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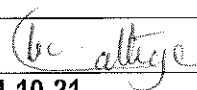
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TITLE:

**SPECIFICATION FOR
MINIATURE CIRCUIT
BREAKERS** (for use in
domestic/residential buildings and
similar premises)

Doc. No.

KP1/3CB/TSP/11/010

Issue No.

1

Revision No.

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0.1 Circulation List

COPY NO.	COPY HOLDER
1	Research & Development Manager
2	Supply Chain Manager (Procurement)
Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?fFolderId=23)	

0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0				

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FOREWORD

This specification has been prepared by the Research and Development Department in collaboration with Nairobi Region Technical Services Department both of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Miniature Circuit Breakers (MCB). It is intended for use by KPLC in purchasing the equipment.

It shall be the responsibility of the manufacturer to ensure adequacy of the design and good engineering practice in the manufacture of the Miniature Circuit Breakers for KPLC. The manufacturer shall also submit information which confirms satisfactory service experience with products which fall within the scope of this specification.

1. SCOPE

This specification is for Miniature Circuit Breakers for overcurrent protection of electrical installations in domestic/residential buildings and similar premises.

2. REFERENCE STANDARDS

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

IEC 898: Circuit-breakers for overcurrent protection for household and similar installations - Part 1: Circuit-breakers for a.c. operation.

IEC 60947-2: Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

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

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The Miniature Circuit Breakers shall be suitable for continuous operation outdoors in tropical areas at altitudes of up to 2000m above sea level, humidity of up to 90%, average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C and heavy saline conditions along the coast.

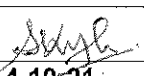
4.2. DESIGN AND CONSTRUCTION

- 4.2.1. The Miniature Circuit Breakers (MCB) shall be a Moulded Case Circuit Breaker and shall comply with the requirements of IEC 60947-2 and IEC 898.
- 4.2.2. The MCBs shall be maintenance free, manufactured for control and protection against overloads and short-circuits of electrical wiring installations for domestic/residential buildings and similar premises and designed for use by uninstructed people.
- 4.2.3. The Circuit Breakers shall be so designed and constructed that, in normal use their performance is reliable and without danger to the user and the surroundings.
- 4.2.4. The MCB shall operate with the declared accuracy under the climatic conditions listed above.
- 4.2.5. The Degree of Protection of the enclosure shall be at least IP20.
- 4.2.6. Rated Voltage shall be 240V AC, 50Hz supply.
- 4.2.7. The mechanical endurance shall be $\geq 20,000$ operations.
- 4.2.8. The electrical operations shall be $\geq 10,000$ operations.
- 4.2.9. The preferred color of the covers is Grey RAL 7015.
- 4.2.10 The MCB is to be used in a single supply network, with a phase and neutral wire (L-N), configuration. The Neutral conductor has multiple earthing. The Neutral is also solidly earthed at the source Distribution Transformer.
- 4.2.11 The MCB shall be designed for and shall have provision for manual operation by hand to the closed position and to the open position.
- 4.2.12 The Circuit Breaker manual operating means shall have an "up-down" movement, when the circuit breaker is mounted as in normal use. The circuit breaker contacts shall be closed by the up movement.

