



TITLE:
11KV & 33KV COMPOSITE LINE POST
INSULATORS – VERTICAL &
HORIZONTAL MOUNTING -
SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/0 4/021
Issue No.	2
Revision No.	0
Date of Issue	2017-12-01
Page 1 of 20	

Table of Contents

FOREWORD	2
1. SCOPE	2
2. NORMATIVE REFERENCES	3
3. DEFINITIONS	4
4. REQUIREMENTS	4
4.1. SERVICE CONDITIONS	4
4.2. DESIGN AND CONSTRUCTION	5
4.2.1. General	5
4.2.2. Core	5
4.2.3. Housing and Weather sheds.....	6
4.2.4. Metallic end fittings.....	8
4.2.5. Mounting Brackets/ Fixing Base	9
4.2.6. Insulator shed profile	9
4.2.7. Finish.....	10
4.2.8. Galvanizing	10
4.3. CHARACTERISTICS.....	10
5. TESTS REQUIREMENTS	11
6. MARKING AND PACKING	11
6.1. Markings.....	11
6.2. Packing.....	12
APPENDICES.....	13
A. TESTS AND INSPECTION (Normative)	13
B. QUALITY MANAGEMENT SYSTEM (Normative).....	15
C. DOCUMENTATION (Normative)	16
D. GUARANTEED TECHNICAL SCHEDULES	17

**TITLE:****11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/04/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 2 of 20**FOREWORD**

This specification has been prepared by the Standards Department in collaboration with Network Management, both of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for 11kV and 33kV composite line post insulators for use on power lines. It is intended for use by KPLC in purchasing the tools.

In preparation of this specification, reference was made to IEC 61952 and IEC 60720.

The objective of review of this specification is to address the concern of clearances between middle insulator and the pole which in some instances has caused flashovers, in addition to taking advantages of new developments in research.

This specification stipulates the minimum requirements for the composite line post insulators 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 guarantees excellent service to KPLC. The manufacturer shall exhibit good workmanship and good engineering practice in the manufacture of the composite line post insulators for KPLC.

1. SCOPE

1.1. This specification for 11kV & 33kV Composite Line Post Insulators – Vertical & Horizontal Mounting covers requirements for 11kV and 33 kV composite line post insulators for use on overhead power transmission lines operating at a nominal voltage of 11kV with highest system voltage of 12 kV at a frequency of 50Hz and nominal voltage of 33kV with highest system voltage of 36kV at a frequency of 50Hz. The insulator category and their mounting brackets in this scope are as follows:

- a) Composite Vertical Line Post Insulator – Rated 12kV
- b) Composite Vertical Line Post Insulator – Rated 36kV
- c) Composite Horizontal Line Post Insulator – Rated 12 kV
- d) Composite Horizontal Line Post Insulator – Rated 36kV

1.2. The specification stipulates minimum requirements, inspection and tests of the composite line post insulators as well as schedule of Guaranteed Technical Particulars.

**TITLE:****11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/04/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 3 of 20**2. NORMATIVE REFERENCES**

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.

- IEC 61952: Insulators for Overhead Lines – Composite Line Post Insulators for A.C. Systems with a Nominal Voltage Greater Than 1 000 V – Definitions, Test Methods and Acceptance Criteria
- IEC 62217: Polymeric HV insulators for indoor and outdoor use. General definitions, test methods and acceptance criteria
- IEC 60437: Radio interference test on high-voltage insulators
- IEC 60587: Electrical insulating materials used under severe ambient conditions – Test methods for evaluating resistance to tracking and erosion
- IEC 60815-1&3: Selection and dimensioning of high-voltage insulators intended for use in polluted conditions -- Part 1: Definitions, information and general principles -- Part 3: Polymer insulators for a.c. systems
- IEC 60383: Insulators for overhead lines with a nominal voltage above 1000V.
- IEC 60071 1&2: Insulation co-ordination – Part 1: Definitions, principles and rules- Part 2: Application guide.
- IEC 60120: Dimensions of ball and socket couplings of string insulator units;
- IEC 60471: Dimensions of clevis and tongue couplings of string insulator units;
- IEC 61466-1: Composite string insulator units for overhead lines with a nominal voltage greater than 1 000 V -- Part 1: Standard strength classes and end fittings;
- IEC 60707: Methods of test for the determination of flammability of solid electrical insulating materials when exposed to an igniting source.
- IEC 60720: Characteristics of line post insulators

