

**DOCUMENT NO.: KP1/13D/4/1/TSP/10/113**



**MATERIALS FOR FABRICATION OF MCB BOXES FOR USE IN DISTRIBUTION  
TRANSFORMERS – SPECIFICATION**

A Document of the Kenya Power & Lighting Co. Ltd

March 2023



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FABRICATION OF MCB BOXES  
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SPECIFICATION**

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**0.1 CIRCULATION LIST**

COPY NO.	COPY HOLDER
1	Manager, Standards
2	Electronic copy (pdf) on Kenya Power server ( <a href="http://172.16.1.40/dms/browse.php?fFolderId=23">http://172.16.1.40/dms/browse.php?fFolderId=23</a> )

**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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**0.2 AMENDMENT RECORD**

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2023-03-15	New issue	Eng. Faith Gicugu	Dr. Eng. Peter Kimemia

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## **FOREWORD**

This Specification has been prepared by the Standards Department in collaboration with Distribution Networks department both of The Kenya Power and of Lighting Company Plc (KPLC) and it lays down requirements for materials for fabrication of MCB boxes for use in distribution transformers. It has been prepared to establish and promote uniform requirements for materials for fabrication of MCB boxes for use in distribution transformers for use at KPLC.

The materials specified are intended for use by the distribution network substation teams in fabrication of MCB boxes intended for monitoring the loading conditions of distribution transformers.

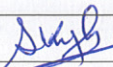
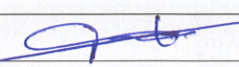
There are no other specifications in this series.

This specification stipulates the minimum requirements for fabrication materials acceptable for use in the company and it shall be the responsibility of the suppliers and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, good workmanship and good engineering practice in the manufacture of the materials for fabrication of MCB boxes for use in distribution transformers for KPLC.

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

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

<b>Name</b>	<b>Division</b>
Bernard Kingesi	Network Management
Mohamed Amiyo	Network Management
Eng. Faith Gicugu	IESR

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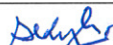

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## 1. SCOPE

1.1. This specification covers the following materials for use in materials for fabrication of MCB boxes for use in distribution transformers by company's distribution network substation teams:

- 1.1.1. Red Dough Moulded Compound (DMC) bus bar insulator – 76mm x 47mm
- 1.1.2. 50mm<sup>2</sup> Bimetal lug compatible to a rod of size M10 nut & bolt
- 1.1.3. Copper lugs 10mm<sup>2</sup> compatible to a rod of size M10 nut & bolt
- 1.1.4. Copper lugs 16mm<sup>2</sup> compatible to a rod of size M10 nut & bolt
- 1.1.5. Brass rod (50-75mm long) size M10 with nut, ordinary washer and a spring washer
- 1.1.6. Waterproof metric cable gland metric thread M24 IP68 with fixing connector
- 1.1.7. Bakelite sheet 4ft x 4ft
- 1.1.8. Slotted standard din rail 35mm x 15mm
- 1.1.9. BNL6 stopper terminal. DIN RAIL stopper

The specification covers requirements, design, inspection, tests, and schedule of Guaranteed Technical Particulars of fabrication materials.

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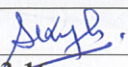
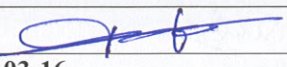
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## 2. NORMATIVE REFERENCES

The following standards contain provision which through reference in this text, constitute provisions of this specification. For dated editions, the cited edition will apply; for undated editions, the latest edition of the referenced document shall apply.

- AS 4325.1: Compression and mechanical connectors for power cables with copper or aluminium conductors Test methods and requirements
- DIN 46235: Cable lugs; for compression connections, cover plate type, for copper conductors.
- DIN 46329: Cable lugs; for compression connections, ring type, for aluminium conductors
- EN 13599: Copper and copper alloys Copper plate, sheet and strip for electrical purposes (DIN 48201).
- EN 13600: Copper and copper alloys. Seamless copper tubes for electrical purposes (DIN 40500 part 2).
- IEC 61557: Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c - Equipment for testing, measuring or monitoring of protective measures - Part 1: General requirements;
- IEC 61000: Electromagnetic Compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test; – Part 6-2: Generic standards – Immunity for Industrial environment.
- ISO 9001: Quality Management systems – Requirements
- ISO/IEC 17025: General Requirements for the competence of testing and calibration laboratories

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SRPS N. F4.101: Cable accessories - Parts for manufacturing of pressed connections for use in power cable networks - Technical requirements.

