	479252	30.1	31.6	11585	11981	13274	13865	715864	17592
750 X 800 X 18.0	421.3	536.7	483549	533512	30.0	31.5	12895	13338	14819	15479	800278	19561
750 X 800 X 20.0	466.1	593.7	531537	586556	29.9	31.4	14174	14664	16339	17068	883261	21478

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
750 X 800 X 22.0	510.4	650.2	578419	638395	29.8	31.3	15425	15960	17833	18630	964721	23342
750 X 800 X 25.0	576.1	733.9	646689	713921	29.7	31.2	17245	17848	20029	20926	1083851	26038
750 X 800 X 28.0	640.9	816.5	712530	786800	29.5	31.0	19001	19670	22169	23165	1199034	28614
750 X 800 X 30.0	683.6	870.8	755093	833936	29.5	31.0	20136	20848	23565	24625	1273476	30263
750 X 800 X 32.0	725.9	924.7	796604	879923	29.4	30.9	21243	21998	24937	26060	1345935	31857
750 X 800 X 36.0	809.2	1030.8	876512	968500	29.2	30.7	23374	24213	27609	28855	1484536	34879
750 X 800 X 40.0	890.8	1134.8	952339	1052621	29.0	30.5	25396	26316	30184	31551	1614117	37676
750 X 850 X 10.0	246.0	313.4	293995	355300	30.6	33.7	7840	8360	8858	9636	497858	12105
750 X 850 X 12.0	294.0	374.5	349173	422117	30.5	33.6	9311	9932	10552	11479	594440	14370
750 X 850 X 14.0	341.6	435.1	403169	487547	30.4	33.5	10751	11472	12219	13295	689808	16582
750 X 850 X 16.0	388.7	495.2	455997	551605	30.4	33.4	12160	12979	13861	15083	783868	18741
750 X 850 X 18.0	435.4	554.7	507666	614301	30.3	33.3	13538	14454	15478	16844	876526	20847
750 X 850 X 20.0	481.8	613.7	558189	675647	30.2	33.2	14885	15898	17069	18577	967686	22898
750 X 850 X 22.0	527.7	672.2	607577	735657	30.1	33.1	16202	17310	18634	20283	1057254	24896
750 X 850 X 25.0	595.7	758.9	679553	823191	29.9	32.9	18121	19369	20935	22792	1188413	27790
750 X 850 X 28.0	662.9	844.5	749038	907784	29.8	32.8	19974	21360	23180	25241	1315455	30559
750 X 850 X 30.0	707.1	900.8	793996	962566	29.7	32.7	21173	22649	24645	26840	1397706	32335
750 X 850 X 32.0	751.0	956.7	837873	1016070	29.6	32.6	22343	23908	26086	28412	1477890	34055
750 X 850 X 36.0	837.4	1066.8	922432	1119294	29.4	32.4	24598	26336	28894	31477	1631687	37324
750 X 850 X 40.0	922.2	1174.8	1002803	1217551	29.2	32.2	26741	28648	31604	34438	1776100	40362
750 X 900 X 10.0	253.9	323.4	307686	405458	30.8	35.4	8205	9010	9228	10432	541507	12835
750 X 900 X 12.0	303.4	386.5	365513	481877	30.8	35.3	9747	10708	10995	12430	646657	15242
750 X 900 X 14.0	352.6	449.1	422131	556769	30.7	35.2	11257	12373	12735	14400	750532	17593
750 X 900 X 16.0	401.3	511.2	477550	630147	30.6	35.1	12735	14003	14449	16341	853038	19890
750 X 900 X 18.0	449.6	572.7	531783	702023	30.5	35.0	14181	15601	16137	18253	954076	22132
750 X 900 X 20.0	497.5	633.7	584841	772410	30.4	34.9	15596	17165	17799	20136	1053550	24319
750 X 900 X 22.0	544.9	694.2	636735	841321	30.3	34.8	16980	18696	19435	21991	1151362	26450
750 X 900 X 25.0	615.4	783.9	712418	941948	30.2	34.7	18998	20932	21841	24721	1294751	29541
750 X 900 X 28.0	684.9	872.5	785547	1039324	30.0	34.5	20948	23096	24191	27387	1433854	32504
750 X 900 X 30.0	730.7	930.8	832898	1102456	29.9	34.4	22211	24499	25725	29129	1524046	34407
750 X 900 X 32.0	776.1	988.7	879143	1164175	29.8	34.3	23444	25871	27235	30844	1612090	36253
750 X 900 X 36.0	865.7	1102.8	968353	1283423	29.6	34.1	25823	28521	30179	34189	1781349	39769
750 X 900 X 40.0	953.6	1214.8	1053266	1397166	29.5	33.9	28087	31048	33024	37425	1940865	43048
750 X 950 X 10.0	261.7	333.4	321377	459658	31.1	37.1	8570	9677	9598	11253	585831	13566
750 X 950 X 12.0	312.9	398.5	381854	546469	31.0	37.0	10183	11505	11437	13412	699677	1

