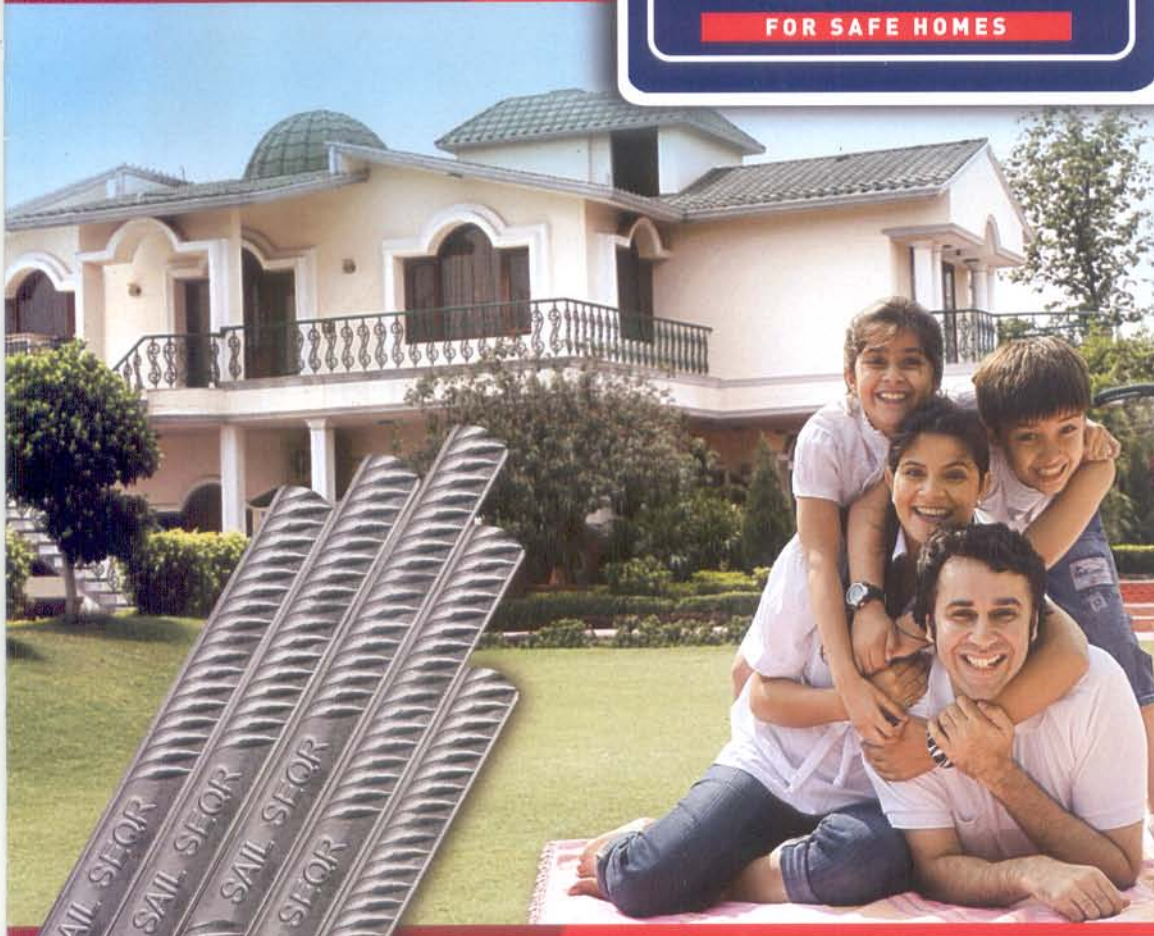


SAIL SeQR TMT BARS



For Safe
Homes



स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड
STEEL AUTHORITY OF INDIA LIMITED
A Government of India Enterprise

There's a little bit of SAIL in everybody's life

SAIL SeQR TMT Bars

For Safe Homes

When does a house become a home? When the members of the household live in a safe and secure environment.

Building a structure that is inherently strong and is able to resist external forces such as earthquakes and other natural forces lays the foundation of a safe home.

Bricks, mortar, even cement, cannot provide this strength. Plain concrete, although compression-resistant, is very weak in tension and therefore is not a very good structural member by itself. However, concrete can be made extremely useful by reinforcing it with steel material like TMT bars which have the desired ductility and bond characteristics to absorb tensile forces.

Thermo Mechanically Treated (TMT) bar is a type of reinforced steel bar which undergoes an additional process during its production cycle to obtain these required characteristics. This additional process consists of Quenching and Self-Tempering.

Good quality TMT bars have high ductility which is why they can resist earthquake shocks. Their design also helps in improved bonding with cement. Strong bonding between steel bars and cement results in buildings becoming earthquake resistant.

The Indian subcontinent has a history of devastating earthquakes. Geographical data shows that almost 54% of land in India is vulnerable to earthquakes. A World Bank and United Nations report estimates that around 200 million city dwellers in India will be exposed to storms and earthquakes by 2050. Natural disasters bring huge economic losses in their wake.

Keeping all these factors in mind, a person planning to build a home should therefore give priority to purchase of TMT bars, which

- ▶ Gives a house a long life
- ▶ Is economical due to use of less quantity
- ▶ Has the dependability of a trusted brand
- ▶ Is resistant to natural occurrences like earthquakes, cyclones etc.



