IS 291 (1989): Machining Purposes [MTD 8: Copper and Copper Alloys]

BLANK PAGE


IS 291 : 1989
( Reaffirmed 2006 )

*Indian Standard*

# NAVAL BRASS RODS AND SECTIONS FOR MACHINING PURPOSES — SPECIFICATION

*( Third Revision )*

भारतीय मानक

मशीनन कार्यों के लिए नैवल पीतल की छड़ें और सेक्शन — विशिष्टि

( तीसरा पुनरीक्षण )

UDC 669·35'5-422 : 669·018·23



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

*September* 1989

**Price Group 2**

## FOREWORD

This Indian Standard ( Third Revision ) was adopted by the Bureau of Indian Standards on 16 January 1989, after the draft finalized by the Copper and Copper Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

This standard was first published in 1951 and subsequently revised in 1961 and 1977. In this revision, following modifications have been made.

a) The existing version of this standard, that is, IS 291 : 1977 covers the requirements of naval brass rods and sections suitable both for machining and forging. As the naval brass forging stock had been covered in IS 6912 : 1985 'Specification for copper and copper alloys forging stock and forgings ( *first revision* )', this revised version of the standard stipulates the requirements of naval brass for machining purposes only.

b) The clauses on chemical composition and analysis, size and tolerances, retest and marking have been modified.

c) The requirement of mercurous nitrate test has been made mandatory.

d) The requirements of sampling and criteria for conformity has been modified.

e) The requirement of test certificate has been added.

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*

# NAVAL BRASS RODS AND SECTIONS FOR MACHINING PURPOSES — SPECIFICATION

## *( Third Revision )*

### 1 SCOPE

This standard specifies requirements for two grades of naval brass rods and sections for machining purposes.

### 2 REFERENCES

| *IS No.* | *Title* |
|---|---|
| IS 387 : 1967 | General requirements for the supply of metallurgical materials (*first revision*) |
| IS 1817 : 1961 | Method of sampling non-ferrous metals for chemical analysis |
| IS 2305 : 1988 | Method for mercurous nitrate test for copper and copper alloys (*first revision*) |
| IS 2654 : 1977 | Method for tensile testing of copper and copper alloys (*first revision*) |
| IS 2826 : 1986 | Dimensions and tolerances for wrought copper and copper alloy rods and bars for general engineering purposes (*third revision*) |
| IS 3288 ( Part 3 ) : 1986 | Glossary of terms relating to copper and copper alloys: Part 3 Wrought form |
| IS 3685 : 1966 | Methods of chemical analysis of brasses |

### 3 TERMINOLOGY

For the purpose of this standard, the following definitions as given in IS 3288 ( Part 3 ) : 1986 shall apply.

#### 3.1 Bar/Rod

A solid wrought product of uniform cross-section along its whole length, supplied in straight length or coil form whose width or greatest distance between parallel faces is greater than 6 mm.

#### 3.2 Section

A solid product with cross-section other than round, hexagonal, square, rectangular or polygonal, such as, angle or channel supplied in straight lengths or in coiled form.

### 4 SUPPLY OF MATERIAL

General requirements relating to the supply of material shall be as laid down in IS 1387 : 1967.

### 5 CONDITION

The material shall be delivered in any one of the following conditions as specified by the purchaser. If no temper is specified by the purchaser, the material shall be supplied in half hard ( HB ) condition.

a) Annealed ( O ),

b) Half-hard ( HB ), or

c) Hard ( HD ).

### 6 FREEDOM FROM DEFECTS

The material shall be clean, smooth, free from surface defects, reasonably straight and free from twist.

### 7 SIZE AND TOLERANCES

#### 7.1 Sizes

The material shall be supplied in sizes as specified in IS 2826 : 1986 or as required by the purchaser.

#### 7.2 Tolerances

Tolerances on sizes of rods shall be as specified in IS 2826 : 1986.

**7.2.1** Tolerances on sections shall be as agreed to between the supplier and the purchaser and shall be stated in the order.

### 8 CHEMICAL COMPOSITION

**8.1** The material shall conform to the chemical composition as specified in Table 1.

**8.2** The chemical composition shall be determined either by the method specified in IS 3685 : 1966 any other established instrumental/chemical method. In case of dispute, the procedure specified in IS 3685 : 1966 shall be the referee method.

**Table 1 Chemical Composition, Percent**

( *Clause* 8.1 )

| Constituent | Grade 1 | Grade 2 |
|---|---|---|
| (1) | (2) | (3) |
| Copper ( including incidental nickel ) | **61·0 to 64·0** | **59·0 to 62·0** |
| Tin | **1·0 to 1·50** | **0·50 to 1·0** |
| Lead | 0·20, *Max* | 0·50 to 1·0 |
| Iron | 0·10, *Max* | 0·10, *Max* |
| Other impurities ( *see* Note ) | 0·20, *Max* | 0·20, *Max* |
| Zinc | **Remainder** | **Remainder** |

NOTE — Other impurities do not produce the possible presence of other unnamed elements. However analysis shall regularly be made only for the minor elements listed in the table, plus either copper or zinc. The major element 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, analysis may be required and limits established for elements not specified.