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
750 X 950 X 30.0	754.2	960.8	871801	1253982	30.1	36.1	23248	26400	26805	31494	1652291	36480
750 X 950 X 32.0	801.2	1,020.7	920412	1324639	30.0	36.0	24544	27887	28384	33355	1748313	38452
750 X 950 X 36.0	894.0	1,138.8	1014273	1461336	29.8	35.8	27047	30765	31464	36991	1933273	42215
750 X 950 X 40.0	985.0	1254.8	1103729	1591965	29.7	35.6	29433	33515	34444	40512	2108133	45734
750 X 1000 X 10.0	269.6	343.4	335068	518026	31.2	38.8	8935	10361	9968	12099	630771	14296
750 X 1000 X 12.0	322.3	410.5	398195	616042	31.1	38.7	10619	12321	11880	14423	753430	16984
750 X 1000 X 14.0	374.5	477.1	460054	712229	31.1	38.6	12268	14245	13765	16715	874691	19615
750 X 1000 X 16.0	426.4	543.2	520658	806600	31.0	38.5	13884	16132	15623	18977	994451	22189
750 X 1000 X 18.0	477.8	608.7	580017	899168	30.9	38.4	15467	17983	17454	21206	1112611	24704
750 X 1000 X 20.0	528.9	673.7	638144	989949	30.8	38.3	17017	19799	19259	23405	1229069	27161
750 X 1000 X 22.0	579.5	738.2	695051	1078956	30.7	38.2	18535	21579	21037	25572	1343722	29558
750 X 1000 X 25.0	654.6	833.9	778147	1209170	30.6	38.1	20751	24183	23654	28765	1512097	33044
750 X 1000 X 28.0	728.8	928.5	858563	1335469	30.4	37.9	22895	26709	26212	31889	1675840	36395
750 X 1000 X 30.0	777.8	990.8	910703	1417518	30.3	37.8	24285	28350	27885	33933	1782259	38553
750 X 1000 X 32.0	826.4	1052.7	961681	1497860	30.2	37.7	25645	29957	29533	35947	1886366	40650
750 X 1000 X 36.0	922.2	1174.8	1060194	1653485	30.0	37.5	28272	33070	32749	39883	2087240	44661
750 X 1000 X 40.0	1016.4	1294.8	1154193	1802450	29.9	37.3	30778	36049	35864	43699	2277657	48422
800 X 850 X 10.0	253.9	323.4	340267	372941	32.4	34.0	8507	8775	9654	10056	549776	12935
750 X 850 X 12.0	294.0	374.5	349173	422117	30.5	33.6	9311	9932	10552	11479	594440	14370
750 X 850 X 14.0	341.6	435.1	403169	487547	30.4	33.5	10751	11472	12219	13295	689808	16582
750 X 850 X 16.0	388.7	495.2	455997	551605	30.4	33.4	12160	12979	13861	15083	783868	18741
750 X 850 X 18.0	435.4	554.7	507666	614301	30.3	33.3	13538	14454	15478	16844	876526	20847
750 X 850 X 20.0	481.8	613.7	558189	675647	30.2	33.2	14885	15898	17069	18577	967686	22898
750 X 850 X 22.0	527.7	672.2	607577	735657	30.1	33.1	16202	17310	18634	20283	1057254	24896
750 X 850 X 25.0	595.7	758.9	679553	823191	29.9	32.9	18121	19369	20935	22792	1188413	27790
750 X 850 X 28.0	662.9	844.5	749038	907784	29.8	32.8	19974	21360	23180	25241	1315455	30559
750 X 850 X 30.0	707.1	900.8	793996	962566	29.7	32.7	21173	22649	24645	26840	1397706	32335
750 X 850 X 32.0	751.0	956.7	837873	1016070	29.6	32.6	22343	23908	26086	28412	1477890	34055
750 X 850 X 36.0	837.4	1066.8	922432	1119294	29.4	32.4	24598	26336	28894	31477	1631687	37324
750 X 850 X 40.0	922.2	1174.8	1002803	1217551	29.2	32.2	26741	28648	31604	34438	1776100	40362
800 X 850 X 10.0	253.9	323.4	340267	372941	32.4	34.0	8507	8775	9654	10056	549776	12935
800 X 850 X 12.0	303.4	386.5	404298	443185	32.3	33.9	10107	10428	11503	11982	656589	15361
800 X 850 X 14.0	352.6	449.1	467015	512011	32.3	33.8	11675	12047	13325	13880	762130	17733
800 X 850 X 16.0	401.3	511.2	528431	579430	32.2	33.7	13211	13634	15119	15750	866301	20050
800 X 850 X 18.0	449.6	572.7	588559	645456	32.1	33.6	14714	15187	16887	17592	969005	22312
800 X 850 X 20.0	497.5	633.7	647409	710099	32.0	33.5	16185	16708	18628	19407	1070143	24519
800 X 850 X 22.0	544.9	694.2	704994	773373	31.9	33.4	17625	18197	20342	21194	1169619	26669
800 X 850 X 25.0	615.4	783.9	789025	865743	31.7	33.2	19726	20370	22864	23824	1315498	29790
800 X 850 X 28.0	684.9	872.5	870275	955100	31.6	33.1	21757	22473	25326	26391	1457083	32782
800 X 850 X 30.0	730.7	930.8	922916	1013018	31.5	33.0	23073	23836	26935	28070	1548923	34706
800 X 850 X 32.0	776.1	988.7	974350	1069627	31.4	32.9	24359	25168	28518	29721	1638610	36571
800 X 850 X 36.0	865.7	1102.8	1073643	1178967	31.2	32.7	26841	27740	31606	32942	1811131	40126

