Eskom	Standard	Technology

Title: **STANDARD SPECIFICATION FOR 22 KV AND 33 KV, POLE-MOUNTED, THREE-PHASE, GANG-OPERATED DISCONNECTORS**

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Date: 08 January 2019	Date: 19/02/2019	Date: 19/02/2019

Supported by SCOT/SC

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Date: 19/02/2019

PCM Reference: **n/a**

SCOT Study Committee Number/Name: **MV & LV Study Committee**

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1. Introduction

This specification covers Eskom's requirements for outdoor, pole-mounted, three-phase, gang-operated disconnectors for application on systems with nominal voltages of 22 kV and 33 kV.

The specification distinguishes between two types of disconnectors:

- Three-Phase Switch-Disconnector (TPSD) &
- Three-Phase Disconnector (TPD)

The TPSD has full load-break capability and the TPD is an off-load device.

2. Supporting clauses

2.1 Scope

This specification specifies the Eskom Distribution Group's requirements for outdoor, pole-mounted, gang operated, three-phase, disconnectors and load-break switch-disconnectors for application on systems with nominal voltages of 22 kV and 33 kV.

2.1.1 Purpose

This specification covers Eskom's requirements for outdoor, pole-mounted, three-phase, gang-operated disconnectors for application on systems with nominal voltages of 22 kV and 33 kV. .

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] IEC [SANS] 60815: Guide for the selection of insulators in respect of polluted conditions.

[3] IEC [SANS] 60265-1: High voltage switches – Part 1: High voltage switches for rated voltages above 1 kV and less than 52 kV.

[4] IEC [SANS] 61109: Composite insulators for a.c. overhead lines with a nominal voltage greater than 1000 V – Definitions, test methods and acceptance criteria.

[5] SANS 121, Hot-dip galvanized coating on fabricated iron and steel articles – Specifications and test methods

[6] 240-75661213 (DPC 34-216): Rev 0, KIPTS natural ageing and pollution performance test procedure for outdoor insulator products. Section 4 – Particular requirements for switch disconnectors

[7] BS 2816: Method for specifying electroplated coatings of silver and silver alloys for engineering purposes

2.2.2 Informative

[8] NRS 046: Load-break switch-disconnectors, pole mounted type for rated a.c. voltages above 1 kV and up to and including 36 kV.

[9] IEC 60050-441: International electro technical vocabulary Chapter 441: Switchgear, controlgear and fuses.

2.3 Definitions

2.3.1 General

The definitions in NRS 046 shall apply to this specification

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
TPD	Three-Phase Disconnector
TPSD	Three-Phase Switch-Disconnector

3. Requirements

3.1 General

3.1.1 Service conditions:

Ambient air temperature : -15^{o}C to 50^{o}C;

Altitude : up to 1800m;

Relative humility : up to 100%;

Solar radiation : 1100 W/m2;

Pollution levels : heavy to very heavy;

3.1.2 System conditions:

Voltage level : 24 or 36 kV

Number of phases : 3

System frequency : 50 Hz

3.2 Ratings

3.2.1 Rated current carrying capability for TPSD

TPSDs shall be classified as a general purpose switch in accordance to SANS 60265-1 and rated accordingly.

The following minimum ratings are therefore required.

a) Rated normal (continuous) current (Ir) 630 A

b) Rated closed loop making current 630 A

c) Rated mainly active load circuit making current (Ik) 630 A

d) Rated peak withstand current 20 kA

e) Rated short-time (3 sec.) withstand current 8 kA

f)	Rated mainly active load breaking current (I1)	630 A
g)	Rated closed loop breaking current (I2a)	630 A
h)	Rated no-load transformer breaking current (I3)	5 A
i)	Rated cable-charging breaking current (I4a)	16 A (24 kV), 20 A (36 kV)
j)	Rated line-charging breaking current (I4b)	1.5 A (24 kV), 2 A (36 kV)
k)	Rated short-circuit making current (Ima)	7.5 kA

3.2.2 Rated current carrying capability for TPD

The TPDs shall be classified, in accordance with IEC [SANS] 60265-1 as limited purpose switches. The following minimum ratings are required.

a)	Rated normal (continuous) current (Ir)	630 A
b)	Rated short-time (3 sec.) withstand current	8 kA
c)	Rated peak withstand current	20 kA

3.2.3 Rated insulation level

The rated insulation level shall be the appropriate combinations of the rated lightning impulse peak withstand voltage and the rated short-duration power-frequency withstand voltage, as given in table 1. This shall be applicable to both the open and closed positions.

