



Eskom

Standard

Technology

Title: **SPECIFICATION FOR MEDIUM
VOLTAGE XLPE AND
IMPREGNATED PAPER
INSULATED CABLES
STANDARD**

Unique Identifier: **240-56063792**

Alternative Reference Number: **32-1271**

Area of Applicability: **Engineering**

Documentation Type: **Standard**

Revision: **3**

Total Pages: **26**

Next Review Date: **March 2027**

Disclosure Classification: **Controlled
Disclosure**

Compiled by

Queeneth Khumalo

**Chief Engineer -Dx Ops
Enablement**

Date: 04-03-2022

Approved by

Jacques Paulse

**Senior Engineer- MV & LV
Cable Systems Convener**

Date: 04-03-2022

Authorized by

Alex Ndlela

**Senior Manager- Dx
Engineering**

Date: 10/03/2022

Supported by SCOT/SC

Queeneth Khumalo

CS&MES SC Chairperson

Date: 04-03-2022

Content

	Page
1. Introduction	4
2. Supporting clauses	4
2.1 Scope	4
2.1.1 Purpose	4
2.1.2 Applicability	4
2.2 Normative/informative references	4
2.2.1 Normative	4
2.2.2 Informative	5
2.3 Definitions	5
2.3.1 General	5
2.3.2 Disclosure classification	5
2.4 Abbreviations	5
2.5 Roles and responsibilities	5
2.6 Process for monitoring	5
2.7 Related/supporting documents	5
3. MV XLPE insulated and MV PILC cable requirements	6
3.1 General requirements for MV cables	6
3.1.1 Rated Voltages	6
3.1.2 Conductors	6
3.1.3 Impregnated-paper-insulated lead sheathed cable	6
3.1.4 XLPE-insulated cable	7
3.2 Packaging, Marking and Labelling	9
3.2.1 Packaging	9
3.2.2 Marking of conductor	9
3.2.3 Marking of cable	10
3.2.4 Marking of cable outer sheath	11
3.2.5 Marking of cable drums	11
3.2.6 Documentation	11
3.3 Tests	12
3.3.1 Documentation	12
4. Authorization	13
5. Revisions	13
6. Development team	14
7. Acknowledgements	14
Annex A – Eskom Logo: Printing Guide And Format	15
Annex B – Technical Schedule A and B for MV PILC and XLPE Cables	17
Annex C – Deviation Schedule	26

Figures

Figure A.1: Typical wooden drum showing Eskom logo branded flange	15
Figure A.2: The Eskom logo format	16

Tables

Table 1: Standard size medium voltage cables.....6

1. Introduction

The requirements and specifications for medium-voltage cross linked polyethylene-insulated (XLPE) and impregnated paper-insulated (PILC) cables for systems with nominal voltages of 11 kV, 22 kV and 33 kV in this standard are based on SANS 1339 and SANS 97. 11 kV nominal voltage rated cables will be used for 3.3 kV and 6.6 kV nominal voltage applications.

This standard has been prepared on behalf of the Steering Committee of Technologies (SCOT). It has been approved by the committee for use by Eskom as a requirement standard for the manufacturing and procurement of XLPE and PILC insulated cables for medium-voltage systems with nominal voltages from 11 kV up to and including 33 kV.

2. Supporting clauses

2.1 Scope

This standard covers the Eskom's minimum requirements for the selection, manufacturing, testing and supply of medium voltage XLPE and PILC cables.

The requirements for XLPE cables are based on SANS 1339 and this document. The requirements for PILC cables are based on SANS 97 and this document.

The safety specification VC 8077 stipulates that all PILC and XLPE-insulated medium-voltage cables in South Africa shall comply with the requirements of SANS 1339 and SANS 97 respectively.

2.1.1 Purpose

The document specifies the technical requirements for medium voltage XLPE and PILC cables to be supplied to Eskom.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] ISO 9001: Quality Management Systems.
- [2] SANS 97, Electric cables – Impregnated-paper-insulated metal-sheathed cables for rated voltages 3,3/3,3 kV up to 19/33 kV.
- [3] SANS 1339, Electric cables – Cross-linked polyethylene (XLPE) – insulated cables for voltages from 3,8/6,6 kV to 19/33 kV.
- [4] SANS 1411-2, Materials of insulated electric cables and flexible cords – Part 2: Polyvinyl chloride (PVC).
- [5] SANS 1411-6, Materials of insulated electric cables and flexible cords – Part 6: Armour.
- [6] SANS 1411-7, Materials of insulated electric cables and flexible cords – Part 7: Polyethylene (PE).
- [7] VC 8077, Compulsory specification for the safety of medium voltage electric cables.
- [8] D-DT-8000, Cable, 11 kV and 22 kV impregnated paper-insulated.
- [9] D-DT-8001, Cable, 11 kV and 22 kV XLPE-insulated.
- [10] D-DT-2800, Cable, 11 kV and 22 kV impregnated paper-insulated.

ESKOM COPYRIGHT PROTECTED

[11] D-DT-2801, Cable, 11 kV and 22 kV XLPE-insulated

2.2.2 Informative

None

2.3 Definitions

2.3.1 General

The definitions given in SANS 97, SANS 1339 and IEV and the following shall apply.

2.3.2 Disclosure classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

The abbreviations given in SANS 97, SANS 1339 and the following shall apply.

