

HOT ROLLED STEEL

Plates and Coils

Best In Quality Steel
for Oil & Gas Pipeline



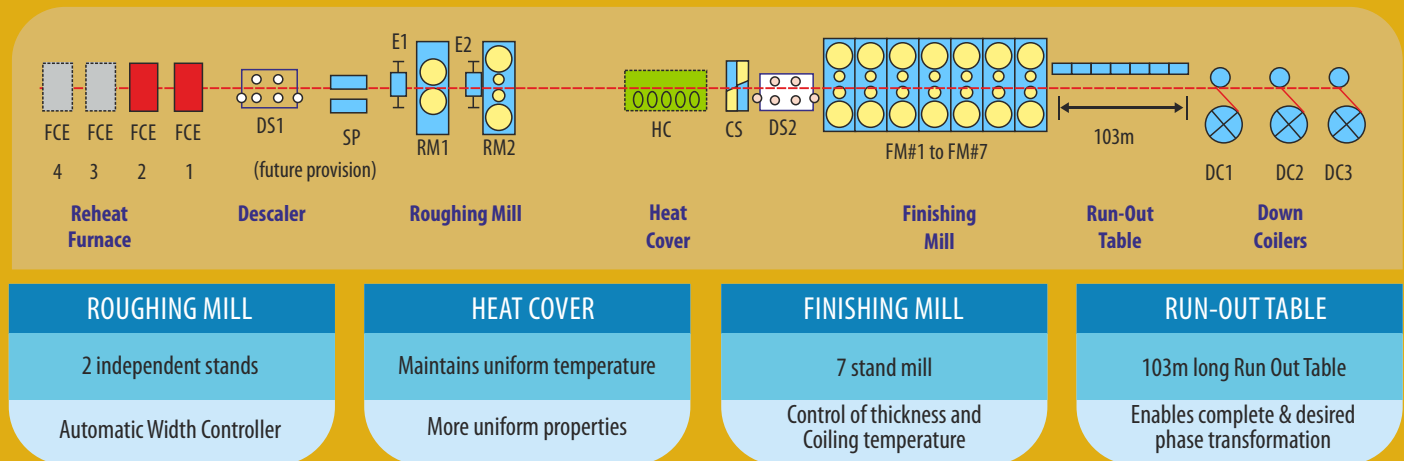
Tata Steel Kalinganagar: India's Industrial Lighthouse

The largest single-location greenfield steel project in India has consistently set benchmarks of excellence. It is the first and only Indian manufacturing plant to be recognised as **World Economic Forum (WEF) Lighthouse**.

Our state-of-the-art facilities designed for widest range of products

STEEL MAKING	Key features	Function	Advantages
	CAS –OB technology	- Allows alloy additions to be made under an inert argon environment - Exothermic heating	- High strength steel through micro-alloying - Energy efficiency
	Sub lance technology	Dynamic model predicts the amount of additional oxygen that needs to be blown	- Improved process control - Improved steel cleanliness, lower cracking
	Vacuum Degassing	To manufacture ultra-low carbon steel by RH degasser	- Remove dissolved gasses, De-carburization - Better steel cleanliness
CASTING	Key features	Function	Advantages
	Vertical bending caster	Inclusion and gas control,	Better steel cleanliness
	Dynamic Soft Reduction	Control over centre line segregation	Reduced centre line segregation
HOT ROLLING	Key features	Function	Advantages
	Roughing mill	High reduction ratio, from 230 mm slab thickness	- Grain refinement - Improved toughness
	Long Run Out Table	103 m long Run Out Table enables producing high strength grades by micro structure control	Improved range of product offering
	Pair cross technology	Control Plate shape and Crown	Better strip shape and profile
	Slab Sizing Press	Better width control and width reduction	Upto 350mm width reduction on 230mm slab

Schematic Diagram: Hot Strip Manufacturing Process and Equipment



Key Characteristics of HSM

Specification	Description
Capacity	5.5 mtpa
Width Range	800 – 2050 mm
Slab Thickness	230/250 mm
Coil OD	2150 mm (Max.)
Thickness Range	1.2 – 25.0 mm

Specification	Description
Coil specific weight	21 kg/mm, 23 kg/mm
Coil Max Weight	40 Tons
Width/Thickness ratio	700 max (Varies based on GWT)

Best in class Downstream processing

Tata Steel has commissioned Cut-to-length (CTL) processing lines capable of producing very high flatness and stringent dimensional tolerances. This line has been supplied by FIMI Italy and has the following unique features

	Key features	Function
	4-High straightening machine and correction roll	• Straightening up to 20mm thickness in co-function with leveler. Levelling from 20.1-25mm is done by straightener alone
	4-High & 11 roll Leveling machine	• Levelling up to 20mm thickness in co-function with straightener
	Crop Shear	• Enables chopping off defective portion at entry itself
	Trimming Shear	• Only CTL having edge trimming facility up to 25 mm thickness (World first) • Automatic blade adjustment to deliver good trim edge quality in all thickness.
	Flying Shear unit	• Automatic blade gap adjustment to deliver good shear edge condition in all thickness.

