TABLE OF CONTENTS

0.1 Circulation List

0.2 Amendment Record

FOREWORD

1. SCOPE
2. REFERENCES
3. TERMS AND DEFINITIONS
4. REQUIREMENTS
5. TESTS AND INSPECTION
6. MARKING AND PACKING
7. DOCUMENTATION

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 for previous five years, four customer reference letters, details of manufacturing capacity, the manufacturer's experience and copies of complete type test certificates and type test reports for tender evaluation, all in English Language)*

0.1 Circulation List

COPY NO.	COPY HOLDER
1	Manager, Standards
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)
Issue 2 Rev 0	2015-09-18	Cancels and replaces Issue No. 1 Rev 0.	Frederick Masibo Michael Apudo	Henry Njenga

FOREWORD

This specification has been prepared by the Standards Department of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for insulating and protective tapes. The supplier shall submit information which confirms manufacturer's satisfactory service experience with products which fall within the scope of this specification.

1. SCOPE

1.1. This specification is for insulating and protective tapes for use on cable joints, terminations and repairs, colour coding of cables, conductor and other electrical installations.

1.2. It covers the following tapes:

a) Adhesive PVC tapes

(i) INSULATION TAPE - 24mmx10mx0.18mm (BLACK)
(ii) INSULATION TAPE - 24mmx10mx0.18mm (RED)
(iii) INSULATION TAPE - 24mmx10mx0.18mm (YELLOW)
(iv) INSULATION TAPE - 24mmx10mx0.18mm (BLUE)
(v) INSULATION TAPE - 24mmx10mx0.18mm (GREEN)

b) Impregnated fabric tapes - TAPE 1"DENSYL

1.3. The specification stipulates the minimum requirements for the insulating and protective tapes acceptable for use 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 items 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) shall apply:

IEC 60454-2 & 3-1: Pressure-sensitive adhesive tapes for electrical purposes – Part 2: Methods of test; --Part 3: Specifications for individual materials –Sheet 1: PVC film tapes with pressure-sensitive adhesive

ASTM D1000-04:	Standard test methods for pressure-sensitive adhesive-coated tapes used for electrical and electronic applications
ASTM E96 -95:	Standard Test Methods for Water Vapor Transmission of Materials,
ASTM G8 – 96:	Standard test methods for cathodic disbonding of pipeline coatings, ambient bonding, cathodic disbonding, pipeline coatings
ISO 15108:	Determination of bonded joints using a bending shear block
ISO 29864:	Measurement of breaking strength and elongation.
ASTM G8 – 96:	Standard test method for dielectric breakdown voltage of insulating liquids using disk electrodes
UL 510:	Listed black colour, flame retardant for general electrical insulation

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 insulating and protective tapes shall be suitable for continuous outdoor and indoor application in tropical areas with the following atmospheric conditions.

a) Maximum Altitude: 2200m above mean sea level
b) Average ambient air Temperature of 30^{0}C with a minimum of -1^{0}C and a maximum of +40^{0}C.
c) Humidity, high at coast up to 95% and lower inland, up to 50%
d) Pollution: Design pollution level to be taken as "*Heavy*" (Pollution level III) and "*Very Heavy*" (Pollution level IV) for coastal applications in accordance with IEC 60815.according to IEC 60815.
e) Isokeraunic level: 180 thunderstorm days per year

4.2. MATERIAL AND CONSTRUCTION

4.2.1. IMPREGNATED FABRIC TAPES - DENSYL TAPE

4.2.1.1. General

4.2.1.1.1. Impregnated fabric tapes commonly known as Petrolatum Tape for Corrosion Protection shall be made from non-woven synthetic fibre fabric, impregnated and coated with a neutral compound based on saturated petroleum hydrocarbons (petrolatum) and inert siliceous fillers. It is formulated particularly for use at tropical temperatures. The tape shall be supplied in rolls in a range of widths.

4.2.1.1.2. The impregnated fabric tapes shall be supplied complete with compatible Paste and/or Priming Solution as recommended in Table 1.

4.2.2. Finish and application

4.2.2.1.1. The impregnated fabric tapes shall be cold applied with properties to remain plastic over a wide temperature range. It shall be non-hardening and non-cracking; highly resistant to mineral acids, alkalis, salts and micro-organisms and highly impermeable to water, water vapour and gases.

