



TATA
TISCON
//TATA TISCON//
ATOOT JOB


EARTHQUAKE RESISTANT

EARTHQUAKE RESISTANT

**TATA TISCON
SUPER DUCTILE REBAR**

MADE WITH PURER STEEL





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

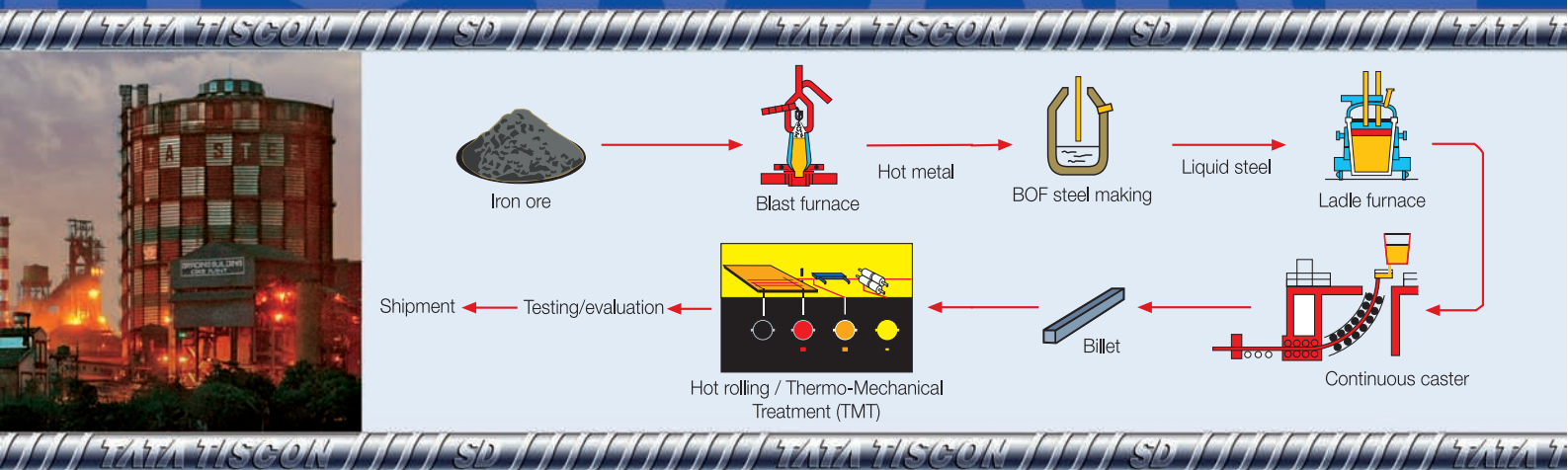
Any rebar contains two harmful impurities, Sulphur (S) and Phosphorus (P) in varying levels which reduce the strength of steel in extreme hot and cold conditions. A superior and controlled steel making practice can reduce the levels of these impurities. In the last revision of the Indian Standard (BIS) in 2008, this aspect was factored in by introducing a superior variant of rebars called "D" with restricted levels of S & P. In compliance to the same, the combined levels of S & P in 100% of TATA TISCON rebars is restricted to a maximum of 0.075%.

However, for construction in earthquake prone areas, special properties are required in the rebars besides purity. 54% of India sits on the highly active Himalayan and Eurasian plates making her susceptible to earthquakes of varying intensity. Earthquakes in Bhuj, Latur, Uttarkashi, Kashmir and Sikkim have all caused enormous damage and loss of life. The damage can be mitigated with better construction material and practices. Rebars used in such construction should be able to bend and rebend repeatedly without breaking. For normal construction, structural designs take into account Yield Strength of rebars, factoring in all dead, live loads and safety limits. However for earthquake prone areas, the design has to account for a higher safety limit even if the stress exceeds the design Yield Strength. Such a design leads to higher evacuation time available to the residents in the event of an earthquake. Tata Steel has developed Super Ductile (SD) rebars, ideally suited for such structural design in earthquake prone areas.

TATA TISCON SD grade is infact superior to the D grade mentioned earlier. SD rebars not only contain the restricted S & P levels, they are made more ductile through a special chemistry and post-rolling treatment. This enhances the gap between the Yield Strength and the Ultimate Tensile Strength so that the stresses exceeding Yield Strength can be easily absorbed without rupture of the rebar. TATA TISCON SD rebars therefore possess a tremendous capacity to absorb energy beyond the yield limits and resist collapse of building during earthquakes.

We always involve ourselves in the buying decision of any household goods like a TV, which costs a few thousands 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?

