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Kenya Power

THREE PHASE METER TESTING BENCH - SPECIFICATION

A Document of the Kenya Power & Lighting Co. Plc

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Table of Contents

FOREWORD 5

1. SCOPE 6
2. NORMATIVE REFERENCES 6
3. DEFINITIONS AND ABBREVIATIONS 6
4. REQUIREMENTS 7
   - 4.1. SERVICE CONDITIONS 7
   - 4.2. DESIGN FEATURES 7
   - 4.3. Testing 14
   - 4.4. FUNCTIONALITY 14
   - 4.5. COMPUTER AND SOFTWARE REQUIREMENTS 15
   - 4.6. SUPPLY VOLTAGE 17
   - 4.7. ACCESSORIES 18
5. TESTS REQUIREMENTS 18
6. MARKING, LABELLING AND PACKING 18
7. INFORMATION AND WARRANTY 18

A. TESTS AND INSPECTION (Normative) 19

B. QUALITY MANAGEMENT SYSTEM (Normative) 20

C. DOCUMENTATION AND DEMONSTRATION (Normative) 20

D. GUARANTEED TECHNICAL PARTICULARS (Normative) 22

0.1 CIRCULATION LIST

COPY NO.	COPY HOLDER
1	Manager, Standards
2	Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?fFolderId=23)

REVISION OF KPLC STANDARDS

In order to keep abreast of progress in the industry, KPLC standards shall be regularly reviewed. Suggestions for improvements to approved standards, addressed to the Manager, Standards department, are welcome.

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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)
Rev 0	2021/08/13	New issue	S. Nguli	Dr. Eng. P. Kimemia

FOREWORD

This Specification has been prepared by the Standards Department in collaboration with Meter Central laboratory, both of The Kenya Power and Lighting Company Plc (KPLC) and it lays down requirements for the Three Phase Meter Testing Bench (referred to as "test bench"), for use in testing of three phase and single phase meters in the Meter Central Laboratory. It is intended for use by KPLC in purchasing these item.

The other specifications in this series are:

KP1/6C/4/1/TSP/14/015: Specification for portable class 0.2 three phase working standard for testing electrical meters

KP1/6C/4/1/TSP/14/058: Specification Miniature Circuit Breaker Testing Bench

This specification stipulates the minimum requirements for the test bench acceptable for use in the company and it shall be the responsibility of the supplier 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 test bench for KPLC.

The following are members of the team that developed this specification:

Name	Division
Patricia Ngaanga	IES&R
John Kenyanya	IES&R
Stephen K. Nguli	IES&R

1. SCOPE

1.1. This specification is for a stationary three phase meter test bench.

1.2. The specification stipulates the minimum requirements of the testing bench as well as schedule of Guaranteed Technical Particulars.

2. NORMATIVE REFERENCES

The following standards contain provisions through reference in this text constitute provisions of this specification. For undated editions, the latest edition shall apply.

IEC 60736 :1	Testing equipment for electrical energy meters
IEC 62057-1:2020	Test equipment, techniques and procedures for electrical energy meters, Part 1: Stationary Meter Test Units (MTU)
IEC62058-31	Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)
IEC 62053-21	Electricity metering equipment – Particular requirements – Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)
IEC 62053-22	Electricity metering equipment (a.c.) – Particular requirements – Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)

3. DEFINITIONS AND ABBREVIATIONS

For the purpose of this specification the definitions given in the reference standards shall apply and the following abbreviations:

IEC:	International Electro-Technical Commission
ISO:	International Organization for Standardization
LCD:	Liquid Crystal Display
KPLC:	Kenya Power and Lighting Co. Plc
LED	Light Emitting Diode

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

The three phase meter test bench shall be suitable for use indoors in tropical areas and harsh climatic conditions including areas exposed to:

Altitude: From sea level up to 2200m above mean sea level.

Humidity: High at the Coast, up to 90% and lower inland, up to 50%.

Temperatures: Average ambient temperature of +35°C with a minimum of -1°C and a maximum of +40°C.

Pollution: Heavy saline with severe corrosive effects in coastal lands and generally clean air inland.

