

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 319 (2007): Free Cutting Brass Bars, Rods and Section
[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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भारतीय मानक
सुकटय पीतल के सरीये, छड़े एवं सैक्शन — विशिष्टि
(पांचवाँ पुनरीक्षण)

Indian Standard
FREE CUTTING BRASS BARS, RODS AND
SECTION — SPECIFICATION
(*Fifth Revision*)

ICS 77.150.30

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

FOREWORD

This Indian Standard (Fifth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Copper and Copper Alloys Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1961 and subsequently revised in 1962, 1968, 1974 and 1989. While reviewing this standard in the light of experience gained during these years, the Committee decided to revise it in line with present practice being followed by Indian industry. In the present revision, following modifications has been made:

- a) The word 'Leaded' is deleted from the main heading of the standard,
- b) Grade 3 has been deleted, since it is not found suitable for high speed machining operation,
- c) Mercurous nitrate test is made mandatory since there is no other test which reveals the internal stress levels, which are harmful for stress corrosion/season cracking,
- d) Hardness requirements have been specified, and
- e) The supply condition for shapes and sections being introduced.

The composition of the Committee responsible for the 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

FREE CUTTING BRASS BARS, RODS AND SECTION — SPECIFICATION

(Fifth Revision)

1 SCOPE

This standard covers the requirements for free cutting brass bars, rods and sections having a minimum cross-sectional dimension over 6 mm suitable for high speed screw cutting and turning work.

2 REFERENCES

The following standards 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 agreements 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>
1387 : 1993	General requirements for the supply of metallurgical materials (<i>second revision</i>)
1501 : 2002	Method for Vickers hardness test for metallic materials (<i>third revision</i>)
1599 : 1985	Method for bend test (<i>second revision</i>)
1608 : 2005	Metallic materials — Tensile testing at ambient temperature (<i>third revision</i>)
1817 : 1961	Methods of sampling non-ferrous metals for chemical analysis
2305 : 1988	Method for mercurous nitrate test for copper and copper alloys (<i>first revision</i>)
2826 : 1986	Dimensions and tolerances for copper and copper alloy, rods and bars for general engineering purposes (<i>third revision</i>)
3288	Glossary of terms relating to copper and copper alloys:
(Part 1) : 1986	Materials (<i>third revision</i>)
(Part 3) : 1986	Wrought forms
3685 : 1966	Methods of chemical analysis of brasses

3 TERMINOLOGY

For the purpose of this standard, the definition of terms given in IS 3288 (Part 1 and Part 3) shall apply.

4 SUPPLY OF MATERIAL

General requirements relating to the supply of material shall be as laid down in IS 1387.

5 FREEDOM FROM DEFECTS

The material shall be clean, smooth, free from surface defects like blisters, slivers, scales, fins, spills, cracks, etc, and free from internal defects like porosity, piping, etc.

6 CONDITION OF DELIVERY

The material shall be supplied in any one of the following conditions as specified by the purchaser:

- a) Annealed (Soft) (O),
- b) Half hard (HB), and
- c) Hard (HD).

NOTE — If 'no temper' is specified by the purchaser, the material shall be supplied in half hard (HB) condition. For shapes and sections the physical properties requirements shall be agreed upon between the manufacturer and the purchaser at the time of placing the order.

7 DIMENSIONS AND TOLERANCES

7.1 Sizes

The material shall be supplied in sizes as specified in IS 2826 or as required by the purchaser.

7.2 Tolerances

7.2.1 The tolerances on sizes of bars/rods shall be as specified in IS 2826.

7.2.2 The tolerances for sections shall be as agreed to between the purchaser and the supplier/manufacturer and shall be stated in the order.

8 CHEMICAL COMPOSITION

8.1 The material when analyzed by the method specified in IS 3685 or any other established instrumental/chemical method shall conform to the requirements as given in Table 1. In case of dispute, the procedure given in IS 3685 shall be the referee method. However when the method is not given in

IS 3685, the referee method shall be as agreed to between the purchaser and the manufacturer.

8.2 Alternatively the method specified in relevant ISO/IEC Standard may be used.

9 MECHANICAL PROPERTIES

9.1 The material when tested for tensile test in accordance with IS 1608 shall conform to the requirements given in Table 2.