### **3. DEFINITIONS AND ABBREVIATIONS**

For the purpose of this specification, the definitions and abbreviations given in the reference standards shall apply together with the following abbreviations.

#### **3.1. ABBREVIATIONS**

**EMC** – Electromagnetic Compatibility

**EU** – European Union

**KPLC**- Kenya Power and Lighting Company Plc

**IP** – Ingress Protection

**ISO** – International Organization for Standardization.

**Kg** – Kilogram

**KV** – Kilovolt

**LV** – Low Voltage

**MCB** – Miniature Circuit Breaker

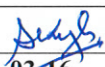

**DMC** – Dough Moulded Compound

### **4. REQUIREMENTS**

#### **4.1. SERVICE CONDITIONS**

4.1.1 All the materials for fabrication of Distribution Transformer boxes shall be suitable for use outdoors in tropical areas and harsh climatic conditions including areas exposed to:

- Altitudes of up to 2200m above sea level;
- Humidity of up to 95%;
- Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C
- Pollution: Class IV (Very Heavy)

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## **4.2. DESIGN AND CONSTRUCTION**

### **4.2.1 Red Dough Moulded Compound (DMC) bus bar insulator – 76mm x 47mm**

4.2.1.1 Red DMC bus bar insulator shall be suitable for use in Electric control panel.

4.2.1.2 It shall have characteristics in table 1 below: -

**Table 1: Red DMC bus bar insulator characteristics**

Material	DMC
Size	76mm x 47mm
Usage/Application	Electric Control Panel for insulation
Tensile strength	10.4Mpa
Weight	85g
Packaging	Box

### **4.2.2 10mm<sup>2</sup> and 16mm<sup>2</sup> Copper lugs**

4.2.2.1 Copper lugs Requirements shall be as per KPLC Specification KP1/13D/4/1/TSP/05/029 – Compressor lugs specifications

### **4.2.3 50mm<sup>2</sup> Bimetallic lugs**

4.2.3.1 Bimetallic lugs requirements shall be as per KPLC Specification KP1/13D/4/1/TSP/05/029 – Compressor lugs specifications

### **4.2.4 Brass rod**

4.2.4.1 Brass rod size M10 (50-75mm long) with nut, ordinary washer and spring washer

### **4.2.5 50mm<sup>2</sup> Cable gland**

4.2.5.1 It shall be waterproof, dustproof, salt proof, acid and alkali resistant, alcohol, oil, grease and general solvents resistant, for both indoor and outdoor application

4.2.5.2 The cable gland shall be with metric thread M16 with fixing connector.

4.2.5.3 The tightening ring shall be specially designed to have a strong fixed pulling force without causing damage to the motor.

4.2.5.4 The fixed head of the waterproof connector shall be made such that there is no need to disassemble it. The cable shall be directly inserted and tightened conveniently.

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4.2.5.5 It shall have mechanical characteristics allowing for threaded connection, manually screwed in.

**4.2.6 Bakelite sheet 2mm thick**

4.2.6.1 The Bakelite sheet shall be tough and impact resistant.

4.2.6.2 It shall have excellent shock absorbing properties, superior electrical properties, excellent abrasion resistance, good dimensional stability and superior machinability.

4.2.6.3 It shall have characteristics in Table 2 below: -

**Table 2: Bakelite characteristics**

Size	4ft x 4ft
Thickness	2mm
Colour	Brown
Material	Phenol
Density	1.4
Pattern	Plain

**4.2.7 Slotted standard din rail**

4.2.7.1 Slotted din rail requirements shall be as per KPLC Specifications – KP1/13D/4/1/TSP/11/047 – Electrical Wiring Accessories specification

**4.2.8 BNL6 stopper terminal**

4.2.8.1 It shall firmly fix the terminal blocks in place at both ends of a terminal block assembly installed on a din rail with the following characteristics: -

**Table 3: Din rail stopper characteristics**

Type	End Stopper
Material	Steel
Surface treatment	Zinc trivalent chromate plating
Screw size	M4
Width	9.5mm
Current rating	up to 150A
Din rail size	35mm DIN rail.

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#### **4.3. WARRANTY AND TECHNICAL SUPPORT**

- 4.3.1. The materials for fabrication of MDI box shall be backed by a minimum of 12-months factory warranty.