4.2.2.1.2. The tape shall be suitable for use in waterproofing of cables and thermal insulation, protecting cable joints both indoor and outdoor and for application on cables installed both above and below ground. The tape shall also be suitable for application on dry and wet surfaces and not affected by water, acid, salts or soil organic.

Table 1: Impregnated fabric tapes Characteristics

Typical Properties		Test Method	Data
Breaking Strength		ASTM D1000	200 N/50mm minimum
Elongation at Break		ASTM D1000	10% average
Breakdown Voltage (55% overlap)		ASTM D-1000	16kV minimum
Resistance to Cathodic Disbonding		ASTM G8 – 30 day	s <500mm²
Resistance to Acids, Alkalis and Salts		UL 510	Excellent
Temperature Range	*For Application*	UL 510	5°C to 55°C
	For Service	UL 510	-20°C to 70°C
Roll Length			10 metres minimum
Thickness		ASTM D1000	1.15mm average
Width			25 mm
Weight			1.44 kg/m² average
RECOMMENDED PRIMER: Paste and Priming Solution			

4.2.3. ADHESIVE PVC ELECTRICAL TAPES

4.2.3.1. General

4.2.3.1.1. The Adhesive PVC Electrical Tapes shall be based on polyvinyl chloride (PVC) and/or its copolymers with a rubber based, pressure sensitive adhesive complying with IEC 60454-3-1 and tested to IEC 60454-3.

4.2.3.1.2. The Adhesive PVC Electrical Tapes shall be compatible with synthetic cable insulation, jackets and splicing compounds and shall remain stable without telescoping more than 2.54mm when maintained at temperatures below 50^0C.

4.2.3.1.3. The Adhesive PVC Electrical Tapes shall be certified for electrical purposes and classified under IEC 60454-3-1-10/F-PVCp/105; applicable for indoor and outdoor uses. The bidder shall submit a copy of the certification with the bid document for tender evaluation

4.2.3.2. Characteristics

4.2.3.2.1. The adhesive PVC electrical tapes in this specification shall be classified as a genuine "soft" tape with no fillers of any kind used; to guarantee excellent physical properties.

4.2.3.2.2. The adhesive PVC electrical tapes shall have the following properties:

a) A good balance between adhesion strength, unwind force and film flexibility assuring outstanding workability, high conformability and good sealing properties.
b) Smooth and free from lumps or bare spots and other defects which would likely cause it to be unsatisfactory in service.
c) A high-grade flame-retardant electrical insulating tape consisting of a pure PVC carrier coated with a pressure sensitive rubber-based adhesive and shall remain stable when maintained at a temperature not more than 70^0C. The tape shall be applied at very low temperature (-10°C).

4.2.3.2.3. The adhesive PVC electrical tapes shall be approximately 190 micron thick with excellent electrical insulation and self-extinguishing properties.

4.2.3.2.4. The adhesive PVC electrical tapes shall be suitable for outside use and shall have excellent workability: high conformability, no flagging, excellent elasticity, non-sticky sides, good ageing properties, good sealing properties, self-extinguishing, a good resistance against abrasion, moisture, oils and solutions with acids and alkaline.

4.2.3.3. **Finish and Application**

4.2.3.3.1. The adhesive PVC electrical tapes shall have a rubber-based, pressure-sensitive adhesive on one side as per Fig. 1. The adhesive shall be fully applied to give a good quality application. There shall be no sign of adhesive transfer when the tape is pulled from the roll.