Table 1 Chemical Composition
(Clause 8.1)

SI No.	Constituent	Percentage	
		Grade 1	Grade 2
(1)	(2)	(3)	(4)
i)	Copper	56.0-59.0	60.0-63.0
ii)	Lead	2.0-3.5	2.5-3.7
iii)	Iron, <i>Max</i>	0.35	0.35
iv)	Total other impurities (excluding iron), <i>Max</i>	0.7	0.5
v)	Zinc	Remainder	Remainder

NOTES

1 If required antimony may be restricted to 0.02 percent in Grade 1 alloy.

2 Any nickel or silver present is to be counted as copper.

3 Other impurities do not preclude the possible presence of other unnamed elements. However, analysis shall be regularly made only for the alloying elements listed in the table, plus either copper or zinc. The major elements that is not analyzed shall be determined by difference between the sum of those elements analyzed and 100 percent. By agreement between the manufacturer and the purchaser, the limits may be established for elements not specified and analysis done.

Table 2 Tensile Properties
(Clause 9.1)

SI No.	Condition	Size		Tensile Strength <i>Min</i> , MPa		Elongation on Gauge Length 5.65√A, Percent, <i>Min</i>	
		Over	Up to and Including	Grade 1	Grade 2	Grade 1	Grade 2
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Annealed (O)	6	25	345	325	12	15
		25	50	315	305	17	20
		50	—	285	275	22	25
ii)	Half hard (HB)	6	12	405	395	4	7
		12	25	395	385	6	10
		25	50	355	345	12	15
		50	—	325	315	17	20
iii)	Hard (HD)	6	12	550	510	—	—
		12	25	490	485	4	—

NOTE — 1N/mm² = 0.102 kgf/mm² = 1 MPa.

Indian Standard

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7.1 Sizes

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NOTES

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Table 2 Tensile Properties
(Clause 9.1)

SI No.	Condition	Size		Tensile Strength <i>Min</i> , MPa		Elongation on Gauge Length $5.65\sqrt{A}$, Percent, <i>Min</i>	
		Over	Up to and Including	Grade 1	Grade 2	Grade 1	Grade 2
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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		25	50	315	305	17	20
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ii)	Half hard (HB)	6	12	405	395	4	7
		12	25	395	385	6	10
		25	50	355	345	12	15
		50	—	325	315	17	20
iii)	Hard (HD)	6	12	550	510	—	—
		12	25	490	485	4	—

NOTE — $1\text{N/mm}^2 = 0.102\text{ kgf/mm}^2 = 1\text{ MPa}$.

9.1.1 Up to and including 32 mm rods, the central longitudinal axis of the test pieces shall be the same as that of the rods.

9.1.2 In case of rods over 32 mm, the central longitudinal axis of the test piece shall be at least 16 mm from the nearest face/surface.

9.1.3 The fractured test piece shall be free from pipe and other surface defects.

9.2 The material when tested in accordance with IS 1501 for Vickers hardness shall conform to the requirements given in Table 3.

10 MERCUROUS NITRATE TEST

10.1 The material is subjected to the test specified in IS 2305.

10.2 There should be no cracks in the test specimen when examined immediately after it is removed from the solution, rinsed with water and wiped off.

11 SAMPLING AND CRITERIA FOR CONFORMITY

11.1 Unless otherwise agreed to between the purchaser and the supplier/manufacturer the following sampling procedure and criteria for conformity shall hold good.

11.2 Lot

In any consignment, all the material of same grade, size and temper manufacturer from the same raw material, produced at the same place, shall be grouped together to constitute a lot.

11.3 Material shall be examined for freedom from defects and for tolerances on diameter/dimensions. Any bar/rod/section found defective shall be rejected.

11.4 From the material found satisfactory in 11.3 one sample shall be selected from each lot of part thereof to provide necessary test pieces for all the tests (chemical analysis, tensile test and electrical resistivity). Mass of each lot vary with the size of material and is given in Table 4.

NOTE — The material required for chemical analysis from the selected bar/rod/section shall be taken in accordance with IS 1817.

11.5 The lot shall be accepted if the samples tested meet all the chemical composition, tensile, properties, hardness and mercurous nitrate test specified above in the specification.

