



PM/ IS 14650/ 1/ May 2020

PRODUCT MANUAL FOR
Carbon Steel Cast Billet Ingots, Billets, Blooms and Slabs for Re-Rolling Purposes
According to IS 14650:1999

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 14650:1999
	Title	:	Carbon Steel Cast Billet Ingots, Billets, Blooms and Slabs for Re-Rolling Purposes
	No. of amendments	:	1
2.	Sampling Guidelines		
a)	Raw material	:	Iron Ore, Quick Lime, Metallurgical Coke, Natural Gas/Coal(DRI), Sponge Iron, Scrap, Silico Manganese, Ferro Silicon , Ferro Manganese, Aluminium etc.
b)	Grouping Guidelines	:	Please refer Annex - B
c)	Sample Size	:	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	:	All tests. For FS drawn, Physical tests such as Dimensions & Tolerances, Freedom from defects shall be carried out in the factory itself .
6.	Scope of the Licence :		
	Licence is granted to use Standard Mark as per IS 14650:1999 with the following scope:		
	Name of the product	Carbon Steel Cast Billet Ingots, Billets, Blooms and Slabs for Re-Rolling Purposes	
	Product Type	Cast Billet Ingots, Billets	
	Product Standard	Per IS 1786	
	Grade	As per applicable product standard (for eg: Fe500D)	
	With or without microalloying		

ANNEXURE A
TO PRODUCT MANUAL FOR
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GROUPING GUIDELINES

1. The limits for chemical composition are as per applicable product standard. It is appropriate to consider grouping of for this Indian Standard for semi-finished material in similar lines with grades/steel designations of corresponding product standard.
2. Accordingly, on the basis of chemical composition - Groups for GoL/CSoL shall be as per the grade/designations of the product standard. One sample shall be drawn from each group for chemical testing only to cover all the grades/designations/qualities within that group.
 - a. To cover multiple grades/designations/qualities in a particular group, sample of the highest grade/designation/quality of that group shall be tested.
 - b. To cover products of a particular group, both with and without micro-alloying elements, sample with micro-alloying elements added shall be tested.
 - c. To cover steel of copper bearing quality, one additional sample of copper bearing quality shall be tested from each group.
3. For testing of physical parameters - Dimensions, Freedom from defects, Shape for considering GoL, one sample of any size, grade/designation of each product type (as specified in A above) intended to be covered in scope 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.
4. 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 facilities for conducting 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.
5. If the above sample passes, then licence may be granted/change in licence scope may be done for the grades of the Group. However, it shall be ensured that the firm is having all necessary manufacturing and testing facilities for the Grades/Product type of carbon Steel to be included in the licence.
6. During the operation of license, BO shall ensure that all Grades & Product types 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>C,S,P,Mn,Si,Al,Cu,Ni,Cr elements content (6)</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>C& S -chemical method, alternative to instrumental method(6)</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 (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>	<p>Phosphorus content- chemical method, alternative to instrumental method (6)</p>
4.	<p>Hot plate, Conical flask</p> <p>Reagents: silver nitrate, ammonium persulphate sodium arsenite solution, Dilute Nitric Acid, Phosphoric Acid, Dilute Sulphuric Acid, Concentrated Nitric Acid, NaCl Solution, Permanganic acid</p>	<p>Manganese content- chemical method, alternative to instrumental method(6)</p>

5.	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 hydrofluoric acid	Silicon content- chemical method, alternative to instrumental method(6)
6.	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 Hydroxide, Acetic Acid, Potassium Iodide, Starch Solution, Sodium Thiosulphate Solution, Ammonium Bifluoride Solution	Copper content(6)
7.	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	Nickel content(6)
8.	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.	Chromium content(6)
9.	Inert gas fusion followed by determination using thermal conductivity detector	Nitrogen content(6)
10.	Reagents: Perchloric Acid, Phosphoric Acid, Nitric Acid, Hydrochloric Acid, Dilute sulphuric acid, potassium thiocyanate solution, stannous chloride solution, n-butyl acetate, Iron-Mo free, molybdenum metal (99.9 pc pure) Spectrophotometer, Volumetric flask, conical flask, titration apparatus (burette, pipette etc.), hot plate, thermometer, separating funnel, dry filter paper and other laboratory glassware and apparatus	Mo content(6) (for determination of Mo by thiocyanate photometric method)
11.	Direct control – inspection through naked eye or using a magnifier (VCM) at a magnification of 3 to 6 times. Indirect control using more sophisticated optical and optoelectronic apparatuses and devices. This covers endoscopes, periscopes and TV cameras.	Freedom from Defects (11)
11.	i) metal-saw cutting machine/ gas cutting equipment/abrasive cutting wheel ii) Machine grinding unit with metallographic polish paper No. 00, 000 for finer finish iii) Lathe/shaper 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	Macro-examination (12)

	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.	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 (12)
14.	Vernier caliper, Steel scale, Micrometer (screw), Feeler gauges, Go/No-Go gauges, Radius Gauges ,Measuring tape, Spirit Level and horizontal flat surface	Dimensions (9) Tolerances (10)
15.	Rough Polishing Machine, Cutting Machine, Micro Polisher, Grinder Machine, Automatic Mount Press, Surface grinder to remove burr	(chemical composition) Preparation of specimen

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

ANNEXURE C
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SCHEME OF INSPECTION AND TESTING

1. 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 and packed conforms to all the requirement of the specification.

4. CONTROL UNIT – For the purpose of this scheme all products representing same cast and grade which are manufactured under uniform conditions of production in the same place shall constitute a control unit. Products of different types(cast billet ingots/blooms/billets/slabs) shall be considered to be of separate 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.

5.2 General requirements relating to the supply of material shall conform to IS 8910. Steel shall be manufactured as per Cl 5 of IS 14650:1999 and records of ordering information shall be maintained.

6. TEST CERTIFICATE-For each consignment of BIS Certified material conforming to IS 14650:1999 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 reusable 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)		(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	Chemical Composition i) Ladle Analysis	6.1 to 6.1.7 & 7	IS 14650:1999 & IS 228 (Various Parts) Or any established Chemical/ Instr. method	R	i) Two (One sample from the beginning and the other from the end of teeming to be drawn) ii) Three (samples to be drawn from beginning, middle and end of teeming)	i) Heat less than 100 tonnes. ii) Heat more than 100 tonnes.	
	ii) Product Analysis			6.2 to 6.2.2, 8.1 to 8.2, Fig.1			
11	Freedom from Defects	11.1 to 11.4	IS 14650:1999	R	Adequate inspection on each item to ensure free from defects		
12	Other Tests: i. Macro-examination ii. Sulphur Print Test	12	IS 14650:1999 IS 11371 IS 12037	S	As mutually agreed to between manufacturer and purchaser.		
9 & 10	Dimensions & Tolerances	9.1 to 9.2, 10.1 to 10.3	IS 14650:1999	R	Adequate inspection to ensure each item conforms to the requirements of the specification		

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.