4.2. DESIGN FEATURES

4.2.1. The test bench shall be designed for twenty (20) positions,

4.2.2. Each position shall be independently controlled by a computer.

4.2.3. The test bench shall have the rack and power source (current and voltage) parts separate. It's only the electrical connections that will be with the rack.

4.2.4. The test bench shall have double side rack with two rows to suspend the meters

4.2.5. The rack shall have dimensions not more than (WxLxH) 230cmX 80cm X 40cm

4.2.6. The test bench rack material shall be of aluminum alloy material, light, strong and corrosion resistant

4.2.7. The test bench shall have wheels for movement and shall be able to be fixed at a stationary position (caster and brake).

4.2.8. The test bench rack shall be fitted with working tables on both sides 80cm from ground of the bench with width of W=40cm

4.2.9. The height of lower test terminals (meter suspension) from ground shall not be less than 90 cm

4.2.10. The test bench shall have adjustable testing positions for testing of the various sizes of meters during testing.

4.2.11. The adjustment of the testing position shall be by Allan keys not screws.

4.2.12. The test bench shall have two (2) mains sockets and two (2) emergency stop buttons to end the test in the event of a fault.

4.2.13. The test system shall be directly connected to the mains power supply of three phase

420 V ± 6 % and frequency of 50 Hz ± 2%

4.2.14. The test bench shall be equipped at the top of the rack with status lamps as follows;

Red: On (bench during testing mode)

Yellow: Alarm

Green: Off (bench on standby mode)

4.2.15. The test bench rack shall have error display for each measurement position with its own error calculator.

4.2.16. The error calculator shall have switchable input for RS232 / RS485

4.2.17. Each measurement position shall have LED display of the meter error 6-digit with floating decimal point.

4.2.18. Each measurement position shall be equipped with a three phase Isolated Current Transformer (ICT) for testing of closed link meters whose specifications are as shown in table 1 on summary of specifications parameters.

4.2.19. The test bench shall have scanning head on each measurement position mounted on a fixing device for easy positioning in all 3 axes. All scanning heads shall be mounted on a common rail and have facility to lift away from the meter in case of meter change.

4.2.20. The scanning heads shall be able to scan rotor marks and LED's of electronic meters as well Infrared diodes whose specifications are as shown in Table 1 on summary of specifications parameters.

4.2.21. The power source shall consist of current- and voltage amplifiers, waveform controller, reference standard and server for communication.

4.2.22. The specifications of the controller, current and voltage amplifiers, reference standard and server is as shown in table 1 on summary of specification parameters.

4.2.23. The reference standard shall be connected direct to the primary test circuit to assure that the system accuracy is related to the reference standard accuracy It shall support the following measurement modes.

a) Three-phase four-wire system, active/ reactive true/apparent

b) Three-phase three-wire system, active/ reactive true/ apparent

c) Single-phase system, active/ reactive true/ apparent

d) Three elements cross connected 90° (Q390)

e) Two elements cross connected 90° (Q290)

f) Two elements cross connected 60° (Q260)

4.2.24. The reference standard shall be of accuracy class 0.02 and shall have with screen display of the values.

4.2.25. The source shall be protected against over & under voltage, surge, thermal and earth leakage.

4.2.26. The source shall have provision of communication with a computer through both USB/Ethernet port and blue tooth.

4.2.27. The source shall be controlled by the computer through both USB interface and a PAD via blue tooth communication.

Table 1: Summary of Specifications

Table 1(a): Isolating Current Transformer(ICT) Specifications

Item	Value
Nominal Current	100 A, max. load 120 %
Ratio	1 : 1
Ratio error	±0.01 % (0.2 A … 120 A) ±0.03 % (0.05 A < 0.2 A) ±0.05 % (0.01 A < 0.05 A)
Phase displacement	±0.3' (0.2 A … 120 A) ± 3' (0.05 A < 0.2 A) ± 8' (0.01 A < 0.05 A)
Max. rated secondary voltage	0.7 V
Max. rated burden for 10 mA ≤ I < 2 A	200 mΩ
Max. rated burden for I ≥ 2 A … 100 A	0.7 V/I
Frequency range	45 Hz…65 Hz

