Kenya Power

SPECIFICATION FOR CONCRETE POLES TESTING TOOLS & EQUIPMENT

A Document of the Kenya Power & Lighting Co. Ltd
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0.1 CIRCULATION LIST

COPY NO.	COPY HOLDER
1	Chief Officer, Quality Control
2	Manager, Inventory Management

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
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	15/05/2024	-	Wesley Tera	P. Laygat

FOREWORD

This specification has been prepared by the Quality Control section, SCL of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Concrete Poles Testing Tools & Equipment

The Concrete Poles Testing Tools & Equipment are intended for use as follows:

a) The Digital Concrete Test Hammer (Schmidt Hammer) - for measuring the compressive strength characteristics of hardened concrete.
b) The Ground Penetrating Radar - detect reinforcing bars and steel mesh, secondary layers of reinforcement, tendon ducts, cables, conduits, and other embedment. Voids, inclusions, discontinuities and slab/wall thickness shall also be tested
c) The Pre-stressed Concrete Cable Tension Measuring System (Load Cell) for testing proof and ultimate loads on pre-cast concrete poles.

This specification was prepared to establish and promote uniform requirements for Concrete Poles Test Tools & Equipment 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 Concrete Poles Test Tools & Equipment acceptable for use in the company. 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 Concrete Poles Test Tools & Equipment for KPLC.

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

1. SCOPE

1.1. This specification is for Concrete Poles Test Tools & Equipment for use by company's Quality Control Section & Inspection and Acceptance teams Companywide

1.2. The specification covers requirements, design, inspection, tests, and schedule of Guaranteed Technical Particulars of Concrete Poles Test Tools & Equipment.

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.

BS EN 12504-2:2021: Testing concrete in structures. Non-destructive testing. Determination of rebound number

ASTM D4748: Standard Test Method for Determining the Thickness of Bound Pavement Layers Using Short-Pulse Radar.

ASTM D6087: Standard Test Method for Evaluating Asphalt-Covered Concrete Bridge Decks Using Ground Penetrating Radar.

ASTM D6432: Standard Guide for Using the Surface Ground Penetrating Radar Method for Subsurface Investigation.

EN 302066-ETSI: Electromagnetic compatibility and Radio spectrum Matters (ERM); Ground- and Wall- Probing Radar applications (GPR/WPR) imaging systems; Part 1: Technical characteristics and test methods.

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

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

EMC – Electromagnetic Compatibility

EU – European Union

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1 The Concrete Poles Test Tools & Equipment shall be suitable for use outdoors in tropical areas and harsh climatic conditions including areas exposed to:

a) Altitudes of up to 2200m 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 DIGITAL CONCRETE TEST HAMMER (SCHMIDT HAMMER)

4.2.1.1 The Digital Concrete Test Hammer (Schmidt Hammer) shall be designed, manufactured and tested according to BS EN 12504-2:2021.

4.2.1.2 The Digital Concrete Test Hammer (Schmidt Hammer) shall be capable of doing the following measurements:

a) Compressive strength characteristics of hardened concrete non-destructively

b) Control uniform concrete quality and detect weak spots in the concrete

4.2.1.3 The Digital Concrete Test Hammer (Schmidt Hammer) shall be equipped with a sensor which measures the rebound value of a test impact to a high resolution and repeatability.

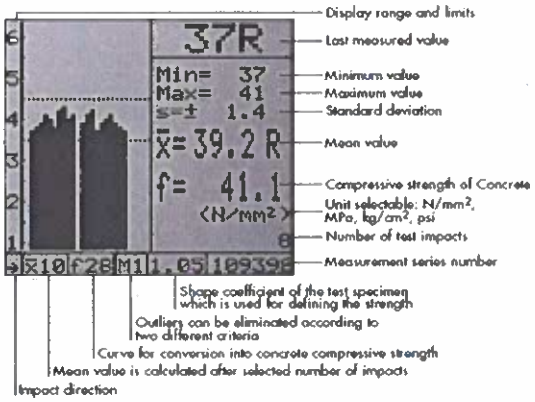
4.2.1.4 The equipment shall be Portable, Rugged and light weight, Shock proof and Impact resistant. The carrying case shall be able to withstand a fall of one meter without damage to the equipment.

