



PM/ IS 2831/ 2/ August 2020

**PRODUCT MANUAL FOR  
CARBON STEEL CAST BILLET INGOTS, BILLETS, BLOOMS AND SLABS FOR RE-  
ROLLING INTO STRUCTURAL STEEL (ORDINARY QUALITY)  
According to IS 2831:2012**

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.	<b>Product</b>	:	<b>IS 2831:2012</b>
	<b>Title</b>	:	Carbon Steel Cast Billet Ingots, Billets, Blooms and Slabs For Re-Rolling into Structural Steel (Ordinary Quality)
	<b>No. of amendments</b>	:	0
2.	<b>Sampling Guidelines</b>	:	-
a)	<b>Raw material</b>	:	No specific requirement
b)	<b>Grouping Guidelines</b>	:	Please refer Annex - A
c)	<b>Sample Size</b>	:	For Physical tests: Camber, Bend, Dimensions & Tolerances shall be carried out in the factory  For chemical composition: 5 pieces of 50 X 50 mm/50 g drillings (samples are to be drawn by discarding the Heat Affected Zone in case of gas cutting).
3.	<b>List of Test Equipment</b>	:	Please refer Annex - B
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer Annex - C
5.	<b>Possible tests in a day</b>	:	Freedom from defects, Dimensions, Camber, Bend, Chemical Composition: By chemical method -- C, S, Mn, P or By instrumental method --all required elements.
6.	<b>Scope of the Licence :</b>		
	Licence is granted to use Standard Mark as per IS 2831:2012 with the following scope:		
	<b>Name of the product</b>	Carbon Steel Cast Billet Ingots, Billets, Blooms and Slabs for Re-Rolling into Structural Steel (Ordinary Quality)	
	<b>Product Type/ Designation/Alloying</b>	Cast Billet Ingots, Billets, Blooms and Slabs <i>of designations, with/without micro-alloying</i>	

**ANNEXURE A**  
**TO PRODUCT MANUAL FOR**  
**Carbon steel cast billet ingots, billets, blooms and slabs for**  
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**According to IS 2831:2012**

**GROUPING GUIDELINES**

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Grouping has been done on the basis of designation as under:

1. C8, C15
2. C22

One sample of any product type (Cast Billet Ingots, Billets, Blooms or slabs) may be drawn for chemical testing only from C8 ( for considering C8 &C15) or C15 (for considering C15 only) or C22 (for considering C22). The sample drawn shall meet following criteria:

- a) In case a manufacturer applies for GOL/Inclusion of more than one product type (Cast Billet Ingots, Billets, Blooms or slabs) for the same Designation, sample drawn may be from any one type of product of a particular designation.
- b) In case applicant /licensee intend to cover designations in the group with micro-alloying the sample drawn for testing shall be with micro-alloying.
- c) In case applicant intends to cover designations with Cu-bearing quality in the group, the sample drawn for testing shall be of sample of Cu-bearing quality.

Note: It is to be ensured that applicable declaration as per Notes given under Table-1 of IS 2831:2012 is submitted by the applicant.

For dimensional tests, such as tests for dimensions, tolerances and freedom from defects, samples of each product type (cast billet ingots, billets, blooms and slabs) and of any size/designation are to be tested in factory itself.

However, while considering inclusion of a new variety (product type/designation), licensee shall submit complete factory test report for dimensional parameters if the dimensional parameters are different from the ones already tested.

In case the applicant has facilities for Sulphur print and/or macro-examination tests, the same may be validated through in-house testing on the product of any size/designation. In case no test facilities are available for the same, consent letter with respect to the arrangements made for sub-contracting to third party laboratory for testing of optional requirements may be submitted by the applicant, if desired. In the absence of conduct of these tests in-house/arrangement for sub-contracting, manufacturer shall submit an undertaking that no claim for conformity of the product to such requirements will be made.

If the above samples passes, then licence may be granted/inclusion be done for the Designations of the Group. However, it shall be ensured that the firm is having all necessary manufacturing and testing facilities for the Grades/Designations /Product type of carbon Steel to be included in the licence.