Abbreviation	Description
AL	Aluminium
Cu	Copper
HDPE	High Density Poly Ethylene
IEV	International Electro-technical Vocabulary
MDPE	Medium Density Poly Ethylene
MV	Medium Voltage
PILC	Impregnated Paper-Insulated Lead covered Cable
PVC	Polyvinyl chloride
PE	Polyethylene
UV	Ultraviolet
XLPE	Cross-Linked Polyethylene
SCOT	Steering Committee of Technologies

2.5 Roles and responsibilities

All Eskom employees and/or appointed bodies involved in the procurement of MV XLPE and MV PILC cables shall ensure that the product meets the requirements as specified in this document. Any deviation from these requirements shall constitute non-conformance, unless it was agreed to by a delegated Cable System Specialist and is based on sound engineering judgement at the time of tender evaluations or after tender award.

2.6 Process for monitoring

The MV XLPE and MV PILC cables acceptance shall be based on the relevant technical evaluation criteria at the time of tender and based on factory acceptance testing requirements as per this standard.

2.7 Related/supporting documents

Refer to clause/ section 2.2.

3. MV XLPE insulated and MV PILC cable requirements

3.1 General requirements for MV cables

- a) Medium voltage cables shall comply with SANS 97 or SANS 1339 and the requirements of this specification.
- b) All cables offered shall carry valid product type tests in accordance with the relevant SANS standard, and where applicable for local type tested cables the SANAS accredited product certification body mark scheme. A copy of all relevant type test reports and the required tender returnable documentation shall be submitted at the time of tender enquiry submissions. Where applicable for local type tested cables the mark scheme permit and accompanying schedules shall also be submitted.

3.1.1 Rated Voltages

The rated voltages of medium-voltage cables shall be:

- a) 6,35/11 kV,
- b) 12,7/22 kV, and
- c) 19.1/33 kV.

Note: 6.35/11 kV cables shall be used and supplied for 1'9/3'3 kV and 3,8/6,6 kV Eskom cable systems applications.

3.1.2 Conductors

The standard conductor shall be copper or aluminium with the equivalent cross-sectional areas specified in table below, unless otherwise specified at the time of tender:

Table 1: Standard size medium voltage cables

Rated voltage: 11 kV, 22 kV and/ or 33 kV	
Single Core (mm ²)	3 Core (mm ²)
50	50
95	95
185	185
300	300
400	400
630	630

3.1.3 Impregnated-paper-insulated lead sheathed cable

PILC cables shall comply with SANS 97, general-purpose cable, with the following specific requirements:

3.1.3.1 Screening

The cores of three-core cables shall be individually screened.

3.1.3.2 Core identification

The cores of 3-core cables shall be identified by the numbers 1, 2 and 3 printed at frequent intervals on the outer layer of paper tape. The colouring agent used for printing shall not fade unduly, shall be chemically neutral and shall have no deleterious effect on the fibres of the paper.

3.1.3.3 Metal sheath

The metal sheath shall be lead alloy E.

3.1.3.4 Bedding under armouring

The bedding under the armouring shall comprise of an extruded layer of PVC type B in accordance with SANS 1411-2.

3.1.3.5 Armour

a) Single-core cables shall be unarmoured.

Note: Single core cables are only utilized within the boundary of a substation and are therefore at low risk of being damaged by excavation.

b) Three-core cables shall be armoured with two layers of galvanized steel tape in accordance with SANS 1411-6.

3.1.3.6 Outer sheath

a) The outer sheath shall comprise an extruded layer of black flame retardant PVC type S2 in accordance with SANS 1411-2.

b) The outer sheath shall be ultraviolet (UV) radiation stabilised.

3.1.4 XLPE-insulated cable

XLPE-insulated cables shall comply with SANS 1339 and shall meet the following specific requirements:

3.1.4.1 Type

The cable construction shall be type A unless otherwise specified in schedule A.

Note: All distribution cables are directly buried and are type A. The armouring is also used as an earth continuity conductor.

3.1.4.2 Semi-conducting core screen

The core screen shall be strippable.

3.1.4.3 Core identification

The cores of three-core cables shall be identified by the numbers 1, 2, 3, printed as numerals or words either directly on the extruded semi-conducting core screen or on the semi-conducting bedding tapes of each core, or by other acceptable means.

3.1.4.4 Bedding under armouring

The bedding under the armouring shall comprise of an extruded layer of PVC type B1 in accordance with SANS 1411-2.

3.1.4.5 Outer sheath

a) The outer sheath shall comprise:

- an extruded layer of black PE type PS2 in accordance with SANS 1411-7, or
- PE type PS2 outer-sheath shall be flame retardant and, if specified in schedule A, shall have a reduced halogen emission property, or
- an extruded layer of black PVC type S5 in accordance with SANS 1411-2, or
- PVC type S5 shall be halogen free.

Note: The use of a PVC outer sheath is restricted to Generation applications only.

- b) The outer sheath shall be ultraviolet (UV) radiation stabilised.
- c) The type of outer sheath required will be specified in schedule A.

3.1.4.6 Fire performance requirements for PVC-sheathed cables

The armour bedding and outer sheath of PVC-sheathed cables shall be flame retardant and, if specified in schedule A, shall have a reduced halogen emission property.

3.1.4.7 Water blocking

Where water blocking is specified in the technical schedules, the cable shall be longitudinally water-blocked in the following parts of the cable:

- a) In the region of the armouring and metal layers;
- b) In the interstices between the cores of a three-core cable;
- c) In the region of the metal screen; and
- d) Along the conductor length

The method used in order to achieve the longitudinal water blocking shall be stated in schedule B.

Suitable water blocking removal instructions shall be submitted with the tender returnable documentation for adding it into joint and termination installation instructions.

