KAMDHENU STEEL

Sampurna Suraksha Ki Guarantee

Next Generation INTERLOCK Steel

KAMDHENU Nxt

DOUBLE RIB TMT BAR

Director Speaks

INNOVATING FOR A SAFER AND HAPPIER TOMORROW

New perspective and newer possibilities

As a new dawn ignited the financial development of India, intermingled reform ideas were presented in the policy framework of the government. With each passing day, greater emphasis is being put on infrastructure development which in return, will increase the demand for steel. We, at Kamdhenu Limited carry innovation in our veins and stand high to produce products which can fulfill the diverse demands of the masses. In our country, the most challenging task for us is to create something technologically advanced within the affordability of our customers. Constructing a building is like constructing the dream of a new future and innovation is the key towards that. That is when our highly ambitious product **Kamdhenu Nxt** originated.

Today, there is a lot of population pressure and the cost of land is high. These demographics surely affect the growth in construction sector. Kamdhenu Limited looks forward to receive advantage from the present scenario and the envisaged future construction boom by ensuring the supply of high-end construction products at competitive prices. Mr. Sunil Kumar Agarwal, Director, Kamdhenu Limited says, "Our country is foreseeing a record allocation of Rs.1.5 trillion to infrastructure sector. Therefore, the spotlight on reinforcement structures like ports, roads and other areas like affordable housing, physical infrastructure will provide necessary momentum to the steel sector to meet its growth targets."

Our company has planned to utilize every opportunity in the new financial year so as to achieve the set targets and create new demands in the market for innovational steel products like **Kamdhenu Nxt**. Keeping the pace matched with developmental process through tactful management of products is the motto of the company in the new world of unlimited possibilities.

Mr. Agarwal further says, "**Kamdhenu Nxt** is surely the **Next Generation Interlock Steel** which is going to change the definition of constructing new-age engineered projects."

With warm regards,

Sunil Kumar Agarwal
Director, Kamdhenu Limited

A Glance at Kamdhenu Limited

More than twenty five years ago, the sun rose with some extra shine, when **Kamdhenu Limited** laid its first stone. Since then, we have established ourselves on the pinnacle of success, being into the compelling business of building concrete foundations of development. We have put forth our effort to shape the dynamism of Indian infrastructure and have become **the first company to offer branded steel products in India**. We have stringently followed all the prerequisite parameters for excellence to succeed on the tough path of self-establishment.

The company has grown speedily with diversifying business interests like Steel & Paints etc. Keeping our head high on the skies of trust, transparency and integrity; we are ambitious to add much broader section for ourselves in the market, in the forthcoming time.

KAMDHENU NXT

Product Background

Kamdhenu Nxt is manufactured with cutting edge technology which is at par with the futuristic national and international quality standards. Hence, it bears the privilege of being called the **'Next Generation Interlock Steel'**. It is going to change the definition of modern architectural patterns and designs meant for newly engineered structures. Behind this fact, a profound as well as pragmatic research and development approach resides. A huge team of engineers, contemporary architects and industry experts sat together to derive the distinguished excellence of the product based upon the need of the industry.

Kamdhenu Nxt has an angular double rib design and is marketed & sold as an exceptionally created double rib TMT bar. With this product, Kamdhenu Limited has reached the zenith of the double rib steel industry.

TECHNOLOGICAL INNOVATION
KAMDHENU 500-D TMT

Kamdhenu has always been a front-runner in the construction segment as far as technological advancements are concerned. With many firsts under its umbrella, Kamdhenu's appetite for innovation has given construction industry numerous path-breaking inventions.

KAMDHENU 500-D TMT

Its latest innovation 500-D is a technological advancement that re-writes the standards of construction. Developed keeping in mind the essentials of earthquake resistant construction Kamdhenu 500-D is the answer to all your needs. Kamdhenu 500-D is totally Sulphur and Phosphorus controlled and purified to the latest quality standards to give your construction the extra strength to withhold under extreme hot and cold weather conditions. Sulphur and Phosphorus are the harmful impurities that make a rebar vulnerable to cracking. Kamdhenu 500-D reduces the combined level of these impurities up to 0.075% as per the latest BIS specifications. Therefore, Kamdhenu 500-D is many times better and absolutely reliable than other rebars available in the market. With Kamdhenu 500-D comes a promise of strength, stability and standard for every company or individual involved in the process of construction.