Table 1: Rated insulation levels

1	2	3	4	5
Nominal system voltage (U_n) (Kv r.m.s	**Highest system voltage (U_m) (Kv r.m.s)**	**Power frequency wet withstand (kV r.m.s)**	**Lightning impulse withstand (kV peak)**	
			*** Live terminals (upper & lower) to ground**	**Across isolating distance**
22	24	50	150	170
33	36	70	200	230
*** Conducted with the disconnectors in the open and closed positions.**				

In order to ensure that flashovers occur across the insulator to ground and not across the isolating distance, the flashover value across the isolating distance shall be at least 15% (rounded to the nearest 10) higher than the flashover value between the live terminals and ground.

4. Design

4.1 Securing position

a) To prevent unwanted operation a disconnector, shall be so designed that it will not change from the open to close position and/or vice versa under the following conditions:

b) Forces arising from gravity, vibration or reasonable shocks;

c) Accidental touching of the operating mechanism;

d) Electromagnetic forces.

4.2 Operation

a) The disconnectors shall be gang operated by means of a portable fibre-glass operating rod (link-stick).

b) A single operating mechanism shall operate all three phases simultaneously; independent operation of each pole is not permitted.

c) The operating mechanism shall be of the pull-to-open and pull-to-close type.

4.3 Latching Mechanism

a) An automatic latching mechanism shall be provided to secure the TPSD in the open position.

b) The mechanism shall be such that two operations are required to close the TPSD, i.e. the first to unlatch the unit and the second to close it.

4.4 Indication of position

a) In order to determine whether the disconnectors are in the open or closed position, the gap or isolating distance of the installed disconnector shall be clearly visible from ground level.

4.5 Mechanical strength

a) The disconnectors shall be capable of withstanding, on its terminals, the total forces, including wind loading and electromagnetic forces, related to their application and rating, without reducing their reliability or current carrying capacity.

b) All the connecting rods, levers, etc. that make up the operating mechanism shall be strong enough to prevent misalignment of the contacts due to normal operation (open and close) of the disconnectors.

4.6 Lifting lugs

a) The disconnector shall be fitted with lifting lugs capable of handling the weight of a fully assembled unit.

4.7 Jumper movement

a) Opening and closing of the disconnector shall not cause jumper movement that reduces the electrical clearance around any of the jumpers.

b) Opening and closing of the disconnector shall not move the jumper.

4.8 Material

The materials used in the design and manufacture of the disconnectors shall comply with the following requirements:

a) Ferrous and ferrous alloy parts shall be hot-dip galvanised in accordance with SANS 121. This requirement also applies to assembly bolts, nuts and washers.

b) The adverse effects, such as galvanic corrosion, of contact between dissimilar metals shall be minimised.

c) Bolts, nuts and washers of size M8 or smaller and all springs shall be manufactured from stainless steel of grades 304 or 316.

d) The design of bushes shall prevent the ingress and accumulation of dust.

4.9 Electrical components

4.9.1 Current path

4.9.1.1 Components in the load current path shall be manufactured of high conductivity, corrosion-resistant materials such as copper and its alloys, e.g. brass, phosphor or bronze aluminium. Load current shall not be permitted to flow through ferrous components, springs or spring-loaded mechanisms.

4.9.1.2 The current paths shall have a minimal number of joints and current transfer points. Points at which current transfer takes place shall be silver-plated in accordance BS 2816, using the coating classification Cu/Ag (95,0) 25 (i.e. a coating with a silver content of at least 95% by mass and a thickness of at least 25 μm on brass or copper).

