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Kenya Power

EQUIPMENT FOR MEASUREMENT OF DIMENSIONS - SPECIFICATION

A Document of the Kenya Power & Lighting Co. Ltd

October 2016



TITLE:
**EQUIPMENT FOR
 MEASUREMENT OF
 DIMENSIONS - SPECIFICATION**

Doc. No.	KP1/6C/4/1/TSP/09/040
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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?FolderId=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	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2016-10-17	Cancels and replaces KPLC1/3CB/TSP/09/021-2 dated 2010/11/19 and KPI /3CB/TSP/09/040 and any previous issues	Nancy Wairimu	Dr. Eng. Peter Kimemia

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FOREWORD

This specification has been prepared by the Standards Department in collaboration with Quality Control Section both of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for equipment for measurement of dimensions. It is intended for use by KPLC in purchasing the items.

This specification stipulates the minimum requirements for equipment for measurement of dimensions 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, good workmanship and good engineering practice in the manufacture of items for KPLC.

References to brand names or catalogue numbers are intended to be descriptive only and not restrictive.

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

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1. SCOPE

- 1.1. This specification is for Equipment for Measurement of Dimensions for use in materials quality control. The specification covers the following:
- a) Vernier Calipers, digital type
 - b) Micrometer Screw Gauge, digital type
 - c) Stainless Steel Rule
 - d) Tape Measure 30m and 5m
- 1.2. The specification also covers requirements, inspection and tests of the equipment and their accessories as well as schedule of Guaranteed Technical Particulars.

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:

- ISO 9001: Quality Management Systems Requirements
- DIN 862: Geometrical product specification – Callipers
- DIN 863: Verification of geometrical parameters – Micrometers
- ISO 14978: Geometrical product specification – General concepts and requirements
- ISO 13102: Geometrical product specification – Dimensional measuring equipment – Electronic digital indicator gauge
- ISO 13385: Dimensional measuring equipment – Callipers
- ISO 3611: Geometrical product specification – Dimensional measuring equipment – Micrometers
- IEC 60529: Degrees of protection provided by enclosures
- KS 184-03: Primary batteries – specification, part 3: watch batteries

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3. DEFINITIONS AND ABBREVIATIONS

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

3.1 ABBREVIATIONS



- KPLC** – Kenya Power and Lighting Company Limited
- IEC** – International Electrotechnical Commission
- ISO** – International Organization for Standardization
- DIN** – Deutsches Institut für Normung (German Institute for Standardization)
- KS** – Kenyan standard
- BS** – British Standards
- IP** – Ingress protection
- LCD** – Liquid crystal display
- ABS** – Absolute measurement System
- INC** – Incremental

4. REQUIREMENTS

4.1 Service Conditions

The Equipment for Measurement of Dimensions shall be suitable for use both indoors and outdoors in tropical areas with the following climatic conditions:

- 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: Design pollution level to be taken as “Heavy” (Pollution level III) and “Very Heavy” (Pollution level IV) for coastal applications in accordance with IEC 60815.

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4.2 Design and Construction



- 4.2.1 The tools shall be suitable for heavy duty applications and sturdy in construction with all components including metal surfaces resistant to corrosion.
- 4.2.2 Valid calibration certificates with national traceability and operation manuals (all in English Language) shall be submitted during delivery of the equipment.

4.3 Specific Requirements

The specific requirements for the individual equipment for the measurement of dimensions shall be as outlined below:

4.3.1 Vernier Caliper

- 4.3.1.1 The Vernier caliper shall be manufactured to DIN 862.
- 4.3.1.2 It shall be in two sizes: 0-150mm and 0-450mm.
- 4.3.1.3 It shall be water and coolant proof with a protection level of at least IP 66 according to IEC 60529
- 4.3.1.4 It shall be of digital type without data output. The general arrangement shall be to Figure 1.
- 4.3.1.5 It shall be suitable for inside diameter, outside diameter and depth measurement
- 4.3.1.6 It shall be sturdy quality, hardened stainless steel
- 4.3.1.7 Units of measurement shall be in both metric and imperial (mm/inch)
- 4.3.1.8 The Vernier caliper shall have a large and clear high contrast LCD display with battery status indication.
- 4.3.1.9 The jaws shall be finely ground and lapped.
- 4.3.1.10 The depth gauge shall be flat.
- 4.3.1.11 The Vernier caliper shall have on/off button, automatic shutdown, with absolute/Incremental measuring system.
- 4.3.1.12 It shall have locking screw and screwed battery compartment cover.
- 4.3.1.13 Each Vernier shall be complete with 1x3V battery, type CR1632 as per KS 184-03 and one sturdy carrying case.
- 4.3.1.14 The individual component parts shall not become loose and fall off during the life of the caliper.

