



TMT BAR

REINFORCING STRENGTH

GERMAN
THERMEX®
TECHNOLOGY



IS:1786
2008



FE 500D & 550D TMT BAR

RS TMT - 500D & 550D REBAR PRODUCT GUIDE



ABOUT US

श्री RAGHUVIR STEEL PVT LTD an emerging organization incorporated by Young & Enthusiastic entrepreneurs with an experience of almost 2 decades in steel industries. Now, RSPL has set up most advanced SMS and Hot-Rolling Mill projects in the heart of Saurashtra – Rajkot.

The introduction of RS TMT-500D Rebar has important implications for everyone involved in reinforced concrete design and construction.

With an increase in minimum yield strength to 500 MPa, & 550 MPa has become more efficient and cost-effective. There is a direct material cost savings of around 10% to 12% obtainable on most projects. Builders will also benefit from simplified reinforcement detailing.

BENEFITS OF USING RS 500 & 550 D TMT BARS VS COMMERCIAL GRADE BARS*

| Sr No. | Content | Results | | | |
|--------|--------------------------|------------------------|-------------|-------------|---------------|
| 1 | Grades | 415 / Commercial Grade | 500 TMT Bar | 550 TMT Bar | 550 D TMT Bar |
| 2 | Saving of TMT Bars | 0% | 2% | 6% | 8% |
| 3 | Volume in Kg | 1000 | 920 | 900 | 880 |
| 4 | Net Savings in Kgs / PMT | 0 | 80 | 100 | 120 |

All Calculation done as per IS structural designing & CNR*

NEW MEASURES FOR DUCTILITY

(IS 13920: 1993 – DUCTILE DETAILING OF REINFORCED CONCRETE STRUCTURES SUBJECTED TO SEISMIC FORCES)

Key changes to IS 13920:1993 include the introduction of new measures of ductility, with steel types classified based on mechanical properties which has been termed as 500D & 550D. In addition Bureau of Indian Standards has combined all reinforcing steel types into the one Standard, IS 1786-2008, replacing IS 1786 - 1984.

RS TMT-500D & 550D, has a minimum tensile strength to yield strength ratio of 1.10 (Cv) and Uniform Elongation (Agt or Eu) of 8% (Cv), will exceed the N Class (normal ductility).

Requirements in the revision of IS 13920:1993 and the new reinforcing steel materials Standard **Fe 500D & Fe 550D** (IS 1786 – 2008).

BAR TYPES

RS TMT 500 D & 550 D & CORROSION RESISTANCE STEEL (RS TMT CRS – 500D & 550 D)

The majority of **RS TMT -500D & 550D** Rebar is made by the THERMEX process, which results in a reinforcing steel with a carbon equivalent (CE) limit of 0.39 max.

RS TMT-500D & 550D Rebar is suitable for use with all types of mechanical splicing systems for joining steel reinforcement like welding of different types for various designs.

In addition, **(RS TMT CRS – 500D & 550D)** has more corrosion resistance because of the unique treatment & microstructure **(Bonding characteristics)** formed in the process.

DIMENSIONS & MASS

RS TMT-500D & 550D Rebar – 08mm to 32mm now available for any complicated designs.

RS TMT CRS – 500D & 550D – 08mm to 32mm now available for more efficient designs.

| BAR SIZE mm | BAR TYPE TC/CRS TC | MASS/METER Kg/m | CROSS SECTION AREA (mm ²) | MIN HOLE DIA.** FOR CLEARANCE (mm) |
|----------------|-----------------------|--------------------|--|--|
| 08 | RS TMT/CRS | 0.370 - 0.395 | 50.27 | 09 |
| 10 | RS TMT/CRS | 0.574 - 0.617 | 78.50 | 12 |
| 12 | RS TMT/CRS | 0.830 - 0.888 | 113 | 15 |
| 16 | RS TMT/CRS | 1.470 - 1.580 | 201 | 20 |
| 20 | RS TMT/CRS | 2.300 - 2.470 | 314 | 25 |
| 25 | RS TMT/CRS | 3.600 - 3.850 | 491 | 29 |
| 32 | RS TMT/CRS | 5.900 - 6.320 | 804 | 38 |

* RS TMT = Thermo mechanically treated; RS CRS = Corrosion Resistance Steel with Thermo Mechanical treatment

* This is the diameter of hole that will allow a bar of nominal size shown to pass through assuming the bar is at maximum size tolerance.

The tolerance on mass per metre is +/- 4.5% for all sizes.

STRENGTH AND DUCTILITY PROPERTIES



RS TMT-500D & 550D Rebar:

Carrying on the Thermo Mechanical Treatment Tradition (THERMEX TECHNOLOGY)

Thermex Technology is one of the processes in manufacturing TMT bars. This technology is from Germany. This technology will give 2 layers in the core of the TMT bars. Outer layer is Martensite and the inner core is Pearlite. This unique formation will give good mechanical properties which can withstand the seismic zone.

RS TMT 500D & 550D Rebar produced by Shri Raghuvir Steel Pvt Ltd has high strength because of unique, patented, mill heat treatment process. The tough outer skin and ductile core of **RS TMT 500D & 550D** results in a reinforcing bar with exceptional toughness, ductility and bendability.