4.9.1.3 If alternative coatings or materials are utilised the onus is on the supplier to prove that it provides equivalent or better current transfer characteristics.

4.9.1.4 All load current paths shall be capable of carrying the specified rated current without exceeding the permitted temperature rise as per IEC [SANS] 60265-1.

4.10 Contacts

a) Positive contact pressure shall be maintained at all times by means of springs manufactured from corrosion –resistant material such as phosphor bronze, beryllium copper or stainless steel of grades 304 or 316. If a different method is utilised the detail shall be submitted with the enquiry documentation.

b) The contacts shall be silver-plated in accordance with BS 2816, using the coating classification Cu/Ag (95,0) 25 (i.e. a coating with a silver content of at least 95% by mass and a thickness of at least 25 μm on brass or copper)

c) The contacts shall be self-aligning.

d) The three contacts shall open and close simultaneously.

e) A definite wiping action shall take place between the fixed and movable parts.

f) The contacts shall not be subject to accumulation of dirt, moisture or pitting.

4.11 Conductor terminals

a) In order to permit the use of compression-type lug fittings, a flat area of at least 30 mm x 30 mm shall be provided. A M12 x 50 mm setscrew or threaded stud shall be located in the centre of the flat area, complete with flat washer, lock washer and nut.

4.12 Insulators

4.12.1 Profile characteristics

4.12.1.1 Insulator profile characteristics shall comply with the guidelines in appendix D of IEC [SANS] 60815.

4.13 Creepage distances

a) The disconnectors shall be suitable for application in areas with light to medium and/or heavy to very heavy pollution levels as defined by IEC [SANS] 60815. The minimum creepage requirements between phase and earth shall be as given in table 2.

Table 2: Minimum creepage requirements for Inland and Coastal applications

1	2	3
SANS 60815 pollution level	**Inland application**	**Coastal application**
	Light to Medium (LM)	Heavy to Very heavy (HVH)
Creepage distance	20 mm/kV	31 mm/kV

4.14 Mounting

a) The disconnectors shall be suitable for either single-pole mounting or H-pole mounting. The required mounting arrangement shall be specified in schedule A of the enquiry document.

b) Disconnectors shall be arranged for horizontal, upright mounting, i.e. with the switching blade in the horizontal plane when closed.

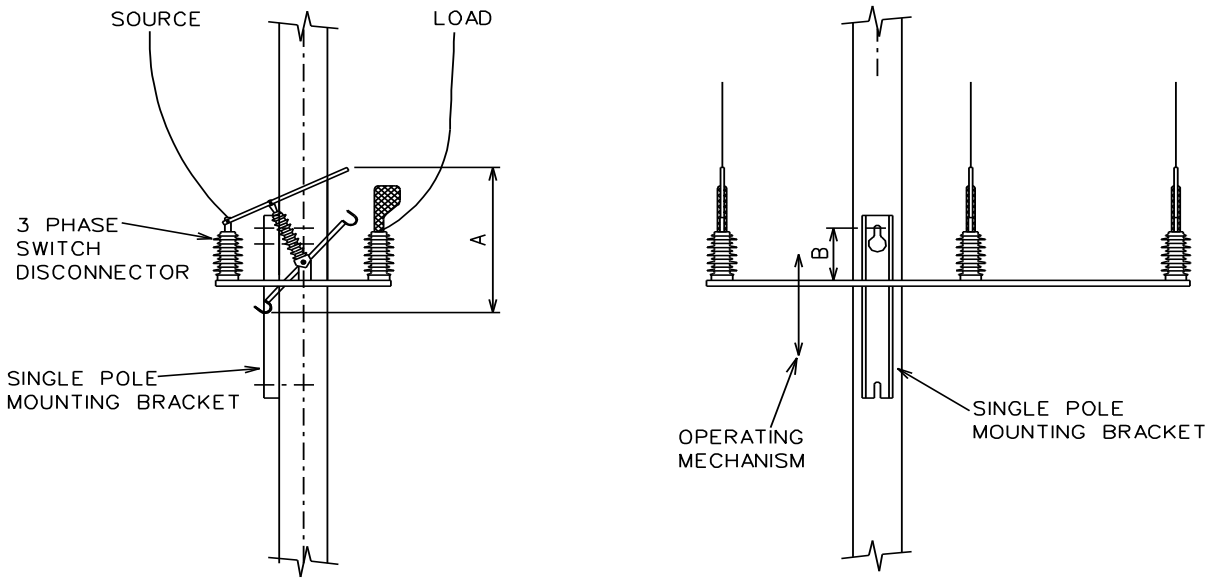
c) All hardware (e.g. brackets, threaded rods, nuts, bolts, washers, etc) required to mount the disconnector shall be supplied with the unit.

