



The Kenya Power & Lighting  
Co. Ltd.

TITLE:

**SPECIFICATION FOR LOW  
VOLTAGE INSULATORS  
(Shackle Insulators, LV)**

Doc. No. KPLC1/3CB/TSP/04/011

Issue No. 1

Revision  
No. 1

Date of  
Issue 2010-04-16

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Issued by: Head of Section, Tech Stds & Specs

Authorized by: Head of Department, R&D

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Date:

2010-04-16

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### 0.1 Circulation List

COPY NO.	COPY HOLDER
1	Research & Development Manager
2	Procurement Manager
3	Stores & Stock Control Manager
4	Operations & Maintenance Manager
5	Deputy Manager, Technical Audit

### 0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 1 Rev 1	2010-04-16	Revised requirements on marking & GTP	S Kimitei <i>S Kimitei</i>	<i>(Signature)</i>

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*S Kimitei*

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*(Signature)*

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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 low voltage insulators. It is intended for use by KPLC in purchasing the insulators.

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 insulators for use on overhead power distribution lines operating at a nominal voltage of 433 Volts and frequency of 50Hz.

The specification also covers inspection and test of the insulators 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 Low Voltage Insulators acceptable for use in the company (KPLC) 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 insulators 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.

ESI 43-93: Line Insulators.

BS 3288: Insulator and Conductor Fittings for Overhead Power Lines

BS 137: Insulators of Ceramic Material or Glass for Overhead Lines with a Nominal Voltage Greater than 1000V A.C.

## 3. TERMS AND DEFINITIONS

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

#### 4. REQUIREMENTS

##### 4.1 SERVICE CONDITIONS

The insulators shall be suitable for continuous operation outdoors in tropical areas at altitudes of up to 2000m above sea level, humidity of up to 90%, average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C, heavy saline conditions along the coast and tropical sunshine conditions.

##### 4.2. MATERIALS AND CONSTRUCTION

4.2.1. The insulating material shall be porcelain.

The porcelain shall be sound, free from flaws and blemishes, smoothly glazed and of uniform brown colour when finished.

4.2.2. The insulator shall be free from stresses due to expansion and contraction in any part which may lead to deterioration.

4.2.3. The hole in the insulator shall be smoothly radiused to present an even bearing surface to the steel bolt.

4.2.4. The insulator shall be of reel type.

##### 4.3. GENERAL CHARACTERISTICS

The dimensional, mechanical and electrical characteristics of the insulator shall be as follows:-

Length of insulator-----65mm  
Outer diameter of insulator-----76mm  
Diameter of through hole-----17.5mm  
Conductor groove diameter-----9.5mm  
Minimum failing load-----15kN  
Minimum wet flashover voltage-----9kV  
Minimum dry flashover voltage-----17kV

#### 5. TESTS AND INSPECTION

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Signed: *W. Atuge*

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5.1 The finished insulator shall be tested in accordance with the requirements of this specification and the relevant requirements of BS 137-1. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified.

Tests shall include the following:

5.1.1 Verification of Dimensions

The dimensions of the insulators shall be those stated in clause 4.3 with a tolerance of  $\pm 5\%$ .

5.1.2 Mechanical Failing Load

The insulator shall be mounted on an M16 bolt of adequate length in a rigidly held bracket. A flexible wire rope of not less than 12mm diameter shall be looped round the conductor groove, and shall be pulled at right angles to the bolt of the insulator bracket and in line with the bracket. The load shall be increased up to 15 kN at a steady rate and held at this load for a period of not less than 10 seconds.

This test shall not cause fracture of the insulator.

5.1.3 Porosity Test

The insulator shall be tested in accordance with BS 137, Part 1 Clause 30.

5.2 Copies of previous test reports by the relevant National Testing/Standards Authority of the country of manufacture (or ISO/IEC 17025 accredited and independent laboratory) shall be submitted with the offer for evaluation (all in English Language).

5.3 Complete test reports for the insulators to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods. KPLC shall be invited (by the supplier) to witness the tests at the factory before shipment.

5.4 On receipt of the insulators KPLC will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The manufacturer shall replace without charge to KPLC, insulators 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 The following information shall be marked indelibly and legibly on the insulator.

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Signed:

*[Signature]*

Signed:

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- i) The letters 'KPLC';
- ii) KPLC order number;
- iii) Manufacturer's name.

For example: KPLC xxxxxxxxxx ZZZ, where xxxxxxxxxx is the order number and ZZZ is the manufacturer's name.

- 6.2 The insulators shall be packed in wood crates which are reinforced and held closed by external steel wire bindings. Each crate shall be internally braced to permit stacking and the steel wire bindings shall be designed to keep the crate firmly closed and permit easy and rapid opening at time of installation.

The crates shall then be stacked on sturdy wood pallet. The assembly shall be held tightly in place with steel bands and protected against moisture by a complete covering of heat-shrinkable polyethylene film.

- 6.3 Instructions for storage, handling and installation shall be included in each package, all in English Language.

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**TENDER NO** .....

Description	Bidder's offer
1. Manufacturer's name & address	
2. Type Reference Number of insulator offered	
3. Service Conditions	
4. Applicable Standards	
5. Materials	
6. Design and construction	
7. Maximum System Voltage	
8. Dimensions	
Length	
Outer diameter of insulator	
Diameter of through hole	
Conductor groove	
9. Minimum failing load of insulator (kN)	
10. Minimum wet flashover voltage	
11. Minimum dry flashover voltage	
12. List of copies of Test Reports submitted (indicate Test Report Numbers, Testing Authority and contact addresses)	
13. List Acceptance Tests to be witnessed by KPLC Engineers at the factory	
14. List of catalogues, brochures, technical data, drawings and customer sales records submitted to support the offer.	
15. Marking (indicate parameters and method of marking to be used during manufacture)	
19. Copy of ISO 9001:2008 Certificate submitted (indicate validity)	
20. Quality Assurance Plan (that will be used to ensure that the insulator design, material, manufacture, workmanship, tests, service capability, maintenance and documentation, will fulfil the requirements stated in the contract documents, standards, specifications and regulations including ISO 9001:2008)	
21. Deviations from tender specifications and supporting data, test reports, technical documents etc.	

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

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Signed:	Signed:
Date: 2010-04-16	Date: 2010-04-16