Eskom	Standard	Technology

Title: **ACCESSORIES FOR MEDIUM-VOLTAGE POWER CABLES FOR SYSTEMS WITH NOMINAL VOLTAGES OF 11KV TO 33KV STANDARD**

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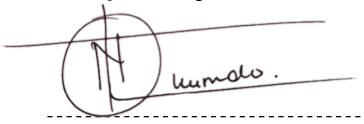

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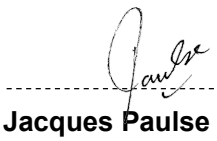

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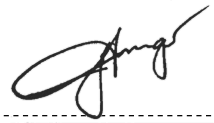

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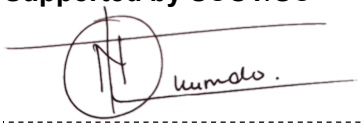

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Date: 23 June 2022

PCM Reference: **Technical Delivery View**

SCOT Study Committee Number/Name: **Cable Systems and Metal Enclosed Switchgear SC**

Content

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Executive Summary

This Eskom specification is based on SANS 1332. Where any conflicting requirements exist; this document will take precedence. This revision will include the Eskom MV cable accessories requirements for heat shrink, cold shrink and cold applied (push on) technologies. Resin type insulation technologies are not included in the specification as Eskom standardised on non-resin insulation solutions.

1. Introduction

This Eskom specification has been compiled in order to promote the standardisation, rationalisation and testing of medium voltage cable accessories for the distribution networks in Eskom. Eskom distribution networks have the following MV networks: 3.3 kV, 6.6 kV, 11 kV, 22 kV and 33 kV, but for standardization: 11 kV cable systems will be used for networks with voltages 3.3 kV and 6.6 kV.

2. Supporting clauses

2.1 Scope

This specification covers Eskom's requirements for the testing, manufacture and supply of medium-voltage accessories for power cables used on a.c. systems with nominal voltages of 3.3 kV, 6.6 kV, 11 kV up to and including 33 kV. This specification includes the following types of technologies: heat shrink, cold shrink, cold applied, and mixed cold and heat applied technologies.

2.1.1 Purpose

The purpose of this specification is to specify the technical requirements for MV accessories to be supplied to Eskom for distribution network (3.3 kV, 6.6 kV, 11 kV, 22 kV and 33 kV) application.

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 60099-4, Surge arresters Part 4: Metal-oxide surge arresters without gaps for a.c. systems,

[3] SANS 876, Cable terminations and live conductors within air-filled enclosures (insulation co-ordination) for rated a.c. voltages from 7,2 kV and up to and including 36 kV,

[4] SANS 1332, Accessories for medium-voltage power cables (3,8/6,6 kV to 19/33 kV),

[5] SANS 60815, Selection and dimensioning of high-voltage insulators intended for use in polluted conditions,

[6] SANS 62217, Polymeric HV insulators for indoor and outdoor use - General definitions, test methods and acceptance criteria,

[7] IEC / TR 62730, HV polymeric insulators for indoor and outdoor use tracking and erosion testing by wheel test and 5000 h test,

[8] 240-75661195 (34-211), KIPTS natural ageing and pollution performance test procedure for outdoor insulator products Section 5 - Particular requirements for outdoor MV cable terminations,

[9] 240-56063792 (ESP 32-1272), Specification for 11 kV and 22 kV impregnated paper and XLPE insulated cables,

[10] 240 – 56030403 (DSP 34- 1936), Specification for 11 kV, 22 kV, and 33 kV rubber insulated flexible cables for use with mobile equipment,

[11] 240-170000895, Clarification on the requirements for test sequence for MV cable accessories in accordance with SANS 1332.

[12] D-DT-8005, MV cable terminations - Impregnated paper insulated cable,

[13] D-DT-8006, MV cable terminations - XLPE insulated cable,

[14] D-DT-8007, MV cable joints - impregnated paper insulated cable,

[15] D-DT-8008, MV cable joints - XLPE insulated cable,

[16] D-DT-8010, MV indoor surge arresters,

[17] D-DT-8011, MV straight shrouds,

[18] D-DT-8015, Cable end caps,

[19] D-DT-8016, MV unscreened separable connectors,

[20] D-DT-8017, MV screened separable connectors and tri-furcating kits,

[21] D-DT-8021, MV transition cable joints (PILC to XLPE), and

[22] D-DT-8077, Cable repair sleeve.

2.2.2 Informative

None

2.3 Definitions

2.3.1 General

The definitions in SANS 1332, SANS 876, NRS 000 and the following shall apply.

Definitions	Description
Cold applied/ push on technologies	Joints, terminations and any part thereof that is constructed with components not pre-expanded and that can be pushed to fit into position without applying any heat or factory fitted pre-expansion.
Cold shrink	Joints, terminations and any part thereof that is constructed with pre-expanded components that require mechanical plastic pull tab tubes to be removed to fit and shrink into position. No heat required for the components to shrink into position. Additional fillers may also be required.
Heat shrink	Joints, terminations and any part thereof that is constructed with pre-expanded components that require heat to fit and shrink into position. Excluding cold shrink components.
Indoor terminations	Terminations that is intended for use where it is not exposed to either solar radiation or weathering.
Mixed cold and heat applied technologies	Joints, terminations and any part thereof that is constructed with both cold and heat applied components i.e. cold applied insulation and screen materials, heat shrink outer-sheath, or if applicable resin fillers.
Outdoor terminations	Termination that is intended for use where it is exposed to either solar radiation or weathering (or both).

2.3.2 Disclosure classification

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

2.4 Abbreviations

The abbreviations in SANS 1332, SANS 876, NRS 000 and the following shall apply. The abbreviations in SANS 1332, SANS 876, NRS 000 and the following shall apply.

