



TITLE:
SPECIFICATION FOR HEAD PROTECTION – INDUSTRIAL SAFETY HELMET FOR GENERAL USE

Part 1: Without Earmuffs

Doc. No.	KP1/6C/13/TSP/01/025-1
Issue No.	1
Revision No.	0
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0.1 Circulation List

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FOREWORD

This specification has been prepared by the Standards Department in collaboration with Human Resource & Administration Department; Safety, Health & Environment Department (SHE) of The Kenya Power and Lighting Company Limited (KPLC/Kenya Power) and The Kenya Electrical Trade & Allied Workers Union. The specification lays down requirements for – Head Protection – Industrial Safety Helmet. It is intended for use by Kenya Power in purchasing these items.

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

1. SCOPE

- 1.1. This specification lays down the requirements regarding material, construction, and performance requirements of helmets intended to provide protection against falling objects hence consequential brain injury and skull fracture and other hazards which may be encountered in power line construction projects and similar other industrial occupations.
- 1.2. The specification also covers inspection and test of the industrial safety helmets as well as schedule of Guaranteed Technical Particulars to be filled, signed by the manufacturer and submitted for tender evaluation.
- 1.3. The specification stipulates the minimum requirements for the industrial safety helmets 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 helmet for The Kenya Power & Lighting Company.
- 1.4. 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 editions (including amendments) apply.

BS EN 397: Specification for industrial safety helmets

BS EN 960: Head-forms for use in the testing of protective helmets

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3. TERMS AND DEFINITIONS

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

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

The industrial safety helmets shall be suitable for use outdoors in tropical climate with temperatures between -1 °C to +45 °C without any deleterious changes occurring.

4.2. MATERIALS AND CONSTRUCTION

4.2.1. Material

The materials used shall be of durable quality, i.e. their characteristics shall not undergo appreciable alteration under the influence of ageing or of circumstances of use to which the helmet is normally subjected (exposure to sun, rain, cold, dust, vibrations, contact with the skin, effects of sweat or of products applied to the skin or hair).

4.2.1.1. **Shell** — the shell of the helmet shall be made of nonmetallic materials conforming to test requirements given in clause 4.4.

4.2.1.2. **Harness** — the criteria for the selection of material for the headband, anti-concussion tape, etc., is that these shall be sweat-resistant, non-irritant and shall not cause skin disease.

4.2.1.3. **Metal Parts** — the metal parts used in helmets shall be either inherently corrosion resistant or of such metal which have been treated for these properties. Such parts shall show no sign of corrosion when subjected to test.

4.2.1.4. **Sweatband** - the material(s) of the sweatband shall be absorbent and shall satisfy the following characteristics:

- a) Thickness: 0.8 mm minimum;
 - b) pH value: 3.5 minimum;
 - c) Washable material content: 6 % maximum;
- And, if made from leather:
- d) Proportion of dichloromethane extractable materials: 4 to 12 %

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4.2.2. Construction

- 4.2.2.1. The helmet shall be designed, manufactured and tested in accordance with BS EN 397 and BS EN 960 and shall include at least a shell, a harness and a sweatband to improve wearer comfort.
- 4.2.2.2. There shall be no sharp edge, roughness or projection on any part of the helmet, its accessories or attachment devices, which are in contact, or potential contact, with the wearer, when the helmet is worn, such as is likely to cause injury to the wearer.
- 4.2.2.3. Any part of the helmet which can be adjusted, or removed by the wearer for the purpose of replacement, shall be so designed and manufactured as to facilitate adjustment, removal and attachment without the use of tools.
- 4.2.2.4. Any adjustment system incorporated within the helmet shall be so designed and manufactured as not to become incorrectly adjusted without the wearer's knowledge under the foreseeable conditions of use.
- 4.2.2.5. The shell shall have a uniform strength and shall not be specially reinforced at any point. This does not exclude a gradual increase in shell thickness or ribs or means for attaching the harness or accessories, but does exclude other highly localized reinforcement.
- 4.2.2.6. The shell shall cover the upper part of the head and extend down to at least the level of the upper edge of the headband at the front of the helmet.
- 4.2.2.7. Helmets should be as light as possible without prejudicing design strength and efficiency. No part of the helmet should have sharp protruding edges and the outer surface of the shell should be smoothly finished.
- 4.2.2.8. For improved comfort, the cradle shall be made from textile tapes which affords optimum accommodation of the shape of the wearer's head, and is more acceptable with regard to perspiration and irritation.
- 4.2.2.9. The design of the helmet shall provide for maximal adjustment of the harness within the shell, in order to optimize wearer comfort.
- 4.2.2.10. Any devices fitted to the helmet shall be so designed that they are unlikely to cause any injury to the wearer in the event of an accident. In particular, there should be no metallic or other rigid projections on the inside of the helmet such as might cause injury.

