



Kenya Power

**SPECIFICATION FOR HAND HELD INSULATION RESISTANCE TESTER**

A Document of the Kenya Power & Lighting Co. Ltd  
November 2023



**TITLE: HAND HELD INSULATION  
RESISTANCE TESTER -  
SPECIFICATION**

**Doc. No.**

**Issue No.**

**1**

**Revision No.**

**0**

**Date of Issue**

**2023-09-22**


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**0.1 CIRCULATION LIST**

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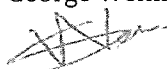
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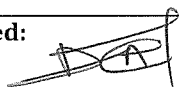
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**0.2 AMENDMENT RECORD**

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2023-10-30	New issue	DANIEL AGIENO 	George Welimo 

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**FOREWORD**

This specification has been prepared by the E/plant workshop of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Hand held insulation resistance tester.

The Hand held insulation resistance tester is intended for use by the e/plant workshop for measuring insulation resistance of transformers.

This specification was prepared to establish and promote uniform requirements for Hand held insulation resistance tester to be used at Kenya Power and Lighting Company Ltd.

There are no other specifications in this series.

This specification stipulates the minimum requirements for Hand held insulation resistance tester acceptable for use in the company and it shall be the responsibility of the suppliers and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, good workmanship and good engineering practice in the manufacture of the Hand held insulation resistance tester for KPLC.

Users of Kenya Power specifications are responsible for their correct interpretation and application.

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## 1. SCOPE

- 1.1. This specification is for Hand held insulation resistance tester for use by company's E/plant workshop.
- 1.2. The specification covers requirements, design, inspection and tests and schedule of Guaranteed Technical Particulars of Hand held insulation resistance tester.

## 2. NORMATIVE REFERENCES

The following standards contain provision which, through reference in this text, constitute provisions of this specification. For dated editions the cited edition will apply; for undated editions the latest edition of the referenced document shall apply.

- IEC 61557: Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c - Equipment for testing, measuring or monitoring of protective measures - Part 1: General requirements;
- IEC 60815: Selection and dimensioning of high voltage insulators intended for use in polluted conditions -Part 1: Definitions, information and general principles
- OIML D 11: General Requirements for Measuring Instruments - Environmental Conditions
- IEC 61000: Electromagnetic Compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test; - Part 6-2: Generic standards - Immunity for Industrial environment.
- IEC 60529: Degrees of protection provided by enclosures (IP code)
- ISO 9001: Quality Management systems - Requirements
- ISO/IEC 17025: General Requirements for the competence of testing and calibration laboratories

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### 3. DEFINITIONS AND ABBREVIATIONS

For the purpose of this specification, the definitions and abbreviations given in the reference standards shall apply together with the following abbreviations.

#### 3.1. ABBREVIATIONS

**KPLC**- Kenya Power and Lighting Company Limited

**ISO** – International Organization for Standardization.

**LED** –Light Emitting Diode

**Kg** –Kilogram

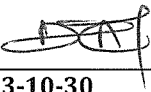

**KV** - Kilovolt

**IP** – Ingress Protection

**LV** – Low Voltage

**EMC** – Electromagnetic Compatibility

**EU** – European Union

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#### **4. REQUIREMENTS**

##### **4.1. SERVICE CONDITIONS**

4.1.1 The Hand held insulation resistance tester 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;
- b) Humidity of up to 95%;
- c) Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C
- d) Pollution: Degree 2

##### **4.2. DESIGN AND CONSTRUCTION**

4.2.1. The Hand held insulation resistance tester shall be designed, manufactured and tested according to IEC/EN 61557 Parts 1,2, 4, 10

4.2.2. The Hand held insulation resistance tester should be capable of carrying out insulation resistance of distribution transformer, motors and cables.

4.2.3. The Hand held insulation resistance tester shall be capable of calculating Polarisation Index (PI) and Dielectric Absorption Ratio (DAR)

4.2.4. Hand held insulation resistance tester shall have the following

- 4.2.4.1. generate test results automatically and display them on a built in LCD Screen
- 4.2.4.2. Built in storage and printing/downloading capabilities of the test results.
- 4.2.4.3. Built-in charging circuit with complete set of rechargeable NiMH batteries
- 4.2.4.4. Large bright LCD display and large buttons enable easy handling of the instrument (even while wearing gloves).

