

SELECTED
Superbrand
INDIA, 2009-10
CONSUMER VALUED

**TATA
TISCON**
REINFORCEMENT SOLUTIONS
AT FOOT JOB

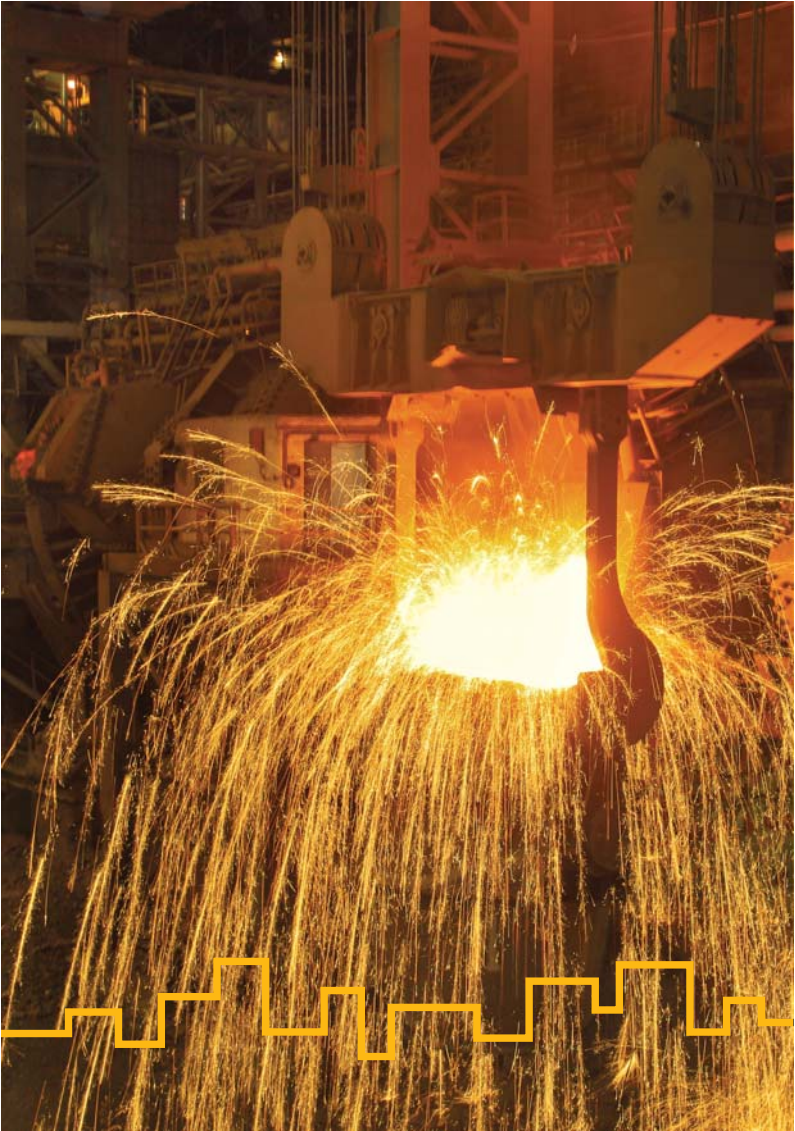
TATA TISCON

500



TATA TISCON 500 D





Since its launch in 2000, TATA TISCON has been redefining India's rebar market. It is the first brand in India to introduce TMT rebars with technological support from Morgan, USA. As India's leading brand of rebars TATA TISCON has been constantly innovating and developing radical solutions in its business.

Rebars are specified and assessed from the functional point of view over mainly two dimensions – mechanical properties and chemical properties. The desired mechanical properties e.g. strength, ductility, bendability are achieved by designing the right chemistry and controlling various rolling parameters. As part of the chemistry, any rebar necessarily contains two harmful impurities, Sulphur (S) and Phosphorus (P) in varying levels which reduce the strength of steel in extreme hot and cold conditions. Therefore lowering the content makes the steel better.

In fact, 70% rebars in India are manufactured by crude processes from scrap by Induction Furnace Route. These processes increase the content of harmful impurities in steel. A superior and controlled steel making practice can reduce the levels of these impurities. In the last revision of the Indian Standard of rebars (BIS) in 2008, this aspect has been factored in and a new superior category of rebar called 'D' has been introduced in the BIS. The step is in the direction of improving the overall quality of steel of Indian steel producers. The BIS guidelines make it an imperative to inform customers about the level of impurities present in rebars that are manufactured through different routes. In view of this development, Tata Steel has introduced a new grade called TATA TISCON 500D where the combined level of Sulphur and Phosphorus is restricted to a maximum of 0.075% to comply with the latest BIS specifications. TATA TISCON is the only rebar, in India which has acquired the 'Superbrand' status.