HOW ARE REBARS MADE



1. HOW ARE REBARS MADE

1.1. 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 SD 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 the 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 SD rebars are 'hot rolled' from steel billets and subjected to PLC controlled on-line Thermo-Mechanical Treatment in three successive stages:

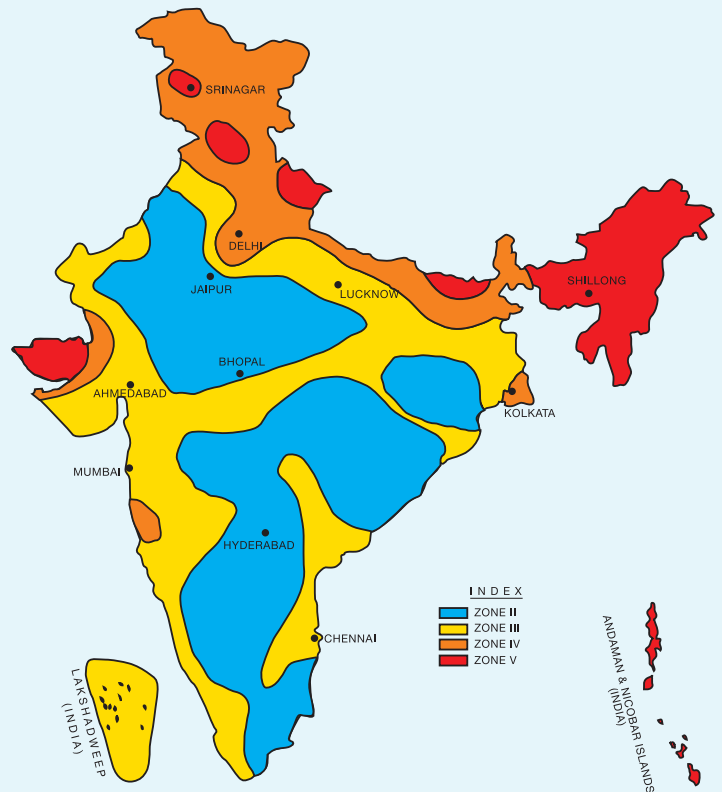
(a) Quenching - The hot rolled bar leaving the final mill stand is rapidly quenched by a special water spray system. This hardens the surface of the bar to a depth optimised for each section through formation of martensitic rim while the core remains hot and austenitic.

(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 SD its unique combination of higher strength and ductility.

2. NEED FOR SPECIAL QUALITY REBARS IN EARTHQUAKES PRONE AREAS

Some earthquake prone countries like Japan, New Zealand, Australia, Mexico and parts of the U.S.A., have learnt to design and construct their buildings in a manner that minimises the damage caused by earthquakes. While the design is important, the quality of the construction material used, particularly the rebars, which hold together the entire structure, is of vital importance. In these countries, Super Ductile rebars have been developed and institutionalised for zones vulnerable to earthquakes. The distinguishing feature of Super Ductile rebars is their capacity to absorb large amounts of energy released during earthquakes without catastrophic failures which might happen in case of ordinary rebars.



The boundaries of India as depicted are neither authentic nor an accurate depiction of the actual borders.

54% of India sits on the highly active Himalayan and Eurasian plates making her susceptible to earthquakes of varying intensity. Earthquakes in Bhuj, Latur, Uttarkashi, Kashmir and Sikkim have all caused enormous damage and loss of life. The loss of lives during earthquakes results mostly from the collapse of man-made structures. This can be avoided only with better construction, materials and practices. For the first time in India, Tata Steel has developed Super Ductile rebars, ideally suited for use in earthquake prone areas (zones III, IV and V as indicated in the map above).



NEED FOR SPECIAL QUALITY REBARS IN EARTHQUAKES

HOW DO SUPER DUCTILE REBARS



2.1. HOW DO SUPER DUCTILE REBARS WORK?

During an earthquake, frequent shaking of the ground and its amplitude may generate stresses that exceed the rebars' Yield Strength. To prevent the collapse of buildings, it is necessary that even when the stress exceeds the Yield Strength, it should not exceed the Tensile Strength. This has been made possible with TATA TISCON Super Ductile rebars, designed to have a much higher UTS/YS ratio compared to ordinary rebars. In other words, they can be plastically deformed to a much larger extent without crossing their Ultimate Tensile Strength. This prevents any sudden collapse of buildings.



3. TATA TISCON SUPER DUCTILE REBARS



BIS-13920, with the amendment in 2002, has incorporated usage of 500D in ductile detailing of structures subjected to seismic forces. This is subject to the rebars possessing higher ductility and are manufactured through the TMT route. In fact, the newly developed TATA TISCON Super Ductile rebars ensure properties that exceed the given standards of Fe 500D.

