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Kenya Power

SINGLE PHASE METER TEST BENCH -SPECIFICATION

APPROVAL RECORD

Description	NAME	DESIGNATION	SIGNATURE	DATE
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Contents

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Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)		Approved by (Name & Signature)
Issue	**2017-02-09**	**New Issue**	**S. Nguli M. Kanini**		**Dr. Eng. Peter Kimemia**

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.

FOREWORD

This specification has been prepared by the Standards Department of the Kenya Power and Lighting Company Limited (Kenya Power) in collaboration with Customer services department. It lays down

requirements for single phase meter test bench. It is intended for use by Kenya Power in purchasing the equipment.

This specification lays out the guidelines for the design, supply, supervised installation, factory testing of major components, certified training, and commissioning of single phase meter test bench in Kenya Power Laboratories

Bidders shall be required to submit evidence with relevant references of design, supply, installation, testing, training, and commissioning of similar single phase meter test bench, with an experience span of not less than FIVE years

This specification was prepared to establish and promote uniform requirements for single-phase test bench to be used at Kenya Power and Lighting Company Ltd. The specification lays down the minimum requirements for equipment acceptable for evaluation.

1.0SCOPE

This specification applies to newly manufactured, single-phase test bench with neutral current test option. Unless otherwise stated Single Phase Test Bench shall comply with IEC TR 61010-3-032 standard on safety.

2.0 NORMATIVE REFERENCES

The following documents were referred to during the preparation of this specification; in case of conflict, the requirements of this specification take precedence.

(i) IEC TR 61010-3-032: standard on safety requirement for electrical equipment for measurements and laboratory use'

(ii) IEC 60529: Degree of protection provided by enclosures

(iii) IEC TR 60736: Testing Equipment for electrical energy meters.

3.0 Terms and Definitions

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

4.0 REQUIREMENTS

4.1 Operating Conditions

4.1.1 The Single Phase Test Bench shall operate in tropical areas with the following atmospheric conditions:

4.1.2 Humidity: High at Coast, up to 95 %

4.1.3 Altitudes ranging from sea level to 2200m above sea level

4.1.4 Temperature: Vary from -1°C to 40 °C degrees.

4.2 Design and construction

4.2.1 The Single Phase Test Bench shall have the rack and power source part separate. It's only the electric connections that will be with the rack.

4.2.2 The power source enclosure shall be IP51 for protection from dust and water

4.2.3 The material for the Test Bench shall be of aluminum alloy material, light and strong corrosion resistant.

4.2.4 The Single Phase Test Bench shall have double side rack with double line rack.

4.2.5 The Test Bench shall be able to test meters of different brands and meter constants at the same time.

4.2.6 The Bench shall measure single phase meters by ways of automatic and manual operation.

4.2.7 The Test Bench shall have protection overload for voltage short circuits, overloads and open current circuits. It shall have an inbuilt voltage stabilizer and two Emergency stop buttons

4.2.8 The Single Phase Test Bench Working Standard shall have a 2 wire active measuring mode (1P 2W)

4.2.9 The Single Phase Test Bench MSVT (Multi-secondary Voltage Transformer) shall test Single-Phase meters with closed links between the current and Voltage measuring circuits. The bench shall test meters even when one position is isolated.

4.2.10 The Bench shall test energy meters with phase- and neutral measurement elements.

4.2.11 It shall have quick connectors with adjustable 4 pins to test with current in phase or current in neutral without changing the wiring.

4.2.12 The Single Phase Test Bench shall test split-type single phase meters with cable, wireless and PLC Communication.

4.2.13 The Test Bench shall have scanning heads swing facility that will simplify the control.

4.2.14 The Test Bench shall have 40 positions, 20 on each side.

4.2.15 The Bench shall have error display for each position

4.2.16 The dimensions of the Test Bench shall be: - Width not more than 320cm, height not more than 205cm as shown in the diagram Appendix B.

