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SPECIFICATION FOR STEEL INGOTS AND BILLETS FOR PRODUCTION OF MILD STEEL RIVET BARS FOR SHIPBUILDING

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SPECIFICATION FOR STEEL INGOTS AND BILLETS FOR PRODUCTION OF MILD STEEL RIVET BARS FOR SHIPBUILDING

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 1 April 1980, after the draft finalized by the Wrought Steel Products Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 With the rapid industrialization in the country, quite a number of mini-steel plants have come up. As there is no standard specification available for ingots or cast billets, it is felt that there may be a possibility of sub-standard material being introduced in the engineering and constructional purposes which is not desirable. The Government of India, Ministry of Industrial Development has desired that the mini-steel plants should be registered for the manufacture of steel ingots of different categories. In order to assure the quality of ultimate products it has become necessary to issue standards covering their products. This standard is one of the standards published in this series.

0.3 For the benefit of the purchaser, an informative appendix (*see* Appendix A) giving particulars to be specified by the purchaser while ordering material conforming to this standard has been included.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for ingots (including cast billet ingots) and billets (including continuous cast billets) for the production of mild steel rivet bars for shipbuilding.

*Rules for rounding off numerical values (*revised*).

1.2 Ingots (including cast billet ingots) and billets (including continuous cast billets) covered by this standard shall be used for the manufacture of mild steel rivet bars conforming to the requirements of IS : 3298-1965*.

2. TERMINOLOGY

2.0 For the purpose of this standard, besides the following definitions, the definitions given in IS : 1956 (Part II)-1976† shall apply.

2.1 Ingot — Castings of suitable shape and size intended for subsequent hot working.

2.2 Cast Billet Ingot — An ingot, generally of cross section not more than 150 mm square which can be rolled directly into merchant products. Cast billet ingot is also sometimes known as ' pencil ingot '.

2.3 Billet — A semi-finished product obtained by forging or rolling, usually square and not exceeding 125 × 125 mm in cross section with rounded or chamfered corners, and is intended for further processing into suitable finished product by forging or re-rolling.

2.4 Continuous Cast Billet — A semi-finished product obtained by continuous casting usually square and not exceeding 125 × 125 mm in cross section with rounded corners and is intended for further processing into suitable finished product by forging or re-rolling.

3. GRADES

3.1 Steel for mild steel rivet bars shall be of grade, specified in **6.1**.

4. SUPPLY OF MATERIAL

4.1 The general requirements relating to the supply of steel shall conform to IS : 8910-1978‡.

5. MANUFACTURE

5.1 Steel shall be manufactured by open hearth, electric, duplex, basic oxygen or a combination of these processes. In case any other process is employed by the manufacturer, prior approval of the purchaser should be obtained.

5.2 Steel shall be supplied semikilled or killed.

*Specification for mild steel rivet bars for shipbuilding.

†Glossary of terms relating to iron and steel: Part II Steel making.

‡General technical delivery requirements for steel and steel products.

6. CHEMICAL COMPOSITION

6.1 The ladle analysis of the material when analysed in accordance with the appropriate part of IS : 228* shall be as given below:

Constituent	*Percent, Max*
Sulphur	0·050
Phosphorus	0·050

6.1.1 In case of continuous cast billets, the billet analysis shall be taken as ladle analysis.

6.2 Product Analysis — Permissible variation in case of product analysis from the limits specified under **6.1** shall be as follows:

Constituent	*Variation Over Specified Limits, Percent, Max*
Sulphur	0·005
Phosphorus	0·005

NOTE 1 — When steel is required in copper-bearing quality, copper content shall be between 0·20 to 0·35 percent. In case of product analysis, permissible variation shall not exceed ±0·03 percent.

NOTE 2 — When the steel is silicon-killed, silicon content in the product analysis shall not be less than 0·10 percent. When the steel is silicon-aluminium killed, the requirement regarding minimum silicon content shall not apply.

7. SAMPLING

7.1 At least one ladle sample analysis shall be taken per cast.

7.2 If required, the samples for product analysis shall be prepared either by forging or rolling down to 30 mm round sections or to the size of rivet bar to be rolled whichever is less.

