

# इंटरनेट

# मानक

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Mazdoor Kisan Shakti Sangathan

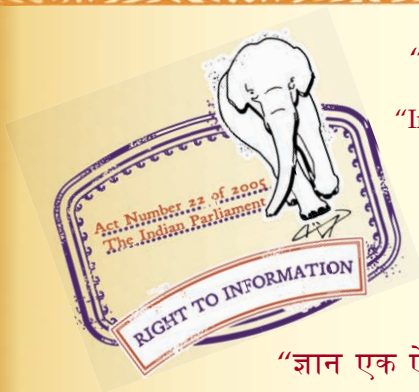
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“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 1148 (2009): STEEL RIVET BARS (MEDIUM AND HIGH TENSILE)  
FOR STRUCTURAL PURPOSES FOR STRUCTURAL PURPOSES [MTD 4:  
Wrought Steel Products]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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*भारतीय मानक*  
संरचनागत प्रयोजनों के लिए (मध्यम एवं उच्च तन्यता के)  
इस्पात की रिवेट छड़ें  
(चौथा पुनरीक्षण)

*Indian Standard*  
**STEEL RIVET BARS (MEDIUM AND HIGH TENSILE)**  
**FOR STRUCTURAL PURPOSES**  
( *Fourth Revision* )

ICS 77.140.60;77.140.70

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**BUREAU OF INDIAN STANDARDS**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

## FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Wrought Steel Products Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1957 and subsequently revised in 1964, 1973 and 1982. While reviewing this standard, in the light of experience gained during these years, the Committee decided to revise it to bring in line with the present practices being followed by the Indian industry.

In this revision following modifications have been made:

- a) Title of the standard has been changed to Steel rivet bars (medium and high tensile) for structural purposes.
- b) Amendment Nos. 1 and 2 have been incorporated.
- c) A new clause on references has been incorporated.
- d) Marking clause has been modified.
- e) Requirements of IS 1149 have been incorporated.

For all the tests specified in this standard (chemical/physical/others), the method as specified in relevant ISO Standard may also be followed as an alternate method.

The standard shall supersede the IS 1149 : 1982 'High tensile steel rivet bars for structural purposes (*third revision*)'.

The composition of the Committee responsible for formulation of this standard is given in Annex A.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# Indian Standard

## STEEL RIVET BARS (MEDIUM AND HIGH TENSILE) FOR STRUCTURAL PURPOSES

### ( Fourth Revision )

#### 1 SCOPE

This standard covers the requirements for medium and high tensile rivet bars in sizes up to 40 mm diameter for structural purposes.

#### 2 REFERENCES

The standards listed below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

| <i>IS No.</i>           | <i>Title</i>                                                                          |
|-------------------------|---------------------------------------------------------------------------------------|
| 228 (in various parts)  | Methods for chemical analysis of steels                                               |
| 1599 : 1985             | Method for bend test ( <i>second revision</i> )                                       |
| 1608 : 2005             | Metallic materials — Tensile testing at ambient temperature ( <i>third revision</i> ) |
| 1956 (in various parts) | Glossary of terms relating to iron and steel                                          |
| 5242 : 1979             | Method of test for determining shear strength of metals ( <i>first revision</i> )     |
| 8910 : 1978             | General technical delivery requirements for steel and steel products                  |

#### 3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 1956 (relevant parts) and the following shall apply.

##### 3.1 Micro-Alloying Elements

Elements, such as niobium, boron, vanadium and titanium added singly or in combination to obtain higher strength to weight ratio combined with better toughness, formability and weldability as compared to unalloyed steel of similar strength level.

#### 4 SUPPLY OF MATERIAL

General requirements relating to the supply of rivet bars for structural purposes shall conform to IS 8910.

