

INDIAN METAL BUILDING FORUM

IMBF

Connecting India's Metal Building Ecosystem

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RESOURCE CENTRE

Technical Knowledge Series

TECHNOLOGY CASE STUDY

Fire-Resistant Structural Steel for Metal Buildings: What a New E350 Grade Means for Design and QA/QC

Based on a news report of 5 October 2026 on a BIS-certified fire-resistant E350 steel from Tata Steel

Understand the Material

Verify the Claim

Design the System

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TECHNICAL CATEGORY:	Materials / Fire performance / PEB and structural steel

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IMBF is vendor-neutral. This case study explains a reported development; it is not an endorsement of any product.

A DOCUMENT CONTROL AND STATUS

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Technical review status

- ☒ Research Draft (based on one news report; manufacturer data and the standard not yet consulted)
- ☐ Technical Review
- ☐ IMBF Approved for Publication

Disclaimer and vendor-neutrality statement

This document has been prepared by the Indian Metal Building Forum (IMBF) as an educational and technical knowledge resource. It is based on a published news report and on general engineering knowledge.

IMBF is independent and vendor-neutral. Naming a company or product here reports a public announcement. It is not an endorsement, a recommendation or a comparison with other producers, who may offer steels to the same standard.

IMBF has not tested the product and has not seen the manufacturer's technical data or the BIS licence. Product claims are reported as stated in the source.

Text marked "IMBF commentary" is general engineering explanation by this series. It is not a statement by the manufacturer or by the Bureau of Indian Standards.

Nothing here replaces project-specific structural and fire-engineering design, the National Building Code, statutory fire approval, manufacturer instructions or competent professional advice. IMBF does not accept responsibility for decisions made solely on the basis of this document.

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EXECUTIVE SUMMARY

Question	Answer
What was announced?	A hot-rolled, fire-resistant structural steel of grade E350, developed by Tata Steel. [S1]
When and where?	Reported on 5 October 2026 from Bhubaneswar, India. [S1]
What is claimed?	The steel keeps two-thirds of its room-temperature yield strength at 600 deg C for up to three hours. [S1]
Is it certified?	It is reported as certified by the Bureau of Indian Standards under IS 15103, the Indian standard for fire-resistant structural steel. [S1]
How is it achieved?	By alloy design: an optimised combination of microalloying elements and control of microstructure. Composition is not given. [S1]
Where can it be used?	Reported as suitable for fire-resistant structural components, including hollow sections and sections used in pre-engineered buildings. [S1]
Why does it matter?	Steel loses strength as it heats. A steel that loses it more slowly gives occupants and fire crews more time before the structure is compromised. [S1]
Main message for the industry	A better material widens the options for fire design. It does not make a building fire-safe by itself: the system, the connections and the approvals still have to be engineered.

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BACKGROUND: STEEL AND FIRE

IMBF commentary.

- Structural steel does not burn, but its yield strength and stiffness fall as temperature rises. Widely used design curves show conventional carbon steel keeping its full yield strength to about 400 deg C, then dropping to roughly half near 600 deg C and to about a tenth near 800 deg C.
- In a fully developed fire the gas temperature is far above 600 deg C. In the standard fire test curve it is about 945 deg C after one hour and about 1050 deg C after two hours.
- Unprotected steel members, especially thin ones, follow the gas temperature quickly. This is why fire ratings are normally achieved with protection: intumescent coating, board, spray, concrete encasement or water sprinklers, together with compartmentation.
- Light, optimised members, typical of PEB, heat faster than heavy sections because they have more exposed surface for each kilogram of steel.
- A steel that keeps more strength at 600 deg C raises the temperature the member can reach before it can no longer carry its load, and therefore the time available.