During the operation of license, BO shall ensure that all Grades & Designations covered in the license are drawn for independent testing on rotation over a period of time.

**ANNEXURE B**  
**TO PRODUCT MANUAL FOR**  
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**According to IS 2831:2012**

**LIST OF TEST EQUIPMENTS**

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Major test equipment 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.	<p><b>Instrumental methods</b>  Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry.</p> <p>Spectrophotometer</p>	<p>Cl. 6.1,6.1.1, 6.2 for C, S, P, Mn, Si, Al, Cu, Micro-alloying and alloying elements content</p> <p>Mn, S, P, Si</p>
2.	<p>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</p> <p>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>	<p>cl.6.1, 6.1.1, 6.2 – C&amp; S  (chemical method, alternative to instrumental method)</p>
3.	<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 (KMnO<sub>4</sub>), Sodium Nitrite (NaNO<sub>2</sub>), Ammonium Molybdate [(NH<sub>4</sub>)<sub>2</sub> Mo<sub>2</sub>O<sub>7</sub>], Ammonium Phosphate [(NH<sub>4</sub>)<sub>3</sub> PO<sub>4</sub>], Potassium Nitrate (K<sub>2</sub>NO<sub>3</sub>), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO<sub>4</sub>), Sulphurous Acid, Hydrobromic Acid (HBr) , other chemicals and reagent as applicable</p>	<p>Phosphorus content Cl. 6.1.1, 6.3  (chemical method, alternative to instrumental method)</p>

4.	<p>Hot plate, Conical flask</p> <p>Reagents:</p> <p>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 Cl 6.1,6.1.1, 6.2 (chemical method, alternative to instrumental method)
5.	<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 Cl 6.1,6.1.1, 6.2 (chemical method, alternative to instrumental method)
6.	<p>Plate, Muffle Furnace, porcelain or silica crucible,</p> <p>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 Hydroxide, Acetic Acid, Potassium Iodide, Starch Solution, Sodium Thiosulphate Solution, Ammonium Bifluoride Solution</p>	Cu content Cl 6.1,6.1.1, 6.2 (chemical method, alternative to instrumental method)
7.	Inert gas fusion followed by determination using thermal conductivity detector	Nitrogen Content Cl. 6.1
8.	<p>Direct control – inspection through naked eye or using a magnifier (VCM) at a magnification of 3 to 6 times.</p> <p>Indirect control using more sophisticated optical and optoelectronic apparatuses and devices. This covers endoscopes, periscopes and TV cameras.</p>	Defects (Cl.9.1, 9.2)
9.	<p>i) Cord;</p> <p>ii) Measuring Tape</p> <p>iii) Depth Gauge or Vernier Caliper</p> <p>iv) Straight Edge</p> <p>v) Flat bench</p>	Bend (Cl 9.3); Camber (Cl 9.4)
10.	<p>i) metal-saw cutting machine/ gas cutting equipment/abrasive cutting wheel</p> <p>ii) Machine grinding unit with metallographic polish paper No. 00, 000 for finer finish</p> <p>iii) Lathe/shaper</p> <p>iv) Cleaning Agent;</p> <p>v) Stiff Fibre Brush;</p> <p>vi) Hot plate;</p> <p>vii) Etching tank(Dish/tray of porcelain, corrosion resistant glass/ Heat resistant glass/ corrosion resistant alloys) resistant Container; and</p> <p>viii) Etching Reagents as per Table 1 of IS 11371</p> <p>ix) Thermometer</p>	Macro-examination (Cl 10.1)

	<ul style="list-style-type: none"> <li>x) Stop Watch</li> <li>xi) Water Bath</li> <li>xii) alcohol</li> </ul>	
11.	<ul style="list-style-type: none"> <li>i) Machine grinding unit</li> <li>ii) Lathe/shaper</li> <li>iii) Photo-sensitive paper/ flat film</li> <li>iv) Sulphuric Acid( <math>\rho_{20} = 1.84</math> g/ml)</li> <li>v) Sodium thiosulphate(hypo solution): 15-20%</li> <li>vi) Water Bath with Heater</li> <li>vii) Stop Watch</li> <li>viii) wad of wet cotton wool</li> <li>ix)Surface Roughness Tester(optional)</li> <li>x)Rubber roller</li> </ul>	Sulphur Print Tests (cl.10.1)
12.	<ul style="list-style-type: none"> <li>i) Measuring Tape; and</li> <li>ii) Vernier Caliper</li> </ul>	Dimensions(cl. 11) Tolerances(Cl. 12)

**Nitrogen content shall be occasionally tested.**

Note: The above list is indicative only and may not be treated as exhaustive.

