



PM/ IS 2062/ 1/ June 2018

PRODUCT MANUAL FOR
Hot Rolled Medium and High Tensile Structural Steel
According to IS 2062:2011

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.	Product	:	IS 2062:2011
	Title	:	Hot Rolled Medium and High Tensile Structural Steel
	No. of amendments	:	1
2.	Sampling Guidelines		
a)	Raw material	:	Material produced by re-rolling finished products (virgin or used or scrap), or by rolling material for which the metallurgical history is not fully documented or not known, are not acceptable. Since the starting material for re-rollers is mostly billets, ingots, it has to be to be ISI marked as per IS 2830.
b)	Grouping Guidelines	:	Please refer Annex - A
c)	Sample Size	:	For mechanical test: 1 metre + Prepared test pieces for impact test For chemical test : 5 pieces of 50 mm length/50 g drilling
3.	List of Test Equipment	:	Please refer Annex - B
4.	Scheme of Inspection and Testing	:	Please refer Annex - C
5.	Possible tests in a day	:	Freedom from defects, Dimensions, Tensile test ,Bend test, Impact (Charpy) Test ,Chemical Composition: By chemical method -- C, S, Mn or By instrumental method –all required elements.
6.	Scope of the Licence :		
	Licence is granted to use Standard Mark as per IS 2062:2011 with the following scope:		
	Name of the product	Hot Rolled Medium and High Tensile Structural Steel	
	Type	<i>[Grade Designation with Type and Quality]</i>	
	Size	<i>[Mention range of nominal sizes for various steel varieties (flat products/sections/Steel bars)</i>	

ANNEXURE A
TO PRODUCT MANUAL FOR
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GROUPING GUIDELINES

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i) Hot Rolled Medium and High Tensile Structure steel according to IS 2062: 2011 are designated as per the following:

Higher Grade ↓	Grade Designations	Quality
	E250	A, BR, B0, C
	E275	
	E300	----->
	E350	Higher Quality
	E410	
	E450	A, BR
	E550	
	E600	----->
	E650	Higher Quality

ii) The following grouping based on type of product, shall be followed for considering grant of licence/inclusion as per IS 2062:2011

Group Number	Group Description	Grouping guidelines
1	Flat Products: (1) Plates, Strips & Flats (2) Bulb Flats	<p>One sample of any size/mode of de-oxidation of flat products Higher Grade and Higher Quality shall be drawn for testing. On testing of the sample, all other Lower grades of higher to lower Quality of flat products alongside Higher Grade and Higher to lower Quality shall be covered in scope of licence.</p> <p>In case highest quality is not specified for the sample of higher grade offered then one more sample of the immediate lower grade with highest quality intended to be covered shall also be drawn for testing.</p> <p>Eg: One sample of highest grade E 650 of quality BR is offered, another sample of grade E 410 of quality C is also to be drawn for covering flat products of grades E 250 to E 650 quality A, BR and grades E 250 to E 410 of Quality B0, C.</p>
2	Sections: 1) Beam, Column, Channels and Angles (2) Bulb Angles, (3) Sheet Piling Sections (4) Channel sections (5) Track Shoe Sections (6) Parallel Beam and Column sections (7) Tee Bars	<p>One sample of any size of Steel section shall be drawn for testing. On testing of sample of Higher Grade and Highest Quality, all other Lower grades and higher to lower Quality of the Steel Sections alongside Higher Grade and Higher to lower Quality shall be covered in scope of licence.</p> <p>In case highest quality is not specified for the sample of higher grade offered then one more sample of the immediate lower grade with highest quality intended to be covered shall also be drawn for testing.</p> <p>Eg: One sample of highest grade E 650 of quality BR is</p>

		offered, another sample of grade E 410 of quality C is also to be drawn for covering sections of grades E 250 to E 650 quality A, BR and grades E 250 to E 410 of Quality B0, C.
3	Bars : (1)Round and Square Bars	<p>One sample of any size of bars shall be drawn for testing. On testing of sample of Higher Grade and Highest Quality, all other Lower grades and higher to lower Quality of the Steel bars alongside Higher Grade and Higher to lower Quality shall be covered in scope of licence.</p> <p>In case highest quality is not specified for the sample of higher grade offered then one more sample of the immediate lower grade with highest quality intended to be covered shall also be drawn for testing.</p> <p>Eg: One sample of highest grade E 650 of quality BR is offered, another sample of grade E 410 of quality C is also to be drawn for covering bars of grades E 250 to E 650 quality A, BR and grades E 250 to E 410 of Quality B0, C.</p>

While considering grant of licence/inclusion of additional varieties, it shall be ensured that complete manufacturing facilities, testing equipments for essential requirements and testing arrangement for optional requirements are available with manufacturer.