**TITLE:****11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/0
4/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 4 of 20

ISO 1461: Metallic Coatings – Hot dip galvanized coatings on fabricated ferrous products – Requirements.

ISO 48: Rubber, vulcanized or thermoplastic -- Determination of hardness (hardness between 10 IRHD and 100 IRHD).

ISO 8611: Pallets for material handling- Flat pallets.

ISO 5922: Malleable cast iron.

3. 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 use outdoors in tropical areas and harsh climatic conditions including areas exposed to:

- a) Altitudes of up to 2200m above sea level and humidity of up to 95%,
- b) Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C, in direct sunlight,
- 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 levels of up to 180 thunderstorm days per year.
- f) Tropical sunshine conditions

NOTE: *The level of galvanizing for all ferrous parts except those that are stainless steel and materials used shall be suitable for these conditions.*

**TITLE:****11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/04/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 5 of 20**4.2. DESIGN AND CONSTRUCTION****4.2.1. General**

4.2.1.1 The composite line post insulators shall be of type A in accordance with IEC 60383 and shall be designed, manufactured and tested in accordance with IEC 61952, IEC 60815-3, IEC 60720 and other applicable /latest IEC standards and the requirements of this specification.

4.2.1.2 The composite line post insulator in this specification shall be a rigid insulator consisting of one piece of insulating material permanently assembled with a metal base cap intended to be mounted rigidly on a supporting structure by means of a central stud or one or more bolts as per IEC 60815-3.

4.2.1.3 The composite line post insulators shall have a core, an insulating housing and weather-shed housing both manufactured by the same manufacturer and a stainless steel hardware components for attaching it to the support and conductor.

4.2.1.4 The composite line post insulators shall be an open shed profile type with excellent self-cleaning properties and a provision for easy cleaning when maintenance is required.

4.2.1.5 The insulators shall maintain satisfactory electrical and mechanical performance throughout their lifetime, which is specified as over 40 years. Evidence in support of the reliability and performance for this period including information on Failure Mode and Effect Analysis shall be submitted for purposes of tender evaluation.

NOTE: *Suppliers/Manufacturers shall be required to comment on the environmental soundness of the design and the materials used in the manufacture of the composite line post insulators offered. In particular, comments should address such issues as recyclability and disposability at the end of service life.*

4.2.2. Core

4.2.2.1 The composite line post insulator core shall be made of brittle fracture-resistant electrical grade solid high density, axially aligned, glass-fibre-reinforced, epoxy resin rod, of uniform cross-

**TITLE:****11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/0
4/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 6 of 20

section to achieve maximum failing load. The core shall be mechanically and electrically sound, free from voids, foreign substances and manufacturing flaws.

4.2.2.2 The composite line post insulators design shall ensure that the core is totally encapsulated and fully sealed, from the live to the earthed ends, by the insulating material from the environment, in order to avoid ingress of moisture. If any tacky substances are used as sealers, they shall not be exposed to environmental influence.

4.2.2.3 Special care shall be taken in connecting the glass-fiber-reinforced, epoxy resin rod, to the metal end fittings that allows having high bending, traction, torsion and compression loads and eliminating water penetration which happens in the usual execution of compression end fittings.

4.2.2.4 The core material shall have four (4) essential requisites:

- a) The capacity to withstand mechanical stresses that come from a specific use.
- b) Sufficient insulating properties to withstand, with an adequate safety-margin, the electrical stresses of usage and those resulting from over voltages of internal and external origin.
- c) Power arc resistance.
- d) Positive results at the tests according to the standard IEC 61952.