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
800 X 850 X 40.0	953.6	1214.8	1168247	1283214	31.0	32.5	29206	30193	34591	36058	1973874	43444
800 X 900 X 10.0	261.7	333.4	355870	425261	32.7	35.7	8897	9450	10049	10877	598555	13715
800 X 900 X 12.0	312.9	398.5	422927	505535	32.6	35.6	10573	11234	11976	12963	714960	16293
800 X 900 X 14.0	363.5	463.1	488640	584246	32.5	35.5	12216	12983	13875	15020	830032	18814
800 X 900 X 16.0	413.8	527.2	553021	661408	32.4	35.4	13826	14698	15746	17048	943671	21279
800 X 900 X 18.0	463.7	590.7	616082	737034	32.3	35.3	15402	16379	17591	19047	1055777	23688
800 X 900 X 20.0	513.2	653.7	677836	811137	32.2	35.2	16946	18025	19408	21016	1166249	26039
800 X 900 X 22.0	562.2	716.2	738294	883729	32.1	35.1	18457	19638	21198	22957	1274986	28333
800 X 900 X 25.0	635.0	808.9	826577	989812	32.0	35.0	20664	21996	23833	25815	1434620	31666
800 X 900 X 28.0	706.9	900.5	912012	1092569	31.8	34.8	22800	24279	26407	28608	1589783	34867
800 X 900 X 30.0	754.2	960.8	967406	1159246	31.7	34.7	24185	25761	28090	30434	1690574	36927
800 X 900 X 32.0	801.2	1020.7	1021563	1224476	31.6	34.6	25539	27211	29747	32232	1789126	38928
800 X 900 X 36.0	894.0	1138.8	1126215	1350646	31.5	34.4	28155	30014	32981	35744	1979114	42750
800 X 900 X 40.0	985.0	1254.8	1226061	1471179	31.3	34.2	30652	32693	36111	39145	2158950	46328
800 X 950 X 10.0	269.6	343.4	371474	481749	32.9	37.5	9287	10142	10444	11723	648139	14496
800 X 950 X 12.0	322.3	410.5	441557	572866	32.8	37.4	11039	12060	12449	13974	774290	17224
800 X 950 X 14.0	374.5	477.1	510265	662270	32.7	37.3	12757	13943	14425	16195	899045	19895
800 X 950 X 16.0	426.4	543.2	577611	749976	32.6	37.2	14440	15789	16374	18386	1022303	22508
800 X 950 X 18.0	477.8	608.7	643606	835997	32.5	37.1	16090	17600	18295	20546	1143960	25063
800 X 950 X 20.0	528.9	673.7	708263	920346	32.4	37.0	17707	19376	20188	22676	1263914	27560
800 X 950 X 22.0	579.5	738.2	771593	1003036	32.3	36.9	19290	21117	22054	24775	1382061	29997
800 X 950 X 25.0	654.6	833.9	864129	1123993	32.2	36.7	21603	23663	24801	27868	1555667	33542
800 X 950 X 28.0	728.8	928.5	953749	1241293	32.1	36.6	23844	26132	27488	30894	1724626	36952
800 X 950 X 30.0	777.8	990.8	1011896	1317484	32.0	36.5	25297	27737	29245	32874	1834512	39150
800 X 950 X 32.0	826.4	1052.7	1068776	1392084	31.9	36.4	26719	29307	30975	34824	1942075	41286
800 X 950 X 36.0	922.2	1174.8	1178786	1536561	31.7	36.2	29470	32349	34356	38636	2149818	45375
800 X 950 X 40.0	1016.4	1294.8	1283874	1674829	31.5	36.0	32097	35260	37631	42332	2347039	49214
800 X 1000 X 10.0	277.4	353.4	387077	542529	33.1	39.2	9677	10851	10839	12594	698457	15276
800 X 1000 X 12.0	331.7	422.5	460187	645328	33.0	39.1	11505	12907	12922	15016	834495	18155
800 X 1000 X 14.0	385.5	491.1	531890	746258	32.9	39.0	13297	14925	14975	17406	969073	20976
800 X 1000 X 16.0	439.0	559.2	602200	845333	32.8	38.9	15055	16907	17001	19764	1102087	23737
800 X 1000 X 18.0	492.0	626.7	671129	942568	32.7	38.8	16778	18851	18998	22090	1233431	26439
800 X 1000 X 20.0	544.6	693.7	738689	1037976	32.6	38.7	18467	20760	20968	24385	1363000	29080
800 X 1000 X 22.0	596.7	760.2	804893	1131571	32.5	38.6	20122	22631	22909	26648	1490690	31661
800 X 1000 X 25.0	674.2	858.9	901681	1268597	32.4	38.4	22542	25372	25770	29984	1678466	35418
800 X 1000 X 28.0	750.8	956.5	995486	1401623	32.3	38.3	24887	28032	28569	33250	1861418	39037
800 X 1000 X 30.0	801.3	1020.8	1056386	1488108	32.2	38.2	26410	29762	30400	35388	1980529	41372
800 X 1000 X 32.0	851.5	1084.7	1115989	1572850	32.1	38.1	27900	31457	32204	37496	2097231	43644
800 X 1000 X 36.0	950.5	1210.8	1231358	1737160	31.9	37.9	30784	34743	35731	41618	2322989	48000
800 X 1000 X 40.0	1047.8	1334.8	1341687	1894664	31.7	37.7	33542	37893	39151	45619	2537856	52100
850 X 900 X 10.0	269.6	343.4	408223	445064	34.5	36.0	9605	9890	10896	11322	656911	14595
850 X 900 X 12.0	322.3	410.5	485323	529192	34.4	35.9	11419	11760	12987	13496	784826	17344

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
850 X 900 X 14.0	374.5	477.1	560938	611723	34.3	35.8	13199	13594	15050	15640	911348	20035
850 X 900 X 16.0	426.4	543.2	635082	692670	34.2	35.7	14943	15393	17084	17755	1036373	22668
850 X 900 X 18.0	477.8	608.7	707765	772046	34.1	35.6	16653	17157	19090	19840	1159798	25243
850 X 900 X 20.0	528.9	673.7	779002	849863	34.0	35.5	18329	18886	21067	21896	1281519	27759
850 X 900 X 22.0	579.5	738.2	848805	926136	33.9	35.4	19972	20581	23016	23923	1401432	30216
850 X 900 X 25.0	654.6	833.9	950847	1037677	33.8	35.3	22373	23059	25886	26908	1577684	33791
850 X 900 X 28.0	728.8	928.5	1049733	1145814	33.6	35.1	24700	25463	28693	29828	1749282	37231
850 X 900 X 30.0	777.8	990.8	1113923	1216036	33.5	35.0	26210	27023	30530	31739	1860922	39448
850 X 900 X 32.0	826.4	1052.7	1176742	1284778	33.4	34.9	27688	28551	32338	33621	1970233	41604
850 X 900 X 36.0	922.2	1174.8	1298312	1417870	33.2	34.7	30549	31508	35873	37300	2181455	45732
850 X 900 X 40.0	1016.4	1294.8	1414541	1545192	33.1	34.6	33283	34338	39298	40865	2382122	49610
850 X 950 X 10.0	277.4	353.4	425863	503839	34.7	37.8	10020	10607	11316	12193	711939	15425
850 X 950 X 12.0	331.7	422.5	506392	599262	34.6	37.7	11915	12616	13490	14537	850688	18335
850 X 950 X 14.0	385.5	491.1	585402	692936	34.5	37.6	13774	14588	15635	16851	987980	21186
850 X 950 X 16.0	439.0	559.2	662907	784874	34.4	37.5	15598	16524	17752	19133	1123710	23977
850 X 950 X 18.0	492.0	626.7	738920	875090	34.3	37.4	17386	18423	19839	21385	1257770	26708
850 X 950 X 20.0	544.6	693.7	813454	963597	34.2	37.3	19140	20286	21897	23606	1390056	29379
850 X 950 X 22.0	596.7	760.2	886521	1050410	34.2	37.2	20859	22114	23927	25796	1520459	31990
850 X 950 X 25.0	674.2	858.9	993399	1177482	34.0	37.0	23374	24789	26917	29024	1712303	35792
850 X 950 X 28.0	750.8	956.5	1097049	1300817	33.9	36.9	25813	27386	29844	32185	1899311	39455
850 X 950 X 30.0	801.3	1020.8	1164376	1380987	33.8	36.8	27397	29073	31760	34254	2021119	41820
850 X 950 X 32.0	851.5	1084.7	1230299	1459529	33.7	36.7	28948	30727	33647	36293	2140511	44122
850 X 950 X 36.0	950.5	1210.8	1357984	1611785	33.5	36.5	31953	33932	37338	40282	2371621	48536
850 X 950 X 40.0	1047.8	1334.8	1480204	1757692	33.3	36.3	34828	37004	40918	44152	2591794	52695
850 X 1000 X 10.0	285.3	363.4	443504	567032	34.9	39.5	10435	11341	11736	13089	767832	16256
850 X 1000 X 12.0	341.1	434.5	527460	674614	34.8	39.4	12411	13492	13993	15608	917581	19326
850 X 1000 X 14.0	396.5	505.1	609866	780287	34.8	39.3	14350	15606	16221	18096	1065808	22337
850 X 1000 X 16.0	451.5	575.2	690733	884067	34.7	39.2	16253	17681	18419	20551	1212405	25286
850 X 1000 X 18.0	506.1	644.7	770075	985967	34.6	39.1	18119	19719	20588	22974	1357263	28174
850 X 1000 X 20.0	560.3	713.7	847906	1086002	34.5	39.0	19951	21720	22727	25365	1500273	31000
850 X 1000 X 22.0	614.0	782.2	924237	1184187	34.4	38.9	21747	23684	24837	27724	1641326	33764
850 X 1000 X 25.0	693.9	883.9	1035951	1328024	34.2	38.8	24375	26560	27949	31203	1848998	37793
850 X 1000 X 28.0	772.8	984.5	1144365	1467776	34.1	38.6	26926	29356	30995	34611	2051651	41680
850 X 1000 X 30.0	824.9	1050.8	1214828	1558698	34.0	38.5	28584	31174	32990	36843	2183783	44192
850 X 1000 X 32.0	876.6	1116.7	1283856	1647839	33.9	38.4	30208	32957	34956	39044	2313411	46639
850 X 1000 X 36.0	978.7	1246.8	1417657	1820836	33.7	38.2	33357	36417	38803	43354	2564720	51340
850 X 1000 X 40.0	1079.2	1374.8	1545867	1986877	33.5	38.0	36373	39738	42538	47539	2804710	55780
900 X 950 X 10.0	285.3	363.4	484671	525930	36.5	38.0	10770	11072	12212	12663	777106	16355
900 X 950 X 12.0	341.1	434.5	576508	625659	36.4	38.0	12811	13172	14561	15100	928721	19446
900 X 950 X 14.0	396.5	505.1	666678	723601	36.3	37.9	14815	15234	16881	17506	1078816	22477
900 X 950 X 16.0	451.5	575.2	755193	819771	36.2	37.8	16782	17258	19170	19880	1227282	25446
900 X 950 X 18.0	506.1	644.7	842069	914183	36.1	37.7	18713	19246	21428	22223	1374009	28353

