



उत्पाद मैनुअल
Specification for Fire-Resistant Steel
IS 15103:2002 के अनुसार

PRODUCT MANUAL
FOR Specification for Fire Resistant Steel
ACCORDING TO IS 15103:2002

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम, 2018 की योजना- I के तहत प्रमाणन के संचालन में अभ्यास और पारदर्शिता के संचालन में पारदर्शिता सुनिश्चित करने के लिए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज़ का उपयोग बीआईएस प्रमाणन लाइसेंस/प्रमाणपत्र प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	उत्पाद Product	:	IS 15103:2002
	शीर्षक Title	:	Specification for Fire Resistant Steel
	संशोधनों की संख्या No.of amendments	:	1
2.	नमूना दिशानिर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	No specific requirement.
b)	समूहीकरण दिशानिर्देश Grouping Guidelines	:	Please refer Annex – A
c)	नमूने का आकार Sample Size	:	For mechanical test: 1 meter For chemical test: 5 pieces of 50 mm X 50 mm
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer Annex – B
4.	निरीक्षण और परीक्षण की स्कीम Scheme of Inspection and Testing	:	Please refer Annex – C
5.	एक दिन में संभावित परीक्षण Possible tests in a day		

	All tests are possible to be carried out in a day	
6.	लाइसेंस का दायरा /Scope of the Licence:	
	Licence is granted to use Standard Mark as per IS 15103:2002 with the following scope:	
	Name of the product	Fire Resistant Steel
	Grades	FR-Fe 410, FR-Fe490
	Form	Beam, Plate, Sheet, Strip, Sections, bars etc.
	Shapes and Sizes	Range of nominal sizes, e.g. Round bars of diameter from .. m up to and including .. mm

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN,9, BAHADUR SHAH ZAFAR MARG,
NEW DELHI-110002

**ANNEX-A to the Product Manual for
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GROUPING GUIDELINES

- 1) The following grouping based on type of product, shall be followed for considering grant of licence/inclusion as per IS 15103:2002

Group Number	Group Description	Grouping guidelines
1	Flat Products: (1) Plates, Strips, Flats (2) Bulb Flats	One sample of any size/type of flat products shall be drawn for testing to cover all sizes/types being manufactured. One sample from each grade to be tested for covering that grade
2	Plates for ship's hull structure	One sample of any size of hull plates shall be drawn to cover all sizes being manufactured One sample from each grade to be tested for covering that grade
3	Sections: (1) Beam, Column, Channel Angle Sections (2) Bulb Angles, (3) Sheet Piling Sections (4) Channel sections (5) Tee Bars	One sample of any size/type of Steel section shall be drawn for testing cover all sizes/types being manufactured. One sample from each grade to be tested for covering that grade
4	Hollow Section	One sample of any size/type of Steel section shall be drawn for testing cover all sizes/types being manufactured. One sample from each grade to be tested for covering that grade
5	Bars: (1) Round and Square Bars	One sample of any size and shapes of bars shall be drawn for testing cover all sizes and shapes being manufactured. One sample from each grade to be tested for covering that grade

- 2) While considering grant of licence/inclusion of additional varieties, it shall be ensured that requisite manufacturing facilities, testing equipments are available with manufacturer.
- 3) During operation of licence, samples of all varieties covered in the scope of licence shall be drawn for testing in rotation, to the extent possible

ANNEX – B to the Product Manual for
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LIST OF TEST EQUIPMENTS