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4.2.2.11. Where stitching is used to secure the harness to the shell, it shall be protected against abrasion.

4.2.2.12. Where ventilation holes are provided, it shall be noted that ventilation may be improved when fresh air is able to enter the helmet around its lower edge and to exit via holes in the shell located in the upper one third of the shell.

4.3. PHYSICAL REQUIREMENTS

4.3.1. External vertical distance

When measured under the conditions given in clause 6.5 of BS EN 397:1995, the external vertical distance shall be not more than 80 mm.

4.3.2. Internal vertical distance

When measured under the conditions given in clause 6.5 of BS EN 397:1995, the internal vertical distance shall be not more than 50 mm. See Figure 1.

4.3.3. Internal vertical clearance

When measured under the conditions given in clause 6.5 of BS EN 397:1995, the internal vertical clearance shall be not less than 25 mm. See Figure 1.

4.3.4. Horizontal distance

When measured under the conditions given in clause 6.5 of BS EN 397:1995, the horizontal distance at the front and sides of the helmet shall be not less than 5 mm.

4.3.5. Wearing height

Provision shall be made for the wearing height to be adjustable. When measured under the conditions given in clause 6.5 of BS EN 397:1995 the wearing height at the front or sides of the helmet shall be not less than:

- (i) 80 mm for helmets mounted on head-form D;
- (ii) 85 mm for helmets mounted on head-form G;
- (iii) 90 mm for helmets mounted on head-form K.

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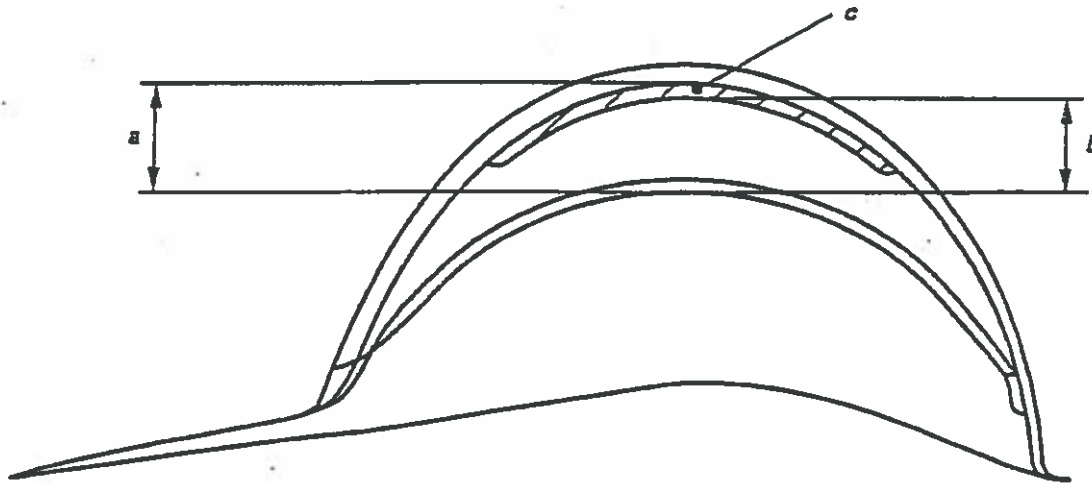
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a = Internal vertical distance
 b = Internal vertical clearance
 c = Padding

Figure 1 — Internal vertical distance and internal vertical clearance

4.3.6. Harness

A harness shall include a headband and nape strap.

4.3.6.1. Headband/nape strap

The length of the headband or the nape strap shall be adjustable in increments of not more than 5 mm.

NOTE: *The angle which the nape strap makes with the edge of the shell may be adjustable. This may be achieved by angular adjustment of the headband within the shell. This provision may improve helmet retention.*

4.3.6.2. Cradle

If the cradle incorporates textile tapes, their individual widths shall be not less than 15 mm, and the total of the widths of the tapes radiating from their intersection shall be not less than 72 mm.

4.3.6.3. Comfort band or sweatband

A sweatband shall cover the inner front surface of the headband for a length of not less than 100 mm each side of the centre of the forehead. The length shall be measured with a flexible measure along a line 10 mm ±1 mm above the lower edge

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of the headband. The sweatband shall have a width not less than that of the headband over the length which it covers.

4.3.6.4. Chin strap

Either the helmet shell or the headband shall be fitted with a chin strap or with means of attaching one. Any chin strap supplied with the helmet shall be not less than 10 mm wide when untensioned and shall be attached either to the shell or to the headband.