RECTANGULAR HOLLOW SECTION (RHS)												
Dimension	Weight	Area	Moment of Inertia		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants	
mm	kg/m	cm2	I _{xx}	I _{yy}	R _{xx}	R _{yy}	Z _{xx}	Z _{yy}	S _{xx}	S _{yy}	J	C
			cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	cm ⁴	cm ³
900X950X20.0	560.3	713.7	927317	1006849	36.1	37.6	20607	21197	23656	24536	1518889	31199
900X950X22.0	614.0	782.2	1010951	1097784	36.0	37.5	22466	23111	25855	26817	1661811	33983
900X950X25.0	693.9	883.9	1133406	1230972	35.8	37.3	25187	25915	29096	30181	1872283	38042
900X950X28.0	772.8	984.5	1252304	1360341	35.7	37.2	27829	28639	32270	33475	2077731	41959
900X950X30.0	824.9	1050.8	1329616	1444489	35.6	37.1	29547	30410	34349	35634	2211722	44490
900X950X32.0	876.6	1116.7	1405380	1526974	35.5	37.0	31231	32147	36399	37762	2343204	46957
900X950X36.0	978.7	1246.8	1552317	1687010	35.3	36.8	34496	35516	40410	41927	2598205	51698
900X950X40.0	1079.2	1374.8	1693219	1840555	35.1	36.6	37627	38749	44305	45972	2841858	56176
900X1000X10.0	293.1	373.4	504474	591536	36.8	39.8	11211	11831	12657	13584	838758	17236
900X1000X12.0	350.5	446.5	600166	703900	36.7	39.7	13337	14078	15094	16201	1002523	20498
900X1000X14.0	407.5	519.1	694155	814316	36.6	39.6	15426	16286	17501	18786	1164703	23697
900X1000X16.0	464.1	591.2	786455	922801	36.5	39.5	17477	18456	19877	21338	1325184	26835
900X1000X18.0	520.2	662.7	877080	1029367	36.4	39.4	19491	20587	22222	23858	1483857	29909
900X1000X20.0	576.0	733.7	966043	1134029	36.3	39.3	21468	22681	24536	26345	1640607	32920
900X1000X22.0	631.3	804.2	1053359	1236802	36.2	39.2	23408	24736	26820	28800	1795323	35867
900X1000X25.0	713.5	908.9	1181270	1387451	36.1	39.1	26250	27749	30190	32422	2023337	40168
900X1000X28.0	794.8	1012.5	1305549	1533929	35.9	38.9	29012	30679	33491	35971	2246140	44323
900X1000X30.0	848.4	1080.8	1386406	1629288	35.8	38.8	30809	32586	35654	38298	2391591	47012
900X1000X32.0	901.7	1148.7	1465681	1722828	35.7	38.7	32571	34457	37788	40593	2534445	49635
900X1000X36.0	1007.0	1282.8	1619540	1904511	35.5	38.5	35990	38090	41965	45089	2811906	54682
900X1000X40.0	1110.6	1414.8	1767232	2079090	35.3	38.3	39272	41582	46025	49459	3077626	59460
950X1000X10.0	301.0	383.4	570112	616039	38.6	40.1	12002	12321	13603	14079	911113	18216
950X1000X12.0	360.0	458.5	678453	733185	38.5	40.0	14283	14664	16226	16794	1089174	21669
950X1000X14.0	418.5	533.1	784933	848346	38.4	39.9	16525	16967	18816	19476	1265583	25058
950X1000X16.0	476.6	607.2	889567	961534	38.3	39.8	18728	19231	21375	22125	1440226	28383
950X1000X18.0	534.4	680.7	992368	1072766	38.2	39.7	20892	21455	23901	24742	1612988	31644
950X1000X20.0	591.7	753.7	1093352	1182056	38.1	39.6	23018	23641	26396	27325	1783753	34840
950X1000X22.0	648.6	826.2	1192532	1289418	38.0	39.5	25106	25788	28858	29875	1952405	37970
950X1000X25.0	733.1	933.9	1337951	1446878	37.9	39.4	28167	28938	32493	33640	2201169	42543
950X1000X28.0	816.8	1040.5	1479390	1600082	37.7	39.2	31145	32002	36057	37332	2444529	46966
950X1000X30.0	872.0	1110.8	1571494	1699878	37.6	39.1	33084	33998	38394	39753	2603572	49832
950X1000X32.0	926.8	1180.7	1661865	1797817	37.5	39.0	34987	35956	40699	42142	2759922	52630
950X1000X36.0	1035.3	1318.8	1837459	1988187	37.3	38.8	38683	39764	45217	46824	3064080	58023
950X1000X40.0	1142.0	1454.8	2006282	2171304	37.1	38.6	42238	43426	49612	51379	3356079	63142