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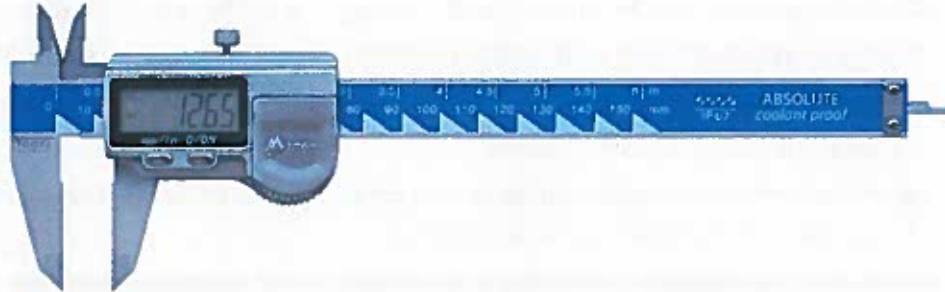


Figure 1: Vernier caliper, general arrangement



4.3.1.15 The Vernier caliper shall also have the following characteristics:

Table1: Characteristics of a Vernier calliper

Property	Requirement	
	Range	0-150mm / 0-6 inch
Units	Switchable between mm & inches	Switchable between mm & inches
Resolution	0.01mm / 0.0005 inches	0.01mm / 0.0005 inches
Accuracy, max	±0.02mm	±0.04mm
Repeatability	0.01mm	0.01mm
Function	ABS/INC	ABS/INC
Font size	8mm font	9mm font
Depth Gauge	Flat type	None
Calibration	Valid Calibration Certificate required with the equipment during delivery	Valid Calibration Certificate required with the equipment during delivery

4.3.2 Micrometer Screw Gauge

- 4.3.2.1 The micrometer screw gauge shall be manufactured to DIN 863.
- 4.3.2.2 It shall be in two sizes: 0-25mm and 25-50mm. The general arrangement shall be to Figure 2.
- 4.3.2.3 The micrometer screw gauge shall be of digital type with Absolute Measurement System/Incremental (ABS/INC-system).
- 4.3.2.4 It shall be sturdy quality with carbide measuring surfaces, lacquered frame and insulation plates.

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- 4.3.2.5 Measuring surfaces shall be finely ground and lapped with the spindle hardened and ground.
- 4.3.2.6 Units of measurement shall be in both metric and imperial (mm/inch), switchable.
- 4.3.2.7 It shall have a large and clear reading, high contrast, LCD display with 7mm digit height.
- 4.3.2.8 The graduation shall be laser engraved.
- 4.3.2.9 The micrometer screw gauge shall have a locking wheel for quick and precise fixing and friction ratchet for constant measuring pressure.
- 4.3.2.10 It shall have zero setting at ant position, on/off button and automatic shutdown.
- 4.3.2.11 Each micrometer screw gauge shall be complete with 1x1.5V battery as per KS 184-03 and one sturdy carrying case.