7.2.1 Drilling shall be taken from the sample (*see* **7.2**) representing two-thirds, half and one-third of height from bottom of the ingot separately.

7.2.2 In case of continuous cast billets and billets produced from ingots (with minimum reduction of 4 : 1 from ingot to billet) the sample (*see* 7.2) may be taken from anywhere from the billets.

*Methods of chemical analysis of steels (*second revision* being issued in parts).

8. FREEDOM FROM DEFECTS

8.1 The billet and continuous cast billets shall be sound and free from pipe, laminations, segregation, inclusions and cracks, etc which are harmful for the purpose for which it is intended.

8.1.1 Subject to agreement between the purchaser and the manufacturer, the billets and continuous cast billets may be supplied with suitable surface dressing.

8.2 Ingots shall either be supplied free from harmful defects such as segregation, piping cracks, inclusions, and blow-hole by appropriate top and bottom discard and dressing, or supplied with suitable surface dressing only, without top and bottom discard if agreed to between the purchaser and the manufacturer, to ensure the requirements of freedom from defects specified in the relevant product specifications.

9. TESTS

9.1 If agreed to between the purchaser and the manufacturer the following tests may be carried out from the samples prepared under **7.2**:

a) Macroexamination and sulphur print, and

b) Inclusion content (*see* IS : 4163-1967*).

10. DIMENSIONS

10.1 The size and tolerance of ingots shall be subject to agreement between the purchaser and the manufacturer. However, the nominal sizes of ingots generally supplied are given below for guidance only:

Width Across Flat, mm	
Wide End	Narrow End
100	76
115	90
125	105
150	120
150	130

10.2 The preferred sizes of billets shall be 50, 63, 71, 80, 90, 100 and 125 mm.

10.3 The sizes other than those specified may be supplied by agreement between the purchaser and the manufacturer.

*Method for determination of inclusion content in steel by microscopic method.

11. TOLERANCES

11.1 In case of billets the following tolerances shall apply:

Width Across Flat mm	*Tolerance* mm
Up to 75	±1·5
Over 75	±3

11.2 A tolerance of ±150 mm shall be permitted on the specified length of ingots and billets.

12. MARKING

12.0 Unless agreed otherwise, the material shall be marked as given in **12.1** and **12.2**.

12.1 The ends of ingots and billets shall be painted with a suitable colour code conforming to IS : 2049-1978*.

12.2 Each ingot and billet shall be legibly stamped or painted with the cast number, and the name or trade-mark of the manufacturer.

12.2.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard convers the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may by granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

APPENDIX A

(*Clause* 0.3)

BASIS FOR ORDER

A-1. While placing an order for the ingots/billets covered by this standard, the purchaser should specify clearly the following:

a) Size of ingot/billet ;
b) Size and dimensions of end product;
c) End use;
d) Tests and test reports required; and
e) Special requirements, if any.

*Colour code for the identification of wrought steels for general engineering purposes (*first revision*).

INDIAN STANDARDS
ON
STEEL INGOTS AND BILLETS

IS:

6414-1978 Cast billet ingots and continuously cast billets for rolling into structural steel (standard quality) (*first revision*)

6915-1978 Cast billet ingots and continuously cast billets for rolling into structural steel (ordinary quality) (*first revision*)

8051-1976 Steel ingots and billets for the production of volute, helical and laminated springs for automotive suspension

8052-1976 Steel ingots and billets for the production of volute and helical spring (for railway rolling stock)

8053-1976 Steel ingots and billets for the production of steel wire for the manufacture of wood screws

8054-1976 Steel ingots and billets for the production of laminated springs (railway rolling stock)

8055-1976 Steel ingots and billets for the production of spring washers

8056-1976 Steel ingots and billets for the production of hard drawn steel wire for upholstery springs

8057-1976 Steel ingots and billets for the production of wire rod for the manufacture of machine screw (by cold heading process)

8951-1978 Steel ingots and billets for production of carbon steel wire rods

8952-1978 Steel ingots and billets for production of mild steel wire rod for general engineering purposes

9467-1980 Steel ingots and billets for the production of rivet bars for structural purposes

9468-1980 Steel ingots and billets for production of mild steel rivet bars for shipbuilding