Steel Authority of India Limited (SAIL), a Maharatna Central Public Sector Enterprise with the largest steel making capacity in the country, pioneered the production of TMT bars in India. SAIL has been in the forefront of the country's infrastructural development, be it railway infrastructure, airports, bridges, dams, oil refineries, power plants or industries, and defence applications. On the safety aspect, too, SAIL has been one of the most dependable and trusted steel suppliers in the country; in fact, SAIL has been the sole supplier of rails to the Indian Railways for decades.

With five integrated steel plants and three special steel plants, SAIL offers the widest range of steel products in the country. These steel products are marketed through a pan-India network of 4 Regional Offices, 37 Branch Sales Offices, 10 Customer Contact Offices and 49 Stockyards.

SAIL has recently installed state-of-the-art new rolling mills in its major plants, among which are modern mills producing new-age TMT bars branded as **SAIL SeQR** (Pronounced as SAIL secure). These bars are produced through advanced manufacturing processes by the modernised integrated steel plants of SAIL using virgin iron ore from SAIL's own mines.

For home builders, **SAIL SeQR** TMT bars, available in dia from 8 mm to 20 mm, promise the highest levels of safety and security at affordable prices.

Unique product attributes of SAIL SeQR TMT Bars

Attributes	Advantages
High UTS/YS ratio & high ductility	Provides good plastic energy absorption leading to higher safety of structures during earthquakes/tsunamis/cyclones, etc.
Superior bendability	Easier to bend & rebend-very good for onsite works
Superior rib pattern	High bonding properties with concrete
High uniform elongation	<ul style="list-style-type: none"> ▪ Enhances plastic energy absorption capacity ▪ High resistance to failure
Clean steel, low Sulphur & Phosphorus levels	Enhances resistance to cold & hot shortness & imparts improved internal soundness

▶▶ Superior Strength with High Ductility

SAIL SeQR TMT bars possess the unique combination of high strength and high ductility that *surpasses the minimum specified level of BIS*. This combination is achieved through carefully controlled cooling which forms a hard martensitic surface and a softer ferrite pearlite inner core.

▶▶ Clean Steel

Usage of primary steel making route from virgin iron ore and secondary refining processes leads to highly clean steel with low levels of sulphur and phosphorus as well as gaseous content. (High phosphorus level makes steel brittle under cold condition leading to cracking, while high sulphur level reduces the strength under high temperature conditions). Lower levels of phosphorus and sulphur as well as use of electro magnetic stirrer impart internal soundness of material thereby improving ductility in terms of higher capability for uniform elongation and better bendability.

▶▶ Bond Strength

The prominent and uniform rib pattern of **SAIL SeQR** TMT bars is produced through the usage of special quality CNC mechanised rings which provide capability for stronger bonding with concrete.

▶▶ High Earthquake Resistance

SAIL SeQR TMT bars are characterised by *high UTS/YS* ratio due to which they are capable of absorbing more energy when stressed beyond yielding point. This enables the bars to maintain their internal strength in the face of sudden occurrences such as earthquake/tsunami, etc., avoiding any catastrophic failures. Capability for higher uniform elongation also enables **SAIL SeQR** TMT bars to accommodate plastic deformation without necking, thereby resisting ultimate failure and providing higher safety to structures during occurrences like earthquake/tsunami/cyclones, etc.

▶▶ Superior Bendability

SAIL SeQR TMT bars are bendable over lower mandrel diameter compared to specified mandrel diameters as per IS 1786-2008, Grade D specification. This allows easier bending with less effort and thus facilitates easier onsite works.

▶▶ Better Weldability

SAIL SeQR TMT bars are perfectly weldable by normal process of welding with suitable electrodes. They are also weldable without preheating, preferably with low hydrogen electrode.

▶▶ Corrosion & Fire Resistance

SAIL SeQR TMT bars have better corrosion and fire resistance properties due to the uniform and thick tempered martensitic rim.



Properties of SAIL SeQR TMT Bars

Chemical Properties (Ladle analysis in %)

Element	IS 1786 : 2008	IS 1786 : 2008	SAIL SeQR Typical Values
	Fe 500	Fe 500D	Fe 500D
Carbon (C) maximum	0.30	0.25	0.25
Sulphur (S) maximum	0.055	0.040	0.035
Phosphorus (P) maximum	0.055	0.040	0.035
S+P maximum	0.105	0.075	0.070

Mechanical Properties

Parameter	IS 1786 : 2008	IS 1786 : 2008	SAIL SeQR Typical Values
	Fe 500	Fe 500D	Fe 500D
YS, MPa (minimum)	500	500	500
Tensile Strength, MPa	545 min.	565 min.	650 max.
UTS/YS ratio (minimum)	1.08	1.10	1.16
Total Elongation (minimum) (GL=5.65√Ao)	12.0	16.0	18.0
Bend test min. mandrel dia (For nominal dia up to 20 mm)	4d	3d	2d
Rebend mandrel dia up to 10 mm Rebend mandrel dia (10 mm to 20 mm)	5d 7d	4d 6d	3d 5d

(d = diameter of TMT Bar)



Rationalised Sizes of SAIL SeQR TMT Bars

Length : 12.0m

Size (in mm)	Weight (in kg/m)
8	0.39
10	0.62
12	0.89
16	1.58
20	2.47



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