

DOCUMENT NO.: KP1/13D/4/1/TSP/09/043-11



Kenya Power

SPECIFICATION FOR LIVE LINE TOOLS

Part 11: Rubber Insulating Gloves, Rubber insulating sleeves, Flexible line hose, Couplers and Cotton liners.

**A Document of the Kenya Power & Lighting Co. Plc
May 2022**

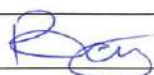
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TITLE:

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LINE TOOLS**
**Part 11: Rubber Insulating
Gloves, Rubber insulating sleeves,
Flexible line hose, Couplers and
Cotton liners.**

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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?ffFolderId=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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Users are reminded that by virtue of Section 25 of the Copyright Act, 2001 (Revised 2009) Cap 130 of the Laws of Kenya copyright subsists in all KPLC Standards and except as provided under Section 26 of this Act, no KPLC Standard produced by KPLC may be reproduced, stored in retrieval system by any means without prior permission from the Managing Director & CEO, KPLC.

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0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 1 Rev 0	2022-05-13	New Issue	John Ng'ang'a	Eng. Simon Kimiti

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FOREWORD

This specification has been prepared by the Standards Department in collaboration with Network Management Division, both of The Kenya Power and Lighting Company Plc (KPLC) and lays down requirements for Liveline items. It is intended for use by KPLC in purchasing these items.

This Specification was prepared to establish and promote uniform requirements for Rubber Insulating Gloves, Rubber Insulating Sleeves, Flexible Line hose, Couplers and Cotton Liners to be used by Kenya Power and Lighting Company Plc in medium voltage overhead lines.

This Specification stipulates the minimum requirements for the items acceptable for use in the company and it shall be the responsibility of the supplier and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, and exhibits good workmanship and good engineering practice in the manufacture.

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

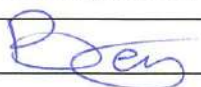
The following are members of the team that developed this specification:

Name	Division
Richard Kioko	Network Management
John Ngángá	Institute of Energy Studies and Research Division

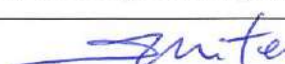
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1. SCOPE

- 1.1. This Specification is for Rubber Insulating Gloves, Rubber Insulating Sleeves, Flexile Line hose, Couplers and Cotton Liners
- 1.2. The specification stipulates minimum requirements, inspection and tests of the items as well as schedule of Guaranteed Technical Particulars.

2. NORMATIVE REFERENCES

The following standards contain provisions, 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 15493:2003	Plastics piping systems for industrial applications -- Acrylonitrile-butadiene-styrene (ABS), unplasticized poly (vinyl chloride) (PVC-U) and chlorinated poly (vinyl chloride) (PVC-C) -- Specifications for components and the system -- Metric series
ASTM F712-06:	Standard test methods and specifications for electrically insulating plastic guard equipment for protection of workers
ASTM F712-88:	Standard Test Methods for Electrically Insulating Plastic Guard Equipment for Protection of Workers
ASTM D149:	Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies ²
OSHA Regulation	1910.269: Part J: Live Line Tool
ISO 2808	Paints and Varnishes-Determination of film thicknesses
ISO 6158:	Metallic and other inorganic coatings—Electrodeposited coatings of chromium for engineering purposes
ISO 9001:2015	Quality management systems – Requirements.

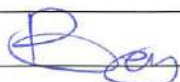
3. DEFINITIONS

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

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IEC: International Electro-Technical Commission
ISO: International Standards Organization
OSHA: Occupational Safety and Health Administration
ASTM: American Society for Testing and Materials
ABS: Acrylonitrile butadiene styrene
PVC: Polyvinyl Chloride

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1 The items shall be suitable for use in tropical areas and harsh climatic conditions including areas exposed to:

- a) At altitudes of up to 2200m above sea level and humidity of up to 95%,
- b) Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C, in direct sunlight,
- c) Pollution: Design pollution level to be taken as “Heavy” (Pollution level III) for inland and “Very Heavy” (Pollution level IV) for coastal applications in accordance with IEC 60815.
- d) Isokeraunic levels of up to 180 thunderstorm days per year.