Abbreviation	Description
KIPTS	Koeberg Insulator Pollution Test Site
OEM	Original Equipment Manufacturer
PILC	Paper Insulated Lead Covered
XLPE	Cross Linked Poly Ethylene

2.5 Roles and responsibilities

All Eskom employees and/or appointed bodies involved in the procurement of MV accessories shall ensure that the product meets the requirements as specified in this document.

Note: Any deviation from these requirements shall constitute non-conformance, unless evaluated and approved by a delegated Cable Systems Specialist based on sound engineering judgement at the time of tender evaluations or after tender award.

2.6 Process for monitoring

The MV accessories 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. Medium-voltage power cables accessories

3.1 Requirements

3.1.1 General

Cable accessories shall comply with the requirements of SANS 1332 and this specification. Where conflicting requirements arise, the requirements of this specification shall take precedence.

3.1.1.1 Standardised cable accessories

Standardised cable accessories for use on medium voltage systems in Eskom are given in the buyer's guide drawings listed in clause 2.2.1.

3.1.1.2 Cable construction and specification

Cable accessories shall be designed for medium voltage cables in accordance with 240-56063792 for XLPE and PILC cable and 240-56030403 for rubber cables where applicable.

3.1.2 Additional specific requirements

3.1.2.1 Standard ranges for accessories

Standard ranges for accessories shall be in accordance with SANS 1332, unless otherwise specified in the relevant buyers guide or technical schedules used at the time of tender enquiry.

For inner cone Type 5 terminations: the range requirements will be as per the relevant buyer's guide descriptions or technical schedules used at the time of tender enquiry.

3.1.2.2 Accessory earthing

1) Unless otherwise specified in schedule A, the cable terminations main earthing conductors shall be terminated with a tinned copper connector that has an M12 fixing hole in accordance with the lengths as stated in SANS 1332 for indoor three core and single core terminations, and as per the below values for the other types of terminations:

   a) The main earthing conductor for outdoor three-core cable terminations shall be of length 1200 mm.

   b) The main earthing conductor for outdoor single-core terminations shall be 1000 mm.

   c) The main earthing conductor for indoor trifurcating terminations that have 800 mm tails shall be 1000 mm.

   d) The main earthing conductor for indoor trifurcating terminations that have 2500 mm tails shall be 2500 mm. It shall be insulated and sealed at both ends with the M12 fixing hole connection ends exposed. The breakout boot arrangement for the trifurcating kit shall include a fourth leg for the connection and the insulation of the earth conductor. The environmental sealing of the breakout boot and insulated tail end is required to be proven by a manufacturer designed test procedure for Eskom consideration.

   e) If specified, the main earthing conductor for indoor single-core cable type 4 and type 5 terminations shall be a 1000 mm.

   f) The main earthing connection for three cores to single core trifurcating kits and trifurcating joint kits shall always be performed with a main earth connection between the three-core cable in the breakout boot and the single core cable connected equipment earth bar.

   g) If specified, the main earthing conductor for indoor Type 2 single-core terminations shall be a 1000 mm.

2) For armoured three core cable to armoured single core cables trifurcating joints; it is required that the main earthing conductor and the secondary earthing conductors are sufficiently combined and connected for both the three core and single core cable ends to be jointed. These combined earthing connections shall be connected and continued from the three-core cable to the singe core cables using suitably rated tinned copper braids and constant force springs. The earth braids shall be sized in accordance with SANS 1332 for the main and secondary earth connections. In addition, the joints shall be designed for the earth connection to the switchgear end in accordance with clause 1 f).

3) For armoured three core cable to copper wire screened un-armoured single core cable trifurcating joints; it is required that the main earthing conductor and the secondary earthing conductors are sufficiently combined and connected. This combined earthing connection shall be connected and continued from the three-core cable to the single-core cables using suitably rated tinned copper braids and constant force springs. The earth braids shall be sized in accordance with SANS 1332 for the main and secondary earth connections. In addition, the joints shall be designed for the earth connection to the switchgear end in accordance with clause1 f).

3.1.2.3 Terminations

a) The minimum specific creepage distance for all terminations shall be in accordance with Table 1.

Table 1: Minimum Specific Creepage Distance for Terminations

Application		Minimum specific creepage (mm/kV)			
		Single-core	Three-core		
		All voltage ratings	≤ 6,35/11 kV	≥ 12,7/22 kV	≥ 19,1/33 kV
Type 1	Outdoor	31	31	31	31
	Indoor	20	20	20	20
Type 2	Outdoor	31	31	31	31
	Indoor	20	20	20	20

Notes:

1. All outdoor cable terminations are Type 1 in accordance with SANS 876.

b) Outdoor three-core cable terminations shall have tail lengths of 1200 mm.

c) Outdoor single-core cable terminations supplied without a main earth braid for earthing connection shall be provided with a leakage current collector located at the bottom of the outer insulating tube, where applicable, alternatively a primary earthing conductor earth braid shall be supplied as per the Eskom buyers guide SAP number description. The purpose of the leakage current collector is to provide an electrical path to drain the surface leakage current to the armour or lead-sheath if no earth braid connection is required. All outdoor single-core cable terminations for armoured single-core XLPE-insulated cables shall be supplied with a secondary earthing conductor to connect the metallic core screen to the armour wires in accordance with the requirements of SANS 1332.

Notes:

1) Single core cables used for distribution networks in Eskom are earthed at one end only.

2) For applications where the single core cable is terminated onto indoor equipment; the earthing connection is normally performed at the indoor equipment termination end (i.e. indoor switchgear). The main earthing conductor of outdoor single core cable terminations in this application is therefore not required.

d) Outdoor single-core cable terminations supplied with a main earth braid for earthing connection shall be provided with a 1000 mm long earth braid connection.

Notes:

1) Single core cables used for distribution networks in Eskom are earthed at one end only.