4.2.17 The Test Bench shall have extremely high power stability, RS 232/RS 485 and Ethernet communication port in each meter position

4.2.18 The Test Bench shall have a hand held unit with barcode scanner for meter serial numbers.

4.2.19 The Test Bench shall have photoelectric scanning heads that move freely along the bench rail.

4.2.20 The test bench standard meter shall be of accuracy class 0.05 with screen display.

4.3 RATINGS

4.3.1 The Input supply to the Test Bench shall be:

(i) Voltage supply 3*230 /400±10%
(ii) Operating frequency 45Hz-65Hz
(iii) Power efficiency up to 90%
(iv) The Output voltage of the test bench shall be:
(v) Test Voltage ..... 24V to 450V
(vi) Multi-secondary voltage transformer ..... class 0.05
(vii) Power of Voltage Output > 800 VA
(viii) Settings accuracy ...0.01%
(ix) Stability..... 0.005%(integration time 150s)
(x) Distortion factor.... less than 0.3% for linear resistance load
(xi) Harmonics.....2nd –21st and programmable.
(xii) Voltage amplifier..... amplification type shall be switch mode
(xiii) Voltage amplifier..... shall have protection against overload and thermal
(xiv) Voltage amplifier ..... shall be easily exchangeable
(xv) The Single Phase Test Bench shall have Current output of:
   a. Test output current.....1mA- 120A
   b. Power of Current Output .....> 2500VA
   c. Settings accuracy ...0.01%
   d. Stability..... 0.005%(integration time 150s)
   e. Distortion factor.... less than 0.3% for linear resistance load
   f. Harmonics.....2nd –21st and programmable
   g. Current amplifier..... amplification type shall be switch mode
   h. Current amplifier ..... shall be easily exchangeable
(xvi) The reference standard meter accuracy class..... 0.05
(xvii) The Single Phase Test Bench shall have Phase Angle settings of:
   a. Range.....0...360 degrees.
   b. Resolution.....0.01 degrees
   c. Setting Accuracy...0.1 degrees

(xviii) The Single Phase Test Bench shall have Frequency range of:
- a. Range……45….65 HZ
- b. Resolution…… up to 0.01Hz

(xix) The Error Display on the Test Bench shall be as below:
- a. Error display type…… Red LED
- b. Error Resolution display……3 digits

(xx) The Single Phase Test Bench shall be able to perform the following tests both on phase and neutral circuits: -
- a. Accuracy Test…. Basic error, meter, Starting current and No Load Test,
- b. Constant Test/Register test

4.3 Computer and software

4.3.1 A computer and software shall be provided for operating the test bench

4.3.2 The computer software shall control the operation of the Single Phase Element Test Bench

4.3.3 The software shall control the power source system of the test bench and the measuring system.

4.3.4 The software shall provide a test menu to verify the communication of the user PC with the other components of the test system.

4.3.4 This shall include display of dialog on the monitor and print out of errors. Standard test plan according to meter test standards must be included.

4.3.5 The software shall Control automatic and generation of test procedures.

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

4.3.7 The software shall be able to localize the test sheet header, the log and other elements to adapt to utility name and -*0

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

5 Instructions and marking requirements

5.1 The test bench shall be marked legibly and indelibly in capital letters with the following information:
(i) The manufacturer's name or other mark by which he may be readily identified;
(ii) Serial number or a type designation,
(iii)Rating and accuracy class
(iv)The inscription "THE PROPERTY OF K.P.LC LTD."

5.2 The following Drawings and Information shall be supplied with the tender.

5.2.1 Drawing giving all relevant dimensions.
- (i) Wiring diagram.
- (ii) Description leaflet of the Test Bench.
- (iii) Users and Operation manual
- (iv) Copies of type approval test certificate(s) with test and calibration results of the meter/standard being offered obtained from a national metrology institute shall be required with test bench to be provided.

(v) Where test and / or calibration certificates/ reports are issued by a laboratory other than the International / National Test Certification Authority, a copy of accreditation certificate from the International / National Testing Certification Authority shall be attached together with the tender documents.

(vi) The manufacturer shall provide proof of conformance to the following International standards:

(vii) ISO 9001(2008) standard

(viii) ISO 14001(2004) standard

(ix) ISO 17025(2005) standard

6 Information and warranty *(In case of tender award)*

6.1 Drawings and technical details shall be submitted to Kenya Power (KP) for approval before manufacture of the test bench commences.

6.2 The test bench shall have a warranty against any defects, which may develop due to faulty material, calibration, transportation or workmanship for a period of twelve (12) months from the date of delivery.

6.3 All defects shall be repaired or replaced at the supplier's cost.

6.4 KPLC shall meet the full costs of two Engineers for equipment inspection and acceptance testing except the cost of transportation within the country the equipment is being manufactured.

6.5 After delivery of test bench to KPLC, the manufacturer shall commission and conduct training for at least 5 days for twenty people in Nairobi, Kenya. The training shall cover and not be limited to:

(i) Equipment installation;

(ii) Equipment features and operation

(iii) Equipment software;

(iv) Equipment configuration and data downloading and saving, etc

(vi) Equipment routine maintenance and calibration

7 Packaging

7.1 The Single Phase Test Bench shall be packaged in such a manner so as to minimize damage and entry of moisture during transportation and handling.