4.2.1.5 Test results

4.2.1.5.1 The Digital Concrete Test Hammer (Schmidt Hammer) readings shall be taken by reading the pointer on the Scale. The strength of the concrete (FR) is found in MPA by using the Conversion Chart on the hammer.

4.2.1.6 The display unit shall resemble the image in figure 1 below:

Figure 1.Display unit



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

Table 1: Technical particulars of Concrete Poles Test Tools & Equipment

Parameter	Requirement
Measuring range	• Compressive strength 10 to 70 N/mm^2 • Impact energy is 2.207 Nm
Display unit	Non-volatile memory for max. 500 measurement series of 10 values each
	Graphic LC- Display 128 x 128 Pixel or more
Interface	RS 232
Printing Requirement	Integrated software for printing the measured values and transmitting to PC
Accuracy of Measurement	± 0.2 R
Reproducibility	± 0.5 R
Special Features	• Multiple statistical functions set by user. • By entering the depth of carbonation, the conversion of rebound value to the compressive strength is automatically compensated. • Multiple conversion tables to give greater accuracy of measurement. • Compatible with TICO Ultrasonics to give strength to 10% accuracy. • Data-Transfer to PC/printer
Accessories	• Four (4) spare springs • Transfer cable for PC

	• Test hammer cable • Grind stone • Carrying straps • Operating instructions, certificate, protection sleeve and carrying case • Printer cable • Testing anvil

d Penetrating Radar

4.2.2.1 The Ground Penetrating Radar shall be designed, manufactured and tested according to ASTM D4748, ASTM D6087, ASTM D6432 and EN 302066-ETSI.

4.2.2.2 The Ground Penetrating Radar shall be ultra-compact, powerful GPR unit that quickly scans in tight spaces, on curved surfaces, overhead, and close to the walls of concrete bridges, structures, and pavements.

4.2.2.3 The Ground Penetrating Radar shall operate with Stepped Frequency Continuous Wave (SFCW) technology, sweeping through a range of frequencies during scanning instead of the one-channel operation of pulsed-radar units.

4.2.2.4 It shall operate 0.4 to 6.0GHz SFCW to achieve a penetration depths of 25.6in (65cm) with high-resolution characterization with a single antenna.

4.2.2.5 The equipment shall be Portable, Rugged and light weight, Shock proof and Impact resistant. The carrying case shall be able to withstand a fall of one meter without damage to the equipment.

4.2.2.6 The Ground Penetrating Radar shall detect reinforcing bars and steel mesh, secondary layers of reinforcement, tendon ducts, cables, conduits, and other embedment. Voids, inclusions, and discontinuities are also identified, and slab or wall thicknesses are measured from a single side.

4.2.2.7 The Ground Penetrating Radar's exclusive wireless tracking wheel adjusts between trailing and sidecar configurations for flexibility in cramped environments and to permit cross-polarized scanning. The cross-polarization method shall combine data from two scans in perpendicular directions from the same area to greatly increase instrument sensitivity and resolution. For scanning in narrow areas with as little as 2.5in (63mm) of clearance, the instrument shall allow the battery pack to be removed and tethered to the scan unit with a USB-C cable.

4.2.2.8 The Ground Penetrating Radar shall be powered by four rechargeable flight-safe or readily available alkaline AA batteries, the unit operates for up to 2.5 hours under continuous use.

4.2.2.9 The Ground Penetrating Radar shall be supplied with a sensing unit and Pro software with a two-year subscription and a telescopic rod with an iPad holder that enables convenient access to hard-to-reach areas. A Wi-Fi module, USB-C cable, carrying case, wrist loop, battery pack, chalk, and two sizes of grid paper are also included.

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

Table 1: Technical particulars of Ground Penetrating Radar

Parameter	Requirement
Frequency	0.4 to 6.0GHz
Depth Measurement	Max: 26.6in (65mm)
Temperature	Operation: 14 to 122 °F (-10 to 50 °C)

Display	Any iPad (iPad OS 15 and later)
Power Supply	(4) AA alkaline or rechargeable batteries
Product Dimensions	Approximately (89 x 89 x 76mm) WxDxH
Estimated Weight	Approximately (8.16kg)

4.2.3 Prestressed Concrete Cable Tension Measuring System (Load Cell)

4.2.3.1 The Prestressed Concrete Cable Tension Measuring System (Load Cell) shall be a digital readout system specifically designed and manufactured as a self-contained, portable, load cell unit to accurately provide cable tension measurements required in the manufacturing process of pre-stressed/ pre-cast concrete.