2) For applications where only outdoor single core terminations will be performed, a main earthing conductor shall be required at any one of the termination ends for performing the single end point earthing.

3.1.2.4 Unscreened separable connectors (USCs)

a) Unscreened separable connectors (USCs) for indoor terminations shall be supplied with a stainless steel or brass M16 x 2 pitch x 35 mm long set screw, spring washer and washer (3 off per set). See Figure 1.

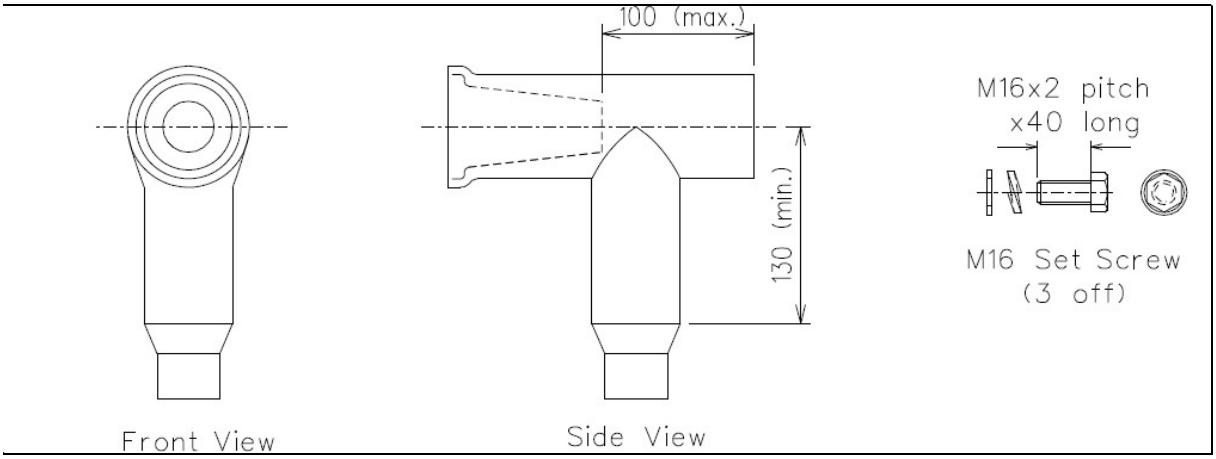

Figure 1: Unscreened separable connectors for a single cable termination (3 off)

3.1.2.5 Extensible screened separable connectors (SSCs)

a) Screened separable connectors for a single cable termination (i.e., set of 3 connectors) shall be either non-extensible or extensible. See Figure 2.

b) Extensible and non-extensible SSC shall be supplied as per SANS 1332.

c) Extensible screened separable connectors (SSCs) shall be supplied for two back-to-back cable terminations (i.e. set of 3 back-to-back connectors – giving a total of 6 SSCs) including the intermediate bushing in accordance with SANS 1332. See figure 3 and figure 4.

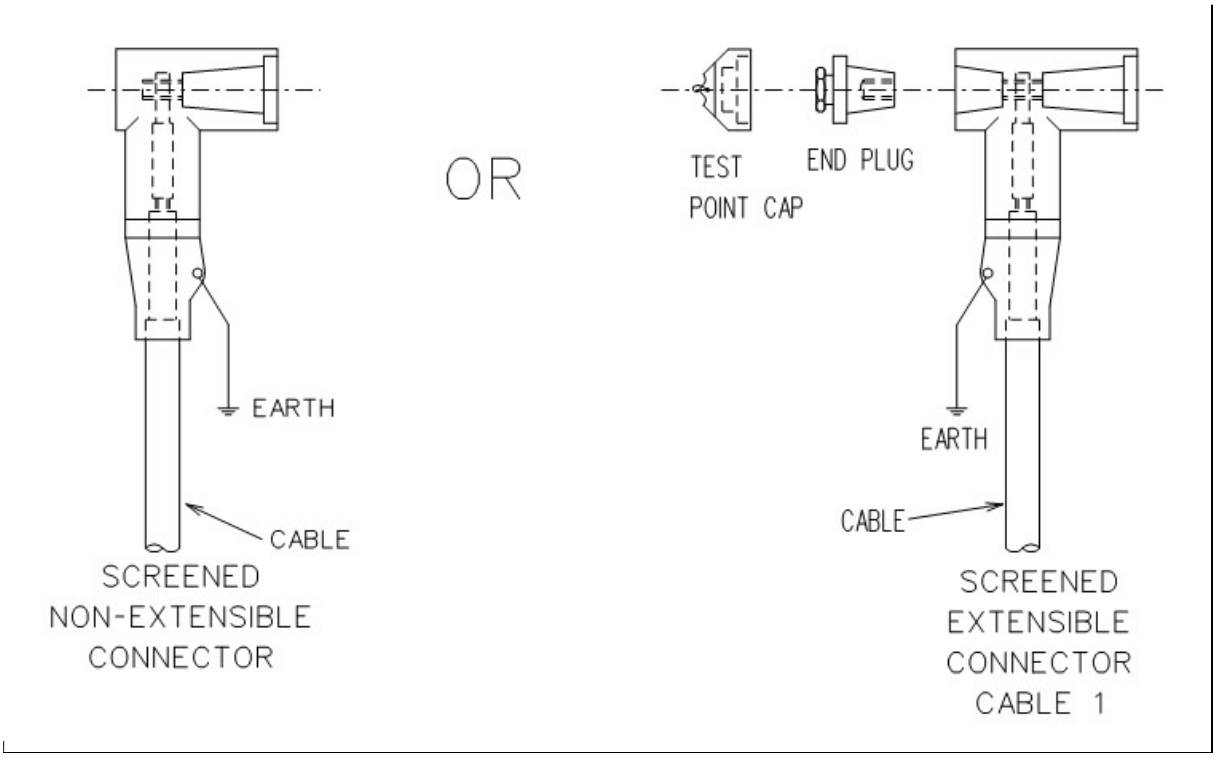

Figure 2: Unscreened separable connectors for a single cable termination (3 off)

