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Kenya Power

EXTENSION LADDER SPECIFICATION

A Document of the Kenya Power & Lighting Co. Plc

March 2024

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0.2 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

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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Head of Section, Standards Development	Head of Department, Standards
Signed:	Signed:
Date: 2024-03-18	Date: 2024-03-18

0.3 AMMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 2 Rev 1	2013-01-30	Cancels and replaces KP1/3CB/TSP/09/003 Issue 2 Rev 0 dated 2012-05-30 and all previous issues	S. Kimitei	G. Owuor
Issue 3 Rev 0	2024-03-18	Cancels and replaces KP1/3CB/TSP/09/003 Issue 2 rev 1 dated 2013-01-30 and all previous issues	Eng. B. Dianga	Dr. Eng. Peter Kimemia

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0.4 Forward

This specification has been prepared by the Standards Department in collaboration with Customer Service and Technical Audit, all of The Kenya Power and Lighting Company Limited (Kenya Power Plc) and it lays down requirements for Ladder Extension also referred to as Ladder Extending or Extension Ladder. It is intended for use by Kenya Power in purchasing ladders

Users of this KPLC specification are responsible for its correct interpretation and application.

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

Name	Department
James Wainaina	Technical Audit
Simon Kimitei	Technical Audit
Joseph Njoroge	Commercial Sales
Benson Dianga	Standards

1. SCOPE

1.1 This specification is for extension ladders for use by Linesmen along power lines, in substations, meter inspections and electrical installations.

1.2 This specification covers the following ladders: -

a) Extension Ladder, Wooden (Push-up/hand operated)
b) Extension Ladder, Reinforced Fibre Glass (Push-up/hand operated)
c) Telescopic Ladder ,Compact Reinforced Fibre Glass(Manually Collapsible)

1.3 The specification also covers inspection and test of the ladders as well as schedule of Guaranteed Technical Particulars to be filled, signed by the manufacturer and submitted for tender evaluation.

The specification stipulates the minimum requirements for ladders acceptable for use in the company and it shall be the responsibility of the supplier 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 ladders for The Kenya Power & Lighting Company.

The specification does not purport to include all the necessary provisions of a contract

2. REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this specification. Unless otherwise stated, the latest edition of the referenced documents (including any amendments) applies.

BS1129: British Standard Specification for Portable Timber Ladders, Steps, Trestles and Light Weight Stagings.

ANSI A 14.5: American National Standard for Ladders – Portable Reinforced Plastic – Safety Requirements.

3.0 TERMS AND DEFINITIONS

For the purpose of this specification, the definitions given in the reference standards shall apply.

4.0 REQUIREMENTS

4.1. SERVICE CONDITIONS

The ladder shall be suitable for continuous use outdoors in tropical areas at

i. altitudes of up to 2200m above sea level,
ii. humidity of up to 90%,
iii. average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C and
iv. heavy saline conditions along the coast.

4.2. DESIGN AND CONSTRUCTION

4.2.1 General Requirements (applicable to both Wooden and Fibre Glass Ladders)

4.2.1.1 The ladder shall be heavy-duty type designed and manufactured to be suitable for use by linesmen working on wooden poles and pre-stressed round concrete poles along power lines and other outdoor structures with overhead metering equipment

4.2.1.2 The ladder shall be suitable for heavy-duty applications where relatively high frequency and onerous conditions of use, carriage and storage occur. It shall withstand transportation on open lorries and on rough roads.

4.2.1.3 The ladder shall be either of the following;

(i) Extension Ladder, Wooden (Push-up/hand operated) and Extension Ladder, Reinforced Fibre Glass (Push-up/hand operated) with two sections with a closed length of 5.4m and extended length of at least 9.7m.

(ii) Telescopic Ladder ,Compact Reinforced Fibre Glass (Manually Collapsible)

4.2.1.4 The sections shall have provisions for securing against inadvertent closing and separation in the position of use.