Where no water blocking removal is required for jointing and termination of the cable, tests shall be performed and submitted to Eskom to prove that no cable de-rating or hot connections will occur for Eskom standard joints and terminations in accordance with SANS 1332.

3.1.4.8 Screening and armouring requirements

MV XLPE shall either be taped and armoured, or copper wire screened for single core cables. MV XLPE shall be taped and armoured or copper wire screened for three core cables.

3.1.4.8.1 Single core MV XLPE cable

- a) Single-core cables shall either be aluminium wire armoured and copper taped screened, or shall be aluminium wire armoured and copper wire screened for 33 kV if specified on technical schedules A.

Note: Copper tape metal screen in 33 kV single-core cables of conductor sizes larger than 400 mm² is not recommended due to the excessive expansion of copper tapes under load cycling.

- b) Taped and aluminium wire armoured MV XLPE cables shall have PVC outer-sheath or PE outer-sheath.

3.1.4.8.2 Outer-sheath for Single core MV XLPE cable

- a) Copper wire screened MV XLPE cables shall have a MDPE or HDPE outer-sheath (for wind farm applications).

3.1.4.8.3 Three core MV XLPE cable

- a) Three-core cables shall be taped and aluminium wire armoured.

3.1.4.8.4 Outer-sheath for three core MV XLPE cable

- a) Taped and aluminium wire armoured MV XLPE cables shall have PVC outer-sheath or PE outer-sheath.

3.2 Packaging, Marking and Labelling

3.2.1 Packaging

- a) The wood in wooden drums shall be heat treated only to prevent biological attack.
- b) Cables shall be supplied on wooden drums with a metal flanged spindle hole that is suitable for a spindle having a diameter of 80 mm (minimum).
- c) Unless otherwise specified at the time of order, standard drum lengths shall be 300 m for three-core cables and 500 m for single-core cables.

3.2.2 Marking of conductor

- a) Each individual conductor shall be marked with a unique and traceable identification system.

Note: The purpose of marking the conductor is to be able to prove ownership through traceability of the conductor using the identification system.

- b) The manufacturer shall keep a secure database of all uniquely marked conductors supplied to Eskom.
- c) The conductor identification system shall comply with the following minimum requirements:
 - The identification system shall be durable and withstand the expected conditions during the manufacturing processes and operating conditions of the cable over its life. If requested, sufficient proof shall be provided that the identification system offered is chemically compatible with the various materials it may be in contact with inside the cable;
 - The identification system shall withstand, without melting or other deleterious effects, continuous conductor operating temperatures of 90°C and short-circuit conductor temperatures of at least 250°C;
 - The identification system shall not negatively impact the electrical and mechanical integrity and performance of the cable over its expected life;
 - The identification system shall not negatively impact the environment in which the cable is installed over its expected life;
 - The identification code shall consist of any of the following options:
 - Alpha-numeric, alpha - or numeric characters,
 - Eskom name,
 - Eskom logo,
 - Coloured yarn,
 - Indented marks,
 - Etc.
 - The identification system used shall be visible to the naked eye so as to readily identify that the conductor is marked;
 - The identification code shall be marked (i.e. appear) at intervals not exceeding 500 mm if not continuous in nature;
 - Where applicable the characters used to uniquely identify the conductor shall be legible with the naked eye or, at most, with the assistance of a portable hand-held magnifying glass. The font size offered and, if applicable, the magnification factor required to read the characters shall be stated in schedule B; and
 - Where applicable for alpha-numeric characters the algorithm used to generate the identification code shall be unique for each manufacturer.

ESKOM COPYRIGHT PROTECTED

- d) Details of the proposed conductor identification system shall be submitted with the tender documentation. The system shall be subject to approval by Eskom.

3.2.3 Marking of cable

Proposal and method for marking of cable shall be submitted to Eskom for evaluation. The proposed method for marking shall meet the following requirements.

- a) Cable shall be marked with a unique and traceable identification system. The cable identification system location shall be stated in schedule B.

Note: The purpose is to provide asset management information relating to the cable manufacturer, order number, date of manufacture, drum number, conductor identification code range, etc.

- b) The manufacturer shall keep a secure database of all uniquely marked cables supplied to Eskom.
- c) The cable identification system shall comply with the following minimum requirements:
- The identification system shall be durable and withstand the expected conditions during the manufacturing processes and operating conditions of the cable over its life. If requested, sufficient proof shall be provided that the identification system offered is chemically compatible with the various materials it may be in contact with inside the cable,
 - The identification system shall withstand, without melting or other deleterious effects, continuous conductor operating temperatures of 90°C and short-circuit conductor temperature of at least 250°C,
 - The identification system shall not negatively impact the electrical and mechanical integrity and performance of the cable over its expected life,
 - The identification system shall not negatively impact the environment in which the cable is installed over its expected life,
 - The identification code shall consist of any of the following:
 - Alpha-numeric -, alpha - or numeric characters,
 - Eskom name,
 - Eskom logo,
 - Coloured yarn,
 - Indented marks,
 - Etc.
 - The identification system used shall be visible to the naked eye so as to readily identify that the cable is marked,
 - The identification code shall be marked (i.e. appear) at intervals not exceeding 500 mm if not continuous in nature,

Note: The identification code will therefore be repeated for up to a maximum distance of one meter of cable.

- The characters used to uniquely identify the conductor shall be legible with the naked eye without the need for any magnification. The font size offered shall be stated in schedule B, and
 - The algorithm used to generate the identification code shall be unique for each manufacturer.
- d) Details of the proposed cable identification system shall be submitted with the tender documentation. The system shall be subject to approval by Eskom.