ANNEXURE B
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LIST OF TEST EQUIPMENTS

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Major test equipment essentially required to test as per requirements of Indian Standard.

Sl. No.	Test Equipment/Chemicals and Identification Numbers (Where applicable)	Tests Used in with Clause Reference
1.	Vernier Callipers	Cl.10& 15
2.	Micrometer	Cl. 10& 15
3.	Steel Scale ,Try-square, Radius gauges, Filler Gauges, Depth gauges, Straight edges, Magnetic V-block, Angle Protector (combination set), Protector outside and inside calliper, Carbon Paper	Cl. 10& 15
4.	UTM (0-1000KN)	Cl.10
5.	Steel Mandrels (for bend tests), Templates(for Bend test), UTM attachments/clamps/vice/Magnifying glass	Mandrels is required on the basis of thickness of the products as given in Table-2 as per Cl.11.1 to 11.3
6.	Charpy Impact tester, Thermometer, Specimen Inspection(Profile projector/Go&No Go Gauges, dial stand, surface plate, Micrometer), Deep Freezer	Cl.12.1 to 12.4(only for BR,B0,C Qualities)
7.	Analytical balance (0-200g,Lc:0.1mg)	Cl.8
8.	Weigh M/c	Cl.15
9.	Steel tape	Cl.15
10.	Surface roughness Tester/profile Meter, Manual welding equipment & low hydrogen electrode 4 mm or 5 mm dia Basic coated low hydrogen electrode or Gas Metal Arc Welding/submerged arc welding,Burner Wire brush or abrasive paper Rutile electrode E3 XXXXX as per IS 814, Oven for baking electrode, Spacers more than 2 mm, Magnetic particle equipment with all attachments and accessories, Grinding wheel / polishing wheel and etching solutions, Metallurgical microscope	Cl.13 (For Y Groove Crack ability Test)(For Grade E250C only,if specifically agreed to between the purchaser and the manufacturer/supplier)
11.	NDT equipments, Metallurgical microscope with all attachments, Polishing wheel, etching solution.	Cl.14-OTHER TESTS such as non-destructive testing ,grain size, directionality, inclusion content. (as per agreement between the purchaser and the manufacturer/supplier)
12.	Instrumental methods Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry. Spectrophotometer	Cl8.1,8.2 for C,S,P,Mn,Si,Al, Cu, Microalloying and alloying elements content Mn,S,P,Si

13.	<p>Strohlein or Leco apparatus with all attachments Barometer with chart, Hot plate, Muffle furnace, Complete range of glass wares, measuring cylinders, Desiccator, 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</p> <p>Reagents for S: Ceramic boats/crucibles – desiccators, Fluxes -Low sulphur copper, tin or iron, Dilute hydrochloric acid, Starch Iodide solution, Potassium iodate</p>	cl.8.1, 8.2 –C& S (chemical method, alternative to instrumental method)
14.	<p>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</p> <p>Potassium Permanganate (KMnO₄), Sodium Nitrite (Na₂NO₃), Ammonium Molybdate [(NH₄)₂ Mo₂O₇], Ammonium Phosphate [(NH₄)₃ PO₄], Potassium Nitrate (K₂NO₃), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO₄), Sulphurous Acid, ,Hydrobromic Acid (HBr) , other chemicals and reagent as applicable</p>	Phosphorus content Cl8.1,8.2 (chemical method, alternative to instrumental method)
15.	<p>Hot plate, Conical flask Reagents: silver nitrate, ammonium persulphate sodium arsenite solution, Dilute Nitric Acid, Phosphoric Acid, Dilute Sulphuric Acid, Concentrated Nitric Acid, NaCl Solution, Permanganic acid</p>	Manganese content Cl8.1,8.2 (chemical method, alternative to instrumental method)
16.	<p>Medium textured filter paper, Porcelain casserole, platinum crucible, filter paper pulp, hot plate, hot air oven, muffle furnace</p> <p>Reagents: Silver nitrate solution, concentrated nitric acid, concentrated sulphuric acid, Dilute Hydrochloric Acid, Dilute Sulphuric Acid, Perchloric Acid, Tartaric acid and hydrofluoric acid</p>	Silicon content Cl8.1,8.2 (chemical method, alternative to instrumental method)
17.	<p>Plate, Muffle Furnace, porcelain or silica crucible, Reagents: Hot Wash Solution (dilute sulphuric acid solution 1 : 99 v/v with hydrogen sulphide), dilute sulphuric acid, hydrogen sulphide, Dilute Nitric Acid, Sodium Fluoride, solid, Dilute Ammonium</p>	Cu content Cl8.1,8.2 (chemical method, alternative to instrumental method)