PROCESS OF MANUFACTURING

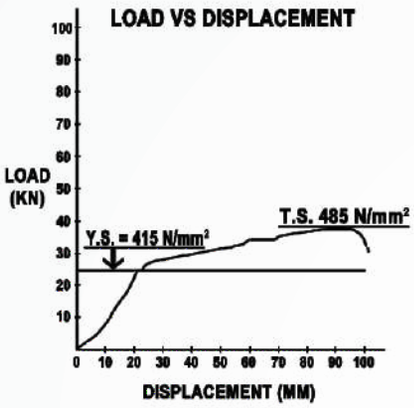
With its most advanced and highly equipped production franchisee units, Kamdhenu manufactures TMT (Thermo-Mechanical Treatment). It uses the latest and most sophisticated technology to manufacture high quality Kamdhenu TMT Bars. The Technology is considered best in business for production of high quality TMT Bars since the technology uses low cost raw materials against costly alloy elements. The technology is formulated in three steps namely Quenching stage, Tempering stage and Cooling stage. Manufactured under the best quality control parameters these bars give high ductility, bendability and weldability and are fully-equipped to resist earthquakes

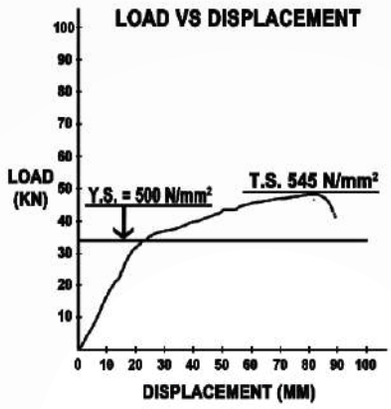
ADVANTAGES OF KAMDHENU 500-D

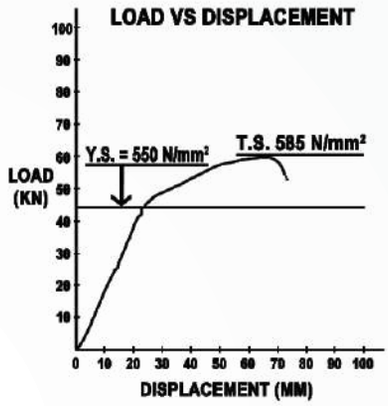
- Earthquake resistant, increasing the sturdiness of construction
- Decreasing the level of Sulphur and Phosphorus, ensuring less impurities
- Non-vulnerable to cracking under extreme hot and cold conditions
- Higher Bonding strength with higher ductility
- Better ductility, bendability and weldability
- Higher thermal stability (400 to 600 degrees)
- Anti-corrosive properties to prevent the formation of coarse carbides
- High elongation values, excellent workability

Power of brand enhanced with Grade Fe 550

Steel is an essential element for any construction activity like multi-storey buildings, houses, airports & bridges etc. With the constant transformation of steel industry there is a growing market need for steel bars with higher strength & elongation. The 21st century has seen a rapid increase in the cost of TMT bars & has also brought greater focus on safety & quality norms of construction. This encouraged Kamdhenu Limited to develop 550 grade TMT bars with properties of high strength which also enables cost savings in construction by reducing consumption, to meet the increasing demand in the market.







"Kamdhenu Nxt rebars are hot rolled from steel billets and subjected to PLC controlled online thermo mechanical treatment in three successful stages which are necessary for making a high quality rebar". The three stages are:

Quenching Stage :

Under the Quenching stage, high pressure water spray is used as a cooling treatment for the hot ribbed bars. The effectiveness of the water spraying equipment in this stage is critical as to rapidly harden the surface layer, faster than the critical rate, to form the martensite while core remains austenite. As a result, we get a hard outer layer with better ductility.

Tempering Stage:

The Tempering stage is very important for bars as after quenching they leave the water quenching line and are exposed to air. The heat flux from the still hot core reheats the surface by conduction thus self-tempering the surface to a structure called "Tempered Martensite" which is strong and tough. The core is still austenitic at this stage and remains soft & ductile.

