



TITLE:
**SPECIFICATION FOR
PERSONAL PROTECTIVE
EQUIPMENT-
INDUSTRIAL BOOTS**

Doc. No.	KP1/6C.1/13/TSP/01/012-1
Issue No.	1
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**Part 1: Protective Rubber
Knee Boots**

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0.1 Circulation List

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0.2 Amendment Record

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FOREWORD

This specification has been prepared by the Standards Department in collaboration with the Human Resource Services Department, and Safety, Health & Environment Department (SHE) all of The Kenya Power and Lighting Company Ltd (Kenya Power) and The Kenya Electrical Trade & Allied Workers Union (KETAWU). The specification lays down requirements for Personal Protective Equipment – protective rubber knee boots. It is intended for use by Kenya Power in purchasing the items.

The supplier shall submit information which confirms satisfactory service experience with products which fall within the scope of this specification.

1.0. SCOPE

- 1.1. This document specifies requirements for lined industrial vulcanized-rubber knee-height boots reinforced with protective steel toe caps known as protective rubber knee boots, for men and women working in KPLC.
- 1.2. This specification also covers test for the industrial protective rubber boots reinforced with protective steel toe caps for use by workmen in heavy metal industries and where the floor is covered with water, chemicals, oil, grease, waxes, lubricants etc.
- 1.3. The specification stipulates the minimum requirements for personal protective equipment – protective rubber knee boots 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 items for The Kenya Power & Lighting Company.

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

2.0. REFERENCES

The following standards contain provisions which, through reference in this text constitute provisions of this specification. Unless otherwise stated, the latest editions (including amendments) apply.

ISO 2023: Rubber footwear - Lined industrial vulcanized-rubber boots – Specification

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- ISO 37: Rubber, vulcanized or thermoplastic -Determination of tensile stress-strain properties.
- ISO 5081: Textiles -- Woven fabrics -- Determination of breaking strength and elongation (Strip method)
- ISO 48: Rubber, vulcanized or thermoplastic -- Determination of hardness (hardness between 10 IRHD and 100 IRHD)
- ISO 188: Rubber, vulcanized - Accelerated ageing or heat-resistance tests.
- ISO 2781: Rubber, vulcanized or thermoplastic -- Determination of density
- BS EN 12568: Foot and leg protectors. Requirements and test methods for toecaps and penetration resistant inserts
- IS 5557: Industrial and Protective Rubber Knee and Ankle Boots

3.0. Terms and Definitions

- 3.1 The definitions given in the reference standard for each item shall apply.
- 3.2 Kenya Power Logo – As per sample available with Human Resource & Administration Division, Kenya Power.

4.0. Requirements

4.1. Operating Conditions

The protective rubber knee boots shall be suitable for use in industrial work, outdoors in tropical climate with temperatures between -1 to 45°C.

4.2. Design requirements

4.2.1. Design

The protective rubber knee boots shall be made of rubber with fabric lining as shown in Fig. 1, Fig. 2 and Fig. 3 respectively. The sole and heel shall be of anti-slip design or as agreed to between the purchaser and the supplier. The boot shall be an oil resistant type industrial protective knee boot as shown in the Fig. 1.