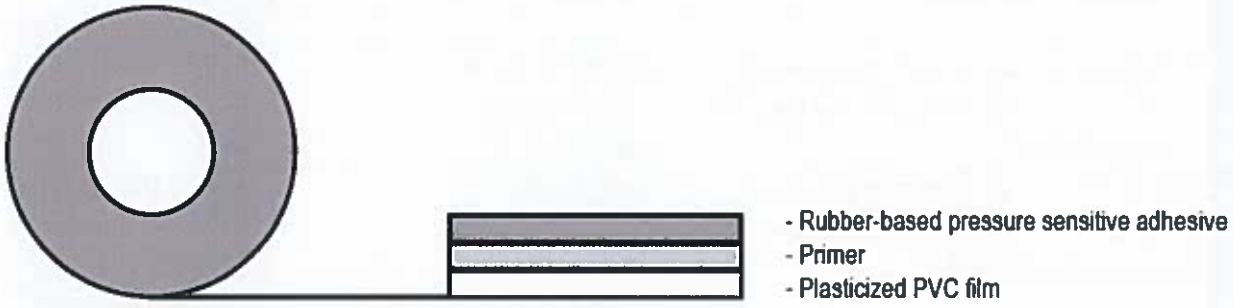


Fig. 1: Construction of Adhesive Tapes

4.2.3.3.2. The adhesive PVC electrical tapes shall be suitable for use as an electrical insulation tape for professionals with excellent conformability.

4.2.3.3.3. The adhesive PVC electrical tapes shall also be used as protection and holding of wiring for electrical appliances, the automotive field for wire harnessing, even in the engine compartment, in the telecom field, for splicing and termination of wires and cables, colour identification, wire harnessing, cable repair and general purpose.

----------SPACE LEFT VACANT----------

Table 2: Technical properties of adhesive PVC tape.

S. No	Properties		Typical value	Test method
1	Total thickness		0.19 mm	IEC 60454-2 Cl. 2
2	Tensile strength - Length Direction (LD)		177 N/10 mm² (section)	IEC 60454-2 Cl. 8
			34 N/10 mm width	IEC 60454-2 Cl. 8
3	Elongation - Length Direction (LD)		235%	IEC 60454-2 Cl. 8
4	Adhesion to BA steel		2.65 N/10 mm	IEC 60454-2 Cl. 11 (Dwelling time 15 min.)
5	Adhesion to backing	at room temperature	2.55 N/10 mm	IEC 60454-2 Cl. 11
		at low temperature (-10°C)	10 N/10 mm	IEC 60454-2 Cl. 12
6.	Voltage Rating		600 V	UL 510
7	Electrical strength	at room temperature	10.5 kV	IEC 60454-2 Cl. 17
		after humid conditioning	10.5 kV	IEC 60454-2 Cl. 18
8	Electrolytic corrosion		min. 1x1011 Ohm/25mm width	IEC 60454-2 Cl. 7.6 (IEC 60167) , 20^{0}C, 40^{0}C & 50^{0}C
9	Low temperature properties (-10°C)		no cracking, no unwinding, no breakdown	IEC 60454-2 Cl. 9
10	Penetration at elevated temperature		60 °C	IEC 60454-2 Cl. 10
11	Shear adhesion to backing after water immersion		31 N	IEC 60454-2 Cl. 13
12	Flammability		self-extinguishing	IEC 60454-2 Cl. 19
13	Maximum Operating Temperature		+105 °C	IEC 60454-2 Cl. 21
14	Roll length		10 m	IEC 60454-2 Cl. 10
15	Width		24 mm	IEC 60454-2 Cl. 8
16	Core diameter, min		31.5 mm	IEC 60454-2 Cl. 8
17	Colour		Black, Red, Yellow, Blue and Green	

4.3. QUALITY MANAGEMENT SYSTEM

4.3.1. The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the insulating and protective tapes 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.

4.3.2. The Manufacturer's Declaration of Conformity to reference standards and copies of quality management certifications including copy of valid and relevant ISO 9001:2008 certificate shall be submitted with the tender for evaluation.

4.3.3. The bidder shall indicate the delivery time of the insulating and protective tapes, manufacturer's monthly and annual production capacity and experience in the production of the type and size of insulating and protective tapes being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for the insulating and protective tapes sold in the last five years together with reference letters from four of the customers shall be submitted with the tender for evaluation.

5. TESTS AND INSPECTION

5.1. Type tests, sampling tests and routine tests shall be done in accordance with the requirements of IEC 60454-2, ASTM D1000-04, ASTM E96 -95, ASTM G8 – 96, ASTM G8 – 96 and this specification. It shall be the responsibility of the supplier to perform or to have performed all the tests specified.

