



The Kenya Power & Lighting  
Co. Ltd.

TITLE:

**SPECIFICATION FOR  
PORCELAIN STAY  
INSULATORS (up to 33kV)**

Doc. No. KPLC1/3CB/TSP/04/016

Issue No. 1

Revision No. 0

Date of Issue 2009-06-22

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**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 type test reports for tender evaluation)*

Issued by: Head of Section, Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date:

2009-06-22

Date:

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### 0.1 Circulation List

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

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**FOREWORD**

This specification has been prepared by the Research and Development Department of The Kenya Power & Lighting Company Limited (KPLC) and it lays down requirements for Porcelain Stay Insulators (upto 33kV). The specification is intended for use by KPLC in purchasing the insulators.

The manufacturer shall submit information which demonstrates satisfactory service experience with products which fall within the scope of this specification.

**1. SCOPE**

This specification is for porcelain stay insulators for use on overhead power distribution lines operating at a nominal voltage of up to 33kV 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 porcelain stay 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 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 60383: Tests on insulators of ceramic material or glass for overhead lines with a nominal voltage greater than 1000V.

IEC 60060-1: High-voltage test techniques. Part 1: General definitions and test requirements.

BS 137: Insulators of ceramic material or glass for overhead lines with a nominal voltage greater than 1000V.

BS 183: Specification for general purpose galvanized steel wire strand.

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### 3. TERMS AND DEFINITIONS

The terms and definitions given in the reference standards shall apply.

### 4. REQUIREMENTS

#### 4.1 Service Conditions

The insulators shall be suitable for continuous use 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, in direct sunlight, heavy saline conditions along the coast and isokeraunic levels of up to 180 thunderstorm days per year.

#### 4.2. DESIGN, MATERIALS AND CONSTRUCTION

4.2.1 The insulator shall be designed for insulation of stays to reduce risk of dangerous potential gradients at ground level and, in the case of stays on earthed structures, to prevent electrolytic corrosion of stay rods.

4.2.2 The insulating material shall be porcelain.

The porcelain shall be sound, thoroughly vitrified and free from defects and blemishes which might adversely affect the life of the insulator. The exposed parts of the porcelain shall be smoothly glazed and shall be brown in colour.

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

4.2.4 The holes in the insulator shall be smoothly radiused with as large a radius as practicable to present an even bearing surface to the stay strand loop.

#### 4.3 PARTICULAR REQUIREMENTS

##### 4.3.1 Particular Requirements for 11kV Stay Insulators

The insulator shall be strain type suitable for stay wire size 7/4.00mm Grade 700 (7/8 SWG), stay wire to BS 183.

The minimum failing load of the insulator shall be: 110kN

The minimum power frequency wet flashover voltage shall be: 20kV, r.m.s.

The minimum impulse withstand voltage shall be: 60kV peak, positive.

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The insulator shall be to the general arrangement drawing shown in Drg. no. tsp/04/016/01.

**4.3.2. Particular Requirements for 33kV Stay Insulators**

The insulator shall be strain type suitable for stay wire size 19/3.55mm Grade 700 (19/10 SWG), stay wire to BS 183.

The minimum failing load of the insulator shall be: 110kN

The minimum power frequency wet flashover voltage shall be: 48kV, r.m.s.

The minimum impulse withstand voltage shall be: 100kV peak, positive.

The insulator shall be to the general arrangement drawing shown in DRG. NO. TSP/04/016/02.

**5. TESTS AND INSPECTION**

5.1 Type tests, routine tests and sample tests shall be done following procedures specified in IEC 60383, IEC 60060-1, BS 137 and the requirements of this specification. It shall be the responsibility of the manufacturer to perform or to have performed the tests specified.

5.2 Copies of Type Test Certificates and Type Test Reports from the relevant 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. Type test reports to be submitted shall include dry lightning impulse withstand voltage test, wet power-frequency withstand voltage test, verification of dimensions, porosity test and test for mechanical strength.

Type Test Reports for stay insulator of similar or higher voltage rating and similar or higher mechanical failing load shall be accepted as representative for any of the stay insulators on tender.

5.3 A sample of each type of stay insulator offered shall be submitted with the bid documents for evaluation.

5.4 The insulators shall be subject to acceptance tests at the manufactures' works before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Limited (KPLC). Acceptance tests shall include impulse withstand voltage test, wet power-frequency withstand voltage test, verification of dimensions, porosity test and test for mechanical strength

5.5 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

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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 clearly and indelibly marked on each insulator:

- a) Name or trade mark of the manufacturer
- b) Year of manufacture
- c) Batch or serial number
- d) Mechanical failing load

The marking may be printed or impressed provided such impressions do not impair the performance of the insulator.

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.

