

BP 12071

REV NO. 08

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COPPER BAR ANNEALED-STRAIGHT EDGE
(CONTROLLED OXYGEN)

SUPERSEDES

BP 12071 Rev 07

1. GENERAL:

This specification governs the requirement of Annealed Copper Rods, Rectangular and Square, with straight edges for electrical purposes with an oxygen content of 400 ppm. Max, (Controlled Oxygen) for sizes upto 50 mm.

2. APPLICATION : For electrical apparatus

3. CONDITION OF DELIVERY

Drawn in straight lengths with straight edges in the annealed 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,

Rectangular Bar : Thickness From 2 to 40 mm

: Width Upto 120 mm

Square Bar : 11 to 50 mm

Revision :

Reviewed & No Tech. Change

Issued by :

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 as given below :

Width (mm)		Perm. Varn. Plus/ Minus	Permissible variation of thickness (mm)					
Dimension Range			Plus / Minus					
Over	Upto		From 2 to 3	Over 3 to 6	Over6 to 10	Over10 to 18	Over18 to 30	Over30 to 40
10	18	0.15	0.07	0.10	0.12	0.15	-	-
18	30	0.22	0.07	0.10	0.12	0.15	0.22	-
30	50	0.30	0.10	0.13	0.15	0.18	0.22	0.30
50	80	0.37	0.13	0.16	0.18	0.22	0.30	0.37
80	120	0.45	-	0.18	0.22	0.27	0.35	0.45

5.2.2 Square Bar :

Tolerance on square bar shall be as given below:

Size (mm)		Permissible Variation (mm)	
From	To	Minus	Plus
11	18	0.18	0.00
19	30	0.21	0.00
31	50	0.25	0.00

5.2.3 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 manufacture from ETP Gr. copper conforming to AAI2024 "Electrolytic Tough pitch copper wire / Bar / Ingots / Continuously Cast Wire Rods".



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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 IS:1608 shall show the following properties.

9.1 Tensile (For sizes Up-to 50mm) :

Tensile Strength	200 -250 N/mm ²
Elongation on 5.65 $\sqrt{S_0}$ G.L.	38 Percent Minimum

9.2 Hardness (Brinell)*

When tested in accordance with IS:1500 the material shall have a Brinell Hardness of 45-70 HB.

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

10. ELECTRICAL RESISTIVITY:

When measured in accordance with IS3635, the Electrical Resistivity at 20°C shall not be greater than 0.01754 Ohms mm²/mtr which, corresponds to 98.28 % Min, 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.



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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:

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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.

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 :

BP12071: Copper Bar Annealed Straight Edge (Controlled Oxygen)

BHEL Order No,

Supplier's Name

Size and Weight.