Table 1(b): Controller Specifications

Item	Values
Frequency for test circuit	45…65 Hz
Adjustable in steps of	0.001 Hz
Test voltage settings, ph-N	30 V…380 V
Test current settings	1 mA…120 A
Phase adjustment	Any power factor in all 4 quadrants, 0…360°
Adjustment in steps of	0.01°
Harmonics in voltage	2nd … 21st max. magnitude 40 % of the V_n
Harmonics in current	2nd … 21st max. magnitude 40 % of the I_n

Table 1(c): Voltage amplifier Specifications

Item	Values
Test voltage	30 V ... 380 V
Voltage ranges	57.7 V, 100 V, 220 V, 380 V
Adjustment	0 % ... 120 % of range, min. voltage 30 V
Accuracy of the test amplitude	< 0.05 %
Accuracy of the test phase adjustment	< ±0.01°
Efficiency	> 85 %
Stability of the output settings	< 100 ppm, T_i = 100 s
Distortion	< 0.5 %
Superposition of harmonics	2nd ... 21st, max 40 % of the fundamental amplitude
Harmonics phase shift	0°... 359.99°
Output power	900 VA
Frequency	45 ... 65 Hz

Table 1(d): Current Amplifier Specifications

Item	Values
Test current	1 mA ... 120 A
Current ranges	10 mA, 25 mA, 50 mA, 100 mA, 0.25 A, 0.5 A, 1 A, 2.5 A, 5 A, 10 A, 25 A, 50 A, 100 A
Adjustment	0 % ... 120 % of range
Accuracy of the test amplitude	0.05 %
Accuracy of the test phase adjustment	0.01°
Efficiency	> 85 %
Stability of the output settings	< 100 ppm, T_i = 100 s
Distortion	< 0.5 %
Superposition of harmonics	2nd... 21st, max 40 % of fundamental
Harmonics phase shift	0°... 359.99°

Item	Values
Output power	2,500 VA
Frequency	45 … 65 Hz

Table 1(e): Reference Standard class 0.02 Specifications: Mains connection

Item	Values
Voltage	85 V … 265 V AC
Frequency	45 Hz … 65 Hz
Power consumption	< 30 VA
Operating temperature	5 °C … 45 °C
Max. relative humidity	≤ 90 %, not condensing
Surge voltage protection	class C
Installation category	III
Pollution degree	IV

Table 1(f): Measurement values

Item	Values
Test voltage, phase-neutral	30 V … 576 V
Voltage ranges	60 V, 120 V, 240 V, 480 V, auto range
Test current	1 mA … 120 A
Current ranges	10 mA, 20 mA, 50 mA, 0.1 A, 0.2 A, 0.5 A, 1 A, 2 A, 5 A, 10 A, 20 A, 50 A, 100 A, auto range
Frequency range, fundamental wave	40 Hz … 70 Hz
Bandwidth	3,200 Hz
Voltage measurement accuracy	< 0.01 %
Voltage measurement drift	< 35 ppm / year
Current measurement accuracy < 25 mA	< 0.02 %

Item	Values
Current measurement accuracy ≥ 25 mA	< 0.01 %
Current measurement drift	< 65 ppm / year
Power measurement accuracy P, Q, S	< 0.02 % (current ≥ 25 mA and λ = 1)
Power measurement drift	< 100 ppm / year
Phase angle	< 0.01° (current ≥ 25 mA and voltage > 30 V)
Frequency	0.005 Hz
Voltage temperature drift	< 2,5 ppm / K
Current temperature drift	< 5 ppm / K
Power temperature drift	< 7.5 ppm / K

Table 1(g): Scanning Heads Specifications

Item	Value
Wavelength	450 nm …1050 nm
Max. frequency, unmodulated	2 kHz
Dark to light change	max. 20 µs
Light to dark change	max. 20 µs
Pulse width	min. 0.2 ms
Operating voltage	6 V … 25 V DC
Operating current	≤ 70 mA (DC 24 V)
Power	0.5 W (no load)
Scanning distance	10 mm …40 mm
Output signal, high	≥ 4.5 V
Output signal, low	≤ 0.2 V
Output current	3.5 mA … 4 mA
Anti-interference distance	≤ 3.0 mm
Sensitivity, artificial light	≤ 1000 lx
Sensitivity, outdoor	≤ 1500 lx