3.2.4 Marking of cable outer sheath

- a) Cables shall be legibly marked in accordance with the requirements of SANS 97 or SANS 1339 as applicable, but the marking shall include the specification number to which the cable has been manufactured, the word "ESKOM", the conductor size in mm² and conductor material e.g. Cu (copper) or Al (aluminium). A typical legend would be:
- "XXXXXXXXX CABLES 2009 6.35/11 kV 95 mm² Cu ESKOM"
- b) The cable shall be sequentially marked at one metre intervals with the legend 000 m, 001 m etc. starting with 000 m at the barrel of the drum and finishing with the number indicating the length of cable on the drum at the outer end of the cable. Length marking shall be to an accuracy of better than 1 %.
- c) PVC or PE sheathed cables shall have a colour coded stripe in accordance with SANS 1339.

3.2.5 Marking of cable drums

In addition to requirements of SANS 1339 and SANS 97, cable drums shall be clearly and indelibly marked with the Eskom stock (SAP) number (i.e. "Eskom SAP Number: XXXXXXXX")

- a) All MV cable drums destined for Eskom shall be branded with the Eskom logo on one of its flat sides (the flange).
- b) The Eskom logo shall be printed in Eskom blue or black on a white-coloured background.
- c) For metal or wooden drums, a portion of the flange surface shall be painted in white to provide a rectangular background on which the signature shall be printed. The height of the white rectangular background shall be three times the diameter of the "circle" part of the Eskom logo.
- d) The printed Eskom logo shall appear centrally on the white rectangular background leaving a space equal to at least one logo "circle" before and after the Eskom logo.
- e) The Eskom logo printing shall be made using a stencil technique or other equivalent techniques which shall be demonstrated to and approved by Eskom.
- f) The dimensions of Eskom logo shall be a minimum length and height of 820 mm and 210 mm respectively. The Eskom logo and standard requirements are shown in Appendix A.
- g) All other printing on the flange shall be positioned so as to ensure a minimum clearance of one logo circle ("circle") diameter away from the Eskom logo.

3.2.6 Documentation

A catalogue that gives the following information shall be provided for the full range of cables manufactured in accordance with SANS 97 and SANS 1339:

- a) Conductor material (i.e. copper or aluminium) and cross-sectional area.
- b) Voltage rating.
- c) Impregnated-paper insulated cable dimensional data:
- Diameter over lead sheath;
 - Diameter over bedding; and
 - Diameter over sheath.
- d) XLPE insulated cable dimensional data:
- Diameter over conductor;
 - XLPE thickness;
 - Armour wire diameter;

ESKOM COPYRIGHT PROTECTED

- Diameter over bedding; and
- Diameter over sheath.

e) Maximum sustained current rating in ground, air and ducts.

Notes:

- 1) The standard installation conditions assumed shall be stated.
- 2) For XLPE-insulated cables, both the 70°C and 90°C current ratings shall be provided.
- f) Short-circuit ratings.
- g) Cable mass (kg/m).
- h) Gross mass per standard drum length (kg).
- i) The 50 Hz a.c. resistance at maximum sustained conductor operating temperature (Ω/km).
- j) Reactance per phase (Ω/km).
- k) Capacitance per phase (nF/km).
- l) Zero sequence impedance and capacitance per phase at maximum sustained conductor operating temperature (Ω/km).

Note: The sequence impedances need only be provided for the range of cables required by this specification.

- m) The cable thermal time constant (s).
- n) A copy of the relevant SABS mark scheme permit and accompanying schedules.

3.3 Tests

Testing of impregnated paper-insulated and XLPE-insulated medium-voltage cable shall be in accordance with SANS 97 and SANS 1339 respectively.

3.3.1 Documentation

3.3.1.1 Technical schedules and test schedules

The full Technical Schedules B (including the Test Schedules and the Deviation Schedules) shall be completed and submitted to Eskom together with the Technical Schedules A for approval at the time of tendering.

3.3.1.2 Drawings

The following drawings shall be submitted:

- a) Cable construction drawings, and
- b) Cable dimensional data drawings,

3.3.1.3 Test reports

- a) All required type test reports (complete type test reports, including the reference to all type tested materials used in the cable construction) shall be submitted to Eskom, in English, by the manufacturer at the time of tendering and/ or pre-qualification.
- b) Cable rating data and calculations shall be submitted for current rating and fault current ratings.

4. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Azwimbavhi Mamanyuha	Dx Operations Support: General Manager
Alex Ndlela	Dx Engineering: Senior Manager
Jacques Paulse	MV/LV Cable Systems CG: Convener

5. Revisions

Date	Rev	Compiler	Clause	Remarks
March 2022	3	Q. Khumalo		Document revision cycle.
			3.1b)	SANAS accredited product certification body mark scheme has been added.
			3.1.4.8.1	Clarified the requirements for copper wire screen for 33 kV cables.
July 2016	2	Q. Khumalo		Document revised to align with the latest template.
				Document number changed from ESP 32-1271 to 240-56063792.
			3.1.1	Document now includes all MV cable ratings.
			3.1.2	Included aluminium conductor for all sizes of cables.
			3.1.4.8	Included requirements for mechanical protection and earthing for XLPE cables.
			3.1.4.8	Included copper wire screened option for single core cables and wind farm application.
			3.2.2	Include other marking techniques
			3.2.4	The SABS mark scheme mandatory requirement was removed.
Jan 2012	1	B. Mwarehwa		The document title change from "Specification for 11 kV and 22 kV impregnated paper and XLPE -insulated cables" to "Specification for medium voltage impregnated paper and XLPE - insulated cables"
			4.4.6.2	The outer sheath shall be ultraviolet (UV) radiation stabilised
			5.4.1	Requirement for the outer sheath marking to include the word "ESKOM" added

