



TITLE:

**SPECIFICATION FOR
AUTOMATED
INSULATION
RESISTANCE TESTER**

Doc. No.	KP1/3CB/TSP/09/034
Issue No.	1
Revision No.	0
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0.1 Circulation List

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0.2 Amendment Record

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FOREWORD

This specification has been prepared by the Research and Development Department and E/Plant, Mt. Kenya office both of The Kenya Power and Lighting Company Limited (Kenya Power) and it lays down requirements for battery powered 10KV (dc) Automated Insulation Resistance Tester. The specification is intended for use by Kenya Power in purchasing the equipment.

It shall be the responsibility of the supplier to ensure adequacy of the design and good engineering practice in the manufacture of battery powered 10KV (dc) Automated Insulation Resistance Tester for Kenya Power. The supplier shall also submit information which confirms satisfactory service experience with products which fall within the scope of this specification.

1. SCOPE

- 1.1. This specification is for a high accuracy, fully automated (digital) Insulation Resistance Tester.
- 1.2. Insulation media suffers from gradual steady decline, as well as occasional sudden damage/failure. This change can be revealed by measuring the insulation resistance and Polarization Index of the Electrical plant.
- 1.3 This instrument shall be used for measuring the insulation resistance of Medium and High-Voltage Electrical plant and Equipments at power utility substations.
These are; Transformers, HT Cables, and switchgears.
- 1.4 The Tester shall also be used to perform Step Voltage and Dielectric Discharge tests. The step voltage identifies the localized weak spots in electrical plants such as HT Cables.
- 1.5 The initial Tester values shall form a reference data bank for future diagnostic and maintenance of the electrical plant.

2. REFERENCES

N/A

3. TERMS AND DEFINITIONS

N/A

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4. REQUIREMENTS

4.1 GENERAL REQUIREMENTS

4.1.1 Construction

4.1.1.1 The equipment shall be portable; rugged, compact, shock proof and impact resistant.

4.1.1.2 The carrying case shall be able to withstand a fall of one meter without damage to the Tester.

4.1.1.3 The tester shall be fully automated, intelligent and of high accuracy.

4.1.1.4 The Tester shall be self calibrating and diagnosing, and shall be equipped with most recent software for easy operation and data analysis.

4.1.2 Operation.

4.1.2.1 The tester shall be independent or if laptop controlled, the Laptop shall be supplied, complete with all necessary accessories.

4.1.2.2 Its operating system shall run on Microsoft windows 7 professional edition, capable of being integrated with other diagnostic and data management software.

4.1.2.3 The insulation resistance tester shall have in built system for automatic suppression of Electrostatic & electromagnetic interference in power substations.

4.1.2.4 The equipment shall have automatic test procedures that are easy and simple to use.

4.1.2.5 The power supply shall be from an internal 12Vdc / 4Ah rechargeable Nickel-Cadmium battery.

4.1.2.6 The supply for the inbuilt battery charging unit shall be 230Vac/50Hz.

4.1.3 Test results

4.1.3.1 The insulation resistance tester shall be able to generate test results automatically and display them on LCD Screen combining digital and analogue readings.

4.1.3.2 The tester shall have built-in storage and printing/Downloading capabilities.

4.1.3.3 The Tester shall upload and download test result to a Laptop via RS232 and USB port/ Ethernet interface.

4.2 TECHNICAL AND SPECIFIC REQUIREMENTS

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4.2.1 Specific requirements:

- 4.2.1.1 The insulation resistance tester shall be capable of automatically carrying out the following field tests on Power (Transmission and Distribution) Transformers, and Substation Equipment such as PTs, CTs and HT Cables.
- i. Insulation resistance of Medium and High Voltage Electrical plant in power Utilities.
 - ii. Automatic measurement of polization index.
 - iii. Dielectric discharge tests for multi layer insulation in power transformers and Under ground HT Cables (Optional)
- 4.2.1.2 The tester shall be self-calibrating and diagnosing before and after each test.
- 4.2.1.3 The automated insulation resistance tester shall be supplied with all the necessary accessories for carrying out the intended tests in Electrical plant and Equipment.
- 4.2.1.4 It shall have built in charging unit operated from 230 Vac/50 Hz supply.
- 4.2.1.5 The tester shall have selectable **0.5 KV, 1 KV, 2.5 KV, 5 and 10 KV dc** test voltages.
- 4.2.1.6 The Tester shall measure up to **≥50GΩ**, and display Leakage current.
- 4.2.1.7 It shall have three selectable Operation modes namely; Insulation resistance, Leakage Current and Breakdown/Burn modes.
- 4.2.1.8 The insulation Resistance tester shall have a variable test duration controlled by an integral timer, which starts automatically on commencement of a test.
- 4.2.1.9 The Integral timer shall show the test duration be used to set the test duration, and stop the test voltage automatically.

4.3 Technical Specifications.

Item No.	Technical description	Kenya Power Technical Requirements
1	Physical features	Portable, Compact and rugged
2	Measurement circuitry	Automatic and accurate with an integral test duration timer.