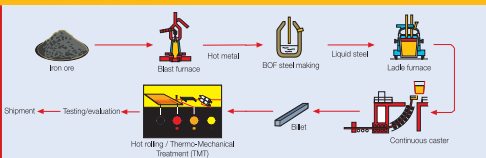
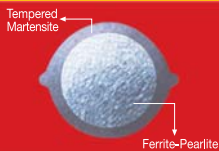
We always involve ourselves in a buying decision of any household goods like a TV, which costs a few thousands of rupees. Do we do the same while buying rebars, which may cost over a lakh of rupees and has a shelf life of a lifetime?



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TATA TISCON 500D, A PRODUCT FROM TATA STEEL, IS THE NEW GENERATION HIGH STRENGTH RIBBED REINFORCEMENT BAR. IT IS DIFFERENT FROM ORDINARY BARS IN ITS METHOD OF MANUFACTURING AND CONSEQUENTLY, IN ITS COMBINATION OF PROPERTIES.



1. WHY REBAR?

Reinforced Cement Concrete (RCC) has become the most easy and effective construction material of modern times. Almost all the residential complexes and individual houses are being constructed with this versatile material. The beauty of this material lies in two aspects – first, the ability of Cement-Concrete to take the desired shape and secondly, the ability of steel reinforcement bars or rebars to resist all kind of forces acting upon a building. Plain Cement Concrete (PCC) without rebars is like a body without bones.

Rebars make buildings safe for its residents by tolerating various damaging forces acting on building members e.g. foundations, beams, columns, slabs, etc. These forces are generated because of different loads like the dead load of the building itself, the live load of occupants and their belongings, the wind/storm load, the earthquake load, etc. which act in different combinations at different times. That is why, to make the buildings strong and long-lasting, steel rebars must be of good quality and strength.



Rebars are like bones in a human body providing basic strength to any structure and unlike tiles, fittings, paints and other items, rebars once used cannot be replaced ever.



2. TMT TECHNOLOGY

Tata Steel, the sixth largest steel producer in the world, is the first company in India to introduce Thermo Mechanically Treated reinforcement bars, using the latest technology available world-wide. TATA TISCON 500D rebars are produced in state-of-the-art plants under close supervision of our frontline metallurgists and engineers. The basic steel is made from virgin iron ore through Blast Furnace-Basic Steel Making-Secondary Refining-Billet Casting route with lowest amount of undesirable impurities and rolled in fully automated rolling mills from world renowned suppliers.

Tata Steel has set up a new bar mill with the latest technology supplied by Morgan, USA. This mill has both horizontal and vertical stands, a series of zero-tension loopers and a fully automated bar bundling and master bundling system. Spacious billet yard for cast-wise stacking of billets, reheating furnace, pre-finishing and finishing mill, cold shear to cut bars, roughing mill, intermediate mill and the latest TMT facilities are the other features of the bar mill. TATA TISCON 500D rebars are 'hot rolled' from steel billets and subjected to PLC controlled on-line thermo-mechanical treatment in three successive stages:

(a) Quenching - The hot rolled bar leaving the final mill stand is rapidly quenched by a special water spray system. This hardens the surface of the bar to a depth optimised for each section through

formation of martensitic rim while the core remains hot and austenitic.

(b) Self Tempering - When the bar leaves the quenching box, the core remains hot compared to the surface, allowing heat to flow from the core to the surface, causing tempering of the outer martensitic layer into a structure called 'Tempered Martensite.' The core still remains austenitic at this stage.

(c) Atmospheric Cooling - This takes place on the cooling bed where the austenitic core is transformed into a ductile ferrite-pearlite structure. Thus the final structure consists of an optimum combination of a strong outer layer (tempered martensite) with a ductile core (ferrite-pearlite). This gives TATA TISCON 500D its unique combination of higher strength and ductility.

Tata Steel is the first company in India to introduce TMT rebars.