ESKOM COPYRIGHT PROTECTED

Date	Rev	Compiler	Clause	Remarks
Oct 2011	0	B. Mwarehwa	4.3	Standard size of 6.6 kV cable and 300 mm ² size added which are required for Generation applications.
			4.5.5.1.2	an extruded layer of black PVC type S5 in accordance with SANS 1411-2.
			4.5.7	The cable shall be longitudinally water blocked. The method used in order to achieve the longitudinal water blocking shall be stated in schedule B.
			5,1,1	The wood in wooden drums shall be resistant to biological attack and therefore be treated in accordance with the relevant SANS standard
			5.2	Marking of conductor requirements added.
			5.3	Marking of cable requirements added.
			5.4.5	Requirements to brand the cable drums with the Eskom Logo added.
			Annex A	Eskom Logo printing guide and format added.

6. Development team

The following people were involved in the development of this document:

- B. Olivier: SI WCOU (Senior Technician)
- D. Monyane: Gx (Chief Technologist)
- J. Mahlangu: SI LOU (Senior Technician)
- J. Paulse: SI WCOU (Senior Engineer)
- M. Mathonsi: SI LOU (Senior Engineer)
- N. Booyens: SI KZN (Senior Engineer)
- Q. Khumalo: Dx Ops Support HV Plant (Chief Engineer)
- S. Mtshaulana: SI GOU (Engineer)
- T. Phali: SI ECOU (Senior Technician)

7. Acknowledgements

The author acknowledges the team which developed the first revision of the document.

Annex A – Eskom Logo: Printing Guide And Format

(Normative)

A.1 The Eskom logo printing guide and format

The logo circle (“circle”) and the logo word (the word “Eskom”) shall always appear together as one unit.

A.1.1 Colour specifications

The Eskom logo shall appear in the Eskom corporate blue or in black. The Eskom corporate blue is as follows:

- Pantone 287C
- 100%C + 70%M + 0%Y + 10%K

A.1.2 Relationship between the logo circle (“circle”) and the logo word (the word “Eskom”)

The relationship between the logo circle (“circle”) and the logo word (the word “Eskom”) shall always be followed as indicated in the graphic. The measurement between the logo circle (“circle”) and the logo word (the word “Eskom”) is twice the line-width of the “circle”.