Cooling Stage:

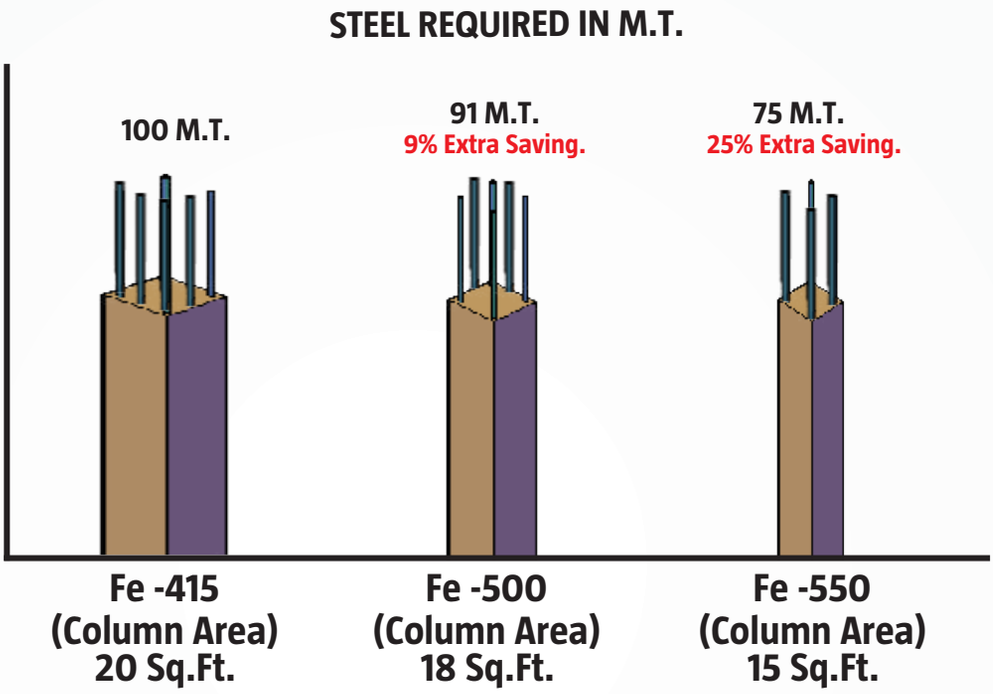
The third stage of "Atmospheric Cooling" occurs on the cooling bed, where the austenitic core is transformed into a ductile ferrite pearlite core. The final structure consists of a combination of a strong outer layer of tempered martensite and a ductile core of ferrite-pearlite.

CNC PATTERN

The CNC notch Cutting m/c ensure uniform rib pattern which allow uniform bonding with concrete for the whole structure. Due to uniformity and critically designed ribs, fatigue strength and ductility of **Kamdhenu Nxt** is much superior to ordinary steel bars.

COST SAVING

In a structure, advanced TMT steel bars with a yielding quantity of 550 N/mm^2 are required in a lesser quantity thereby, decreasing the general expense of the structure. In addition to reducing the steel consumption and ensuring savings in cost, the use of 550 grade steel can also increase carpet area of construction by reducing the column area, as 550 grade TMT bars have high tensile strength and it occupies less space.



As shown above, if we use 500 or 415 grade TMT bar instead of 550 grade TMT bar then apart from increasing the area of column in the structure, the consumption of steel by using 500 or 415 grade will also be 9% & 25% extra respectively, in comparison to the consumption of steel by using 550 grade.

CHALLENGES

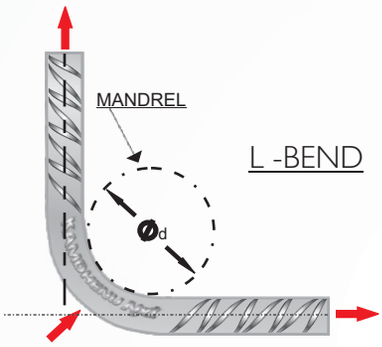
Today steel structures are being designed with 415 & 500 grade TMT bars due to lack of awareness hence, the consumption & cost of steel is higher as compared to what should ideally be used in construction. Moreover, various brands claim that their product is of 500 grade whereas, they are manufacturing 415 grade instead. If a RCC column is designed for 550 grade steel but the steel actually used doesn't qualify the strength of 550 grade, then it can lead to collapse of structure. Kamdhenu Nxt guarantees its 550 grade TMT bars to be cost effective and safe for construction of any structure.

