



TITLE:
**SPECIFICATION FOR SOFT
DRAWN COPPER
CONDUCTORS (Bare & PVC
Covered) – for Earthing**

Doc. No.	KP1/6C.1/13/TSP/06/026
Issue No.	2
Revision No.	1
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ANNEX A: Guaranteed Technical Particulars (to be filled and signed by the Manufacturer and submitted together with copies of manufacturer's catalogues, brochures, drawings, technical data, sales records and copies of test certificates and test reports for tender evaluation)

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0.1 Circulation List

COPY NO.	COPY HOLDER
1	Manager, Standards
Electronic copy (pdf) on KPLC Server (currently: Network→stima-fprnt-001→techstd&specs)	

0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 2 Rev 1	2016-04-15	<p>1. Foreword; Supplier to submit information on manufacturer's satisfactory experience included</p> <p>2. References: ISO/IEC 17025 Standard included in the list of Standards</p> <p>3. Tests and Inspection: Need for supplier to replace material that fails tests included</p>	S Nguli	Dr. Eng. Kimemia

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FOREWORD

This specification has been prepared by the Standards Department of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for soft drawn copper conductors for grounding electrical systems. It is intended for use by KPLC in purchasing the conductors.

The supplier shall submit information which confirms the manufacturer's satisfactory service experience with products which fall within the scope of this specification.

1. SCOPE

This specification is for plain bare and PVC covered soft drawn copper conductors for grounding electrical systems.

The specification also covers inspection and test of the conductors as well as schedule of Guaranteed Technical Particulars to be filled, signed by the manufacturer and submitted for tender evaluation.

The specification stipulates the minimum requirements for soft drawn copper conductors acceptable for use in the company and it shall be the responsibility of the Manufacturer to ensure adequacy of the design, good workmanship and good engineering practice in the manufacture of the conductors for KPLC.

The specification does not purport to include all the necessary provisions of a contract.

2. REFERENCES

The following standards contain provisions which, through reference in this text constitute provisions of this specification. Unless otherwise stated, the latest editions (including amendments) apply.

IEC 60228: Conductors of insulated cables

IEC 60502-1: Power Cables with extruded insulation and their accessories for rated voltages from 1kV ($U_m=1.2kV$) up to 30kV ($U_m=36kV$)- Part 1: Cables for rated voltages 1kV ($U_m=1.2kV$) and 3kV ($U_m=3.6kV$)

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ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories

3. TERMS AND DEFINITIONS

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

4. REQUIREMENTS

4.1 Service Conditions

The conductor shall be suitable for continuous outdoor operation in tropical areas with the following conditions.

- a) Altitude: up to 2,200m above sea level;
- b) Temperature: average of +30°C with a minimum of -1°C and max +40 °C;
- c) Humidity: up to 95%;
- d) Pollution: Design pollution level to be taken as “*Heavy*” (Pollution level III) for inland and “*Very Heavy*” (Pollution level IV) for coastal applications in accordance with IEC 60815.
- e) Isokeraunic level: 180 thunderstorm days per year

4.2 Materials and Construction

- 4.2.1 The soft drawn copper conductors shall be suitable for grounding electrical systems where high conductivity and flexibility are required.
- 4.2.2 The conductors shall be as per IEC 60228. Sizes and electrical characteristics shall be in accordance with Table 1.
- 4.2.3 PVC covering shall be type PVC/A as per IEC 60502-1. The nominal thickness shall be in accordance with IEC 60502-1 (same values given in Table 1).

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Table 1: Characteristics of the soft drawn copper conductors

Nominal cross-sectional area mm ²	Number & nominal diameter of wires No x Ø (mm)	Max. resistance 20°C Ohm/km	DC at	Approx. overall diameter (uncovered conductor) mm	Nominal thickness of PVC covering mm
16	7x1.68	1.15		5.1	1.0
35	7x2.48	0.524		7.4	1.2
50	19x1.80	0.387		9.0	1.4
70	19x2.10	0.268		10.5	1.4
95	19x2.48	0.193		12.4	1.6
120	37 No. As per IEC 60228	0.153		14.5	1.6
150	37 No. As per IEC 60228	0.124		16.2	1.8

4.3 QUALITY MANAGEMENT SYSTEM

4.3.1 The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, maintenance and documentation, will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2008.

4.3.2 The Manufacturer's Declaration of Conformity to reference standards and copies of quality management certifications including copy of valid and relevant ISO 9001: 2008 certificate shall be submitted with the tender for evaluation.

4.3.3 The bidder shall indicate the delivery time of the conductors, manufacturer's monthly and annual production capacity and experience in the production of the type and size of conductors being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for the conductors sold in the last five years together with reference letters from four of the customers shall be submitted with the tender for evaluation.

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5. TESTS AND INSPECTION

- 5.1 The soft drawn copper conductors shall be tested and inspected in accordance with the requirements of this specification, IEC 60502-1 and IEC 60228. It shall be the responsibility of the manufacturer to perform or to have performed the tests specified.
- 5.2 Copies of previous Test Reports (in English Language) from the relevant International or National Testing/Standards Authority of the country of manufacture (or ISO/IEC 17025 accredited independent laboratory) shall be submitted with the tender for the purpose of technical evaluation. A copy of accreditation certificate for the laboratory shall also be submitted (all in English Language).
- 5.3 Routine and sample test reports for the cables to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods.
- 5.4 During delivery of the conductors, KPLC will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification (including verification of length on drum). The supplier shall replace/rectify without charge to KPLC, conductors which upon examination, test or use fail to meet any or all of the requirements in the specification.