CIRCULAR HOLLOW SECTION

Circular Size Range
21.3mm to 406.4mm

Thickness
1.6mm to 12mm

CIRCULAR HOLLOW SECTION IS:1161 : 2014

Outside Diameter	Thickness	Mass	Area of Cross Section	Internal Volume	Moment of Inertia	Elastic Modulus	Plastic Modulus	Radius of Gyration	Square of Radius of Gyration	Torsional Constant
mm	mm	kg/m	cm ²	cm ³ /m	cm ⁴	cm ³	cm ³	cm	cm ²	cm ³
21.3	2.0	0.95	1.21	235	0.57	0.54	0.75	0.69	0.47	1.07
21.3	2.2	1.04	1.32	224	0.61	0.57	0.81	0.68	0.46	1.15
21.3	2.5	1.16	1.48	209	0.66	0.62	0.89	0.67	0.45	1.25
21.3	2.8	1.28	1.63	194	0.71	0.67	0.97	0.66	0.44	1.34
26.4	2.0	1.20	1.53	394	1.15	0.87	1.19	0.87	0.75	1.74
26.4	2.2	1.31	1.67	380	1.23	0.94	1.29	0.86	0.74	1.87
26.4	2.5	1.47	1.88	360	1.35	1.03	1.43	0.85	0.72	2.05
26.4	2.8	1.63	2.08	340	1.47	1.11	1.57	0.84	0.71	2.22
33.7	2.0	1.56	1.99	693	2.51	1.49	2.01	1.12	1.26	2.98
33.7	2.2	1.71	2.18	674	2.71	1.61	2.19	1.12	1.25	3.22
33.7	2.5	1.92	2.45	647	3.00	1.78	2.44	1.11	1.22	3.56
33.7	2.8	2.13	2.72	620	3.27	1.94	2.68	1.10	1.20	3.88
33.7	3.2	2.41	3.07	585	3.60	2.14	2.99	1.08	1.18	4.28
33.7	3.6	2.67	3.40	552	3.91	2.32	3.28	1.07	1.15	4.64
38.1	3.2	2.75	3.51	789	5.39	2.83	3.91	1.24	1.54	5.66
38.1	3.6	3.06	3.90	750	5.87	3.08	4.30	1.23	1.50	6.16
38.1	4.0	3.36	4.29	712	6.31	3.31	4.67	1.21	1.47	6.63
38.1	4.5	3.73	4.75	665	6.82	3.58	5.11	1.20	1.44	7.16
38.1	5.0	4.08	5.20	620	7.28	3.82	5.52	1.18	1.40	7.65
38.1	6.0	4.75	6.05	535	8.07	4.23	6.25	1.15	1.33	8.47
38.1	8.0	5.94	7.56	384	9.17	4.82	7.42	1.10	1.21	9.63
42.4	2.0	1.99	2.54	1158	5.19	2.45	3.27	1.43	2.05	4.90
42.4	2.3	2.27	2.90	1122	5.84	2.76	3.70	1.42	2.02	5.51
42.4	2.6	2.55	3.25	1087	6.46	3.05	4.12	1.41	1.99	6.10
42.4	2.9	2.83	3.60	1052	7.06	3.33	4.53	1.40	1.96	6.66
42.4	3.2	3.09	3.94	1018	7.62	3.59	4.93	1.39	1.93	7.19
42.4	3.6	3.45	4.39	973	8.33	3.93	5.44	1.38	1.90	7.86
48.3	2.0	2.28	2.91	1541	7.81	3.23	4.29	1.64	2.68	6.47
48.3	2.3	2.61	3.32	1500	8.81	3.65	4.87	1.63	2.65	7.30
48.3	2.6	2.93	3.73	1459	9.78	4.05	5.44	1.62	2.62	8.10
48.3	2.9	3.25	4.14	1419	10.70	4.43	5.99	1.61	2.59	8.86
48.3	3.2	3.56	4.53	1379	11.59	4.80	6.52	1.60	2.56	9.59
48.3	3.6	3.97	5.06	1327	12.71	5.26	7.21	1.59	2.51	10.52
48.3	4.0	4.37	5.57	1276	13.77	5.70	7.87	1.57	2.47	11.40
48.3	4.5	4.86	6.19	1213	15.01	6.21	8.66	1.56	2.42	12.43
48.3	5.0	5.34	6.80	1152	16.15	6.69	9.42	1.54	2.37	13.38
48.3	6.0	6.26	7.97	1035	18.19	7.53	10.81	1.51	2.28	15.07
48.3	8.0	7.95	10.13	819	21.37	8.85	13.16	1.45	2.11	17.70
60.3	2.0	2.88	3.66	2489	15.58	5.17	6.80	2.06	4.25	10.34
60.3	2.3	3.29	4.19	2437	17.65	5.85	7.74	2.05	4.21	11.71
60.3	2.6	3.70	4.71	2384	19.65	6.52	8.66	2.04	4.17	13.04
60.3	2.9	4.11	5.23	2333	21.59	7.16	9.56	2.03	4.13	14.32
60.3	3.2	4.51	5.74	2282	23.47	7.78	10.44	2.02	4.09	15.57
60.3	3.6	5.03	6.41	2215	25.87	8.58	11.59	2.01	4.03	17.16
60.3	4.0	5.55	7.07	2148	28.17	9.34	12.70	2.00	3.98	18.69
60.3	4.5	6.19	7.89	2067	30.90	10.25	14.04	1.98	3.92	20.50
60.3	5.0	6.82	8.69	1987	33.48	11.10	15.33	1.96	3.85	22.21