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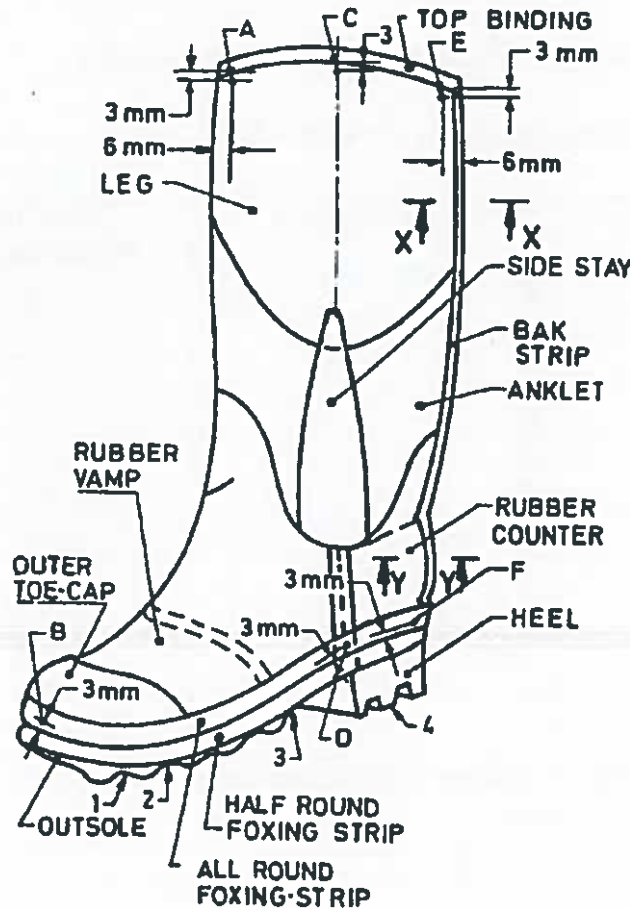
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4.2.2. Sizes

The protective rubber knee boots shall be made in sizes 5 to 12 conforming to fittings as prescribed in "Paris point 38 to 48.

4.2.3. Thickness

The minimum thickness (rubber and fabric) of the boots for the various parts and components as indicated in drawings shall meet the requirements, as prescribed in Table 1.



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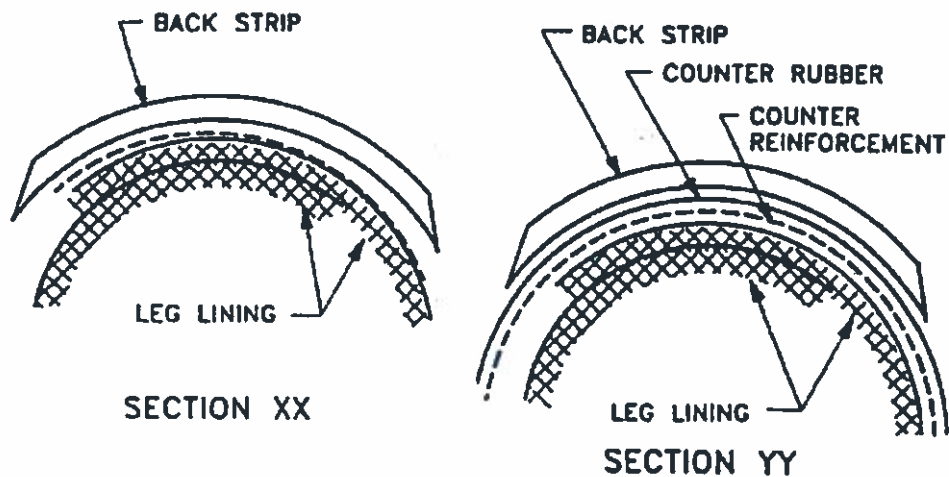


Fig. 1 industrial protective rubber knee boots

Table 1 Thickness at Various Parts of the Boots

Parts of Boot	Position in Figures	Minimum Thickness, mm
Leg	A	1.5
	B	3.5
	C	1.5
	D	3.5
	E	1.5
	F	4.0
Outsole	1-At cleat	8.0
	2-Between cleat	2.0
	3-At waist	2.0
	4-Heel with cleat	22.0
Insole	-	2.5
Packing and filler*	-	1.5

* - 1. Packing and filler, in moulded construction boots, may not be required to be provided
2. To be measured at green stage

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4.2.4. Materials

4.2.4.1. Rubber components

The rubber components of the boots shall be nonporous and homogeneous. These shall comply with the physical requirements as prescribed in Table 2.