6. MARKING, LABELLING AND PACKING

- 6.1 Where explicitly requested for, the words "Property of The Kenya Power & Lighting Co. Ltd" shall be marked at intervals of 500mm on the centre strand by laser cutting. The laser cutting shall not change the required mechanical properties of the conductor.
- 6.2 The finished conductor shall be wound on wooden drum such as to prevent damage during transportation and handling. The drums shall be made from treated timber resistant to termite attack.
- 6.3 The actual length of conductor shall not be less than the length indicated on the drum.
- 6.4 The following information shall be marked legibly and in a permanent manner on the flange of the drum.

a) The manufacturer's name.

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- b) The type of conductor.
- c) The conductor cross-sectional areas in mm².
- d) The length of the conductor, in metres.
- e) The year of manufacture.
- f) The gross mass and net mass, in kilogram.
- g) Standard of manufacture
- h) The instructions for handling and use (in English Language).
- i) The words “**Property of The Kenya Power & Lighting Co. Ltd**”

6.5 PVC covered conductors shall be marked with the manufacturer’s name, type of conductor, cross-sectional area, year of manufacture and the words “Property of Kenya Power & Lighting Co. Ltd.” An indelible marking shall also be given at every one meter interval to assist field personnel in cutting required length.

7. DOCUMENTATION

7.1 The bidder shall submit its tender complete with technical documents required by Annex A (Guaranteed Technical Particulars) for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:

- a) Guaranteed Technical Particulars;
- b) Copies of the Manufacturer’s catalogues, brochures, drawings and technical data;
- c) Sales records for the last five years and at least four customer reference letters;
- d) Details of manufacturing capacity and the manufacturer’s experience;
- e) Copies of required test reports by a third party testing laboratory accredited to ISO/IEC 17025. The test reports shall not be more than five years old.
- f) Copy of accreditation certificate for the testing laboratory.

7.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

- a) Guaranteed Technical Particulars,
- b) Design Drawings with details of conductors to be manufactured for KPLC,
- c) Quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2008
- d) Detailed test program to be used during factory testing,

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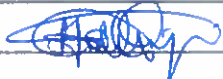


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- e) Marking details and method to be used in marking the conductor drums
- f) Manufacturer's undertaking to ensure adequacy of the design, good engineering practice, adherence to the specification and applicable standards and regulations as well as ensuring good workmanship in the manufacture of the conductors for The Kenya Power & Lighting Company
- g) Packaging details (including packaging materials and their dimensions).

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ANNEX A: Guaranteed Technical Particulars (to be filled and signed by the Manufacturer for all clauses and submitted together with catalogues, brochures, drawings, technical data and test reports for tender evaluation)

Name of Bidder.....

Clause	Guaranteed Technical Particulars for Conductor	Bidders Offer	
1	Name and address of the Manufacturer		
	Country of manufacture		
	Manufacturer's Letter of Authorization		
	Model/Type Reference No. of the offered transformer		
	Drawing Reference Number		
	Manufacturer's warranty and guarantee certificate for the offered conductor		
2	Type and Size		
3.	Reference Standard of manufacture		
4.1	Service Conditions		
4.2	Materials	Copper (condition/grade)	
		PVC Insulation (type and thickness)	
		PVC Sheath (type and thickness)	
4.3.1	Construction & Standard		
4.3.2	Direction of lay		
4.3.3	Inner Insulation and standard of manufacture		
	Oversheath and standard of manufacture		
	Thickness of insulation		
4.4	Size and ratings		
	Nominal area of copper, mm ²		
	Overall diameter of bare conductor, mm		
	Overall diameter of covered conductor, mm		
	Stranding, No./mm	Copper	
		Tolerance on diameter	
	Maximum d.c. resistance at 20°C, ohm/km		

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	Minimum breaking load, kN	
	Approximate mass of conductor, kg/km	
	Current carrying capacity, A (state applicable conditions)	
5.1	Test standard(s) for bare and covered conductors	
5.2	List test reports submitted (indicate test report numbers, date, Testing Institution and their contact addresses)	
5.4	Test reports to be submitted to KPLC before delivery	
5.5	Replacement of non-compliant conductor	
6.1	Mode of Packing, & Length on drum	
6.3	Mode of Sealing of both end of conductor	
6.4	Permanent Marking on the drum	
7.1	Documents submitted with tender	
7.2	Documents to be submitted to KPLC for approval before manufacture	
Other details required with the tender	Manufacturer's Guarantee and Warranty	
	List catalogues, brochures, technical data, drawings and customer sales records submitted to support the offer	
	List Acceptance Tests to be witnessed by KPLC Engineers at the factory	
	Statement of compliance to specification	

NB: - This schedule does not in any way substitute for detailed information required elsewhere in the specification.

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

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