#### 5 MANUFACTURE

**5.1** Rivet bars shall be made from the steel 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.

**5.1.1** Steel shall be supplied semi-killed or killed.

**5.1.2** Unless specified otherwise, bars shall be supplied in hot-rolled condition.

#### 6 CHEMICAL COMPOSITION

##### 6.1 Ladle Analysis

Ladle analysis of the steel, when carried out either by the method specified in the relevant parts of IS 228 or any other established instrumental/chemical method shall be as given below. In case of dispute the procedure given in the relevant Part of IS 228 shall be the referee method.

| <i>Constituent</i> | <i>Percent, Max</i> |
|--------------------|---------------------|
| Carbon             | 0.23                |
| Sulphur            | 0.050               |
| Phosphorus         | 0.050               |

##### 6.2 Product Analysis

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

| <i>Constituent</i> | <i>Variations Over the Specified Maximum Limit, Percent</i> |
|--------------------|-------------------------------------------------------------|
| Carbon             | 0.02                                                        |
| Sulphur            | 0.005                                                       |
| Phosphorus         | 0.005                                                       |

**6.3** 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  $\pm 0.03$  percent.

**6.4** When microalloying elements (Nb, V, Ti and B) are used individually or in combination, the total content of microalloying elements shall not exceed 0.20 percent.

**6.5** 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 FREEDOM FROM DEFECTS

Rivet bars shall be well and cleanly rolled to the dimensions and tolerances specified. The finished material shall be free from such surface and internal flaws as would be detrimental to the end use of the material.

## 8 LENGTHS

Unless agreed to otherwise between the purchaser and the manufacturer, rivet bars shall be ordered only in multiples of 250 mm length.

## 9 DIMENSIONAL TOLERANCES

**9.1** The bars shall comply with the following dimensional tolerances:

| <i>Diameter of Bar</i><br>mm | <i>Total Tolerance</i><br>mm |
|------------------------------|------------------------------|
| Below 20                     | 0.40                         |
| 20                           | 0.45                         |
| 22 and 24                    | 0.50                         |
| Over 24                      | 2 percent of diameter        |

**9.1.1** All the tolerances specified under **9.1** shall be minus tolerances. When special plus and minus tolerances are required by the purchaser, the sum of such tolerances shall not be specified as less than the above total tolerances.

## 10 SELECTION OF TEST SAMPLES

**10.1** Test samples may be selected by the purchaser from the cuttings of the bars.

**10.2** The test samples shall not be cut from the bars except in the presence or with the approval of the purchaser.

**10.3** Before the test samples are selected full particulars regarding cast number, size, weight and number of bars in each cast shall be furnished by the manufacturer to the purchaser.

**10.4** The test samples shall not be annealed or otherwise subjected to heat treatment unless the material from which they are cut is similarly treated, in which case the test samples shall be similarly and simultaneously treated with the material before testing. Any slight straightening of test samples which may be required shall be done cold.

## 11 TENSILE TEST

**11.1** One tensile test shall be made from the finished steel for every 10 tonne of a cast or part thereof. When more than one diameter of the bar is specified one additional test shall be made for each variation in diameter.

**11.2** Tensile test may be carried out on unmachined round bars below 6 mm.

**11.3** The tensile properties of steel bar when determined in accordance with IS 1608 shall be as given below:

| <i>Characteristics</i>                                                                   | <i>Requirement</i> |              |
|------------------------------------------------------------------------------------------|--------------------|--------------|
|                                                                                          | Medium Tensile     | High Tensile |
| Tensile strength, <i>Min</i> , MPa                                                       | 410                | 460          |
| Yield stress, <i>Min</i> , MPa:                                                          |                    |              |
| 6 mm up to and including 12 mm                                                           | 260                | 310          |
| Over 12 mm up to and including 20 mm                                                     | 250                | 300          |
| Over 20 mm up to and including 40 mm                                                     | 240                | 280          |
| Elongation, % <i>Min</i> , gauge length $5.65 \sqrt{S_0}$                                | 23                 | 22           |
| NOTE — 1 MPa = 1 N/mm <sup>2</sup> = 1 MN/m <sup>2</sup> = 0.102 0 kgf/mm <sup>2</sup> . |                    |              |

## 12 BEND TEST

**12.1** One bend test shall be carried out for every 100 tonne/a full heat less than 100 tonne or part thereof. One additional test shall be made for each variation in diameter.