5.2. Copies of Type Test Certificates & Type Test Reports 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. A copy of the accreditation certificate to ISO/IEC 17025 for the testing laboratory shall also be submitted (all in English language).Copies of type test reports to be submitted with the tender (by bidder) for evaluation shall be as stated:

a) **Impregnated Fabric tapes**
   (i) Breaking Strength
   (ii) Elongation at Break
   (iii) Breakdown Voltage (55% overlap)
   (iv) Resistance to Cathodic Disbonding
   (v) Resistance to Acids, Alkalis and Salts
   (vi) Dimensional and weight checks

b) **Adhesive PVC tapes**
   The tests shall be done in accordance with IEC 60454-2 and Table 2
   (i) Total thickness
   (ii) Tensile strength - Length Direction (LD)
   (iii) Elongation - Length Direction (LD)
   (iv) Adhesion to BA steel
   (v) Adhesion to backing
   - at room temperature
   - at low temperature (-10°C)

   (vi) Electrical strength
   - at room temperature

- after humid conditioning

(vii) Electrolytic corrosion
(viii) Low temperature properties (-10°C)
(ix) Penetration at elevated temperature
(x) Shear adhesion to backing after water immersion
(xi) Flammability
(xii) Maximum Operating Temperature

5.3. The insulating and protective tapes shall be subject to acceptance tests at the manufactures' works before dispatch. Acceptance tests (routine & sample tests) shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Limited (KPLC). Routine and sample test reports for the insulating and protective tapes to be supplied shall be submitted to KPLC for approval before shipment of the goods.

5.4. Tests to be witnessed by KPLC Engineers at the factory before shipment shall be the same as those in clause 5.2, in accordance with IEC 60454-2, ASTM D1000-04, ASTM E96 -95, ASTM G8 – 96, ASTM G8 – 96 and this specification.

5.5. On receipt of the insulating and protective tapes 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, insulating and protective tapes which upon examination, test or use fail to meet any of the requirements in the specification.

6. MARKING, LABELLING AND PACKING

6.1. MARKING, LABELLING

The length, thickness, designation, core diameter, colour and any other necessary identification, shall be suitably marked inside the outer label of the tape. This same information, together with the purchase order number, the manufacturer's serial number (if any) and all shipping marks and other information shall appear on the outside of each label.

6.2. PACKING

6.2.1. Each packaged roll of insulating and protective tapes and each kit within the packaged roll of tapes shall be clearly, indelibly and permanently marked with the following information (in the English language).

a) Name and trademark of manufacturer/Supplier/manufacturer product code.
b) Thickness, width and length of tape;
c) Colour of tape (for PVC tapes);
d) The maximum working temperature;
e) Item description;

f) Purchaser's stock code;
g) Quantity: One (1) kit pack size – Number of kits and contents
h) Shelf life - "use before" date;
i) Date of manufacture
j) The words **"PROPERTY OF KPLC"**.

6.2.2. During transport and storage the product shall always be protected against direct sunlight and extremes in temperature and humidity and contained in its original packaging. Once removed from its packaging, it should be promptly applied and remain shielded from direct sunlight and extreme temperature as well as protected against dust and other impurities.

6.2.3. Instructions for use, care, and storage shall be submitted with the items at the time of delivery.

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 signed by the manufacturer;
b) Copies of the Manufacturer's catalogues, brochures, drawings and technical data;
c) Sales records for the last five years and at least four customer reference letters;
d) Details of the manufacturer's experience;
e) Copies of required type test reports by a third party testing laboratory accredited to ISO/IEC 17025 and a copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory;
f) Manufacturers letter of authorization, ISO 9001:2008 certificate and other technical documents required in the tender.
g) Packaging details (including packaging materials).
h) The manufacturer shall be required to also provide detailed information regarding the products - Material Safety Data Sheet which shall consist of:
   - Materials identification,
   - Ingredients and hazards data,
   - Physical data of the chemicals used,
   - Fire and explosion data i.e.
     - Flash point(method)
     - Extinguishing media
     - Unusual fire or explosion hazards
     - Special fire-fighting procedures
   - Reactivity data,

- Chemical incompatibilities
- Conditions to avoid
- Hazardous decomposition byproducts

- Health hazard information,
  - Summary of risks
  - Target organs
  - First aid to various organs such as eye contacts, skin contacts, inhalation and ingestion
- Special protection information,
  - Personal protection equipment such as gloves and respirators
  - Work considerations such as ventilations and safety stations.
- Special precautions.
  - Storage segregation
  - Special handling/storage
  - DOT class.