4.2.3.2 The Digital readout shall display the actual load in pounds/Kilo newton and features a remote "Hold" load control circuit. The system can accommodate one (1) or two (2) load cells.

4.2.3.3 The manufacturer shall perform the annual ASTM E-4 calibration and system is certified to the ASTM E-4 specification before shipping. Sample calibration certificates and certification shall be submitted with the tender for evaluation.

4.2.3.4 The load cell shall be a hollow compression canister type that is designed with ¾" through hole which allows the 0.5" or 0.6" D-shackle to pass through. The load cell shall be designed with a swivel top assembly for uniform load distribution.

4.2.3.5 The Prestressed Concrete Cable Tension Measuring System (Load Cell) shall be supplied with a 10' (3 meters) interconnecting cable, hold cable and operates using four (4) 9-VDC batteries. The system shall be a compact design with a fiberglass case that houses the digital readout, load cell, and cables.

4.2.3.6 The Prestressed Concrete Cable Tension Measuring System (Load Cell) package shall be calibrated and meets the ASTM E-4 standard traceable to NIST and have the accuracy/linearity of +/-0.10 F.S.

4.2.3.7 The Prestressed Concrete Cable Tension Measuring System (Load Cell) have a load capacity of 40,000 lb and Weigh approximately 12 pounds.

4.3 DOCUMENTATION AND SUPPORT

4.3.1 Warranty and training

4.3.1.1 The Prestressed Concrete Cable Tension Measuring System (Load Cell) shall be packed by a two (2) year complete system warranty.

4.3.1.2 Technical support and software upgrade, where applicable shall be provided free of charge to KENYA POWER for a period of not less than 24 months.

4.3.1.3 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

4.3.1.4 In the case of tender award, technical details for the Concrete Poles Test Tools & Equipment shall be submitted to the Kenya Power for approval before manufacture commences

4.4 TESTS REQUIREMENTS

4.4.1 The Concrete Poles Test Tools & Equipment 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.

4.4.2 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 Concrete Poles Test Tools & Equipment 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 Concrete Poles Test Tools & Equipment offered to be submitted for tender evaluation shall include the following:

4.4.2.1 Measured values of the standard equipment

4.4.2.2 Indicated values of the unit under test (Concrete Poles Test Tools & Equipment)

4.4.2.3 Expanded Relative uncertainty

4.4.2.4 Details of standard and reference equipment used in calibration tests.

5 MARKING AND PACKING

5.2 MARKING

The following information shall be marked legibly and in a permanent manner on the Concrete Poles Test Tools & Equipment:

a) The manufacturer's name or trade mark;

b) The type reference number / model number;

c) Units of the measured quantity;

d) Ranges of measurement;

e) Type of battery and polarity of connection in the battery compartment

f) Standard of manufacture;

g) The serial number;

h) Letters "PROPERTY OF KENYA POWER"

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

5.3 PACKING

5.3.1 The Concrete Poles Test Tools & Equipment shall be packed in a carrying case so as to protect it from damage and entry of moisture during transportation, handling and storage.

5.3.2 The carrying case shall shock proof and impact resistant and shall be able to withstand a fall of one meter without damage to the Concrete Poles Test Tools & Equipment.

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 Concrete Poles Test Tools & Equipment 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 Test certificates and calibration certificates for the Concrete Poles Test Tools & Equipment to be supplied shall be submitted to KPLC for approval before shipment/delivery of the equipment.

A.4 On receipt of the Concrete Poles Test Tools & Equipment, 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 Concrete Poles Test Tools & Equipment 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 Concrete Poles Test Tools & 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: 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 Concrete Poles Test Tools & Equipment being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the Concrete Poles Test Tools & 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.

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 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 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) stamped and signed by the manufacturer;
b) Drawings of the Concrete Poles Test Tools & Equipment to be manufactured for KPLC.
c) Product manuals, operation manuals and brochures,
d) 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.
e) Marking details and method to be used in marking the Hand Held Winding Resistance Tester;
f) All documentation necessary for safety of the equipment.
g) Packaging details (including packaging materials).

C.3. The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the Hand Held Winding Resistance Tester to KPLC stores.

C.4. The successful bidder shall demonstrate to KPLC Staff (in Nairobi) the use of the Concrete Poles Test Tools & Equipment.