4.3. Testing

4.3.1. The test system shall perform meter testing to all relevant standards, as outlined below:

a) automatic acceptance inspection for meters' accuracy to IEC62058-31 or EN50470-2 (MID), class A, B and C
b) test of no-load condition, IEC62058-31, item 5.4
c) starting test, IEC62058-31, item 5.5
d) accuracy tests, IEC62058-31, item 5.6
e) verification of meter constant, IEC62058-31, item 5.7
f) calibration for meters accuracy to IEC 62053-11
Electromechanical meters for active energy (classes 0,5, 1 and 2)
g) calibration for meters accuracy to IEC 62053-21
Static meters for active energy (classes 1 and 2)
h) calibration for meters acc. to IEC 62053-22
Static meters for active energy (classes 0,2 S and 0,5 S)
i) calibration for meters acc. to IEC 62053-23
Static meters for reactive energy (classes 2 and 3)

4.4. FUNCTIONALITY

4.4.1. The test bench shall have the following testing capabilities;

a) Manual mode and automatic mode
b) Pre-warming
c) Accuracy testing of energy meters
d) No load test
e) Starting current test
f) Dial test / register test

g) Influence of self-heating

h) Harmonics tests

i) Absolute measurement or testing of reference meters with accuracy ≥ cl.0.05

j) Influence of magnetic field

4.5. COMPUTER AND SOFTWARE REQUIREMENTS

4.5.1. The test bench shall be supplied with one desktop computer, loaded with operating software in English language as detailed in table 2.

Table 2: Summary of Specifications for Computer and Software.

Minimum requirements for computer and software installation	
Item	**Value**
Processor (CPU)	Intel Core i7-6xxx or equivalent
Operating System	Microsoft Windows 8
Memory	8 GB RAM
Storage	512 GB internal HDD
Monitor/Display	24" LCD monitor
Interfaces	USB port with RS485 adapter and Bluetooth
Software	Microsoft Internet Explorer > version 8, PDF reader software (e.g. Acrobat Reader)

4.5.2. The computer shall be supplied with additional (24" LCD monitor) screen for continuous monitoring of actual testing values.

4.5.3. The minimum Microsoft operation system requirements for software shall be OS Windows 8 or higher.

4.5.4. The Microsoft operation system and software shall NOT require additional licenses.

4.5.5. The software shall be used for controlling the meter test equipment and related devices in accordance with IEC 62057-1:2020.

4.5.6. The software shall display the progress of the test being carried.

4.5.7. The software shall display the actual testing values.

4.5.8. The software shall display error / results for each position.

4.5.9. The software shall be able to determine and display the highest and lowest errors per test.

4.5.10. The software application shall be capable of running in multiple screen mode. For example, screen one to show the test results and ongoing testing process while screen two provide all information regarding the settings (actual values, phasor diagram, harmonics analysis.

4.5.11. The software shall test all types of electronic and electromechanical energy meters.

4.5.12. The software shall allow generation of Test plans for individual meters. The number of tests per test plan shall be unlimited.

4.5.13. The software shall do the following tests complete automatically;

(i) Pre-warming
(ii) No-load test
(iii) Starting test (active, reactive)
(iv) All kind of accuracy tests related to variation of current
(v) Register tests for all quadrants
(vi) Voltage variation tests
(vii) Frequency variation tests
(viii) Reverse current tests
(ix) Reverse phase sequence tests
(x) Voltage unbalanced tests
(xi) Accuracy tests in the presence of harmonics
(xii) Influence of self-heating
(xiii) Thermal Stability verification
(xiv) Variation Tests with missing neutral line (N must be disconnected manually)

4.5.14. Access to meter test system information shall only be through user-level password(s).

4.5.15. The software shall support 3 access levels:

a) Low level security - The level of security would allow users with the appropriate password to read specified data fields in the test bench.

b) Low level security - The level of security would allow users with the appropriate password to perform specified tests.

c) High level security - The level of security would allow users with the appropriate password to reconfigure the test bench with a new program or test plans.