4.1.2 Approach & Insulation Distance Information

MAD = Minimum Approach Distance is the minimum air gap or summation of air gaps measured between any part of the operator and live electrical apparatus. Detailed information can be found in OSHA guidelines in Table R-6 of the Federal Register. An extraction from the standard for minimum distances based on ideal circumstances is tabulated in table 1.

Table 1: Live Working Recommended Minimum Distances at a Glance

Nominal Voltage AC (kV) Auto-reclose Distance	Minimum Approach Distance (MAD)	
	Phase to Earth	Phase to Phase
	OFF (mm)	OFF (mm)
11	800	950
33	800	1100
66	900	1300
132	1200	1900
220	1700	2800

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4.2. DESIGN AND CONSTRUCTION

4.2.1. Flexible Line Hose 17kV

- 4.2.1.1. Line hose shall be designed in the connector end style, which is similar to the straight style except that it shall have a molded connector permanently affixed to one end of the line hose.
- 4.2.1.2. Flexible line hose shall be made and tested to ASTM D-1050.
- 4.2.1.3. Flexible line hose shall be made of ozone/corona- resistant thermoplastic elastomer.
- 4.2.1.4. Flexible line hose shall be made such that it offers protection to workers from accidental contact with conductors.
- 4.2.1.5. The maximum operating voltage for the line hose shall be 17kV.
- 4.2.1.6. The inside diameter of the line hose shall be 40mm.
- 4.2.1.7. The length of the line hose shall be 915mm.

4.2.2. Flexible Line Hose 36kV

- 4.2.2.1. Flexible line hose shall be made such that it offers offer protection to workers from accidental contact with conductors.
- 4.2.2.2. Flexible line hose shall be made of ozone/corona- resistant thermoplastic elastomer.
- 4.2.2.3. Flexible line hose shall be made and tested to ASTM D-1050.
- 4.2.2.4. Line hose shall be designed in the extended lip style with major outward extending lips. It shall have a molded connector permanently affixed to one end of the line hose.
- 4.2.2.5. The maximum operating voltage for the line hose shall be 36kV.
- 4.2.2.6. The inside diameter of the line hose shall be 40mm.
- 4.2.2.7. The length of the line hose shall be 1372mm.

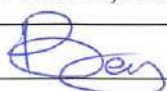
4.2.3. Line Hose Coupler 36kV

- 4.2.3.1. Line hose coupler shall be made such that it offers protection to workers from accidental contact with conductors.
- 4.2.3.2. Line hose coupler shall be made of ozone/corona- resistant thermoplastic elastomer.
- 4.2.3.3. Line hose coupler shall be made and tested to ASTM D-1050.
- 4.2.3.4. Line hose coupler shall be suitable for the coupling of extended –lip flexible line hose.
- 4.2.3.5. The maximum operating voltage for the line hose coupler shall be 36kV.

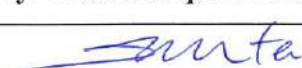
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4.2.3.6. The inside diameter of the line hose shall be approximately 50mm.

4.2.3.7. The length of the line hose coupler shall be approximately 267mm.

4.2.4. Rubber Insulating Gloves

4.2.4.1. Rubber insulating gloves shall be made such that it offers protection to workers from accidental contact with electrically charged equipment.

4.2.4.2. Rubber insulating gloves shall be made and tested to ASTM D120 or EN 60903 standards.

4.2.4.3. Rubber insulating gloves shall be made for use in high voltage installations up to 36kV phase to phase.

4.2.4.4. Rubber insulating gloves shall be made with straight cuff and standard lengths of 16" (406mm) or 18" (457mm).

4.2.4.5. The following information shall be marked at an appropriate location on the Rubber insulating gloves: -

- a. Class (maximum voltage),
- b. Size,
- c. Color,
- d. Standard,
- e. Type,
- f. Manufacture.

4.2.4.6. The material for Rubber insulating gloves shall be ozone resistance synthetic rubber.

4.2.5. Rubber Insulating Sleeves

4.2.5.1. Rubber Insulating Sleeves shall be made such that it offers protection to workers from accidental contact with electrically charged equipment by extending the coverage of the arm from the cuff of the Rubber insulating glove.

