Kenya Power

SPECIFICATION FOR TRANSFORMER WINDING OHMMETER

A Document of the Kenya Power & Lighting Co. Ltd

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0.1 CIRCULATION LIST

COPY NO.	COPY HOLDER
1	E/Plant
2	

0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2026-01-19	New issue	George Welimo	

FOREWORD

This specification has been prepared by the Electrical Plant of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Transformer winding ohmmeter.

The Transformer winding ohmmeter is intended for use by the Electrical Plant for measuring winding resistance and demagnetization in transformers.

This specification was prepared to establish and promote uniform requirements for Transformer winding ohmmeter 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 Transformer winding ohmmeter 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 Transformer winding ohmmeter for KPLC.

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

1. SCOPE

1.1. This specification is for Transformer winding ohmmeter for use by company's Electrical Plant.

1.2. The specification covers requirements, design, inspection and tests and schedule of Guaranteed Technical Particulars of Transformer winding ohmmeter.

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

IEC 61010 - Safety requirements for electrical equipment for measurement, control, and laboratory use. During a test, software will perform safety checks before applying full test voltage.

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

AC-Alternating Current

DC-Direct Current

IEC-

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1 The Transformer winding ohmmeter shall be suitable for use outdoors in tropical areas and harsh climatic conditions including areas exposed to:

a) Altitudes of up to 2000m above sea level;

b) Humidity of up to 95%;

c) Average ambient temperature of +30ºC 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 Transformer winding ohmmeter shall be able to perform winding resistance measurement of single and three phase transformers

4.2.2. The Transformer winding ohmmeter shall be able to perform demagnetization of single and three phase transformers after each winding resistance test.

4.2.3. The Transformer winding ohmmeter shall perform automatic measurement of all windings

4.2.4. The Transformer winding ohmmeter shall have the capability for automatic discharge after finished measurement.

4.2.5. The Transformer winding ohmmeter shall have the capability to perform winding resistance tests across multiple OLTC taps to verify continuity of the tap changer connections.

4.2.6. Transformer winding ohmmeter shall have the following

4.2.6.1. User interface of a built in LCD touch Screen with color

4.2.6.2. Built in storage and printing/downloading capabilities of the test results to a USB memory device.

4.2.6.3. Can be operated from Personal Computer.

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

Table 1: Technical particulars of Transformer winding ohmmeter

Parameter	Requirement	
Input Power	Mains power supply	90-260 V_{AC} 47-60Hz
Output Power	Voltage	3 phase, 30VDC and above
	current	10mA – 20 A
Transformer testing standards	IEEE C57.152-2013 IEC 60076-1:2011 AS/NZS 6076 1:2014 CIGRE 445 2 011	
DC Measurement voltage	30V and above	
Current and resistance ranges	**Current** 20A 15A 10 A 5 A 1 A 100mA 10 mA	**Min Ω Max Ω** 1.0μΩ 1.999Ω 1.0μΩ 3.999Ω 10μΩ 4.999Ω 100μΩ 9.999Ω 100μΩ 24.999Ω 10mΩ 249.9 Ω 10mΩ 9.99mΩ
Accessories for Transformer winding ohmmeter	**Description**	**Quantity**
	AC power cord	1
	USB 2.0 Cable	1
	OLTC Tap Changer control cable - 9m (30ft) and above	2
	OLTC Tap Changer cable adapters	2
	Cable bag - backpack	To accommodate all cables supplied
	Ground Cable - 4m (16ft) and above	1
	15 Meters and above H-side test cables	2 sets
	15 Meters and above X-side test cables	2 Sets

Parameter	Requirement	
	Large Kelvin test clip with jaw opening 65mm and above	8 Pieces
	Transportation reel for cables	2 Sets
	PC software	On USB

4.4. DOCUMENTATION AND SUPPORT

4.4.1. Warranty and training

4.4.1.1. The Transformer winding ohmmeter 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 Transformer winding ohmmeter 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 Transformer winding ohmmeter 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 Transformer winding ohmmeter offered to be submitted for tender evaluation shall include the following

5.2.1. Measured values of the standard equipment

5.2.2. Indicated values of the unit under test (Transformer winding ohmmeter 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 Transformer winding ohmmeter:

a) The manufacturer's name or trade mark;

b) The type reference number / model number;

c) The serial number;

d) Letters "PROPERTY OF KENYA POWER"

e) The instructions for handling and use (in the English Language).