4.2.3. Housing and Weather sheds

4.2.3.1 The weather sheds shall be made of polymer materials such as ethylene, propylene or silicone elastomers such as:

- a) 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
- b) HPS silicone rubber compound 1800-12000V.

NOTE:

- i) *The silicon rubber shall be treated with additive packages to modify their behavior for satisfactory performance in an outdoor polluted environment. The additives (fillers) shall include*

**TITLE:****11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/04/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 7 of 20

but not limited to anti-tracking agents, ultra-violet screens and stabilizers, antioxidants, ionic scavengers, etc.

ii) Proof of the type of base polymer used and the additives shall be provided to support the tender during evaluation.

4.2.3.2 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.

4.2.3.3 A minimum sheath thickness of 3.0 mm of silicone rubber shall be extruded or injection moulded on the reinforced fiberglass rod. The polymer sleeve and weather-shed insulating material shall have a chemical structure of 100 percent silicone rubber before fillers are added.

4.2.3.4 The silicone rubber shall be firmly bonded to the rod, be seamless, smooth and free from imperfections. The strength of the silicone rubber to rod interface shall be greater than the tearing strength of the silicone rubber.

4.2.3.5 The weather-sheds shall be firmly bonded to the sheath, vulcanized to the sheath or moulded as part of the sheath and be seamless smooth and free from imperfections. The strength of the silicone rubber weather-shed to sheath interface shall be greater than the tearing strength of the silicone rubber.

4.2.3.6 Weather-sheds shall be at intervals to provide optimum electrical performance and the weather-shed designs shall provide a protected bottom surface that tends to keep dry in wet conditions.

4.2.3.7 The composite line post insulators shall be capable of withstanding high pressure power washing. A power wash test shall be performed on polymer insulators to demonstrate that the units can be power washed. This test shall be a water spray at a shed seam of approximately 3m from the insulators. The spray shall be a solid stream through a 6mm diameter nozzle at 3.79Mpa for a period of ten minutes. There shall be no signs of water entering through or under the outside weather-shed into the core or at the polymer hardware interface into the core.

**TITLE:****11KV & 33KV COMPOSITE LINE POST
INSULATORS–VERTICAL & HORIZONTAL
MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/0
4/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 8 of 20

4.2.3.8 The gap between hardware base and the housing shall be sealed by an elastomer with permanent elasticity. The sealing shall stick permanently to the surface of the material as well as to the housing.

4.2.3.9 Cracks on the insulator surface shall not be allowed. Superficial defects or cavities are allowed provided the total defective area does not exceed 0.2% of the total insulator surface and the individual defective areas do not exceed 25 mm². The depth of any cavities must not exceed 1 mm or 5% of the layer thickness of the blanket material in the area under consideration. Individual protrusions on the insulator surface are allowed up to 2 mm as long as their total protruded area does not exceed 0.2% of the total surface of the insulator and the individual protruded area does not exceed 25 mm².

4.2.4. Metallic end fittings

4.2.4.1 The metallic end fittings placed at the end of the fiberglass rod shall be:

- a) **Clamp- top type** – designation "HC" for Horizontal mounting or designation "VC" for vertical mounting complete with stud base (complete with two (2) trunnion bolts and locknut) as per ANSI C29-7 with:
 - i) Sufficient mechanical features to take the stresses that insulators are subjected to.
 - ii) Conventional horizontal and vertical trunnion to accommodate a standard Line Post Insulator, bolted conductor clamp.
 - iii) A design with an additional eye for the attachment of other devices during installation or maintenance activities.
- b) **K-Clamp** – designation "C" in drawing in Appendix E and made of corrosion resistant aluminum casting with:
 - i) A long, smooth contoured conductor clamping zone that accommodates a full range of conductor sizes
 - ii) A single captive live-line operable bolt.