Circular Hollow Section IS:1161 : 2014										
Outside Diameter	Thickness	Mass	Area of Cross Section	Internal Volume	Moment of Inertia	Elastic Modulus	Plastic Modulus	Radius of Gyration	Square of Radius of Gyration	Torsional Constant
mm	mm	kg/m	cm ²	cm ³ /m	cm ⁴	cm ³	cm ³	cm	cm ²	cm ³
60.3	6.0	8.04	10.24	1832	38.18	12.66	17.76	1.93	3.73	25.33
60.3	8.0	10.32	13.14	1541	45.99	15.25	22.05	1.87	3.50	30.51
71.5	3.2	5.39	6.87	3329	40.13	11.22	14.94	2.42	5.84	22.45
71.5	3.6	6.03	7.68	3247	44.38	12.41	16.61	2.40	5.78	24.83
71.5	4.0	6.66	8.48	3167	48.48	13.56	18.25	2.39	5.72	27.12
71.5	5.0	8.20	10.45	2971	58.07	16.24	22.15	2.36	5.56	32.49
71.5	6.0	9.69	12.35	2781	66.77	18.68	25.81	2.33	5.41	37.35
71.5	8.0	12.53	15.96	2419	81.72	22.86	32.43	2.26	5.12	45.72
76.2	2.0	3.66	4.66	4094	32.11	8.43	11.01	2.62	6.89	16.85
76.2	2.3	4.19	5.34	4026	36.49	9.58	12.56	2.61	6.83	19.15
76.2	2.6	4.72	6.01	3959	40.76	10.70	14.09	2.60	6.78	21.40
76.2	2.9	5.24	6.68	3893	44.92	11.79	15.59	2.59	6.73	23.58
76.2	3.2	5.76	7.34	3826	48.98	12.86	17.06	2.58	6.67	25.71
76.2	3.6	6.45	8.21	3739	54.23	14.23	18.99	2.57	6.60	28.47
76.2	4.0	7.12	9.07	3653	59.30	15.56	20.87	2.56	6.54	31.13
76.2	4.5	7.96	10.14	3547	65.39	17.16	23.16	2.54	6.45	34.33
76.2	5.0	8.78	11.18	3442	71.22	18.69	25.39	2.52	6.37	37.39
76.2	6.0	10.39	13.23	3237	82.11	21.55	29.64	2.49	6.21	43.10
76.2	8.0	13.46	17.14	2846	101.03	26.52	37.38	2.43	5.89	53.03
88.9	2.0	4.29	5.46	5661	51.57	11.60	15.11	3.07	9.44	23.20
88.9	2.3	4.91	6.26	5581	58.70	13.21	17.25	3.06	9.38	26.41
88.9	2.6	5.53	7.05	5502	65.68	14.78	19.37	3.05	9.32	29.55
88.9	2.9	6.15	7.84	5424	72.52	16.31	21.46	3.04	9.26	32.63
88.9	3.2	6.76	8.62	5346	79.21	17.82	23.51	3.03	9.19	35.64
88.9	3.6	7.57	9.65	5242	87.90	19.77	26.21	3.02	9.11	39.55
88.9	4.0	8.38	10.67	5140	96.34	21.67	28.85	3.00	9.03	43.35
88.9	4.5	9.37	11.93	5014	106.54	23.97	32.09	2.99	8.93	47.94
88.9	5.0	10.35	13.18	4889	116.37	26.18	35.24	2.97	8.83	52.36
88.9	6.0	12.27	15.63	4645	134.94	30.36	41.31	2.94	8.64	60.72
88.9	8.0	15.96	20.33	4174	167.97	37.79	52.53	2.87	8.26	75.58
88.9	10.0	19.46	24.79	3728	195.98	44.09	62.59	2.81	7.91	88.18
88.9	5.0	10.35	13.18	4889	116.37	26.18	35.24	2.97	8.83	52.36
101.6	2.0	4.91	6.26	7482	77.63	15.28	19.84	3.52	12.41	30.56
101.6	2.3	5.63	7.18	7390	88.48	17.42	22.68	3.51	12.33	34.84
101.6	2.6	6.35	8.09	7299	99.14	19.52	25.49	3.50	12.26	39.03
101.6	2.9	7.06	8.99	7208	109.59	21.57	28.26	3.49	12.19	43.15
101.6	3.2	7.77	9.89	7118	119.85	23.59	31.00	3.48	12.12	47.19
101.6	3.6	8.70	11.08	6999	133.24	26.23	34.59	3.47	12.02	52.46
101.6	4.0	9.63	12.26	6881	146.28	28.80	38.12	3.45	11.93	57.59
101.6	4.5	10.78	13.73	6735	162.13	31.92	42.46	3.44	11.81	63.83
101.6	5.0	11.91	15.17	6590	177.47	34.93	46.70	3.42	11.70	69.87
114.3	2.6	7.16	9.12	9348	142.37	24.91	32.45	3.95	15.60	49.82
114.3	2.9	7.97	10.15	9246	157.55	27.57	36.00	3.94	15.52	55.13
114.3	3.2	8.77	11.17	9144	172.47	30.18	39.51	3.93	15.44	60.36
114.3	3.6	9.83	12.52	9009	191.98	33.59	44.13	3.92	15.33	67.19
114.3	4.0	10.88	13.86	8875	211.07	36.93	48.69	3.90	15.23	73.86
114.3	4.5	12.19	15.52	8709	234.32	41.00	54.28	3.89	15.10	82.00