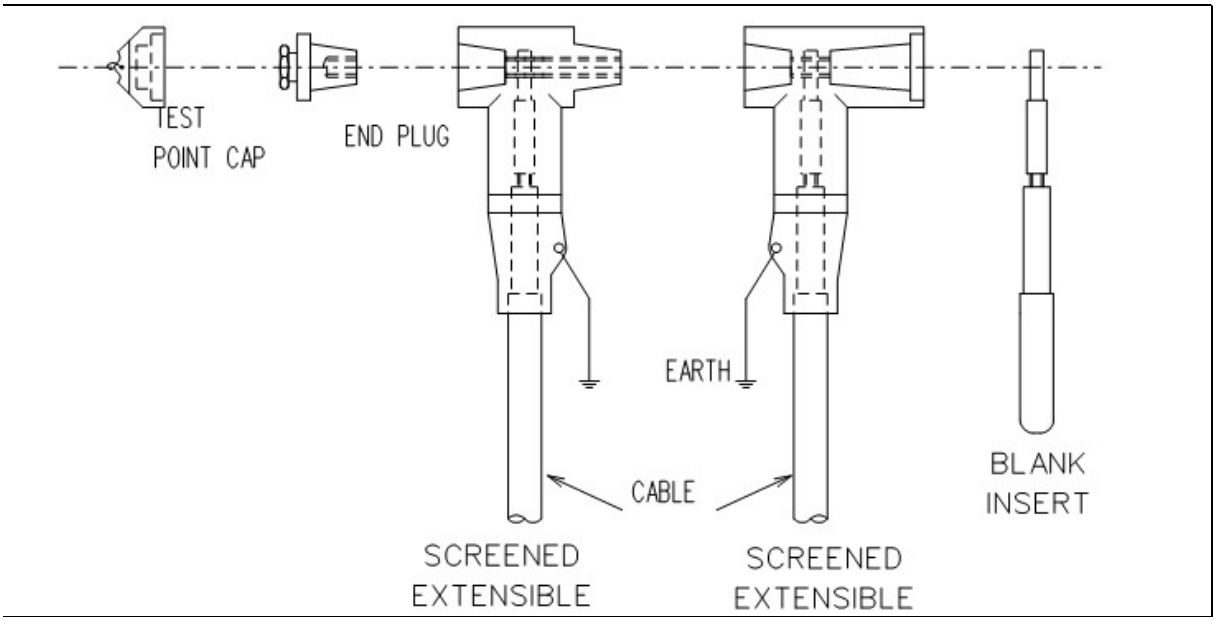

Figure 3: Screened separable connectors for a double cable termination (3 off)

