

# The right grade

Fe 415, Fe 500...steel rebars come in several grades. They have specific advantages, too. Your engineer will help you pick the right one

Concrete, a mixture of cement, sand and aggregate, is by far the most stable of building compounds. But it is beset with a problem: low tensile strength and ductility. This means its ability to stretch and to withstand pressure at an angle without breaking is very less.

Now, enters steel. Steel is a metal with great tensile strength and ductility. It can extend these qualities to concrete. In other words, it reinforces concrete. Steel in the form of bars has been doing this job for more than a century now.

Naturally, the quality of steel has an important role in deciding the quality of concrete. Research has periodically produced various kinds of steel bars with qualities that make concrete more stable. It started with mild steel (MS); TOR steel and various grades of TMT followed.

Indian standards specify that the MS bars have a tensile strength of 250MPa. TOR steel is required to have 415MPa. This increase in strength enhances the factor of safety of the construction by a huge margin. Even today, many buildings are designed assuming a strength of 250MPa for Fe 415, a higher grade steel. Hence buildings built with Fe 415 grade steel provide a factor of safety that is much higher than that is required.

But the higher strength of Fe 415 grade TOR steel rebars brings down

ductility, or the ability to retain shape even under pressure, which is also a major requirement of steel reinforcement.

### The TMT advantage

The advent of TMT bars helped overcome this handicap. In the TMT process, the hot steel rebars coming from the rolling mill is rapidly quenched for a short time in a water jet. Thus, the outer layer of the rebar is cooled, forming a martensite structure with high strength. The rebar is removed from the water jet quickly, leaving the core still hot and soft. Hence the rebars are endowed with a soft inner core with high ductility and a hard outer layer that provides it high strength.

The high ductility makes it easy to work with and gives the buildings the ability to withstand shocks such as earthquakes. Such rebars also have the advantage of being thinner, thereby reducing the quantity of steel required and saving space.

Fe 415 TMT bars with much higher strength than mild steel bars provide an extra cushion to the factor of safety of the design. And so, Fe 415 TMT bars became the most commonly used steel

grade in construction of houses in the State.

Fe 415 may be the de facto standard in construction but specialised applications call for special products. Various other grades of steel – from Fe 500 to Fe 600 - are available today, to suit different needs.

### Know your choices

High rise buildings call for steel of higher strength, and hence higher grades of TMT steel – Fe 500 and above – are used in such buildings. This is because using Fe 415 steel will require a large number of rebars to provide the required strength. That would increase the size of the columns. This is a serious concern at a time when space is at a premium – else why should one go for high rises.

Fe 500 is produced using the same TMT process that is used to produce Fe 415. The beauty of the TMT process is that it can produce different grades of steel by making slight changes in the process. If the steel is quenched a little more, the outer martensite layer that provides the high strength to the steel re-



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# The alternative wood

Engineered wood can match hardwood on many counts.  
Easily available, it comes at an affordable cost



Most people have only one variety of wood in their mind when it comes to furnishing their homes: hardwood. That too, of exquisite varieties such as teak, rosewood or mahogany. This is because the charm, class and comfort that wood offers cannot be easily matched by other materials.

However, what stop many from realising the dream are the high cost and less availability of quality hardwood. While planting your own tree could take a while, you have an alternative at hand: engineered wood.

There are several varieties of engineered wood available in the market that can meet your specific requirements. The important ones that can be used for home furnishing are decorative plywoods, prefinished hardboards and floorings. They can match hardwood in terms of looks, class and finish, and at the same time are available at affordable cost.

Engineered wood products in general are dimensionally stable products with their properties spread in all directions. Most of them are fire-resistant:

when a part is charred, it forms an insulation, preventing further progress of the fire. This adds a sense of security to the occupants of a building.

Engineered wood products are made in factories and hence designed to meet application-specific performance requirements. They are available in a wide variety of thicknesses, sizes, grades. They are easy to work with using ordinary tools and basic skills. They can be cut, drilled, routed, jointed, glued, and fastened. Plywood can be bent to form curved surfaces without loss of strength. And large panel size speeds construction by reducing the number of pieces to be handled and installed.