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**Annex A: Guaranteed Technical Particulars and Statement of Compliance**

No.	Requirements	BIDDER'S OFFER
1.	Name of the manufacturer and country of origin	
2.	Applicable standards	
3.	Service conditions	
4.	Voltage Rating	
5.	Type of insulator (strain type required)	
6.	Size of stay wire to be used	
7.	Minimum mechanical failing load	
8.	Minimum power frequency flashover voltage, wet	
9.	Minimum impulse withstand voltage, positive	
10.	Drawing submitted (indicate drawing number)	
11.	Materials, colour and finish	
12.	Manufacturer's Guarantee and Warranty	
13.	List catalogues, brochures, technical data and drawings submitted to support the offer.	
14.	List customer sales records submitted to support the offer.	
15.	List Type Test Certificates and their Test Reports submitted with tender (indicate test report numbers, date, Testing Institution and contact addresses) <ul style="list-style-type: none"> <li>• Dielectric tests (Lightning Impulse and Power Frequency Withstand Tests).</li> <li>• Mechanical Failing Load.</li> <li>• Verification of Dimensions.</li> <li>• Porosity Test.</li> </ul>	
16.	List Acceptance Tests to be witnessed by KPLC Engineers at the factory.	
17.	Copy of ISO 9001:2000 Certificate submitted (indicate validity)	
18.	Quality Assurance Programme/Plan	
19.	Statement of compliance to tender specifications	
20.	Comments on tender specifications	
21.	Deviations from tender specifications and supporting data, test reports, technical documents etc.	
22.	Inspection of the insulators at KPLC stores/site.	
23.	Marking and Packing	

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

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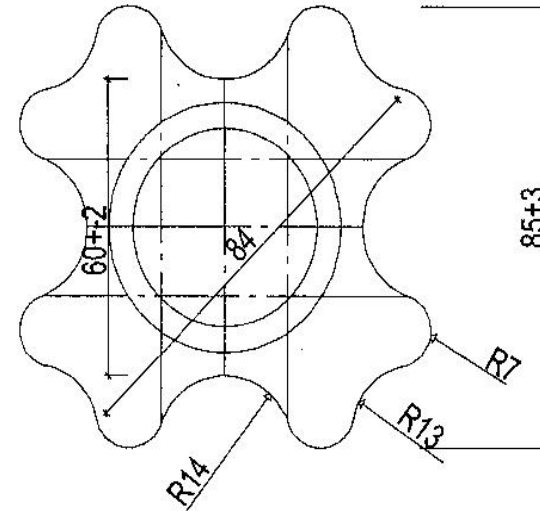
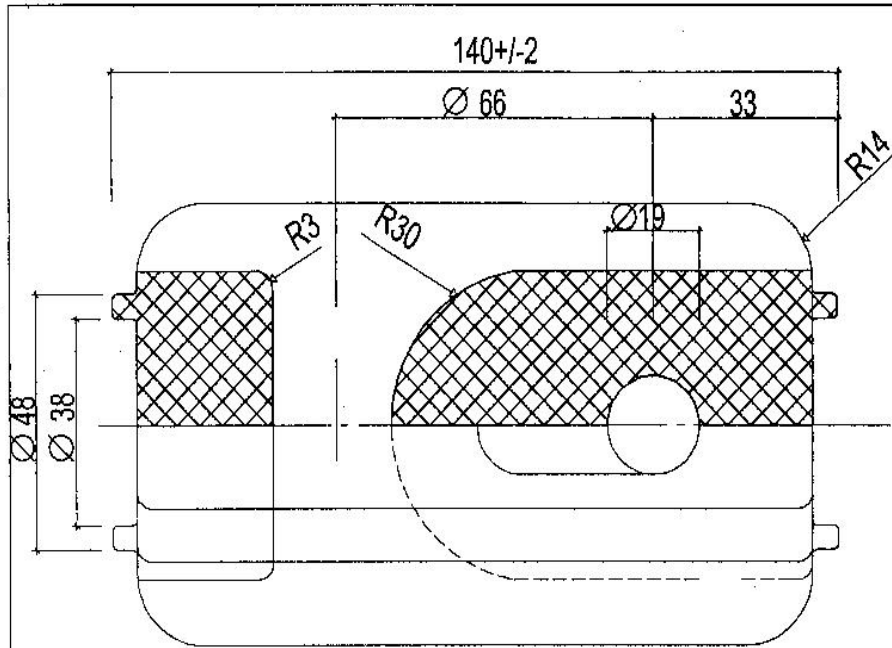
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Signed:

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Date: 2009-06-22



Technical specification

1. part shows without glaze, the other parts are all in brown glaze.
2. Mechanical failing load: 110KN
3. power frequency wet flashover voltage: 20KV
4. Impulse withstand voltage: 60Kv
5. standard: BS137
6. Transition: All transition between surface must be smooth to provide even bearing for stay wire.

