



PLANT PURCHASING SPECIFICATION BHOPAL

BP 12077

REV NO. 06

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COPPER ROD HARD - STRAIGHT EDGE CLOSE TOLERANCES (CONTROLLED OXYGEN)

SUPERSEDES
BP 12077 Rev 05

1 GENERAL :

This specification governs the requirement of Hard Copper Bar, Round, Rectangular & Square, with straight edges having close tolerances, for electrical purposes with an oxygen content of 400 ppm. Max. (Controlled Oxygen).

Refer AA 12023 for Copper Rod Hard, with normal tolerance.

2. APPLICATION :

For Electrical Apparatus .

3. CONDITION OF DELIVERY :

Drawn in straight lengths with straight edges in the hard condition.

4. COMPLIANCE WITH NATIONAL STANDARDS :

There is no Indian Standard covering ETP Grade Copper with controlled oxygen content.

5. DIMENSIONS AND TOLERANCES :

5.1 Sizes :

The material shall be supplied to the dimensions stated on the order / drawing.

Revision :

Reviewed & No Tech. Change

Issued by :

Prayk
STANDARDS AND MATERIALS GROUP
TECHNICAL SERVICES DEPARTMENT

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5.2 Tolerances :

5.2.1 Rectangular Bar :

Tolerances of rectangular bars shall be in accordance with Table 1 of DIN 1759 Group I reproduced below :

Width (mm)		Perm. Varn.	Permissible variation of thickness (mm) Plus / Minus					
Dimension Range			Plus/ Minus	From 2 to 3	Over 3 to 6	Over 6 to 10	Over 10 to 18	Over 18 to 30
Over	Upto							
-	10	0.08	0.05	0.07	0.08	-	-	-
10	18	0.10	0.05	0.07	0.09	0.10	-	-
18	30	0.15	0.05	0.07	0.09	0.10	0.15	-
30	50	0.20	0.07	0.09	0.10	0.12	0.15	0.20
50	80	0.25	0.09	0.11	0.12	0.15	0.20	0.25

5.2.2 Round Bar :

Tolerance on round bar shall be in accordance with DIN 1756 Group II reproduced below :

Size (mm)		Permissible Variation (mm)	
From	To	Minus	Plus
06	10	0.09	0.00
10	18	0.11	0.00
18	30	0.13	0.00
30	40	0.16	0.00

5.2.3 Square Bar :

Tolerance on square bar shall be in accordance with DIN 1761 Group I reproduced below :

Size (mm)		Permissible Variation (mm)	
From	To	Minus	Plus
-	06	0.08	0.00
07	10	0.09	0.00
11	18	0.11	0.00
19	30	0.13	0.00
31	40	0.16	0.00



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5.2.4 Straightness :

The edges of rods shall not vary from a straight line by more than 3 mm in any 1000 mm length.

5.3 Length :

In straight lengths with straight edges as called for in the Drawing / order.

6. MANUFACTURE :

6.1 Conductor Material

The conductor shall be manufactured from ETP grade copper conforming to CPS AA 12024 "Electrolytic Tough Pitch Copper Wire Bars / Ingots / Continuously Cast Wire Rods".

Note:- It is preferable to manufacture conductor from continuous cast copper rods provided all other acceptance parameters & conditions remain same.

7. FREEDOM FROM DEFECTS:

The material shall be clean, smooth, straight, free from cracks, slivers, scales and other harmful defects.

8. TEST SAMPLES:

One test sample shall be selected per size, per heat treatment batch, per consignment for testing. The sample shall be cut off cold & shall receive no further treatment before testing.

9. MECHANICAL PROPERTIES :

The material when tested in accordance with IS1608, shall show the following properties.

9.1 Tensile (For sizes Upto 40 mm) :

Tensile Strength : 300 - 360 N/mm²

Elongation on 5.65 $\sqrt{S_0}$: 10 Percent Minimum Gauge Length

9.2 Hardness (Brinell) :*

When tested in accordance with IS:1500 Pt.1, the material shall have a Brinell Hardness of 80-105.

***Note :-** Hardness test shall be done only when Tensile Test cannot be carried out.



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10. ELECTRICAL RESISTIVITY :

When measured in accordance with IS 3635/the Electrical Resistivity at 20°C shall not be greater than 0.01754 Ohms mm² / metre, which corresponds to 98.28 Percent Minimum of Electrical Conductivity of IACS Standard.