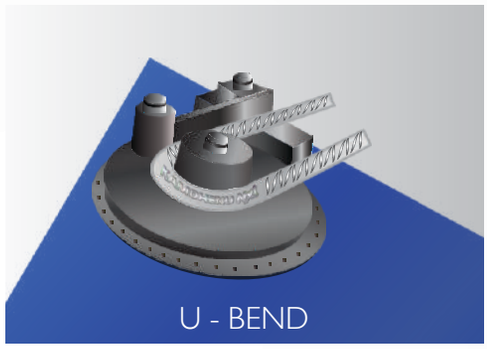
Kamdhenu Nxt TMT bars have outstanding bending & re-bending properties. But, due to lack of knowledge about the correct process of Bending & Re-Bending and what should be the appropriate mandrel diameter, end users face many problems like crackness, breaking of bars while making L-bend, U-bend, Z-bend etc. at site. As of today, we know that the market requires higher grade with more strength to reduce the consumption of steel hence, we introduced Fe-550 grade which requires bigger mandrel diameter.

Herein below is the correct procedure of bend & re-bend test:

Bend Test

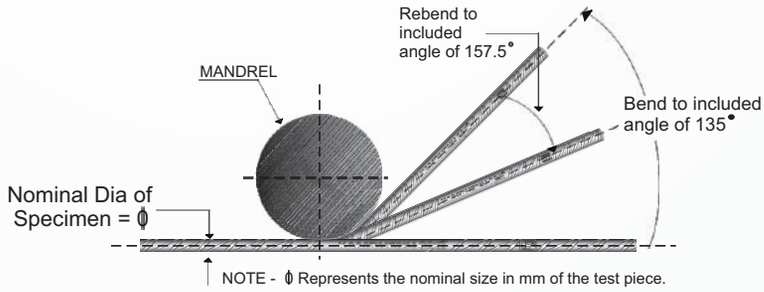
The bend test shall be performed in accordance with the requirements of IS 1599 (IS-1786) and the mandrel diameter for different grades shall be as specified in given table. The test piece, when cold, shall be doubled over the mandrel by continuous pressure until the sides are parallel. There should be no cracks visible to a person of normal vision on Bend portion.





Re-Bend Test

For Re-bend test please note that a new sample piece should be taken for test. Now as shown in figure, the test piece should be bent to an included angle of 135 degree using a mandrel of appropriate diameter (as given in table) Now the bent piece shall be aged by keeping in boiling water (100 degree) for 30 min. & then allow to cool. The test piece shall be bent back to have an included angle of 157.5 degree. There should be no cracks visible to a person of normal vision on Re-bend portion.



RE-BEND TEST

Mandrel Required for Bend and Re-Bend Test

S.No	Properties	Unit	IS: 1786 Fe-500	KAMDHENU NXT(Fe-500)	IS: 1786 Fe-500D	KAMDHENU NXT(Fe-500D)	IS: 1786 Fe-550	KAMDHENU NXT(Fe-550)
1	**Bend Test** a) Upto& Including 20 mm b) Over 20 mm	Mandrel dia (in mm), ø-dia of bar	4ø 5ø	3ø 4ø	3ø 4ø	2ø 3ø	5ø 6ø	4ø 5ø
2	**Re-Bend Test** a) Upto& Including 10 mm b) Over 10 mm	Mandrel dia (in mm), ø-dia of bar	5ø 7ø	4ø 6ø	4ø 6ø	3ø 5ø	7ø 9ø	6ø 8ø

Chemical Properties

Kamdhenu Nxt is a uniquely produced product of the company within the quality standards according to BIS specifications.