**TITLE:****11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/04/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 9 of 20

iii) Overall length shall permits standard cover up hoods to effectively cover all insulator sheds.

iv) A design can be installed in either a horizontal or vertical configuration

4.2.4.2 These terminals shall be manufactured according to the IEC 60120, IEC 60471, and IEC 61466-1 standards and according to the characteristics requested by KPLC or their use. The terminals shall be manufactured as follows:

- a) Forged steel C 30 or C 40, worked and then hot dip galvanized
- b) Casting steel C 30 or C 40, worked and then hot dip galvanized

4.2.5. Mounting Brackets/ Fixing Base

4.2.5.1 The top and bottom flanges of the end fittings shall have PCDs, holes and thread sizes as per the drawings attached in Appendix E

4.2.5.2 Insulators for horizontal application shall be complete with an integral curved base suitable for direct mounting onto a round pole. The insulator shall be complete with galvanized metal brackets/fittings for attachment to prestressed round concrete poles at an angle of 5° from the horizontal.

4.2.6. Insulator shed profile

4.2.6.1 Insulator shed profiles shall be designed in accordance with IEC 60815. Alternating sheds with an ‘open’ or ‘aerodynamic’ profile are preferred. Designs utilizing ‘Under-ribs’ in order to increase the creepage distance shall not be accepted.

4.2.6.2 The following parameters apply to the shed profile and are the recommended minimum values in IEC 60815 for full compliance:

- a) The shed spacing-projection (s/p) ratio shall be at least 0.65.
- b) The minimum distance between sheds shall be 30 mm;
- c) The creepage to clearance ratio (l/d) shall not exceed 5.
- d) The shed angle shall be between 5° and 22.5°.

**TITLE:****11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/04/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 10 of 20

NOTE: Besides the dimensional constraints of the shed profile, the sheds shall be sufficiently robust to withstand reasonable handling and transportation stresses.

4.2.7. Finishing

4.2.7.1 The composite line post insulators shall be supplied complete with necessary hardware such as galvanized steel pin with nut spring washer and a lock nut for mounting the insulator to the channel iron cross arms as shown in the drawings in Appendix E.

4.2.7.2 The finished product shall be of high resistance to moisture, high salinity, ultraviolet radiation, high temperatures and tropical sunshine conditions.

4.2.7.3 The final colour of the insulator housing shall be GREY.

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

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

4.2.8. Galvanizing

4.2.8.1 All steel hardware components shall be galvanized after their machined bent or worked operations of any manner. The zinc coating shall adhere tightly to the surface of the base metal. The zinc coated parts shall not have any un-coated spots.

4.2.8.2 The coating shall be uniform and free from blisters, flux, black spots, dross, tear drop edges, flaking zinc, rough appearance and in general shall be smooth, clean and unscarred when received. The minimum thickness of the coating of the steel or iron base shall conform to ISO 1461 and Table 1.

4.3. CHARACTERISTICS

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



TITLE: 11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION	Doc. No.	KP1/6C/4/1/TSP/04/021
	Issue No.	2
	Revision No.	0
	Date of Issue	2017-12-01
	Page 11 of 20	

Table 1: Mechanical and electrical characteristics of the insulators as per IEC 60720 and ISO 1461

CHARACTERISTICS	12KV	36KV
System Highest Voltage	12kV, 50Hz	36kV, 50Hz
Creepage Distance - Minimum	372mm	1116mm
Minimum Power Frequency Withstand Voltage (wet), 50Hz, 1min	38kV	90kV
Minimum Lightning Impulse Withstand Voltage, 1.2/50µs, dry, positive	95kV	200kV
Minimum Failing Load	12.5kN	12.5kN
Nominal total height	222mm	430
Mean coating thickness for iron and steel castings and forgings	610 g/m ² of 85µm	
Mean coating thickness for bolts, nuts and washers	375 g/m ² of 54µm	

5. TESTS REQUIREMENTS

The composite line post insulators shall be inspected and tested in accordance with the requirements of IEC 61952, IEC 60815-1&3, IEC 62217, IEC 60720, IEC 60707, IEC 60383, IEC 60437, ISO 48, ISO 1461 and provisions of this specification.