Table 2 Physical requirements of rubber components

Characteristics	Upper	Outer sole and heel	Method of test
Relative density , max	1.4	1.2	ISO 2781
Hardness (IRHD)*	55±5	60±5	ISO 48
Change in initial hardness: After accelerated ageing at 100±2°C for 24h (IRHD)	-	+5 -0	ISO 188
Tensile strength, MPa, min	-	8	ISO 37
Elongation at break, %, min	-	200	ISO 37
Change in tensile strength after accelerated ageing at 100±2°C for 24h	-	+10 -0	ISO 188
Change in elongation at break in %	-	+5 -25	ISO 37

4.2.4.2. Fabric

4.2.4.2.1. The upper shall consist of reinforcing fabric liner at leg, made of cotton or man-made fabric or a suitable blend. Breaking load in warp and weft direction shall not be less than 1000 N and 550 N respectively when tested in accordance with ISO 5081.

4.2.4.2.2. The reinforcing fabric for vamp and counter shall have a breaking load of 550 N in both warp and weft direction when tested in accordance with ISO 5081.

4.2.4.2.3. The insole will be made out of cotton fabric having minimum breaking load of 1000 N at warp and 550N at weft, when tested in accordance with ISO 5081. Insole fabric will be lined with suitable rubber compound/rubber sponge compound of rubber compound mixed with cotton flock.

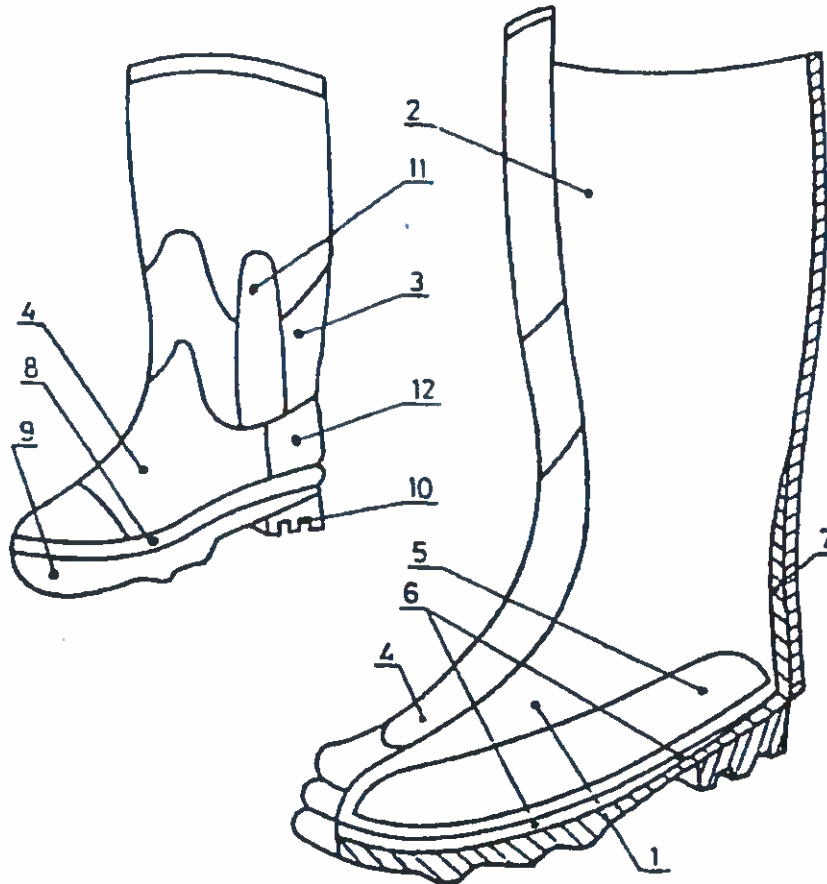
4.2.5. Construction

4.2.5.1. Various components of the boots are to be prepared from the materials as prescribed in Fig. 1, Fig. 2, Fig. 3 and Table 3. Fabric used as inner lining of the footwear shall be

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coated with rubber compound at one side and fabric used for reinforcement will be coated with rubber at both sides. Toe shall be fortified with protective steel toe cap with sponge as inside lining and as shown in Fig. 3.

