

# ARCELOR MITTAL TMT BARS OF GRADE FE500

ArcelorMittal is the leading and largest steel manufacturer in the world. ArcelorMittal produces and distributes steel on five continents in excess of 1200 lakh tons of steel annually through its 335,000 employees with presence in over 60 countries. It's name needs no introduction in India also. Superior Quality and Production Processes are the hallmarks of Arcelor Mittal rebars. It has everything it needs for steel production including captive coal and iron ore mines. Arcelor Mittal does not only set the standards for steel products in the world, IT IS THE STANDARD.

## **TMT Bars in Indian Context**

In India, TMT bars are manufactured by the Main Steel Plants such as SAIL, RINL and TISCO and secondary re-rollers. The Main Steel Plants do not have capacity to manufacture the required quantity of rebars to cater to the tremendous growth happening in India.

The secondary sector is catered by re-rollers manufacture TMT bars from Ingots which are made from unknown scrap. The production process is unique and found nowhere else in the world. Scrap of unknown origins is put in an induction furnace from which Ingots are casted. They undergo no refining, as there are no refining facilities at any of the Ingot Plants. These ingots themselves have many defects such as piping, slag, porosity, inclusions, etc. which make their way into the final product. It usually contains high levels of Sulphur and Phosphorous which makes steel more brittle. IS1786 clause 1.6 specifically prohibits use of such steels as it states "rolling material for which the metallurgical history is not fully documented or not known, are not acceptable as per this standard".

These ingots are then rolled in re-rolling mills which do not have the proper equipment, people or processes to make quality rebars. Even no proper segregation of heats is done. That is why if you test different bars in the same trailer you will find different chemical and physical properties. A surprise visit to any re-rolling mill can confirm for you the above.

That is why there is a cost difference between the re-rolled bars and the Main Steel Plants as quality carries costs associated with it. Big Plants have big melting refining facilities with which they make quality billets from iron ore and coke.

## **Role of Arcelor Mittal**

People require quality rebars to make good quality construction. To take advantage of this shortage of good quality rebars in the Indian marketplace, Arcelor Mittal rebars are being introduced in India. These rebars are imported from their Kriviy Rih, plant in Ukraine.

The following sizes are now available in FE500D and Fe550D grade

Sizes- 8mm, 10mm, 12mm, 16mm, 20mm, 25mm, 32mm

Arcelor Mittal Rebars have the following advantages

A) Superior Quality

Arcelor Mittal is produced through the primary steel making route, i.e., using iron ore and coke from captive mines. It is then manufactured by melting and refining the iron ore thoroughly. This results in steel having desired range of Carbon and very low levels of Sulphur and Phosphorous. The rebars produced have excellent dimensional tolerance and surface finish.

Chemistry	Unit	Arcelor Mittal 500 Rebar
Carbon	%	0.15-0.25
Sulphur	%	0.040 max
Phosphorous	%	0.035 max
S+ P	%	0.070 max
Nitrogen	%	0.010 max

B) Good Chemical Composition

Carbon is restricted to enable a superior combination of properties such as strength, corrosion resistance and good weldability.

C) Lower Sulfur and Phosphorous Values

Sulfur (S) and Phosphorous (P) are impurities in steel rebars. They are removed from steel with advanced refining techniques. Lower the values, higher the quality of steel. Maximum values of S and P individually is 0.060 as per IS standards. Even Indian Big Steel Producers typically have a standard of 0.045 max. Arcelor Mittal has low values of S and P as can be seen in table above.

Arcelor Mittal Rebars also have a total S+P content far below 0.075 which is specified as a requirement for 500 Ductile grade material in Indian IS1786:2008 codes.

#### D) Lower Nitrogen Values

IS1786:2008 specifies a maximum value of 0.012 percent for Nitrogen. Nitrogen induces strain aging, blue brittleness and other adverse effects on steel.

Arcelor Mittal tests Nitrogen for every Heat and keeps it within specified limit due to its advanced processes. They also mention it on all test certificates.

Indian Steel Producers do not mention Nitrogen content on the test certificates and their test practices for this important element are unknown.

#### E) Superior Physical Properties

Arcelor Mittal due to its fully automated rolling mills, people and processes make rebars which possess a combination of strength and ductility. The superior microstructure also results in rebars with superior ductility, bendability, corrosion resistance and seismic resistant properties.

Mechanical Properties	Unit	Arcelor Mittal 500
Yield Stress	N/mm <sup>2</sup>	540 min
Tensile Strength	N/mm <sup>2</sup>	600 min
UTS/YS Ratio		1.10 min
Elongation	%min	18 min

The above are typical value for 90% of heats

#### F) Fatigue Properties

In reinforcing steels, fatigue properties are governed primarily by the stress concentration developed at the root of the ribs and any bar failures normally initiate from such points. As such this is more a function of the care exercised by the manufacturer in producing the ribs. Any excessive rib damage resulting from bending or de-coiling can create a problem with respect to fatigue.

The test requirement for fatigue is to survive 5 million stress cycles, at stress conditions that depend on the size of the bar.

Cutting and Proper Design of Ribs is also essential for bond properties of steel with concrete. Arcelor Mittal rebars have uniformly designed ribs which ensure uniform and strong bond with concrete and also excellent fatigue strength.

#### G) Superior Product Manufacturing Technology, People and Processes

Superior product quality requires not only good plants but also good people and good processes.

Arcelor Mittal rebars are produced using iron ore and coal from their own captive mines through the primary steel making route. Molten Steel undergoes superior refining processes to ensure consistent properties in the rebar.

A lot of money and resources is invested every year in research and development to provide customers with superior quality products.

Because Quality Outcomes depend on the quality of People, ArcelorMittal always seeks to attract and nurture the best people.

All plants have not only all the process certifications such as ISO 9001:2008 and OHSAS but also they have appointed third party inspection for their processes and products in manufacture of rebars

#### H) UKCARES Approval

In text books on construction, it is always mentioned that since rebars are manufactured in factory setting more stress should be put on concrete on site rather than rebars. But the many failures of steel on site make the quality claims of many steel manufacturers hollow.

In India, though everybody claims good quality one does not know the true state of affairs at the plant level. One only has to rely on testing which is done after material reaches on site. And by the time the material test results come, usually the material is consumed.

Arcelor Mittal plants are approved by third party agency CARES.

CARES is an independent, not-for-profit certification body, established in 1983 to provide confidence to the users, purchasers and detailers of constructional steels through a regime of regulation, testing and inspection. It operates for the benefit of the construction industry offering certification schemes for companies that produce materials, components or offer services, primarily to the reinforced concrete industry. Clients can specify CARES approved companies and products with confidence that they will comply with the relevant product or system standards and without the need for verification testing by the purchaser or contractor.

Certification by CARES can be used by manufacturers in support of CE marking. CARES is an international operator, providing certification in over 40 countries worldwide. In order to provide product users with the confidence that their products arrive at the construction site as specified CARES certifies firms at all levels through the supply chain, from the production of hot metal through processing and stocking and distribution. CARES endeavors to ensure that its certification is required by major companies operating in the construction supply chain in the UK, Europe, Middle East and the Far East in particular.

Further details about cares can be had from [www.ukcares.co.uk](http://www.ukcares.co.uk)

I) Mill Marking

Arcelor Mittal material is marked with the AM logo at regular intervals on each bar.

J) Packing

Arcelor Mittal rebars are packed in approx 2MT ton bundles for ease of handling.

K) Prices

ArcelorMittal is competitively priced as compared to other Big Steel Plants.

L) Length

Lengths of the bars are 12meters.

For further details kindly contact

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