Major test equipment required to test as per the Indian Standard

Sl. No.	Tests Used In With Clause Reference	Test Equipment/Chemical
1	Chemical composition cl.7., Table 1 and Weldability, cl.8.	Instrumental Spectrometer: inductively coupled plasma atomic-absorption spectrometry, inductively coupled plasma mass emission, techniques, spark source optical spectrometry, Spectrophotometer in case of instrumental methods Or other chemical methods as below
	Carbon and Sulphur	Strohlein or Leco apparatus with all attachments Barometer with chart, Hot plate, Muffle furnace, Complete range of glass wares, measuring cylinders, Desiccators, porcelain boats or ceramic crucibles, Thermometer, Electronic Balance, Distilled Water, Hot air oven, Oxygen-99.5 percent minimum purity, ether or acetone Standard Reference Material (NML) with certificate Reagents for C: tin granules or pure iron fillings, acidulated water/brine water, methyl red, caustic potash Reagents for S: Ceramic boats/crucibles – desiccators, Fluxes-Low sulphur copper, tin or iron, Dilute hydrochloric acid, Starch Iodide solution, Potassium iodate
	Silicon content	Medium textured filter paper, Porcelain casserole, platinum crucible, filter paper pulp, hot plate, hot air oven, muffle furnace Reagents: Silver nitrate solution, concentrated nitric acid, concentrated sulphuric acid, Dilute hydrochloric Acid, Dilute Sulphuric Acid, Perchloric Acid, Tartaric acid and 4hydrofluoric acid
	Phosphorus content	Weighing balance, Heater/ Heating element along with energy regulator, Ice water bath, Vol Flask Cap – 1 litre, (Whatman) filter paper No. 040, Suction Filtration Facility, Filter paper pulp pad, Standard Reference Material (NML) with certificate Potassium Permanganate (KMnO ₄), Sodium Nitrite (Na ₂ NO ₃), Ammonium Molybdate [(NH ₄) ₂ Mo ₂ O ₇], Ammonium Phosphate [(NH ₄) ₃ PO ₄], Page 5 of 9 Potassium Nitrate (K ₂ NO ₃), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium

		Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO ₄), Sulphurous Acid, ,Hydrobromic Acid(HBr),other chemicals and reagent as applicable
	Chromium content	Hot plate, stop watch Reagents: dilute sulphuric acid and phosphoric acid mixture, concentrated nitric acid, ammonium persulphate, silver nitrate, dilute hydrochloric acid, ferrous ammonium sulphate, standard potassium permanganate solution.
	Mo content	Weighing Balance, Heater/Heating Element, Ashless Filter Paper, Glassware, Ashless Paper Pulp, Stirrer, Platinum Crucible, Hot Plate Reagents: Dilute Sulphuric Acid, Conc.Nitric Acid, Hydrofluoric Acid, Boric Acid Solution (4%), Solid Potassium Bisulphide, Ferrous Sulphate Solution (5%),Alpha-Benzoinoxime, Ethanol, Bromine Water, Dilute Ammonium Hydroxide Solution,Sulphuric Acid- Benzoinoxime Wash Solution, Conc.HCl, Dil.HCl, Solid Tartaric Acid, Hydrogen Sulphide Gas, Hydrogen Sulphide Wash Solution,Cinchonine Hydrochloride
2	Tensile Test @Ambient Temperature cl.10., Table-3	Universal Tensile Testing Machine with necessary attachments
3	Tensile Test @Elevated Temperature 600 C cl.10., Table-3	Universal Tensile Testing machine for High Temperature Test with temperature control arrangement and strain/Strain measurement arrangement.
4	Bend Test, Cl.11.3	Steel Mandrels (for bend tests), Bend Testing machine. and suitable bending device.
5	Impact Test, Cl. 12	Charpy Impact tester, V notch cutting machine Deep Freezer/Subzero soaking bath Profile Projector Thermometer
5	Freedom from defects, Cl. 13 and Dimensions and Tolerances, Cl. 14	Magnifying glass, Vernier caliper, Micrometer, Steel Scale, Try-square, Radius gauges, Feeler Gauges, Measuring Tape, Depth gauges, Straight edges, Magnetic V-block, Angle Protractor
6	Mass, Cl. 16	Weighing machine

The list above is indicative only and may not be considered as exhaustive

ANNEX C to the Product Manual for
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SCHEME OF INSPECTION AND TESTING

1. LABORATORY: A laboratory shall be maintained which shall be suitably equipped and staffed, where the tests shall be carried out in accordance with the methods given in the specification.

1.1 All testing apparatus/measuring instruments shall be periodically checked, verified and calibrated as appropriate and records of such checks/verification, calibration shall be maintained.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. PACKING AND MARKING–The Standard Mark as given in Schedule of the license shall be incorporated on the product and/or the Test Certificate accompanying each consignment of material, provided always that the material thus marked conforms to the requirements of the Indian Standard.

