



The Kenya Power & Lighting  
Co. Ltd.

TITLE:

SPECIFICATION FOR 11 & 33kV  
COMPOSITE INSULATORS  
Part 2: Pin Type 4

Doc. No.	KPLC1/3CB/TSP/04/017/2
Issue No.	2
Revision No.	0
Date of Issue	2010-04-06
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**ANNEX A:** *Guaranteed Technical Particulars (to be filled and signed by the Manufacturer and submitted together with copies of relevant Manufacturer's catalogues, brochures, drawings, technical data, sales records and copies of type test certificates and type test reports for tender evaluation)*

Issued by: Head of Section, Tech Stds & Specs

Authorized by: Research & Development Manager

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Date:

2010-04-06

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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	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 2 Rev 0	2010-04-06	Cancels and replaces Issue 1 Rev 2 dated April 10, 2008	S Kimitel <i>S Kimitel</i>	G Owour

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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 11 & 33kV Pin Type Composite 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

- 1.1 This specification is for composite insulators for use on overhead power lines.
- 1.2 This specification covers the following composite insulators:
  - (i) 11kV Pin Type Composite Insulators;
  - (ii) 33kV Pin Type Composite Insulators.

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 Pin Type Composite 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.

IEC 60120: Dimensions of ball and socket couplings of string insulator units.

IEC 60815: Guide for the selection of insulators in respect of polluted conditions.

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- ISO 1461: Metallic Coatings – Hot dip galvanized coatings on fabricated ferrous products – Requirements.
- ISO 1460: Metallic Coatings – Hot dip galvanized coatings on fabricated ferrous metals – Determination of mass per unit area – Gravimetric method.
- IEC 61109: Composite insulators for a.c. overhead lines with a nominal voltage greater than 1000V – Definitions, test methods and acceptance criteria.
- IEC 60383: Tests on insulators of ceramic material or glass for overhead lines with a nominal voltage greater than 1000V

### 3. TERMS AND DEFINITIONS

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. The level of galvanizing for all ferrous parts and materials used shall be suitable for these conditions.

#### 4.2. MATERIALS AND CONSTRUCTION

- 4.2.1. The insulators shall be manufactured to IEC 61109, other applicable /latest IEC standards and the requirements of this specification.
- 4.2.2. The insulator shall be pin type moulded in one single piece and supplied complete with metal end fittings. Metal fittings shall be galvanized to ISO 1461 to suit service conditions specified in clause 4.1.
- 4.2.3. The insulator shall be made of composite materials of high resistance to moisture, ultraviolet radiation, high temperatures and tropical sunshine conditions. The core shall be made of resin-impregnated glass fibres free from defects. The housing of the insulator shall be manufactured from high quality silicone rubber.

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- 4.2.4. The under surface and grooves of sheds or skirts shall be easy cleaning. Sheds shall be substantially symmetrical in shape without appreciable warping.
- 4.2.5. The insulator shall be suitable for both vertical and horizontal applications. It shall be suitable for both bare and protected conductors.
- 4.2.6. The insulator bottom metal end fitting shall be suitable for mounting on steel cross arm.
- 4.2.7. The top and side grooves shall be designed to accept conductor sizes in the range 7 – 18.2mm overall diameter.
- 4.2.8. The final colour of the insulator housing shall be BROWN.

#### 4.3. CHARACTERISTICS

The mechanical and electrical characteristics of the insulators shall be as follows:-

CHARACTERISTICS	11kV INSULATOR	33kVINSULATOR
Minimum Creepage Distance	300 mm	900 mm
Minimum Power Frequency Withstand Voltage (Wet), 50Hz 60s	38 kV	90 kV
Minimum Lighting Impulse Withstand Voltage (Dry), +ve, 1.2/50µs	95 kVp	200 kVp
Minimum Failing Load	10 kN	10 kN

#### 4.4. QUALITY MANAGEMENT SYSTEM

- 4.4.1 The supplier shall submit a quality assurance plan (QAP) 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. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2008.
- 4.4.2 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.