4.2.5.2. Boots shall be made in vulcanized or moulded process or both.



- | | |
|---------------|----------------------|
| 1 Feet lining | 7 Heel reinforcement |
| 2 Leg lining | 8 Foxing strip |
| 3 Anklet | 9 Outsole |
| 4 Rubber vamp | 10 Heel |
| 5 Insole | 11 Sidestay |
| 6 Filling | 12 Rubber counter |


Fig. 2 General location of parts

NOTE 1: Illustrations show the general location of parts, all of which are not necessarily included in the construction or implied in the specification. In the case of moulded boots, the terms indicate a particular area of the boot, rather than a separate part.

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NOTE 2 -This illustration is diagrammatic only and is not intended to illustrate detail of design.

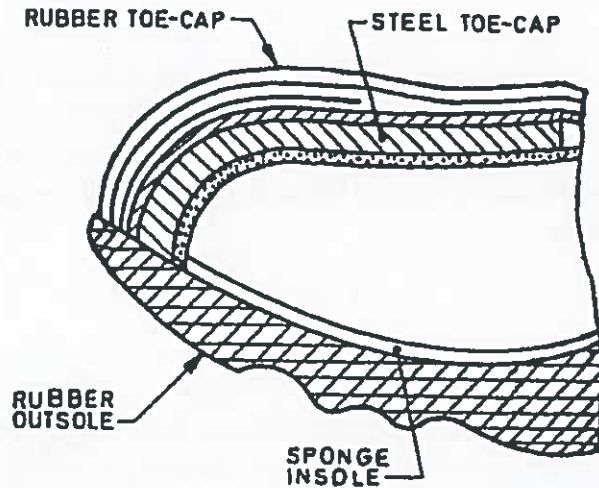


Fig. 3 Cross-section of toe of a boot fitted with protective steel toe-cap

Table 3 Material Requirement for Industrial Protective Rubber Boots

Components	Material
Leg	Inside fabric/Outside rubber
Vamp	Inside fabric/Outside rubber
Counter	Rubber fabric
Inner reinforcement at vamp	Rubber or rubberized fabric
Heel piece	Rubber
Outer toe cap	Rubber
Back strip	Rubber
Foxing strip	Rubber
Top binding	Rubber
Insole	Outside fabric, inside rubber or sponge or suitable rubber compound
Filler	Rubber or rubber with fabric composition
Outer sole	Rubber
Heel	Rubber
Counter reinforcement or back strengthening piece	Rubber or rubberized fabric
Anklet	Rubber
Toe cap	Shall conform to BS EN 12568:2010

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4.3. Physical Requirements

4.3.1. Heat treatment

All rubber components shall be capable of withstanding, without developing any sign of brittleness or tackiness when aged at 100 ~ 2°C at atmospheric pressure, in an air oven, for a period of 24 h in accordance with the method prescribed in ISO 188. On completion of the test the rubber face shall not show any sign of brittleness, tackiness, cracking or damage when viewed with unaided eye.

4.3.2. Composite strength

The strength of the composite upper when tested in accordance with method as prescribed below shall be such that it withstands a minimum average breaking load of 300 N in both directions at vamp and 500 N being minimum average breaking load in both directions at upper (leg):

- a) From the upper (leg) and vamp portions of the boot, representative sample of width 25 * 0.5 widths is to be cut along the length of the boot of enough length so as to make it convenient to allow a distance of minimum 25 mm between the jaws of the tensile testing machine.
- b) Rate of traverse of the pulling jaw shall be 100* 10mm, *min*. Three pieces from each direction will be required to be obtained from the made up footwear and will be subjected to test to break each test piece. Mean value of results for each size are to be taken for record.