4.2.1.5 Guide brackets shall be made of steel bolted type with lock nuts. Rivets shall not be used in the manufacture of the ladders.

4.2.1.6 The ladder shall be suitable for use where there is electrical hazard. Materials used shall withstand contact with transformer oil.

4.2.1.7 The fully extended ladder shall have a continuous working load of not less than 175kg. The working load includes the weight of the user, materials and tools that the ladder is to support for the intended use.

4.2.1.8 The spacing between ladder rungs shall be on 250 - 300mm centres.

4.2.1.9 Hardware and all steel parts used shall be protected against corrosion by hot dip galvanization to ISO 1461. Metals shall be so selected as to avoid galvanic action.

4.2.2 Wooden Ladder

In addition to the requirements in clause 4.2.1, wooden ladders shall comply with the following:

4.2.2.1 Design

a) The ladder shall be designed and manufactured to BS 1129 and the requirements of this specification.

b) The ladder shall be Class 1 as per BS 1129 suitable for heavy duty and industrial applications.

4.2.2.2 Materials

4.2.2.2.1 Species of Timber

a) The ladder shall be manufactured from timber complying with BS 1129. The species of timber as per BS 1129 includes Douglas fir, European redwood and western hemlock.

b) Stiles and rungs shall be of the same species of timber.

c) Laminated stiles shall not be accepted.

4.2.2.2.2 Quality of Timber

a) All timber shall be free from damage, fungal decay, insect attack and other defects.

b) Kiln dried timber shall be free from case-hardening and honeycombing.

c) Edges of sawn faces shall be so finished that there is no rough surface which might constitute a hazard for the hands of the user.

d) Rungs shall be free from knots.

e) The combined slope of grain shall be not steeper than 1 in 8 for Douglas fir and 1 in 10 for all other species, when determined in accordance with BS 1129.

f) Each stile shall be inspected visually for quality and finish before assembly.

4.2.2.2.3 Moisture content

The moisture content at the time of manufacture shall be in the range of 16% to 22%.

4.2.2.2.4 Other components and material

a) All components and material shall be to BS 1129.

b) Tie rods shall be of mild steel and be hot dip galvanized to ISO 1461.

c) Tie rods shall be threaded type and shall be not less than 3mm diameter with 4mm rolled threads and buttons.

d) Ladder buttons shall be pressed steel and be hot dip galvanized to ISO 1461.

4.2.2.2.5 Fittings

a) All metal fittings shall be of steel and be hot dip galvanized to ISO 1461.

b) All fittings shall be well finished and securely fitted.

c) Fixed and latching hooks shall be such that they bear evenly over a length of not less than 12mm along each end of the engaged rung.

d) Steel guide brackets shall have minimum cross section of 40mm x 6mm.

e) Steel guide brackets shall enclose one side and the back of the stile to which they are fixed and provide a bearing on the front of the sliding stile of not less than 75% of the stile width.

f) Steel guide brackets shall be properly formed with no tool marks that could affect their strength or performance and shall have all sharp corners removed. The internal radius of any bend shall be not less than the thickness of the material.

g) Each steel guide bracket shall be securely fitted by two bolts.

h) A pair of steel guide brackets shall be fitted to each section other than the top section.

4.2.2.3 Dimensions

The wooden ladders shall comply with the requirements in 4.2.1, 4.2.2.1, 4.2.2.2 and the following:

4.2.2.3.1 The stiles (side rails) shall not have steel reinforcement and the finished sizes of the stiles shall be not less than 89mm x 32mm (3½"x1¼") to compensate for the lack of reinforcement.

4.2.2.3.2 The ends of the stiles shall be suitably chamfered or rounded, and the edges shall have a small radius to remove the sharp corners.

4.2.2.3.3 The width between the inner surfaces of the stiles of the top section shall be 250mm – 300mm.

4.2.2.3.4 The width of the sections of extending ladders shall be such as to provide a minimum clearance consistent with the operation of the ladder and in no case greater than 6mm.

