



TSD 6208 A

PLANT PURCHASING SPECIFICATION
BHOPAL

BP 12082

Rev. No. 05

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SUPERSEDES
BP 12082 Rev. 04

HIGH CONDUCTIVITY COPPER TUBES

1. **GENERAL:**

This specification governs the quality requirements of high conductivity copper tube, upto 125 mm outside diameter.

2. **APPLICATION:**

For use in Traction Motors/Current Transformers.

3. **CONDITION OF DELIVERY:**

The tube shall be supplied in solid drawn condition in straight lengths.

Ends shall be cut clean and square with the axis of the tube.

4. **COMPLIANCE WITH NATIONAL STANDARDS:**

There is no Indian Standard for this material. However assistance has been drawn from IS:2501/ BSEN 13600.

5. **DIMENSIONS AND TOLERANCES:**

5.1 Sizes:

These tubes shall be designated by outside diameter and thickness. The material shall be supplied to the dimensions as specified in the purchase order.

The sizes shall be selected from IS:5493.

5.2 Tolerances:

The tolerances shall comply with IS: 5493, as detailed below.

Revision : BS references updated
Brought upto-dated

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5.2.1 Diameter:

The **mean diameter** of the tube shall not vary from the **specified diameter** by more than the **amount of tolerance** given below. The mean diameter is half the sum of two diameters measured at right angles at any section of the **tube**.

Outside Diameter Specified mm	Tolerances Nominal ± mm
Upto 10	0.08
Over 10 to 18	-0.10
Over 18 to 32	0.12
Over 32 to 50	0.15
Over 50 to 80	0.20
Over 80 to 125	0.25

5.2.2 Thickness:

The mean thickness of the tube shall not vary from the **specified thickness** by more than $\pm 12.5\%$ of the specified wall **thickness**. However total weight of the tubes should not differ by more than $\pm 5\%$ from the **nominal dimensions**.

5.2.3 Length:

The tube ordered in the specified length shall be within the **tolerances** as **specified** below:

Specified Length Metres	*Tolerance on Specified Length mm
Upto & including 3	+ 4
Over 3 upto 6	+ 6
Over 6 upto 10	+ 8

* Note: Minus tolerances are not permissible.

5.3 Straightness:

For the acceptable **straightness** of the tubes, the permissible max. deflection shall not exceed 2 mm per **metre**.

6. MANUFACTURE:

The **tubes** shall be solid drawn, temper annealed and in no **case** shall be **redrawn** from used **tubes**.

7. **FREEDOM FROM DEFECTS:**

The tubes shall be round, straight, **smooth**, clean, **uniform** in diameter and free from cracks **seams**, **slivers**, scales, deleterious films in the **bore** and other harmful defects.

The ends shall be cut clean and square with the axis of the **tube**.

8. **CHEMICAL COMPOSITION:**

The chemical composition of the material shall be as **follows**:

Copper including silver : **99.98 Min.**

Note: These elements need not be determined when the material supplied conforms with Electrical & Mechanical properties specified in this **specification**. However, the supplier shall ensure that the composition of material conforms the specified **limits**.

9. **TEST SAMPLES:**

One sample per size, per batch, per consignment, shall selected for test.

10. **MECHANICAL PROPERTIES:**10.1 **Tensile:**

Test pieces when tested in accordance with **IS:1608** shall show a tensile strength of 245 **N/mm²** Minimum.

10.2 **Hardness:**

The material when tested in accordance with **IS:1501**, shall show a **vicker's** hardness of **75-90HV**.

11. **ELECTRICAL CONDUCTIVITY:**

The electrical conductivity of the material when tested at **20°C** in the '**As Received**' condition shall be **978 min.** of IACS standard which is equivalent to resistivity of 0.01777 Ohm **mm²/meter** max.

The material shall be tested in accordance with IS 3635.

Alternatively, the eddy current probe method as per **ASTM E1004** is also acceptable. Refer Appendix 8 of IS: 613 for temperature correction factor.



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12. TEST CERTIFICATE:

Unless otherwise **stated** on the order three copies of the test **certificate shall be supplied.**

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.

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BHEL Order No.

Manufacturer's/Supplier's Name.

Size and **number** of tubes.

Batch No.

Results of Tests:

Test results obtained for Electrical and Mechanical Properties and Dimensional tolerances as per this **specification.**

13. PACKING AND MARKING:

The tubes shall be **suitably**, Hessian wrapped and packed to **prevent** damage during transit.

Each package shall bear the following **information.**

BP 12082 : **High** conductivity Copper Tubes.

Manuf **acture/Supplier's Name.**

Size and Weight of the material.