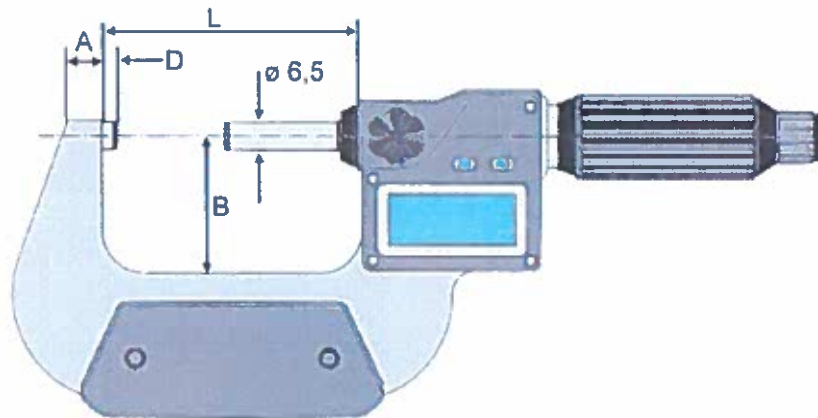


Figure 2: Micrometer screw gauge, general arrangement

4.3.2.12 The micrometer screw gauge shall also have the following characteristics:

Table 2: Characteristic of micrometer screw gauge

Property	Requirement	
	0-25mm / 0-1 inch	25-50mm / 1-2 inch
Range	0-25mm / 0-1 inch	25-50mm / 1-2 inch
Units	Switchable between mm / inches	Switchable between mm / inches
Resolution	0.001mm / 0.00005 inches	0.001mm / 0.00005 inches
Accuracy	±0.002mm	±0.002mm
Display	≥7mm font	≥7mm font
Spindle diameter	6.5mm	6.5mm
Thimble diameter	20mm	20mm
Thread pitch	2mm	2mm

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Property		Requirement	
		With ABS/INC system	With ABS/INC system
Function			
Protection		≥ IP 65	≥ IP 65
Dimensions, typical	A	6mm	8mm
	B	25mm	32mm
	D	3mm	3mm
	L	35mm	59mm
Calibration		Valid Calibration Certificate required with the equipment during delivery	Valid Calibration Certificate with the equipment during delivery

4.3.3 Stainless Steel Rule

- 4.3.3.1 This shall be of stainless steel of 1m nominal length for use in engineering inspections.
- 4.3.3.2 It shall be manufactured in one continuous length from stainless steel.
- 4.3.3.3 The steel shall be hardened and tempered, and shall have a hardness of 450 to 550 HV.
- 4.3.3.4 It shall be of a graduated continuous length with one or two square datum ends.
- 4.3.3.5 Graduations shall be from left to right, front and back, where front top and bottom is 1/2 /1mm; with back top and bottom, 1/32 and 1/16 inches respectively
- 4.3.3.6 The steel rule shall be flexible version, stainless spring steel, non-glare, matt surface with etched graduation.
- 4.3.3.7 The painting shall be permanently bonded to the steel rule. A typical stainless steel rule is shown in figure 3.



Figure 3: Typical stainless steel rule

- 4.3.3.8 The stainless steel rule shall also have the following characteristics:

Table 3: Characteristics of a stainless steel rule

Property	Requirement
Range	1000mm / 39 inch
Units	Both mm & inches
Protection	All weather
Calibration	Valid Calibration Certificate required with the equipment during delivery

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4.3.4 Tape Measure, stainless steel type 30m/100ft

- 4.3.4.1 It shall be made of corrosion resistant steel protected by an anti-abrasion polymer coating in a compact, durable and sturdy closed case with folding rewinding handle.
- 4.3.4.2 Blade shall be made of stainless steel.
- 4.3.4.3 Shall be capable of measuring in both metric and imperial upto 30m/100ft
- 4.3.4.4 Tape ending shall be a brass ring, with a hook, included in the measurement.
- 4.3.4.5 The tape measure shall be as shown in figure 4 below.



Figure 4: Typical tape measure 30m/100ft



4.3.4.6 The tape measure shall also have the following characteristics:

Table 4: Characteristics of a Tape measure 30m/100ft

Property	Requirement
Range	30m / 100feet
Units / Graduation	Both cm / feet – two sided
Blade width	9mm – 15mm
Tape ending	Metal ring with foldable hook
Accuracy	≥EC II or equivalent
Calibration	Valid Calibration Certificate required with the equipment during delivery

4.3.5 Tape Measure, stainless steel type 5m/16ft

- 4.3.5.1 It shall be made of stainless steel with rubber covered housing and ergonomic design.
- 4.3.5.2 Shall have a rugged and sturdy closed case with a clip, lanyard, blade stop and durable steel retraction spring for automatic return.
- 4.3.5.3 Graduation shall be in both metric and imperial.

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4.3.5.4 The tape measure shall be as shown below in figure 5.