Cut to length facility at Kalinganagar (make FIMI)

Line	Thickness range	UTS	Width up to	Length
WCTL #2	8 mm-20 mm	Up to 1050 MPA	2050mm	1 m – 13 m
	>20 mm (upto 25mm)	Up to 1050 MPA	1000mm – 1500mm	1 m – 13 m
		Up to 800 MPA	2050mm	1 m – 13 m
WCTL #1	1.2 mm – 12 mm	Up to 1050 MPA	2050mm	1 m – 13 m



WCTL #2 Tolerances

Length	+/- 0.7 mm per meter of length (add +/- 0.1 mm per meter with higher length)		
Width	Untrimmed	All widths	+20 /-0 mm
	Trimmed	700mm – 1500mm	+/-0.5 mm
		>1500mm	+/-1 mm
Diagonal	W<= 1 mtr	+/-0.7 mm (for 13m length)	
	1mtr<W<2mtr	+/-1.4 mm (for 13m length)	
Flatnes	5l when input coil is < 40l		
	10l when input coil is 40l – 150l		

WCTL #1 Tolerances

Length	L = 1m – 4m	T = 1.2 to 5 mm	+0.3/-0 mm
		T = 5.1 to 12 mm	+0.8/-0 mm
	L = 4m – 8m	T = 1.2 to 12 mm	+1/-0 mm
		T = 1.2 to 5 mm	+1/-0 mm
Width	Untrimmed	All width	+20/-0 mm
		700mm – 1500mm	+/-0.5 mm
	Trimmed	>1500mm	+/-1 mm
Diagonal	± 0.2 mm/m length		
Flatness	5l when input coil is < 40l		
	8l when input coil is 40l – 80l		
	10l when input coil is 80l – 100l		

Equipped with Cutting-edge Testing facilities

S.No	Instrument	Make	Purpose
1	600 kN Automated UTMs 2 nos	ZWICK	Tensile Testing
2	DWTT	ZWICK	% Shear Area
3	Bend Testing Machine	ZWICK	Bend Test
4	Metallurgical Microscope	LEICA	Microstructure
5	Impact Tester	INSTRON	Impact Toughness
6	Vickers Hardness Tester	EMCO Test	Hardness Testing
7	Rockwell Hardness Tester	ZWICK	Bulk Hardness
8	Portable Hardness Tester	MITUTOYO	Hardness Testing
9	Metallurgical Sample Polisher	STRUERS	Metallurgical Sample polishing
10	Mounting Press	STRUERS	Metallurgical Sample polishing
11	Surface Roughness Tester	MITUTOYO	Roughness Measurement
12	Macro Etching Apparatus	CBC POWER	Centre line segregation

Technology from world renowned suppliers



HR for Oil & Gas Pipelines

The growing demand of Oil and Gas across the world and in India have generated a huge demand for steel. Tata Steel is one of the few manufacturers globally capable of producing API(American Petroleum Institute) grade steel and finds wide acceptance amongst the Pipe manufacturers.



Steel for various API specifications are calcium treated to modify harmful inclusions. Hydri facility in RH degasser facilitates precise control of Hydrogen—a critical requirement for line pipes. Multifunction top lance is equipped with Metallurgical powder blowing to achieve ultra-low Sulphur. Close super heat control and Dynamic Soft Reduction (DSR) facility limit centre line segregation in slabs. All slabs are further inspected and scarfed to eliminate defects.

In the state-of-the-art Mitsubishi-Hitachi mill, slabs are reheated and thermo-mechanically rolled for homogeneous mechanical properties.

- Pair Cross technology ensures closer dimensional tolerances
- High powered motors facilitates rolling of high strength steels
- Long run-out table for targeted grain refinement and desired microstructure



Tata Steel products have superior properties in order to meet the most stringent strength and toughness requirements by ensuring Low DBTT (Ductile Brittle Transition Temperature), good ductility, and excellent Weldability properties.

Grade –Capability for Oil & Gas Pipelines

Chemical composition (Max)

Grade	C	Si	Mn	P	S	V	Nb	Ti	CE (IIW)	CE (PCM)
X42M	0.22	0.45	1.3	0.025	0.015	0.05	0.05	0.04	0.43	0.25
X46M	0.22	0.45	1.3	0.025	0.015	0.05	0.05	0.04	0.43	0.25
X52M	0.22	0.45	1.4	0.025	0.015	V + Nb + Ti ≤ 0.15			0.43	0.25
X56M	0.22	0.45	1.4	0.025	0.015				0.43	0.25
X60M	0.12	0.45	1.6	0.025	0.015				0.43	0.25
X65M	0.12	0.45	1.6	0.025	0.015				0.43	0.25
X70M	0.12	0.45	1.7	0.025	0.015				0.43	0.25

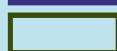


Mechanical Properties

Grade	YS (MPa) Min	YS (MPa) Max	UTS (MPa) Min	UTS (MPa) Max	YS/UTS Ratio (Max)	Elongation
X42M	290	495	415	655	0.93	*
X46M	320	525	435	655	0.93	*
X52M	360	530	460	760	0.93	*
X56M	390	545	490	760	0.93	*
X60M	415	565	520	760	0.93	*
X65M	450	600	535	760	0.93	*
X70M	485	635	570	760	0.93	*