4.3.3. Flexing endurance

The vamp portion of upper and sole shall withstand continuous flexes as prescribed in Table 4 and when tested in accordance with Annex E of ISO 2023:1994, the samples for flexing endurance shall be taken after the same samples are aged and tested and conform to the requirements prescribed in clause 4.3.1

Table 4 Number of flex cycles for boot upper and sole

Part of individual test pieces	No. of flexes, min	Result
Upper (Vamp portion)	125,000	No crack
Outsole	60,000	No initial crack

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4.3.4. Leakage resistance test

- 4.3.4.1. Finished boots will be sealed from the top and will be subjected to minimum pressure of 15kN/ m² and will be immersed in water. Boots will be immersed in a manner that 75 mm from the top of the boot will remain outside the water for a minimum duration of 2 min and will be examined for escape of air, and there shall be no leakage.
- 4.3.4.2. There will be no wet feeling inside the boot and no seepage of water will take place.

4.3.5. Consolidation test

- 4.3.5.1. The **individual adhesion value** for consolidation test noted /recorded shall be not less than 15N (1.5kgf) for each of the test pieces.
- 4.3.5.2. In case of dead load method rate of separation should not be more than 25 mm/minute. Max.

4.3.6. Performance test

When boots are subjected to the impact as per prescribed method given in Annex C of IS 5557 (2004) for examining the protective factor of the boots, they shall be considered to have passed the test, if the clearance inside the boots at the moment of maximum depression is subjected to impact is 13.5 mm, *Min* or more for size 8 and there will be increase and decrease of impact value by 0.5 mm for every size of increase and decrease respectively.

4.3.7. Height of the boots

In absence of any agreement between the purchaser and the supplier, height of the boots shall be as per Table 4. The heights shall be measured on the inside at the back of the boot from the insole upwards, including any flexible extension.

Table 4 - Boot heights
Dimensions in millimetres

Measurement	Height	
	Men's	Women's
Ankle	115 to 179	115 to 152
Half knee	180 to 239	153 to 203
Short knee	240 to 329	204 to 279
Knee	330 to 429	280 to 380

NOTE - Agreement between the interested Parties on the nominal boot height and permitted tolerances is common commercial practice.

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4.3.8. Resistance to oil

The protective rubber knee boots, shall be required to comply with the test as prescribed and when tested in accordance with the method as prescribed in Annex E of IS 5557 (2004), the increase in volume shall be no greater that 15 percent.

4.4. QUALITY MANAGEMENT SYSTEM

- 4.4.1. The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the requirements for protection, ergonomic characteristics, innocuousness, mechanical properties, marking of the protective rubber knee boots, will fulfil the requirements stated in the contract documents, standards, specifications and regulations.
- 4.4.2. The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications shall be submitted with the tender for evaluation.
- 4.4.3. 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 protective rubber knee boots 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 protective rubber knee boots shall be inspected and tested in accordance with ISO 2023, ISO 37, ISO 5081, ISO 48, ISO 188, ISO 2781, IS 5557 and the requirements of this specification. It shall be the responsibility of the supplier to perform or to have performed all the tests specified.
- 5.2. Copies of previous **Test Reports confirming full conformity to clause 4 for the protective shoes 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).

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5.3. Test Reports for the protective rubber knee boots to be supplied under the contract shall be submitted to The Kenya Power & Lighting Company for approval before shipment/delivery and shall include all the tests in clause 4.2 and 4.3 on the following parts:

- a) Heat treatment tests
- b) Composite strength tests
- c) Flexing endurance tests
- d) Leakage resistance tests
- e) Consolidation tests
- f) Performance tests
- g) Confirmation of height of boots
- h) Determination of breaking force of laces
- i) Determination of resistance to abrasion of laces
- j) Determination of thickness
- k) Resistance to oil tests
- l) Tests on rubber and fabric as per Table 2 and clause 4.2.4.2 respectively.

5.4. The protective rubber knee boots shall be subject to acceptance tests at the manufactures' works before dispatch. Acceptance tests (routine & sample tests) will be witnessed by two Tender Processing Committee (TPC) members appointed by The Kenya Power and Lighting Company Limited (KPLC). Routine and sample test reports for the protective rubber knee boots to be supplied shall be submitted to KPLC for approval before shipment of the goods.