3. SUPERIOR PRODUCT QUALITY

Why is TATA TISCON 500D superior to traditional rebars in the market? As mentioned in the beginning, Sulphur & Phosphorus (S&P) are harmful impurities in steel. High levels of Phosphorus can lead to 'cold shortness' in steel where the steel tends to become very brittle under extreme cold conditions and thus vulnerable to cracking. High level of Sulphur can lead to 'hot shortness' in steel, a condition in which the melting point of steel gets lowered thereby reducing its strength dramatically under high temperature conditions. However, lower levels of S&P can be achieved only through advanced steel making technology. Such low S&P levels, as specified in the 500D specifications of BIS, are almost impossible to be achieved through normal scrap & induction furnace route. At Tata Steel, due to state-of-the-art steel making facilities as well as the stringent quality controls at every step, from mines to the mill 100% of the rebars are now produced in compliance to the 500D grade specifications.

As part of the chemistry, any rebar necessarily contains two harmful impurities, Sulphur (S) and Phosphorus (P) in varying levels, which reduce the strength of steel in extreme hot and cold conditions. Therefore lower these values the better.

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TATA TISCON is produced through a combination of superior processes. The steel for TATA TISCON 500D is produced through primary steel making route, using iron ore from captive mines. It is subsequently processed through the blast furnace, LD & LF (ladle refining) to refine the steel to the fullest extent and continuously cast into billets. The resultant steel is of superior quality, containing no harmful ingredients (like Sulphur and Phosphorus) and ensures the desired and consistent properties in the rebar.

Cast billets are hot rolled in fully automated rolling mills equipped with computer controlled process monitoring devices to ensure uniform properties in each rebar. All our rolling mills are fully modernized with the latest rolling technologies employing state-of-the-art tungsten carbide rolls in place of conventional steel rolls which ensure excellent dimensional tolerance and surface finish. The superiority of TATA TISCON 500D is further detailed in the subsequent sections.

3A. Chemical properties

TATA TISCON 500D is produced in Fe 500D IS:1786 grade. However, its carbon levels are maintained at much lower than the specification, which results in its excellent ductility, high bendability, better corrosion resistance and superior weldability. The other undesirable impurities (like Sulphur and Phosphorus) that impair the overall longevity of rebars inside constructions are also maintained at much lower than specifications in TATA TISCON 500D.



This is possible because of the purity of steel in TATA TISCON 500D, which is 100% processed through the primary steel making route with refining facility unlike secondary routes. As TATA TISCON 500D does not have any undesirable elements, its intrinsic quality to withstand load under adverse conditions is enhanced.

Chemical properties	Unit	IS:1786 Fe 500	IS:1786 Fe 500D	TATA TISCON 500D*
Carbon	%	0.300 max	0.250 max	0.250 max
Carbon equivalent (C + Mn/6)	%	0.420 max	0.420 max	0.400 max
Sulphur	%	0.055 max	0.040 max	0.035 max
Phosphorus	%	0.055 max	0.040 max	0.035 max
S and P	%	0.105 max	0.075 max	0.070 max

* as obtained in 90% of the heats

More than 70% of rebars in India are produced from scrap/sponge - Induction Furnace Route, which has technological limitation to remove harmful impurities in steel. As per BIS guidelines, the customer must be suitably informed if buying rebars produced through this route.



3B. Mechanical properties

TATA TISCON 500D's unique method of manufacturing creates a combination of strength and ductility that far exceeds the minimum limit specified in the standard IS:1786. In the case of the yield strength for TATA TISCON 500D, though the standard specifies a minimum of 500 N/mm², and designers use this value for design, the typical values are as high as 540 N/mm². For the same product, the typical value of ductility as measured by elongation is 18% minimum as against the standard value of 16% minimum. Undoubtedly, the superior values of strength and ductility are a guarantee of higher levels of safety for ages.

UTS / YS ratio and percentage elongation are important properties in a rebar that reflect the ability to handle the pressure of earthquakes. Higher these values, the better.

Mechanical Properties	Unit	IS:1786 Fe 500	IS:1786 Fe 500D	TATA TISCON 500D*
Yield Stress (YS)	N/mm ²	500 min	500 min	540 min
Ultimate Tensile Strength (UTS)	N/mm ²	545 min	565 min	600 min
UTS/YS	Ratio	1.08 min	1.10 min	1.12 min
Elongation	%	12 min	16 min	18 min

* as obtained in 90% of the heats

Bendability

The special microstructure of TATA TISCON 500D results in a rebar with excellent bendability. The bar can be bent easily and sharply. TATA TISCON 500D can be bent to the exact angle unlike ordinary rebars as desired by the design around mandrels, and is much smaller in diameter than what is specified in IS:1786. This has obvious advantages at construction sites.

