

# **HOT ROLLED STRUCTURES**

ANGLES •  
CHANNELS •  
BEAMS •  
H BEAMS •



**Skipper Limited** is the largest Transmission Tower manufacturing company in India and also among the top 10 largest tower manufacturers in the world. Skipper is also the one and only integrated T&D company in the world to be present across the entire value chain - Angle Rolling, Tower and Monopole manufacturing, Load Testing and EPC line construction.

# SKIPPER FACTS:

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## **Incorporation:**

Established in 1981, Skipper has emerged as a prominent and competitive global manufacturer of electrical Transmission Towers and Poles



## **Location:**

Headquartered in Kolkata (West Bengal, India). Skipper is present both in national and international markets exporting to more than 40 countries



## **Facilities & Capacity:**

Three of the Company's manufacturing facilities are located in Kolkata and two units in Guwahati (Assam) with a total manufacturing capacity of 300000 MTPA



## **R&D:**

In-house Research & Development Center recognized by the Department of Scientific and Industrial Research (DSIR), Govt. of India, backed by world's Largest Tower Testing Station



## **Award:**

Recognised as the largest tower supplier for the third consecutive year by PGCIL





# STEEL ANGLES

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Skipper Limited is one of the largest manufacturer of hot rolled equal leg angles, available in various ranges of grades and sizes.

Skipper's Angles are ideal for usage in any kind of structural applications, general fabrications, machining, repairs and any kind of engineering activity.

Skipper's advantage over other players lies in the variety and customization it offers. The angles are manufactured using latest technologies in the state of the art plants. Our plants conform to various national and international standards, which ensure superior quality product every time. The plants are certified with ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007 standards.



# SKIPPER USPs:

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- ▶ 100% of Billets / Blooms / Slabs are tested as per standard specifications and are reheated in a furnace to the desired temperature
- ▶ Offers multiple variety of ranges
- ▶ Excellent Weldability
- ▶ Availability of High and Mild strength Steel structures
- ▶ 3 State of the art Continuous Automatic Rolling mills to ensure short lead time for Angle section sizes
- ▶ Close Dimensional tolerance
- ▶ Quality surface finish
- ▶ Superior mechanical and chemical properties
- ▶ Equal Leg Angles
- ▶ Customization of structures (of any length) as per requirement

## SALIENT FEATURES OF THE ROLLING MILLS

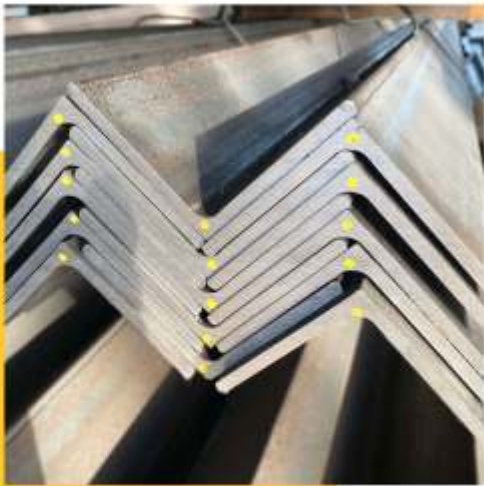
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- ▶ Side ways heating system
- ▶ Online descaler
- ▶ Hot saw shearing
- ▶ Cooling Bed
- ▶ Online straightening upto 1000 mm centre
- ▶ Systematic handling system to maintain quality
- ▶ Foolproof quality control



## PREMIUM QUALITY

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Skippers steel structures are of premium quality and manufactured end to end in the factories till the final delivery. Skipper facilities are equipped with modern automated machineries that enables finer product delivery and stringent quality control measures at every level of production leaving no stones unturned.

Skipper's quality structural sections are not only available in India but also internationally.

## QUALITY CONTROL FACILITIES

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At Skipper Limited, quality is a way of life. We test and certify all that we manufacture so that our customers can be completely assured in the knowledge that they are being delivered the most genuine products.



## The facilities at Skipper:

- ▶ NABL accredited lab
- ▶ Fully equipped mechanical and chemical testing laboratory
- ▶ Universal testing machines (with a load capacity of 1000KN)
- ▶ Bend testing machinery
- ▶ Impact test testing (to carry out charpy impact)
- ▶ Brinell cum rockwell hardness tester
- ▶ CNC wire cut machines – To execute complex notches
- ▶ Profile check
- ▶ UTM machine
- ▶ Spectrometer and Charpy impact test machine



▶ UTM Machine



▶ Charpy Impact Test Machine



▶ Spectrometer

## PACKAGING

At Skipper, packaging is the manifestation of the company's ethos to care till the last mile for its valuable customers. Utmost care is taken to ensure all structures reach the end customer in sturdy sea-worthy packing for ease of handling during transportation. All the bundles are marked with size / length / steel grade details.