The supply of **RS TMT 500D & 550D** Rebar is on the basis of conformance to batch test results as defined in the proposed new Standard. This will include at least three tests per batch, with the following property requirements:

YIELD STRESS

Average of batch results to exceed 530 MPa, with no individual result below 525 MP (RS 500D)

Average of batch results to exceed 570 MPa, with no individual result below 560 MP (RS 550D)

DUCTILITY VALUES: (TS/YS RATIO AND AGT OR $\sum u$)

Average of batch test results will be not less than the characteristics values. Sufficient production has been completed; statistical data for assessment of conformance to the long term quality levels for determination of characteristic values are also available.



BENDING PROPERTIES

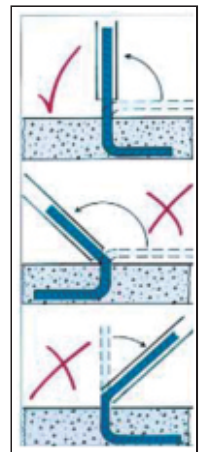
Bending Practice Notes (Refer fig. below)

A number of situations may arise where bars must be bent or rebent on site, or where Pre-bent bars must be straightened. For smaller diameter bars (eg., 08, 10, 12 and 16 mm), this is preferably performed at ambient temperatures, as this has the least effect on steel properties.

The following guidelines should be observed.

THE DIAMETER OF MENDRAL TO BE USED FOR BENDING TMT BARS AS PER IS 1786:2008

| Sr No. | Nominal Sizes (in mm) | Fe 415 | Fe 415 D | Fe 500 | Fe 500 D | Fe 550 | Fe 550 D |
|--------|---------------------------|--|----------|--------|----------|--------|----------|
| | | Nominal Size of Mendral to be used (in mm) | | | | | |
| 1 | Up to and including 10 mm | 50 | 40 | 50 | 40 | 70 | 60 |
| 2 | Over 10 mm | 70 | 60 | 70 | 60 | 80 | 70 |
| 3 | Up to and including 20 mm | 60 | 40 | 80 | 60 | 100 | 80 |
| 4 | Over 20 mm | 80 | 60 | 100 | 80 | 120 | 100 |



(Figure: Process to bend & Rebend the rebars)

For larger diameter bars, the application of heat (eg from an acetylene flame) may be used to reduce the bending force, but a reduction in bar strength may result. (See the section: Effect of heat on ambient temperature properties.) A pipe must not be used to make the initial bend, or to rebend back past the straight position.

Do not use impact blows to bend or rebend the steel.

The initial bend should be performed around a mandrel or former of diameter specified in the relevant code, and generally not less than 4d.

Visually inspect the rebent area for cracks.

Re bending or straightening should be performed using a powered bending tool or a pipe with internal diameter not greater than 2x the nominal bar diameter.

Take care to minimize surface damage.

Welding RS TMT - 500D & 550D Rebar



RS TMT-500D & 550D Rebar produced has a carbon equivalent (CE) limit of 0.39 max and, as such, requires no preheating prior to welding.

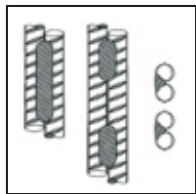
RS TMT CRS – 500D& 550D Rebar has a carbon equivalent limit of 0.44 max, however, will still not require preheating when welded in accordance with the revised Welding Standards.

Other manufacturers' 500 MPa reinforcing steel may be made to higher CE limits and pre-heating may then be required in certain circumstances e.g. for tack & lap welding of larger bars.

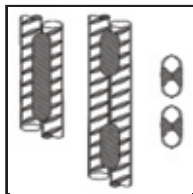
*** Users should also be aware that hydrogen controlled electrodes will be required for all weld types, and matching strength electrodes will be required for butt welds.**



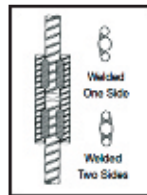
PROCEDURES FOR SPECIFIC WELD TYPES



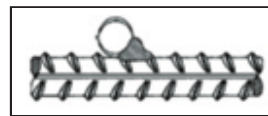
SINGLE SIDED LAP WELD



DOUBLE SIDED LAP WELD



STRAP WELD



LOCATIONAL TACK WELDS



BUTT WELD

GENERAL RULES FOR THE WELDING OF RS TMT-500D & 550D REBAR

All Welding must conform to the requirements of Welding Standards

| | |
|---|--|
| Pre Heat | Not Required |
| Post Heat | Not Required |
| Electrode Type | Hydrogen controlled welding processes and electrodes such as GMAW (MIG), FCAW and low hydrogen MMAW (sticks) must be used for all weld types. Correct control, storage and drying of electrodes is essential. |
| Welding Technique And Heat Input | Best results are achieved using stringer beads where heat input will generally exceed 2.5kJ/mm. input will generally not exceed 2.5kJ/mm. Weaving is not recommended. |
| Welding Practice Notes | <ul style="list-style-type: none"> Observe 200°C maximum limit on interpass temperature. Balance welding on each side of joint as required to minimise distortion. For butt welds, back grind root run on fusion side prior to completing the joint Refer to electrode manufacturer's recommended current ranges and shielding gasses. |
| General Notes | Non-symmetric joints such as lap welds may not be suitable for use in seismic applications – specialist advice and evaluation should be sought in such cases. |

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THE REAL STRONG STEEL