6. MARKING AND PACKING

6.1. Markings

6.1.1. The following information shall be marked indelibly and legibly and in a permanent manner on each insulator in English Language.

- a) Manufacturer's name or trademark;
- b) Manufacturer's type designation;
- c) Specified electrical characteristics;

**TITLE:****11KV & 33KV COMPOSITE LINE POST
INSULATORS–VERTICAL & HORIZONTAL
MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/0
4/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 12 of 20

d) Specified mechanical load.

e) The letters ‘PROPERTY OF KPLC’.

6.1.2. All marking shall be by embossing on the insulator housing and marking on metal fittings shall be before galvanizing. The marking shall not affect the performance of the insulator.

NOTE: *Markings on loose tags/ties shall not be accepted.*

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

6.2. Packing

6.2.1 All insulators shall be packaged in individual wooden weatherproof crates to protect them against damage during shipping, inland transportation and storage. The crates shall be secured to pallets for handling by forklifts. Pallets shall not exceed 4 feet in height or 1,000 pounds in weight. The packages shall be weatherproof and designed to be removable by hand without cutting.

6.2.2 Each package shall have a packing list and in addition, shall be marked with the following information in English Language.

a) Descriptive name , Rated voltage, Quantity packed in package, Contract and lot number, Gross weight of package, Volume of package, Applicable standards

b) Label “**Property of KPLC**”.

**TITLE:****11KV & 33KV COMPOSITE LINE POST
INSULATORS–VERTICAL & HORIZONTAL
MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/0
4/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 13 of 20**APPENDICES****A. TESTS AND INSPECTION (Normative)**

- A.1. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified. Bidders shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.
- A.2. Copies of Type Test Certificates and Type Test Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate to ISO/IEC 17025 for the testing laboratory shall also be submitted. Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Laboratory that carried out the tests.
- A.3. Copies of type test reports to be submitted with tender (by bidder) for evaluation shall be as stated below:
- a) Mechanical load-time test and tightness test of the interface between end fittings and insulator housing;
 - b) Recovery of hydrophobicity test (IEC 61442) ;
 - c) Brittle fracture resistance test.
 - d) Tests on interfaces and connections of metal fittings;
 - e) Assembled core load-time test;
 - f) Test of housing: tracking and erosion test The test reports MUST include resistance to ageing tests (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) and shall include;
 - g) Tests for the core material;
 - h) Visible discharge test;
 - i) Dry lightning impulse withstand voltage test;
 - j) Wet power frequency test;

**TITLE:****11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/0
4/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 14 of 20

- k) Dry power frequency test;
- l) One minute rain test/wet flashover test;
- m) Chemical composition test for silicon content

NOTE: Any translations of certificates and test reports into English language shall be signed and stamped by the third party ISO/IEC 17025 accredited Testing Laboratory that carried out the tests.

A.4. The Insulators shall be subject to acceptance tests at the manufacturer's works before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Limited (KPLC). Routine and Sample Test Reports for the insulators to be supplied shall be submitted to KPLC for approval before delivery of the goods.