	Hydroxide, Acetic Acid, Potassium Iodide, Starch Solution, Sodium Thiosulphate Solution, Ammonium Bifluoride Solution	
18.	ashless paper pulp, paper pulp pad, hot plate, dessicator, Reagents: ammonium nitrate, methyl red, dilute ammonium hydroxide, Concentrated hydrochloric acid Concentrated nitric acid, Perchloric acid, Hydrofluoric Acid	Ni content C18.1,8.2 (chemical method, alternative to instrumental method)
19.	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.	Cr content C18.1,8.2 (chemical method, alternative to instrumental method)

Nitrogen content shall be occasionally tested.

Note: The above is an indicative list for the purpose of guidance only

ANNEXURE C
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SCHEME OF INSPECTION AND TESTING

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LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipments.

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

3. LABELLING, MARKING, PACKING –

The Standard Mark as given in Column (1) of the First Schedule of the license and Licence Number (i.e. CM/L.....) shall be incorporated, and the 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 – All structural steel hot rolled to same dimensions and form (Angle or Channel or Flat or Round etc.), representing the same cast & grade designation, manufactured under uniform conditions of production in a day in the same place.

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 2062:2011 there shall be a test certificate which shall contain the Standard Mark, the cast/Control Unit number and the corresponding test results (as given in Annexure-I enclosed)

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.

ANNEXURE C
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SCHEME OF INSPECTION AND TESTING

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TABLE 1: LEVELS OF CONTROL

(1)				(2)	(3)		(4)
TEST DETAILS					LEVELS OF CONTROL		REMARKS
Clause	Requirements	Test Method		Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Samples	Frequency	
		Clause	Reference				
7	Freedom from defects	7.1 to 7.3	IS 2062	R	Adequate inspection to ensure each item to be free from surface defects.		
8	Chemical Composition		IS 2062 & IS 228 (Various Parts) Or any established Chemical/ Instr. method				
	Ladle Analysis	8.1	-do-	R	One	Each Heat	Applicable for manufacturers with steel making facilities
	Product Analysis	8.2	-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	

							(see Note-3)
10	Tensile Test	10.1 to 10.3	IS 2062 , IS 1608 & IS 3803 (Pt.1)	R	2	Every Control Unit	
11	Bend Test	11.1 to 11.3	IS 2062 & IS 1599	R	2	Every Control Unit	
12	Impact Test	12.1 to 12.4	IS 2062 & IS 1757	R	3	-do-	
13	Y Groove Crackability Test	13	IS 2062 & IS 10842	S	If specifically agreed to between the purchaser and the manufacturer/supplier.		
14	Other Tests- Non destructive testing, Metallurgical tests	14	IS 2062	S	Subject to mutual agreement between the purchaser and the manufacturer/supplier.		
15 & 16	Dimensions & Tolerances	15 & 16 and Table 4	IS 2062, IS 1852, IS 12779 IS 808 IS 1173 IS 1730 IS 1732 IS 1863 IS 2314 IS 3954 IS 10182 (Parts 1 and 2) & IS 12778	R	Adequate inspection to ensure each item conforms nominal dimensions and tolerances stipulated in relevant standard.		

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: The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.

Note -3: No testing for product analysis is required if material fed to rolling mills is ISI marked and received with test certificate

ANNEXURE I

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(Para 6 of the Scheme of Inspection and Testing)
 XYZ IRON AND STEEL COMPANY
 (Registered office Address and works address)



TEST CERTIFICATE FOR HOT ROLLED MEDIUM AND HIGH TENSILE STRUCTURAL STEEL

TEST CERTIFICATE No. _____
 TO M/s _____

DATE _____

We certified that the material described below fully conforms to 2062:2011 Chemical composition and Mechanical 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 2062:2011 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	Section (nom Size)	Control Unit No.	Grade & Quality	Quantity in tonnes	CHEMICAL COMPOSITION							MECHANICAL PROPERTIES					Optional	Remarks	
					C	S	P	S i	Mn	*Cu	@Micro Alloying Elements	Al	CE	Tensile strength	Elongation	Yield Stress			Bend test
					%	%	%	%	%	%	%								

* For copper-bearing quality

@ Micro-alloying element present should be indicated

REMARKS

WAGON NO.

TRUCK NO.

(It is suggested that size A4 paper be used for this test certificate)

FOR XYZ IRON AND STEEL COMPANY