4.15 Single-pole mounting

a) The standard single-pole mounting arrangement is indicated in figure 1.

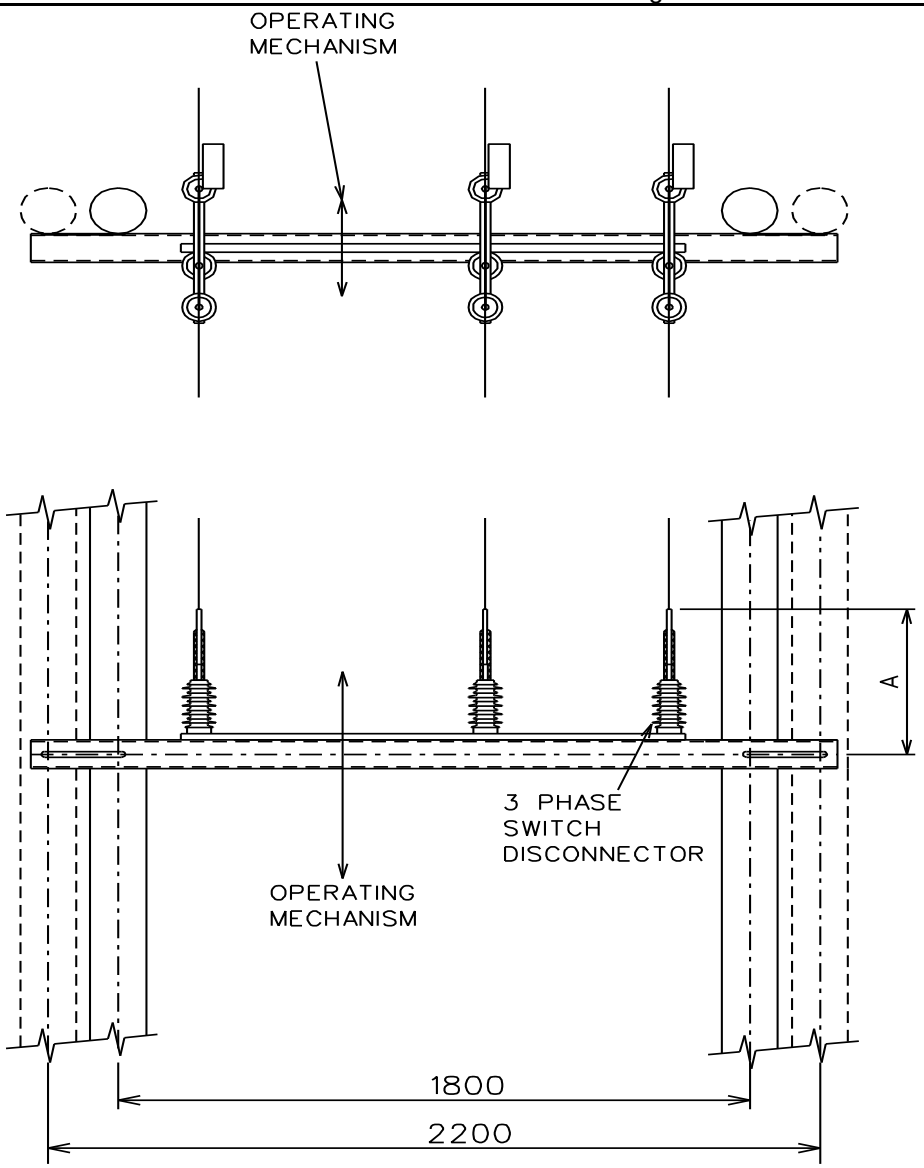
4.16 H-pole mounting

a) The H-pole-mounted disconnectors shall be suitable for mounting on both the standard Eskom H-pole structures. The standard Eskom H-pole structures have pole centres at either 1,8 m or 2,2 m and pole diameters of 220 mm at the point of mounting, see