*Guaranteed as per API standard

Mill capability – Grade - width – thickness

	API GR B
	API X42, X46, X52, X56
	API X60, X65, X70

Thickness/Width	900-1250	1251-1450	1451-1600	1601-1800	1801-2000
6 to 8					
8 to 12					
12 to 16					
16 to 19					
19.01 to 20					
20.01 to 25					

- X80 and X65 (for sour service) under development



Availability

Tata Steel has well developed and strong distribution network across India which ensures products can be delivered to the doorstep of your operation with short lead times. The supply chain is complemented by our technical and commercial teams who are always available to answer any requests. Our product application group works closely with the customer to understand their requirement and establish a robust mechanism developing customer specific product.

Sales offices

North Zone

New Delhi	Tata Steel Limited 15th Floor, Hindustan Times House, 18-20 Kasturba Gandhi Marg, New Delhi 110001 Delhi Sales Office: 011-6128-8700
Chandigarh	Tata Steel Limited C/O MRH enterprises, SCP : 16, 1st Floor, Sector - 26, Madhyam Marg, Chandigarh - 160 019 Reception No: 0172-5086382 / 0172-2790932
Ghaziabad	Tata Steel Limited C/o Sikri Bros Coal Sales (P) Ltd. Khasra No. 1227, 1228, 1229 Lalkuan, G.T.Road, P.O. Shahpur, Ghaziabad - 201 001 Reception No - 0120-2866179
Ludhiana	Tata Steel Limited C-44-47, Focal Point, Hero Majestic Road, Ludhiana - 141010 Reception No -0161-2670806/0161 - 2673459
Faridabad	Tata Steel Limited 2nd Floor 330B, NIT Faridabad - 121001 Haryana Reception No. 0129-4098321
Kanpur	Tata Steel Limited 16/97, Navroz Building, 1st Floor, The Mall, Kanpur - 208 001 Reception No - 0512-2312298
Jaipur	Tata Steel Limited G-Business Park, 6th Floor, D-34, Subhash Marg, Near Agrasen Circle, C-scheme, Jaipur- 302 001 Reception No- 0141- 4032341

West Zone

Pune	Tata Steel Ltd. Office No.6 & 7, Second Floor, Wing B, Great Eastern Plaza, Old Airport Road Yerwada, Pune-411006 Reception No: 020-66407580
Mumbai	Tata Steel Limited 3rd Floor, OneForbes 1, Dr V N Gandhi Marg, Fort, Mumbai 400001 Phone: 022-6749-4600 (Mumbai Sales Office)
Nagpur	Tata Steel Limited Museum Road, Civil Lines, Nagpur-440001 0712 - 2520170 - Mr. Bhaskar Rao
Ahmedabad	Tata Steel Limited 172/2, 8th Floor, Premchand House ,Opposite Sales India, Ashram Road, Ahmedabad - 380009 Reception no. 079-66612600
Indore	Tata Steel Limited NRK Business Park 3rd Floor A B Road, Vijay Nagar, Indore 452010 Reception no. 0731-6450191

South Zone

Chennai	Tata Steel Limited 8th Floor, Chettinad Sigapi Achi Building, 18/3- Rukmini Lakshmipathy Road, Egmore Chennai- 600008
Bangalore :	Tata Steel Limited A Wing, 2nd Floor, Jubilee Building 45, Museum Road, Bangalore- 560025 Phone: 91 80 669 50033 Fax: 91 80 669 50038
Secunderabad	Tata Steel Limited 8th Floor, Surya Towers 104, Sardar Patel Road Secunderabad 500 003 Phone: 91 40 5526 1020 / 1030 Fax: 91 40 2781 2418

East Zone

Guwahati	Tata Steel Limited 4th Floor, Subham Velocity, Honuram Boro Path (Opp Wallford) G.S.Road, Guwahati-781005 General Office no. 0361 -2130960
Patna	Tata Steel Limited 4th Floor, Orchid Mall, Opp A.N. College, Boring Road, Patna- 800 001 General Office No. 0612-2540072
Bhubaneswar	Tata Steel Limited 2B, Fortune tower Chandrasekharpur Bhubaneswar- 751 023, Odisha Reception No. 0674 - 6651100
Jamshedpur	Tata Steel Limited 'B' Road East, Opp to Chummari Guest House, P.O. : Bistupur, Jamshedpur - 831001. Reception no. - 0657-6640856 / 0657-6640784
Kolkata	Tata Steel Limited 52, Jawaharlal Nehru Road, Kolkata 700 071 Reception No: 91 33 2282 1778 / 2282 1348 Fax: 91 33 2282 1687

TATA STEEL

Tata Centre-43, Jawaharlal Nehru Road, Kolkata 700 071
Phone: 91 33 2282 1778 / 2282 1348
 www.tatasteel.com

 www.linkedin.com/company/166262/
 twitter.com/tatasteelltd
 www.youtube.com/user/Thetatasteel
 facebook.com/TataSteelLtd/