4.5.16. The software shall be capable of tracking user access to the test bench.

4.5.17. The software shall identify a fault in the system by indicating where the fault is i.e. troubleshooting capability.

4.5.18. The software shall save test results automatically in a format that cannot be edited.

4.5.19. The software shall store test results in files with individual meter search/query facility.

4.5.20. The stored results shall be available for online review in HTML format and printable in PDF.

4.5.21. The software shall allow customization of the test reports (e.g. utility log, name, date, digital signature.) and to exporting of the test results for analysis in excel and other formats.

4.5.22. The software shall allow for retrieval and printing of the results.

4.5.23. The software shall be able to indicate traceability i.e. reference serial no, calibration certificate and date of calibration

4.6. SUPPLY VOLTAGE

The test bench shall be operated from a three mains power supply according to EN 50160 420 V, 50 Hz.

4.7. ACCESSORIES

The test bench shall be supplied complete with all the necessary cable accessories and consumable parts

5. TESTS REQUIREMENTS

The test bench shall be inspected and tested in accordance with the requirements of IEC 60898-1 and other relevant standards and provisions of this specification.

6. MARKING, LABELLING AND PACKING

6.1. The test bench shall be marked legibly and indelibly in English with the following information:

a) Name or trade mark of the manufacturer;

b) Country of origin;

c) Type/model;

d) Serial no;

e) The inscription "Property of K.P. &. L. Co Plc."

f) Date, Month and Year of manufacture.

6.2. The test bench shall be packaged in such a manner as to minimize damage and entry of moisture during transportation and handling.

6.3. The packaging shall include the test bench calibration certificate/s of all various parts. Each test data shall include the corresponding Uncertainty budget values.

7. INFORMATION AND WARRANTY

7.1.1. The test system shall be guaranteed by warranty against any defects, which may develop due to faulty material, calibration, transportation or workmanship for a period of at least sixty (60) months from the date of delivery and commissioning. All defects shall be repaired or parts replaced at the supplier's cost.

7.1.2. All software supplied shall be updated by the supplier at no extra cost during the warranty period and beyond.

7.1.3. The successful bidder and /or manufacturer shall commission, carry out training on the operation, maintenance and calibration of the test bench after delivery to at least ten (15) KPLC staff and confirm their competency on use of the test system.

APPENDICES

A. TESTS AND INSPECTION (Normative)

A.1 It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified on the test bench in accordance with IEC 60898-1. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.

A.2 Copies of Type Test Certificates and Type Test Reports issued by a third-party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate to ISO/IEC 17025 for the testing laboratory shall also be submitted. Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Laboratory that carried out the tests.

A.3 The test bench shall be subject to acceptance tests at the manufacturer's premises before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by KPLC.

A.4 **Testing Facility**

A.4.1 The bidder shall provide current e-mail address, fax and telephone numbers and contact person at the Testing Laboratory where Type Tests and Special Tests were carried out.

A.4.2 All test and measuring equipment to be used during acceptance testing shall have been calibrated and copies of valid calibration certificates shall be provided to KPLC Engineers. A detailed list of workshop tools, test/measuring equipment and list of tests that can be carried out by the manufacturer shall be submitted with the tender for evaluation.

A.5 Routine and Type Test reports for the test bench shall be submitted to The Kenya Power and Lighting Company for approval before shipment.

A.6 During delivery of the test bench, KPLC 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/rectify without charge to KPLC, failure of the bench to meet any or all of the requirements in the specification.

B. QUALITY MANAGEMENT SYSTEM (Normative)

B.1 The bidder shall submit a quality assurance plan (QAP) that will be used to ensure that the test bench design, material, workmanship, tests, service capability, maintenance and documentation, will fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2015.

