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Mazdoor Kisan Shakti Sangathan

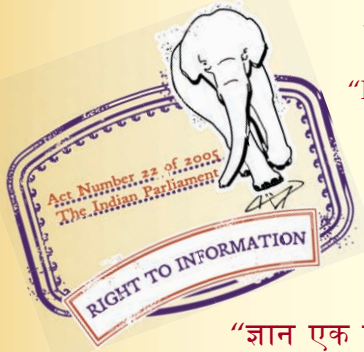
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“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

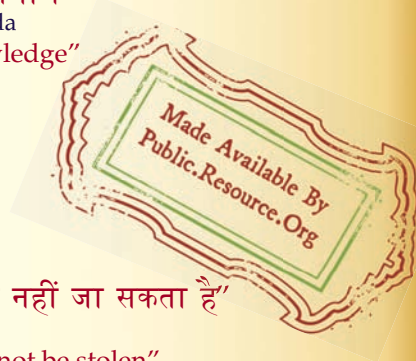
IS 10742 (1983): Cast gun metal rods and bars [MTD 8:
Copper and Copper Alloys]



“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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IS : 10742 - 1983

Indian Standard
SPECIFICATION FOR
CAST GUN METAL RODS AND BARS

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR CAST GUN METAL RODS AND BARS

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(*Continued on page 2*)

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Indian Standard

SPECIFICATION FOR CAST GUN METAL RODS AND BARS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 November 1983, after the draft finalized by the Copper and Copper Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard specifies the requirements of gun metal rods and bars in sand, chill and continuous cast conditions. In view of the special requirements of gun metal rods and bars which are not exactly met by IS:28-1975*, IS:318-1981† and IS:306-1968‡, the necessity was felt that there should be a separate standard for covering the requirement of gun metal rods and bars. In this specification the composition of three different grades with mechanical properties has been mentioned. Grades I and II have a fair strength and good machining properties. They are used in valve fittings, pumps, and bearing shells, Grade III is suitable for steam valve bodies and general utility structural use in severe conditions.

0.3 While preparing the standard, the necessary assistance has been derived from:

DIN 1705 Tin bronze and leadbrass castings. Deutschen Normenausschusses.

JIS H 5115 Leaded tin bronze castings. Japanese Standards Association.

BS 1400:1973 Specification for copper alloy ingots and copper and copper alloy castings. British Standards Institution.

Annual Book of ASTM Part 6 Copper and copper alloys. American Society for Testing and Materials.

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.

*Specification for phosphor bronze ingots and castings (*third revision*).

†Specification for leaded tin bronze ingots and castings (*second revision*).

‡Specification for tin bronze ingots and castings (*second revision*).

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

1. SCOPE

1.1 This standard covers the requirements of three grades of cast gun metal rods and bars.

2. TERMINOLOGY

2.1 For the purpose of this standard, the following definitions as given in IS: 3288 (Part 1)-1981* shall apply.

2.1.1 *Bar/Rod* — Any extruded, drawn, cold- or hot-rolled, forged, cast or combination of any of these processes of solid section supplied in straight length, whose width or greatest distance between parallel faces is greater than 6 mm.

2.2 *Melt* — The quantity of metal melted in a crucible or furnace at one time and cast in the form of rods and bars. In the case of continuous casting, it shall be the quantity cast continuously over a period of 4 hours.

3. SUPPLY OF MATERIAL

3.1 General requirements relating to the supply of material shall conform to IS: 1387-1967†.

4. CHEMICAL COMPOSITION

4.1 The material shall have the chemical composition as given in Table 1.

TABLE 1 CHEMICAL COMPOSITION

CONSTITUENT	COMPOSITION, percent		
	Grade I	Grade II	Grade III
Tin	4-6	6-8	9.5- 0.5
Zinc	4-6	1.5-3.0	1.75-2.75
Lead	4-6	2.5-5.5	0-1.5
Nickel	2.0, <i>Max</i>	2.0, <i>Max</i>	1.0, <i>Max</i>
Iron	0.35, <i>Max</i>	0.35, <i>Max</i>	0.15, <i>Max</i>
Aluminium	0.01, <i>Max</i>	0.01, <i>Max</i>	—
Total impurities	0.8, <i>Max</i>	0.7, <i>Max</i>	0.5, <i>Max</i>
Copper	Remainder	Remainder	Remainder

*Glossary of terms for copper and copper alloys: Part 1 Cast form and wrought form (main types) (*second revision*).

†General requirements for the supply of metallurgical materials (*first revision*).

4.2 The chemical composition shall be determined either by the method specified in IS:4027-1967* or any other established instrumental/chemical method. In case of dispute the procedure specified in the latest edition of IS:4027* for chemical analysis, shall be the referee method.

4.3 The manufacturer shall, when required, supply free of charge a copy of his works analysis of the material.

NOTE — The 'works analysis' is defined as the routine analysis carried out by the manufacturer in order to control the quality of material.

5. MECHANICAL PROPERTIES

5.1 Tensile Test — Rods and bars when tested in accordance with IS:2654-1977† shall have the tensile properties as given in Table 2.