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4.3. It shall have the technical particulars as shown in table 1 below:

**Table 1: Technical particulars of Hand held insulation resistance tester**

Parameter	Requirement		
<b>Power Supply Adapter</b>	Battery power supply		NiMH rechargeable batteries, size AA
	Mains power supply		90-260 V <sub>AC</sub>
<b>Insulation Resistance Measurement</b>	Measurement range	Test voltage range	Insulation measurement Range
		100 V <sub>DC</sub> and 250 V <sub>DC</sub>	00-999 MΩ
		500 V <sub>DC</sub> , 1000 V <sub>DC</sub> and 2500 V <sub>DC</sub>	00-99.9 GΩ
	Resolution	Insulation resistance measurement Range	Resolution digits MΩ
		0.00 MΩ-19.99 MΩ	0.01
		20.0 MΩ -199.9 MΩ	0.1
		200 MΩ -999 MΩ	1
		1.00 GΩ- 4.99 GΩ	10
		5.00 GΩ -19.99 GΩ	10
		20.0 GΩ 99.9 GΩ	100
	Measurement Accuracy	Insulation resistance measurement Range	Accuracy
		0.00 MΩ-19.99 MΩ	±(5 % of reading + 3 digits)
		20.0 MΩ -199.9 MΩ	±5 % of reading
		200 MΩ -999 MΩ	±5 % of reading
		1.00 GΩ- 4.99 GΩ	±10 % of reading
		5.00 GΩ -19.99 GΩ	±20 % of reading
		20.0 GΩ 99.9 GΩ	±20 % of reading
			0.01-9.99

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Parameter	Requirement		
<b>Dielectric absorption ratio DAR, Polarization index PI</b>	Dielectric absorption ratio DAR,		10.0-100.0
	Polarization index PI		
	Accuracy	PI range	Accuracy percentage
		0.01- 9.99	±(5 % of reading + 2 digits)
		10.0-100.0	±5 % of reading
	PI Resolution	PI range	Resolution
		0.01-9.99	0.01
		10.0-100.0	0.1
<b>Weight</b>	Approximately less than 1 Kgs (with battery and accessories)		
<b>Built in Battery</b>	Type		NiMH
	Voltage		9V
	Replaceability		User replaceable
	Chargeability		Regarchable
<b>Accessories for each Hand held insulation resistance tester</b>	<b>Description</b>		<b>Quantity</b>
	USB cable		1
	Power supply adapter		1
	carrying bag		1
	Crocodil clips, 2 set (black, red)		2
	Test probes, 2 set (black, red)		2
	Test lead, black, Red ,green 4 m each		2 sets
	Instruction manual		2
	PC software		1
	NiMH battery 9 V		2 set

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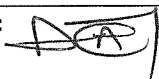
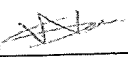
#### 4.4. DOCUMENTATION AND SUPPORT

##### 4.4.1. Warranty and training

- 4.4.1.1. The Hand held insulation resistance tester shall be backed by a minimum of 12-months factory warranty.
- 4.4.1.2. Technical support and software upgrade, where applicable shall be provided free of charge to KENYA POWER for a period of not less than 36 months.
- 4.4.1.3. The Bidder shall submit a clause by clause statement of compliance with the specifications together with copies of the manufacturer's catalogues, brochures, technical data and proven test reports clearly marked to support each clause, all in English for evaluation. The manufacturer's type reference/designation of the item offered shall be indicated

#### 5. TESTS REQUIREMENTS

- 5.1. The Hand held insulation resistance tester shall be inspected and tested in accordance with standards and this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.
- 5.2. Copies of previous Test/calibration Reports issued by own or a third party testing laboratory that is accredited to ISO/IEC 17025:2005 or 17025:2017 confirming accuracy and compliance of the Hand held insulation resistance tester offered shall be submitted with the offer for evaluation (all in English Language). A copy of the **accreditation certificate** and the **scope of accreditation** of the testing/calibrating laboratory shall also be submitted. Any translations of certificates or reports into English language shall be signed and stamped by the Testing/Calibrating Authority that carried out tests/calibration. Copies of test/calibration reports for the Hand held insulation resistance tester offered to be submitted for tender evaluation shall include the following
  - 5.2.1. Measured values of the standard equipment