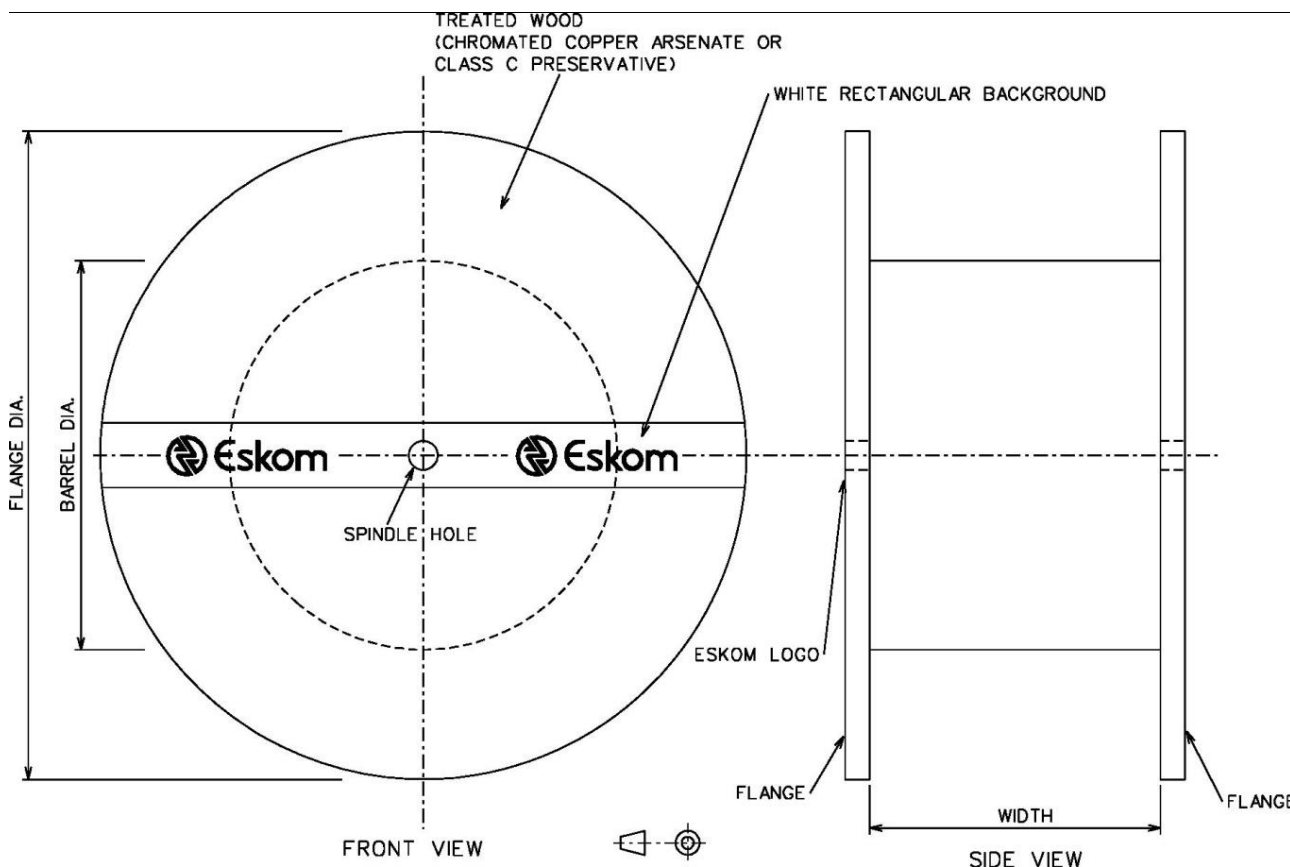


Figure A.1: Typical wooden drum showing Eskom logo branded flange

ESKOM COPYRIGHT PROTECTED



Figure A.2: The Eskom logo format

Annex B – Technical Schedule A and B for MV PILC and XLPE Cables

Informative

Use of the technical schedules is intended to obviate the need for preparing a detailed technical specification for every enquiry. The purchaser need only specify compliance with 240-56062752 and provide the tenderers with the relevant schedules A and B.

Schedule A gives Eskom's requirements. It lists the requirements to be specified by the purchaser in enquiries and orders. These requirements may include references to the relevant sub-clauses in this document. Where the text of any referenced standard stipulates that the purchaser shall indicate his requirements, these requirements should also be specified in schedule A. The purchaser shall set out his particular requirements and choices in schedule A.

The purchaser shall require the tenderer to fill in schedule B. By doing this, the tenderer will state compliance with this document and provide the information the purchaser has requested. Schedule B shall be completed in full by the supplier.

Deviations/modifications/alterations from the requirements specified in Schedule A shall be well documented in the deviation schedule.

Price schedules shall be so drawn up and the covering letter so worded that the costs of all services such as tests and delivery are declared and allowed for in the tender.

Generic Technical Schedules A and B For: MV PILC Cables**TECHNICAL SCHEDULES A & B FOR MV PILC CABLES****Schedule A: Purchasers specific requirements****Schedule B: Guarantees and technical particulars of equipment offered**

Item	240-56063792	Description		Schedule A	Schedule B
1		Item and system description			
1.1		SAP No	Item Specific	xxxxxxxxxx	
1.2		Buyers Guide Drawing	Item Specific	xxxxxxxxxx	
1.3		Symmetrical fault current rating kA	Item Specific		
1.4	3.1.1	Nominal system voltage kV	Item Specific	xxxxxxxxxx	
1.5		Earth fault current rating kA	Item Specific		
2.1	3.1.1	Rated voltage (U_r) kV	11, 22 or 33	xxxxxxxxxx	
2.2	3.1.2	Number of cores (1- Core or 3- Cores)	1 or 3	xxxxxxxxxx	
2.3	3.1.3.1	Screening of cables	xxxxxxxxxx	xxxxxxxxxx	
2.4	3.1.3.2	Core identification	Item Specific	xxxxxxxxxx	
2.5	3.1.3.3	Metal sheath	Item Specific	xxxxxxxxxx	
2.6	3.1.3.4	Bedding under armouring	Item Specific	xxxxxxxxxx	
2.7	3.1.3.5	Armouring	Item Specific	xxxxxxxxxx	
2.8	3.1.2	Conductor Size mmsq	Item Specific	xxxxxxxxxx	
2.9		Rated frequency (f_r) Hz	50	xxxxxxxxxx	
2.10	3.1.3.6	Type of outer sheath	Item Specific	xxxxxxxxxx	
2.11	3.1.3.6	Is outer sheath ultraviolet (UV) radiation stabilized?	Item Specific		
3					
3.1	3.2.1	Hole for wooden drums for a spindle if not mm 80mm (minimum).	Item Specific		
3.2	3.2.1	Drum length required as per 3.2.1 m	Item Specific	xxxxxxxxxx	
3.3	3.2.2	Is conductor marking system details supplied with tender?	Item Specific		
3.4	3.2.2	Font size for conductor marking mm characters	xxxxxxxxxx		
3.5	3.2.3	Is marking of cable identification system Yes details supplied with tender?	Yes		

SPECIFICATION FOR MEDIUM VOLTAGE XLPE AND
IMPREGNATED PAPER INSULATED CABLES
STANDARD

Unique Identifier: 240-56063792

Revision: 3

Page: 19 of 26

Item	240-56063792	Description	Schedule A	Schedule B
3.6	3.2.3	Cable identification system location	xxxxxxxxxx	
3.7	3.2.3	Font size for the cable identification mm system characters	xxxxxxxxxx	
3.8	3.2.4	Does the marking of cable outer Yes sheath comply with 3.2.4?	Yes	
3.9	3.2.6	Are all relevant documents submitted?	Yes	
3.10	3.2.6	Catalogue to be provided with tender documentation?	Yes	
3.11	3.3.1.3	Copy of type tests report and where Yes applicable certificates to be provided with tender documentation	Item Specific	
3.12	3.3.1.2	Dimensions of cable submitted	Yes	
3.13	3.2.6	Maximum sustained current rating at 70°C conductor temperature, installed in:	xxxxxxxxxx	
3.14		a) Ground?	xxxxxxxxxx	
		b) Air?	xxxxxxxxxx	
		c) Ducts?	xxxxxxxxxx	
3.15	3.2.6.f)	Short circuit rating? kA	xxxxxxxxxx	
3.16	3.2.6.g)	Cable mass? kg/m	xxxxxxxxxx	
3.17	3.2.6.h)	Gross mass per standard drum kg length?	xxxxxxxxxx	
3.18	3.2.6.i)	Resistance at max conductor 70°C temperature?	xxxxxxxxxx	
3.19	3.2.6.j)	Reactance per phase? Ω /m	xxxxxxxxxx	
3.20	3.2.6.k)	Capacitance per phase? nF/m	xxxxxxxxxx	
3.21	3.2.6.l)	Zero sequence impedance and Ω /m capacitance per phase?	xxxxxxxxxx	
3.22	3.2.6.m)	Cable thermal time constant? seconds	xxxxxxxxxx	
3.23	3.3	Testing of cable is done in accordance with SANS 97?	Item Specific	