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

B.3 The bidder shall indicate the delivery time of the test bench. A detailed list and contact addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for exact or similar test bench sold in the last five years 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 required by Appendix D (Guaranteed Technical Particulars) for tender evaluation. The 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, test bench drawings and wiring diagrams and technical data showing description leaflet, programming details and manuals,

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 type test certificates and type test reports by a third-party testing laboratory accredited to ISO/IEC 17025,

f) Copy of accreditation certificate to ISO/IEC 17025 for the third-party testing laboratory,

g) Manufacturer's warranty and guarantee; subject to 60 months from date of commissioning at KPLC laboratory.

h) Manufacturer's letter of authorization, copy of the manufacturer's ISO 9001:2015 certificate or ISO 17025:2017 certificate.

C.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture;

i. Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacturer,

ii. Design drawings and wiring diagrams of the test bench,

iii. Original software, software manuals and operation manuals shall be submitted,

iv. Quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, maintenance 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 9001:2008 or later,

v. Detailed test program to be used during factory testing,

vi. Marking details and method to be used in marking the test bench,

vii. Manufacturer's undertaking to ensure adequacy of the design, good engineering practice, adherence to the specification and applicable standards and regulations as well as ensuring good workmanship in the manufacture of the test bench for The Kenya Power & Lighting Company,

viii. Packaging details (including packaging materials).

C.3 The successful bidder and manufacturer shall demonstrate at their cost to at least two KPLC staff at the manufacturer's factory.

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	KPLC requirement	Bidder's offer
Manufacturer's Name and address		
Country of Manufacture		
Bidder's Name and address		
4.1	**SERVICE CONDITIONS**	
	i. Altitudes ii. Humidity iii. Average ambient temperature iv. Pollution level	specify
4.2	**DESIGN FEATURES**	
4.2.1.	No of test positions	State
4.2.2.	Independent computer control of each position	specify
4.2.3.	Separate current and voltage source	specify
4.2.4.	Meter suspension	specify

Clause	KPLC requirement	Bidder's offer
4.2.5.	Dimensions of the rack	state
4.2.6.	Material of the bench mark and corrosion treatment	specify
4.2.7.	Ability of the test bench to be moved freely. Provision of Caster and brake	specify
4.2.8.	Working tables and dimensions	specify
4.2.9.	Height of test terminals from ground	State
4.2.10	Provision of adjustable testing positions	specify
4.2.11	Adjustment of testing position	Specify
4.2.12	No of sockets and emergency stop buttons	specify
4.2.13	Mains supply voltage and frequency	Specify
4.2.14	Provision of status lamps	list
4.2.15	Provision of error display for each measurement	Specify
4.2.16	error calculator with switchable input for RS232 / RS485	Specify
4.2.17	Provision of LED display of the meter error 6-digit with floating decimal point.	Specify
4.2.18	Provision of Isolated Current Transformer	Specify
4.2.19	Provision of scanning head on each measurement position	State
4.2.20	Scanning heads shall be able to scan rotor marks and LED's of electronic meters as well Infrared diodes	Specify

Clause	KPLC requirement	Bidder's offer
4.2.21	Provision of power source current and voltage amplifiers	Specify
4.2.22	Reference standards for controller, current and voltage amplifiers	State
	Catalogues and brochures to be submitted to support the offer of all items list in (a) to (g)	
4.2.23	Measurement modes supported	List
4.2.24	Accuracy of the reference standard	State
4.2.25	Protection of sources against voltage fluctuations, thermal and leakages	Specify for each parameter
4.2.26	Modes of Source communications with a computer	State
4.2.27	Source control by both USB interface and a PAD via blue tooth communications	State
4.3	Testing	
4.3.1	The tests to be performed by the tests systems	List
4.4	**Functionality**	
4.4.1	Test Functionalities	List
4.4.2	Current range for magnetic tests	state
4.5	**Computer and Software Requirements**	
4.5.1	Supply of desktop loaded with the operating software	Specify
4.5.2	Size of additional LCD monitor	State
4.5.3	Microsoft operation system	State