Alternatively the method of measurement employing Eddy Current probes as per ASTM E 1004 shall also be acceptable.

Refer Appendix B of IS : 613 - for temperature correction factor.

11. TEST CERTIFICATE :

Three copies of the test certificate, shall be supplied unless otherwise stated on the order.

In addition, supplier shall ensure to enclose one copy of the test certificate alongwith their despatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information.

BHEL Reference:

BP 12077 Rev. 06

Order No.

Supplier's Reference

Supplier's Name.

Size and Number .

Batch No.

Test Results :

Test results obtained for Electrical & Mechanical Properties & Dimensional tolerances, shall be recorded.



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12 PACKING AND MARKING:

The material shall be properly wrapped with Kraft Packing Paper bound with cord or soft wire and packed in crates to prevent corrosion and damage during transit.

Each crate shall be legibly marked with the following information :

BP 12077 : Copper Rod Hard Straight Edge

Close Tolerances (Controlled Oxygen).

BHEL Order No.

Supplier's Name

Size and Weight.

GENERAL INFORMATION FOR CALCULATION (NOT TO FORM ACCEPTANCE CRITERION)

0.2% Proof Stress : 250 N/mm²



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SUPERSEDES
 BP 12080 Rev.11

RECTANGULAR COPPER BAR- HARD HALF-ROUND EDGE AND PROFILES (CONTROLLED OXYGEN)

1. GENERAL :

This specification governs the quality of drawn rectangular copper bars with half-round edge & profiles as per drawing having an Oxygen content of 400 PPM Max. (Controlled Oxygen) for sizes upto 30 mm thick in the hard condition.

2. APPLICATION :

For electrical apparatus.

3. CONDITION OF DELIVERY :

Drawn, in straight length, with half-round edges in hard condition. Profiles as per drawing.

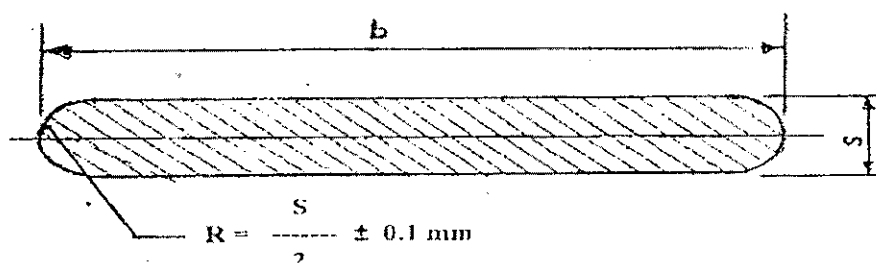
4. COMPLIANCE WITH NATIONAL STANDARDS :

There is no Indian standard covering ETP gr. Copper with controlled oxygen content.

5. DIMENSIONS AND TOLERANCES :

5.1 Sizes

The dimensions shall comply with that stated in the order/drawing accompanying our order, In Case drg. is not furnished, half round edged bars shall have profiles as per figure show below.



5.2 Tolerances (REF. Fig. Above)

The tolerances for the material shall be as stated in Table below.

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The material shall be clean, smooth, straight, free from cracks, slivers, scales and other harmful defects.

Three copies of the rest certificate shall be supplied, unless otherwise stated on the order.



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In addition, the supplier shall ensure, to enclose one copy of the Test certificate along with their dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

BHEL Reference :

BP 12080 - Rev. 12

Order no.

Supplier's References :

Supplier's Name

Size and Number.

Batch No.

Test Results: Test result for Electrical & Material properties and dimensional Tolerances, shall be recorded.

12. PACKING AND MARKING :

The material shall be properly wrapped with Kraft packing paper., bound with cord of soft wire and packed in crates to prevent corrosion and damage during transit.

Each crate shall be legibly marked with the following information.

BP 12080: Rectangular copper Bar-Hard, Half-Round Edge & Profiles

(Controlled Oxygen)

BHEL ORDER NO.

SUPPLIER's NAME

SIZE AND WEIGHT.

GENERAL INFORMATION FOR CALCULATION

(NOT TO FORM ACCEPTANCE CRITERION)

0.28 proof stress - 250 N/mm² Minimum