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Kenya Power

ALUMINIUM BINDING WIRE — SPECIFICATION

A Document of the Kenya Power & Lighting Co. Ltd
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0.1 Circulation List

COPY NO.	COPY HOLDER
1	Manager, Standards
Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?fFolderId=23)	

REVISION OF KPLC STANDARDS

To keep abreast of progress in the industry, KPLC standards shall be regularly reviewed. Suggestions for improvements to approved standards, addressed to the Manager, Standards department, are welcome.

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0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 1 Rev 0	2005-08-00	New issue	R & D	S. Kimitei
Issue 1 Rev 1	2015-05-08	i. Formatting ii. Definition of material requirements	S. Nguli	Dr. Eng. P. Kimemia
Issue 1 Rev 2	2017-04-11	i. Definition of wire material designation ii. Removed Clause 4.2.2 in *Issue 1 Rev 1* iii. Tests requirements added	Rotich Benard	Dr. Eng. P. Kimemia

FOREWORD

This specification has been prepared by the Standards Department in collaboration with the Quality Control Department, both of the Kenya Power and Lighting Company Limited (Kenya Power). The specification lays down requirements for Aluminium Binding Wire for low voltage and medium voltage application.

This specification is a revision of the previous issue (Issue 1 Rev 1). The revision was necessitated by reports that the previous deliveries of aluminium binding wire at Kenya Power stores were not malleable. On testing of the samples, it was found out that the binding wire had tensile strength identical to the aluminium wire used in overhead all aluminium conductor. This anomaly has been addressed in this specification.

The specification stipulates the minimum requirements for the binding wire acceptable for use in the company and it shall be the responsibility of the supplier and manufacturer to ensure that the offered design is of the highest quality and exhibits good workmanship and good engineering practice in the manufacture.

The following are members of the team that developed this specification:

Name	Department
Eng. S. Kimitei	Quality Control
Eng. S. Nguli	Standards
Rotich Benard	Standards

1. SCOPE

1.1. This specification is for Aluminium Binding Wire for use on Overhead Power Lines operating at voltages of up to 33kV, 50Hz and covers the following types:

i. Aluminium Binding Wire, Bare

ii. Aluminium Binding Wire, PVC Covered

2. REFERENCES (NORMATIVE)

The following standards contain provisions which through reference in this text constitute provisions of this specification. For dated editions, the cited edition shall apply; for undated editions, the latest edition of the referenced document shall apply.

BS 1475: Specification for Wrought Aluminium and aluminium alloys for general engineering purposes – wire.

BS 2627: Specification for Wrought Aluminium for Electrical Purposes.

BS 6746: Specification for PVC insulation and sheath of electric cables.

BS 7655-3.1: Specification for insulating and sheathing materials for cables. PVC insulating compounds. Harmonized types

BS EN 50363-3: Insulating, sheathing and covering materials for low voltage energy cables. PVC insulating compounds

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

3. DEFINITIONS AND ABREVIATION

For this specification, the definitions and abbreviations given in the reference standards shall apply.

4. REQUIREMENTS

4.1. Service conditions

The aluminium binding wire shall be suitable for use outdoors in tropical areas and harsh climatic conditions including areas exposed to:

a) Altitudes of up to 2200m above sea level

b) Humidity of up to 95%

c) Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C, in direct sunlight,

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* levels of up to 180 thunderstorm days per year.

4.2. Materials and Construction

4.2.1. The aluminium binding wire shall be made from annealed aluminium wire in the O condition, as per BS 2627, soft drawn.

4.2.2. The material composition of the aluminium alloy used to make the binding wire shall be as follows:

i. Aluminium – 99.5% minimum

ii. Copper, silicon, iron – 0.5% maximum

4.2.3. The binding wire shall be of nominal diameter 3.5 mm with the tolerance on diameter being not more than ± 5 %.

4.2.4. The binding wire for use with PVC covered conductors shall be covered with 0.5mm black PVC to BS 6746 Type T1 or its equivalent.

4.2.5. The binding wire shall be suitable for securely binding the bare All Aluminium and Aluminium Conductor Steel Reinforced (ACSR) conductors to the pin insulators and to provide positive contact with the conductors.

4.2.6. The binding wires shall be round, smooth, uniform and without any sharp edges that may cause injuries. The binding wire shall be suitable for manual application without use of a plier.

4.2.7. The tensile strength shall be in the range of 5.0 - 6.5 N/mm^2.

5. TESTS AND ACCEPTANCE REQUIREMENTS

The following routine checks and tests shall be carried out on aluminium binding wire:

5.1. Physical properties

5.1.1. The surface of the finished wires shall be checked to ensure that it is smooth, free from all irregularities, imperfections and inclusions and that its cross section approximates closely that of true circle.

5.1.2. The wire shall be checked to ensure that its diameter and tolerances are within the values given in Clause 4.2.3 above.

5.2. **Wrapping test**

5.2.1. The wire shall withstand one cycle of a wrapping test as in Clause 5.2.2:

5.2.2. The wire shall be closely wrapped round a wire of its own diameter form a close helix of eight turns. Six turns shall then be unwrapped and again closely rewrapped in the same direction as the first wrapping. The wire shall not break or crack when subjected to this test.

5.3. **Ultimate tensile strength**
When tested on a standard tensile testing machine, the value obtained for the ultimate tensile strength shall be in the range of 5.0 - 6.5 N/mm^2

6. MARKING AND PACKING

6.1. **Parking**

6.1.1. The aluminium binding wire shall be delivered in 100m coils, with each coil having an inner diameter of around 300mm. Random or non-standard lengths shall not be permitted.