## Decorative plywoods



Decorative plywoods are made with quality plywood at the core and veneers of high quality hardwood at the face. The plywood at the core passes through a series of standard production practices to ensure that they match the specified quality requirements. The face veneers are then fixed to the core using environment-friendly glues. The veneer options vary from teak to rosewood, mahogany, padouk and oriental cherry. They are the best alternative to hard wood for home interiors, offices and furniture, giving them a touch of class.

Decorative plywood panels can be used for a variety of purposes such as wall paneling and partition, table tops and cupboard shutters. There are doors too made of decorative plywood.

Decking plywoods, exclusively designed for decks and hulls in luxury boats/yachts, are the most luxurious in the group. They are specially handcrafted with durable species of water-resistant timber.

## Pre-finished boards

Pre-finished boards are hardboards that come with the surfaces pre-finished with



advanced technology, resulting in outstanding decorative surface akin to natural wood. They can replace hardwood on a wide variety of usages without compromising on the quality and looks, at a fraction of the cost of solid wood.

It is not just the surface finish that makes it a suitable material in home furnishing. It also offers ease of work and longevity. The ready-to-use panels are also amenable to nailing, cutting or screwing. Since there is no need to bond to another substrate, it saves money, time and effort. Some panels are even specially grooved for paneling and ceiling applications.

The UV-cured panels are resistant to ageing and peeling and is protected against moisture and micro-organisms even in extreme climatic conditions with the result that they retain the vi-

brant natural looks for years.

Use: Furniture draw bottom, flush doors, panel doors, automotive coach building, handicraft, toys, partitioning, panel inserts, cladding of auditoriums and studios where acoustic properties and aesthetics are equally important.

### Flooring

Wooden floors are perhaps the symbol of ultimate luxury. And if you ever thought of it, and dropped the idea because of the high cost, then think again. There are affordable wooden floors, made of engineered wood.

Engineered wooden floors are essentially plywood covered with veneers and coated with abrasion-resistant materials. They are easy to lay as they use an advanced tongue-and-groove system that locks them in place. These thin floors (usually called floating floors) can be placed directly over a floor.



Engineered wood products are dimensionally stable with pre-cut joints, and hence are advised for furnishing places with high usage such as showrooms. They are a good choice for indoor courts also.

Planning a home theatre? Wood

has great acoustic features compared to any other material, and hence they are best for home theatres and studios. That good quality engineered wood products can be drilled is another factor that makes them a good choice for such options.

They are resistant to moisture; however, like any wooden material, their optimum life is ensured by keeping them off moisture. The best engineered wood floors can last as long and perform as well as a plank floor.

The most commonly noticed reason for the degradation of wood flooring is a wetting and drying cycle. It is important to ensure that there is no seepage of water into the wooden flooring due to improper construction or plumbing. Don't worry, occasional mishaps involving the spillage of water onto the wooden flooring will not affect the stability. Only a regular wetting, drying cycle will damage it.

*Information courtesy:*

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### Decorative plywoods

- Plywood at the core, veneers on the sides
- Choicest wood such as teak, rosewood
- Less costly than hardwood
- Easy availability
- Easy workability: amenable to nailing, cutting or screwing
- Low emission of glues

**Use:** Panels, doors, partitions, furniture

### Prefinished boards

- Hardboards with pre-finished surface
- Great aesthetics
- Durable
- Easy workability
- Resistant to ageing, peeling

**Use:** Furniture draw bottom, flush doors, panel doors, partitioning, panel inserts, cladding of auditoriums and studios where acoustic properties and aesthetics are equally important.

### Wooden floor

- Veneer top layer
- Plywood core
- Tongue and groove finish: easy to lay
- UV cured; to last long
- Abrasion resistant

bar becomes thicker at the expense of the soft inner core that endows it with ductility. This is exactly what happens in Fe 500 grade TMT steel.

Many engineers recommend Fe 500 grade steel today for ordinary buildings, too, citing its high strength. If you design buildings considering the use of Fe 500 steel in construction, it could help reduce the volume of steel used and reduce the column size. And the savings on this count could more than compensate for the higher price of Fe 500 grade steel.

