



PM/ 14650/3
Nov 2023

उत्पाद मानुयल

Unalloyed and Alloyed Steel Ingot and Semi-finished Products for Re-Rolling Purposes -Specification
as per IS 14650:2023 के अनुसार

**PRODUCT MANUAL FOR
Unalloyed and Alloyed Steel Ingot and Semi-finished Products for Re-Rolling Purposes -
Specification as per IS 14650:2023**

भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम 2018 की स्कीम-I के तहत यह उत्पाद मानुयल प्रमाणीकरण के प्रचलन में रीति और पारदर्शिता के सुसंगत सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेंस धारियों द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस लाइसेंस/प्रमाण पत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग 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 14650:2023
	शीर्षक Title	:	Unalloyed and Alloyed Steel Ingot and Semi-finished Products for Re-Rolling Purposes -Specification
	संशोधन संख्या No. of Amendments	:	NIL
2.	नमूनाकरण दिशा निर्देश Sampling Guidelines:		
a)	कच्चा माल Raw material	:	No specific raw material requirement
b)	समूहिकरण दिशा निर्देश Grouping guidelines	:	कृपया Annex-A देखें Please see Annex – A
c)	नमूने का परिमाण 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). The requirement of Dimensions (cl.10.),Tolerances (cl.11.1, cl.11.2, cl.11.3, cl.11.4) , Bend (cl.11.5), Camber (cl.11.6) and cl.11.7 and Freedom from Defects (cl.12.) shall be tested during factory testing on the full size ingots / semi-finished products.
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	कृपया Annex-B देखें Please refer Annex –B

4.	निरीक्षण व परीक्षण स्कीम Scheme of Inspection and Testing	:	कृपया Annex-C देखें Please refer Annex –C
5.	एक दिन में संभावित परीक्षण Possible tests in a day :	:	सभी परीक्षण All tests are possible to be carried out in a day
6.	लाइसेन्स का कार्यक्षेत्र / Scope of the Licence:		
	IS 14650:2023 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेन्स निम्नलिखित कार्यक्षेत्रके लिए प्रदान किया जाता है Licence is granted to use Standard Mark as per IS 14650:2023 with the following scope:		
	उत्पाद का नाम Name of the product	Unalloyed and Alloyed Steel Ingot and Semi-finished Products for Re-Rolling Purposes -Specification	
	Product Type (with Manufacturing Route)	Cast Billet Ingot, Continuously Cast Billet, Blooms, Slabs, Rolled Billet, Forged Blank for sections etc.	
	Product Designation (Steel Grade)	IS 14650 CPS 2062/E250BR IS 14650 CPS 1079/HR2 IS 14650 CPS 2002/3 IS 14650 CPS 2041/R260 IS 14650 CPS 1786/Fe500D IS 14650 CPS 6911/304 IS 14650 CPS 7904/HC42A All grades as per the relevant product standard are required to be mentioned in the scope of the licence	
	With or without optional requirements	1) Macro examination 2) Sulphur Print 3) Inclusion Content	

BUREAU OF INDIAN STANDARDS
Manak Bhawan, 9, Bahadur Shah Zafar
Marg, New Delhi – 110002

Annexure-A to the
Product Manual of
Unalloyed and Alloyed Steel Ingot and Semi-finished Products for Re-Rolling Purposes — Specification as
per IS 14650:2023

GROUPING GUIDELINES

- 1) IS 14650:2023 covers the requirement of unalloyed and alloyed (including Stainless Steel) steel ingots and semi-finished products for rolling into different products conforming to applicable Indian Standard.
- 2) All ingots and semi-finished products of all categories of steel (Ref IS 7598) which are manufactured for further hot rolling into different products are covered under this standard.
- 3) Semi-finished products include continuously cast products and products generally obtained by forging or rolling ingots and intended for transformation into different steel products.
- 4) As per cl.5. (Product Designation) of IS 14650:2023, the steel grade shall be designated giving reference to the applicable product standard grade. For example: IS 14650 CPS 2062/E250 BR means that the grade of the semi-finished product is intended for manufacture of Hot Rolled Medium and High Tensile Structural Steel of grade E250BR.
- 5) The ladle analysis of steel shall conform to the ladle analysis requirements of the relevant product standard under which the ingots and semi-finished products have been ordered.
- 6) In view of above, the following grouping guidelines shall be considered for the purpose of GoL/CSoL:

Group	Category of Steels	Sub-category of Steels (carbon percent/total alloying elements percent)	Grouping
Group-I	Unalloyed Steels (Carbon Steels)	1) Low Carbon (up to 0.25 percent) 2) Medium Carbon (more than 0.25 to 0.60 percent) 3) High Carbon (greater than 0.60 percent)	One sample of any steel grade (designated as per cl.5.) from each sub-category of steels of any form and shape (Ingot, Billets, Blooms, Slabs, Round, Square etc.) manufactured through one route (Continuously Cast, Ingot Casting, Rolling , Forging etc.) shall be drawn and tested to cover all steel grades within the sub-cateogry for that manufacturing route.
Group-II	Alloy Steels (excluding Stainless Steels)	1) Low Alloy (up to and including 5 percent) 2) Medium Alloy (more than 5 but up to and including 10 percent) 3) High Alloy (More than 10 percent)	One sample of any steel grade (designated as per cl.5.) from each sub-category of steels of any form and shape (Ingot, Billets, Blooms, Slabs, Round, Square etc.) manufactured through one route (Continuously Cast, Ingot Casting, Rolling , Forging etc.) shall be drawn and tested to cover all steel grades within the sub-cateogry for that manufacturing route.
Group-III	Stainless Steel	1) Austenitic	One sample of any steel