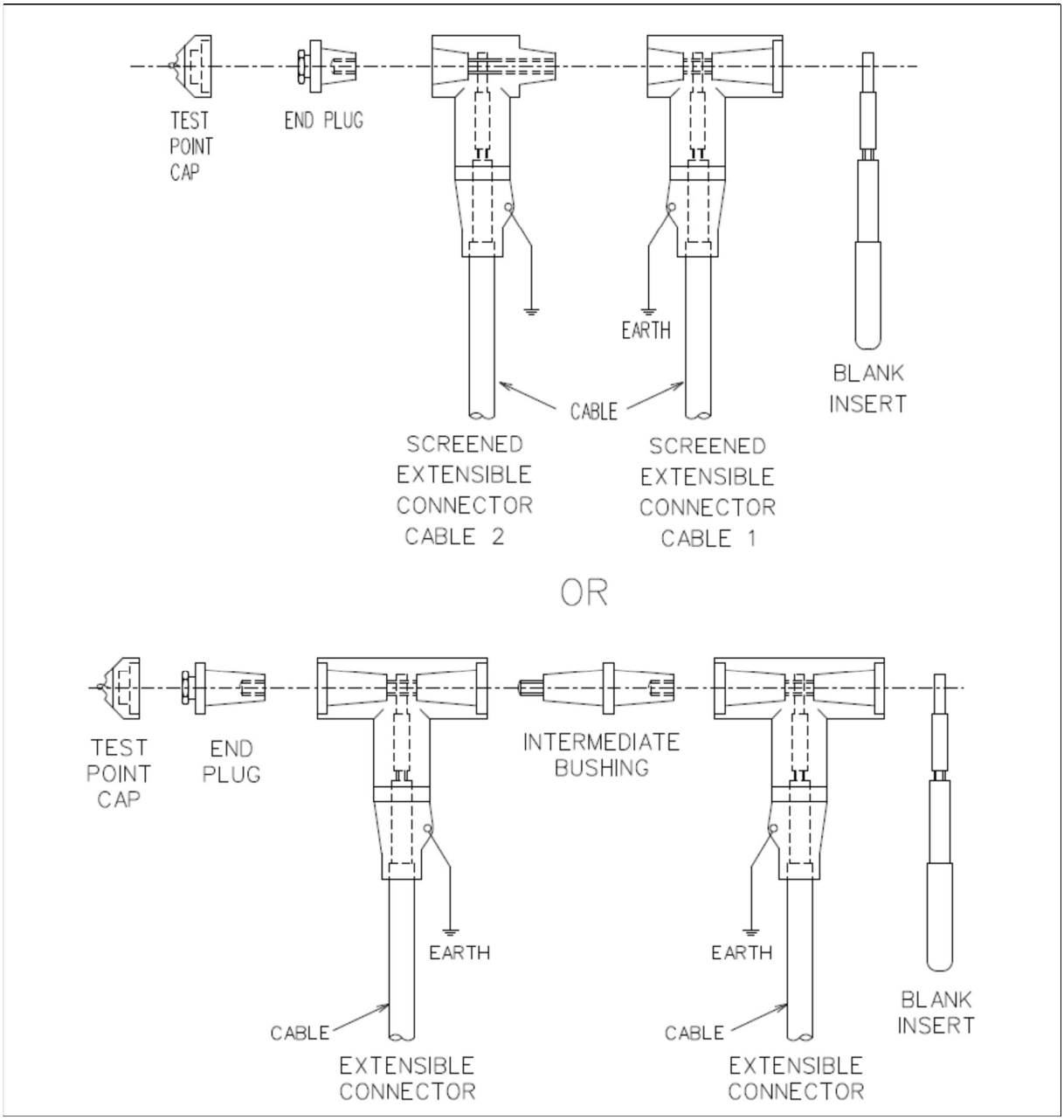

Figure 4: Screened separable connectors for a double cable termination with intermediate bushing

3.1.3 Indoor surge arresters

3.1.3.1 General requirements

a) Indoor surge arresters shall comply with the requirements of SANS 60099-4 and Table 2.

Table 2: Electrical requirements for surge arresters

System voltage	Minimum MCOV kV	Maximum residual voltage kV	Discharge current kA	SANS / IEC Line-discharge class
6,35/11 kV	10 kV	40 kV	10 kA	Class 1
12,7/22 kV	19,2 kV	80 kV	10 kA	Class 1
19/33 kV	28,8 kV	120 kV	10 kA	Class 1
Note: The electrical requirements given in this table are in accordance with Eskom's requirements for 'distribution class' surge arresters. The minimum MCOV is equal to 80 % of U_m.				

b) Surge arresters shall withstand short-circuit currents without violent shattering and shall have the ability to self-extinguish any fire caused by the arc.

c) Surge arresters shall be polymer housed.

3.1.3.2 Surge arresters for Type 2 cable terminations

a) Surge arrestors supplied for use with Type 2 cable terminations (i.e. withdrawable MV indoor metal enclosed switchgear panels) in accordance with SANS 876 shall be supplied with the relevant switchgear OEM tail and tail length requirements and a tinned copper lug (or equivalent) with an M16 fixing hole.

b) The lead shall be connected to the 'live' end of the arrester.

c) The lead and arrester shall be insulated / covered with anti-track material and shall have a minimum specific creepage of 20 mm/kV.

d) The base of the arrester (earthed end) shall have a M12 x 35 mm stainless steel threaded stem with a nut, spring washer and washer.

e) The diameter of the surge arrester and housing shall not exceed 60 mm.

f) Surge arrestors shall be supplied as individual items. See Figure 5.

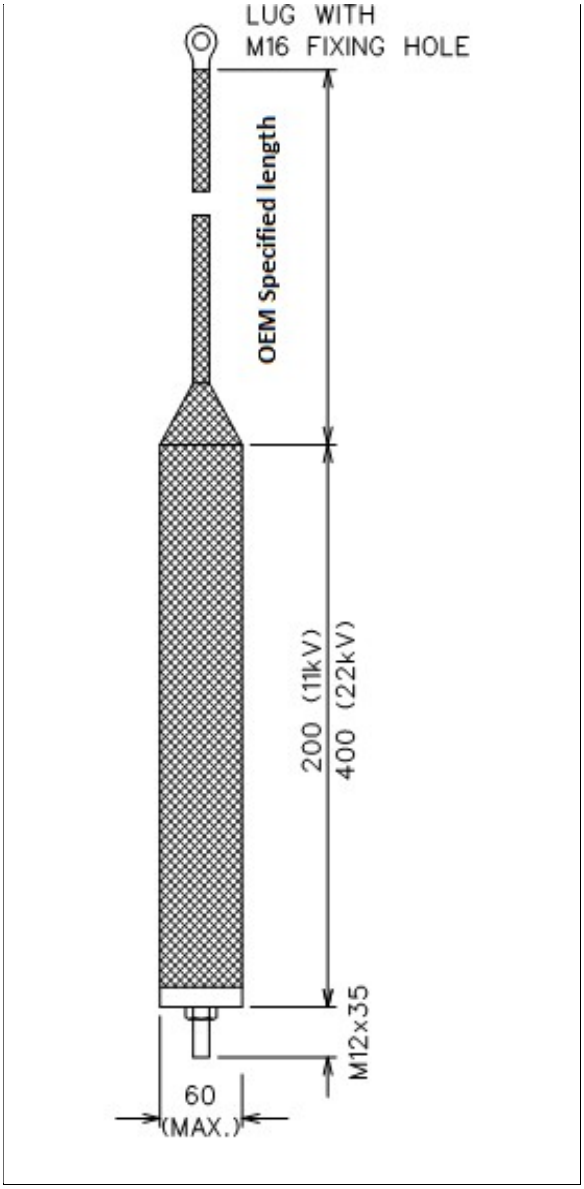

Figure 5: Indoor surge arrester details (Type 2 connection)

3.1.4 Surge arresters for Type 4 and Type 5 cable terminations

a) SSCs shall be connected in tandem (i.e., back-to-back) with the separable connectors and shall comply with the insulation requirements of Type 4 cable terminations in accordance with SANS 876.

b) The depth of the cable termination enclosure (i.e., front to back) shall be assumed to be 300 mm.

c) Suitable means shall be provided for earthing the base of the surge arresters. Earthing leads shall be at least 800 mm long and shall be fitted with a lug having an M12 fixing hole.

d) Where applicable, the earthing conductor for the arrester housing (i.e., for a Type 4 and Type 5 cable termination) shall comply with the requirements of SANS 1332.

e) If different to the preference for self-supporting surge arresters, the method of supporting the arresters in the cable termination enclosure shall be given at the time of enquiry. Preference shall be given to self-supporting surge arresters i.e., those requiring only the separable connector to which they are attached as the means of support.

f) The method used for disconnecting the surge arresters for the purpose of cable testing shall be given at the time of enquiry.