7.2 Packaging shall be done only after inspection, testing and acceptance of the single phase test bench has been finalized.

7.3 In the absence of these, consent to package and shipment shall be granted, in writing, by the Procurement manager, Kenya Power and lighting Company Ltd.

8.0 APPENDICES

APPENDIX A: GUARANTEED TECHNICAL PARTICULARS

Clause Number	KPLC REQUIREMENTS	Bidder's offer	Manufacturer's catalogue, drawing, technical data or tests certificate Reference Page to support the offer.
3.1	**Operating Conditions**		
3.1.1	The Single Phase Test Bench shall operate in tropical areas with the following atmospheric conditions:		
3.1.2	Humidity: High at Coast, up to 95 %		
3.1.3	Altitudes ranging from sea level to 2200m above sea level		
3.1.4	Temperature: Vary from -5°C to 45 °C degrees		
3.2	**Design & Construction**		
3.2.1	The Single Phase Test Bench shall have the rack and power source part separate. It's only the electric connections that will be with the rack.		
3.2.2	The power source enclosure shall be IP51 for protection from dust and water		
3.2.3	The Single Phase Test Bench shall be of aluminum alloy material, light and strong corrosion resistant.		

3.2.4	The Single Phase Test Bench shall have double side rack with double line rack.		
3.2.5	The Single Phase Test Bench shall be able to test meters of different brands and meter constants at the same time.		
3.2.6	The Single Phase Test Bench shall measure single phase meters by ways of automatic and manual operation.		
3.2.7	The Single Phase Test Bench shall have protection overload for: voltage short circuits, overloads and open current circuits. It shall have an inbuilt voltage stabilizer and two Emergency stop buttons		
3.2.8	The Single Phase Test Bench Working Standard shall have a 2 wire active measuring mode (1P 2W)		
3.2.9	The Single Phase Test Bench MSVTc (Multi-secondary Voltage Transformer) shall test single-Phase meters with closed links between the current and Voltage measuring circuits. The bench		

	shall test meters even when one position is isolated.		
3.2.10	The Single Phase Test Bench shall test energy meters with phase- and neutral measurement elements.		
3.2.11	The Single phase Test Bench shall have quick connectors with adjustable 4 pins to test with current in phase or current in neutral without changing the wiring.		
3.2.12	The Single phase Test Bench shall test split-type single phase meters with cable, wireless and PLC Communication.		
3.2.13	The Single Phase Test Bench shall have scanning heads swing facility that will simplify the control.		
3.2.14	The Single Phase Test Bench shall have 40 positions, 20 on each side.		
3.2.15	The Single Phase Test Bench shall have error display for each position		
3.2.16	The Single Phase Test Bench shall have Width not more		

	than 320 cm, height not more than 205cm as shown in the diagram APPENDIX B		
3.2.17	The Single Phase Test Bench shall have extremely high power stability. RS 232 and Ethernet communication port in each meter position		
3.2.18	The Single Phase Test Bench shall have a hand held unit with barcode scanner for meter serial numbers.		
3.2.19	The Single Phase Test Bench shall have photoelectric scanning heads that move freely along the bench rail.		
3.2.20	The Single Phase Test Bench shall be able to test different Constants and makes of meter at the same time.		
3.3	**RATINGS**		
3.3.1	The Single Phase Test Bench shall have: - (i)Voltage Supply 230/400V (ii)Operating frequency 45Hz-65Hz		

NB: - This schedule does not in any way substitute for detailed information required elsewhere in the specification.

	(iii)Power efficiency up to 90%		
3.3.2	**BENCH OUTPUTS** **Voltage**: a) Test Voltage ..... 24V to 450V b) Multi-secondary voltage transformer ..... class 0.02 c) Power of Voltage Output 800 to 1000 VA d) Operating resolution ...0.01% of full scale value of range e) Stability....005%(integration time 150s) f) Load Regulation from 0-max. load...0.01% g) Distortion factor.... greater than 0.3% for linear resistance load h) Harmonics....2^{nd} –21^{st} and programmable. i) Voltage amplifier.... amplification type shall be switch mode		

Manufacturer's Declaration: I .....on behalf of.....

