

THE KENYA POWER AND LIGHTING CO. LTD.

SPECIFICATION for FOUR CORE MV ALUMINIUM CABLES

REVISION RECORD

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FORE WORD

This standard specification has been prepared by the Research and Development Department of the Planning, Research and Performance Monitoring Division, KPLC and lays down specification for MV, four core PVC insulated cables.

This specification is intended for procurement of materials and does not include provision of contract.

This specification is based on IEC 502 and BS 6346. It is subject to revision as and when required.

This specification supersedes all specifications for MV, four core PVC insulated cables issued before the revision date.

INTRODUCTION

This specification was prepared to establish and promote uniform requirements for Low voltage four core, PVC insulated, steel wire armoured cables. The specification stipulates the minimum requirements for equipment acceptable for evaluation

FOUR CORE MV ALUMINIUM CABLE (PVC).

1. SCOPE

- 1.1. This specification is for four core, stranded aluminium conductors, polyvinyl chloride (PVC) insulated, single wire armoured, PVC outer sheathed power cables for operation upto and including 600 volts to earth and 1000 volts between conductors.
- 1.2. This specification is for the following cable sizes:-
- 25 sq mm Aluminium conductor PVC insulated four core cable
 - 70 sq mm Aluminium conductor PVC insulated four core cable
 - 120 sq mm Aluminium conductor PVC insulated four core cable
 - 185 sq mm Aluminium conductor PVC insulated four core cable
 - 300 sq mm Aluminium conductor PVC insulated four core cable

2. REFERENCES

The following documents were referred to during the preparation of this specification. In cases of conflict, the provisions of this specification shall take precedence.

Unless otherwise specified, the latest revision, edition and amendments shall apply.

IEC 228(1978):- Conductors of insulated cables

IEC 502:(1983):- Extruded solid dielectric insulated power cables for rated voltages from 1 kV upto 30 kV

IEC 811:- Common test methods for insulating and sheathing materials of electric cables

BS 6346(1969):- PVC - insulated cables for Electricity supply (with 1974 ammendments).

ESI 09 - 7:- Insulated concentric service cables with copper or solid aluminium phase conductor and copper concentric conductors.

3 TERMS AND DEFINITIONS

For the purpose of this specification, the definitions in IEC 228 and IEC 502 shall apply.

4 REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1 Operating conditions

The cables shall be suitable for continuous operation in tropical areas with the following atmospheric conditions.

- (a) Altitude: From sea level up to 2200m above mean sea level.
- (b) Humidity: Polluting saline atmosphere in coastal areas and where humidity is 90% and up country area where air is relatively clean and humidity not below 50%.
- (c) Ambient temperatures of +30° C average, (+40° C Max. and -1° C Min).

4.2. MATERIAL AND CONSTRUCTION

- 4.2.1. The cable in general shall be designed and manufactured according to the requirement of IEC 227, IEC228 and BS 6346.
- 4.2.2. The phase conductors of the cable shall be made from circular stranded compact plain aluminium conductor as per IEC 228.
- 4.2.3. The insulation shall be polyvinyl chloride (PVC) complying with the requirement of IEC 502 for type PVC/A and shall be suitable for climatic conditions described.
- 4.2.4. The insulation shall be applied by extrusion process and shall form a compact homogeneous body.

The insulation shall concentrically cover the conductor
- 4.2.5. Where necessary, the cable shall be cored with suitable non-hydroscopic inner covering and filler to make a substantially circular cable.
- 4.2.6. Extruded oversheath shall be of black polyvinyl chloride (PVC).
- 4.2.7. The individual cores shall be identified by coloured insulation and the colour shall be red, yellow, blue and black.

4.2.8. The cable shall be clearly and permanently embossed with the following information throughout the length of the oversheath. Letters and figures, raised and consist of upright block characters. Minimum size of characters not less than 15% of average overall cable diameter.

(i) 600/1000 VOLTS PVC CABLE PROPERTY OF KPLC.

(ii) Year of manufacture.

(iii) Size of cable

(Example: '120 SQ MM 600/1000 VOLTS PVC CABLE PROPERTY OF KPLC 2000')

4.3. STANDARD SIZES AND CHARACTERISTICS

4.3.1 The characteristics of the cables shall comply with the following table

Item			Characteristics
Conductor resistance			Not more than the value indicated
A.C. withstand voltage			To withstand the indicated value for 5 min.
Insulation resistance			Not less than the value indicated.
Tensile strength and elongation	PVC	Tensile strength, minimum	12.5N/mm (1.27 Kg/mm)
Aging requirement*	PVC	Elongation, minimum percentage of unaged value	150% 75 - 125%

* Properties after Ageing in air oven:

temperature	100 ± 2°C
duration of treatment	168 hrs

4.3.2 The standard sizes for the PVC cables shall be as follows:-

Conductor nominal sectional area	sq. mm	25	70	120	185	300
Conductor shape	compact round stranded					
Conductor diameter	mm	8.5	11.5	13.2	16.4	20.8
Thickness of insulation	mm	1.2	1.4	1.6	2.0	2.4
Diameter of armour wire	mm	1.6	2.0	2.5	2.5	2.5
Thickness of outer sheath	mm	1.8	2.1	2.4	2.6	3.0
Approximate overall diameter	mm	26	37	46	55	67
Approximate net weight	kg/km	1400	2600	4200	5800	8400
Test Voltage	kV/5 min	3	3	3	3	3
Max. conductor resistance (20 ⁰ C)	Ω/km	1.2	0.44	0.25	0.16	0.12
Min. insulation resistance (20 ⁰ C)	MΩ-km	5	5	5	5	5

5. TESTS

- 5.1 The manufacturer shall be responsible for performing or for having performed all the required tests specified in this specification. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.
- 5.2 The cable cores, sheath and completed cable shall be tested in accordance with the requirements of IEC 811 and BS 6346. Test certificates shall be certified by the National Testing or the National Standards Institute of the country of origin. Sample copies for similar material shall be presented with the tender for the purpose of technical evaluation.

Test reports shall be completed and made available for approval before shipment of the materials.

All materials shall be subjected to inspection by KPLC Engineers or her representative at place of manufacture and all routine tests carried out in their presence.

Routine tests shall be carried out by KPLC staff on the material upon delivery to counter check compliance with specification and factory test reports.

6 NOTICES

- 7.1 Draft design and construction drawings shall be submitted to KPLC before the manufacturing of cables commence. KPLC undertake to submit their comments or approval for the drawings within three weeks of receiving the draft copies.
- 7.2 Tenders with substantial deviation but offering superior materials shall be accompanied by detailed descriptive manuals, drawings and certified test reports for the purposed of technical evaluation.
- 7.3 A detailed list & contact address of previous customers shall be submitted with the tender. List of workshop tools and equipment shall also be appended.

7. PACKING

- 7.1. The cable shall be wound on wooden drums such as to prevent damage during transportation. The wooden drums shall be made from treated timber resistant to termite attack.
- 7.2. The following description shall be marked on one flange of the reel
 - (a) Direction of rotation of the reel
 - (b) Type of cable
 - (c) Number of conductors and size
 - (d) Cable Length
 - (e) Net weight and gross weight
 - (f) Manufacturer's name
 - (g) Year of manufacture

END SEPTEMBER 2000