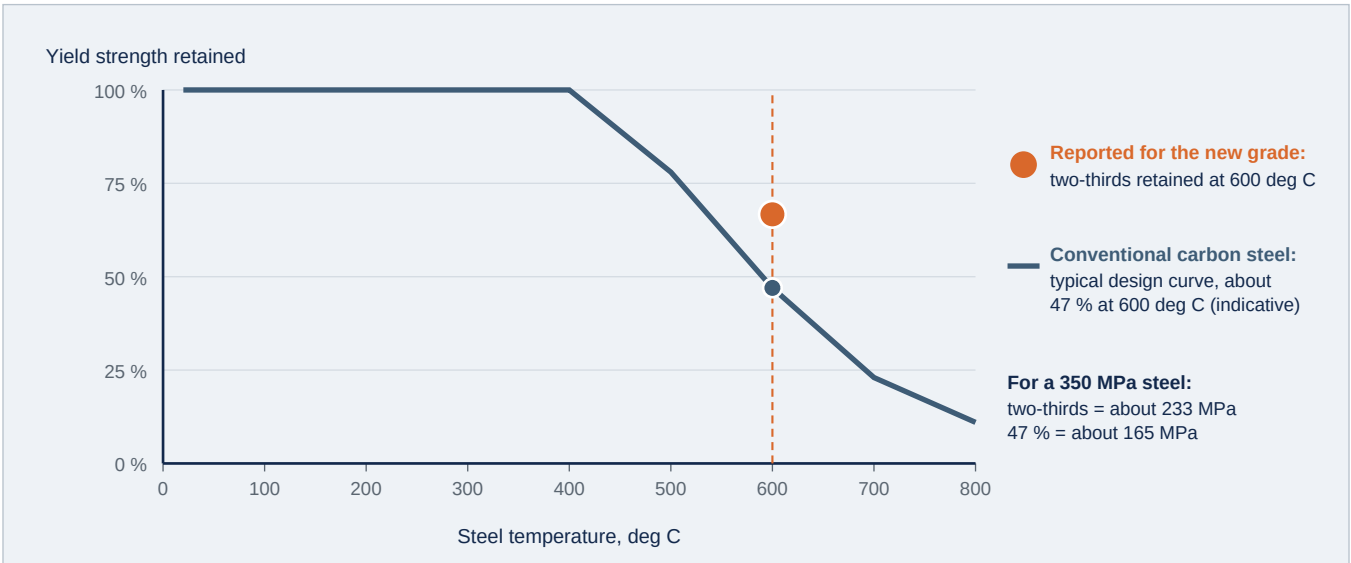


Figure 1. Reported strength retention of the new grade at 600 deg C against an indicative design curve for conventional carbon steel. Original IMBF chart. The conventional curve is drawn from commonly used design values and must be checked against the design code; only the single orange point comes from the source.

3 WHAT THE CLAIM MEANS, AND WHAT IT DOES NOT

The report says	What it does not say (IMBF commentary)
Two-thirds of room-temperature yield strength is kept at 600 deg C.	Performance above 600 deg C. A real fire can take unprotected steel well beyond that.
The strength is kept for up to three hours at that temperature.	That a building made of it has a three-hour fire rating. A fire rating belongs to a tested or engineered assembly, not to a steel grade.
The steel is BIS-certified under IS 15103.	That fire protection can be left out. Any reduction in protection needs a fire-engineering assessment and approval by the fire authority.
It suits hollow sections and sections used in PEB.	Which products, thicknesses and widths are available, in particular plate and coil for built-up members and cold-formed purlins and girts.
Structural performance requirements are not compromised.	Weldability data, toughness, price and delivery. These must come from the manufacturer.

4 REPORTED PRODUCT DATA

Item	Reported data	Source
Producer	Tata Steel	[S1]
Product form	Hot-rolled structural steel	[S1]
Grade	E350	[S1]
Elevated-temperature property	Two-thirds of room-temperature yield strength at 600 deg C, for up to three hours	[S1]
Standard and certification	IS 15103 (fire-resistant structural steel); certified by BIS	[S1]
Metallurgy	Microalloying and microstructural engineering	[S1]
Stated applications	Structural hollow tubes; sections used in pre-engineered buildings; industrial facilities, warehouses, large-span structures	[S1]
Chemical composition, thickness range, weldability, toughness, test method, price, availability	Not established in the available source.	-

5 OPPORTUNITIES FOR THE METAL BUILDING INDUSTRY

IMBF commentary. Each point is a possibility to be proved by design, not a promised benefit.

Area	Opportunity	Condition
Design	Higher critical temperature of members; longer time to loss of load capacity.	Fire design to the code using verified elevated-temperature properties.
Fire protection	Possible reduction in thickness or extent of applied protection on some members.	Fire-engineering justification and authority approval.
Safety	More time for evacuation and firefighting in warehouses and industrial buildings.	Detection, exits and compartmentation still required.
Asset protection	Better chance that a frame survives a moderate fire and can be repaired.	Post-fire assessment by a structural engineer.
Cost	Trade-off between a steel premium and savings in protection and maintenance.	Whole-life costing for the specific project.
Productivity	Less site-applied protection can shorten the programme.	Only where protection is actually reduced by approved design.

6 DESIGN QUESTIONS TO SETTLE BEFORE USE

- **Whole load path.** Rafters and columns in fire-resistant steel are of limited value if bolts, end plates, welds, bracing rods, purlins or the fixings of fire walls fail first.
- **Connections.** Ask for elevated-temperature data for bolts and for weld metal, or protect the connections.
- **Secondary members.** Cold-formed purlins and girts are thin and heat quickly; they also restrain the main frames. Check what happens to frame stability when they soften.
- **Temperature reached.** Calculate the steel temperature for the design fire and section size. If it exceeds 600 deg C, the reported property does not cover it.
- **Deflection and expansion.** Stiffness also falls with temperature, and heated members expand. Check deflection, thrust on walls and stability, not only strength.
- **Code basis.** Use the fire provisions of IS 800 and the National Building Code of India, and agree the approach with the fire authority at the start.

