



U-XEGG
TMT BAR

SETTING THE BAR HIGH!



ELECTROSTEEL STEELS LIMITED

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THE BEGINNING OF A NEW LEGACY

Vedanta Group is a globally diversified Natural Resources Company specializing in Zinc, Lead, Silver, Iron Ore, Steel, Copper, Aluminum, Power, Oil and Gas. It is the Largest Mining and Non-ferrous Metals Company in India and has Mining, Petroleum and Gas Operations in various countries across the Globe. The group's journey consists of regular geological exploration and discoveries, technological advancements, sustainable developments, turning around businesses and setting new industry benchmarks.

With the acquisition of integrated steel manufacturing unit of Electrosteel Steels Limited (ESL), Vedanta group is now looking to set new benchmarks in the steel industry. At the Greenfield Integrated Steel Plant in Bokaro (Jharkhand), ESL has a current capacity and produces approximately 1.5 Million Ton per annum of high-quality Steel intermediaries and Products - Pig Irons, Billets, TMT Bars, Wire Rods, and Ductile Iron Pipes.

With process like benchmarking, operational and commercial excellence at every stage of value chain of steel Business, backed by state of the art technology and partnership with internationally reputed suppliers, the entity is poised for delivering refreshed and enhanced quality products. Along with technological interventions, entity is equally "in sync" with latest ecological standards for production of "GREEN" steel, contributing to responsible nation building and serving the communities in a more sustainable way.

QUALITIES THAT RAISE THE BAR

- Low sulphur and low phosphorous content
- Made from fully killed steel
- Very clean steel with low tramp element content
- Higher tensile strength to yield strength ratio
- Higher percentage elongation compared to BIS specifications
- Easy bendability, weldability and excellent ductility ensures economy and safety of use
- Requires less energy for bending and re-bending
- Can be butt welded or lap welded
- Use of Fe-550 D grade results in saving more than 15% in steel consumption when compared to Fe-415 grade
- Superior corrosion resistance and seismic resistance properties
- Ideally suited for any type of concrete structure



PACKING:

Bare, in strapped bundles/piles weighing 2 to 3 metric tonnes approximately per bundle.

TOLERANCE:

As per IS:1786:2008

LENGTH:

Uniform 12 metres, can also be supplied in any length on mutual agreement.





STEEL STRONG TECHNOLOGY:

Electrosteel Steels Limited has introduced Thermo-mechanically Treated (TMT) reinforcement bars in India, using the latest technology available worldwide.

V-XEGA TMT bars are produced at our Electrosteel's Bokaro plant under the close supervision of our frontline metallurgists and engineers. Our TMT Bars are made from virgin steel through the **Blast Furnace-Basic Steel Making-Secondary Refining-Billet Casting** route with the lowest amount of impurities and processed through fully automated rolling mills.

Rolling:

The concast billets are subsequently converted into TMT bars, as per requirement. First, hot billets (around 600°C) are charged into an online reheating furnace for uniform heating and proper soaking. The furnace is provided with sixty-eight burners arranged in three different zones, namely; heating, soaking and bottom heating zones. The blast furnace gas, obtained as a by-product, is used as a fuel in the furnace which has regenerative burners for controlled heating. The heated billets are then rolled in the Bar Mill, equipped with alternate horizontal and vertical housing-less stands, for twist-free operation and accurate size control. In the finishing stands, computer-controlled vertical loopers have been provided for push-pull control during rolling in the continuous mill.



Quenching and Self-Tempering Technology (QST):

The finished bar then enters the programmable logic-controlled cooling quenching operation, where the bar is subjected to heat treatment in three successive stages. The first stage of quenching begins when the hot rolled bar leaves the final mill stand and is rapidly quenched by a water spray system. This converts the surface layer of the bar into a hardened structure called 'Martensite' while the core remains austenitic.

Atmospheric Cooling:

The third stage of 'atmospheric cooling' takes place on the cooling bed, where the austenitic core adjacent to the martensitic ring is transformed into a tough bainitic structure ring, and the core of the bar into ductile pearlite. Thus, the final structure consists of a combination of a strong outer layer of tempered martensite followed by a bainite ring and a ductile core of pearlite. This is what gives V-XEGA TMT bars their unique combination of strength and ductility.

Self-Tempering:

The second stage of self-tempering begins when the bar leaves the quenching box with a temperature gradient through its cross section, the temperature of core being higher than that of the surface. This allows heat to flow from the core to the surface, resulting in the tempering of the surface, giving it a structure called 'Tempered Martensite' which is strong and tough. The core is still austenitic at this stage.



V-XEGA 550D: A GRADE ABOVE

Superior Strength and High Ductility:

V-XEGA TMT bars show rare combination of high strength and excellent ductility. The tensile to yield strength ratios are always greater than 1.15.

Resistance to Ageing:

The mechanical properties of V-XEGA TMT Bars such as strength and elongation do not change with time.