Figure 5: Typical Tape measure, 5m/16ft

4.3.5.5 The tape measure shall also have the following characteristics:

Table 5: Characteristics of a Tape measure 5m/16ft

Property	Requirement
Range	5m / 16feet
Units / Graduation	Both mm / inches – one sided
Blade width	10mm – 20mm
Accuracy	≥EC II or equivalent
Calibration	Valid Calibration Certificate required with the equipment during delivery

5. TESTS REQUIREMENTS

The measurement equipment shall be inspected and tested in accordance with the requirements of this relevant standards and provision of this specification.

6. MARKING AND PACKING

6.1 The following information shall be marked legibly and in a permanent manner on each measurement equipment:

- a) The manufacturer's identity;
- b) Model Number;
- c) Markings required by the applicable standard.

6.2 Each equipment for measurement of dimensions shall be packed in a manner so as to protect it from damage during transportation, storage and use.

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APPENDICES

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 certificates by a third party testing laboratory accredited to ISO/IEC 17025 shall be submitted with the offer for 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 Test certificates and calibration certificates for the dimensions measuring equipment to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods.
- A.4 On receipt of the dimensions measuring equipment, KPLC will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification.
- A.5 The supplier shall replace without charge to KPLC, any measuring equipment which upon examination/inspection, test or use fail to meet any 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 dimensions measuring equipment 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 9001:2008.
- 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: 2008 certificate shall be submitted with the tender for evaluation.
- B.3 The bidder shall indicate the delivery time of the items, manufacturer's monthly & annual production capacity and experience in the production of the type and size of items being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the dimensions measuring equipment 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.

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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 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 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) Manufacturers letter of authorization, ISO 9001:2008 certificate and other technical documents required in the tender.
- h) Operating instructions:

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

- a) Fully filled clause by clause guaranteed technical particulars (GTP) signed by the manufacturer;
- b) Design Drawings with details of dimensions measuring equipment to be manufactured for KPLC.
- c) 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.
- d) All documentation necessary for safety of the equipment.

C.3 The successful bidder shall demonstrate to KPLC Staff (in Nairobi) the use of the dimensions measuring equipment and explain the features that guarantee excellent service. This shall be done at the drawings approval stage.

C.4 Each dimensions measuring equipment will be backed up with a manufacturer's warranty.

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D: GUARANTEED TECHNICAL PARTICULARS (NORMATIVE)

To be filled and signed by the Supplier 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 (indicate full details of the offered equipment for each requirement of the specification)
	Item Name and Model Number	Specify
	Manufacturer's Name and address	Specify
	Country of Manufacture	Specify
1.	Specify	State
2.	Normative References	State
3.	Definitions and Abbreviations	State
4.	Requirements	
4.1	Service Conditions	State
4.2	Design & Construction	
4.2.1	Suitability for heavy duty applications	Specify
	Sturdy in construction	
	All components including metal surfaces resistant to corrosion.	
4.2.2	Valid calibration certificates with national traceability and operation manual(all in English)	Provide
4.3	Specific requirements	
4.3.1	Vernier Calipers	
4.3.1.1	Standard of manufacture	State
4.3.1.2	Sizes	State
4.3.1.3	Protection level	State
4.3.1.4	Type and general arrangement	State and attach drawing
4.3.1.5	Suitability for inside diameter, outside diameter and depth measurements	Specify
4.3.1.6	Shall be made from sturdy quality, hardened stainless steel	State compliance
4.3.1.7	Units of measurements: metric and imperial	State
4.3.1.8	Display	Specify
	Battery status indication	

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4.3.1.9	Jaws construction	State		
4.3.1.10	Depth gauge construction	State		
4.3.1.11	On/off button present?	Specify		
	Automatic shutdown present?			
	Absolute/Incremental measuring system present?			
4.3.1.12	Locking screw and screwed battery compartment cover present?	Specify		
4.3.1.13	Battery type and size	Specify		
	Sturdy carrying case present?			
4.3.1.14	The individual components shall not fail during the life of the calliper.	State compliance		
4.3.1.15	Properties	Range	0-150mm / 0-6 inch	0-450mm / 0-18 inch
		Units	Specify	Specify
		Resolution	Specify	Specify
		Accuracy	Specify	Specify
		Repeatability	Specify	Specify
		Function	Specify	Specify
		Font size	Specify	Specify
		Depth gauge Calibration	Specify	Specify
4.3.2	Micrometer screw gauge			
4.3.2.1	Standard of manufacture	Specify		
4.3.2.2	Sizes and general arrangement	Specify		
4.3.2.3	Type	Specify		
4.3.2.4	Measurement systems	Specify		
4.3.2.5	Sturdy quality with carbide measuring surfaces, lacquered frame and insulation plates.	Specify		
4.3.2.6	Measuring surfaces construction	Specify		
4.3.2.7	Display	Specify		
4.3.2.8	Graduation marking	Specify		
4.3.2.9	Locking wheel for quick and precise fixing and friction ratchet for constant measuring pressure present?	Specify		
4.3.2.10	Zero setting at ant position	Specify		
	On/off button			
	Automatic shutdown			