A.5. Tests to be witnessed by KPLC Engineers at the factory before shipment shall be in accordance with IEC 61952, IEC 60815-1&3, IEC 62217, IEC 60720, IEC 60707, IEC 60383, IEC 60437, ISO 48, ISO 1461, and this specification and shall include the following:

A. Tests on interfaces and connections of end fittings

- a) Pre-stressing
 - (i) Thermal-mechanical pre-stressing
 - (ii) Water immersion test
- b) Verification tests
 - (i) Visual examination
 - (ii) Steep-front impulse voltage test
 - (iii) Dry power frequency voltage test

B. Assembled core load-time tests

- a) Test for verification of the Maximum Design Cantilever Load MDCL
- b) Tensile load test

C. Test of sheds and housing material

- a) Hardness test

**TITLE:****11KV & 33KV COMPOSITE LINE POST
INSULATORS–VERTICAL & HORIZONTAL
MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/0
4/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 15 of 20

b) Flammability test acc. to IEC 60707

D. Test for the core material

a) Dye penetration test

b) Water diffusion test

c) Voltage test

A.6. On receipt of the product, KPLC will perform any of the tests specified in order to verify compliance with this specification. The supplier shall replace without charge to KPLC the insulators which upon examination, test or use, fail to meet any of the requirements in the specification.

B. QUALITY MANAGEMENT SYSTEM (Normative)

B.1 The bidder shall submit a quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, maintenance and documentation of the insulators 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 or later.

B.2 The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001 certificate shall be submitted with the tender for evaluation.

B.3 The bidder shall indicate the delivery time of the insulators, manufacturer's monthly and annual production capacity and experience in the production of the type of insulators being offered. A detailed list and contact addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for exact or similar rating items sold in the last five years shall be submitted with the tender for evaluation.

**TITLE:****11KV & 33KV COMPOSITE LINE POST
INSULATORS–VERTICAL & HORIZONTAL
MOUNTING - SPECIFICATION****Doc. No.****KP1/6C/4/1/TSP/0
4/021****Issue No.**

2

Revision No.

0

Date of Issue

2017-12-01

Page 16 of 20**C. DOCUMENTATION (Normative)**

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

- a) Fully filled clause by clause Guaranteed Technical Particulars (GTP) stamped and signed by the manufacturer,
- 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 type test certificates and type test reports by a third party testing laboratory accredited to ISO/IEC 17025,
- f) Copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory,
- g) Manufacturer's warranty and guarantee;
- h) Manufacturer's letter of authorization, copy of the manufacturer's ISO 9001:2008 or 2015 certificate, ISO 17025(2005) certificate.

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 (GTP) signed by the manufacturer,
- b) Design drawings and construction details of the insulator including 3-D views,
- 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 or later,
- d) Detailed test program to be used during factory testing,



TITLE:

11KV & 33KV COMPOSITE LINE POST INSULATORS–VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION

Doc. No.

KP1/6C/4/1/TSP/04/021

Issue No.

2

Revision No.

0

Date of Issue

2017-12-01

Page 17 of 20

- e) Marking details and method to be used in marking each insulator
- 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 insulators for The Kenya Power & Lighting Company,
- g) Packaging details (including packaging materials and marking and identification of batches).

Guaranteed Technical Schedules

To be filled and signed by the manufacturer and submitted together with relevant copies of the Manufacturer’s catalogues, brochures, drawings, test reports and technical data

Tender No.

Clause	KPLC requirement	Bidder’s offer
	Manufacturer’s Name and address	Specify
	Country of Manufacture	Specify
2.	Applicable Standards	Specify
4.	Requirements	
4.1	Service Conditions	Specify
4.2	Design and Construction	
4.2.1	General	
4.2.1.1	Reference standards	Specify
4.2.1.3	Design and manufacturing	Specify
4.2.1.4	The composite line post insulators shall be an open shed profile type with excellent self-cleaning properties	Specify
4.2.1.5	The insulators shall maintain satisfactory electrical and mechanical performance throughout their lifetime (40years). period	Provide evidence
4.2.2	Core	
4.2.2.4	The core material shall have four (4) essential requisites:	Specify



TITLE:
11KV & 33KV COMPOSITE LINE POST INSULATORS-VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/04/021
Issue No.	2
Revision No.	0
Date of Issue	2017-12-01
Page 18 of 20	