THE STRENGTHS OF V-XEGA TMT BARS

Superior Corrosion Resistance:

Lower carbon content and the absence of torsional residual stress allow better corrosion resistance. This unique property of V-XEGA TMT Bars is further enhanced through a martensitic layer on the outside surface, uniform microstructure and an adherent scale film formed by water quenching during rolling.

Superior Rib Pattern:

V-XEGA TMT bars have unique rib patterns resulting in formation of a stronger bond with concrete. The mean projected area of V-XEGA TMT is more than the specified values of the IS:1786 standard. The uniformity of the rib pattern ensures uniform strong bonding with concrete for the entire structure.

Excellent Bendability and Workability:

The tough outer layer of martensite and the ductile core of the V-XEGA TMT bars result in excellent bendability. This Ferrite Pearlite structure makes the bars flexible and strong.

Seismic Property:

With superior seismic properties, V-XEGA TMT bars ensure better protection and minimum damage to the structure in case of earthquake. Additional area under the curve shows the extra energy that can be dissipated before breaking. High UTS/YS indicates high strain hardening rate beyond yield point – a requirement for EQR steel. It confirms to international standards by maintaining minimum uniform elongation at maximum stress.

Fire Resistance Property:

V-XEGA TMT bars when exposed to a temperature of 400°C for one hour lose only 5% of its tensile strength, which it regains as soon as the temperature comes down.

Higher Fatigue Strength:

The fatigue strength of these bars meets the requirements of international Standards.



TMT BARS COMPARISON

SECTIONAL WEIGHT

DIA (mm)	Nominal Weight (Kg/metre)
8	0.395
10	0.617
12	0.888
16	1.580
20	2.470
25	3.850
32	6.313
36	7.990
40	9.860

DIMENSIONAL TOLERANCES

Sizes	IS 1786-2008 Specifications		V-Xega TMT Rebars	
	Positive Tolerances	Negative Tolerances	Positive Tolerances	Negative Tolerances
8, 10 mm	+7%	-7%	0%	-7%
12, 16 mm	+5%	-5%	0%	-4%
20 to 40 mm	+3%	-3%	0%	-3%

CHEMICAL PROPERTIES

Element	IS 1786-2008 Fe 500	IS 1786-2008 Fe 500 D	IS 1786-2008 Fe 550 D	UK BS 4449/2005 500B	UK BS 4449/2005 500C	Aus/ NZ 500 E	Aus/ NZ 500 N	ESL FE 500D	ESL FE 550 D	ESL FE 500D CRS	ESL FE 550D CRS
% C max	0.30	0.25	0.25	0.22	0.22	0.22	0.22	0.25	0.25	0.15	0.15
% S max	0.055	0.040	0.040	0.050	0.050	0.05	0.05	0.040	0.040	0.04	0.04
% P max	0.055	0.040	0.040	0.050	0.050	0.05	0.05	0.040	0.040	0.080	0.080
% [S+P] max	0.105	0.075	0.075	N.S	N.S	N.S	N.S	0.075	0.075	0.12	0.12
% CE - max	Not Defined	0.50	0.61	0.50	0.50	0.44	0.49	0.42	0.42	0.42	0.42
% [Cr + Cu + P]	-	-	-	-	-	-	-	-	-	0.50min	0.50min

CHEMICAL COMPOSITION

ELEMENTS V-Xega 550 D	
Carbon (%):	0.23 Max
Sulphur (%):	0.40 Max
Phosphorous (%):	0.40 Max
Carbon Equivalent (%):	0.36 Max

PHYSICAL PROPERTIES

Element	IS 1786-2008 Fe 500	IS 1786-2008 Fe 500 D	IS 1786-2008 Fe 550 D	UK BS 4449/2005 500B	UK BS 4449/2005 500C	Aus/ NZ 500 E	Aus/ NZ 500 N	ESL FE 500D	ESL FE 550 D	ESL FE 500D CRS	ESL FE 550D CRS
YS (N/mm ²)	500 min	500 min	550 min	500-650	500-650	500-600	500-650	530min.	580 min	530min.	580 min
TS (N/mm ²)	545 min	565 min	600 min	N.S	N.S	N.S	N.S	600 min	640 min	600 min	640 min
TS/YS min	1.08	1.10	1.08	1.08	1.15-1.35	1.15-1.40	1.08	1.10	1.08	1.10	1.08
% Elongation min	12	16	14.5	N.S	N.S	N.S	N.S	16	14.5	16	14.5
% Uniform elongation at max stress, min	N.S	5	5	5	7.5	10	5	5	5	5	5
Application	General	Seismic	Seismic	General	Seismic	Seismic	General	Seismic	Seismic	Seismic	Seismic

PHYSICAL PROPERTIES

MECHANICAL PROPERTIES V-Xega 550 D	
Yield Strength (N/mm ²)	550 Min
Tensile strength (N/mm ²)	600 Min
Elongation (%)	≥14.5
Ratio of Tensile Strength to Yield Strength	≥1.08