#### **5. TESTS REQUIREMENTS**

- 5.1. The materials for materials for fabrication of MCB boxes for use in distribution transformers shall be inspected and tested in accordance with the relevant standards and requirements of this specification.
- 5.2. Copies of test reports for the items offered shall be submitted for tender evaluation shall include all tests specified in the relevant IEC standard.

#### **6. MARKING AND PACKING**

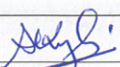
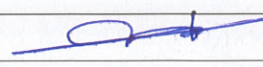
##### **6.1. MARKING**

The following information shall be marked legibly and in a permanent manner on all materials for fabrication of MCB boxes for use in distribution transformers.

- a) The manufacturer's name or trade mark;
- b) The manufacturer's type designation and year of manufacture;
- c) Standard of manufacture;
- d) Country of manufacture
- e) The inscription "KPLC"

##### **6.2. PACKING**

- 6.2.1. The materials for fabrication of MCB boxes for use in distribution transformers shall be packaged in such a manner as to minimize damage during transportation and handling.

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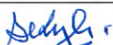

## APPENDICIES

### 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. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.
- A.2 Copies of previous Test Reports issued by own or a third party testing laboratory that is accredited to ISO/IEC 17025:2005 or 17025:2017 confirming accuracy and compliance of the materials offered shall be submitted with the offer for evaluation (all in English Language). A copy of the accreditation certificate and the scope of accreditation of the testing laboratory shall also be submitted. Any translations of certificates or reports into English language shall be signed and stamped by the Testing Authority that carried out the tests.
- A.3 Test certificates and calibration certificates for the materials to be supplied shall be submitted to KPLC for approval before shipment/delivery of the equipment.
- A.4 On receipt of the products, KPLC will inspect them and may perform any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to KPLC, any items which upon examination, test or use fail to meet any or all of the requirements in the specification.

### B: QUALITY MANAGEMENT SYSTEM (Normative)

- B.1 The supplier shall submit a **Quality Assurance Plan (QAP)** that will be used to ensure that the Maximum demand indicator physical properties, tests and documentation, will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001: 2015.

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B.2 The Manufacturer's **Declaration of Conformity** to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001:2015 certificate shall be submitted with the tender for evaluation.

B.3 The bidder shall indicate the delivery time of the equipment, manufacturer's monthly & annual production capacity and experience in the production of the items being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar items sold in the last five years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.

**C: DOCUMENTATION AND DEMONSTRATION (Normative)**

C.1 The bidder shall submit their tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:

- 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.
- Details of manufacturing capacity and the manufacturer's experience.
- Copies of required test and calibration reports from a testing laboratory accredited to ISO/IEC 17025.
- Copy of accreditation certificate to ISO/IEC 17025 for the testing laboratory.
- Manufacturers letter of authorization, ISO 9001 certificate, and other technical documents required in the tender.
- Manufacturer's warranty and guarantee; subject to 12 months from date of delivery to KPLC stores.
- Operational manuals/datasheets.

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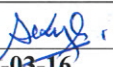
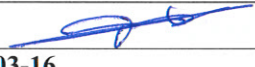
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C.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

- a) Fully filled clause by clause guaranteed technical particulars (GTP) stamped and signed by the manufacturer.
- b) Drawings of the Maximum demand indicator to be manufactured for KPLC.
- c) Product manuals, operation manuals and brochures.
- d) Quality assurance plan (QAP) that will be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2015.
- e) Marking details and method to be used in marking
- f) All documentation necessary for safety of the equipment.
- g) Packaging details (including packaging materials).

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

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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	Requirement	Bidder's offer
	Manufacturer's Name and address	State
	Country of Manufacture	State
	Name and model Number	State
1.	Scope	State
2.	Normative References	State
3.	Definitions and Abbreviations	
3.1.	Abbreviations	State
<b>4.</b>	<b>Requirements</b>	
4.1	Service Conditions	State
4.1.1	Suitable for outdoor use in tropical areas and harsh climatic conditions	State compliance
a	Altitudes of up to 2200m above sea level	State
b	Humidity of up to 95%;	State
c	Average ambient temperature, Minimum & maximum	State
d	Pollution: Class	State
<b>4.2</b>	<b>Design and construction</b>	

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**TITLE: MATERIALS FOR  
FABRICATION OF MCB BOXES  
FOR USE IN DISTRIBUTION  
TRANSFORMERS -  
SPECIFICATION**