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 signed by the manufacturer;
b) Design Drawings with details of the insulating and protective tapes to be manufactured for KPLC.
c) 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 9001:2008
d) Detailed test program to be used during factory testing;
e) 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 insulating and protective tapes for The Kenya Power & Lighting Company;
f) Packaging details (including packaging materials).

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 insulating and protective tapes to KPLC stores

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 for previous five years, four customer reference letters, details of manufacturing capacity, the manufacturer's experience and copies of complete type test certificates and type test reports for tender evaluation, all in English Language)*

Tender No. .....

Clause	Description			Guaranteed Technical Particulars offered
4.2.1	**Impregnated fabric tapes - Densyl tape**			
	Bidders name			State
	Manufacturer and country of manufacture			State
	Catalogue number or Type designation			State
	Operating conditions			State
	Standards of manufacture			State
	Material of manufacture			State
	Recommended primer			State
	Properties			List all its properties
	Application			Specify
	Characteristics	Breaking Strength		State the offered values and attach test report
		Elongation at Break		
		Breakdown Voltage (55% overlap)		
		Resistance to Cathodic Disbonding		
		Resistance to Acids, Alkalis and Salts		
		Temperature Range	*For Application*	
			For Service	
		Roll Length		
		Thickness		
		Width		
		Weight		
4.2.2.	**Adhesive PVC electrical tapes**			
	Bidders name			State
	Manufacturer and country of manufacture			State
	Catalogue number or Type designation			State
	Operating conditions			
	Standards of manufacture			State
	Material of manufacture			State
	Certification by IEC 60454-3-1-10/F-PVCp/105			State
	Application area – indoor and outdoor			State
	Compatibility with synthetic cable insulation, jackets and splicing compounds			State
	Not telescoping more than 2.54mm when maintained at temperatures below 50^0C			State

Clause	Description			Guaranteed Technical Particulars offered
	Adhesive tape properties	Total thickness, mm		State the offered values and attach test report
		Tensile strength - Length Direction (LD) Dwelling time 15 min.), N/10mm		
		Elongation - Length Direction (LD), %		
		Adhesion to BA steel, N/10mm		
		Adhesion to backing	at room temperature	
			at low temperature (-10°C)	
		Voltage Rating, V		
		Electrical strength	at room temperature, kV	
			after humid conditioning, kV	
		Electrolytic corrosion, Ohm/25mm width		
		Low temperature properties (-10°C)		
		Penetration at elevated temperature, ^{0}C		
		Shear adhesion to backing after water immersion		
		Flammability		
		Maximum Operating Temperature, ^{0}C		
		Roll length, m		
		Width, mm		
		Core diameter, min, mm		
		Colours provided		
4.3	Quality Management System			
	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	Test standards and responsibility of carrying out tests			provide
	Copies of Type Test Reports submitted with tender			provide
	Test reports to be submitted by supplier to KPLC for approval			provide
	Tests to be witnessed by KPLC Engineers at factory before shipment			specify
	Replacement of rejected the insulating and protective tapes.			specify
6	Marking			specify
	Packing			specify
7	Documents submitted with tender			provide
	Documents to be submitted by supplier to KPLC for approval before manufacture			provide
8	Manufacturer's Guarantee and Warranty			provide
9	List catalogues, brochures, technical data and drawings submitted to support the offer			provide
10	List customer sales records and reference letters submitted to support the offer.			provide

Clause	Description	Guaranteed Technical Particulars offered
14	List Test Certificates submitted with tender	provide
15	List test reports of the wrenches to be submitted to KPLC for approval before shipment	provide
16	Statement of compliance to specification (indicate deviations if any & supporting documents)	provide

I ..... on behalf of..... ..... declare that the above specifications matrix conforms to a typical tender item type ..... as clearly marked in the attached technical brochure & drawings, and being offered for this tender.

Signature.....Date .....Stamp/Seal.....

I hereby declare that I have read, understood and responded fully to each and every clause in this technical specification.

.....

Manufacturer's Name, Signature, Stamp/seal and Date