An essential characteristic for earthquake zone construction is that the rebars should be able to bend and rebend repeatedly without breaking. Structural designs take into account Yield Strength of rebars, factoring in all dead, live loads and safety limits. But, Super Ductile rebars also account for a higher safety limit even if the stress exceeds the design Yield Strength. This leads to higher evacuation time in the event of an earthquake.

4. PROPERTIES OF TATA TISCON SUPER DUCTILE REBAR

4.1. CHEMICAL PROPERTIES

TATA TISCON Super Ductile rebars guarantee more than the basic characteristic strength as per BIS-1786. They offer superior properties with respect to percentage elongation and UTS/YS ratio compared to the standards and are in-line with the international norms of the 'high ductile' speciality rebar. The high 'uniform elongation' ensures that even after large plastic deformation, the rebars do not start 'necking'- a phenomenon which initiates ultimate failure.

Chemistry - TATA TISCON Super Ductile rebars are made with a unique chemistry with critical control over carbon, sulphur, phosphorus and other alloying elements. Carbon equivalent is maintained at a lower range to facilitate good weldability. Billets are cast with electromagnetic stirring to eliminate harmful segregation. The heat size is as high as 140 MT which ensures consistent properties over a large batch.

Moreover, it has restricted nitrogen levels as per the latest international norms for a high quality rebar which in turn improves the resistance against critical torsional stresses that are encountered by the structural members during an earthquake.

Rolling - The billets are rolled in most advanced mills with all PLC drives for maintaining very narrow range of temperatures and other rolling parameters which are critical for making rebars super ductile. The rebars also have very close dimensions, prominent rib pattern and surface finish. For certain sections, tungsten carbide rolls are used in place of conventional steel rolls to enhance the surface quality and bond strength with concrete.

4.2. SUPERIOR MECHANICAL PROPERTIES

TATA TISCON Super Ductile rebars have a minimum characteristic Yield Strength of 500 MPa as specified in BIS-1786 which means, structural designing need not incorporate any deviation from the standard characteristic strength assumptions. In fact, the UTS and ductility being greater than specified in the Standard, the rebars ensure enhanced safety during earthquakes. Due to higher UTS but same characteristic Yield Strength, rebars acquire more bendability resulting in ease of work at sites. Moreover, the bent portion retains higher residual ductility, critical to prevent any brittle failure.

TATA TISCON Super Ductile variety is in fact a superior class in the Fe 500D grade. They are made more ductile through a special chemistry and post-rolling treatment. This enhances the gap between the Yield Strength and the Ultimate Tensile Strength so that stresses exceeding Yield Strength can be easily absorbed without rupture by the rebar. Thus, they possess a tremendous capacity to absorb energy beyond the yield limits and resist collapse of buildings during earthquakes.



PROPERTIES OF TATA TISCON
SUPER DUCTILE REBAR

TABLE: TATA TISCON SUPER DUCTILE REBAR PROPERTIES

Mechanical Properties	BIS - 1786			U.K. B.S. 4449/2005		Australia & New Zealand		TATA TISCON Super Ductile
	Fe415	Fe500	Fe500D	500B*	500C*	500N*	500E*	Fe-500E SD*
YS Min. MPa	451	500	500	500	500	500	500	500
YS Max. MPa	N.S.	N.S.	N.S.	650	650	650	600	650
UTS Min.	10% higher than YS	8% higher than YS	10% higher than YS	8% higher than YS	15% higher than YS	8% higher than YS	15% higher than YS	15% higher than YS
UTS Max.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	40% higher than YS	30% higher than YS
UTS Min.	1.10	1.08	1.10	1.08	1.15	1.08	1.15	1.15
Total Elongation	14.5	12.0	16.0	N.S.	N.S.	N.S.	N.S.	16.0 Min
Total Elongation upto UTS	-	-	5.0 Min	5.0 Min	7.5 Min	5.0 Min	10.0 Min	8.0 Min
Application	General	General	General	General	E.Q.Zone	General	E.Q.Zone	E.Q.Zone

E.Q. ZONE: EARTHQUAKE ZONE

N.S.: NOT SPECIFIED

***N2: 120 PPM MAX.**

Bendability: The special microstructure of TATA TISCON SD results in a rebar with excellent bendability. The bar can be bent easily and sharply. TATA TISCON SD 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 SD, 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.