## 9 TENSILE PROPERTIES

**9.1** The material when tested in accordance with IS 2654 : 1977 shall conform to the tensile properties as specified in Table 2.

**9.2** The tensile test shall be made on test pieces machined to shape and largest dimensions practicable as specified in IS 2654 : 1977 from the samples selected in accordance with **11.3**.

**9.3** 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.

**9.4** For other sizes, the central longitudinal axis of the test pieces shall be the same as that of the rods.

**9.5** Should a tensile test piece break outside the middle third of its gauge length and the elongation percentage obtained be lower than the minimum specified, the test may be discarded and another test made.

## 10 MERCUROUS NITRATE TEST

**10.1** The material shall be subjected to the test as specified in IS 2305 : 1988.

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

## 11 SAMPLING AND CRITERIA FOR CONFORMITY

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

**Table 2 Tensile Properties**

( *Clause* 9.1 )

| Grade | Condition | Size | | Tensile Strength, *Min* | Elongation on Gauge Length $5.65\sqrt{S_o}$, *Min* |
|---|---|---|---|---|---|
| | | Over | Up to and Including | | |
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | mm | mm | MPa | Percent |
| Grade 1 | Annealed ( O ) | | All sizes | 325 | 20 |
| | Half-hard ( HB ) | — | 12·5 | 390 | 18 |
| | | 12·5 | 50 | 380 | 18 |
| | | 50 | 100 | 345 | 18 |
| | Hard ( HD ) | — | 12·5 | 430 | 10 |
| | | 12·5 | 25 | 410 | 10 |
| | | 25 | 50 | 390 | 10 |
| Grade 2 | Annealed ( O ) | | All sizes | 355 | 20 |
| | Half-hard ( HB ) | | All sizes | 390 | 15 |

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

**11.2** The material shall be examined for freedom from defects and for tolerance on diameter/dimensions. Any rod/section found defective shall be rejected.

**11.3** From the material found satisfactory in **11.2**, one sample shall be selected from each lot or part thereof to provide necessary test pieces for all the tests. Mass of each lot varies with the size of material and is given in Table 3.

NOTE — The material required for chemical analysis from the selected rods/sections shall be taken in accordance with IS 1817 : 1961.

**Table 3 Lot Size**

| Specified Size (Diameter or Width Across Flat) | | Mass of Each Lot |
|---|---|---|
| Over | Up to and Including | |
| (1) | (2) | (3) |
| mm | mm | kg |
| — | 12 | 1 000 |
| 12 | 40 | 2 000 |
| 40 | — | 4 000 |

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

**11.4** The lot shall be accepted if the samples tested meet all the chemical composition, tensile properties and mercurous nitrate test requirements of the specification.

## 12 RETESTS

**12.1** If a test result of chemical analysis fails to satisfy the requirements for any of the constituents, two more tests for that constitutent 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 fail to pass any of the requirements of tensile properties and mercurous nitrate test, two further samples from the same lot shall be selected for testing, one of which shall be from the same rod/section material from which the original sample was taken unless it is withdrawn by the supplier.

**12.2.1** If the test piece from both these additional samples pass, the 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 rods/sections shall be supplied in bundles and strapped with hoops and shall be suitably packed to avoid damage during transit or as required by the purchaser.

## 14 MARKING

Suitable tags or labels with marking made on them to show the size, grade, temper, lot number, the name of the manufacturer or any such information as required by the purchaser.

## 15 TEST CERTIFICATE

The supplier shall provide the test certificate for each consignment giving information, such as, cast number, corresponding chemical composition, tensile properties and mercurous nitrate tests.

**Standard Mark**

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 Standard 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 BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

**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.



**Revision of Indian Standards**

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : No. SMDC 11 ( 2911 )

**Amendments Issued Since Publication**

| Amend No. | Date of Issue | Text Affected |
|---|---|---|
| | | |
| | | |
| | | |

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
( Common to all Offices )

Regional Offices:

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002 — 331 01 31, 331 13 75

Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola
CALCUTTA 700054 — 36 24 99

Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036 — 2 18 43, 3 16 41

Southern : C.I.T. Campus, IV Cross Road, MADRAS 600113 — 41 24 42, 41 25 19, 41 29 16

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
BOMBAY 400093 — 6 32 92 95

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. PATNA. TRIVANDRUM.

Printed at Arcee Press, New Delhi, India