TABLE OF CONTENTS

0.1 Circulation List

0.2 Amendment Record

FOREWORD

1. SCOPE
2. REFERENCES
3. TERMS AND DEFINITIONS
4. REQUIREMENTS
5. TESTS AND INSPECTION
6. MARKING AND LABELLING
7. Technical Particulars

0.1 Circulation List

COPY NO.	COPY HOLDER
1	Manager ,Standards
Electronic copy (pdf) on Kenya Power 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)
1	2016-08-22	1.) Included requirement for resistance to ageing tests clause 5.2.3	S. Nguli	P. Kimemia
2		made reference to the latest IEC standards	S. Nguli	P. Kimemia
3.		Changed height asl from 2000m to 2200m at Clause 4.1 on service conditions.		
4.		Included isokeraunic level of 180 thunderstorm days at Clause 4.1 on service conditions		
5.		Changed title		

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 11 & 33KV Pin Type Composite Insulators. It is intended for use by KPLC in purchasing the insulators.

It shall be the responsibility of the supplier to ensure adequacy of the design and good engineering practice in the manufacture of the insulators for KPLC. 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

1.1 This specification is for composite insulators for use on overhead power lines. This specification covers 11 and 33 KV Pin Type Composite Insulators;

2. REFERENCES

The following documents were referred to during the preparation of this specification; in case of conflict, the requirements of this specification shall take precedence.

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.

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.

ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories
ISO 9001:2008: Quality Assurance Plan

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 2200m above sea level, humidity of up to 95%, 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. The weather isokeraunic levels reach up to 180 thunderstorm days per year.

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 molded 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 fibre free from defects. The housing of the insulator shall be manufactured from high quality silicone rubber

4.2.4. The insulator shall have a core made of resin-impregnated glass fibres free from defects. The housing of the insulator shall be manufactured from high quality silicone rubber.

4.2.5. The housing of the insulator shall be made of high quality reinforced high temperature vulcanized (HTV) silicone rubber based on dimethyl siloxane, which exhibit hydrophobicity with the capability to transfer hydrophobicity to the layer of pollution.

4.2.6. The reinforced HTV silicone rubber shall have a Shore 'A" hardness of not less than 60 as per ISO 48 and the track resistance of the sheath and shed materials shall meet the requirements of IEC 60587 Method 1 Class 1A4.5 or 1B4.5 or Method 2 Class 2A4.5.

4.2.7. Insulator sheds shall be open type, designed to minimize trapping of contamination. It shall be made of polymer having glazed grey color. The silicon rubber housing shall be made by direct molding method.

4.2.8. The under surface and grooves of sheds or skirts shall be easy cleaning. Sheds shall be substantially symmetrical in shape without appreciable warping.

4.2.9. The insulator shall be suitable for both vertical and horizontal applications. It shall be suitable for both bare and protected conductors.

4.2.10. The insulator bottom metal end fitting shall be suitable for mounting on steel cross arm.

4.2.11. The top and side grooves shall be designed to accept conductor sizes in the range 7 – 18.2mm overall diameter.

4.2.12. The final color of the insulator housing shall be GREY.

4.3. CHARACTERISTICS

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

Table 1: Electrical and mechanical parameters

CHARACTERISTICS	11kV INSULATOR	33kVINSULATOR
Minimum Creapage Distance	300 mm	900 mm
Minimum Power Frequency Withstand Voltage (Wet)	38 kV	90 kV
Minimum Lighting Impulse Withstand Voltage (Dry)	95 kV	200 kV
Minimum Failing Load(cantilever)	10 kN	10 kN

Table 2: Withstand capabilities of insulator housing

Description	Units	Requirement	
Lightning impulse withstand voltage,	kVpk	95	200
Power frequency withstand voltage for 1 min, wet	kVrms	46	116
Creepage distance, 25mm/kV,	mm	300	900
Permissible head load static (SLL),	N	175	
Permissible head load dynamic (SLL),	N	250	
Short circuit withstand capability (rated short circuit (withstand) current Is)	kA	20	
Permissible length of the active part	mm	135	145
Housing shield resistance	Ω	<5,000	
Number of units		1	

5. TESTS AND INSPECTION

5.1 Design tests, type tests, sampling tests and routine tests shall be done in accordance with the requirement of IEC 1109, IEC 383, 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 Certified true copies of previous design and type test reports by the relevant Independent/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 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 (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

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;
ii) Manufacturer's Type Designation;
iii) Specified Electrical Characteristics;
iv) Specified Mechanical Load.
v) KPLC PROPERTY

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 A set of Three (3) installation and technical manuals for the insulators shall be submitted during delivery.

---------THIS SPACE LEFT BLANK---------

7: 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

Clause	Description	Bidder's offer
1.0	*Manufacturer name and Address*	
2.0	Applicable Standards	
4.1	Service Conditions	
4.2.1	Material of fittings and level of corrosion protection	
4.2.3	Material of rod	
4.2.4	Material of housing and sheds	
4.2.5	Conductor groove, size	
4.2.6	Suitable for both vertical & horizontal application	
4.3.1	Maximum System Voltage (kV)	
4.3.2	One-minute power frequency withstands voltage, 50Hz, wet. (kV)	
4.3.3	Lighting impulse withstand voltage, 1.2/50 pos. (kV)	
4.3.4	Minimum creepage distance (mm)	
4.3.5	Specified mechanical load (kN)	
4.3.6	Length of insulator with fittings (mm)	

.....

Manufacturer's Name, Signature, Stamp and Date