5.5. Tests to be witnessed by KPLC Engineers at the factory before shipment shall be in accordance with ISO 2023, ISO 37, ISO 5081, ISO 48, ISO 188, ISO 2781, IS 5557 and this specification and shall include:

- a) Performance tests
- b) Confirmation of height of boots
- c) Determination of breaking force of laces
- d) Determination of resistance to abrasion of laces
- e) Determination of thickness

5.6. On receipt of the boots KPLC 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 KPLC, boots which upon examination, test or use fail to meet any of the requirements in the specification.

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6. MARKING AND PACKING

6.1. Marking

Each item of protective rubber knee boots shall be indelibly and legibly marked, for example by embossing or branding. All markings shall be given on the insole/leg lining fabric legibly with suitable ink. They shall be as follows:

- (i) Brand/Trade name of the manufacturer, manufacturer's or supplier's identification mark;
- (ii) Name of the item, month and year of manufacture,
- (iii) Batch number and license number,
- (iv) Standard Mark,
- (v) Each article of footwear shall be indelibly and legibly marked with the following:
- (vi) Size, stamped on the inside or moulded or impressed on the waist of the Outsole;
- (vii) Country of origin;
- (viii) The number of this International Standard, stamped on the Inside of the boot;
- (ix) The words, "**Property of KPLC**" are to be marked on the insole/leg lining legibly with suitable ink.

6.2. Packaging

- 6.2.1. The right and left boots of each pair shall be packed in a suitable container as agreed to between the purchaser and the supplier.
- 6.2.2. The packaging in which the protective rubber knee boots is sold or is to be sold shall have indelibly printed on it or otherwise permanently affixed to it, clearly and prominently displayed, the information required by clause 6.1.

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 the manufacturer's experience;

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- e) Copies of required test reports by a third party testing laboratory accredited to ISO/IEC 17025 and a copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory;
- f) Manufacturers letter of authorization, QMS certificate and other technical documents required in the tender.
- g) Packaging details (including packaging materials).
- h) General information
Protective rubber knee boots shall be supplied to the customer with information written in English language. All information shall be unambiguous. The following information shall be given:
 - (i) Name and full address of the manufacturer and/or his authorized representative;
 - (ii) Notified body involved in type examination; for category III products the notified body involved with article 11;
 - (iii) Number and year of the standard;
 - (iv) Explanation of any pictograms, markings and levels of performance. A basic explanation of the tests that have been applied to the footwear, if applicable;
 - (v) Instructions for use:
 - Tests to be carried out by the wearer before use, if required;
 - Fitting; how to put on and take off the footwear, if relevant;
 - Application; basic information on possible uses and, where detailed information is given, the source;
 - Limitations of use (e.g. temperature range, etc.);
 - Instructions for storage and maintenance, with maximum periods between maintenance checks (if important, drying procedures to be defined);
 - instructions for cleaning and/or decontamination;
 - Obsolescence deadline or period of obsolescence;
 - If appropriate, warnings against problems likely to be encountered (modifications can invalidate the type approval, e.g. orthopaedic footwear);
 - If helpful, additional illustrations, part numbers etc.
 - (vi) Reference to accessories and spare parts, if relevant;
 - (vii) The type of packaging suitable for transport, if relevant.

7.2. The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the protective rubber knee boots to KPLC store.

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Tender No.

Clause number	KPLC requirement		Bidder's offer
Manufacturer's Name and address			Specify
Country of Manufacture			Specify
Bidder's Name and address			Specify
Model / Catalogue number			
1.	Scope		Specify
2.	Standards of manufacture		Specify
3.	Terms & Definitions		Specify
4.1	Operating Conditions		Specify
4.2	Design requirements		
4.2.1	Design	As shown in fig 1,2 & 3	Specify
4.2.2	Sizes	Sizes 5 to 11 conforming to fittings prescribed in "Paris point 38 to 48	Specify
4.2.3	Thickness	As prescribed in Table 1	Attached a design drawing
	Materials	Rubber components for Upper	Relative density , max Hardness (IRHD)*
		Rubber components for Outer sole and heel	Relative density , max Hardness (IRHD)*
			Change in initial hardness: After accelerated ageing at 100±2°C for 24h (IRHD)
			Tensile strength, MPa, min
			Elongation at break, %, min
			Change in tensile strength after accelerated ageing at 100±2°C for 24h
	Change in elongation at break in %		
Fabric	Upper breaking load in warp and weft direction	Shall not be less than 1000 N and 550 N respectively	Prove compliance
			Specify and attach test report