Note: Cable testing is done by means of a separate cable test facility that does not require the removal of the cable termination separable connectors.

g) Surge arrestors shall be supplied in sets of three i.e., allowing for the termination of one three-core cable or three single core cables.

h) The surge arresters and all the required interfacing components (including end plugs and test point caps if applicable) shall be supplied as a single item together with the set of separable connectors. Figure 5 shows an example of screened separable connectors supplied with surge arresters.

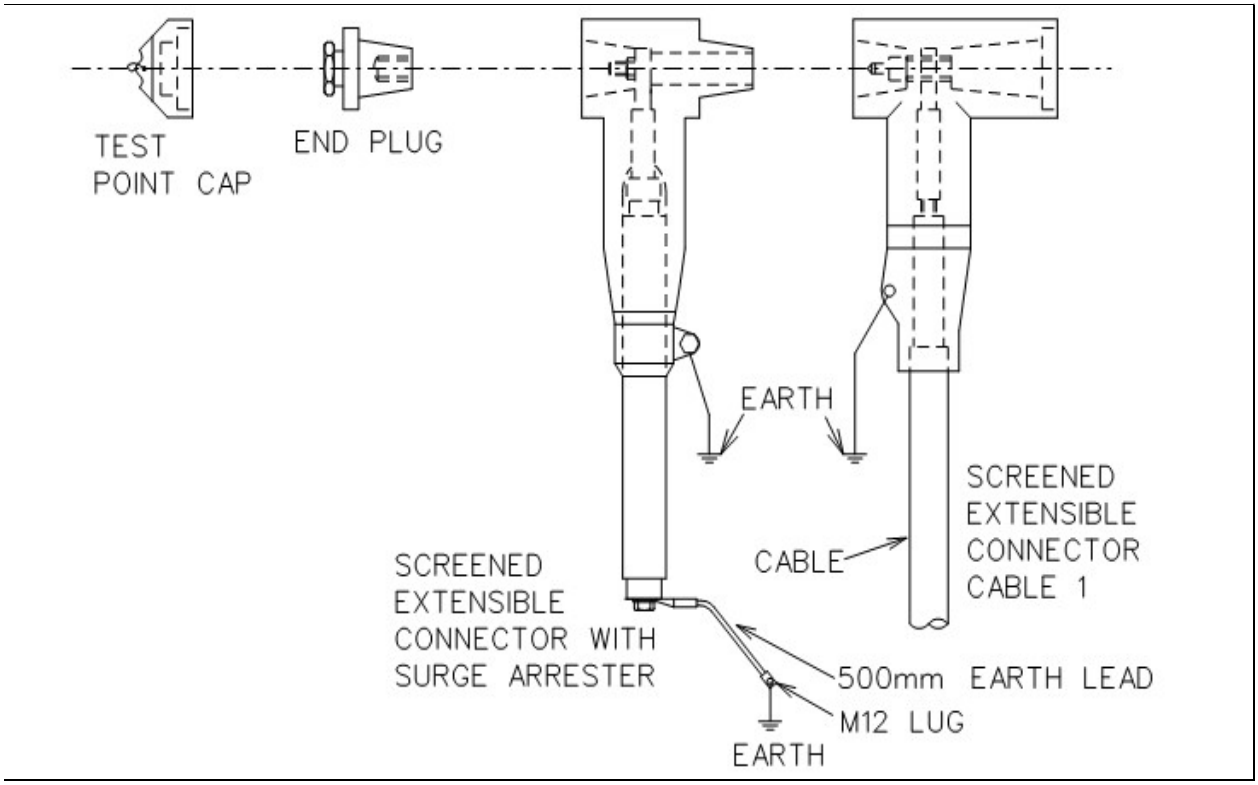

Figure 6: Screened separable connectors with surge arresters for a single cable termination (3 off)

3.1.5 Quality management system

a) The supplier (deemed to be an organization that undertakes any manufacturing or assembly operation) shall have a formally documented and implemented quality management system (QMS), which as at minimum meets with the requirements of the international code of practice for quality management systems ISO 9001:2015. Eskom reserves the right to audit quality management systems for suitability and effectiveness, and to verify all goods for conformance prior to delivery.

b) Foreign and third-party manufacturers shall, in addition, hold valid certification of their quality management system. Such certification shall be from a national quality systems certification body (Registrar), duly accredited by a QMS accreditation body, which is signatory to a mutual recognition agreement with South Africa.

c) Additional quality requirements may apply when Eskom enters into a term contract. Specific requirements will be specified therein.

3.2 Documentation

3.2.1 Tests

a) Cable accessories shall be type tested in accordance with SANS 1332.

b) Outdoor cable terminations shall be subjected to a natural ageing test in accordance with 240-75661195 at the Koeberg Insulator Pollution Test Site (KIPTS) as minimum. The Engineering instruction titled “Interim insulation pollution standards required in place of KIPTS (240-170000774)” shall apply while the KIPTS test centre is not in operation.

c) Clarification of the test sequence shall be in accordance with the technical bulletin 240-170000895.

d) All required type test report shall be submitted to Eskom at the time of tender.

e) The supplier shall at the time of tender submit the manufacturer, manufacturing location and component description of each type tested component. This shall be traceable and auditable for the type test report listed product drawing and description.

f) The supplier shall at the time of tender submit the final assembly manufacturing location of the offered product.

g) The supplier shall include a jointer training proposal or offer as part of any tender submission.

3.2.2 Acceptance of alternative international standards

In addition to clause 3.5 of SANS 1332: Accessories that have been successfully tested in accordance with the relevant test methods of CENELEC HD 629.2 S2, IEC 60055-1 or SANS 60502-4 shall be deemed to comply with the requirements of this standard provided that; the test were performed at the test voltages specified in SANS 1332 or higher to be qualified for accessories falling within the same voltage range.