4.3.6.5. Ventilation

4.3.6.5.1. The position of ventilation holes shall be such that the central axis of the holes is almost horizontal when the helmet is in normal wearing position. The diameter of any hole shall not exceed 6 mm nor the edges of adjacent holes closer than 15 mm.

4.3.6.5.2. The minimum number of holes on each of the two sides shall be not less than 3 and the total area of such holes shall be not less than 150 mm² and not more than 450 mm².

NOTE 1: Means of closing the ventilation holes shall be provided.

NOTE 2: If such means are provided, the holes shall be opened to the maximum extent when the above measurement is performed.

4.3.6.6. Accessories

For the fixing of helmet accessories, specified in the information accompanying the helmet, in accordance with clause 6.1, the required fixing devices, or appropriate holes in the helmet shell, shall be provided by the helmet manufacturer.

4.4. PERFORMANCE REQUIREMENTS

4.4.1. Shock absorption

When a helmet is tested by the method given in clause 6.6 of BS EN 397:1995, the force transmitted to the head-form shall not exceed 5.0kN. This requirement shall be satisfied by helmets treated in accordance with the appropriate conditioning processes given in clause 6.2 of BS EN 397:1995.

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4.4.2. Resistance to penetration

When a helmet is tested by the method given in clause 6.7 of BS EN 397:1995, the point of the striker shall not contact the surface of the head-form. This requirement shall be satisfied by helmets treated in accordance with the appropriate conditioning processes given in clause 6.2 of BS EN 397:1995,

4.4.3. Flame resistance

When tested by the method given in clause 6.8 of BS EN 397:1995, the materials of the shell shall not burn with the emission of flame after a period of 5 s has elapsed after removal of the flame.

4.4.4. Chin strap anchorages

When tested in accordance with 6.9 of BS EN 397:1995, the artificial jaw shall be released at a force of not less than 150 N and not more than 250 N, due to failure only of the anchorage(s).

4.4.5. Electrical properties

When tested by all three of the methods given in clause 6.10 of BS EN 397:1995, the leakage current shall not exceed 1.2 mA.

NOTE

1. *This requirement is intended to provide protection to the wearer against short term, accidental contact with live electrical conductors at voltages upto 440 V a.c.*
2. *Test 1 is intended to simulate closely the in-use situation — that is, the leakage current to the wearer via a live conductor touching the shell.*
3. *Test 2 is dependent upon the transverse resistance of the complete shell (thickness). This effectively precludes the use of a metal shell and of metal fasteners or ventilation holes passing through the shell.*
4. *Test 3 is dependent only upon the surface resistance of the shell, and effectively precludes the use of shells which have a conductive surface (e.g. metal electro-plating). This test was deemed to be necessary in order to obviate the danger to the wearer should he try to remove a helmet whose shell was in contact with a live conductor.*

Helmets claimed to meet this requirement (for all 3 tests) shall state this fact on the label attached to the helmet, in accordance with clause 6.1.

4.4.6. Lateral deformation

When tested by the method given in clause 6.11 BS EN 397:1995, the maximum lateral deformation of the helmet shall not exceed 40 mm, and the residual lateral deformation

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shall not exceed 15 mm. Helmets claimed to meet this requirement shall state this fact on the label attached to the helmet, in accordance with clause 6.1.

4.4.7. Molten metal splash

When tested by the method given in clause 6.12 BS EN 397:1995, the helmet shell shall not:

- (i) Be penetrated by the molten metal;
- (ii) Show any deformation, measured at right angles to the base plane of the helmet, greater than 10 mm;
- (iii) Burn with the emission of flame after a period of 5 s has elapsed after the pouring of molten metal has ceased. Helmets claimed to meet this requirement shall state this fact on the label attached to the helmet, in accordance with clause 6.1.

4.5. SIZES

- 4.5.1. Helmets shall be in sizes 520, 530, 540, 550, 560, 570, 580, 590 and 600 mm. These sizes may be generated out of one or more shells or one or more headbands. The size adjustment range shall be clearly marked on the helmet. A tolerance of ± 10 mm on the size of the headband shall be permitted.

NOTE — *the size of the headband shall be measured with either a fixed ring gauge or an expanding gauge which shall be made of metal or by an appropriate head-form.*

4.5. QUALITY MANAGEMENT SYSTEM

- 4.5.1. 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 industrial safety helmets, will fulfill the requirements stated in the contract documents, standards, specifications and regulations.
- 4.5.2. The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications shall be submitted with the tender for evaluation.

