



PM/ IS 2830/ 2/ August 2020

PRODUCT MANUAL FOR
Carbon Steel Cast Billet Ingots, Billets, Blooms and Slabs for
Re-Rolling into Steel for General Structural Purposes
According to IS 2830:2012

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.	Product	:	IS 2830:2012
	Title	:	Carbon Steel Cast Billet Ingots, Billets, Blooms and Slabs for Re-Rolling into Steel for General Structural Purposes
	No. of amendments	:	1
2.	Sampling Guidelines		-
a)	Raw material	:	No specific requirement
b)	Grouping Guidelines	:	Please refer Annex - A
c)	Sample Size	:	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.	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, Camber, Bend, 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 2830:2012 with the following scope:		
	Name of the product	Carbon Steel Cast Billet Ingots, Billets, Blooms and Slabs for Re-Rolling into Steel for General Structural Purposes	
	Product Type/ Designation/ Grade/Alloying	Cast Billet Ingots, Billets, Blooms and Slabs <i>of designations and Grades, with/without micro-alloying</i>	

ANNEXURE A
TO PRODUCT MANUAL FOR
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GROUPING GUIDELINES

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

Sl.No.	Type	Classification										
1.	Type	(a) Cast Billet Ingot (b) Billet (c) Bloom (d) Slab										
2.	Grade (based on Sulphur and Phosphorus content)	(a) Grade A (lowest grade) (b) Grade B (c) Grade C (highest grade)										
3.	Designation (based on Carbon and Manganese content)	<table border="1"> <thead> <tr> <th>Designation</th> <th>%Mn</th> </tr> </thead> <tbody> <tr> <td>(a) C15, C18, C20</td> <td>0.30-0.60</td> </tr> <tr> <td>(b) C15 MMn, C18 MMn, C20 MMn</td> <td>0.60-1.00</td> </tr> <tr> <td>(c) C15 HMn, C18 HMn, C20 HMn</td> <td>1.00-1.80</td> </tr> <tr> <td>(d) C25 HMn</td> <td>1.80 Max</td> </tr> </tbody> </table> <p>*No grade is specified against C25 HMn designation</p>	Designation	%Mn	(a) C15, C18, C20	0.30-0.60	(b) C15 MMn, C18 MMn, C20 MMn	0.60-1.00	(c) C15 HMn, C18 HMn, C20 HMn	1.00-1.80	(d) C25 HMn	1.80 Max
Designation	%Mn											
(a) C15, C18, C20	0.30-0.60											
(b) C15 MMn, C18 MMn, C20 MMn	0.60-1.00											
(c) C15 HMn, C18 HMn, C20 HMn	1.00-1.80											
(d) C25 HMn	1.80 Max											

Based on the above, the product may be divided into the following four groups:

Group-1	(a) C15,C18,C20
Group-2	(b) C15 MMn,C18 MMn,C20 MMn
Group-3	(c) C15 HMn,C18 HMn,C20 HMn
Group-4	(d) C25 HMn

- 1) One sample may be drawn from each group as above for **chemical testing only**, to cover all the designations of the product within that group. The sample drawn from each group shall meet following criteria:
 - a) If sample of grade-C has been tested and found conforming, the scope may cover grades A and B also. Similarly, if sample of grade B has been tested and found conforming, grade A may also be covered in the scope of licence.
 - b) In case a manufacturer applies for GOL/Inclusion of more than one product type (Cast Billet Ingot, Billet, Bloom or slab) for the same Grade and Designation, separate samples from each product type for chemical test shall not be drawn.
 - c) In case applicant /licensee intend to cover designations in the group with micro-alloying the sample to be drawn, for independent testing from each group for chemical tests only as mentioned above, shall be with micro-alloying.
 - d) In case applicant intends to cover designations with Cu-bearing quality in the group, one additional sample of Cu-bearing quality shall be drawn from the group.
- 2) For testing of Dimensions, Microscopic defects, Shape for considering GOL, one sample of any size, grade, designation of each product type intends to be covered in the licence may be tested in the factory. Separate samples are not required to be tested for physical parameters for each size/grade/designation.