7 FABRICATION AND QA/QC IMPLICATIONS

Area	What changes with a fire-resistant grade
Ordering	State IS 15103 and the grade on the purchase order; do not rely on "E350" alone.
Material certificates	Mill test certificate should report the elevated-temperature tensile test as well as room-temperature properties, and carry the BIS licence reference.
Traceability	Fire-resistant and ordinary E350 look the same. Mark and store them separately, and keep heat-number traceability to each member.
Welding	Different alloy content can change carbon equivalent, preheat and consumable choice. Confirm whether existing WPS and PQR cover the grade; qualify new ones if not.
Consumables	Check whether the weld metal needs matching elevated-temperature strength, with the manufacturer and the designer.
Cutting, forming, galvanizing	Ask the manufacturer for any limits on thermal cutting, cold forming radius and hot-dip galvanizing.
Substitution	No replacement of fire-resistant steel by ordinary steel, or the reverse, without the designer's written approval.
Records	As-built record of where fire-resistant steel was used, for the owner and for any later modification.

8 INDIAN CONTEXT

- Steel-intensive construction, including PEB, is growing across industrial, commercial and infrastructure projects, which makes fire performance a more frequent design question. [S1]
- Warehouses and logistics buildings carry high fire loads in large undivided volumes. Fire safety there depends first on detection, sprinklers, compartmentation and exits; material choice supports these.
- Applied fire protection is often value-engineered out, damaged in service or left unmaintained. A material with inherent resistance cannot be scraped off, which is its practical appeal.
- An Indian Standard and BIS certification give specifiers a clear way to call for the material and to check it on receipt. [S1]
- Designers, fabricators and fire authorities will need shared guidance on how to take credit for such steels. This is a subject IMBF can help convene.

Reference	Subject	Relevance
IS 15103	Fire-resistant structural steel	The product standard named in the report. [S1]
IS 2062	Hot-rolled structural steel	Ordinary structural grades, for comparison.
IS 800	General construction in steel: code of practice	Structural design, including design for fire.

Reference	Subject	Relevance
National Building Code of India, Part 4	Fire and life safety	Required fire resistance by occupancy and building type.

Clause numbers are deliberately not cited. Only IS 15103 is named in the source; the other titles are from general knowledge and must be confirmed against current BIS publications.

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IMBF CHECKLIST: BEFORE SPECIFYING OR ACCEPTING FIRE-RESISTANT STEEL

Point	Required check	Status	Remarks
Fire strategy	Required fire resistance for the building fixed with the fire authority	☐	
Design	Steel temperature and member capacity in fire calculated by a competent engineer	☐	
Protection	Any reduction in applied protection justified and approved in writing	☐	
Load path	Connections, bolts, bracing and secondary members checked for fire	☐	
Product data	Manufacturer data sheet with elevated-temperature properties obtained	☐	
Availability	Required sections, plate and coil sizes confirmed available in the grade	☐	
Purchase order	IS 15103 and grade stated; BIS-marked material required	☐	
Certificates	Mill certificate shows elevated-temperature test; heat numbers recorded	☐	
Segregation	Fire-resistant steel marked and stored apart from ordinary steel	☐	
Welding	WPS, PQR and consumables confirmed for the grade	☐	
Substitution	No substitution without designer approval	☐	
Records	As-built location of fire-resistant steel handed to the owner	☐	

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KEY TAKEAWAYS

5 engineering lessons

1. Steel strength falls with temperature; this grade is reported to fall more slowly.
2. The claim is a material property at 600 deg C, not a building fire rating.
3. Thin, light members heat fastest.
4. Connections and secondary members can govern in fire.
5. Check stiffness and expansion as well as strength.

5 management lessons

1. Agree the fire strategy before choosing material.
2. Compare whole-life cost, not steel price.
3. Do not delete fire protection without approval.
4. Ask producers for full technical data.
5. Stay vendor-neutral: specify by standard.

5 QA/QC lessons

1. Order to IS 15103, not to "E350" alone.
2. Demand the elevated-temperature test on the certificate.
3. Segregate and trace the material.
4. Confirm welding procedures for the grade.
5. Record where it is used.

5 preventive actions

1. Request product data from producers of IS 15103 steel.
2. Run a trial fire design on a typical PEB frame.
3. Brief detailers and stores on segregation.
4. Engage fire authorities on design credit.
5. Develop IMBF guidance on fire design of metal buildings.

11 IMBF KEY MESSAGE

"A steel that holds its strength longer in fire is a real gain for metal buildings. The gain is realised only when the whole system is designed, certified, traced and approved around it. Specify by standard, verify by certificate, and engineer the fire case."

12 SOURCE REGISTER

Ref	Source and organisation	Date	Used for	Consulted?
S1	Tata Steel develops fire-resistant structural steel for safer buildings. H. K. Rout, Business Standard, Bhubaneswar. https://www.business-standard.com/companies/news/tata-steel-develops-fire-resistant-structural-steel-for-safer-buildings-126100501205_1.html	5 Oct 2026	All statements about the product, its certification, applications and context	Yes, in full
S2	Manufacturer's press release and product data sheet.	2026	Would confirm composition, sizes, weldability and test basis	No
S3	IS 15103, Fire resistant steel: specification. Bureau of Indian Standards.	-	Named in S1 as the product standard	No

Limits of this draft: it rests on one news report of a company announcement. The claim has not been checked against the manufacturer's data, the BIS licence or IS 15103. Fire temperatures, the conventional-steel curve in Figure 1 and all design guidance are general engineering knowledge written by IMBF and should be verified by a fire or structural engineer before publication. No photograph from the source is reproduced.

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