5. TESTS AND INSPECTION

- 5.1. The industrial safety helmets shall be inspected and tested in accordance with BS EN 397, BS EN 960 and the requirements of this specification. It shall be the responsibility of the supplier to perform or to have performed all the tests specified.

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- 5.2. Copies of previous Test Reports confirming conformity to clause 4 for the protective gloves for motorcycle riders 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).
- 5.3. Test Reports for the industrial safety helmets to be supplied under the contract shall be submitted to The Kenya Power & Lighting Company for approval before shipment/delivery.
- 5.4. The industrial safety helmets 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 industrial safety helmets to be supplied shall be submitted to KPLC for approval before shipment of the goods.
- 5.5. On receipt of the industrial safety helmets, 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, industrial safety helmets which upon examination, test or use fail to meet any of the requirements in the specification

6. MARKING AND PACKING

6.1. Marking

Every helmet that complies with the requirements of this specification shall carry moulded or impressed marking giving the following information in English Language:

- The standard of manufacture;
- Name or identification mark of the manufacturer;
- Year and quarter of manufacture;
- Type of helmet (manufacturer's designation). This shall be marked on both the shell and the harness;
- Size or size range (in millimetres). This shall be marked on both the shell and the harness;
- Abbreviation for the material of the shell in accordance with ISO 472. (For example, ABS, PC, HDPE, etc.);
- Electrical insulation properties i.e. 440 V AC;
- Lateral deformation LD capacity;
- Molten metal splash MM characteristics;
- The latest approved Kenya Power and Lighting Company (KPLC) logo in blue and yellow colour (at the front top symmetrically positioned).

NOTE: All markings shall be done at the factory during manufacturing.

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6.2. Packing

6.2.1. Industrial safety helmets shall be suitably packed in polyethylene envelopes to avoid scratching against each other before packing them in cartons. Each carton shall contain 50 helmets.

6.2.2. A label shall be attached to each helmet package giving the following information, provided precisely and comprehensively in English Language:

- a) The name and address of the manufacturer.
- b) Instructions or recommendations regarding adjustment, fitting, use, cleaning, disinfection, maintenance, servicing and storage. Substances recommended for cleaning, maintenance or disinfection shall have no adverse effect on the helmet and shall not be known to be likely to have any adverse effect upon the wearer, when applied in accordance with the manufacturer's instructions.
- c) Details of suitable accessories and appropriate spare parts.
- d) The significance of the requirements complied with and given in accordance with 6.1, and guidance regarding the limits of use of the helmet, corresponding to the respective risks.
- e) Guidance regarding the obsolescence deadline or period of obsolescence of the helmet and its component parts.
- f) Guidance regarding details of the type of packaging suitable for transportation of the helmet.
- g) "For adequate protection this helmet must fit or be adjusted to the size of the user's head.
- h) The helmet is made to absorb the energy of a blow by partial destruction or damage to the shell and the harness, and even though such damage may not be readily apparent, any helmet subjected to severe impact shall not be used again for this purpose.
- i) The attention of users is also drawn to the danger of modifying or removing any of the original component parts of the helmet, other than as recommended by the helmet manufacturer. Helmets should not be adapted for the purpose of fitting attachments in any way not recommended by the helmet manufacturer.
- j) Do not apply paint, solvents, adhesives or self-adhesive labels, except in accordance with instructions from the helmet manufacturer."
- k) The letters, "**Property of KPLC**".

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 fully filled and signed by the manufacturer;

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- b) Copies of the Manufacturer's catalogues, brochures, drawings and technical data;
- c) Sales records and 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 testing laboratory.
- g) Manufacturer's warranty and guarantee
- h) Manufacturer's letter of authorization, copy of the manufacturer's ISO 9001:2008/ KEBS Diamond mark 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,
- b) Design Drawings and construction details of the industrial safety helmets,
- c) Quality assurance plan (QAP) that will be used to ensure that the industrial safety helmets 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 9001:2008
- d) Detailed test program to be used during factory testing,
- e) Marking details and method to be used in marking the industrial safety helmets,
- 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 industrial safety helmets for The Kenya Power & Lighting Company
- g) Packaging details.

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 industrial safety helmets to KPLC stores.

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ANNEX A: 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, the manufacturer's experience and copies of complete type test reports for tender evaluation, all in English Language)

Tender No.

