



The Kenya Power & Lighting
Co. Ltd.

TITLE:

SPECIFICATION FOR HIGH
CONDUCTIVITY COPPER TUBES FOR
ELECTRICAL PURPOSES (Substation
Busbars)

Doc. No.

KPLC1/3CB/TSP/06/28

Issue No.

1

Revision
No.

2

Date of
Issue

2008-03-25

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Issued by: Research & Development Department

Signed:

Date:

2008-03-26

Authorized by: Research & Development Manager

Signed:

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0.1 Circulation List

COPY NO.	COPY HOLDER
1	Research & Development Manager
2	Supplies Manager
3	Stores & Stock Control Manager
4	Transmission Manager
5	Distribution Manager
6	Assistant Manager, Technical Audit

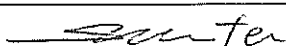
0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
2	2008-03-25	1) Updated to reflect current reference standard (BS EN 13600 instead of BS 1977) and properties. 2) Revised thickness to reflect field practice.	S. Kimitai  2008-03-26	G. Owuor

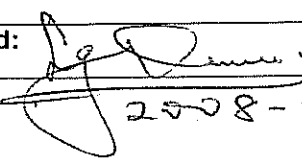
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FOREWORD

This specification has been prepared by the Research and Development Department of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for High Conductivity Copper Tubes for Electrical Purposes. It is intended for use by KPLC in purchasing the items.

It shall be the responsibility of the manufacturer to ensure adequacy of the design and good engineering practice in the manufacture of the High Conductivity Copper Tubes for Electrical Purposes for KPLC. The manufacturer shall submit information which confirms satisfactory service experience with products which fall within the scope of this specification.

1. SCOPE

This specification is for High Conductivity Copper Tubes for Electrical Purposes. It covers seamless High Conductivity Copper Tubes for use as substation busbars.

2. REFERENCES

The following document was referred to during the preparation of this specification. In case of conflict, the provision of this specification shall take precedence.

BS EN 13600: Copper and copper alloys – Seamless copper tubes for electrical purposes

3. TERMS AND DEFINITIONS

For the purpose of this specification, the definitions given in the reference standard shall apply.

4. REQUIREMENTS

4.1 General

4.1.1 The copper tubes shall be suitable for use outdoors in tropical climate with maximum ambient temperature of 40°C, heavy polluting saline conditions and humidity of up to 90%.

4.1.2 The copper tubes shall be designed for use as busbars in substations operating at maximum system voltages of up to 245kV, 50Hz.

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4.2 Materials and Construction

- 4.2.1. The tubes shall be round, seamless, solid drawn copper tubes of electrolytic tough pitch high conductivity material for electrical purposes manufactured to BS EN 13600.
- 4.2.2. The tubes shall not be re-drawn from used tubes.
- 4.2.3. The tubes shall be supplied in straight lengths (as specified) and the ends shall be cut clean and square with the axis of the tube.
- 4.2.4. The tubes shall be clean, smooth and free from harmful defects.

4.3 Dimensions

The copper tubes shall be in the following sizes and indicated tolerances:

Outside Diameter		Wall thickness		Length	
Size (mm)	Tolerance (mm)	Thickness (mm)	Tolerance (%)	Size (m)	Tolerance (%)
50	±0.10	3.0	±11	6.0	+8, 0
75	±0.15	3.0	±12	6.0	+8, 0

4.4 Electrical and Mechanical Properties

The copper tubes shall be of electrolytic tough pitch high conductivity material (Cu-ETP) with the following properties as per BS EN 13600:

Condition	Volume Resistivity at 20°C ($\Omega\text{mm}^2/\text{m}$), max	Conductivity* (%)
R290	0.017 86	96.6

*expressed as % of the standard value for annealed high conductivity copper as laid down by the International Electrotechnical Commission. Copper having a volume resistivity at 20°C of 0.017 241 $\mu\Omega\text{m}$ is said to have a conductivity of 100% IACS (International Annealed Copper Standard).

4.5 Mechanical Properties

The minimum and maximum tensile strength of the copper tubes shall be 290N/mm² and 360N/mm² respectively as per BS EN 13600.

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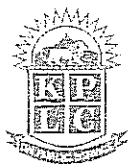
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5 TESTS AND INSPECTION

5.1 The copper tubes shall be tested in accordance with BS EN 13600 and the requirements of this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the relevant tests.

5.2 Certified true copies of previous test reports by the relevant International or National Testing/Standards Authority of the country of manufacture (or ISO/IEC 17025 accredited laboratory) shall be submitted with the offer for evaluation (all in English Language). A copy of accreditation certificate for the laboratory shall also be submitted.

Copies of test reports to be submitted shall include dimensions, tensile strength and electrical resistivity tests. The Manufacturer's Declaration of Conformity to the reference standard shall also be submitted.

5.3 Routine and sample test reports (including dimensions, tensile strength and electrical resistivity) for the copper tubes to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods. KPLC Engineers (2) will witness acceptance tests at the factory before shipment.

5.4 On receipt of the goods KPLC may perform any of the relevant tests in order to verify compliance with this specification. The supplier shall replace without charge to KPLC copper tubes which upon examination, test or use fail to meet any of the requirements in the specification.

6 MARKING AND PACKING

6.1 The copper tubes shall be engraved legibly and indelibly with the following information, all in English:

- Name of the manufacturer
- Year of manufacture
- Product Designation (including dimensions)
- Standard to which the copper tubes comply

6.2 The copper tubes shall be supplied in bundles wrapped in plastic foil.

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Description	Bidder's offer
1. Service Conditions	
2. Applicable Standards	
3. Dimensions	Outside diameter and tolerance
	Wall thickness and tolerance
	Length and tolerance
4. Electrical properties	Volume resistivity at 20°C ($\mu\Omega\text{m}$)
	Conductivity (% IACS)
5. Condition of material	
6. Mechanical properties (minimum & maximum tensile strength, N/mm ²)	
7. List of copies of Test Reports submitted (indicate Test Report Numbers)	
8. Manufacturer's Declaration of Conformity	
9. List of Acceptance Tests to be witnessed by KPLC Engineers at the factory	
10. List of catalogues, brochures, technical data, and drawings submitted to support the offer.	
11. List of customer sales records submitted to support the offer.	

.....
Manufacturer's Name, Signature, Stamp and Date

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