**ANNEXURE C**  
**TO PRODUCT MANUAL FOR**  
**Carbon steel cast billet ingots, billets, blooms and slabs for**  
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**According to IS 2831:2012**

**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** – The Standard Mark as given in the Schedule of the license , Licence Number (i.e. CM/L.....) shall be incorporated and the markings shall be done as per the provisions of the Indian Standard, provided always that the product thus marked conforms to all the requirement of the specification. In addition, details of BIS website shall be marked as follows: “For details of BIS certification please visit [www.bis.gov.in](http://www.bis.gov.in)” .

**4. CONTROL UNIT** – All carbon steel cast billet ingots or semi-finished products representing same cast, designation and manufactured under uniform conditions of production 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 2831:2012 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/ 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				Test equipment requirement R: required (or) S: Sub-contracting permitted	LEVELS OF CONTROL		REMARKS
Clause	Requirements	Test Method			No. of Samples	Frequency	
		Clause	Reference				
6	Chemical Composition		IS 2831 & IS 228 (Various Parts) Or any established Chemical/ Instr. method				
	Ladle Analysis	6.1, 6.1.1, Table-1	-do-	R*	One	Each Cast	Please see the note 1 below
	Check Analysis	6.2 Table-2	-do-	R*	One	Each Cast	-do-
9	Freedom from Defects	9.1, 9.2	IS 2831	R	Adequate inspection on each item to ensure free from defects		
	Bend	9.3	IS 2831	R	Adequate inspection to ensure each item to be as per requirement of the standard.		
	Camber	9.4	IS 2831	R	Adequate inspection to ensure each item to be as per requirement of the standard.		
10.1	Macro-examination	10.1, 14	IS 2831 & IS 11371	S	As mutually agreed to between manufacturer and purchaser.		
	Sulphur Print Tests	10.1, 14	IS 2831 & IS 12037	S	-do-		

11 & 12	Dimensions & Tolerances	11.1, 11.2, 11.2.1, 11.2.2, 11.3, 12,12.1, 12.2, 12.3 and Table 3	IS 2831	R	Adequate inspection to ensure each item conforms to nominal dimensions as agreed between and tolerances as stipulated in the standard.
13	Marking	13.1, 13.2 & 13.2.1	IS 2831	R	Unless otherwise agreed the material shall be marked as given in 13.1 of IS 2831:2012

\* Note-1: Nitrogen content of the steel shall be ensured by the manufacturer by occasional check analysis and may be subcontracted to a laboratory recognised by the bureau or Government laboratories empanelled by the bureau.

Note-2: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-3: 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 for approval by BO Head.



**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 CARBON STEEL CAST BILLET INGOTS, BILLETS, BLOOMS AND SLABS FOR RE-ROLLING INTO STRUCTURAL STEEL (ORDINARY QUALITY)**

TEST CERTIFICATE No. \_\_\_\_\_

DATE \_\_\_\_\_

To M/s \_\_\_\_\_

We certified that the material described below fully conforms to 2831:2012 Chemical composition and Physical properties of the product, as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks Licence No. CM/L \_\_\_\_\_ are as indicated below against each order No.

(PLEASE REFER TO IS 2831:2012 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

**TEST RESULTS**

Order No. & Date	(nom Size)	Control Unit No.	Designation	Quantity in tonnes	CHEMICAL COMPOSITION							PHYSICAL PROPERTIES					Colour code	Remarks						
					C %	S %	P %	Si %	Mn %	*Cu %	@ Micro Alloying Elements %	Al %	Bend	Camber	Freedom from defects	Tolerances			# Sulphur print test tests	# macro-examination				

\* For copper-bearing quality

# If agreed between

@ 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