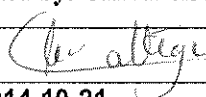
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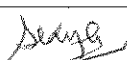
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- 4.2.13 The Open position of the circuit breaker shall be indicated by the symbol "O" and the closed position by the symbol "I". The Operating means shall be used to indicate the position of the circuit breaker contacts.
- 4.2.14 The Circuit Breakers shall be so constructed that the moving contacts can come to rest only in the Closed Position or in the Open position, even when the operating means is released in an intermediate position.
- 4.2.15 The Supply and the Load terminals shall be marked appropriately in accordance with IEC 898. Alternatively the words "LIVE" for supply terminals and "LOAD" for Load terminals may be inscribed next to the terminals.
- 4.2.16 Connections whether electrical or mechanical shall withstand the mechanical stresses occurring in normal use.
- 4.2.17 The MCBs shall be equipped with an overcurrent release as well as an overload release.
- 4.2.18 The rated current for the MCB, which it will be able to carry continuously without tripping, shall be One (1) Amp or Seven (7) Amp (or as specified on schedule of tender requirements).
- 4.2.19 The MCB shall Trip once the current rating in clause 4.2.18 is exceeded. The minimum current at which the MCB will Trip, shall be stated by the bidder, but shall not exceed $1.45I_n$, where I_n is the rated current. The MCB shall however not operate for load current up to $1.13I_n$ where I_n is the rated current. The Time –Current Characteristic shall be submitted with the Bid.
- 4.2.20 Time Current Characteristic for the MCB**
- The MCB shall be equipped with a fast Time-Current Characteristic that shall ensure coordination with a Load Current Limiter. All short circuits beyond the MCB shall be isolated by the MCB and the Load Current Limiter shall not operate for such faults.
- 4.2.21 The Unit shall have an inbuilt Inrush delay to allow for motor/compressor start up and hence prevent false trips.
- 4.2.22 The MCB shall have a rated short-circuit capacity of 6kA, as per IEC 60947-2.
- 4.2.23 The Power frequency withstand voltage of the MCB shall be 3kV rms.

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4.2.24 The Impulse withstand voltage of the MCB shall be 8kVp.

4.2.25 The Connection Terminals shall be Screw terminals with washer or clamping plate or anti-spread device and shall be large enough to accommodate power supply cables up to 2.5 mm².

4.2.26 The terminals shall be designed to clamp solid conductors as well as rigid stranded conductors.

4.2.27 The terminals shall be corrosion free under the climatic conditions stated in this specification.

4.2.28 Current carrying parts and connections including parts intended for protective conductors, if any shall be of either:

- Copper or
- An alloy containing at least 50% copper for parts worked cold or at least 50% copper for other parts or
- Other metal or suitable coated metal with no less resistance to corrosion than copper and having mechanical properties no less suitable.

4.2.29 Terminals for external conductors shall be such that the conductors may be connected so as to ensure that necessary contact pressure is maintained permanently.

4.2.30 Terminals shall be so designed that they clamp the conductor without undue damage to the conductor.

4.2.31 Terminals shall be so designed that they clamp the conductor reliably between the surfaces. Once the conductor has been tightened the screw shall not become loose on its own.

4.2.32 The Unit shall be supplied complete with terminal connection screws.

4.2.33 The MCB shall be suitable for mounting on a rail inside a distribution board

4.2.34 The maximum temperature rise shall not exceed the values stated in IEC 898, when the circuit breaker is carrying its rated current in the conditions specified in the standard.

4.2.35 The MCB shall have one protected pole.

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5. TESTS AND INSPECTION

- 5.1 Type and routine tests shall be done in accordance with the requirements of IEC 898, IEC 60947-2 and this specification (KPLC/1/3CB/TSP/11/010). It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified.
- 5.2 Certified true copies of previous test reports by the relevant International or National Testing/Standards Authority of the country of manufacture (or ISO/IEC 17025 /ILAC accredited laboratory) shall be submitted with the offer for evaluation (all in English Language). A copy of accreditation certificate for the laboratory shall also be submitted.

The copies of Type Test Reports to be submitted with the tender shall include the following tests in accordance with IEC 898:

- a) Indelibility of Marking
- b) Reliability of Screws, Current carrying parts and connections
- c) Reliability of terminals for external conductors
- d) Protection against electric shock
- e) Dielectric Properties
- f) Temperature rise
- g) 28 Day Test
- h) Tripping Characteristic
- i) Mechanical and Electrical endurance
- j) Short-Circuit
- k) Resistance to Mechanical shock and Impact
- l) Resistance to heat
- m) Resistance to abnormal heat and to fire
- n) Resistance to rusting.

- 5.3 A sample of the MCB offered shall be submitted with the Bid at no cost to KPLC.
- 5.4 Routine test reports for the MCB to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods. KPLC Engineers (2) will witness acceptance tests at the factory before shipment.
- 5.5 On receipt of the MCBs, KPLC will inspect them for acceptance at stores and may perform or have tests performed in order to verify compliance of the MCBs with this specification.