	j) Voltage amplifier…… shall have protection against overload and thermal k) Voltage amplifier …. shall be easily exchangeable		
3.3.3	**Current:** a) Test output current .1mA- 120A b) Power of Current Output. 1200 to 1600VA c) Operating resolution …0.01% of full scale value of range. d) Stability…0.005%(integration time 150s) e) Load Regulation from 0-max. load…0.01% f) Distortion…factor …. greater than 0.3% for linear resistance load g) Harmonics.2nd-21stand programmable h) Current amplifier…… amplification type shall be switch mode		

	i) Current amplifier…. shall be easily exchangeable j) High accuracy standards meter class… 0.02		
3.3.4	Phase Angle: (i)Range…….0-360° (ii)Resolution…0.01 ° (iii)Setting Accuracy…0.1°		
3.3.5	Frequency: (i)Range…45-65 HZ (ii)Resolution…up to 0.01HZ		
3.3.6	Error Display (i)Error display type …. Red LED (ii)Error resolution display….3 digits		
3.3.7	Major Functions: (i)Accuracy Test…. Basic error, Constant Test/Register test, Starting and No Load Test. (ii) Current double circuits… double circuit verification.		

3.4	COMPUTER AND SOFTWARE		
3.4.1	A computer and software shall be provided for operating the test bench		
3.4.2	The computer software shall control the operation of the Single Phase Double Element Test Bench.		
3.4.3	The software shall control the power source system of the test bench and the measuring system.		
3.4.4	The software shall provide a test menu to verify the communication of the user PC with the other components of the test system. This shall include display of dialog on the monitor and print out of errors. Standard test plan according to meter test standards must be included.		
3.4.5	The software shall Control automatic and generation of test procedures.		
3.4.6	The software shall be able to determine the highest and lowest errors per test.		
3.4.7	The software shall be able to localize the test sheet header, the log and other elements to adapt to utility name and -*0		
3.4.8	The software shall store test results in files with individual meter search/query facility.		
4	INSTRUCTIONS AND MARKING		

4.1.1	The test bench shall be marked legibly and indelibly in capital letters with the following information: a) The manufacturer's name or other mark by which he may be readily identified; b) Serial number or a type designation, c) Rating and accuracy class The inscription "THE PROPERTY OF K.P. CO. LTD."		
4.1.2	The following Drawings and Information shall be supplied with the tender. (a) Drawing giving all relevant dimensions. (b) Wiring diagram. (c) Description leaflet of the Test Bench. (d) Users and Operation manual		
4.1.3	Copies of type approval test certificate(s) with test and calibration results of the meter/standard being offered obtained from a national metrology institute shall be required with test bench to be provided. Where test and / or calibration certificates/		

	reports are issued by a laboratory other than the International / National Test Certification Authority, a copy of accreditation certificate from the International / National Testing Certification Authority shall be attached together with the tender documents.		
4.1.4	The manufacturer shall provide proof of conformance to the following International standards: a) ISO 9001(2008) standard b) ISO 14001(2004) standard c) ISO 17025(2005) standard		
5	**Information and warranty (In case of tender award)**		
5.1	Drawings and technical details shall be submitted to Kenya Power (KP) for approval before manufacture of the test bench commences.		

5.2	The test bench shall have a warranty against any defects, which may develop due to faulty material, calibration, transportation or workmanship for a period of twelve (12) months from the date of delivery. All defects shall be repaired or replaced at the supplier's cost.		
5.3	KPLC shall meet the full costs of two Engineers for equipment inspection and acceptance testing except the cost of transportation within the country the equipment is being manufactured.		
5.4	After delivery of test bench to KPLC, the manufacturer shall commission and conduct training for at least 5 days for twenty people in Nairobi, Kenya. The training shall cover and not be limited to: a) Equipment installation; b) Equipment features and operation c) Equipment software;		

	d) Equipment configuration and data downloading and saving, etc e) Equipment routine maintenance and calibration		
6	**Packaging**		
6.1	The Single Phase Test Bench shall be packaged in such a manner so as to minimize damage and entry of moisture during transportation and handling.		
6.2	Packaging shall be done only after inspection, testing and acceptance of the single phase test bench has been finalized. In the absence of these, consent to package and shipment shall be granted, in writing, by the Procurement manager, Kenya Power and lighting Company Ltd.		

Declare that the above specifications matrix conforms to a typical tender item type..... as clearly marked in the attached technical brochures & drawings, and being offered for this tender.

Signature..... Date.....Stamp/Seal.....

APPENDIX B: METER RACK AND ACCESSORIES

APPENDIX B: METER RACK AND ACCESSORIES