4.2.2.3.5 The ladder shall be so designed that, when it is fully extended, the minimum effective section to section overlap shall be 5t, where t is the spacing of rungs.

4.2.2.3.6 Rungs shall be circular and shall be a drive fit into their holes and shall not rotate.

4.2.2.3.7 The minimum diameter of the finished circular rung shall be 31mm as per clause 9.4.3 of BS 1129.

4.2.2.3.8 The ends of the circular rungs shall be shouldered end, housed full section into stile, finish flush with outside surface of stile.

4.2.2.3.9 The shouldered end shall have a diameter at a point of entry into the stile of between 28mm and 35mm. It shall be housed between 5mm and 8mm full section into the stile reducing thereafter to between 16mm and 22mm. In no case shall a shoulder butt closely against the inner face of the stile without housing.

4.2.2.3.10 Shouldered ends of rungs shall be finished flush with the surfaces of the stiles, or, if in blind holes, 6mm from the outer surfaces.

4.2.2.3.11 Rungs shall be uniformly spaced at centres of 250mm to 300mm except in case of the top and bottom rung which may be positioned at a distance of between 125mm and 300mm measured from the end of the stile to the centre of the nearest rung.

4.2.2.3.12 Steel tie rods shall be fitted immediately below every rung for rung reinforcement.

4.2.2.3.13 Any projection of tie-rods or washers above the surface of the stiles shall be smoothed off to prevent injury to the hands of the user.

4.2.2.3.14 All timber shall be machined on all surfaces and smoothly finished.

4.2.2.3.15 Finished products shall be of the minimum dimensions specified

4.2.2.3.16 Finished products shall be free from wind or twist and shall not be painted.

4.2.2.3.17 The finished products shall be treated with two coats of varnish which shall not conceal the grain of the timber.

4.2.2.3.18 In order to avoid injuries; accessible edges, corners and protruding parts shall be free from burrs and shall be rounded. The side rails (stiles) shall be designed and constructed in a manner that protects the ends from splits.

4.2.3 Reinforced Extension Fibre Glass Ladder

4.2.3.1 The side rails shall be manufactured from high quality reinforced glass fibre (GRP) of long life, high temperature resistance and complying with ANSI A 14.5.

4.2.3.2 The side rails shall be at least 75mmx25mm box section.

4.2.3.3 The rungs shall be Aluminium alloy with square 30mmx30mm section (minimum) and anti-slip coating.

4.2.3.4 The insulation between two steps shall be at least 30kV (test performed after immersion in water for 24hours).

4.2.3.5 The ladder shall have high mechanical resistance to bending and twisting, high fire resistance and high resistance against bad weather, ultraviolet radiation and corrosive elements.

4.2.3.6 The surfaces shall be smooth and no fibres shall be exposed.

4.2.3.7 Both ends of the ladder shall be provided with anti-skid devices.

4.2.4 Reinforced Compact Telescopic Fibre Glass Ladder

4.2.4.1 The ladder shall be made from non conductive insulation epoxy resin fiberglass of long life, high temperature resistance and complying with ANSI A 14.5.

4.2.4.2 Shall be Extendable and lockable using the thumb buttons for steps that won't slip down while in use.

4.2.4.3 The ladder shall be retractable from its extended height to maximum dimensions shown on the table 1 below.

4.2.4.4 The ladder shall have provisions for latching on the support poles on any structure for stable support during use

4.2.4.5 The ladder shall have wide anti-slip treads to ensure stability and avoid slipping and tipping over when in use.

4.2.4.6 The ladder shall have wear resistant non slip foot pad

4.2.4.7 The ladder shall have heavy duty straps to secure the collapsed dimensions during storage.

4.2.4.8 Maximum design width of the ladder shall be 0.5m

Table 1: Working dimensions of the compact Fibre Reinforced telescopic ladder

Minimum Telescopic Height(m)	Maximum Retractable Height(m)
2.0	0.8
2.5	0.9
3.5	1.0

Minimum Telescopic Height(m)	Maximum Retractable Height(m)
4.0	1.1
4.5	1.5
5.0	1.7
6.0	1.8

4.3 QUALITY MANAGEMENT SYSTEM

4.3.1 The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the ladder 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.