Clause	KPLC requirement	Bidder's offer
4.5.4	Licensing of the software	state
4.5.5	Standards for controlling the meter test equipment	State
4.5.6	The Software to display progress of tests	State
4.5.7	The Software to display actual tests values	State
4.5.8	The Software to display error / results for each position	State
4.5.9	The software to determine and display the highest and lowest errors per test	State
4.5.10	The software to run multiple screen mode	State
4.5.11	The software shall test all types of electronic and electromechanical energy meters.	State
4.5.12	The software to generate test plans for individual meters. The number of tests per test plan shall be unlimited.	State
4.5.13	Test to be performance by the software automatically	List
4.5.14 - 4.5.15	Access to system through passwords	Specify the levels
4.5.16	Software to tack system access	specify
4.5.17	Fault identification and indication	specify
4.5.18	Software to save test results automatically in a format that cannot be edited	specify
4.5.19	Software to store test results in files with individual meter search/query facility	specify

Clause	KPLC requirement	Bidder's offer
4.5.20	stored results shall be available for online review in HTML format and printable in PDF	Specify
4.5.21	customization and exportation of the test reports	Specify
4.5.22	Retrieval and printing of the results	Specify
4.5.23	Indication of traceability i.e. reference serial no, calibration certificate and date of calibration	Specify
4.6	Supply voltage and frequency	State
4.7	Accessories to be supplied	List
5.0	Test standard(s)	List
6.0	**Marking, Labelling and Packaging**	
6.1	Method and mode of marking, parameters to be marked	Specify/List
6.2	Mode of packaging	State
6.3	Documentation to be delivered together with the test bench	List
7.0	**Information And Warranty**	
7.1.1	(i) Warranty and guarantee	State
	(ii) Repair and replacement of parts at no extra costs to KPLC during warranty period	State
7.1.2	Upgrade of software at no extra cost during warranty period	State
7.1.3	Carrying out training to KPLC staff and certification of the competency	State

Clause	KPLC requirement	Bidder's offer
TESTS AND INSPECTION		
A.1	Test standard and responsibility perform or to have performing all the tests specified. Any limitations shall be clearly specified	state
A.2	Copies of Type Test Certificates and Type Test Reports issued by a third-party testing laboratory that is accredited to ISO/IEC 17025	Attach copy
A.3	Acceptance tests shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Limited (KPLC)	List
A.4	**TESTING FACILITY**	
A.4.1	Current e-mail address, fax and telephone numbers and contact person at the Testing Laboratory where Type Tests and Special Tests were carried out	List
A.4.2	All test and measuring equipment to be used during acceptance testing shall have been calibrated and copies of valid calibration certificates shall be provided to KPLC Engineers. A detailed list of workshop tools, test/measuring equipment and list of tests that can be carried out by the manufacturer shall be submitted with the tender for evaluation	Attach Valid calibration Certificates of the main Testing equipment
A.5	Test reports for the test bench shall be submitted to The Kenya Power and Lighting Company for approval before shipment	State compliance

Clause	KPLC requirement	Bidder's offer
A.6	During delivery of the test bench, KPLC 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/rectify without charge to KPLC, failure of the bench to meet any or all of the requirements in the specification	State compliance
B	**QUALITY MANAGEMENT SYSTEM**	
B.1	The bidder shall submit a quality assurance plan (QAP) that will be used to ensure that the test bench design, material, workmanship, tests, service capability, maintenance and documentation, will fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2015 or later	Attach
B.2	The Manufacturer's Declaration of Conformity to applicable standards, this specification and copies of quality management certifications including copy of valid and relevant ISO 9001 certificate shall be submitted with the tender for evaluation	Attach
B.3	The bidder shall indicate the delivery time of the test bench. A detailed list and contact addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for exact or similar test bench sold in the last five years	Attach

Clause	KPLC requirement	Bidder's offer
	shall be submitted with the tender for evaluation	
C	**DOCUMENTATION AND DEMONSTRATION**	
C.1	The bidder shall submit its tender complete with technical documents required by Appendix C	List
C.2	The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture	List
Any other document	Statement of Deviation	State

***NOTE*:**

** Words like 'agreed', 'confirmed', 'As per KPLC specifications', Yes, etc. shall not be accepted and shall be considered non-responsive.*

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Manufacturer's Name, Signature, Stamp and Date