



The Kenya Power &  
Lighting Co. Ltd

TITLE:

**SPECIFICATION FOR TEST AND  
MEASURING EQUIPMENT – Part  
1: Earth Tester (electrode  
resistance & soil resistivity)**

Doc. No.

KPLC1/3CB/TSP/09/018-1

Issue No.

1

Revision No.

0

Date of Issue

2010-01-20

Page 1 of 7

## 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. INSTRUCTIONS AND MARKING

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

Issued by: Head of Section, Technical Stds & Specs

Authorized by: Head of Department, R&D

Signed:

Signed:

Date:

2010-01-25

Date:



The Kenya Power &  
Lighting Co. Ltd

TITLE:

**SPECIFICATION FOR TEST AND  
MEASURING EQUIPMENT – Part  
1: Earth Tester (electrode  
resistance & soil resistivity)**

Doc. No.

KPLC1/3CB/TSP/09/018-1

Issue No.

1

Revision No.

0

Date of Issue

2010-01-20

Page 2 of 7

**0.1 Circulation List**

COPY NO.	COPY HOLDER
1	Research & Development Manager
2	Procurement 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)
0	2010-01-20	New (cancels and replaces KPLC1/3CB/TSP/09/017)	S. Kimitei <i>[Signature]</i> 2010-01-25	E. K. Gathige <i>[Signature]</i> 2010-01-26

Issued by: Head of Section, Technical Stds & Specs

Authorized by: Head of Department, R&D

Signed:

*[Signature]*

Signed:

*[Signature]*

Date:

2010-01-25

Date:

2010-01-26



The Kenya Power &  
Lighting Co. Ltd

TITLE:

**SPECIFICATION FOR TEST AND  
MEASURING EQUIPMENT – Part  
1: Earth Tester (electrode  
resistance & soil resistivity)**

Doc. No.

KPLC1/3CB/TSP/09/018-1

Issue No.

1

Revision No.

0

Date of Issue

2010-01-20

Page 3 of 7

## 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 Earth Tester. The Specification is to be used by KPLC for procurement of the equipment.

## 1. SCOPE

This specification is for Earth Tester for measuring earth electrode resistance and soil resistivity.

The specification also covers inspection and test of the equipment as well as schedule of Guaranteed Technical Particulars to be filled, signed by the bidder and submitted for tender evaluation.

The specification stipulates the minimum requirements for Earth Tester acceptable for use by KPLC and it shall be the responsibility of the supplier to ensure adequacy of the design, good workmanship and good engineering practice in the manufacture of the equipment 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 61010: Safety requirements for electrical equipment for measurement, control and laboratory use

IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements

BS 7430: Code of practice for earthing

## 3. TERMS AND DEFINITIONS

For the purpose of this specification the definitions given in the reference standards shall apply

Issued by: Head of Section, Technical Stds & Specs

Authorized by: Head of Department, R&D

Signed:

*[Signature]*

Signed:

*[Signature]*

Date:

2010-01-25

Date:

2010-01-26



The Kenya Power &  
Lighting Co. Ltd

TITLE:

**SPECIFICATION FOR TEST AND  
MEASURING EQUIPMENT – Part  
1: Earth Tester (electrode  
resistance & soil resistivity)**

Doc. No.

KPLC1/3CB/TSP/09/018-1

Issue No.

1

Revision No.

0

Date of Issue

2010-01-20

Page 4 of 7

#### 4. REQUIREMENTS

##### 4.1 SERVICE CONDITIONS

The Earth Tester shall be suitable for use 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 and saline conditions along the coast.

##### 4.2 DESIGN AND CONSTRUCTION

4.2.1 The Earth Tester shall be robust and compact designed for measuring earth electrode resistance and soil resistivity.

4.2.2 The Earth Tester shall apply the four terminal method of measurement which eliminates the resistance of the current circuit from the measurement. The circuit design shall ensure that the resistance of the potential circuit does not affect the measurement during practical testing.

4.2.3 The instrument shall be microprocessor controlled and shall provide a flexible 'user-friendly' approach to earth testing by giving good error detection capabilities and full test information on a large easily readable alpha-numeric display.

4.2.4 It shall have a key pad to be used to adjust the test frequency, the test current level and the filtering so that adverse conditions influencing the test may be overcome. The display shall indicate:

- If the noise interference in the soil passing the test current is excessive.
- If the current test spike resistance is too high.
- If the potential test spike resistance is too high.
- If the battery needs recharging.

*Note: all display parameters shall be in English Language only.*

4.2.5 The chosen test current frequency, test current level and the increased filtering option shall be stored in memory for use in subsequent tests.

4.2.6 The maximum output voltage shall be limited to 50V for safety when performing a test and convenience when re-positioning test spikes.

4.2.7 The instrument shall be auto-ranging relieving the operator of any concern as to which resistance range to use.

4.2.8 The instrument shall have a minimum rating of IP 54.

Issued by: Head of Section, Technical Stds & Specs

Authorized by: Head of Department, R&D

Signed: *[Signature]*

Signed:

Date: 2010-01-25

Date:



The Kenya Power &  
Lighting Co. Ltd

TITLE:

**SPECIFICATION FOR TEST AND  
MEASURING EQUIPMENT – Part  
1: Earth Tester (electrode  
resistance & soil resistivity)**

Doc. No.