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3	Test Voltage Accuracy	Selectable 0.5kv, 1kv, 2.5kv, 5kv and 10kv DC. Or Variable Voltage in 25Vdc steps up to 10KV dc. ±5% for test voltage <10KVdc.
4	Power supply	12Vdc / 4Ah rechargeable Nickel-Cadmium battery.
5	Battery continuous operating time. Built in charger supply	At least 5hrs of normal operation. 220-230Vac /50 Hz.
6	Insulation resistance test Range. Accuracy	100 KΩ to 50GΩ Analogue 10KΩ to 50GΩ at 10KV Digital ±5% of reading.
7	Short circuit current	2mA Maximum
8	Leakage current measurement Range Accuracy	0.1nA to 900μA ±5% of reading
9	Capacitance measurement (Optional) Range Accuracy	0.01to 10 μF ±15% of reading
	Display	Both Analogue and Digital
11	Printer/ Laptop interface	RS-232C and USB port
12	Integral Timer	Selectable 0 to 60min. Test Voltage Switched off at the end of preset time.
13	Test result storage	Can store at least 50 transformer test results and Plans.
14	Warranty on Equipment	At least 12 months
15	Accessories	Set of :- i. 6 m Single phase Extension cable ii. 6 m Grounding Cable, iii. 3m USB cable iv. 3m RS-232C cable

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		v. Carrying case. vi. 6m of all cables needed for all tests
16	Calibration	Self calibration and diagnosing.
17	Interference suppression	Automatic suppression of Electromagnetic interference
18	Safety	Meets: L6101A1 and CAN/CSA C22.2 No.1010.1-92 Certification
19	Insulation resistance tester operation	Independent
20	International standards	Comply to: ANSI/IEEE C57.12.90, CEI/IEC 76-1:1993. ISO 9001:2000, IEC-1010-1
21	Laptop	<ul style="list-style-type: none"> ➤ Minimum processor type i3-350 ➤ Minimum RAM 2GB ➤ Minimum HDD-500 GB ➤ Memory card slots ➤ HDMI slot ➤ VGA slot ➤ Ethernet both wired and wireless including capability for gigabit Ethernet ➤ USB slots ➤ RS-323 slot ➤ Microsoft windows 7 professional edition ➤ Bluetooth capability
21	Operating temperature	-5 ⁰ C to 50 ⁰ C;
23	Humidity	0 to 90%. Non-condensing
24	Calibration certificate	Certificate of accredited international laboratory
25	Operation and maintenance manual	Three copies all in English language
26	Installation	At KENYA POWER chosen location

4.4 DOCUMENTATION AND SUPPORT

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4.4.1 Warranty and training

4.4.1.1 The Automated Insulation Resistance tester shall be backed by a minimum of 12 months factory warranty.

4.4.1.2 Technical support and software for upgrades 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 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.

4.4.1.4 In the case of tender award, technical details for the Insulation resistance tester shall be submitted to the KENYA POWER for approval before manufacture commences.

5. TESTS AND INSPECTION

5.1 Copies of previous certificates by the relevant 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).

5.2 Relevant certificates (calibration/test) shall be submitted together with the equipment during delivery.

6.0 MARKING AND INSTRUCTIONS

6.1 The following information shall be marked indelibly and legibly on the CT Analyzer:

- i) Manufacturer's Name or Trademark;
- ii) Type reference
- iii) Letters "PROPERTY OF KENYA POWER "
- iv) Operating Voltage

6.2 Operating and technical manuals shall be supplied together with the equipment during delivery (all in English language).

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ANNEX A: Guaranteed Technical Particulars (to be filled and signed by the *Manufacturer and submitted together with copies of manufacturer's catalogues, brochures, drawings, technical data, sales records and copies of certificates/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. Scope	
1.1	
1.2	
1.3	
1.4	
1.5	
4.1 General Requirements	
4.1.1 Construction	
4.1.1.1	
4.1.1.2	
4.1.1.3	
4.1.1.4	
4.1.2 Operation	
4.1.2.1	
4.1.2.2	
4.1.2.3	
4.1.2.4	
4.1.2.5	
4.1.2.6	
4.1.3 Test results	
4.1.3.1	
4.1.3.2	
4.1.3.3	
4.2.1 Specific Requirements	
4.2.1.1	
4.2.1.2	
4.2.1.3	
4.2.1.4	
4.2.1.5	
4.2.1.6	
4.2.1.7	
4.2.1.8	
4.2.1.9	

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4.3 Technical Specifications:	
Physical features	
Measurement circuitry	
Test Voltage	
Accuracy	
Power supply	
Battery continuous operating time.	
Built in charger supply	
Insulation resistance test Range.	
Accuracy	
Short circuit current	
Leakage current measurement Range	
Accuracy	
Capacitance measurement Range	
Accuracy	
Display	
Printer/ Laptop interface	
Integral Timer	
Test result storage	
Warranty on Equipment	
Accessories	
Calibration	
Interference suppression	
Safety	
Insulation resistance tester operation	
International standards	
Laptop	
Operating temperature	
Humidity	
Calibration certificate	
Operation and maintenance manual	
Installation	
4.4.1 Warranty & Training	
4.4.1.1	
4.4.1.2	
4.4.1.3	

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4.2.1.4	
5 Test and Inspection	
5.1	
5.2	

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

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