4.2.5.2. Rubber Insulating Sleeves shall be made and tested to ASTM D1051.

4.2.5.3. Rubber Insulating Sleeves shall be made for use in high voltage installations up to 36kV phase to phase.

4.2.5.4. Rubber Insulating Sleeves shall be made with Extra-curve.

4.2.5.5. The following information shall be marked at an appropriate location on the Rubber insulating gloves: -

- a. Class (maximum voltage),
- b. Size,
- c. Color,
- d. Standard,

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- e. Type,
- f. Manufacture.

4.2.5.6. The material for Rubber insulating sleeves shall be ozone resistance synthetic rubber.

4.2.5.7. The dimensions of the rubber Insulating Sleeves shall be as per table 2 and figure 1.

Table 2: Sizing Linemen's Sleeves

A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)
Regular			
26.5 (673)	15.5 (394)	12.25 (311)	5.25 (146)
Large			
27.75 (705)	16 (406)	12.87 (327)	6.87 (175)
Extra Large			
29.5 (749)	17.5 (445)	12.87 (327)	7 (178)

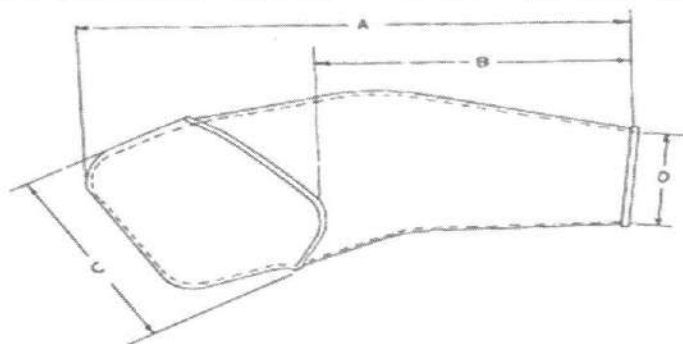


Fig 1: Curved arm sleeve

4.2.6. Cotton Glove Liners

- 4.2.6.1. Cotton glove liners shall be made of 100% cotton for warmth and comfort under rubber gloves.
- 4.2.6.2. Cotton glove liners shall be one size fit most.
- 4.2.6.3. Cotton glove liners shall be made reversible to fit either hand.

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Fig 2: Typical Glove liners

5. TESTS REQUIREMENTS

The Rubber Insulating Gloves, Rubber Insulating Sleeves, Flexible Line hose, Couplers and Cotton Liners shall be inspected and tested in accordance with the provisions of this specification and applicable standards.

6. MARKING AND PACKING

6.1. All hoses shall be permanently marked with a manufactures trademark and a serial number on a top part of the hose for traceability in English Language.

- a) Identity of the manufacturer
- b) Type reference number
- c) The standard of manufacture
- d) The words "PROPERTY OF KPLC".

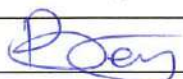
6.2. PACKAGING

- 6.2.1. The items shall be packed in such a manner to avoid damage during transportation and storage.
- 6.2.2. The items shall be packaged in a waterproof storage bags that help guard against contaminants and abrasion. This shall help maintain the insulating properties of items.
- 6.2.3. The bags shall be of yellow heavy-duty vinyl-impregnated fabrics that last for years of rugged service.
- 6.2.4. Snaps, rubber closures and custom-tailored pockets shall be provided to fit the appropriate tools supplied together with the sticks.
- 6.2.5. The following information shall be printed on a suitable label firmly attached to each packaging:
 - a) Purchase order number/tender
 - b) Manufacturer's name
 - c) Year of manufacture

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d) Insulated hand tools catalog number

e) The words, "PROPERTY OF KENYA POWER & LIGHTING CO.

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APPENDICES

A. TESTS AND INSPECTION (Normative)

- A.1 It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified in ASTM F712 -06 & 88, ASTM D149 and OSHA Regulation 1910.269: Part J standards and this specification. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.
- A.2 Copies of Type Test Certificates and Type Test Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate to ISO/IEC 17025 for the testing laboratory shall also be submitted. Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Laboratory that carried out the tests.

Tests shall include:

Type Tests

Electrical tests

- a) Electrical test after water conditioning test
- b) Dielectric strength of internal insulation test
- c) Electrical test after mechanical age

Mechanical tests

- a) Dye penetration test
- b) Durability of marking

Chemical Analysis of the materials

- A.3 The items shall be subject to factory acceptance tests at the manufacturer's works before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Plc (KPLC).