Clause number	KPLC requirement		Bidder's offer (indicate full details of the offered for the industrial safety helmets)	
Manufacturer's Name and address			specify	
Brand name or designation			specify	
Country of Manufacture			specify	
Bidder's Name and address			specify	
1.	Scope		specify	
1.1-1.3				
2.	Applicable Standards	BS EN 397, BS EN 960 or equivalent	specify	
3.	Terms & Definitions		specify	
4.	REQUIREMENTS		specify	
4.1	Service Conditions	No deleterious changes at -20 ⁰ C to +50 ⁰ C	specify	
4.2	Design & Construction			
4.2.1	Materials properties	Durable quality, no change due to ageing	Show proof by stating materials used conforming to the attributes	
	4.2.1.1 - Shell	Nonmetallic passing all tests of clause 4.4		
	4.2.1.2 - Harness	Sweat resistant, non-irritant, causes no skin disease		
	4.2.1.3 – Metal parts	Corrosion resistant		
	4.2.1.4 - Sweatband	Absorbent material	Attach test reports	
		Thickness		>0.8mm
		pH value		>3.5
		Washable material content		>6 %
		Proportion of dichloromethane extractable materials	4 – 12 %	
4.2.2	Construction	4.2.2.1	Shall consist of shell, harness and sweatband	Show proof by stating materials used conforming to the attributes
		4.2.2.2	No sharp edges, roughness or projections	
		4.2.2.3	Adjustable	
		4.2.2.4	Shell with uniform strength and no reinforcement	
		4.2.2.5	Shell shat fit upper part of head correctly	
		4.2.2.6	Shall be light in weight	

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	4.2.2.7	Cradle made of textile tape for comfort						
	4.2.2.8	Maximum adjustment of harness						
	4.2.2.9	No injury to wearer						
	4.2.2.10	Stitching if present shall be protected from abrasion						
	4.2.2.11	Ventilation holes for fresh air						
4.3	Physical requirements							
4.3.1	External vertical distance	< 80 mm	Attach test reports as a proof of conformity					
4.3.2	Internal vertical distance	< 50 mm						
4.3.3	Internal vertical clearance	>25 mm						
4.3.4	Horizontal distance	>5 mm						
4.3.5	Wearing height as per BS EN 970	<table border="1"> <tr> <td>mounted on head-form D</td> <td>>80 mm</td> </tr> <tr> <td>mounted on head-form G</td> <td>>85 mm</td> </tr> <tr> <td>mounted on head-form K</td> <td>>90 mm</td> </tr> </table>		mounted on head-form D	>80 mm	mounted on head-form G	>85 mm	mounted on head-form K
mounted on head-form D	>80 mm							
mounted on head-form G	>85 mm							
mounted on head-form K	>90 mm							
4.3.6	Harness	Shall include headband and nape strap	Attach test reports as a proof of conformity					
4.3.6.1	Headband/nape strap	Adjustable in increments of		< 5mm				
4.3.6.2	Cradle	Material		Textile tapes				
		Width		>15 mm				
		Tape width		>72 mm				
4.3.6.3	Comfort band/sweat band	Length on each side		>100 mm				
		Width		>15 mm				
4.3.6.4	Chin strap	Width		>10 mm				
4.3.6.5	Ventilation	Hole diameter	< 6 mm					
		Inter-hole distance	< 15 mm					
		Number of holes on each side	>3					
		Total area of holes	$150 \leq x \leq 450 \text{ mm}^2$					
4.3.6.6	Accessories	As specified in clause 6.1						
4.4	Performance requirements							
4.4.1	Shock absorption	Force transmitted to the head <50kN	Attach test reports as per BS EN 397:1995 or equivalent to confirm					
4.4.2	Resistance to penetration	As per clause 6.2 of BS EN 397:1995						
4.4.3	Flame resistance	As per clause 6.8 of BS EN 397:1995						
4.4.4	Chin strap resistance	As per clause 6.9 of BS EN 397:1995						

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Signed:	Signed:
Date: 2015-08-03	Date: 2015-08-03



**TITLE:
SPECIFICATION FOR HEAD
PROTECTION – INDUSTRIAL
SAFETY HELMET FOR GENERAL
USE**

Part 1: Without Earmuffs

Doc. No.	KP1/6C/13/TSP/01/025-1
Issue No.	1
Revision No.	0
Date of Issue	2015-08-03
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Clause number	KPLC requirement		Bidder's offer (indicate full details of the offered for the industrial safety helmets)
4.4.5	Electrical characteristics	As per clause 6.10 of BS EN 397:1995	conformity performance tests
4.4.6	Lateral deformation	As per clause 6.11 of BS EN 397:1995	
4.4.7	Molten metal splash	As per clause 6.12 of BS EN 397:1995	
4.5	Sizes	Between 520, 530, 540, 550, 560, 570, 580, 590 and 600 mm Tolerance - ± 10 mm	Specify
4.6	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 industrial safety helmets		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

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

NOTE:

*The **Guaranteed Technical Particulars (GTP)** 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, 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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