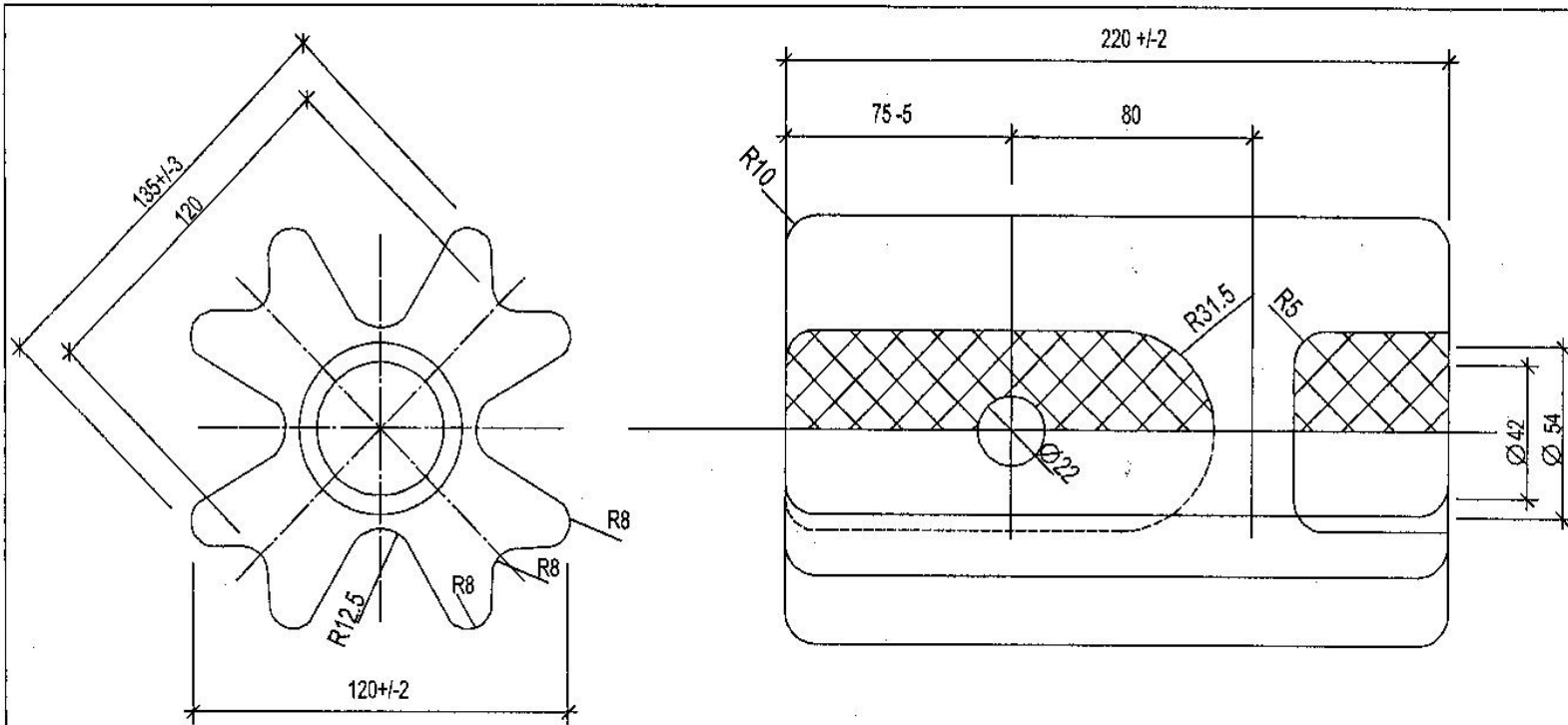
APPROVED	DATE	NAME	SIGN

CHECKED ENGINEER VC	DATE	NAME	SIGN	REF	REVISION	DATE	SIGN	CHECKED	DATE

11KV porcelain insulator stay

K. P. & L. Co. Ltd  
 Drg. no.tsp/04/016/01





TECHNICAL SPECIFICATION

1. part shows without glaze, the other parts are all in brown glaze.
2. Mechanical failing load: 110KN
3. Power frequency wet flashover voltage: 48KN
4. Impulse withstand voltage: 100KV
5. Standard: BS137
6. Transitions: All transition between surface must be smooth to provide even bearing for stay wire.

	DATE	NAME	SIGN
APPROVED			
CHECKED ENGINEER I/C	24/6/05	S. D. K.	[Signature]
CHECKED PRINCIPAL DWMAN	24/6/05	H. M. D.	[Signature]
DRAWN	24/6/05	M. M. D.	[Signature]
TRACED			

REF	REVISION	DATE	SIGN	CHECKED	DATE
1					
2					
3					
4					
5					

33kv porcelain insulator stay

K. P. & L. Co. Ltd

DRG NO: TSP/04/016/02