Circular Hollow Section IS:1161 : 2014										
Outside Diameter	Thickness	Mass	Area of Cross Section	Internal Volume	Moment of Inertia	Elastic Modulus	Plastic Modulus	Radius of Gyration	Square of Radius of Gyration	Torsional Constant
mm	mm	kg/m	cm ²	cm ³ /m	cm ⁴	cm ³	cm ³	cm	cm ²	cm ³
114.3	5.0	13.48	17.17	8544	256.92	44.96	59.77	3.87	14.96	89.91
114.3	6.0	16.03	20.41	8219	300.21	52.53	70.45	3.83	14.71	105.06
127.0	2.9	8.88	11.31	11537	217.78	34.30	44.67	4.39	19.26	68.59
127.0	3.2	9.77	12.45	11423	238.60	37.57	49.06	4.38	19.17	75.15
127.0	3.6	10.96	13.96	11272	265.87	41.87	54.83	4.36	19.05	83.74
127.0	4.0	12.14	15.46	11122	292.61	46.08	60.54	4.35	18.93	92.16
127.0	4.5	13.60	17.32	10936	325.29	51.23	67.56	4.33	18.78	102.45
127.0	5.0	15.05	19.16	10751	357.14	56.24	74.46	4.32	18.64	112.48
127.0	6.0	17.91	22.81	10387	418.44	65.90	87.92	4.28	18.35	131.79
139.7	3.2	10.77	13.72	13956	319.78	45.78	59.63	4.83	23.30	91.56
139.7	3.6	12.09	15.39	13789	356.65	51.06	66.70	4.81	23.17	102.12
139.7	4.0	13.39	17.05	13623	392.86	56.24	73.68	4.80	23.04	112.49
139.7	4.5	15.01	19.11	13417	437.20	62.59	82.29	4.78	22.87	125.18
139.7	5.0	16.61	21.16	13212	480.54	68.80	90.76	4.77	22.71	137.59
139.7	6.0	19.79	25.20	12808	564.26	80.78	107.33	4.73	22.39	161.56
139.7	8.0	25.99	33.10	12018	720.29	103.12	138.93	4.66	21.76	206.24
165.1	3.2	12.78	16.28	19781	533.48	64.63	83.89	5.73	32.78	129.25
165.1	3.6	14.34	18.27	19582	595.79	72.17	93.91	5.71	32.62	144.35
165.1	4.0	15.89	20.24	19384	657.16	79.61	103.83	5.70	32.46	159.22
165.1	4.5	17.83	22.70	19138	732.57	88.74	116.10	5.68	32.27	177.49
165.1	5.0	19.75	25.15	18894	806.54	97.70	128.20	5.66	32.07	195.41
165.1	6.0	23.55	29.99	18409	950.25	115.11	151.95	5.63	31.69	230.22
165.1	8.0	31.00	39.48	17460	1221.25	147.94	197.61	5.56	30.93	295.88
168.3	2.6	10.63	13.53	20893	464.63	55.21	71.39	5.86	34.33	110.43
168.3	2.9	11.83	15.07	20739	515.46	61.26	79.34	5.85	34.21	122.51
168.3	3.2	13.03	16.60	20587	565.74	67.23	87.24	5.84	34.09	134.46
168.3	3.6	14.63	18.63	20384	631.90	75.09	97.67	5.82	33.92	150.18
168.3	4.0	16.21	20.65	20182	697.09	82.84	108.00	5.81	33.76	165.68
168.3	4.5	18.18	23.16	19931	777.22	92.36	120.77	5.79	33.56	184.72
168.3	5.0	20.14	25.65	19681	855.85	101.70	133.38	5.78	33.36	203.41
168.3	6.0	24.02	30.59	19187	1008.69	119.87	158.12	5.74	32.97	239.74
168.3	8.0	31.63	40.29	18218	1297.27	154.16	205.74	5.67	32.20	308.32
193.7	4.0	18.72	23.84	27084	1072.79	110.77	143.97	6.71	45.00	221.54
193.7	4.5	21.00	26.75	26793	1197.52	123.65	161.12	6.69	44.77	247.29
193.7	5.0	23.27	29.64	26504	1320.23	136.32	178.08	6.67	44.54	272.63
193.7	6.0	27.78	35.38	25930	1559.72	161.05	211.46	6.64	44.08	322.09
193.7	8.0	36.64	46.67	24801	2015.54	208.11	276.05	6.57	43.19	416.22
219.7	4.0	21.28	27.11	35199	1576.96	143.56	186.13	7.63	58.18	287.11
219.7	5.0	26.48	33.72	34537	1944.29	177.00	230.52	7.59	57.65	353.99
219.7	6.0	31.63	40.28	33882	2301.27	209.49	274.08	7.56	57.13	418.98
219.7	8.0	41.77	53.21	32589	2984.92	271.73	358.71	7.49	56.10	543.45
219.7	10.0	51.72	65.88	31322	3629.46	330.40	440.07	7.42	55.09	660.80
273.1	5.0	33.06	42.11	54367	3785.05	277.19	359.43	9.48	89.88	554.38
273.1	6.0	39.53	50.35	53543	4492.13	328.97	428.13	9.45	89.22	657.95
273.1	8.0	52.31	66.63	51915	5858.34	429.03	562.39	9.38	87.93	858.05
273.1	10.0	64.90	82.66	50312	7162.25	524.51	692.55	9.31	86.65	1049.03
273.1	12.0	77.28	98.43	48735	8405.78	615.58	818.65	9.24	85.40	1231.17

CIRCULAR HOLLOW SECTION IS:1161 : 2014										
Outside Diameter	Thickness	Mass	Area of Cross Section	Internal Volume	Moment of Inertia	Elastic Modulus	Plastic Modulus	Radius of Gyration	Square of Radius of Gyration	Torsional Constant
mm	mm	kg/m	cm ²	cm ³ /m	cm ⁴	cm ³	cm ³	cm	cm ²	cm ³
323.9	6.0	47.05	59.92	76405	7572.47	467.58	606.43	11.24	126.37	935.16
323.9	8.0	62.34	79.39	74458	9910.08	611.92	798.51	11.17	124.82	1223.84
323.9	10.0	77.43	98.61	72536	12158.34	750.75	985.67	11.10	123.29	1501.49
323.9	12.0	92.32	117.58	70639	14319.56	884.20	1167.96	11.04	121.78	1768.39
355.6	6.0	51.74	65.90	92725	10070.55	566.40	733.39	12.36	152.82	1132.80
355.6	8.0	68.59	87.36	90579	13201.37	742.48	966.78	12.29	151.11	1484.97
355.6	10.0	85.25	108.57	88457	16223.50	912.46	1194.73	12.22	149.42	1824.92
355.6	12.0	101.70	129.53	86361	19139.47	1076.46	1417.31	12.16	147.76	2152.92
406.4	6.0	59.26	75.47	122170	15128.33	744.50	961.99	14.16	200.45	1489.01
406.4	8.0	78.62	100.13	119704	19873.89	978.05	1269.95	14.09	198.48	1956.09
406.4	10.0	97.78	124.53	117264	24475.81	1204.52	1571.66	14.02	196.54	2409.04
406.4	12.0	116.74	148.69	114849	28937.01	1424.07	1867.19	13.95	194.62	2848.13