S.No	CONSTITUENT	MAXIMUM					
		IS:1786	KAMDHENU NXT	IS:1786	KAMDHENU NXT	IS:1786	KAMDHENU NXT
		Fe-500	Fe-500	Fe-500D	Fe-500D	Fe-550	Fe-550
1	Carbon%	0.30	0.25	0.25	0.23	0.30	0.25
2	Sulphur%	0.055	0.050	0.040	0.035	0.055	0.050
3	Phosphorus%	0.055	0.050	0.040	0.035	0.055	0.050
4	S+P%	0.105	0.100	0.075	0.070	0.100	0.095
5	Carbon Equivalent%	–	–	0.50	0.40	–	–
6	Nitrogen%	0.012	0.010	0.012	0.010	0.012	0.010

*As contained in 90% of the heats.

Physical Properties

Kamdhenu Nxt is manufactured by unique method maintaining the combination of strength & ductility that exceeds the minimum limit specified in BIS.

S.No	Properties	Unit	IS: 1786 Fe-500	KAMDHENU NXT(Fe-500)	IS: 1786 Fe-500D	KAMDHENU NXT(Fe-500D)	IS: 1786 Fe-550	KAMDHENU NXT(Fe-550)
1	Yield Stress (Min.)	N/mm^2	500	530.0	500.0	530.0	550.0	565.0
2	Tensile Strength (Min.)	N/mm^2	545	600.0	565.0	610.0	585.0	610.0
3	TS/YS Ratio	Ratio	≥ 1.08	≥ 1.10	≥ 1.10	≥ 1.12	≥ 1.06	≥ 1.08
4	Elongation (Min.)	%	12	16.0	16.0	18.0	10.0	14.0
5	Uniform Elongation (Min.)	%	--	--	5.0	6.0	–	–
6	Bend Test a) Upto& Including 20 mm b) Over 20 mm	Mandrel dia (in mm), ø-dia of bar	4ø 5ø	3ø 4ø	3ø 4ø	2ø 3ø	5ø 6ø	4ø 5ø
7	Re-Bent Test a) Upto& Including 10 mm b) Over 10 mm	Mandrel dia (in mm), ø-dia of bar	5ø 7ø	4ø 6ø	4ø 6ø	3ø 5ø	7ø 9ø	6ø 8ø

*As contained in 90% of the heats.

Kamdhenu Nxt Ductility

Safety of concrete structure is first

Concrete is a brittle without ductility and cannot be used for structural applications without reinforcement. The ductility within a structure, something which the concrete does not have, is provided by steel reinforcement. Therefore, the steel must be sufficiently ductile so that every reinforced concrete section, including structural elements has the capacity to deform by an adequate amount.

Ductility of an element is its ability to withstand deflection or extensive cracking in an overload situation without sudden catastrophic collapse.

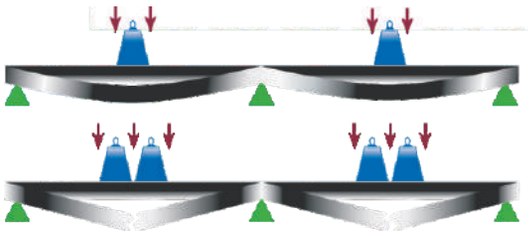
Imagine a beam built of plain concrete without reinforcing steel supported at both ends and in the middle. If we load both spans then:

- On initial loading, the beam deflects a little.
- In the second stage of loading, the beam collapses all of a sudden.

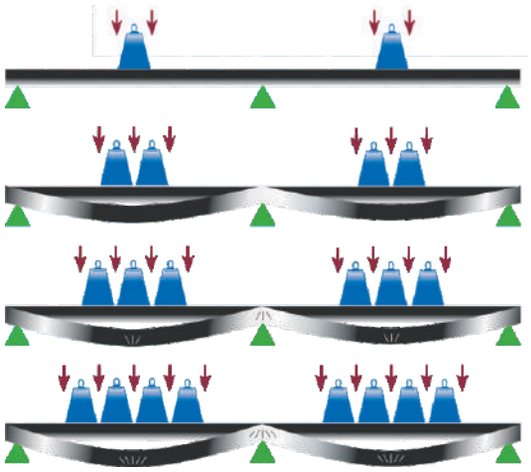
Now, if the concrete is reinforced with steel bars and loaded in the same way as before then:

- In initial stage of loading, the beam deflects a little.
- In the second stage of loading, the beam continues to deform.
- In the third stage of loading, the beam deflects some more and small cracks appear.
- In the fourth stage of loading, the beam deflects even more and cracking becomes more extensive.

