TABLE OF CONTENTS

0.1 Circulation List

COPY NO.	COPY HOLDER
1	Supplies Manager
2	Stores & Stock Control Manager
3	Technical Services Manager
4	Regional Manager, Nairobi
5	Research & Development Manager
6	Assistant Manager, Technical Audit

0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
1	2009 -04-03	Amend clauses 4.2.1, 4.2.2 and 4.3.2	Stephen Nguli	G. Owuor

FOREWORD

This specification has been prepared by the Research and Development Department of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Ready Boards for single-phase service connections. It is intended for use by KPLC in purchasing the Ready Boards.

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

1. SCOPE

This specification is for Ready Boards for single-phase service connections in single room dwellings and similar premises.

2. REFERENCES

N/A

3. TERMS AND DEFINITIONS

N/A

4. REQUIREMENTS

4.1 SERVICE CONDITIONS

The ready boards shall be suitable for continuous use indoors in tropical areas at altitudes of up to 2200m 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. The level of corrosion protection for all ferrous parts shall be suitable for these conditions.

4.2. MATERIALS AND CONSTRUCTION

4.2.1. The ready board shall consist of sheet metal enclosure, flame retardant base and top cover designed to house components. The degree of protection shall be at least IP 21.

4.2.2. The minimum thickness of the enclosure (steel sheet) and base plate shall not be less than 0.6mm.

4.2.3. Each ready board shall be completely wired and fitted with single-phase MCBs (Miniature Circuit Breakers), Double Pole Mains Switch 20A MCB, Socket Outlets all in accordance with the applicable standards and the schematic at Appendix 1.

4.2.4. The front door panel shall be openable for easy replacement of components and accessories. All hinges shall be internal/concealed type.

4.2.5. The ready board shall be of flush front design (for the enclosure) and suitable for wall mounting on either concrete or timber wall.

4.2.6. All the components shall be easily operated from the front panel plate/door without necessarily opening the plate/door.

4.2.7. The light shall be suitably placed on top of the enclosure for maximum light intensity.

4.2.8. Adequate provision shall be made for the incoming supply cable entry and connection.

4.2.9. The finish shall have no sharp edges that may cause injury to personnel.

4.3. Paintwork

4.3.1 The panels shall be thoroughly cleaned by an approved method and shall be given a priming coat followed by a spray of two coats of contrasting colours of durable weather-resisting paint. The final coat shall be high gloss and the primer and the middle layer shall match.

4.3.2 The paint thickness shall be not less than 40µm anywhere on the panels (including the sharp edges).

4.3.3 The final colour of the ready board shall be *light aircraft grey* as per colour No. 627 of BS 381C.

4.4. Accessories/Components

The Ready Board shall be complete with the following components/accessories:

- 2-way Distribution Board;
- 2 Pole Mains Switch MCB – 20A;
- 10A MCB (SP);
- 5A MCB (SP);
- Twin Socket Outlet (each 13A), controlled by the 10A MCB;
- 1 Light Switch (5A), controlled by the 5A MCB;
- 1 Light Fitting (60W min)
- Provision for extending the lighting circuit;
- Provision for earthing all the metallic parts;
- Provision for incoming 2 x 16mm² and 1 x 6mm² s/c copper PVC cables;
- Provision for mounting the ready board on either wooden or concrete wall.

4.5. In addition to the individual current ratings given above, the MCBs shall meet the following requirements:

4.5.1 The Miniature Circuit Breakers (MCBs) shall be Moulded Case Circuit Breaker and shall comply with the requirements of IEC 60947-2 and IEC 898.

4.5.2 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.

4.5.3 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.

4.5.4 The MCB shall operate with the declared accuracy under the climatic conditions listed in clause 4.1 above.

4.5.5 Rated Voltage shall be 240V AC, 50Hz supply.

4.5.6 The mechanical endurance (of the MCB) shall be ≥ 20,000 operations.

4.5.7 The electrical operations (of the MCB) shall be ≥ 10,000 operations.

4.5.8 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.

4.5.9 The MCB shall be designed for and shall have provision for manual operation by hand to the closed position and to the open position.

4.5.10 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.

4.5.11 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.

4.5.12 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.

4.5.13 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.

4.5.14 Connections whether electrical or mechanical shall withstand the mechanical stresses occurring in normal use.

4.5.15 The MCB shall be equipped with an over current release as well as an overload release.

4.5.16 The MCB shall Trip once the Rated Current 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.

4.5.17 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.

4.5.18 The Unit will preferably have an inbuilt Inrush delay to allow for motor/compressor start up and hence prevent false trips.

4.5.19 The MCB shall have a rated short-circuit capacity of 6kA, as per IEC 60947-2.

4.5.20 The Power frequency withstand voltage of the MCB shall be 3kV rms.

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

4.5.22 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 mm^2.

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

4.5.24 The terminals shall be corrosion free under the climatic conditions stated in this specification. The connection terminals shall be suitable for both aluminium and copper cables, without corrosion.

4.5.25 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.

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

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

4.5.28 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 it's own.

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

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

4.5.31 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.

4.5.32 The MCB shall have one protected pole.

4.6. Materials, components and accessories:

All materials, components and accessories shall be manufactured in accordance with the applicable IEC standards and proof of the same in the form of catalogue/brochure; technical data, drawings and test reports shall be submitted with the bid for evaluation purposes.