The rosy part aside, Fe 500 grade steel could pose quite a few site specific issues during construction, especially for small builders. A higher strength and lower ductility means that Fe 500 bars do not bend easily. For example, a 12 mm rebar of Fe 500 breaks when bent into a perfect 'U' shape with zero radius, unlike a similar rebar of Fe-415 grade. It might cause it to crack, too. Manual bending takes its toll on the masons. Hence hydraulic bending machines have to be used to bend the bar. Weldability too is an issue with Fe 500 grade steels.

**Customer care: 94470 65360**

The builders of most high rises that use Fe 500 grade rebars procure them in factory cut sizes, avoiding the need to work on them further. Their designers provide them with the steel detail that helps them procure items of the shelf.

Small builders may not have such luxuries. In the first place, their design might not be for Fe 500 steel, negating the savings in quantity of steel. Even

if their design is for Fe 500 steel, they might not be able to take the due advantage due to a variety of reasons. They might not have access to a steel detail that gives the precise number of various types of structural steel elements needed for the building. Even if they have the steel detail, and can buy factory-cut steel bars based on it, transporting them to work sites in the

**If the Fe 500 steel you bought bends easily and offers no issues with workability, you might have been taken for a ride.**

interiors through roads that hardly allow a truck to pass is a difficult task. That is the main reason why factory cut steel has not picked up in Kerala. In such a situation they will have to resort to fashioning the required steel elements at the work site itself.

And then, an absence of the machinery required to bend the Fe 500 rebars would lead to an increase in labour costs and a decline in quality. This is especially true if the rebar has to be shaped into tight curves. In, short they would have to incur the extra cost without getting the perceived benefits.

All this when an Fe 415 TMT rebar would have more than satisfied their requirements. An Fe 415 bar would be an optimal choice for normal buildings due to its right combination of strength and ductility. Adding more strength at the cost of

ductility might not be the best solution for your dream home. In fact, IS:13920, the code of practice for ductile detailing for structures for seismic forces, recommends steel reinforcements of grade Fe 415 or less. Only select grades of Fe 500 rebars having an elongation more than 14.5 per cent, against the normal 12 per cent can be used for the purpose.

One should also be on the lookout for fraudsters who sell other grades of steel under the Fe 500 label. The increasing demand for Fe 500 grade steel in the market and the inability to solve the problems associated with it provides ample room for such fraudsters. If the Fe 500 steel you bought bends easily and offers no issues with workability, you might have been taken for a ride. After all, India is a country where the government has not yet been able to mandate ISI certification for steel makers.

So, before you set out to purchase steel for your dream home, assure yourself that you go for the right grade. If you have a premium for space, a design that has factored in the use of Fe 500 steel, and have access to factory-cut steel, it is all for you. For the rest, Fe 415 will be the choice. And when in doubt, ask your engineer.

**IS:1786 (Fe 415)**

Yield Stress,N/mm2: 415 (minimum)  
Tensile Strength,N/mm2:10% over YS  
Elongation ,%min:14.5(minimum)

**IS:1786 (Fe 500)**

Yield Stress,N/mm2: 500 (minimum)  
Tensile Strength,N/mm2:10% over YS  
Elongation ,%min: 12(minimum)



When you choose Metcon TMT bars, you're ensuring inner strength and quality that'll outlast the tests of time. High-performance ductility and strength of latest German TMT technology bind firmly into each Metcon TMT bar. That's not all. Metcon TMT is so obsessed with perfection that the TMT bars excel even ISI and ISO quality parameters. This world class quality is well-proven in quality tests\*.

**METCON STRENGTHS**

- Superior TMT quality  mark on every meter
- Tremor resistance
- Better bonding, thanks to unique rib patterns
- Resists rusting
- Correct weight to length proportion
- Helps you save 15% on bar costs, when compared to ordinary bars.

**SAVE 15% ON STEEL COSTS**



Call Customer Care Cell for more details: 94470 65360

Available in 8, 10, 12, 16, 20 mm

\*Conducted in Central Govt. approved centres.