6.1.2. Each coil shall be adequately guarded against damage due to transportation and handling and shall have an outer layer of tightly wound polythene tape or be contained in a suitable, transparent plastic bag.

6.2. **Marking:**

6.2.1. The following information shall be marked legibly and in a permanent manner on the package:

i. The manufacturer's name
ii. The type of product
iii. The length, in metres
iv. The mass, in kilogram
v. The standard to which the product complies.
vi. The words "**Property of Kenya Power & Lighting Co. Ltd.**"

6.2.2. The actual length of conductor on a drum shall NOT be less than the length indicated on the drum.

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APPENDICES

APPENDIX A: TESTS AND INSPECTION (NORMATIVE)

A.1. It shall be the responsibility of the manufacturer to perform or to have performed the tests specified and whatever other tests normally performed at works including the following:

a) Chemical composition
b) Tensile test
c) Wrapping test
d) Resistivity test

A.2. The Aluminium Binding Wire shall be tested and inspected in accordance with the requirements of this specification and BS 2627, BS 1475 and BS 6746 as applicable.

A.3. On receipt of the aluminium binding wire Kenya Power shall inspect them and may perform or have performed any of the relevant tests to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, binding wires which upon examination, test or use fail to meet any of the requirements in the specification.

APPENDIX B: QUALITY MANAGEMENT SYSTEM (NORMATIVE)

B.1. The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the binding wires' material, workmanship, tests, service capability, etc. will fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2008/2015

B.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 or 2015 certificate shall be submitted with the tender for evaluation.

B.3. The bidder shall indicate the delivery time of the binding wire, manufacturer's monthly and annual production capacity and experience in the production of the items. A detailed list and contact addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for the binding wires sold in the last five years together with reference letters from four of the customers shall be submitted with the tender for evaluation.

APPENDIX C: TECHNICAL DOCUMENTATION (NORMATIVE)

C.1. The bidder shall submit its tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:

a) Fully-filled clause by clause Guaranteed Technical Particulars (GTPs)- Appendix D - stamped and signed by the manufacturer.

b) Copies of the Manufacturer's catalogues, brochures, drawings and technical data;

c) Details of manufacturing capacity and the manufacturer's experience;

d) Copies of required test certificates and test reports by a third-party testing laboratory accredited to ISO/IEC 17025;

e) Copy of accreditation certificate to ISO/IEC 17025 for the third-party testing laboratory;

f) Sales records for previous five years and reference letters from at least four of the customers;

C.2. The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

a) Fully filled clause by clause Guaranteed Technical Particulars (GTPs) stamped and signed by the manufacturer **(these are not the ones submitted with the tender)**;

b) Drawings and technical data of the aluminium binding wire; stamped and signed by the manufacturer.

c) Marking and packaging details.

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APPENDIX D: GUARANTEED TECHNICAL PARTICULARS (GTPS) — NORMATIVE

(to be filled, stamped and signed by the Supplier and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of suppliers' capacity and experience; and copies of complete test certificates and test reports for tender evaluation or approval, all in English Language, as per clauses C.1 and C.2)

Tender No. .....

Bidder's name and Address.....

Description			**Bidder's offer**
1. Manufacturer's Name & Country of manufacture			State
2. Name of item to be supplied			State
3. Type of binding wire (Bare or PVC covered)			Specify
Clause	**Description**		**Bidders offer***
1.1	Scope	Bare	State
		PVC Covered	State
2	Applicable Standards		List
4.1	Service conditions		Specify
4.2.1	Material designation of the binding wire		State
	Material designation standard		State
	Condition of material as per BS 2627		State
4.2.2	Binding wire material composition	Aluminium	State values
		Copper	State values
		Silicon	State values
		Others	State values
4.2.3	Diameter of the binding wire and tolerance		Specify
4.2.4	PVC covered thickness		State values
	PVC colour		State
4.2.5	Applicability of the binding wires		State
4.2.6	Binding wire workmanship		State
4.2.7	Tensile strength		State values
5	The conductor shall comply with the specification and applicable standards test requirements.		State
6.1.1	Length of binding wire per coil and Coil diameter		State
6.1.2	Parking material and protection against damage		State

6.2.1	Markings on the drums	State
6.2.2	Actual length of the wire shall NOT be less than the indicated.	State
A1	Tests to be performed	State
A2	Standards for inspection and testing	State
A3	Supplier shall replace without charge to KPLC items that don't meet specification	State
B1	QAP and ISO 9001:2008	State
B2	Copies of quality management certifications attached	State
B3	Delivery time, Production capacity & experience of the manufacturer	State
C1	Technical documents to be submitted with tender documents	
	a. Fully-filled clause by clause Guaranteed Technical Particulars (GTPs)-Appendix D - stamped and signed by the manufacturer.	
	b. Manufacturer's catalogues, brochures, drawings and technical data;	state
	c. Details of manufacturing capacity	Specify
	d. Copies of required type test certificates and type test reports by a third-party testing laboratory accredited to ISO/IEC 17025;	State
	e. Copy of accreditation certificate to ISO/IEC 17025 for the third-party testing laboratory;	State
	f. Sales records for previous five years and reference letters from at least four of the customers;	State
C2	Documents to be submitted for approval before manufacture	
	a. Fully filled clause by clause Guaranteed Technical Particulars (GTPs	State
	b. Drawings and technical data of the aluminium binding wire; stamped and signed by the manufacturer.	State
	c. Marking and packaging details	State

** Words like 'agreed', 'confirmed', 'As per KPLC specifications', etc. shall not be accepted and shall be considered non-responsive.*

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Manufacturer's Name, Signature, Stamp and Date