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

- 3) If mutually agreed between purchaser and manufacturer for carrying out Sulphur print and macro-examination tests in case of cast billet ingots, separate samples for each size, irrespective of grade/designation may be drawn for testing in-house. In case no test facilities are available, details may be sought from the applicant with respect to the arrangement proposed for testing of optional requirements. In the absence of conduct of these tests in-house/arrangement for testing, the manufacturer shall submit an undertaking that no claim for conformity of the product to such requirements will be made.
- 4) While drawing samples for independent testing, applicable declaration as per Notes given under Table-1 of IS 2830:2012 may be obtained and reflected in the test request appropriately.
- 5) If the above sample 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.
- 6) 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
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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>Instrumental methods 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, 6.3 for C,S,P,Mn,Si,Al, Cu, Microalloying 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, 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</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, 6.3 –C& 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 (KMnO₄), Sodium Nitrite (NaNO₂), Ammonium Molybdate [(NH₄)₂ Mo₂O₇], Ammonium Phosphate [(NH₄)₃ PO₄], Potassium Nitrate (KNO₃), 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>	<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, 6.3 (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, 6.3 (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 6.2, 6.3 (chemical method, alternative to instrumental method)
7.	<p>ashless paper pulp, paper pulp pad, hot plate, dessicator,</p> <p>Reagents: ammonium nitrate, methyl red, dilute ammonium hydroxide, Concentrated hydrochloric acid Concentrated nitric acid, Perchloric acid, Hydrofluoric Acid</p>	Ni content Cl 6.1,6.1.1, 6.3 (chemical method, alternative to instrumental method)
8.	<p>Hot plate, stop watch</p> <p>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.</p>	Cr content Cl 6.1,6.1.1, 6.3 (chemical method, alternative to instrumental method)
9.	Inert gas fusion followed by determination using thermal conductivity detector	Nitrogen Content Cl. 6.1
10.	<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>	Freedom from Defects (Cl.9)
11.	<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>	Macro-examination (Cl 10.1)

	<ul style="list-style-type: none"> iv) Cleaning Agent; v) Stiff Fibre Brush; vi) Hot plate; vii) Etching tank (Dish/tray of porcelain, corrosion resistant glass/ Heat resistant glass/ corrosion resistant alloys) resistant Container; and viii) Etching Reagents as per Table 1 of IS 11371 ix) Thermometer x) Stop Watch xi) Water Bath xii) alcohol 	
12.	<ul style="list-style-type: none"> i) Machine grinding unit ii) Lathe/shaper iii) Photo-sensitive paper/ flat film iv) Sulphuric Acid ($\rho_{20} = 1.84 \text{ g/ml}$) v) Sodium thiosulphate (hypo solution): 15-20% vi) Water Bath with Heater vii) Stop Watch viii) wad of wet cotton wool ix) Surface Roughness Tester (optional) x) Rubber roller 	Sulphur Print Tests (cl.10.1)
13.	<ul style="list-style-type: none"> i) Cord; ii) Measuring Tape iii) Depth Gauge or Vernier Caliper iv) Straight Edge v) Flat bench 	Bend (Cl 10.2); Camber (Cl 10.3)
14.	<ul style="list-style-type: none"> i) Measuring Tape; and ii) Vernier Caliper 	Dimensions (cl. 11) Tolerances (Cl. 12)

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 –

The Standard Mark as given in the Schedule of the license and Licence Number (i.e. CM/L.....) shall be incorporated, and the marking 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.

4. CONTROL UNIT – All carbon steel cast billet ingots or semi-finished products representing same cast, grade, 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 2830:2012 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/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.

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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 2830 & IS 228 (Various Parts) Or any established Chemical/ Instr. method				
	Ladle Analysis	6.1, 6.1.1, 6.2, Table-1	-do-	R*	One	Each Cast	Please see note-1 below
	Check Analysis	6.3, 7,8, 8.1, 8.1.1, 8.2, Table-2	-do-	R*	One	Each Cast	-do-
9	Freedom from Defects	9.1, 9.2	IS 2830	R	Adequate inspection on each item to ensure free from defects		
10.1	Macro-examination	10.1, 14	IS 2830 & IS 11371	S	As mutually agreed to between manufacturer and purchaser.		
	Sulphur Print Tests	10.1	IS 2830 & IS 12037	S	-do-		
10.2	Bend	10.2	IS 2830	R	Adequate inspection to ensure each item to be as per requirement of the standard.		

10.3	Camber	10.2	IS 2830	R	Adequate inspection to ensure each item to be as per requirement of the standard.
11 & 12	Dimensions & Tolerances	11.1,11.1.1,11.2,11.2.1,11.2.2,11.3, 12,12.1,12.2, 12.3 and Table 3	IS 2830	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, 13.3, 13.4 & Table-4	IS 2830	R	Unless otherwise agreed the material shall be marked as given in 13.2 and 13.3 of IS 2830:2012

* 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: 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 empanelled by the Bureau.

Note-3: The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.

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 STEEL FOR GENERAL STRUCTURAL PURPOSE

TEST CERTIFICATE No. _____

DATE _____

To M/s _____

We certified that the material described below fully conforms to 2830:2012 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 2830:2012 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	(nom Size)	Control Unit No.	Grade & Quality	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