**12.2** The bend test shall be carried out in accordance with IS 1599.

**12.2.1** In case of bars over 25 mm in diameter, the test piece, when cold, shall withstand, without fracture, being doubled over, either by pressure or by slow and steady blows from a hammer, till the internal diameter is not greater than three times the diameter of the test piece and the sides are parallel.

**12.2.2** For bars 25 mm in diameter and under the internal diameter of the bend shall be not greater than twice the diameter of the bar.

## 13 SHEAR TEST

**13.1** One shear test shall be carried out for every 10 tonne of a cast or part thereof. One additional test shall be made for each variation in diameter.

**13.2** The ultimate shear strength of the bars as rolled shall be not less than 330 MPa and 370 MPa for medium and high tensile rivet bars respectively. The shear test shall be carried out in accordance with IS 5242.

## 14 HOT COMPRESSION TEST

**14.1** One hot compression test shall be made for every 100 tonne of cast or part thereof. One

additional test shall be made for each variation in diameter.

**14.2** A test piece, having a length equal to twice its diameter, shall be cut from a bar and shall, without cracking or showing signs of fracture withstand being heated to a forging temperature and hammered or compressed on the end till its length has been reduced to its original diameter.

## 15 PACKING AND MARKING

**15.1** Rivet bars shall be securely bundled and a metal tag attached to each bundle shall be marked with the following:

- a) Manufacturer's name or trade-mark, and
- b) Cast number or identification mark by which the steel can be traced to the cast from which it was made.

**15.2** Rivet bars, when not secured in bundles shall each be legibly marked as specified in **15.1**

### 15.3 BIS Certification Marking

The material may also be marked with the Standard Mark.

**15.3.1** The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

## ANNEX A (Foreword)

### COMMITTEE COMPOSITION

Wrought Steel Products Sectional Committee, MTD 4

| <i>Organization</i>                                | <i>Representative(s)</i>                                                                                                               |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Tata Steel Ltd, Jamshedpur                         | DR D. BHATTACHARJEE ( <b>Chairman</b> )<br>SHRI INDRANIL CHAKRABORTY ( <i>Alternate I</i> )<br>DR A. N. BHAGAT ( <i>Alternate II</i> ) |
| All India Induction Furnace Association, New Delhi | SHRI R. P. VARSHNEY                                                                                                                    |
| Bharat Heavy Electricals Ltd, Tiruchirapalli       | SHRI V. RAJASEKHARAN                                                                                                                   |
| Central Boilers Board, New Delhi                   | REPRESENTATIVE                                                                                                                         |
| DGS&D, Bhilai Nagar, Delhi                         | REPRESENTATIVE                                                                                                                         |
| Escorts Knowledge Management Centre, Faridabad     | SHRI ALOK NAYAR                                                                                                                        |
| Essar Steels Ltd, Hazira                           | DR A. K. DAS<br>SHRI R. K. BALASUBRAMANIAM ( <i>Alternate</i> )                                                                        |
| Institute of Steel Development and Growth, Kolkata | DR R. K. P. SINGH<br>SHRI JAYANTA KUMAR SAHA ( <i>Alternate</i> )                                                                      |
| Jindal South West Ltd, Vasind                      | SHRI M.K. MAHESHWARI                                                                                                                   |