KPLC1/3CB/TSP/09/018-1

Issue No.

1

Revision No.

0

Date of Issue

2010-01-20

Page 5 of 7

- 4.2.9 The instrument shall have in-built rechargeable battery capable of at least 5 hours of life per charge.
- 4.2.10 The instrument shall be built into a robust plastic case and have its four terminals, equipped for spade or 4mm connectors, mounted on the front panel.
- 4.2.11 The Earth Tester shall be complete with earth testing kit comprising carrying case and pouch containing:
- Four galvanized steel spikes ('L' shape) 1mm dia x 350mm long
  - 30m of cable on a winder
  - 50m of cable on a winder (different colour)
  - Two 3m leads complete with connectors and clips
  - Hammer (suitable for the above spikes and various soils)
- 4.2.12 The Earth Tester shall also be complete with standard accessories including mains supply lead for battery charging (240V ac) and operating instruction book.
- 4.2.13 The Earth Tester shall be of the following minimum ratings/characteristics:

Description	Requirement
Earth resistance range and accuracy	0.010 to 19.99k $\Omega$ , auto-ranging, 1m $\Omega$ resolution and accuracy of $\pm 0.5\%$ $\pm 2$ digits
Comply with standards	BS 7430, IEC 61010, IEC 61326
Test frequency	105 to 160Hz reversing d.c. (50Hz operation default to 128Hz) set in steps of 0.5Hz
Test current	50mA max (selectable high and low levels)
Maximum output voltage	50V r.m.s.
Maximum interference	40V peak-to-peak (50Hz sinusoidal nature)
Display	Alphanumeric L.C.D. giving test information and a large (20mm) 3½-digit reading
Environmental protection	IP54
Flash test	3kV a.c.
Fault conditions	To withstand 240V a.c. between any two terminals
Power supply	(1) Rechargeable battery, (2) 5hours life continuous use (3) Charging supply required: 200 to 260V 50Hz (4) Charging time: 6hrs max (from completely exhausted), charging current automatically controlled to stop overcharging
Weight	Approximately 5kg (for ease of field use)

Issued by: Head of Section, Technical Stds & Specs

Authorized by: Head of Department, R&D

Signed:

*S. M. Tei*

Signed:

*W. M. Mwangi*

Date:

2010-01-25

Date:

2010-01-26



The Kenya Power & Lighting Co. Ltd

TITLE:

**SPECIFICATION FOR TEST AND MEASURING EQUIPMENT – Part 1: Earth Tester (electrode resistance & soil resistivity)**

Doc. No.

KPLC1/3CB/ISP/09/018-1

Issue No.

1

Revision No.

0

Date of Issue

2010-01-20

Page 6 of 7

## 5 TESTS AND INSPECTION

5.1 Test records of tests performed on identical equipment in the form of copies of test certificates, issued by an internationally recognized testing authority or the National Testing Authority of country of manufacture or ISO/IEC accredited laboratory shall be submitted with the tender for evaluation.

5.2 Calibration certificates and test reports for each Earth Tester shall be submitted to KPLC during delivery of the equipment/instrument.

5.3 The supplier shall replace without charge to KPLC any Earth Tester which upon examination, test or use fails to meet any of the requirements in this specification.

## 6 INSTRUCTIONS AND MARKING

6.1 The following information shall be marked legibly and in a permanent manner on each Earth Tester:

- a) The manufacturer's name or trade mark;
- b) The type reference number;
- c) The applicable standards;
- d) Connection/measurement diagram

6.2 Manufacturer's instructions for the use, care and maintenance of the instrument shall be submitted during delivery (all in English language). The Instructions for use shall include the interpretation of all indications during tests.

.....THIS SPACE LEFT BLANK.....

Issued by: Head of Section, Technical Stds & Specs

Authorized by: Head of Department, R&D

Signed:

*[Signature]*

Signed:

*[Signature]*

Date:

2010-01-25

Date:

2010-01-26



The Kenya Power &  
Lighting Co. Ltd

TITLE:

**SPECIFICATION FOR TEST AND  
MEASURING EQUIPMENT – Part  
1: Earth Tester (electrode  
resistance & soil resistivity)**

Doc. No.

KPLC1/3CB/TSP/09/018-1

Issue No.

1

Revision No.

0

Date of Issue

2010-01-20

Page 7 of 7

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

Tender No. ....

Clause number	Bidder's offer (indicate full details of the offered equipment for each requirement of the specification)
1	
2	
3	
4.1	
4.2.1	
4.2.2	
4.2.3	
4.2.4	
4.2.5	
4.2.6	
4.2.7	
4.2.8	
4.2.9	
4.2.10	
4.2.11	
4.2.12	
4.2.13	
5.1	
5.2	
5.3	
6.1	
6.2	

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

Issued by: Head of Section, Technical Stds & Specs

Authorized by: Head of Department, R&D

Signed:

*[Signature]*

Signed:

*[Signature]*

Date:

2010-01-25

Date:

2010-01-26