3.2.3 Drawings and instructions

All drawings and installation instruction or manuals shall be submitted to Eskom on the time of tender.

Installation instructions shall be compliant with the terminology used in SANS 10198, SANS 1332 and SANS 876.

Installation instructions for each item supplied shall include the Eskom provided water blocking removal instruction for the cables to be jointed or terminated from all Eskom approved cable suppliers. These documents will be provided during Eskom tenders.

3.3 Marking, Labelling and Packaging

Marking labelling and packaging shall be in accordance with SANS 1332.

3.4 Spares

Not applicable

4. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Azwimbavhi Mamanyuha	Dx Operations Support: General Manager
Mfundi Songo	Dx Ops: Planning, GAU, HV Plant: Senior Manager

5. Revisions

Date	Rev	Compiler	Remarks
June 2022	3	Q. Khumalo	Document revision cycle. 3.2.1 5000 hour salt fog test has been removed as an option instead of KIPTS. 3.2.1 Engineering instruction 240-170000774 has been included as an interim insulation pollution standards required in place of KIPTS. 3.2.1 Technical Bulletin which clarifies the test sequence for MV cable accessories has been included (240-170000895). 3.2.2 Acceptance of type test performed in accordance with other international standards has been added.
Feb 2017	2	Q. Khumalo	New document template was used. Resin type insulation technologies have been removed 1: Requirements for 3.3 kV and6.6 kV were added. 3.1.21: The requirements for Type 5 terminations have been added. 3.1.2.2: Accessory earthing requirements have been revised. 3.1.2.3: The BIL requirements for 33 kV Type 1 and Type 2 terminations have been added. 3.1.4: Surge arrestor requirements for Type 4 and Type 5 cable terminations have been added. 3.2: Added an option for 1000 hour salt fog test for prequalification requirement. 3.2: Option for 5000 hour salt fog test was included as an option instead of KIPTS test.
May 2013	1	B. Mwarehwa	Final Document for Publication
Nov	0	B. Mwarehwa	Draft Document for review created from 34-1622

6. Development team

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

- D. Monyane: Gx (Chief Technologist)
- 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)

7. Acknowledgements

Not applicable.

Annex A – Technical Schedule A and B for MV Cable Accessories

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 240-56030619 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.

Annex B – Technical schedule A&B for MV cable accessories

	TECHNICAL SCHEDULES A & B FOR				
	MV cable accessories				
	Schedule A: Purchasers specific requirements				
	Schedule B: Guarantees and technical particulars of equipment offered				
1	2	3		4	5
Item	**Subclause SANS1332**	**Description**		**Schedule A**	**Schedule B**
1		**Select item and system description**			
		Item Specific			
1.1		SAP Number		Item specific	
1.2		DDT Number		Buyer's Guide	
1.3		Manufacturers' reference number		xxxxxxxxxx	_____
1.4		Nominal system voltage	kV	11	_____
1.5		Marking, Labelling and Packaging in accordance with SANS 1332		Yes	_____
2	**4.1.1**	**Standard operating conditions**			
2.1	a)	altitude	m	1800m (max)	_____
2.2	b)	ambient temperature	°C	"-5 to 40"	_____
2.3	c)	lightning ground flash density: severe (14 flashes per square kilometre per year)	Strikes per km²	Severe / 14	_____
2.4	d)	maximum solar radiation	W/m2	1000	_____
2.5	e)	ultraviolet radiation:		High	_____
2.6	f)	relative humidity	%	10%-90%	_____
2.7	g)	pollution conditions:		Very heavy.	_____
2.8					
2.9	**4.1.2**	**Standard ranges for accessories**			
2.10	4.1.2.1 & 4.1.4.1	The type of accessory?		Item Specific	_____
2.11	4.1.2.2	All accessories range-taking in accordance with Table 1?		Item specific	_____
2.12		Amount of cable cores		Item Specific	_____
2.13	4.1.4.12	Amount of accessories (set)		single unit	_____
2.14	4.1.4.4.	Tail length		xxxxxxxx	_____
3		**Accessory earthing**			

3.1	4.1.3.1	Minimum earth fault current rating of the main earthing conductor?	kA	10kA 1s	_____
3.2	4.1.3.2	The main earthing conductor length:		xxxxxxxx	_____
3.5	Table 2	What is the size of the tinned copper secondary earth conductor?		0	_____
3.6	Table 2	The amount of secondary earth conductors		0	_____
3.7	4.1.3.1.3	Are all cable termination earthing conductors water blocked?		xxxxxxxx	xxxxxxxx
3.8	4.1.3.1.3	The method of waterproofing?		xxxxxxxx	_____
3.9	240-56030619 clause 3.1.2.3 c)	CFS or equivalent connector provided as a suitable leakage current collector		Yes	
3.10	4.1.3.1.4	Minimum width of the CFSs used to connect the main earthing conductor to the lead sheath or armour	mm	20	_____
3.11	4.1.3.1.4	Are the CFS's suitable for the relevant cable dimensions?		Yes	_____
3.12	4.1.3.1.5	CFSs that form part of the main earthing connection are not used to secure any ferrous metal enclosures used for the mechanical protection of a three-core cable joint.		xxxxxxxx	xxxxxxxx
3.13	4.1.3.1.6	The main earthing conductor of a joint shall be separated from the individual core insulation by a collective insulating inner sleeve that:			
3.14		b) extends from bedding to bedding for an XLPE-insulated cable,		Yes	_____
3.15		c) extends from lead sheath to bedding for a transition joint, and		xxxxxxxx	xxxxxxxx
3.16		d) is effectively sealed at each bedding or lead sheath interface.		Yes	_____
3.17	4.1.3.1.7	Is suitable filler tape provided to smooth edges of a CFS and to restrain the spring.		Yes	_____
	4.1.3.2	**XLPE-insulated cables**			
3.18	4.1.3.2.1	Are the earthing conductor requirements (for the various cable types in accordance with SANS 1339) in accordance with table 2?		Yes	_____
3.19	4.1.3.2.1	Are all earthing conductors made of tinned copper braid?		Yes	_____