		2) Ferritic 3) Martensitic 4) Duplex	grade (designated as per cl.5.) from each sub-category of steels of any form and shape (Ingot, Billets, Blooms, Slabs, Round, Square etc.) manufactured through one route (Continuously Cast, Ingot Casting, Rolling , Forging etc.) shall be drawn and tested to cover all steel grades within the sub-cateogry for that manufacturing route.
--	--	--	---

7. Manufacturer shall declare the steel grades (designated as per cl.5.) being manufactured under each category and sub-cateogry of steels as indicated above at the time of application.
8. While considering Grant of licence/inclusion of additional varieties, it shall be ensured that the applicant/licensee has got the complete manufacturing and testing facilities for all the steel grades, forms and shapes of semi-finished products,

ANNEXURE B

TO PRODUCT MANUAL FOR Unalloyed and Alloyed Steel Ingot and Semi-finished Products for Re-Rolling Purposes — Specification as per IS 14650:2023 LIST OF TEST EQUIPMENTS

Page 1 of 3

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

Sl. No.	Tests Used in with ClauseReference	Test Equipment/Chemicals and IdentificationNumbers (Where applicable)
1.	Instrumental methods Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry. Spectrophotometer	C,S,P,Mn,Si,Al,Cu,Ni,Cr, Mo, V,Nb, Ti, Co, W, Zr, Ta, B, Ce, N elementscontent (7) Mn,S,P,Si
2.	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, DistilledWater,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, Potassiumiodate	C& S -chemical method, alternative to instrumental method(7)
3.	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], 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	Phosphorus content-chemical method, alternative to instrumental method (7)
4.	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	Manganese content-chemical method, alternative to instrumental method(7)

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(7)
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(7), chemical method, alternative to instrumental method
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(7) chemical method, alternative to instrumental method
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(7), chemical method, alternative to instrumental method
9.	Inert gas fusion followed by determination using thermal conductivity detector	Nitrogen content(7)
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(7) (for determination of Mo by thiocyanate photometric method), chemical method, alternative to instrumental 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 (12)
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 (13)

	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($\rho_{20} = 1.84$ 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 (13)
13.	Laboratory Furnace, Metallographic Sample Preparation Equipment, Etching Reagent(either natal or picral), Metallurgical Microscope (x500)	Inclusion Content (cl.13)
14.	Vernier caliper, Steel scale, Micrometer (screw), Feeler gauges, Go/No-Go gauges, Radius Gauges ,Measuring tape, Spirit Level and horizontal flatsurface	Dimensions (10) Tolerances (11)
15.	Rough Polishing Machine, Cutting Machine, Micro Polisher, Grinder Machine, Automatic Mount Press, Surface grinder to remove burr	(chemical composition 7) Preparation of specimen

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

ANNEXURE C
TO PRODUCT MANUAL FOR
Unalloyed and Alloyed Steel Ingot and Semi-finished Products for Re-Rolling Purposes -Specification as per
IS 14650:2023

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.

The manufacturer shall prepare and implement a calibration plan for the test equipment.

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 ingots/semi-finished products representing same heat/cast, steel grade and manufactured under uniform conditions of production in the same place 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.

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 14650:2023 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.

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	7.1, 7.1.1., 7.1.2, 7.1.3, 8	IS 14650 & IS 228 (Various Parts) Or any other established Chemical/ Instrumental method	R	One	Each Heat	Applicable for manufacturing units having steel melting facilities only
	i) Ladle Analysis						The chemical composition of steel shall conform to the ladle analysis requirements of the relevant product standard under which the ingots and semi-finished products have been ordered.
	ii) Check Analysis	7.2.1, 7.2.2, 7.2.3, 9, Fig 1		R	One	Each Cast	Applicable for manufacturing units not having steel melting facilities and are manufacturing semis through Rolling or Forging. No further testing is required if the material fed to rolling mill/forging dies is ISI marked and is received with Test Certificate Check analysis shall be carried out on the product from the standard position (see 9). Permissible variations in the case of check analysis from the limits of ladle analysis shall be as specified in the relevant product standard.
12	Freedom from Defects	12.1 to 12.3	IS 14650	R	Manufacturer shall exercise adequate in-process controls to ensure that each ingot/semi-finished product is free from harmful defects		

13	Other Tests: i. Macro-examination ii. Sulphur Print Test iii. Inclusion Content	13	IS 14650 IS 11371 IS 12037 IS 4163	S	As mutually agreed to between manufacturer and purchaser.
10 & 11	Dimensions & Tolerances	10.1 to 10.2 11.1 to 11.7	IS 14650	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 empanelled 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 for approval by BO Head.

ANNEXURE I

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

BIS
STANDA
RD
MARK

TEST CERTIFICATE FOR Carbon Steel Cast Billet Ingots, Billets, Blooms and Slabs for Re-Rolling Purposes

TEST CERTIFICATE No. _____

DATE _____

To M/s _____

We certified that the material described below fully conforms to IS 14650:2023. 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 14650:2023 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	(Nom Size)	Control Unit No.	Grade	Tolerances	Qty in tonnes	CHEMICAL COMPOSITION										Product Designation	PHYSICAL PROPERTIES				Remarks
						C %	S %	P %	Si %	Mn %	Cu %	Al %	Ni %	Cr %	Mo % etc.		Freedom from defects	#Sulphur print test	#macro-examination	#inclusion content	
																Steel Grade as per relevant product standard					

If agreed between

REMARKS

WAGON NO.

TRUCK NO.

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

FOR XYZ IRON AND STEEL COMPANY