Tests to be witnessed shall include:

Routine Tests

- a) Visual and dimensional checks
- b) Durability of marking
- c) Dye penetration test

Electrical tests

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- a) Electrical test after water conditioning test
- b) Dielectric strength of internal insulation test
- c) Electrical test after mechanical age

Mechanical tests

- a) Bending test
- b) Torsion test
- c) Crushing test on tube
- d) Mechanical ageing tests

Specific tests

- a) Operating rod functioning test
- b) Tension strength of the connecting clamp tests
- c) Tightening capability test.

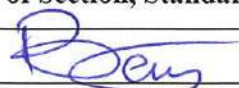
- A.4 On receipt of the items, KPLC will perform any of the tests specified in order to verify compliance with this specification. The supplier shall replace without charge to KPLC the items which upon examination, test or use, fail to meet any of the requirements in the specification.

B. QUALITY MANAGEMENT SYSTEM (Normative)

- B.1 The bidder shall submit a quality assurance plan (QAP) that will be used to ensure that the items design, material, workmanship, tests, service capability, maintenance and documentation, will fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2015.
- B.2 The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001 certificate shall be submitted with the tender for evaluation.
- B.3 The bidder shall indicate the delivery time of each type of items, manufacturer's monthly & annual production capacity and experience in the production of the type of item being offered. A detailed list and contact addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for exact or similar rating items sold in the last five years shall be submitted with the tender for evaluation.

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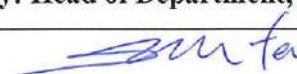
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C. DOCUMENTATION (Normative)

- C.1 The bidder shall submit its tender complete with technical documents required by Appendix E (Guaranteed Technical Particulars) for tender evaluation. The documents to be submitted (all in English language) for tender evaluation shall include the following:
- Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacturer,
 - Copies of the manufacturer's catalogues, brochures, drawings and manuals,
 - Sales records for the last five years and at least four customer reference letters, three outside the country of manufacture,
 - Details of manufacturing capacity and the manufacturer's experience,
 - Copies of required type test certificates and type test reports by a third party testing laboratory accredited to ISO/IEC 17025,
 - Copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory,
 - Manufacturer's warranty and guarantee,
 - Manufacturer's letter of authorization, copy of the manufacturer's ISO 9001:2015 certificate, and Testing Laboratory's ISO 17025 certificate.
- C.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company Plc for approval before manufacture:
- Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacturer,
 - Design drawings,
 - Operation manuals and brochures shall be submitted,
 - 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 9001:2015,
 - Detailed test program to be used during factory testing,
 - Marking details and method to be used in marking the items,
 - 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 current loggers for The Kenya Power & Lighting Company Plc,
 - Packaging details (including packaging materials and marking and identification of batches).

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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	KPLC requirement	Bidder's offer
	Manufacturer's Name and address	Specify
	Country of Manufacture	Specify
	Bidder's Name and address	Specify
1.	Scope	Specify
1.1-1.2		
2.	Applicable Standards	Specify
3.	Terms & Definitions	Specify
4.	Requirements	
4.1	Service Conditions	Specify
4.1.1- 4.1.2		
4.2	Design and Construction	
4.2.1	Flexible Line hose 17kv	
4.2.1.1	Line hose shall be designed in the connector end style, which is similar to the straight style except that it shall have a molded connector permanently affixed to one end of the line hose	Specify
4.2.1.2	Flexible line hose shall be made and tested to ASTM D-1050	Specify
4.2.1.3	Flexible line hose shall be made of ozone/corona- resistant thermoplastic elastomer.	Specify
4.2.1.4	Flexible line hose shall be made so as to offer protection to workers from accidental contact with conductors	Specify
4.2.1.5	The maximum operating voltage for the line hose shall be 17kv.	Specify
4.2.1.6	The inside diameter of the line hose shall be approx. 40mm	Specify
4.2.1.7	The length of the line hose shall be approx.915mm	Specify
4.2.2	Flexible Line hose 36kv	
4.2.2.1	Flexible line hose shall be made so as to offer protection to workers from accidental contact with conductors	Specify
4.2.2.2	Flexible line hose shall be made of ozone/corona- resistant thermoplastic elastomer.	Specify
4.2.2.3	Flexible line hose shall be made and tested to ASTM D-1050	Specify