3.20	4.1.3.2.2	Is the connection between secondary earthing conductors and the metallic tape screen of a cable made using a CFS?		Yes	_____
3.21	4.1.3.2.3	Is the main earthing conductor of a three-core armoured cable joint or termination connected to the armour wires of the cable with a CFS?		Yes	_____
3.22	4.1.3.2.4	Are armour wires of a three-core armoured cable supported using a range-taking (adjustable) stainless-steel support bush.		Yes	_____
3.23	4.1.3.2.4	Type of armour support offered		xxxxxxxx	_____
3.24	4.1.3.2.5	For single core cables that have a copper wire screen, is a Mechanical torque shear lugs provided with an M12 fixing hole for the purposes of connecting the copper screen wires?		Yes	_____
4.1	**4.1.5**	**Cable joints**			
4.2	4.1.5.1	Are all the three-core cable joints of the filled type?		xxxxxxxx	xxxxxxxx
4.3	4.1.5.1	The method of filling?		xxxxxxxx	xxxxxxxx
4.4	4.1.5.2	Do all jointing instructions clearly indicate the maximum length and diameter of the ferrule(ferrules) that may be used with the joint?		Yes	_____
4.5	4.1.5.3	Are all three-core cable joints designed to accommodate crossing of cable cores within the joint?		xxxxxxxx	xxxxxxxx
4.6	4.1.5.3	Is the method of core crossing indicated in the jointing instructions?		xxxxxxxx	xxxxxxxx
4.7	4.1.5.4	Are three-core XLPE cable joints individually screened using a suitable tinned copper metallic screening layer (e.g. tinned copper mesh tape or tinned copper earth sock) that extends from the metallic core screen on the one side to the metallic core screen on the other?		xxxxxxxx	xxxxxxxx
4.8	4.1.5.4	Are all the tinned copper screening connected to the metallic core screen with a CFS.		xxxxxxxx	xxxxxxxx
4.9	4.1.5.6	Cable joints shall be supplied in sets of three range-taking mechanical torque-shear ferrules in accordance with NRS 075 and shall be suitable for the range of joint offered		Yes	_____
4	**4.1.4**	**Terminations**			

4.1	4.1.4.2	Does the design of a cable termination take into account changes to the electrical field distribution caused by pollution deposited on the surface of the termination in indoor and outdoor applications?		Yes	_____
4.2	4.1.4.3	Actual creepage distance offered?	kV/mm	20	_____
4.3	4.1.4.3	Is the creepage path material (e.g. outer anti-track tubing) the same for the entire creepage distance.		Yes	_____
4.4	4.1.4.3	In the case of single-core terminations, no separate earthing or armouring tube shall be used and the outer anti-track material shall extend from the lug to the nearest exposed earth point?		xxxxxxxx	xxxxxxxx
4.5	4.1.4.3	In the case of single-core terminations, the creepage distance measured from the end of cable insulation at the lug, along the surface of the termination tail, to the cable crutch (i.e. where the tails exit the crutch).		xxxxxxxx	xxxxxxxx
4.6	4.1.4.5	Are all three-core cable termination instructions based upon the “top down” principle of measurement and does it clearly indicate the distance to the end of the core screen (screen cut) from the top down?		Yes	_____
	240-56030619 Rev 2 3.1.2.3 b)	To what distance can the outdoor termination cable core tails be trimmed down to if necessary and still meet creepage requirements?		xxxxxxxx	
4.7	4.1.4.8	Are all three-core cable terminations designed to accommodate crossing of cable cores within the screened section of the trifurcated cores?		Yes	_____
4.8	4.1.4.9	Does the design of the cable termination ensure that no part of the armour or lead sheath of the cable is exposed once the termination is completed. (In the case of a three-core termination this shall be achieved by either ensuring that the length of the break-out boot is adequate or provision for a separate earthing/armour tube is made)?		Yes	_____
4.9	4.1.4.11	Are cable terminations provided with a means of sealing the interface		Yes	_____

		between the termination tail outer tube and the lug barrel either by:			
4.10	a)	allowing for at least 100 mm of additional length of termination tail outer tube and sealing mastic that covers the lug barrel?		xxxxxxxx	_____
4.11	b)	providing lug outer tubes of length at least 100 mm and sealing mastic?		xxxxxxxx	_____
4.12	4.1.4.14	Are terminations supplied with range-taking mechanical torque-shear lugs in accordance with NRS 075?		Yes	_____
4.13	4.1.4.14	Are the lugs suitable for the applicable range specified in table 1?		Yes	_____
4.14	4.1.4.14	Does the mechanical torque shear lug have a M16 fixing hole.		Yes	_____
4.15	4.1.4.15	Are three-core terminations supplied with three phase identification tubes marked “R” (red), “W” (white) and “B” (blue) respectively? (The tubes shall be of the same material as the phase outer tube material and shall be provided with a suitable sealant on the inside surface.)		Yes	_____
5	7	**Samples and storage**			
	7.2	Components shall be capable of being stored without deterioration within the temperature range −10 °C to +45 °C for a minimum of 12 months.		Yes	_____
	SIGNATURES				
	Local agent	Name (Print)		Sign	Date
	OEM	Name (Print)		Sign	Date
	Eskom	Name (Print)		Sign	Date

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 that that specified by Eskom.		
Item	**Clause**	**Proposed deviation**
		NO DEVIATIONS TO SPECIFICATION