# SPECIFICATIONS

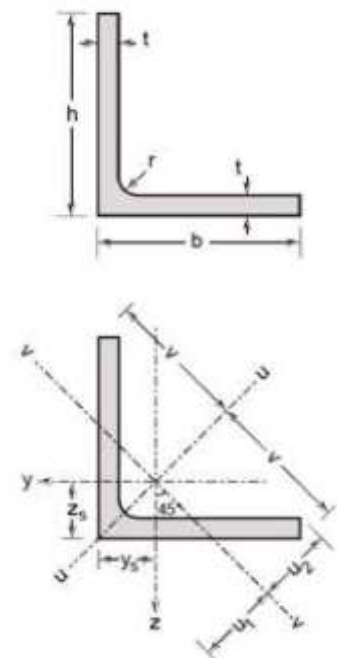
Basically angles are re rolled products which have been rolled after reheating of billet and blooms at a certain temperature. The profiles are made based on customer specific standards and length requirements, then straightened and packed accordingly.

We are also rolling it in different grades and standards like IS, BSEN, ASTM, DIN etc as per standard tolerance.

## List Of Angle Sections :

SECTION	THICKNESS																																		
	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
38x38	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40X40	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
45X45	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50X50	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
55X55	—	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60X60	—	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
65X65	—	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
70X70	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
75X75	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
80X80	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
90X90	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100X100	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
110X110	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
120X120	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
125x125	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
130X130	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
140x140	—	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
150X150	—	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—
160x160	—	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—
170x170	—	—	—	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
175x175	—	—	—	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
180X180	—	—	—	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
200X200	—	—	—	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—
250x250	—	—	—	—	—	—	—	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
45X30	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Product	Minimum size	Maximum size
Channel	75x40	400x100
Joist/ Beam	100x50	400x140
Flat	50	300
Special Beam	116x100	
	152x152	
	150x150	
Unequal Angle	45x30	
	75X50	
	90x60	
	100x75	
	125x75	
	150x75	
	150x90	
	150x115	



# GRADE CHART SHOWING MECHANICAL AND CHEMICAL PROPERTIES OF DIFFERENT GRADES THAT WE PRODUCE

BS EN 10025 : 2004																			
GRADE & QUALITY	CHEMICAL COMPOSITION											MECHANICAL PROPERTIES							
	C% max	Mn% max	S% max	P% max	Si% max	Al% min	Ni% max	Cu% max	Microalloy elements V % min	Microalloy elements Nb % min	CE% max	Yield Stress (≤16mm thickness)	Yield Stress (16 - 40mm thickness)	Tensile Strength (3 - 100mm thickness)	U.T.S (≤3mm thickness )	EN (min)	Impact Test Room Temp (J/K Grade)	Impact Test 0-10 Grade	Impact Test 20-112 Grade
S355JR	0.27	1.70	0.045	0.045	0.60	0.015	0.014	0.60	0.030	0.015	0.45	355 (min)	345 (min)	470-630	510-660	20	27 J, after then 5mm Thickness	27 J, after then 5 mm Thickness	27 J, after then 5mm Thickness
S355JO	0.23	1.70	0.040	0.040	0.60	0.015	0.014	0.60	0.030	0.015	0.45								
S355J2	0.23	1.70	0.035	0.035	0.60	0.015	-	0.60	0.030	0.015	0.45								
S355K2	0.23	1.70	0.035	0.035	0.60	0.015	-	0.60	0.030	0.015	0.45								
S275JR	0.24	1.60	0.045	0.045	-	0.015	0.014	0.60	-	-	0.40	275 (min)	265 (min)	410-560	430-580	21	27 J, after then 5mm Thickness	27 J, after then 5 mm Thickness	27 J, after then 5mm Thickness
S275JO	0.21	1.60	0.040	0.040	-	0.015	0.014	0.60	-	-	0.40								
S275J2	0.21	1.60	0.035	0.035	-	0.015	-	0.60	-	-	0.40								
S235JR	0.19	1.50	0.045	0.045	-	0.015	0.014	0.60	-	-	0.35	235 (min)	225 (min)	360-510	380-510	24	27 J, after then 5mm Thickness	27 J, after then 5 mm Thickness	27 J, after then 5mm Thickness
S235JO	0.19	1.50	0.040	0.040	-	0.015	0.014	0.60	-	-	0.35								
S235J2	0.19	1.50	0.035	0.035	-	0.015	-	0.60	-	-	0.35								