6.2. PACKING

6.2.1. The Transformer winding ohmmeter 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 Transformer winding ohmmeter.

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 Transformer winding ohmmeter 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 Transformer winding ohmmeter, 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 Transformer winding ohmmeter 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 Transformer winding ohmmeter 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.

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 Transformer winding ohmmeter being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the Transformer winding ohmmeter 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.

C.2 The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of Transformer winding ohmmeter to KPLC stores

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 Transformer winding ohmmeter shall be suitable for use outdoors in tropical areas and harsh climatic conditions including areas exposed to:	
a)	Altitudes above sea level;	State
b)	Humidity ;	State
c)	Average ambient temperature	state
d)	Pollution:	state

Clause number	Requirement	Bidder's offer
4.2.	DESIGN AND CONSTRUCTION	
4.2.1.	Perform winding resistance measurement of single and three phase transformers	State
4.2.2.	Perform demagnetization of single and three phase transformers after each winding resistance test	State
4.2.3.	Perform automatic measurement of all windings	State
4.2.4.	The capability for automatic discharge after finished measurement	State
4.2.5.	capability to perform winding resistance tests across multiple OLTC taps to verify continuity of the tap changer connections.	State
4.2.6.	Transformer winding ohmmeter shall have the following	State
4.2.6.1.	User interface of a built in LCD touch Screen with color	State
4.2.6.2.	Built in storage and printing/downloading capabilities of the test results to a USB memory device.	State
4.2.6.3.	Can be operated from Personal Computer.	State
4.3.	It shall have the technical particulars as shown in table 1 below:	

Parameter	Requirement		
Input Power	Mains power supply Voltage		Specify
Output Power	Voltage		Specify
	current		Specify
DC Measurement voltage			State
Current and resistance ranges			State
Accessories for Transformer winding ohmmeter	**Description**	**Quantity**	
	AC power cord	1	Specify
	USB 2.0 Cable	1	Specify
	OLTC Tap Changer cable - 9m and above(30ft)	2	Specify
	OLTC Tap Changer cable adapters	2	Specify
	Cable bag - backpack	To accommodate all	Specify

Clause number	Requirement			Bidder's offer
			cables supplied	
		Ground Cable - 4m and above (16ft)	1	Specify
		15 Meters and above H-side test cables	2 sets	Specify
		15 Meters and above X-side test cables	2 Sets	Specify
		Large Kelvin test clip with jaw opening 65mm and above	8 Pieces	Specify
		Transportation reel for cables	2 sets	Specify
		PC software	On USB	Specify
4.4.1.	**Warranty and training**			
4.4.1.1.	The Transformer winding ohmmeter 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	**TESTS REQUIREMENTS**			
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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 Transformer winding ohmmeter 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			submit

Clause number	Requirement	Bidder's offer
	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 Transformer winding ohmmeter offered to be submitted for tender evaluation shall include the following	
5.2.1.	Measured values of the standard equipment	submit
5.2.2.	Indicated values of the unit under test (Transformer winding ohmmeter offered)	submit
5.2.3.	Expanded Relative uncertainty	submit
5.2.4.	Details of standard and reference equipment used in calibration tests.	submit
6	**MARKING AND PACKING**	
6.1.	**MARKING**	
a)	The manufacturer's name or trade mark;	State
b)	The type reference number / model number;	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.	**PACKING**	
6.2.1.	The Transformer winding ohmmeter should be packed in a carrying case so as to protect it from damage and entry of moisture during transportation, handling and storage.	State
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	APPENDICIES	
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Clause number	Requirement	Bidder's offer
	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 Transformer winding ohmmeter, 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 Transformer winding ohmmeter which upon examination, test or use fail to meet any or all of the requirements in the specification.	State
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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 Transformer winding ohmmeter being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the Transformer winding ohmmeter 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
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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:	
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Clause number	Requirement	Bidder's offer
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
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 Transformer winding ohmmeter to KPLC stores.	State

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Manufacturer's Name, Signature, Stamp and Date