Weldability

TATA TISCON 500D, due to its low carbon equivalent, has weldability which is superior to ordinary rebars. It can be butt-welded or lap-welded using ordinary rutile coated electrodes of matching strength. In manual arc welding, no pre-warming or post-welding treatment is necessary.

3C. Superior rib pattern

Although steel and concrete are two different materials, they have to behave as a single unit in a reinforced structure. This can happen only when the concrete grips the steel rebar to form the strongest bond through the unique rib pattern of the rebar. TATA TISCON 500D has a unique rib pattern in terms of greater rib depth and closer rib spacing. Its ribs are made using computer controlled CNC notch cutting machines.

Rib patterns on the rebar surface provide quality bonding with cement only when they are produced through CNC machined Rolls.

This ensures uniform rib pattern for 100% of the rebars, which allows uniformly strong bonding with concrete for the whole structure. This is in contrast to the ordinary rebars, where ribs are cut manually which always leaves scope for non-uniform rib pattern and thereby, non-uniform and weaker bonding throughout the structure. Due to uniformity and critically designed ribs, fatigue strength of TATA TISCON 500D is much superior to ordinary rebars.

Rib patterns on the rebar surface can give quality bonding with cement only if they are produced through CNC machined rolls.



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3D. Seismic resistant properties

Several studies were conducted on concrete beam column joints reinforced with TATA TISCON 500D to evaluate its performance under repeated reversed loading with large deformations as would be encountered during an earthquake. The energy dissipation was found to be almost same for each cycle, indicating uniformly maintained ductility throughout the repeated stress cycles. The tests revealed superior seismic resistant properties for TATA TISCON 500D. The seismic resistant property facilitates minimum damage to the structure and hence minimises casualties caused due to earthquakes. TATA TISCON 500D rebars demonstrate superiority by providing safe and durable structures to the end user in this regard.

UTS / YS ratio and percentage elongation are important properties in a rebar that reflect the ability to handle the pressure of earthquakes. Higher these values, the better.



3E. Corrosion resistant characteristics

TATA TISCON 500D is produced by TMT technology and not by cold twisting. Therefore, there is no torsional residual stress in the bar, which results in superior corrosion resistant characteristics compared to traditional cold twisted bars. On account of its composite and uniform microstructure, TATA TISCON 500D has comparatively better corrosion resistant properties than other TMT bars, while being embedded inside concrete.



4. THE TATA TRUST

TATA TISCON 500D has the best combination of strength and ductility and an unparalleled quality consistency. It is available through our professional distribution and dealers' network, assuring the company prescribed price and correct weight at the point of purchase. This ensures a deep-rooted trust in TATA TISCON 500D - one of the core values of the brand.

5. STANDARDS

TATA TISCON 500D rebars are comparable to Indian, American, British and Australian standards.



6. PRODUCT RANGE

TATA TISCON 500D rebars are available in the following sizes at the retail/distribution network across India: 6, 8, 10, 12, 16, 20 and 25 mm.

7. APPLICATIONS

TATA TISCON 500D is available for all reinforcement applications ranging from small individual houses to large infrastructure projects. TATA TISCON 500D is retailed through its extensive distribution network of dealers across India. Tata Steel sales offices or distributors can be contacted for the details of nearest authorized dealers present in any territory.

8. PRODUCT PACKAGING

Each TATA TISCON 500D rebar is supplied in a fixed length of 12 metres to ensure standard processing and thereby, causing less wastage during fabrication. TATA TISCON 500D is supplied section-wise in convenient pre-packed bundles with fixed number of pieces per bundle.

9. UNIQUE SERVICE OFFERINGS

Selling by Piece – Every TATA TISCON rebar is sold in a standard length of 12 metres thereby removing the hassle of weighing.

Free Home Delivery* – TATA TISCON rebars are delivered by the dealer at the work site of the customer free of charge.

Recommended Consumer Price (RCP) – TATA TISCON rebars are sold at RCP for better transparency. The RCP's are displayed at all dealer outlets.

Availability – TATA TISCON rebars are available across India at more than 1800 authorized dealer outlets.



10. THE MARK OF A LEADER

TATA TISCON 500D is a registered trademark of Tata Steel. To buy a genuine TATA TISCON 500D rebar, look for the TATA TISCON 500D logo embossed on the rebar in its own distinctive style.

TATA TISCON is the only rebar in India which has acquired the 'Superbrand' status.

*Within municipal limits

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