



PM/ IS 8951/ 1/ May 2020

**PRODUCT MANUAL FOR  
Steel Cast Billet Ingots, Billets and Blooms for  
Production of High Carbon Steel Wire Rods  
According to IS 8951:2001**

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 8951:2001</b>  |
|    | <b>Title</b>  | :  | Steel Cast Billet Ingots, Billets and Blooms for Production of High Carbon Steel Wire Rods   |
|    | <b>No. of amendments</b>  | :  | 0  |
| 2. | <b>Sampling Guidelines</b>  |  |  |
| a) | <b>Raw material</b>   | :  | Iron Ore, Quick Lime, Metallurgical Coke, Natural Gas/Coal(DRI), Sponge Iron, Scrap, Silico Manganese, Ferro Silicon , Ferro Manganese, Aluminium etc.   |
| b) | <b>Grouping Guidelines</b>  | :  | Please refer Annex - A   |
| c) | <b>Sample Size</b>  | :  | For Physical tests: Dimensions & Tolerances, Freedom from defects shall be carried out in the factory.<br><br>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 & Tolerances, Chemical Composition: By chemical method -- C, S, Mn or By instrumental method –all required elements.  |
| 6. | <b>Scope of the Licence :</b>   |  |  |
|    | Licence is granted to use Standard Mark as per IS 8951:2001 with the following scope: |  |  |
|    | <b>Name of the product</b>  | Steel Cast Billet Ingots, Billets and Blooms for Production of High Carbon Steel Wire Rods |  |
|    | <b>Product Type</b>   | Cast Billet Ingots, Billets,..   |  |
|    | <b>Grade X</b>  | X  |  |

**ANNEXURE A**  
**TO PRODUCT MANUAL FOR**  
Steel Cast Billet Ingots, Billets and Blooms for  
Production of High Carbon Steel Wire Rods **According to IS 8951:2001**

**GROUPING GUIDELINES**

**PAGE 1 of 1**

1. Grouping has been done on the basis of chemical composition of the product. Guidelines for drawing of samples for each grade are as under:

| <b>Group</b> | <b>Grade</b> | <b>Remarks</b>  |
|--------------|--------------|---|
| 1            | X            | One sample from each group of any variety (ingot/billet/bloom) of Steel may be drawn for tests as per specification |
| 2            | E            |   |
| 3            | F            |   |
| 4            | G            |   |
| 5            | H            |   |

2. During preliminary inspection, before drawing samples for independent testing, it shall be ensured by IO that tests as per cl.10, 11.2, 11.3, 12, 13 and 14 of IS 8951:2001 shall be carried out at factory premises on the samples to be drawn for independent testing as it is difficult to transport bulky samples to laboratory.

3. If mutually agreed between purchaser and manufacturer for carrying out tests as per Cl 11.1 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 conducting these tests in-house and lack of other arrangements for testing, 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 8951:2001 may be obtained and reflected in the test request appropriately. Also, such declaration should capture details of ranges for elements carbon, Manganese, Silicon, in the steel that can be supplied by manufacturer.

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**  
**TO PRODUCT MANUAL FOR**  
**Steel Cast Billet Ingots, Billets and Blooms for Production of High Carbon Steel Wire Rods**  
**According to IS 8951:2001**

**LIST OF TEST EQUIPMENTS**

**Page 1 of 3**

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><br/> 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 (7)</p> <p>Mn,S,P,Si</p>               |
| 2.      | <p>Strohlein or Leco apparatus with all attachments<br/> 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&amp; S -chemical method, alternative to instrumental method(7)</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 (Na<sub>2</sub>NO<sub>3</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- chemical method, alternative to instrumental method (7)</p> |
| 4.      | <p>Hot plate, Conical flask</p> <p>Reagents:<br/> 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(7)</p>   |

|     |   |   |
|-----|---|---|
| 5.  | Medium textured filter paper, Porcelain casserole, platinum crucible, filter paper pulp, hot plate, hot air oven, muffle furnace<br><br>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)   |
| 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)   |
| 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)   |
| 9.  | Inert gas fusion followed by determination using thermal conductivity detector  | Nitrogen content(7)   |
| 10. | Direct control – inspection through naked eye or using a magnifier (VCM) at a magnification of 3 to 6 times.<br><br>Indirect control using more sophisticated optical and optoelectronic apparatuses and devices. This covers endoscopes, periscopes and TV cameras.  | Freedom from Defects (10)   |
| 11. | i) metal-saw cutting machine/ gas cutting equipment/abrasive cutting wheel<br>ii) Machine grinding unit with metallographic polish paper No. 00, 000 for finer finish<br>iii) Lathe/shaper<br>iv) Cleaning Agent;<br>v) Stiff Fibre Brush;<br>vi) Hot plate;<br>vii) Etching tank (Dish/tray of porcelain, corrosion resistant glass/ Heat resistant glass/ corrosion resistant alloys) resistant Container; and<br>viii) Etching Reagents as per Table 1 of IS 11371<br>ix) Thermometer<br>x) Stop Watch<br>xi) Water Bath<br>xii) alcohol | Macro-examination (11.1)  |