4.3.2 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.

4.3.2 The bidder shall indicate the delivery time of the ladders, 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 ladders 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.

5 TESTS AND INSPECTION

5.1 The ladder shall be inspected and tested in accordance with the requirement of BS 1129 (Wooden Ladders), ANSI A-14.5 (Fibre Glass Ladders) and this specification. It shall be the responsibility of the supplier to perform or to have performed all the tests specified.

5.2 Each type of ladder shall withstand the Simulated In-use Inclined Load Test in accordance with ANSI A 14.5 for the design working load.

5.3 Copies of previous 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. The accreditation certificate for the third party testing laboratory shall also be submitted with the tender (all in English Language).

5.4 Test Reports for the Ladders to be supplied under the contract shall be submitted to The Kenya Power & Lighting Company for approval before shipment/delivery.

5.5 The ladders shall be inspected and tested as per this specification before acceptance to The Kenya Power & Lighting Company stores. The supplier shall replace any ladders which fail to meet any of the requirements during inspection/test at stores or when used.

6.0 MARKING AND PACKING

6.1 The ladders shall be packed in standard steel containers in such a manner to avoid damage during transportation.

6.2 The ladders shall be marked in a permanent manner with the following information (in English Language):

a) Standard to which the ladder complies

b) Name of manufacturer

c) Type of ladder (description of type, number and length of ladder sections)

d) Year and month of manufacture and serial number

e) Maximum permissible loading

f) The words "Property of The Kenya Power & Lighting Co"

g) The class and duty rating e.g. class 1-industrial

Note: The words "Property of The Kenya Power & Lighting Co" shall be engraved permanently on each section of each type of ladder while the other parameters shall be marked on a permanent label.

6.3 The ladders shall be provided with a separate permanent label displaying advice to the user. The advice shall be on a background coloured blue.

7. DOCUMENTATION

7.1 The bidder shall submit its tender complete with technical documents required by Annex A (Guaranteed Technical Particulars) for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:

a) Guaranteed Technical Particulars 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) Manufacturer's letter of authorization, ISO 9001:2015 certificate and other technical documents required in the tender.

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

a) Guaranteed Technical Particulars signed by the manufacturer;
b) Design Drawings with details of ladders to be manufactured for KPLC. The details shall include species of timber, timber processing and manufacturing process flow chart;
c) Quality assurance plan (QAP) that will be used to ensure that the 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
d) Detailed test program to be used during factory testing;
e) Marking details and method to be used in marking the ladders;
f) 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 ladders for The Kenya Power & Lighting Company;
g) Packaging details (including packaging materials).

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

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ANNEX Guaranteed Technical Particulars

(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, four customer reference letters, details of manufacturing capacity, the manufacturer's experience and copies of complete type test reports for tender evaluation, all in English Language)

Tender No. .....

Clause	Clause number	Bidder's offer (indicate full details of the offered ladders for each requirement of the specification)
	Manufacturer's Name and address	State
	Country of Manufacture	State
	Bidder's Name and address	State
	1. Scope	
1.1	Application	State
1.2	Ladder Type	State
1.3	Design Compliance	State
2	Applicable Standards	State
3	Terms & Definitions	State
4	**Requirements**	
4.1	Service Conditions	State
4.2	**Design and Construction**	
4.2.1	General requirements	State
4.2.1.1	Areas of applications and use	Specify
4.2.1.2	Ruggedness and resistance to damage on frequent use, handling and storage	State
4.2.1.3	Telescopic design of the ladder	specify
4.2.1.4	Provision for security during use	specify

