



CORPORATE PURCHASING SPECIFICATION

AA 121 41

Rev. No. 03

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PHOSPHOR BRONZE RODS AND BARS FOR ELECTRICAL MACHINES

1.0 GENERAL:

This specification governs the quality requirements of Phosphor bronze rods and bars greater than 6 mm and upto and including 100 mm.

2.0 APPLICATION:

Electrical machines.

3.0 CONDITION OF DELIVERY:

As manufactured. The material shall be suitably stress relieved, if required.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

The material shall comply with the requirements of the following national standard and also meet the requirements of this specification.

IS: 7811 - 1985 : Phosphor Bronze Rods and Bars.

5.0 DIMENSIONS AND TOLERANCES:

The dimensions shall be as specified in the order. The tolerances shall be as given in IS:2826: Dimensions and tolerances for copper & copper alloy rods, bars for general engineering purposes.

6.0 FREEDOM FROM DEFECTS:

The material shall be free from porosity and other defects of a nature that may interfere with normal commercial operation.

7.0 CHEMICAL COMPOSITION:

The analysis of copper when analysed in accordance with IS:4027 (Method for chemical analysis of bronzes) or any other conventional/Instrumental methods shall be as follows:

| Element | Percent, min. | Percent, max. |
|-------------------------------------|---------------|---------------|
| Tin | 4.2 | 5.5 |
| Phosphorus | 0.02 | 0.40 |
| * Lead | -- | 0.02 |
| * Zinc | -- | 0.03 |
| * Total Impurities (including Zinc) | -- | 0.05 |
| Copper | Remainder | |

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Note: These elements need not be determined, when the material supplied conform with the mechanical properties specified. However, the supplier shall ensure that the composition of the material lies within the limits specified above.

8.0 TEST SAMPLES:

For conducting tests all rods/bars of same dimensions and manufactured under similar conditions of production shall be grouped in batches as follows;

| Specified size (diameter or width across flats) in mm | Mass of batch in kg |
|---|---------------------|
| Upto and including 12 | 250 |
| Over 12 & upto and including 40 | 500 |
| Over 40 & upto and including 80 | 1000 |
| Over 80 & upto and including 100 | 2000 |

One sample shall be selected from each batch or part thereof to provide necessary test pieces for chemical, Mechanical, Electrical resistivity and Mercurous Nitrate tests.

9.0 MECHANICAL PROPERTIES:

When tested in accordance with IS 1608, (Mechanical testing of metals-Tensile testing), the material shall show the following properties in as received condition:

| Cross sectional thickness, mm | | 0.2% proof stress, min., in N/mm ² | Tensile strength min., N/mm ² | Elongation on G.L. of 5.65 √So, min., percent |
|-------------------------------|---------------|---|--|---|
| Over | upto & incld. | | | |
| 6 | 18 | 410 | 500 | 12 |
| 18 | 38 | 380 | 460 | 12 |
| 38 | 70 | 315 | 380 | 16 |
| 70 | 100 | 235 | 315 | 20 |

10.0 ELECTRICAL RESISTIVITY:

The electrical resistivity at 20^oC of a rod of 1 meter in length and uniform cross sectional area of 1 mm² shall be 0.108 ohm ± 10%.

11.0 RETEST:

Should any of the test pieces first selected, fail to pass the prescribed tests mentioned under various clauses in this specification, two further samples from the same batch shall be selected for testing one of which shall be from the same component from which the original test sample was taken, unless that component has been withdrawn by the supplier.

Should the test pieces from both these additional samples pass, the batch represented by the test sample shall be accepted. Should the test pieces from either of these additional samples fail, the batch represented by the test samples shall be rejected.



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12.0 INSPECTION AT SUPPLIER ' WORKS:

When ever specified, tests and inspection are to be conducted in the presence of BHEL's representative.

The supplier shall offer BHEL's representative all reasonable facilities, without charge to satisfy the latter that the material is being furnished in accordance with this specification.

The supplier shall prepare and provide necessary test specimens for testing to be carried out at his premises. If facilities are not available at his works, the supplier shall make necessary arrangements for carrying out the prescribed test elsewhere. The supplier shall notify BHEL in advance about the readiness of the material for inspection and testing.

BHEL reserves the right to test the material at BHEL's works and the final acceptance of the material shall be based on these test results.

13.0 TEST CERTIFICATES:

Unless other wise stated, three copies of certificates shall be supplied along with each consignment.

In addition, the supplier shall ensure to send one copy of test certificates along with the dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

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BHEL Order No.

Manufacturer 's/Supplier's Name:

Consignment/Identification No.

Sizes and Quantity Supplied

Results of dimensional inspection, chemical analysis, mechanical, electrical and all other tests as called for.

14.0 PACKING AND MARKING:

The material shall be supplied in bundles weighing about 50 kg and strapped with loops and suitably packed in wooden crates to prevent corrosion and damage during transit.

Each package or crate shall be legibly marked with the following information:

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BHEL Order No.

Identification No:

Weight

Supplier's Reference and Name

15.0 REFERRED STADARDS (Latest Publications Including Amendments):

1. IS: 1608

2. IS 2826

3. IS: 4027

4. IS: 7811