12 RETEST

12.1 If a result of chemical analysis fails to satisfy the requirements for any of the constituents, two more tests for that constituents shall be done 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 considered as conforming to this specification, otherwise not.

12.2 If any of the test pieces first selected fails to pass the requirements of tensile properties, hardness or mercurous nitrate test, two further sample from the same lot shall be selected for testing, one of which shall be from the same piece of material from which the original sample was taken, unless it is withdrawn by the supplier.

Table 3 Hardness Properties

(Clause 9.2)

Sl No.	Condition	Size		Vickers Hardness (HV)	
		Over mm	Up to and Including mm	Grade 1	Grade 2
(1)	(2)	(3)	(4)	(5)	(6)
i)	Annealed	6 and above		100, <i>Max</i>	90, <i>Max</i>
ii)	Half hard	6	12	125-155	120-150
		12	25	120-150	115-145
		25	50	110-140	100-130
		50 and above		100-130	90-120
iii)	Hard	6	12	160-185	155-185
		12	25	155-180	145-175

NOTE — For bars and rods above 12 mm, hardness should be taken on the cross-section midway between surface and centre.

Table 4 Lot Size

(Clause 11.4)

Sl No.	Specified Size (Diameter or Width Across Flats) of Material		Mass of Each Lot kg
	Over mm	Up to and Including mm	
(1)	(2)	(3)	(4)
i)	—	12	1 000
ii)	12	50	2 000
iii)	50	—	4 000

NOTE — When the order does not permit forming lots in the above quantity the lot size shall be as agreed to between the supplier and the purchaser.

12.2.1 If the test piece from both these additional samples pass in the test(s) in which it was failed earlier, lot represented by the test samples shall be deemed to comply with this standard. If the test piece from either of these additional samples fail the lot represented by the test samples shall be rejected.

13 PACKING

The material shall be packed in bundles, boxes, cases or crates or as required by the purchaser and specified in the order so as to ensure the safe transportation of the material and avoid damage in transit.

14 MARKING

14.1 Each packages with suitable metal tag which shall be marked with the following details:

- Name/trade-mark of manufacturer,
- Lot number,
- Dimensions,
- Mass,
- Grade/chemical composition,
- Temper,
- Date of manufacture, and
- Any other information required by the purchaser.

14.2 BIS Certification Marking

The material may also be marked with the Standard Mark.

14.2.1 The use of the Standard Mark is governed by the provision of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of the 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.

15 TEST CERTIFICATE

The supplier shall provide the test certificate for each consignment giving information like lot number, size, grade and temper of the material with corresponding chemical composition, tensile properties, hardness and mercurous nitrate test result.

16 INFORMATION TO BE GIVEN BY THE PURCHASER

This standard contains a number of clauses in which the purchaser is allowed to exercise an option. The purchaser should provide following information at the time of placing the order:

- Whether the purchaser wished to inspect the material at the supplier's works (*see 4*),
- Grade and temper of the material (*see 8 and 6*),
- Dimensions and tolerances (*see 7*),
- Sampling and criteria for conformity (*see 11*),
- Packing details (*see 13*),
- Marking details (*see 14*), and
- Whether test certificate required by the purchaser (*see 15*).

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Copper and Copper Alloys Sectional Committee, MTD 8