## IS 1148 : 2009

| <i>Organization</i>                                                     | <i>Representative(s)</i>                                                                                         |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| M.N. Dastur & Co Ltd, Kolkata/Delhi                                     | SHRI SUBHABRATA SENGUPTA<br>SHRI V. K. TYAGI ( <i>Alternate</i> )                                                |
| Ministry of Defence (DGOFB), Kolkata                                    | SHRI P. S. BANDHOPADHYAY<br>SHRI T. BASU ( <i>Alternate</i> )                                                    |
| Ministry of Defence (DGQA), Ichapur                                     | SHRI S. K. KHILNANEY<br>SHRI P. MEENA ( <i>Alternate</i> )                                                       |
| Ministry of Railways (RDSO), Lucknow                                    | SHRI RADHEY SHAM<br>SHRI R. K. NAYYAR ( <i>Alternate</i> )                                                       |
| Ministry of Steel (Government of India), New Delhi                      | SHRI A. C. R. DAS<br>SHRI B. D. GHOSH ( <i>Alternate</i> )                                                       |
| Powergrid Corporation of India Ltd, Gurgaon                             | REPRESENTATIVE                                                                                                   |
| Rashtriya Ispat Nigam Ltd (VSP), Vishakhapatnam                         | SHRI P. K. SEN<br>SHRI P. SRINIVAS ( <i>Alternate</i> )                                                          |
| SAIL, Bhilai Steel Plant, Bhilai                                        | SHRI S. BHATTACHARYA<br>SHRI P. K. DATTA ( <i>Alternate</i> )                                                    |
| SAIL, Bokaro Steel Plant, Bokaro                                        | DR M. M. S. SODHI<br>SHRI P. S. REDDY ( <i>Alternate</i> )                                                       |
| SAIL, Central Marketing Organization, Kolkata                           | SHRI P. C. JHA<br>SHRI B. V. S. PANDIT ( <i>Alternate</i> )                                                      |
| SAIL, Durgapur Steel Plant, Durgapur                                    | SHRI A. KANAN                                                                                                    |
| SAIL, IISCO Steel Plant, Burnpur                                        | SHRI A. K. SINGH                                                                                                 |
| SAIL, Research & Development Center for Iron & Steel, Ranchi            | DR RAMEN DATTA<br>DR B. K. JHA ( <i>Alternate</i> )                                                              |
| SAIL, Rourkela Steel Plant, Rourkela                                    | SHRI C. MUTHUSWAMY<br>SHRI S. MUKHOPADHYAYA ( <i>Alternate</i> )                                                 |
| Steel Furnace Association of India, New Delhi                           | REPRESENTATIVE                                                                                                   |
| Steel Re-rolling Mills Association of India, Mandi Gobindgarh           | SHRI B. M. BERIWALA<br>COL SURINDER SINGH ( <i>Alternate</i> )                                                   |
| TCE Consulting Engineers, Jamshedpur                                    | DR M. D. MAHESHWARI                                                                                              |
| Tata Motors Limited, Pune                                               | SHRI B. R. GALGALI                                                                                               |
| In personal capacity [403, Udaigiri, Kaushambi, Distt Ghaziabad, U.P.]  | SHRI N. MITRA                                                                                                    |
| BIS Directorate General                                                 | DR (SHRIMATI) SNEH BHATLA, Scientist 'F' and Head (MTD)<br>[Representing Director General ( <i>Ex-officio</i> )] |
| <i>Member Secretary</i><br>SHRI DEEPAK JAIN<br>Scientist 'E' (MTD), BIS |                                                                                                                  |

### Long Steel Products and Wires Subcommittee, MTD 4 : 2

|                                                                               |                                                                      |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Rashtriya Ispat Nigam Ltd, (VSP), Vishakhapatnam                              | SHRI P. K. SEN ( <i>Convenor</i> )                                   |
| All India Steel Re-Rollers Associations, New Delhi                            | SHRI VINOD VASHISHT<br>SHRI A. K. BHARGAVA ( <i>Alternate</i> )      |
| SAIL, Bhilai Steel Plant, Bhilai                                              | SHRI A. DAS GUPTA<br>SHRI K. L. BALASUBRAMANIAN ( <i>Alternate</i> ) |
| Steel Wires manufacturers Association of India, Kolkata                       | SHRI MAHESH PODDAR<br>SHRI S. K. GHOSH ( <i>Alternate</i> )          |
| In personal capacity (248, Akash Darhan Society, Mayur Vihar-I, Delhi-110091) | SHRI AVTAR SINGH                                                     |

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### Amendments Issued Since Publication

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