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5.2.2. Indicated values of the unit under test (Hand held insulation resistance tester offered)

5.2.3. Expanded Relative uncertainty

5.2.4. Details of standard and reference equipment used in calibration tests.

## **6. MARKING AND PACKING**

### **6.1. MARKING**

The following information shall be marked legibly and in a permanent manner on the Hand held insulation resistance tester:

- a) The manufacturer's name or trade mark;
- b) The type reference number / model number;
- c) Units of the measured quantity;
- d) Ranges of measurement;
- e) Type of battery and polarity of connection in the battery compartment
- f) Standard of manufacture;
- g) The serial number;
- h) Letters "PROPERTY OF KENYA POWER"
- i) The instructions for handling and use (in the English Language).

### **6.2. PACKING**

6.2.1. The Hand held insulation resistance tester shall be packed in a carrying case so as to protect it from damage and entry of moisture during transportation, handling and storage.

6.2.2. The carrying case shall shock proof and impact resistant and shall be able to withstand a fall of one meter without damage to Hand held insulation resistance tester.

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**APPENDICIES**

**A: TESTS AND INSPECTION (Normative)**

A.1 It shall be the responsibility of the supplier to test or to have all the relevant tests performed.

A.2 Copies of previous Test/calibration Reports of Hand held insulation resistance tester issued by own or a third party testing laboratory that is accredited to ISO/IEC 17025:2005 or 17025:2017 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate for the testing laboratory shall also be submitted with the tender (all in English Language). Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Authority.

A.3 On receipt of the Hand held insulation resistance tester, Kenya Power will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, any Hand held insulation resistance tester which upon examination, test or use fail to meet any or all of the requirements in the specification.

**B: QUALITY MANAGEMENT SYSTEM (Normative)**

B.1 The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the Hand held insulation resistance tester physical properties, tests 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: 2015.

B.2 The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001:2015 certificate shall be submitted with the tender for evaluation.

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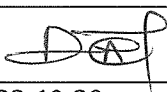

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B.3 The bidder shall indicate the delivery time of the equipment, manufacturer's monthly & annual production capacity and experience in the production of the Hand held insulation resistance tester being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the Hand held insulation resistance tester sold in the last five years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.

**C: DOCUMENTATION AND DEMONSTRATION (Normative)**

C.1 The bidder shall submit its tender complete with technical documents for tender evaluation. The technical 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) signed by the manufacturer;
- b) Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, Wiring diagram / Schematic Diagram 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 test/calibration reports of testing/calibrating laboratory accredited to ISO/IEC 17025;
- f) Copy of accreditation certificate to ISO/IEC 17025 for the testing/calibrating laboratory;
- g) Manufacturers letter of authorization, ISO 9001:2015 certificate, and other technical documents required in the tender.
- h) Manufacturer's warranty and guarantee; subject to 12 months from date of delivery to KPLC stores
- i) Operational manual.
- j) Service manual.

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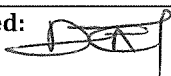
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C.2 The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of Hand held insulation resistance tester to KPLC Isiolo road stores

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**D: GUARANTEED TECHNICAL PARTICULARS (Normative)**

*To be filled and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of suppliers' capacity and experience; and copies of complete type test certificates and test reports for tender evaluation, all in English Language)*

**Tender No. ....**

**Bidder's name and Address.....**

Clause number	Requirement	Bidder's offer
	Manufacturer's Name and address	State
	Country of Manufacture	State
	Name and model Number	State
1.	Scope	State
2.	Normative References	State
3.	Definitions and Abbreviations	State
3.1.	Abbreviations	State
4.1.	SERVICE CONDITIONS	
4.1.1	The Hand held insulation resistance tester 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;	State
b)	Humidity of up to 95%;	State
c)	Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C	state