#### 5. TESTS AND INSPECTION

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- 5.1 Design tests, type tests, sampling tests and routine tests shall be done in accordance with the requirement of IEC 61109, IEC 60383, ISO 1460 and the requirements of this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified.
- 5.2 Copies of previous design and type test reports by 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 offer for evaluation (all in English Language). A copy of accreditation certificate for the laboratory shall also be submitted.

Copies of test reports for the following Design and Type Tests shall be submitted for tender evaluation:

- 5.2.1 Tests on interfaces and connections of metal fittings;
- 5.2.2 Assembled core load-time test;
- 5.2.3 Test of housing: tracking and erosion test. The test reports MUST include resistance to ageing tests by KEMA or equivalent Testing Authority (under climate chambers to mimic the conditions – sunshine, salinity, temperature, humidity, spray and so on – typical of tropical climate and those stated in clause 4.1 in addition to the highest system voltage);
- 5.2.4 Tests for the core material;
- 5.2.5 Flammability test;
- 5.2.6 Dry lightning impulse withstand voltage test;
- 5.2.7 Wet power frequency test;
- 5.2.8 Mechanical load-time test and test of the tightness of the interface between end fittings and insulator housing.
- 5.3 Routine and sample test reports for the insulators 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.

Acceptance tests shall include the following tests as per IEC 1109 and applicable latest IEC standards:

- 5.3.1 Verification of dimensions;
- 5.3.2 Verification of the locking system;
- 5.3.3 Verification of tightness of the interface between end fittings and insulator housing;
- 5.3.4 Verification of the specified mechanical load;
- 5.3.5 Galvanizing test (by Gravimetric method).

## 6. MARKING AND LABELLING

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- 6.1 The following information shall be marked indelibly and legibly and in a permanent manner on each insulator.
  - i) Manufacturer's Name or Trademark – embossed on largest silicon rubber shed;
  - ii) Manufacturer's Type Reference Number – embossed on silicon rubber portion over the metal fitting;
  - iii) Rated Voltage – embossed on the silicon rubber shed;
  - iv) Specified Mechanical Load – embossed on the metal fitting;
  - v) The letters 'KPLC' - embossed on silicon rubber portion over the metal fitting.
- 6.2 All marking shall be by embossing and marking on metal fittings shall be before galvanizing. The marking shall not affect the performance of the insulator.
- 6.3 Interpretation of the Type Reference Number (in terms of specified electrical characteristics) shall be given in the manufacturer's brochure/catalogue delivered together with the insulators (all in English language).
- 6.4 A set of Three (3) installation and technical manuals for the insulators shall be submitted during delivery.

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**ANNEX A: Guaranteed Technical Particulars** (to be filled and signed by the Manufacturer and submitted together with copies of relevant Manufacturer's catalogues, brochures, drawings, technical data, sales records and copies of type test certificates and type test reports for tender evaluation)

**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. Maximum System Voltage (kV)	
6. One-minute power frequency withstand voltage, 50Hz, 60s, wet (kV rms)	
7. Lighting impulse withstand voltage, 1.2/50µs positive, dry, (kVp)	
8. Minimum creepage distance (mm)	
9. Specified mechanical load (kN)	
10. Length of insulator with fittings (mm)	
11. Material of fittings and level of corrosion protection	
12. Material of rod	
13. Material of housing and sheds	
14. Conductor groove, size	
15. Suitability for both vertical & horizontal application	
16. List of copies of Design and Type Test Reports submitted (indicate Test Report Numbers, Testing Authority and contact addresses)	
17. List Acceptance Tests to be witnessed by KPLC Engineers at the factory	
18. List of catalogues, brochures, technical data, drawings and customer sales records submitted to support the offer.	
19. Marking (indicate parameters and method of marking to be used during manufacture)	
20. Copy of ISO 9001:2008 Certificate submitted (indicate validity)	
21. Quality Assurance Plan	
22. Deviations from tender specifications and supporting data, test reports, technical documents etc.	

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

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