Clause	KPLC requirement	Bidder's offer
	<p>a The capacity to withstand mechanical stresses that come from a specific use.</p> <p>b Sufficient insulating properties to withstand, with an adequate safety-margin, the electrical stresses of usage and those resulting from over voltages of internal and external origin.</p> <p>c Power arc resistance</p> <p>d Positive results at the tests according to the standard IEC 61952.</p>	
4.2.3	Housing and Weather sheds	
4.2.3.1	The weather sheds shall be made of polymer materials such as ethylene, propylene or silicone elastomers such as:	
	a 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	Specify
	b HPS silicone rubber compound 1800-120V.	Specify
4.2.3.2	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.	Specify
4.2.3.3	A minimum sheath thickness of 3.0 mm of silicone rubber shall be extruded or injection moulded on the reinforced fiberglass rod.	Specify
4.2.3.7	The composite line post insulators shall be capable of withstanding high pressure power washing.	Specify
4.2.3.8	The gap between hardware base and the housing shall be sealed by an elastomer with permanent elasticity.	Specify
4.2.4	Metallic end Fittings	
4.2.4.1	The metallic end fittings placed at the end of the fiberglass rod	Specify



TITLE:
**11KV & 33KV COMPOSITE LINE POST
 INSULATORS–VERTICAL & HORIZONTAL
 MOUNTING - SPECIFICATION**

Doc. No.	KP1/6C/4/1/TSP/0 4/021
Issue No.	2
Revision No.	0
Date of Issue	2017-12-01
Page 19 of 20	

Clause	KPLC requirement	Bidder's offer
4.2.4.2	The terminals shall be manufactured as follows: a) Forged steel C 30 or C 40, worked and then hot dip galvanized b) Casting steel C 30 or C 40, worked and then hot dip galvanized	Specify
4.2.5	Mounting Brackets/Fixing Base	Specify
4.2.6	Insulator shed profile	Specify
4.2.6.2	The shed profile and the recommended minimum values in IEC 60815 for full compliance: a) The shed spacing-projection (s/p) ratio shall be at least 0.65. b) The minimum distance between sheds shall be 30 mm; c) The creepage to clearance ratio (l/d) shall not exceed 5. d) The shed angle shall be between 5° and 22.5°.	Specify
4.2.7	Finishing	
4.2.7.1	The composite line post insulators shall be supplied complete with necessary hardware	Specify
4.2.7.2	The finished product shall be of high resistance to moisture, high salinity, ultraviolet radiation, high temperatures and tropical sunshine conditions.	Specify
4.2.7.3	The final colour of the insulator housing shall be GREY.	Specify
4.2.7.5	The top and side grooves shall be galvanized steel and be designed to accept conductor sizes in the range 7 – 18.2mm overall diameter.	Specify
4.2.8	Galvanizing	
4.2.8.1	All steel hardware components shall be zinc coated	Specify
4.2.8.2	The minimum thickness of the coating of the steel or iron base shall conform to ISO 1461	Specify
6	Marking and packing	
6.2	Marking and Packaging	Specify
A	Tests and Inspection	



TITLE:
11KV & 33KV COMPOSITE LINE POST INSULATORS-VERTICAL & HORIZONTAL MOUNTING - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/04/021
Issue No.	2
Revision No.	0
Date of Issue	2017-12-01
Page 20 of 20	

Clause	KPLC requirement	Bidder's offer
A.2	Copies of Type Test Reports	State
A.3	Copies of type test reports Dry power frequency test; a) One minute rain test/wet flashover test; b) Chemical composition test for silicon content	State
A.4/5	Acceptance tests	State
B	Quality Management System	
B.1	Quality Assurance Plan	Provide
B.2	Copy of ISO 9001:2008 (or later) Certificate or KEBS Diamond mark of quality	Provide
B.3	Manufacturer's experience	Provide
	Manufacturing Capacity (units per month)	Provide
	List of previous customers and reference letters	Provide
C	Documentation and demonstration	
C.1	Documents submitted with tender	Provide

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