|     |  |   |
|-----|--|---|
| 12. | <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 (11.1)  |
| 13. | Polishing Machine, Microscope with 100x magnification.   | Inclusion Content (11.1)  |
| 14. | Vernier caliper, Steel scale, Micrometer (screw), Feeler gauges, Go/No-Go gauges, Radius Gauges Spirit Level and horizontal flat surface   | Camber (11.3), Bend (11.3)<br>Tolerances (13)                     |
| 15. | Rough Polishing Machine, Cutting Machine, Micro Polisher, Grinder Machine, Automatic Mount Press, Surface grinder to remove burr   | (chemical composition, Inclusion content) Preparation of specimen |

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

**ANNEXURE C**  
**TO PRODUCT MANUAL FOR**  
Steel Cast Billet Ingots, Billets and Blooms for Production of High Carbon Steel Wire Rods  
**According to IS 8951:2001**

**SCHEME OF INSPECTION AND TESTING**

**Page 1 of 3**

**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 the 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** – 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(ingots/blooms/billets) 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. Records information given by purchaser s per Cl 15 of IS 8951:2001 shall be maintained.

**6. TEST CERTIFICATE**-For each consignment of BIS Certified material conforming to IS 8951:2001 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**  
**TO PRODUCT MANUAL FOR**  
Steel Cast Billet Ingots, Billets and Blooms for Production of High Carbon Steel Wire Rods  
**According to IS 8951:2001**  
Page 2 of 3

**SCHEME OF INSPECTION AND TESTING**

**TABLE 1: LEVELS OF CONTROL**

| (1)          |   |                           |   | (2)  | (3)  |   | (4)     |
|--------------|---|---------------------------|---|--|--|---|---------|
| TEST DETAILS |   |                           |   |  | LEVELS OF CONTROL  |   | REMARKS |
| Clause       | Requirements                                  | Test Method               |   | Test equipment requirement<br>R: required (or)<br>S: Sub-contracting permitted | No. of Samples   | Frequency   |         |
|              |   | Clause                    | Reference   |  |  |   |         |
| 7            | Chemical Composition<br><br>i) Ladle Analysis | 7.1, 7.1.1, 8,<br>Table-1 | IS 8951 &<br>IS 228<br>(Various<br>Parts)<br>Or any established<br>Chemical/<br>Instr. method | R  | i) Two (One sample<br>from the beginning<br>and the other from<br>the end of teeming<br>to be drawn)<br><br>ii) Three (samples<br>to be drawn from<br>beginning, middle<br>and end of teeming) | i) Heat less than<br>100 tonnes.<br><br>ii) Heat more than<br>100 tonnes. |         |
|              | ii) Product Analysis                          |                           |   | 7.2,<br>9.9.1,9.1.1,9.2<br>Table-1,2 &<br>Fig-1                                |  |   |         |
| 10           | Freedom from Defects                          | 10.1, 10.2                | IS 8951   | R  | Adequate inspection on each item to ensure free from defects   |   |         |

| (1)          |                         |  |                     | (2)  | (3)  |           | (4)     |
|--------------|-------------------------|--|---------------------|--|--|-----------|---------|
| TEST DETAILS |                         |  |                     |  | LEVELS OF CONTROL  |           | REMARKS |
| Clause       | Requirements            | Test Method                              |                     | Test equipment requirement<br>R: required (or)<br>S: Sub-contracting permitted | No. of Samples   | Frequency |         |
|              |                         | Clause                                   | Reference           |  |  |           |         |
| 11.1         | Macro-examination       | 11.1                                     | IS 8951<br>IS 11371 | S  | As mutually agreed to between manufacturer and purchaser.  |           |         |
|              | Sulphur Print Tests     |  | IS 8951<br>IS 12037 | S  |  |           |         |
|              | Inclusion Content       |  | IS 8951<br>IS 4163  | S  |  |           |         |
| 11.2         | Bend                    | 11.2                                     | IS 8951             | R  | Adequate inspection to ensure each item conforms to the requirements of the specification  |           |         |
| 11.3         | Camber                  | 11.3                                     | IS 8951             | R  |  |           |         |
| 12 & 13      | Dimensions & Tolerances | 12.1 to 12.3<br>,13.1 to 13.3<br>Table-3 | IS 8951             | R  | Adequate inspection to ensure each item conforms to nominal dimensions as agreed between and tolerances as stipulated in the 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.