ALLOWABLE STRESS VALUES (IN MPA) AND DIMENSIONAL TOLERANCE IS:1161 : 2014						
S. No.	Grade	Tensile Strength	Yield Strength	Elongation	Tolerance	
		Min	Min	Min	Dimension	On outside diameter up to & including 48.3= +0.4mm/-0.8mm
		MPa	MPa	Percent		Over 48.3mm=+/-1%
1	YSt 210	330	210	20	Thickness	Welded tubes ±10%
2	YSt 240	410	240	17		Single Tube ±10%
3	YSt 310	450	310	14		10 ton lot ±7.5%
4	YSt 355	490	355	10	Weight	
5	YSt 420	500	420	10		



Amity University – Hyderabad

OUR PROJECTS

PROJECT - Prayagraj Airport Expansion

CONSULTANT - Sikka Associates

CLIENT - Airport Authority of India

YEAR - 2025



ABOUT THE PROJECT

Prayagraj Airport is a growing domestic aviation hub located in Bamrauli, Uttar Pradesh, with a modern civilian terminal inaugurated in 2019. The 2025 expansion was strategically executed to accommodate increased passenger traffic, particularly during large-scale events like the MahaKumbhMela. By enhancing operational capacity and regional connectivity, the airport has emerged as a vital infrastructure asset supporting economic growth and promoting investment in northern India’s aviation and tourism sectors.

CHALLENGE

- Completing the airport expansion within a strict timeline to ensure readiness before the MahaKumbhMela.
- Managing the anticipated surge in passenger traffic and strengthening connectivity with other states.
- Coordinating complex engineering, construction, and operational tasks simultaneously.
- Maintaining high standards of quality, safety, and compliance under time pressure.

SOLUTION

- Structural drawings vetted and approved by IIT Roorkee for compliance with engineering and safety standards.
- Implemented an optimized tubular structural design to reduce steel consumption by ~25% using customized sections from APL Apollo.
- Accelerated construction techniques ensured on-time completion without compromising structural integrity or operational readiness.

RESULT AND CONCLUSION

- Airport became operational ahead of schedule, ready to handle high passenger volumes during the MahaKumbhMela.
- Demonstrated operational reliability and efficiency in managing large-scale events.
- Material optimization led to cost savings and enhanced sustainability.
- Reinforced the value of innovative design, meticulous planning, and coordinated execution for large-scale infrastructure projects.



PROJECT - Max Super Speciality Hospital, Saket
CONTRACTOR - Ahluwalia Contracts (India) Limited
CLIENT - Max Healthcare Institute Ltd.
YEAR - 2025



ABOUT THE PROJECT

Max Super Speciality Hospital, Saket undertook a major infrastructure expansion to enhance healthcare capacity and operational efficiency. The project required a structural system that would enable rapid construction while ensuring durability, safety, and long-term performance in a critical healthcare environment.

CHALLENGE

- To achieve faster construction to enable early commissioning of the OPD block.
- Optimize structural steel usage without compromising strength.
- Ensure high-quality execution aligned with healthcare infrastructure standards.
- Accelerate operational readiness to achieve faster return on investment (ROI).

SOLUTION

- Approximately 4,000 MT of tubular sections were incorporated into the structural design.
- Customized tubular sections were used to optimize the building framework, reducing overall tonnage compared to conventional structural systems.
- The tubular structural system enabled faster fabrication and erection, improving project timelines and execution efficiency.

RESULT AND CONCLUSION

- Accelerated construction allowed the OPD building to become functional earlier than conventional schedules.
- Early commissioning contributed to faster revenue generation and improved ROI realization.
- Optimized tonnage reduced material consumption while maintaining structural integrity and safety.
- Demonstrated the effectiveness of tubular structural solutions in large-scale healthcare infrastructure projects.

The Max Saket expansion showcases how innovative tubular structural design can drive speed, efficiency, and measurable financial impact. By integrating engineering optimization with strategic execution, the project delivered operational readiness ahead of schedule while maintaining high performance and quality standards.



PROJECT - Tirupati Railway Station
CONTRACTOR - Varindra Construction Company
CLIENT - Indian Railways- South Central Railways
YEAR - 2025



ABOUT THE PROJECT

Tirupati Railway Station, located in Tirupati, Andhra Pradesh, underwent a major redevelopment and modernization as part of Indian Railways’ infrastructure upgrade program. This project marked the first complete railway station building constructed using a tubular structure, setting a benchmark in fast-track, durable construction. The redevelopment aimed to enhance passenger experience, improve operational efficiency, and accommodate increasing rail traffic in the region, particularly for pilgrims visiting the famous Tirumala temple.

CHALLENGE

The key challenge was to modernize and expand the railway station efficiently while ensuring structural durability and minimizing construction time. Incorporating advanced architectural and engineering standards, the project required a design solution that could accelerate construction, optimize materials, and deliver a modern, climate-controlled facility suitable for high passenger volumes.

SOLUTION

- Approximately 1,600 MT of APL APOLLO tubular sections were utilized to construct the superstructure, enabling faster and more durable completion.
- The building design was optimized by 20% through the use of customized tubular sections, reducing overall material usage while maintaining structural strength.
- The project introduced Air Concourse Areas supported by tubular structures, making Tirupati the first railway station in India to implement this innovation in combination with a fully tubular structure framework.
- Close coordination between design, engineering, and construction teams ensured timely delivery without compromising quality or safety.

RESULT AND CONCLUSION

The redevelopment of Tirupati Railway Station achieved significant milestones:

- First fully tubular railway station demonstrating advanced structural engineering.
- Faster construction and material efficiency resulted in cost savings and enhanced durability.
- Introduction of air-conditioned concourse areas improved passenger comfort and service standards.
- The project strengthened the station’s capacity to handle large passenger volumes, particularly during peak pilgrimage seasons, establishing a model for future railway modernization projects.

APPLICATION



OUR CLIENTELE



ENVIRONMENT

At APL Apollo, we are committed to taking care of the environment by implementing several measures for a better and cleaner tomorrow, while ensuring that the entire process is energy efficient. Our Zero Discharge sustainable policy makes sure that all water used in the production process is treated and reused. This reduces industrial water wastage drastically. We have planted trees in and around our premises and we've converted barren lands into green pastures.

OUR NETWORK