TABLE 2 MECHANICAL PROPERTIES OF BARS/RODS

	DESCRIPTION	TENSILE STRENGTH, <i>Min</i> MPa	ELONGATION PERCENTAGE ON GAUGE LENGTH OF $5.65 \sqrt{A}$, <i>Min</i>
Grade I	Sand cast (separately cast)	200	13
	Chill cast (separately cast)	200	6
	Continuous cast	250	15
Grade II	Sand cast (separately cast)	250	16
	Chill cast (separately cast)	250	5
	Continuous cast	300	13
Grade III	Sand cast (separately cast)	270	13
	Chill cast (separately cast)	230	3
	Continuous cast	300	10

NOTE — 1 MPa = 0.102 kg/mm².

5.2 Fracture Test — Sample rod/bar shall be broken in the presence of the purchaser in such a manner that the area of fracture is as large as practicable. If the fracture shows dross, dirt spots or void, all castings produced from the same melt shall be rejected.

*Methods of chemical analysis of bronzes.

†Method for tensile testing of copper and copper alloys (*first revision*).

6. FORMS OF TEST

6.1 Forms of Test Bars for Sand and Chill Cast Materials—The test bars shall be according to one of the appropriate types described in IS:1408-1968*. In the case of continuous castings, the test bar shall be selected from cast rods and bars.

7. FREEDOM FROM DEFECTS

7.1 Rods and bars shall be clean, sound and free from blow-holes and flaws.

7.1.1 Rods and bars shall not be repaired, plugged, impregnated, welded or burned-in.

8. DIMENSIONS

8.1 The dimensions of the rods and bars unless otherwise specified in the contract shall not exceed by more than 5 percent of the specified diameter/thickness or 2 mm whichever is more.

9. SAMPLING AND CRITERIA FOR CONFORMITY

9.0 Unless otherwise decided by mutual agreement of the purchaser and supplier, the following sampling procedure and criteria for conformity shall hold good.

9.1 Sample for Chemical Analysis and Mechanical Properties

9.1.1 In case of sand cast or chill cast, separately cast test bars shall be provided by the manufacturer. In the case of continuous casting, the sample rod/bar drawn for chemical analysis may be used for mechanical tests. The number of samples tested for chemical analysis and mechanical tests shall be as given in Table 3.

TABLE 3 SAMPLING FOR RODS/BARS

MASS OF INDIVIDUAL CAST ROD/BAR	LOT SIZE	NO. OF SAMPLES FOR CHEMICAL ANALYSIS AND MECHANICAL PROPERTIES
10 kg or less	1 000 kg or part thereof	1
Above 10 kg but below 100 kg	2 500 kg or part thereof	1
100 kg or above	5 000 kg or part thereof	1

*Recommended procedure for inspection of copper-base alloy sand castings (first revision).

9.1.2 The lot shall be accepted if the samples tested meet all the chemical composition and mechanical properties requirements of the specification.

9.2 Retest

9.2.1 If the sample drawn for chemical analysis fails to meet the requirements stipulated in the standard, two more tests shall be conducted on the same sample in order to confirm that the analysis has been done properly. If both the test results satisfy the relevant requirements, the lot shall be accepted and if either of the test results fail, the lot represented shall be deemed as not complying with the standard.

9.2.2 Should a test piece fail to meet the mechanical properties requirements specified in the standard, two further test pieces which represent the same cast may be tested in the same manner. Should one of the further test pieces meet the requirement of specification the material represented thereby shall be deemed to comply with the standard. Should both of these test pieces fail, the material represented thereby shall be deemed not to comply with the standard.

10. PACKING

10.1 The material shall be supplied in bundles weighing about 50 kg and more depending on the size of rods and bars. The bundles shall be strapped with hoops or as required by the purchaser.

11. MARKING

11.1 Suitable tags with markings made on them to show the size of bars/ rods, lot number, date of manufacture, grade and where applicable temper of the material in addition to name of the manufacturer, and any other information required by the purchaser, shall be attached to each bundle of the material.

11.1.1 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 conveys 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 be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>	<i>Definition</i>
Force	newton	N	1 N = 1 kg·m/s ²
Energy	joule	J	1 J = 1 N·m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V·s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

AMENDMENT NO. 1 JUNE 2004
TO
IS 10742 : 1983 SPECIFICATION
FOR CAST GUN METAL RODS AND BARS

(Page 4, clause 2.1, line 2) — Substitute 'IS 3288 (Part 3) : 1986*' for 'IS : 3288 (Part 1) - 1981*'.
'

(Page 4, footnote marked '*') — Substitute the following for the existing footnote:
'

'*Glossary of terms relating to copper and copper alloys : Part 3 Wrought forms.'

(Page 4, clause 3.1, line 2) — Substitute 'IS 1387 : 1993†' for 'IS : 1387 - 1967†'.
'

(Page 4, footnote marked '†') — Substitute the following for the existing footnote:
'

'†General requirements for the supply of metallurgical materials (second revision).'

(Page 5, clause 5.1, line 2) — Substitute 'IS 1608 : 1995†' for 'IS : 2654 - 1977†'.
'

(Page 5, footnote marked '†') — Substitute the following for the existing footnote:
'

'†Mechanical testing of metals – Tensile testing (second revision).'

(MTD 8)