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Clause number	Requirement			Bidder's offer
d)	Pollution: Degree 2			state
4.2.	DESIGN AND CONSTRUCTION			
4.2.1.	The Hand held insulation resistance tester shall be designed, manufactured and tested according to IEC/EN 61557 Parts 1,2, 4, 10			State
4.2.2.	The Hand held insulation resistance tester should be capable of carrying out insulation resistance of distribution transformer, motors and cables.			
4.2.3.	The Hand held insulation resistance tester shall be capable of calculating Polarisation Index (PI) and Dielectric Absorption Ratio (DAR)			State
4.2.4.	Hand held insulation resistance tester shall have the following			
4.2.4.1.	generate test results automatically and display them on a built in LCD Screen			State
4.2.4.2.	Built in storage and printing/downloading capabilities of the test results.			State
4.2.4.3.	Built-in charging circuit with complete set of rechargeable NiMH batteries			
4.2.4.4.	Large bright LCD display and large buttons enable easy handling of the instrument (even while wearing gloves).			state screen size
4.3.	It shall have the technical particulars as shown in table 1 below:			
	Parameter	Requirement		
	<b>Power Supply Adapter</b>	Battery power supply	NiMH rechargeable batteries, size AA	Specify
		Mains power supply	90-260 V <sub>AC</sub>	Specify
	<b>Insulation Resistance Measurement</b>	Measurement range	Test voltage range	Insulation measurement Range
			100 V <sub>DC</sub> and 250 V <sub>DC</sub>	00-999 MΩ Specify
				00-99.9 GΩ Specify

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Clause number	Requirement				Bidder's offer
			500 V <sub>DC</sub> , 1000 V <sub>DC</sub> and 2500 V <sub>DC</sub>		
			Insulation resistance measurement Range	Resolution digits MΩ	
		Resolution	0.00 MΩ-19.99 MΩ	0.01	Specify
			20.0 MΩ -199.9 MΩ	0.1	Specify
			200 MΩ -999 MΩ	1	Specify
			1.00 GΩ- 4.99 GΩ	10	Specify
			5.00 GΩ -19.99 GΩ	10	Specify
			20.0 GΩ 99.9 GΩ	100	Specify
		Measurement Accuracy	Insulation resistance measurement Range	Accuracy	
			0.00 MΩ-19.99 MΩ	±(5 % of reading + 3 digits)	Specify
			20.0 MΩ -199.9 MΩ	±5 % of reading	Specify
			200 MΩ -999 MΩ	±5 % of reading	Specify
			1.00 GΩ- 4.99 GΩ	±10 % of reading	Specify
			5.00 GΩ -19.99 GΩ	±20 % of reading	Specify
			20.0 GΩ 99.9 GΩ	±20 % of reading	Specify
				0.01-9.99	Specify

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Clause number	Requirement				Bidder's offer
	Dielectric absorption ratio DAR, Polarization index PI	Dielectric absorption ratio DAR, Polarization index PI		10.0-100.0	Specify
			PI range	Accuracy percentage	
		Accuracy	0.01-9.99	±(5 % of reading + 2 digits)	Specify
			10.0-100.0	±5 % of reading	Specify
			PI range	Resolution	
		PI Resolution	0.01-9.99	0.01	Specify
			10.0-100.0	0.1	Specify
	Weight	Approximately less than 1 Kgs (with battery and accessories)			Specify
	Built in Battery	Type		NiMH	specify
		Voltage		9V	specify
		Replaceability		User replaceable	specify
		Chargeability		Regarchable	specify
	Accessories for each Hand held insulation resistance tester	Description		Quantity	
		USB cable		1	specify
		Power supply adapter		1	specify
		carrying bag		1	specify
		Crocodile clips, 2 set (black, red)		2	specify
		Test probes, 2 set (black, red)		2	specify
		Test lead, black, Red ,green 4 m each		2 sets	specify
		Instruction manual		2	specify
		PC software		1	specify
		NiMH battery 9 V		2 set	specify
4.4.1.	Warranty and training				