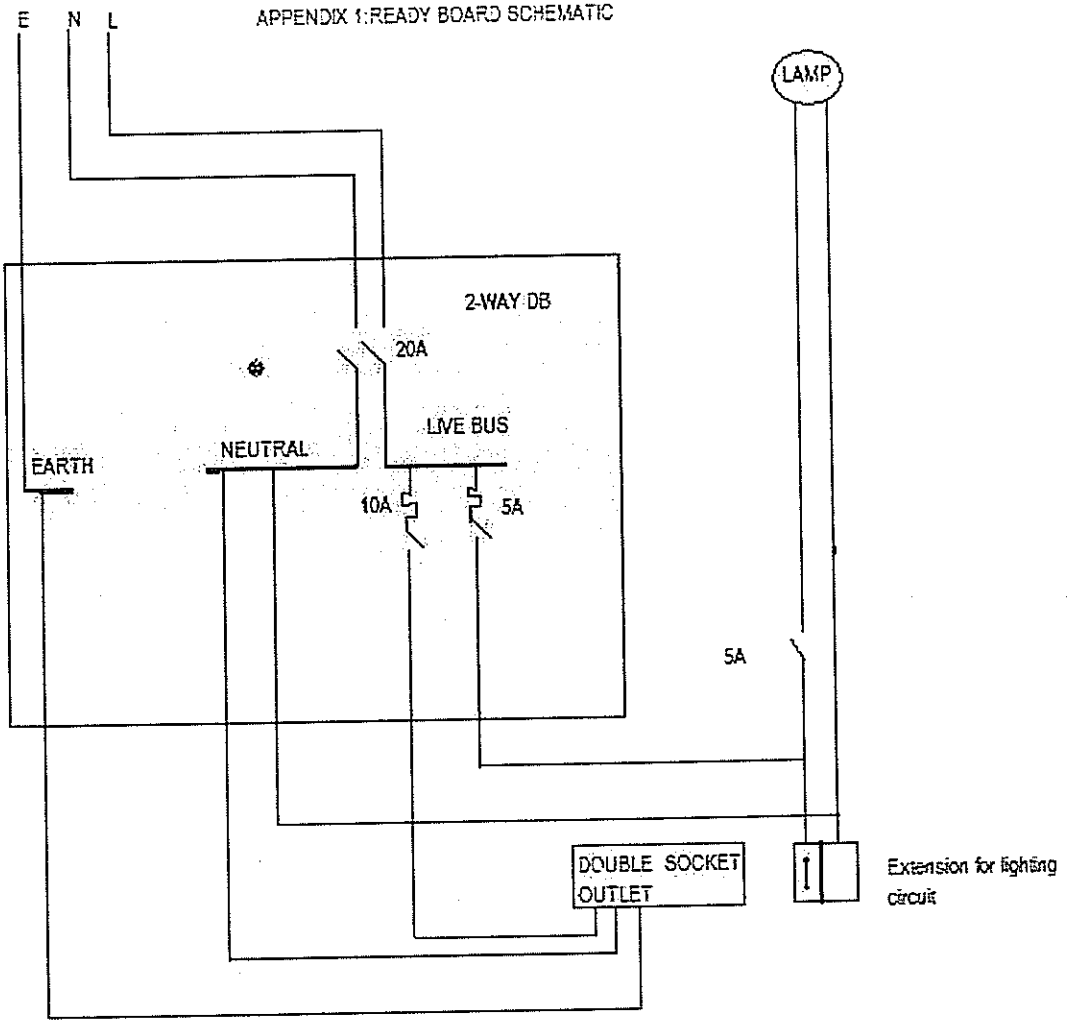
4.7. Wiring

4.7.1 The socket outlets shall be wired in 2.5sq.mm s/c copper PVC insulated cables.

4.7.2 The light fitting shall be wired in 1.5sq.mm s/c copper PVC insulated cables.

4.7.3 Wiring shall be as per Appendix 1 below.

APPENDIX 1:READY BOARD SCHEMATIC



5. TESTS AND INSPECTION

5.1 Ready Board

5.1.1 The following acceptance tests shall be carried out on sample ready boards in the presence of KPLC Engineers before shipment/delivery:

a) Insulation of the circuits from neutral and earth;
b) Overload test on circuit breakers.

5.1.2 The supplier shall carry out tests in accordance with IEC Standards on the Ready Boards and issue a certificate for each of them. A copy of the certificate shall be stuck on the inside of the front door or engraved on a metal plate and mounted on the door.

5.2 MCB

5.2.1 The MCB shall be type and routine tested in accordance with the requirements of IEC 898, IEC 60947-2 and this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified.

5.2.2 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 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 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.

5.2.3 Routine test reports for the MCB to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods.

5.3 **Sample**

A sample of the ready board offered (complete with MCBs) shall be submitted with the tender for evaluation.

6. MARKING AND LABELLING

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

i) Manufacturer's Name or Trademark;
ii) IP Rating;
iii) The letters "KPLC"

6.2 The following information shall be marked indelibly and legibly on each 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.

Note: 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.

All markings shall be by engraving.

6.3 The number of electrical operations at full fault current and the mechanical operations of the MCB shall be indicated and in accordance with IEC 898.

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.

ANNEX A

A1: MANUFACTURER'S EXPERIENCE

The Manufacturer shall complete the Table below:

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	

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Manufacturer's Name, Signature, Stamp and Date

A2: TECHNICAL SCHEDULES

The Manufacturer shall complete the Table below:

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	

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Manufacturer's Name, Signature, Stamp and Date