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The supplier shall replace without charge to KPLC, any MCBs which upon examination, test or use fail to meet any or all of the requirements in this specification.

6. MARKING, LABELLING AND INSTRUCTIONS

6.1 The following information shall be marked indelibly and legibly on the MCB:

- a) Manufacturer's name or trade mark;
- b) Type designation and serial number;
- c) Rated voltage;
- d) Rated current and the instantaneous tripping curve;
- e) Rated frequency;
- f) Rated short-circuit capacity;
- g) Wiring diagram.

NB: where all the details listed above cannot fit on the front of the device, a), b), c), e) and f) shall be marked on the side of the MCB as per recommendations of IEC 898.

In addition to the required markings above, the following letters shall be printed on the unit: "PROPERTY OF KPLC"

All markings shall be by engraving.

- 6.2 The number of electrical operations at full fault current and the mechanical operations of the MCB shall be indicated and be in accordance with IEC 898.
- 6.3 A set of Five (5) Original Hard Cover Operation and Installation Manuals for the MCBs shall be supplied with the equipment.
- 6.4 One set of Operating and Maintenance Manual with technical data shall be submitted with the Bid for purposes of carrying out technical evaluation. This manual shall provide proof of compliance with this specification. If compliance with this specification cannot be ascertained in the attached manual then the bid may be rejected.

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ANNEX A (to be filled and signed by the manufacturer and submitted together with manufacturer's catalogues, brochures, drawings, technical data, customer sales records and certified test reports for tender evaluation)

A1: MANUFACTURER'S EXPERIENCE

Table A.1: Eligibility: Manufacturer's Experience

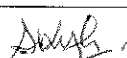
ITEM NO.	DESCRIPTION	BIDDER TO ENTER DETAILS
1	Manufacturer's Name	
2	Manufacturer's Address	
3	Location of Manufacturing Plant	
4	Reference Number/Name for MCB offered	
5	Number of years that the MCB has been manufactured	
6	Number of MCB units sold to date	
7	Manufacturer's experience in the manufacture of the MCB	
8	Manufacturer's Guarantee and Warranty	
9	List catalogues, brochures, technical data, drawings submitted to support the offer	
10	List customer sales records submitted to support the offer	
11	List copies of Type Test Certificates and their Test Reports submitted with tender (indicate test report numbers, date, Testing Institution and contact addresses)	
12	List Acceptance Tests to be witnessed by KPLC Engineers at the factory	
13	List test reports to be submitted to KPLC for approval before shipment/delivery	
14	Quality Assurance Programme	
15	Manufacturer's Declaration of Conformity to Standards	
16	Statement of compliance to tender specification	
17	Comments on tender specification/Deviations from tender specifications and supporting data, test reports, technical documents etc	
18	Inspection of the MCBs at KPLC stores/site	

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

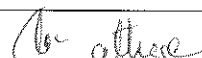
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A2: TECHNICAL SCHEDULES

Table A.2: Performance Guarantees for the MCB

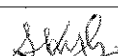
ITEM NO.	DESCRIPTION	BIDDER TO ENTER DETAILS
1	Manufacturer's Name	
2	Reference Number/Name for MCB offered	
3	Rated Temperature and Humidity	
	Altitude	
4	Applicable Standard(s)	
5	Rated Voltage	
6	Rated Current	
	Rated Short-Circuit Current	
7	Minimum Trip Current as a multiple of rated current for the MCB	
8	Instantaneous tripping curve offered (attach a copy of the tripping curve)	
9	Inbuilt Inrush delay feature	
10	Largest supply cable that can be connected to the MCB (in mm ²)	
11	Close/Open Indication	
12	Type of terminals	
13	Material used for terminals	
15	Suitable for Mounting on a rail in a distribution board	
16	Markings to be included	
17	Operating duty cycle	
18	Markings on the MCB	
19	No. of Poles	
20	Number of Electrical operations at 100% fault level	
21	Mechanical endurance	

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


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