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Clause number	KPLC requirement	Bidder's offer
4.2.2.4	Line hose shall be designed in the extended lip style with major outward extending lips. It shall have a molded connector permanently affixed to one end of the line hose	Specify
4.2.2.5	The maximum operating voltage for the line hose shall be 36kv.	Specify
4.2.2.6	The inside diameter of the line hose shall be approx. 40mm	Specify
4.2.2.7	The length of the line hose shall be approx.1372mm	Specify
4.2.3	Line Hose coupler 36kv	
4.2.3.1	Line hose coupler shall be made so as to offer protection to workers from accidental contact with conductors	Specify
4.2.3.2	Line hose coupler shall be made of ozone/corona- resistant thermoplastic elastomer.	Specify
4.2.3.3	line hose coupler shall be made and tested to ASTM D-1050	Specify
4.2.3.4	Line hose coupler shall be suitable for the coupling of extended –lip flexible line hose	Specify
4.2.3.5	The maximum operating voltage for the line hose coupler shall be 36kv.	Specify
4.2.3.6	The inside diameter of the line hose shall be approx. 50mm	Specify
4.2.3.7	The length of the line hose coupler shall be approx.267mm	Specify
4.2.4	Rubber Insulating Gloves	
4.2.4.1	Rubber insulating gloves shall be made so as to offer protection to workers from accidental contact with electrically charged equipment	Specify
4.2.4.2	Rubber insulating gloves shall be made and tested to ASTM D120 or EN 60903 standards	Specify
4.2.4.3	Rubber insulating gloves shall be made so as to be used for works at voltages up to 36kv phase to phase	Specify
4.2.4.4	Rubber insulating gloves shall be made with straight cuff and the following standard lengths 16''(406mm) or 18''(457mm)	Specify
4.2.4.5	Rubber insulating gloves shall be marking	Specify
4.2.4.6	Rubber insulating gloves shall be made from synthetic rubber which is ozone resistance	Specify
4.2.5	Rubber Insulating Sleeves	
4.2.5.1	Rubber Insulating Sleeves shall be made so as to offer protection to workers from accidental contact with electrically charged equipment by extending the coverage of the arm from the cuff of the Rubber insulating glove	Specify
4.2.5.2	Rubber Insulating Sleeves shall be made and tested to ASTM D1051	Specify
4.2.5.3	Rubber Insulating Sleeves shall be made so as to be used for works at voltages up to 36kv phase to phase	Specify
4.2.5.4	Rubber Insulating Sleeves shall be made with Extra-curve	Specify

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Date: 2022-05-18

TITLE:

**SPECIFICATION FOR LIVE
LINE TOOLS**

**Part 11: Rubber Insulating
Gloves, Rubber insulating sleeves,
Flexible line hose, Couplers and
Cotton liners.**

Doc. No. KP1/13D/4/1/TSP/09/043
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Issue No. 1

Revision No. 0

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Clause number	KPLC requirement	Bidder's offer
4.2.5.5	Rubber Insulating Sleeves markings	Specify
4.2.5.6	Rubber Insulating Sleeves shall be made from synthetic rubber which is ozone resistance	Specify
4.2.5.7	The dimensions of the Linemen rubber Insulating Sleeves	Specify
4.2.6	Cotton Glove Liners	
4.2.6.1	Shall be made of 100% cotton for warmth and comfort under rubber gloves	Specify
4.2.6.2	Shall be one size fit most	Specify
4.2.6.3	Shall be made reversible to fit either hand	Specify
5	Test Requirements	State
6	Marking and Packing	
6.1	Marking on items	Specify
6.2	Packaging	Specify
6.3	Marking on packaging	Specify
A	Tests and Inspection	
A.1	Responsibility of carrying out tests	State
A.2	Copies of Type Test Reports submitted with tender	State
A.3	Acceptance tests to be witnessed by KPLC at factory before shipment	State
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	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	List
C.2	Documents to be submitted by supplier to KPLC for approval before manufacture	List
	Statement of compliance to specification	Provide

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Manufacturer's Name, Signature, Stamp and Date

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