<i>Organization</i>	<i>Representative(s)</i>
Indian Copper Development Centre, Kolkata Agarwal Metal Works, Rewari	DR D. DE SARKAR (<i>Chairman</i>) SHRI D. K. JAIN SHRI O. P. RANA (<i>Alternate</i>)
Alcobex Metals Ltd, Jodhpur	SHRI G. C. KANUNGO SHRI S.D. PUROHIT (<i>Alternate</i>)
All India Air Conditioners & Refrigeration Association, Delhi	SHRI A. H. GIDWANI SHRI A. P. KHURANA (<i>Alternate</i>)
Bhabha Atomic Research Centre, Mumbai	SHRI V. K. TANGRI SHRI S. K. GUPTA (<i>Alternate</i>)
Bharat Electronics Ltd, Bangalore/Ghaziabad	SHRI SRIDHAR S. NADIGER SHRI ANUJ SINGH (<i>Alternate</i>)
Bharat Heavy Electricals Ltd, Bhopal	REPRESENTATIVE
Birla Copper Ltd, Bharuch	SHRI A. N. CHAKARVARTI SHRI B. M. SHARMA (<i>Alternate</i>)
Crompton Greaves Ltd, Mumbai	REPRESENTATIVE
DGS&D (Quality Assurance Wing), Kolkata/New Delhi	SHRI B. DAS GUPTA SHRI S.K. PANDEY (<i>Alternate</i>)
Finolex Cable Ltd, Bangalore	REPRESENTATIVE
Gem Sanitary Appliances Pvt Ltd, Delhi	SHRI B. K. SINGHAL SHRI V. K. CHOWDHARY (<i>Alternate</i>)
Hindustan Cables Ltd, Burdwan	SHRI A. K. NAG
Hindustan Copper Ltd, Kolkata	SHRI P. N. GANGAPADHYAY
India Govt. Mint, Hyderabad	SHRI M. J. RAY
Indian Telephone Industries Ltd, Bangalore	SHRI V. V. PRABHU SHRI M. D. DAWOOD (<i>Alternate</i>)
Indoswe Engineers Pvt Ltd, Pune	SHRI U. K. JATIA SHRI S. K. JAIN (<i>Alternate</i>)
International Copper Promotion Council (India), Mumbai	SHRI NAVEEN SHUKLA SHRI NARSIMHAN (<i>Alternate</i>)
Larsen & Toubro Ltd, Mumbai	SHRI R. C. AGARWAL SHRI U. R. JOSHI (<i>Alternate</i>)
Ministry of Defence (DGQA), Ambernath	SHRI R. S. MISHRA SHRI A. K. SHRIVASTAVA (<i>Alternate</i>)
Ministry of Defence (OFB), Kolkata	SHRI R. S. SINGH SHRI P. S. BANDHOPADHYAY (<i>Alternate</i>)
Ministry of Defence (DMRL), Hyderabad	DR S. NAGARJUNA
Ministry of Railways (RDSO), Lucknow	SHRI A. K. MANDAL SHRI S. K. DAS (<i>Alternate</i>)
National Metallurgical Laboratory, Jamshedpur	DR T. S. N. SANKARNARAYAN SHRI K. K. GUPTA (<i>Alternate</i>)
National Test House, Kolkata	DR SHYAMAL KR. SAHA SHRI ASHOKE BASU (<i>Alternate</i>)
Rupam Conductors Ltd, Mumbai	SHRI HASMUKH R. MEHTA SHRI S.R. RAJYAGOR (<i>Alternate</i>)
Ordnance Factory, Katni	DR A. S. BALGIR SHRI J. Z. WARKADE (<i>Alternate</i>)
Rapsari Engineering Industries Ltd, Bangalore	DR P. SRIRAM SHRI K. N. GANAPATHY (<i>Alternate</i>)
Regional Research Laboratory, Thiruvananthapuram	DR T. PRASAD RAO

<i>Organization</i>	<i>Representative(s)</i>
Saru Copper Alloy Semis Pvt Ltd, Meerut	SHRI D. P. JAIN SHRI SANJEEV JAIN (<i>Alternate</i>)
Sterlite Industries India Ltd, Mumbai	SHRI BAL CHANDRA KAMAT SHRI ALOKE CHAKRAVARTY (<i>Alternate</i>)
The Indian Smelting & Refining Co, Mumbai	SHRI D. BHATTACHARYYA SHRI M. P. SAHLOT (<i>Alternate I</i>) SHRI V. D. KELUSKAR (<i>Alternate II</i>)
The Institute of Indian Foundrymen, Ghaziabad/New Delhi	SHRI K. S. SATYANARAYANA SHRI A. K. ANAND (<i>Alternate</i>)
Vanaz Engineers Pvt Ltd, Pune	SHRI S. K. KHANDEKAR SHRI K. P. VELAYUDHAN (<i>Alternate</i>)
Voltas Ltd, Thane	SHRI P. D. RAO
BIS Directorate General	SHRI S. K. GUPTA, Scientist 'F' & Head (MTD) [Representing Director General (<i>Ex-officio</i>)]

Member Secretary
SHRI DEEPAK JAIN
Scientist 'E' (MTD), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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