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Clause number	KPLC requirement		Bidder's offer
	Vamp and counter	Breaking load in warp and weft direction >550N	Prove compliance
	Insole breaking load in warp and weft direction	Shall be 1000 N and 550 N respectively	Prove compliance
Construction	Materials of various components	As prescribed in Fig. 1, Fig. 2, Fig. 3 and Table 3	Specify
		Process of manufacture	Shall be made in vulcanized or moulded process or both
	Material requirement for parts industrial protective rubber boots	Leg	Specify
		Vamp	Specify
		Counter	Specify
		Inner reinforcement at vamp	Specify
		Heel piece	Specify
		Outer toe cap	Specify
		Back strip	Specify
		Foxing strip	Specify
		Top binding	Specify
		Insole	Specify
		Filler	Specify
		Outer sole	Specify
		Heel	Specify
Counter reinforcement or back strengthening piece	Specify		
Anklet	Specify		
Physical Requirements	Heat treatment	As prescribed in ISO 188	Prove compliance
	Composite strength	withstand a minimum average breaking load: 300 N in both directions at vamp 500 N in both directions at upper (leg)	Prove compliance
Flexing endurance	No. of continuous flexes for Upper (Vamp portion)		Specify and attach test report
	No. of continuous flexes for Outsole		
Leakage resistance test			
Individual adhesion value		>15N (1.5kgf)	Prove compliance
Dead load method rate of separation		< 25 mm/minute. max.	Prove compliance
Performance test		As per Annex C of IS 5557 (2004)	Prove compliance

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Signed:

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Date: 2015-10-12

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TITLE:
SPECIFICATION FOR PERSONAL PROTECTIVE EQUIPMENT- INDUSTRIAL BOOTS
Part 1: Protective Rubber Knee Boots

Doc. No.	KP1/6C.1/13/TSP/01/012-1
Issue No.	1
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Date of Issue	2015-10-12
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Clause number	KPLC requirement	Bidder's offer	
Height of the boots	Ankle	Man	specify
		Woman	
	Half knee	Man	specify
		Woman	
	Short knee	Man	specify
		Woman	
	Knee	Man	specify
		Woman	
Resistance to oil	The increase in volume <15 %	Prove compliance	
4.5	Quality Management System	Provide	
	Quality Assurance Plan	Provide	
	Copy of ISO 9001:2008 Certificate	Provide	
	Manufacturer's experience	Provide	
	Manufacturing Capacity (units per month)	Provide	
	List of previous customers	Provide	
	Customer reference letters	Provide	
5.1	Test standards and responsibility of carrying out tests	Provide	
5.2	Copies of Type Test Reports submitted with tender	Provide	
5.3	Acceptance tests to be witnessed by KPLC at factory before shipment	Provide	
5.4	Test reports to be submitted by supplier to KPLC for approval before shipment	Provide	
5.5	Replacement of rejected Protective Rubber Knee Boots	Provide	
6.1	Markings	Provide	
6.2	Packing	Provide	
7.1	Documents submitted with tender	Provide	
7.2	Documents to be submitted by supplier to KPLC for approval before manufacture	Provide	
8.0	Statement of compliance to specification	Provide	

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Manufacturer's Name, Signature, Stamp and Date

NOTE:

The Guaranteed Technical Particulars (GTP), test reports & their certificates, drawings and/or catalogues shall form the basis of technical tender evaluation. Bidders shall ensure that the offered values for the item conform to the values in the test reports and their certificates, drawings, catalogue references and/or brochures. Failure to adhere by this requirement shall lead to automatic disqualification at the technical evaluation stage.

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