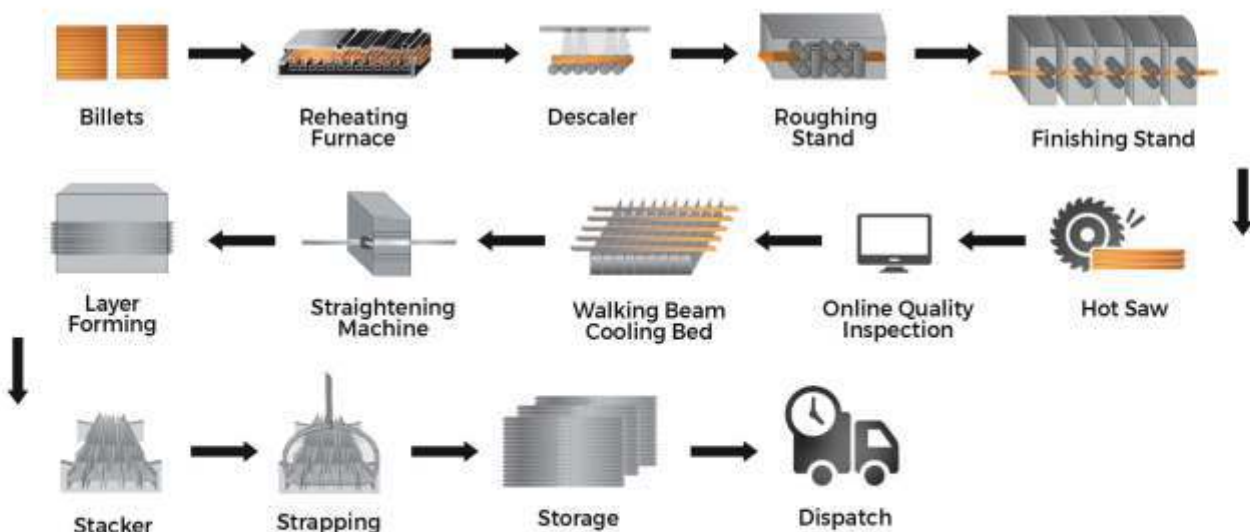
**Note 1.** The max. value for nitrogen does not apply if the chemical composition shows a minimum total Al content of 0.015 % or alternatively min. 0.015 % acid soluble Al or if sufficient other N binding elements are present. In this case the N binding elements shall be mentioned in the inspection document.

**2.** The steel may show a Nb content of max. 0.06 %, a V content of max. 0.15 % and a Ti content of max. 0.05 %.

ASTM A572 & ASTM 36																	
GRADE & QUALITY	CHEMICAL COMPOSITION											MECHANICAL PROPERTIES					
	C% max	Mn% max	S% max	P% max	Si% max	Al% min	Ni% max	Cu% min	Microalloy elements V % min	Microalloy elements Nb % min	CE max	Yield Stress (Mpa)	Tensile Strength (Mpa)	EN (min)	Impact Test		
Gr. 50	0.23	1.35	0.050	0.040	0.40	-	-	-	0.030	0.015	0.45	345 (min)	450 (min)	21	-		
ASTM A572, Gr.50 - For each reduction of 0.01 percentage point below the specified carbon maximum, an increase of 0.06 percentage point Manganese above the specified maximum is permitted, up to a maximum of 1.60%																	
Gr. 60	0.26	1.35	0.050	0.040	0.40	0.020	-	-	0.030	0.015	-	415 (min)	520 (min)	18	-		
ASTM A572, Gr.60 - For each reduction of 0.01 percentage point below the specified carbon maximum, an increase of 0.06 percentage point Manganese above the specified maximum is permitted, up to a maximum of 1.60%																	
Gr. 65	0.23	1.65	0.050	0.040	0.40	0.020	-	-	0.030	0.015	-	450 (min)	550 (min)	17	-		
A 36	0.25	1.05	0.050	0.040	0.40	-	-	-	-	-	0.42	250 (min)	400-550	23	-		

IS 2062 : 2011																	
GRADE & QUALITY	CHEMICAL COMPOSITION											MECHANICAL PROPERTIES					
	C% max	Mn% max	S% max	P% max	Si% max	Al% min	Ni% max	Cu% max	Microalloy elements V % min	Microalloy elements Nb % min	CE (min-max)	YS ≤16mm thickness	YS 16 - 40mm thickness	Tensile Strength (Mpa)	EN (min)	Impact Test	
E350A(HI)	0.15-0.22	1.20-1.60	0.045	0.045	0.15-0.30	0.015	0.012	0.10	0.030	0.015	0.18-0.47	350 (min)	320 (min)	490 (min)	22	-	
E250A(MS)	0.16-0.25	0.60-1.050	0.045	0.045	0.15-0.30	-	0.012	0.10	-	-	0.18-0.42	250 (min)	-	410 (min)	23	-	

## MANUFACTURING PROCESS:





# APPLICATIONS

Angles are used in several applications. Some of these are:



► Transmission Towers & EPC projects



► Construction Sites



► Bridges / Boundaries (Fencing etc.)



► Support structures that require Welding, Riveting or Bolting on Bridges etc.



► Precipitators



► Railway Wagon

## FEW CUSTOMERS

### ► Domestic



### ► Export



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Limited

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