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4.3.2.11	Battery type and size Sturdy carrying case present?	Specify		
4.3.2.12	Property	Specify	Specify	
	Units	Specify	Specify	
	Resolution	Specify	Specify	
	Accuracy	Specify	Specify	
	Display	Specify	Specify	
	Spindle diameter	Specify	Specify	
	Thimble diameter	Specify	Specify	
	Thread pitch	Specify	Specify	
	Function	Specify	Specify	
	Protection	Specify	Specify	
	Dimensions, typical	A	Specify	Specify
		B	Specify	Specify
D		Specify	Specify	
L		Specify	Specify	
	Calibration	Specify	Specify	
4.3.3	Stainless steel rule			
4.3.3.1	Stainless steel of 1m nominal length	Specify		
4.3.3.2	Manufactured in one continuous length from stainless steel	Specify		
4.3.3.3	Hardness	Specify		
4.3.3.4	Graduated continuous length with one or two square datum ends	Specify		
4.3.3.5	Graduations properties	Specify		
4.3.3.6	Steel rule construction	Specify		
4.3.3.7	Painting and general arrangement	Specify and attach drawing		
4.3.3.8	Property	Range	Specify	
		Units	Specify	
		Protection	Specify	
		Calibration	Specify	
4.3.4	Tape Measure, stainless steel type 30m/100ft			
4.3.4.1	Material	Specify		
4.3.4.2	Blade material	Specify		
4.3.4.3	Units of measurements	Specify		

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**EQUIPMENT FOR MEASUREMENT
 OF DIMENSIONS – SPECIFICATION**

Doc. No. KPI/6C/4/1/TSP/09/040
Issue No. 1
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Clause number	Requirement	Bidder's offer (indicate full details of the offered equipment for each requirement of the specification)	
4.3.4.4	Tape ending construction	Specify	
4.3.4.5	General arrangement	Provide drawing	
4.3.4.6	Property	Range	State
		Units / Graduation	State
		Blade width	State
		Tape ending	State
		Accuracy	State
	Calibration	State	
4.3.5	Tape Measure, 5m/16ft		
4.3.5.1	Material	Specify	
4.3.5.2	Construction	Specify	
4.3.5.3	Units of measurements	State	
4.3.5.4	General arrangement	Provide drawing	
4.3.5.5	Property	Range	State
		Units / Graduation	State
		Blade width	State
		Accuracy	State
		Calibration	State
5	Tests Requirements	State	
6	Marking and Packing		
6.1	Marking	State	
6.2	Packing	State	
A	Test and inspection		
A.1	Responsibility of carrying out tests	State	
A.2	Copies of Type Test Reports submitted with tender	Provide	
A.3	Test reports to be submitted by supplier to KPLC for approval before shipment	Provide	
A.4	Inspection at the stores	State compliance	
A.5	Replacement of rejected instruments	State compliance	
B	Quality Management System		
B.1	Quality Assurance Plan	Provide	
B.2	Copy of ISO 9001:2008 Certificate	Provide	
B.3	Manufacturer's experience	Provide	
	Manufacturing Capacity (units per month)	Provide	
	List of previous customers	Provide	

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Clause number	Requirement	Bidder's offer (indicate full details of the offered equipment for each requirement of the specification)
	Customer reference letters	
C	Documentation and Demonstration	
C.1	Documents submitted with tender	Provide
C.2	Documents to be submitted by supplier to KPLC for approval before manufacture	Provide
C.3	Demonstration	State compliance
C.4	Warranty	State
	Statement of compliance to specification	State compliance

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

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