SIGNATURES

Supplier

Name (Print)

Sign

Date

Factory

Name (Print)

Sign

Date

Eskom

Name (Print)

Sign

Date

ESKOM COPYRIGHT PROTECTED

Generic Technical Schedules A and B For: MV XLPE Cables

TECHNICAL SCHEDULES A & B FOR MV XLPE CABLES

Schedule A: Purchasers specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	240-56063792	Description	Schedule A	Schedule B
1		Item and system description		
1.1		SAP No	Item Specific	xxxxxxxxxx
1.2		Buyers Guide Drawing	Item Specific	xxxxxxxxxx
1.3		Symmetrical fault current rating kA	Item Specific	
1.4	3.1.1	Nominal system voltage kV	Item Specific	xxxxxxxxxx
1.5		Earth fault current rating kA	Item Specific	
2.1	3.1.1	Rated voltage (U_r) kV	11, 22 or 33	xxxxxxxxxx
2.2	3.1.2	Number of cores (1- Core or 3- Cores)	1 or 3	xxxxxxxxxx
2.3	3.1.3.1	Screening of cables	xxxxxxxxxx	xxxxxxxxxx
2.4	3.1.3.2	Core identification	Item Specific	xxxxxxxxxx
2.5	3.1.3.3	Metal sheath	Item Specific	xxxxxxxxxx
2.6	3.1.3.4	Bedding under armouring	Item Specific	xxxxxxxxxx
2.7	3.1.3.5	Armouring	Item Specific	xxxxxxxxxx
2.8	3.1.2	Conductor Size mmsq	Item Specific	xxxxxxxxxx
2.9		Rated frequency (f_r) Hz	50	xxxxxxxxxx
2.10	3.1.3.6	Type of outer sheath	Item Specific	xxxxxxxxxx
2.11	3.1.3.6	Is outer sheath ultraviolet (UV) radiation stabilized?	Item Specific	
3				
3.1	3.2.1	Hole for wooden drums for a spindle if not mm 80mm (minimum).	Item Specific	
3.2	3.2.1	Drum length required as per 3.2.1 m	Item Specific	xxxxxxxxxx
3.3	3.2.2	Is conductor marking system details supplied with tender?	Item Specific	
3.4	3.2.2	Font size for conductor marking mm characters	xxxxxxxxxx	
3.5	3.2.3	Is marking of cable identification system details supplied with tender?	Yes	

SPECIFICATION FOR MEDIUM VOLTAGE XLPE AND
IMPREGNATED PAPER INSULATED CABLES
STANDARD

Unique Identifier: 240-56063792

Revision: 3

Page: 21 of 26

1	2	3	4	5
Item	240-56063792	Description	Schedule A	Schedule B
3.6	3.2.3	Cable identification system location	xxxxxxxxxx	
3.7	3.2.3	Font size for the cable identification mm system characters	xxxxxxxxxx	
3.8	3.2.4	Does the marking of cable outer Yes sheath comply with 3.2.4?	Yes	
3.9	3.2.6	Are all relevant documents submitted?	Yes	
3.10	3.2.6	Catalogue to be provided with tender documentation?	Yes	
3.11	3.3.1.3	Copy of type tests report and where Yes applicable certificates to be provided with tender documentation	Item Specific	
3.12	3.3.1.2	Dimensions of cable submitted	Yes	
3.13	3.2.6	Maximum sustained current rating at 70°C conductor temperature, installed in:	xxxxxxxxxx	
3.14		a) Ground?	xxxxxxxxxx	
		b) Air?	xxxxxxxxxx	
		c) Ducts?	xxxxxxxxxx	
3.15		Maximum sustained current rating at 90°C conductor temperature, installed in:	xxxxxxxxxx	
		a) Ground?	xxxxxxxxxx	
		b) Air?	xxxxxxxxxx	
		c) Ducts?	xxxxxxxxxx	
3.16	3.2.6.f)	Short circuit rating? kA	xxxxxxxxxx	
3.17	3.2.6.g)	Cable mass? kg/m	xxxxxxxxxx	
3.18	3.2.6.h)	Gross mass per standard drum kg length?	xxxxxxxxxx	
3.19	3.2.6.i)	Resistance at max conductor 70°C temperature?	xxxxxxxxxx	
		Resistance at max conductor 90°C temperature?		
3.20	3.2.6.j)	Reactance per phase? Ω/m	xxxxxxxxxx	
3.21	3.2.6.k)	Capacitance per phase? nF/m	xxxxxxxxxx	
3.22	3.2.6.l)	Zero sequence impedance and Ω/m capacitance per phase?	xxxxxxxxxx	
3.23	3.2.6.m)	Cable thermal time constant? seconds	xxxxxxxxxx	

ESKOM COPYRIGHT PROTECTED

**SPECIFICATION FOR MEDIUM VOLTAGE XLPE AND
IMPREGNATED PAPER INSULATED CABLES
STANDARD**

Unique Identifier: **240-56063792**

Revision: **3**

Page: **22 of 26**

3.24	3.3	Testing of cable is done in accordance with SANS 1339?	Item Specific	
------	-----	--	---------------	--