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	
3.1.	Abbreviations	State
4.	Requirements	
4.1	Service Conditions	State
4.2	Design and construction	
4.2.1	**Digital Concrete Test Hammer (Schmidt Hammer)**	
4.2.1.1	State	

4.2.1.2	State		
4.2.1.3	State		
4.2.1.4	State		
4.2.1.5	State		
4.2.1.6	State		
4.2.1.7	**Table 1: Technical particulars of Concrete Poles Test Tools & Equipment**		
	Parameter	**Requirement**	
	Measuring range	• Compressive strength 10 to 70 N/mm^2 • Impact energy is 2.207 Nm	State
	Display unit	Non-volatile memory for max. 500 measurement series of 10 values each	State
		Graphic LC- Display 128 x 128 Pixel or more	State
	Interface	RS 232	State
	Printing Requirement	Integrated software for printing the measured values and transmitting to PC	State
	Accuracy of measurement	± 0.2 R	State
	Reproducibility	± 0.5 R	State
	Special Features	• Multiple statistical functions set by user. • By entering the depth of carbonation, the conversion of rebound value to the compressive strength is automatically compensated. • Multiple conversion tables to give greater accuracy of measurement. • Compatible with TICO Ultrasonics to give strength to 10% accuracy. • Data-Transfer to PC/printer	State
	Accessories	• Four (4) spare springs • Transfer cable for PC • Test hammer cable • Grind stone • Carrying straps • Operating instructions, certificate, protection sleeve and carrying case • Printer cable • Testing anvil	State

4.2.2	**Ground Penetrating Radar**		
4.2.2.1	State		
4.2.2.2	State		
4.2.2.3	State		
4.2.2.4	State		
4.2.2.5	State		
4.2.2.6	State		
4.2.2.7	State		
4.2.2.8	State		
4.2.2.9	State		
4.2.2.10	**Table 1: Technical particulars of Ground Penetrating Radar**		
	Parameter	**Requirement**	State
	Frequency	0.4 to 6.0GHz	State
	Depth Measurement	Max: 26.6in (65mm)	State
	Temperature	Operation: 14 to 122 °F (-10 to 50 °C)	State
	Display	Any iPad (iPad OS 15 and later)	State
	Power Supply	(4) AA alkaline or rechargeable batteries	State
	Product Dimensions	Approximately (89 x 89 x 76mm)	State
	Estimated Weight	Approximately (8.16kg)	State
4.2.3	**Prestressed Concrete Cable Tension Measuring System (Load Cell)**		
4.2.3.1	State		
4.2.3.2	State		
4.2.3.3	State		
4.2.3.4	State		
4.2.3.5	State		
4.2.3.6	State		
4.2.3.7	State		
4.4	**DOCUMENTATION AND SUPPORT**		
4.4.1	**Warranty and training**		
4.4.1.1	Shall be backed by a minimum of 24 months factory warranty.		State
4.4.1.2	Shall provide free Technical support and software upgrade to KENYA POWER for a period of not less than 24 months.		state

4.4.1.3	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
4.4.1.4	Shall submit technical details for the Concrete Poles Test Tools & Equipment to the Kenya Power for approval before manufacture commences	state
5	Test Requirement	
5.1	Manufacturer's capabilities of inspections and testing	State
5.2	Copies of previous Test/calibration Reports A copy of the **accreditation certificate** and the **scope of accreditation**	Attach
6	Marking and Packing	
6.1	Marking	Specify
6.2	Packing	Specify
A	Test and inspection	
A.1	Responsibility of carrying out tests	State
A.2	Copies of Type Test Reports submitted with tender	Provide
A3	Test certificates and calibration certificates to be submitted by supplier to KPLC for approval before supply/delivery	Provide
A.4	Inspection at the stores and replacement of rejected items	State compliance
B	Quality Management System	
B.1	Quality Assurance Plan	Provide
B.2	Copy of ISO 9001:2015 Certificate	Provide
B.3	Delivery time of the equipment	Provide
	Manufacturer's experience	Provide
	Manufacturing Capacity (units per month)	Provide
	List of previous customers	Provide
	Customer reference letters	Provide
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	Documents to be submitted during delivery at the store	Provide
C.4	Demonstration	State
	Statement of compliance to specification (indicate deviations if any & supporting documents)	State compliance

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Manufacturer's Name, Signature, Stamp and Date