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

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

0.1 Circulation List

COPY NO.	COPY HOLDER
1	Research & Development Manager
2	Procurement Manager
3	Stores & Stock Control Manager
4	Design & Construction Manager
5	Operations & Maintenance Manager
6	Transmission Manager
7	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)

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 66kV Suspension/Tension 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

This specification is for composite insulators for use on overhead lines for tension and suspension purposes. The specification covers 66kV Suspension/Tension composite line insulators.

The specification stipulates the minimum requirements for 66kV Suspension/Tension composite line insulators acceptable for use in the company 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 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 does not purport to include all the necessary provisions of a contract.

2. REFERENCES

The following standards contain provisions which, through reference in the text constitute provisions of this specification. Unless otherwise stated, the latest editions (including amendments) apply.

IEC 120: Dimensions of ball and socket couplings of string insulator units.

IEC 815: 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 1109: Composite insulators for a.c. overhead lines with a nominal voltage greater than 1000V – Definitions, test methods and acceptance criteria.

3. TERMS AND DEFINITIONS

For the purpose of this specification the terms and 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 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 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.

4.2.3. The insulator shall be of high resistance to moisture and ultraviolet radiation and shall withstand high tropical sunshine conditions.

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

4.2.5. The insulator shall be fitted with ball and socket coupling in accordance with IEC 120.

The ball pin and socket shall be of medium carbon steel with hot dip galvanized finish. Galvanizing shall be to ISO 1461.

The ball pin diameter shall be 16mm and shall be supplied complete with a corresponding "W" form retaining clip.

The security clip shall be of stainless steel.

4.3. CHARACTERISTICS

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

Description	Requirement
System Highest Voltage	72.5kV, 50Hz
Minimum Creepage Distance	1800mm
Minimum Power Frequency Withstand Voltage (wet) [altitude correction factor of 1.16 applied on 140kV]	160kV, rms
Minimum Lighting Impulse Withstand Voltage (dry) [altitude correction factor of 1.16 applied on 325kV]	380kV (1.2/50µs positive)
Minimum Arc Distance (between metal fittings)	720mm
Minimum Failing Load	70kN

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 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 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/ILAC 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 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).

5.4 On receipt of the insulators, KPLC will inspect them for acceptance at stores and may perform or have tests performed in order to verify compliance of the insulators with this specification.

The supplier shall replace without charge to KPLC, any insulators which upon examination, test or use fail to meet any or all of the requirements in this specification.

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.

6.2 All marking shall be by embossing and any 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.

ANNEX A: **Guaranteed Technical Particulars and Statement of Compliance** *(to be filled and signed by the Manufacturer for all clauses and submitted together with catalogues, brochures, drawings, technical data and test reports for tender evaluation)*

Description	Bidder's offer
1. Service Conditions	
2. Applicable Standards	
3. Maximum System Voltage (kV) and frequency (Hz)	
4. One-minute power frequency withstand voltage, 50Hz, wet (kV)	
5. Lighting impulse withstand voltage, 1.2/50μs pos. (kV)	
6. Minimum creepage distance (mm)	
7. Specified mechanical load, tension (kN)	
8. Length of insulator set with fittings (mm)	
9. Minimum Arcing Distance (mm)	
10. Material of fittings and level of corrosion protection	
11. Material of rod	
12. Material of housing and sheds	
13. Socket, size & standard	
14. Ball, size & standard	
15. List of copies of Design and Type Test Reports submitted (indicate Test Report Numbers, Testing Authority and contact addresses)	
16. List of Acceptance Tests to be witnessed by KPLC Engineers at the factory	
17. List of catalogues, brochures, technical data, drawings and customer sales records submitted to support the offer.	
18. Inspection for Acceptance to Stores & Guarantee	
19. Statement of compliance to specifications	

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Manufacturer's Name, Signature, Stamp and Date