SIGNATURES

Supplier

Name (Print)

Sign

Date

Factory

Name (Print)

Sign

Date

Eskom

Name (Print)

Sign

Date

ESKOM COPYRIGHT PROTECTED

TECHNICAL SCHEDULES A & B FOR MV XLPE CABLES

Schedule A: Purchasers specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	240-56063792	Description	Schedule A	Schedule B
1		Item and system description		
1.1		SAP No	Item Specific	xxxxxxxxxx
1.2		Buyers Guide Drawing	Item Specific	xxxxxxxxxx
1.3		Symmetrical fault current rating kA	Item Specific	
1.4	3.1.1	Nominal system voltage kV	Item Specific	xxxxxxxxxx
1.5		Earth fault current rating kA	Item Specific	
2.1	3.1.1	Rated voltage (U_r) kV	11, 22 or 33	xxxxxxxxxx
2.2	3.1.2	Number of cores (1- Core or 3- Cores)	1 or 3	xxxxxxxxxx
2.3	3.1.3.1	Screening of cables	xxxxxxxxxx	xxxxxxxxxx
2.4	3.1.3.2	Core identification	Item Specific	xxxxxxxxxx
2.5	3.1.3.3	Metal sheath	Item Specific	xxxxxxxxxx
2.6	3.1.3.4	Bedding under armouring	Item Specific	xxxxxxxxxx
2.7	3.1.3.5	Armouring	Item Specific	xxxxxxxxxx
2.8	3.1.2	Conductor Size mmsq	Item Specific	xxxxxxxxxx
2.9		Rated frequency (f_r) Hz	50	xxxxxxxxxx
2.10	3.1.3.6	Type of outer sheath	Item Specific	xxxxxxxxxx
2.11	3.1.3.6	Is outer sheath ultraviolet (UV) radiation stabilized?	Item Specific	
3				
3.1	3.2.1	Hole for wooden drums for a spindle if not mm 80mm (minimum).	Item Specific	
3.2	3.2.1	Drum length required as per 3.2.1 m	Item Specific	xxxxxxxxxx
3.3	3.2.2	Is conductor marking system details supplied with tender?	Item Specific	
3.4	3.2.2	Font size for conductor marking mm characters	xxxxxxxxxx	
3.5	3.2.3	Is marking of cable identification system Yes details supplied with tender?	Yes	

**SPECIFICATION FOR MEDIUM VOLTAGE XLPE AND
IMPREGNATED PAPER INSULATED CABLES
STANDARD**

Unique Identifier: **240-56063792**Revision: **3**Page: **24 of 26**

1	2	3	4	5
Item	240-56063792	Description	Schedule A	Schedule B
3.6	3.2.3	Cable identification system location	xxxxxxxxxx	
3.7	3.2.3	Font size for the cable identification mm system characters	xxxxxxxxxx	
3.8	3.2.4	Does the marking of cable outer Yes sheath comply with 3.2.4?	Yes	
3.9	3.2.6	Are all relevant documents submitted?	Yes	
3.10	3.2.6	Catalogue to be provided with tender documentation?	Yes	
3.11	3.3.1.3	Copy of type tests report and where Yes applicable certificates to be provided with tender documentation	Item Specific	
3.12	3.3.1.2	Dimensions of cable submitted	Yes	
3.13	3.2.6	Maximum sustained current rating at 70°C conductor temperature, installed in:	xxxxxxxxxx	
3.14		a) Ground?	xxxxxxxxxx	
		b) Air?	xxxxxxxxxx	
		c) Ducts?	xxxxxxxxxx	
3.15		Maximum sustained current rating at 90°C conductor temperature, installed in:	xxxxxxxxxx	
		a) Ground?	xxxxxxxxxx	
		b) Air?	xxxxxxxxxx	
		c) Ducts?	xxxxxxxxxx	
3.16	3.2.6.f)	Short circuit rating? kA	xxxxxxxxxx	
3.17	3.2.6.g)	Cable mass? kg/m	xxxxxxxxxx	
3.18	3.2.6.h)	Gross mass per standard drum kg length?	xxxxxxxxxx	
3.19	3.2.6.i)	Resistance at max conductor 70°C temperature?	xxxxxxxxxx	
		Resistance at max conductor 90°C temperature?		
3.20	3.2.6.j)	Reactance per phase? Ω/m	xxxxxxxxxx	
3.21	3.2.6.k)	Capacitance per phase? nF/m	xxxxxxxxxx	
3.22	3.2.6.l)	Zero sequence impedance and Ω/m capacitance per phase?	xxxxxxxxxx	
3.23	3.2.6.m)	Cable thermal time constant? seconds	xxxxxxxxxx	

ESKOM COPYRIGHT PROTECTED

**SPECIFICATION FOR MEDIUM VOLTAGE XLPE AND
IMPREGNATED PAPER INSULATED CABLES
STANDARD**

Unique Identifier: **240-56063792**

Revision: **3**

Page: **25 of 26**

3.24	3.3	Testing of cable is done in accordance with SANS 1339?	Item Specific	
------	-----	--	---------------	--

SIGNATURES

Supplier

Name (Print)

Sign

Date

Factory

Name (Print)

Sign

Date

Eskom

Name (Print)

Sign

Date

ESKOM COPYRIGHT PROTECTED

When downloaded from the WEB, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorized version on the WEB.

Annex C – Deviation Schedule

Deviation schedule		
		Item Specific
Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by Eskom.		
Item	Clause	Proposed deviation
		NO DEVIATIONS TO SPECIFICATION

ESKOM COPYRIGHT PROTECTED