4.3. BETTER BOND STRENGTH

The rib pattern of TATA TISCON Super Ductile rebars are specially designed to bond best with concrete. The carefully designed ribs and uniform replication of the same during rolling through the length of the rebar is ensured through cutting roll passes with auto-programmed CNC machines only.

4.4. HIGH ENERGY ABSORPTION CAPACITY

While the current BIS-1786 code specifies for conventional SD grade the minimum UTS/YS ratio of 1.10, for the new Super Ductile variety, this is maintained at a minimum of 1.15. This ensures that rebars when stressed beyond Yield Strength, as it may happen during an earthquake, will absorb the stress easily and to a much higher extent without any danger of sudden and catastrophic rupture.

TATA TISCON SD exhibits superior mechanical properties, better bond strength, higher energy absorption capacity and superior ductility properties. No wonder, it is the preferred choice of engineers and architects.



4.5. SUPERIOR DUCTILITY

Internationally, the concept of rebar ductility has changed. It is now expressed as uniform elongation up to Ultimate Tensile Strength rather than total elongation which stands for elongation till breakage. Breakage cannot be allowed in any case and therefore measure of total elongation is not so relevant. In TATA TISCON Super Ductile variety, the uniform elongation is maintained at a very high value compared to some of the international specifications. Thus Super Ductile rebars can undergo plastic deformations to a large extent without necking and thus resist ultimate breakage.

4.6. 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 SD 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 SD is much superior to ordinary rebars.

4.7. CORROSION RESISTANT CHARACTERISTICS

TATA TISCON SD 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 SD has comparatively better corrosion resistant properties than other TMT bars, while being embedded inside concrete.

5. THE TATA TRUST

TATA TISCON SD 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 SD - one of the core values of the brand.



6. PRODUCT RANGE

TATA TISCON SD rebar are available in the following sizes at the retail/distribution network across India : 6, 8, 10, 12, 16, 20, 25 and 32 mm.

7. PRODUCT PACKAGING

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

8. 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.

9. THE MARK OF A LEADER

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

10. ACCOLADES

- Only rebar brand in India to be acknowledged as a consumer `Superbrand' 2009-10
- Made in the only steel plant in India to have the highest level of quality certification (Deming Award from JUSE)
- Only rebar brand in India to be accredited the prestigious CARES certificate by UK for its quality compliance
- Made in the world's best steel plant-rated by World Steel Dynamics for several years during 2004-2008 (2004, 2006, 2007)

*within municipal limits

TATA TISCON MARKETING OFFICES (Long Products)

Tata Centre, 43, Jawaharlal Nehru Road, Kolkata 700 071, India

Phone: 91 33 2288 7051/9251 • Fax: 91 33 2288 1640

For further information, call 1800 345 8282, visit us at www.tatatiscon.co.in, SMS (TISCON) to 53636

TATA TISCON OFFICES (Long Products)

NORTH ZONE

Delhi: Tata Steel Limited
1st Floor, Jeevan Tara Building
5, Sansad Marg
New Delhi 110 001
Phone: 011 23342646/2648
Fax: 011 23343196

Chandigarh: Tata Steel Limited
SCO16, 1st Floor, Sector 26
Madhya Marg
Chandigarh 160 019
Phone: 0172 2791047, 2700932
Fax: 0172 2792426

Kanpur: Tata Steel Limited
16/97, Navroz Building, The Mall
Kanpur 208 001
Phone: 0512 2375679
Fax: 0512 2316631

SOUTH ZONE

Chennai: Tata Steel Limited
El Dorado Building, 2nd Floor,
112 Nungambakkam High Road
Chennai 600 034
Phone: 044 66960011
Fax: 044 28269101

Bangaluru: Tata Steel Limited
'A' Wing, Jubilee Building, 2nd Floor,
45, Museum Road
Bangaluru 560 025
Phone: 080 25325517/18/19
Fax: 080 25325527

Secunderabad: Tata Steel Limited
Surya Towers, 6th Floor,
104/5, Sardar Patel Road
Secunderabad 500 003
Phone: 040 55261050
Fax: 040 27812418

EAST ZONE

Kolkata: Tata Steel Limited
52, Jawaharlal Nehru Road
Kolkata 700 071
Phone: 033 65508157/8166
Fax: 033 22821687

Bhubaneshwar: Tata Steel Limited
C/o Rungta Agencies Pvt. Ltd.,
P.O. Rasulgarh
Bhubaneshwar 751 010
Phone: 0674 2585765
Fax: 0674 2580968

Jamshedpur: Tata Steel Limited
191, Burma Road, Burma Mines
Jamshedpur 831 001
Phone: 0657 2270901/0995
Fax: 0657 2270685