Clause	Clause number	Bidder's offer (indicate full details of the offered ladders for each requirement of the specification)
4.2.1.5	Fastening methodology. No reverts	specify
4.2.1.6	Nature of insulation and IP protection provisions	specify
4.2.1.7	Load bearing thresholds	State
4.2.1.8	Rung spacing design and dimensions(clearances)	State
4.2.1.9	Protection of metallic and steel parts to ISO 1461	State
4.2.2	**Wooden Ladder**	
4.2.2.1	Design standards	specify
4.2.2.2	**Materials**	
4.2.2.2.1	Timber type, and Standard of manufacturing	State
4.2.2.2.2	Quality of Timber: Workmanship and treatment	State
4.2.2.2.3	Moisture content	State
4.2.2.2.4	Standards of Compliance and Other components and materials	State
4.2.2.2.5	**Fittings**	
a)	Galvanizing metallic Parts	State
b-c)	Hooks and Fittings	State
d	Dimension of guide brackets	State
e-h	Design of Steel Guide	State
4.2.2.3	**Dimensions**	
4.2.2.3.1	Design of guides and side rails	State
4.2.2.3.2	Design of stiles edges	State
4.2.2.3.3	Dimensions of stiles	State
4.2.2.3.4	Clearance of extension slide operations	State
4.2.2.3.5	Extension overlap dimensions	State
4.2.2.3.6-8,11	Design of rungs	State
4.2.2.3.9-10	Design of Shoulder butt	State
4.2.2.3.9-12	Placement of steel tie	State
4.2.2.3.9-13-	General Ladder assembly design	State

Clause	Clause number	Bidder's offer (indicate full details of the offered ladders for each requirement of the specification)
4.2.2.3.9-18		
4.2.3	**Reinforced Extension Fiber Glass Ladder**	
4.2.3.1	Material of manufacture	State
4.2.3.2	Side rail dimensions	State
4.2.3.3	Rungs design and material	State
4.2.3.4	Insulation levels of the rungs, Test results	State
4.2.3.5	Fiber resistance levels	State
4.2.3.6-7	Design of surfaces and ends	State
4.2.4	**Reinforced Compact Fiber Glass Ladder**	
4.2.4.1	Material of manufacture	State
4.2.4.2	Mode of operation	State
4.2.4.3	Size reduction mechanism,	State
4.2.4.4-5	Mode of security and latching provisions	State
4.2.4.6	Protection of foot pads	State
4.2.4.7	Provision for security for storage	State
4.2.4.8	Width dimensions	State
4.3	**Quality Management Systems**	
	Quality Assurance Plan	Provide
	Copy of ISO 9001:2015 Certificate	Provide
	Manufacturer's experience	Provide
	Manufacturing Capacity(units per month)	Provide
	List of Previous customers	Provide
	Customer reference letters	Provide
5.1-5.2	Test standards and responsibility of carrying out tests	Provide
5.3	Copies of Type Test Reports submitted with tender	Provide
5.4	Test reports to be submitted by supplier to KPLC for approval	Provide
5.5	Inspections and Replacement of rejected insulating loves.	Specify
6.1	Packings	Specify
6.2	Marking Details	Specify
6.3	Manual or advise to user	Specify

Clause	Clause number	Bidder's offer (indicate full details of the offered ladders for each requirement of the specification)
7.1	Documents submitted with tender	Provide
7.2	Documents to be submitted by supplier to KPLC for approval before manufacture	Provide
7.3	Material on recommendations for use, care, storage and routine inspection/testing procedures,	Provide

Notes to Bidders

i. Bidders shall give full details and the offered diagrams of extension ladders as per GTP Checklist The details provided shall conform to the test reports and their certificates, well labelled drawings complete with dimensions, catalogues and/or brochures for the purposes of tender evaluation.

ii. Bidder who shall have not complied by this requirement in bullet 1 above shall automatically be disqualified from bidding for this item

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

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Manufacturer's Name, Signature, Stamp and Date