3.1 Marking and packing shall be done as per the provisions of the Indian Standard, provided always that the product thus marked and packed conforms to all the requirement of the specification.

4. CONTROL UNIT – For the purpose of this scheme, the entire quantity of Fire Resistant Steel of the same grade and form, manufactured from same cast/heat under identical conditions in a day shall constitute a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

5.1 All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

6. TEST CERTIFICATE- For each consignment of BIS Certified material conforming to IS 15103:2002, there shall be a test certificate which shall contain the Standard mark, cast number, size, dimensions, and the corresponding test results (as given in Annexure I).

7. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016. Any rejected material which is potentially re-salable be sheared or cut or deformed in such a manner that it cannot be used for any other purpose except re-melting. A separate record shall be maintained giving information on quantity and cast number/coil number/control unit number, as applicable, relating to all such rejections/defective/sub- standard material of the production not conforming to the requirements of the Specification and the method of its disposal. Such material shall in no case be stored together with that conforming to the Specification. The Standard Mark (if already applied) on rejected material should be defaced.

TABLE 1 - LEVELS OF CONTROL

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or)S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods Clause Reference			No. of Sample	Frequency	Remarks
7 , 8	Chemical Composition & Weldability		IS 228 (various parts) I or established instrumental method				
	Ladle Analysis	7.1	-do-	R	One	Each Heat	Applicable for manufacturers with steel making facilities
	Product Analysis	7.2	-do-	R	i)Nil	i)Nil	i)Applicable for manufacturers with steel making facilities.
					ii)One	ii)Each Cast	ii)*Applicable for manufacturers feeding to rolling mills through reheating. Furnace (PI see note 3)
10	Tensile Test @Ambient Temperature	10.1 to 10. 3	IS 1608 (Part 1)	R	1	Every Control Unit	----
10	Tensile Test @Elevated Temperature	10.1.1	IS 1608 (Part 2) Annex A of IS 15103	R	1	Every Control Unit	-----
11	Bend Test	11.1 to 11.3	IS15103 IS1599	R	1	Every Control Unit	-----
12	Impact Test	12.1 to 12.3	IS15103 IS1757 Part 1	R	1	Every Control Unit	-----
13	Freedom from defects	13.1 to 13.2	IS 15103	R	Manufacturers shall maintain adequate inspections/in process controls to ensure freedom from defects		

14	Dimensions & Tolerances		IS15103 IS 808 IS 12779 IS 1173 IS 1252 IS 1730 IS 1732 IS 1863 IS 2314 IS 3954 IS 4923 IS 5488	R	Adequate inspection to ensure that the material conforms to the requirements of the specifications. Nominal Dimensions of Parallel Flange Beams and Column Sections are covered under IS 808. Rolling and Cutting Tolerances of Parallel Flange Beams and Column Sections are covered under IS 12779.
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Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.

Note-2: Levels of Control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification.

Note-3: No testing is required for product analysis (chemical composition) if material is ISI marked and received with test certificate indicating conformity.

ANNEXURE-I
XYZ IRON AND STEEL COMPANY
(Registered office Address and works address)
TEST CERTIFICATE FOR **Fire Resistant Steel**

BIS
STANDARD
MARK

TEST CERTIFICATE No. _____
TO M/s _____
DATE _____

We certified that the material described below fully conforms to 15103:2002 Chemical composition and Physical properties of the product, as tested in accordance with the Scheme of Testing and Inspection contained in the BIS Certification Marks Licence No. CM/L _____ are as indicated below against each order No.

(PLEASE REFER TO IS 15103:2002 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	Section (nom Size)	Control Unit No.	Grade & Quality	Quantity in tonnes	CHEMICAL COMPOSITION											Tensile Properties at Ambient Temperature			Tensile Properties at 600 °C	Impact Test	Bend Test	Remarks
					C	S	P	Si	Mn	Cr	Mo	Nb	V	Ti	CE	Yield Strength	Tensile Strength	Elongation	Yield Strength at 600°C			
					%	%	%	%	%	%	%	%	%	%	%							

REMARKS
WAGON NO.
TRUCK NO.

FOR XYZ IRON AND STEEL COMPANY