Guwahati: Tata Steel Limited
C/o Rungta Agencies Pvt. Ltd.,
Meena Bhawan
Kanchan Road, Ulubari
Guwahati 781 007
Phone: 0361 2523093, 2454161
Fax: 0361 2526582

Patna: Tata Steel Limited
Boring Road
Near Gasoline Petrol Pump
Patna 800 001
Phone: 0612 2225624, 5510338/0329
Fax: 0612 2232044

WEST ZONE

Mumbai: Tata Steel Limited
New India Assurance Building,
3rd Floor
87, M.G. Road, Fort
Mumbai 400 001
Phone: 022 22675669/5945
Fax: 022 22619902

Indore: Tata Steel Limited
316 & 317 City Centre, 3rd Floor
570, M.G. Road
Indore 452 001
Phone: 0731 6450690, 2538685
Fax: 0731 2535951

Nagpur: Tata Steel Limited
Museum Road, Civil Lines
Nagpur 440 001
Phone: 0712 2533209, 2522209, 5611812
Fax: 0712 2537078

Ahmedabad: Tata Steel Limited
Premchand House Annexe, 2nd Floor
172/2, Ashram Road, Old High Court Way
Ahmedabad 380 009
Phone: 079 66612605
Fax: 079 66612604

TATA STEEL RETAIL DISTRIBUTORS

NORTH ZONE

M. S. Beigh
EMPIRE STEELS
309, Narsingh Ghar Batmaloo
Srinagar - 190 009, Jammu & Kashmir
Phone: 0194-2479491/2479831
Mobile: 09906562250, Fax: 0194-2474908
e-mail: empiresteels@yahoo.com

Rajnish Sharma
HINDUSTAN SALES CORPORATION
Ambedkar (Panama Chowk)
Railway Road, Jammu - 180 004
Phone: 0191-2470892, Mobile: 09906681888
Fax: 0191-2471364
e-mail: htc_he@yahoo.com

Arun Handa
MRH ASSOCIATES
Adjoining Tee Emm Motors-IBP Petrol Pump, Malik
Complex, 1st Floor
Chandigarh-Ambala Highway
Village Pabhat, Zirakpur,
Distt. Mohali - 140 105, Punjab
Phone: 01762-509252, Mobile: 09814116088
email: mrhtatatiscon@rediffmail.com

Bhupinder Bansal
NEELKANTH STEEL & ALLOYS
113/8, Navyug Market, 1st Floor
Ghaziabad - 201 001
Uttar Pradesh
Phone: 0120-4109988/6544586
Mobile: 09811073040
Fax: 0120-2791428
e-mail: vikrantispat@rediffmail.com

EAST ZONE

Anil Agarwal
SILIGURI BUILDERS PVT. LTD.
Sky Star Building, 429/354 Sevoke Road
Siliguri - 734 401, West Bengal
Phone: 0353-2435887, Mobile: 09434051366
Fax: 0353-2530421
e-mail: anil_sbpl@vsnl.net

Sonjoy Kundu
G. L. KUNDU & SONS
S.M. Pally, N.H.-34, Malda - 732 101
West Bengal
Phone: 03512-266413/284134
Mobile: 09434065552, Fax: 03512-268572
e-mail: sanjoykundu@hotmail.com

Sarat Kumar Jain
S. M. CORPORATION
Anil Plaza, 3rd Floor, G. S. Road
Guwahati - 781 005, Assam
Phone: 2545652/2630076/251446
Mobile: 09706048008
e-mail: saratghy@satyam.net.in

WEST ZONE

Atul Shah
SACHI AGENCY
B-502, Nirman Complex Navrangpura,
Ahmedabad - 380 009, Gujarat
Phone: 079-66300108
Mobile: 09825016193
Fax: 079-26430869
e-mail: sachiagency@satyam.net.in

Ajay Damani
ANUSHKA ENTERPRISES
B-804, "NIRMAN"
Behind Navrangpura Bus Stand
Navrangpura, Ahmedabad-380009
Phone: 91 79 26563312/26430880/30024570
Mobile: 09824046932 (Sunil Srivastava)
Fax: 91 70 660 60057
e-mail: anushka.ent@gmail.com



TATA STEEL Limited, Long Products Division, 15th Floor,
Tata Centre, 43, Jawaharlal Nehru Road, Kolkata 700 071, India
Phone: 91 33 2288 7051/9251 • Fax: 91 33 2288 1640
call 1800 345 8282, visit us at www.tatatiscon.co.in, SMS (TISCON) to 53636