In general, higher steel ductility provides greater ductility to the beam.



This happens because concrete is a brittle material with low ductility.
BRITTLE = NON DUCTILE



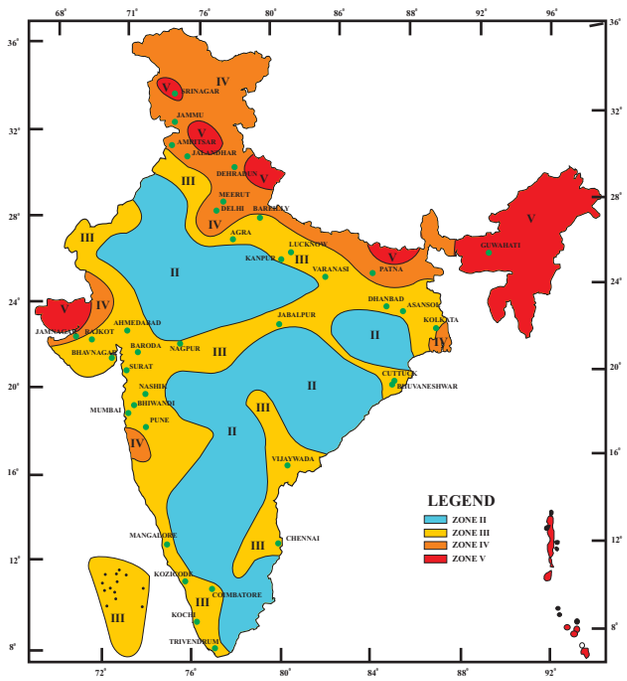
"In general, the higher the steel ductility, the greater the ductility of the beam".
"The tensile ductility of steel is its ability to deform when loaded above its elastic limit without fracturing".

Bond strength

In addition to the strength and ductility requirements, reinforced concrete needs adequate bonding between steel and concrete to ensure that the composite works efficiently and cracks are under control. Perfect bonding between concrete and ductility is a property of reinforcing steel that is essential in those applications where structures are subject to unexpected forces (seismic, dynamic, impact etc.)

Kamdhenu Nxt boasts more than 200% higher values as compared to required bond strength. The structure of two ribs at different angles gives an intact bonding with concrete.

The Features & Applications



FEATURES

Kamdhenu Nxt is called the product of the next generation because it has the characteristics to meet the requirements of the new engineered reinforcement structures and smart architectural concepts. The vital features of this high end interlock steel bar are as follows:

- **Exceptional double rib design:** For a stronger interlock bond
- **2.5 times stronger concrete - steel interlock (ratio of load/bond strength):** To give more strength to the structure
- **Advanced earthquake resistance:** Ensuring the safety and security of the building and structure
- **Superior thermal resistance:** To resist the heat flow in the constructed building
- **Better corrosion resistance:** To guarantee longer life span of interlock steel bar due to good anti-corrosion qualities
- **High ductile strength:** To make certain unbreakable flexibility assuring better application
- **Extensive application range:** Right chemical and physical properties make it suitable for maximum reinforcement structures and buildings
- **Compatible with skyline structures:** Well-suited for strengthening new-age high-rise buildings
- **Extremely economical:** To make innovational products available for all without compromising on the quality

APPLICATIONS

In addition to the strength and ductility requirements, reinforced concrete needs adequate bonding between steel and concrete to ensure that the composite works efficiently. This perfect bonding is essential for those applications where structures are subject to unexpected forces like seismic, dynamic, impact etc. Therefore, these are widely used in concrete reinforcement structures like **bridges, flyovers, dams, thermal and hydel plants, industrial towers, skyline buildings, underground platforms** etc. Throughout the making of this next generation double rib TMT bar, each process is highly focused upon so as to not compromise on its quality at any cost, at any stage.

PAN-India Presence

KAMDHENU STEEL
Sangurna Suraksha Ki Guarantee

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