<b>Doc. No.</b>	<b>KP1/13D/4/1/TSP/10/113</b>
<b>Issue No.</b>	<b>1</b>
<b>Revision No.</b>	<b>0</b>
<b>Date of Issue</b>	<b>2023-03-16</b>
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Clause number	Requirement	Bidder's offer
4.2.1	Red DMC Bus bar Insulator, For Electric Control Panel	Specify
4.2.1.1	Suitable for use in electric control panel	State
4.2.1.2	Characteristics	State
	Material	State
	Size	State
	Usage/Application	State
	Tensile strength	State
	Weight	State
	Packaging	State
4.2.2	10mm <sup>2</sup> and 16mm <sup>2</sup> Copper lugs	
4.2.2.1	Shall be as per KPLC specification KP1/13D/4/1/TSP/05/029	Provide GTPs
4.2.3.	50mm <sup>2</sup> Bimetallic lugs	
4.2.3.1	Shall be as per KPLC specification KP1/13D/4/1/TSP/05/029	Provide GTPs
4.2.4	Brass rod	State
4.2.4.1	Rod size (M10 – 50-75mm long)	State
	Ordinary washer	Provide
	Spring washer	Provide
4.2.5	50mm <sup>2</sup> Cable gland	State
4.2.5.1	Waterproof, dustproof, salt proof,	State
	Acid and alkali resistant	State
	Alcohol, oil, grease and general solvents resistant	State
	For both indoor and outdoor application	State
4.2.5.2	Shall be with metric thread M16 with fixing connector	State
4.2.5.3	Specially designed to have a strong fixed pulling force without causing damage to the motor.	State

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Clause number	Requirement	Bidder's offer
4.2.5.4	The fixed head of the waterproof connector shall be made such that there is no need to disassemble it.	State
	The cable shall be directly inserted and tightened conveniently	State
4.2.5.6	Mechanical Characteristics allowing for threaded connection, manually screwed in.	State
4.2.6	Bakelite sheet	State
4.2.6.1	Size - 10mm thick, 4ftx4ft	State
	Excellent impact resistance and toughness	State
4.2.6.2	Excellent shock absorbing properties	State
	Superior electrical properties	State
	Excellent abrasion resistance	State
	Good dimensional stability	State
	Superior machinability	State
4.2.7	Slotted standard din rail	
4.2.7.1	As per KPLC Specifications – KP1/13D/4/1/TSP/11/047	Provide GTPs
4.2.8	BNL6 stopper terminal	State
4.2.8.1	Shall firmly fix the terminal blocks in place at both ends of a terminal block assembly installed on a din rail	State
	Type	State
	Material	State
	Surface treatment	State
	Screw size	State
	Width	State
	Current rating	State
	Din rail size	State

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Clause number	Requirement	Bidder's offer
4.3	<b>Warranty and Technical Support</b>	
4.3.1.	Minimum of 12-months factory warranty.	State
<b>5</b>	<b>Test Requirement</b>	
5.1	Test standards and requirements	State
5.2	Copies of test reports for the items offered submitted for tender evaluation	Attach
<b>6</b>	<b>Marking and Packing</b>	
6.1	Marking	Specify
6.2	Packing	Specify
<b>A</b>	<b>Test and inspection</b>	
A.1	Responsibility of carrying out tests	State
A.2	Copies of Type Test Reports submitted with tender	Attach copies
A.3	Test certificates and calibration certificates to be submitted by supplier to KPLC for approval before supply/delivery	Attach copies
A.4	Inspection at the stores and replacement of rejected items	State compliance
<b>B</b>	<b>Quality Management System</b>	
B.1	Quality Assurance Plan	Provide
B.2	Copy of ISO 9001:2015 Certificate	Provide
B.3	Delivery time of the equipment	Provide
	Manufacturer's experience	Provide
	Manufacturing Capacity (units per month)	Provide
	List of previous customers	Provide
	Customer reference letters	Provide
<b>C</b>	<b>Documentation and demonstration</b>	
C.1	Documents submitted with tender for evaluation	Provide

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Clause number	Requirement	Bidder's offer
C.2	Documents to be submitted by supplier to KPLC for approval before manufacture	Provide
C.3	Documents to be submitted during delivery at the store	Provide
	Statement of compliance to specification (indicate deviations if any & supporting documents)	State compliance

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

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