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Clause number	Requirement	Bidder's offer
4.4.1.1.	The Hand held insulation resistance tester shall be backed by a minimum of 12-months factory warranty.	submit
4.4.1.2.	Technical support and software upgrade, where applicable shall be provided free of charge to KENYA POWER for a period of not less than 36 months.	State
4.4.1.3.	The Bidder shall submit a clause by clause statement of compliance with the specifications together with copies of the manufacturer's catalogues, brochures, technical data and proven test reports clearly marked to support each clause, all in English for evaluation. The manufacturer's type reference/designation of the item offered shall be indicated	state
5	<b>TESTS REQUIREMENTS</b>	
5.1.	The Hand held insulation resistance tester shall be inspected and tested in accordance with standards and this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.	State
5.2.	Copies of previous Test/calibration Reports issued by own or a third party testing laboratory that is accredited to ISO/IEC 17025:2005 or 17025:2017 confirming accuracy and compliance of the Hand held insulation resistance tester offered shall be submitted with the offer for evaluation (all in English Language). A copy of the accreditation certificate and the scope of accreditation of the testing/calibrating laboratory shall also be submitted. Any translations of certificates or reports into English language shall be signed and stamped by the Testing/Calibrating Authority that carried out tests/calibration. Copies of test/calibration reports for the Hand held insulation resistance tester offered to be submitted for tender evaluation shall include the following	submit
5.2.1.	Measured values of the standard equipment	submit
5.2.2.	Indicated values of the unit under test (Hand held insulation resistance tester offered)	submit
5.2.3.	Expanded Relative uncertainty	submit
5.2.4.	Details of standard and reference equipment used in calibration tests.	submit

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Clause number	Requirement	Bidder's offer
6	<b>MARKING AND PACKING</b>	
6.1.	<b>MARKING</b>	
a)	The manufacturer's name or trade mark;	State
b)	The type reference number / model number;	State
c)	Units of the measured quantity;	State
d)	Ranges of measurement;	State
e)	Type of battery and polarity of connection in the battery compartment	State
f)	Standard of manufacture;	State
g)	The serial number;	State
h)	Letters "PROPERTY OF KENYA POWER"	State
i)	The instructions for handling and use (in the English Language).	State
6.2.	<b>PACKING</b>	
6.2.1.	The Hand held insulation resistance tester should be packed in a carrying case so as to protect it from damage and entry of moisture during transportation, handling and storage.	State
6.2.2.	The carrying case shall shock proof and impact resistant and shall be able to withstand a fall of one meter without damage to the Hand held insulation resistance tester .	State
	<b>APPENDICIES</b>	
A:	<b>TESTS AND INSPECTION (Normative)</b>	
A.1	It shall be the responsibility of the supplier to test or to have all the relevant tests performed.	confirm
A.2	Copies of previous Test/calibration Reports of Hand held insulation resistance tester issued by own or a third party testing laboratory that is accredited to ISO/IEC 17025:2005 or 17025:2017 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate for the testing laboratory shall also be submitted with the tender (all in English Language). Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Authority.	submit
A.3	On receipt of the Hand held insulation resistance tester, Kenya Power will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the	State

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Clause number	Requirement	Bidder's offer
	specification. The supplier shall replace without charge to Kenya Power, any Hand held insulation resistance tester which upon examination, test or use fail to meet any or all of the requirements in the specification.	
<b>B:</b>	<b>QUALITY MANAGEMENT SYSTEM (Normative)</b>	
B.1	The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the Hand held insulation resistance tester physical properties, tests 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: 2015.	submit
B.2	The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001:2015 certificate shall be submitted with the tender for evaluation.	submit
B.3	The bidder shall indicate the delivery time of the equipment, manufacturer's monthly & annual production capacity and experience in the production of the Hand held insulation resistance tester being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the Hand held insulation resistance tester sold in the last five years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.	State
<b>C:</b>	<b>DOCUMENTATION AND DEMONSTRATION (Normative)</b>	
C.1	The bidder shall submit its tender complete with technical documents for tender evaluation. The technical 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) signed by the manufacturer;	submit
b)	Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, Wiring diagram / Schematic Diagram and technical data;	submit
c)	Sales records for the last five years and at least four customer reference letters;	submit

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Clause number	Requirement	Bidder's offer
d)	Details of manufacturing capacity and the manufacturer's experience;	submit
e)	Copies of required test/calibration reports of testing/calibrating laboratory accredited to ISO/IEC 17025;	submit
f)	Copy of accreditation certificate to ISO/IEC 17025 for the testing/calibrating laboratory;	submit
g)	Manufacturers letter of authorization, ISO 9001:2015 certificate, and other technical documents required in the tender.	submit
h)	Manufacturer's warranty and guarantee; subject to 12 months from date of delivery to KPLC stores	submit
i)	Operational manual.	submit
j)	Service manual.	submit
C.2.	The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the Hand held insulation resistance tester to KPLC Isiolo road stores.	State

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

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