figure 2. The minimum dimensions of the mounting brackets are shown in figure 3 and 4.



	22 kV	33kV
A (max)	1380mm	1510mm
B (max)	200mm	200mm

Figure 1: Single-pole mounting arrangement



	22 kV	33kV
A (max)	1380mm	1510mm

Figure 2: H-pole mounting arrangement

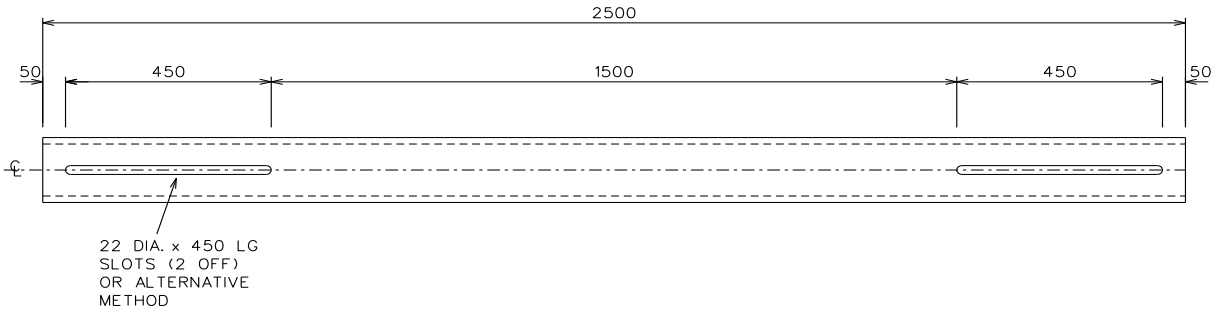


Figure 3: H-pole mounting bracket minimum dimensions

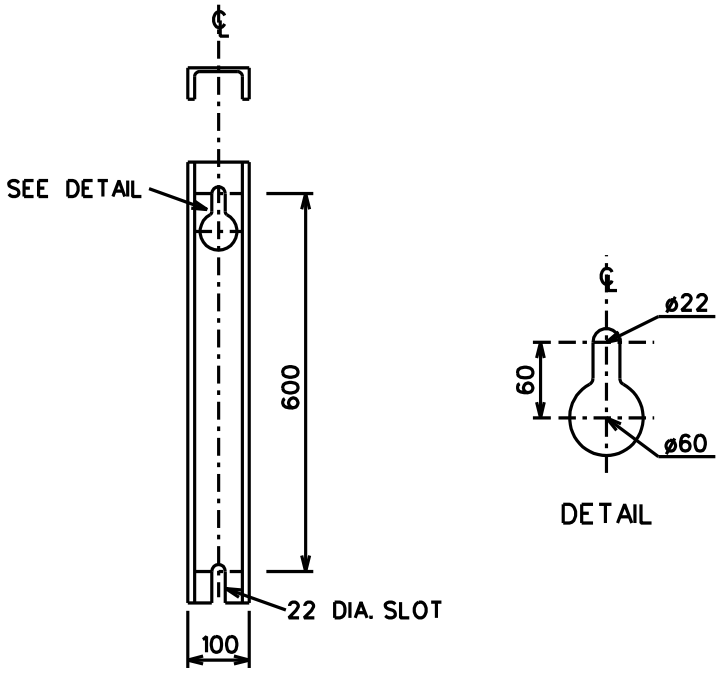


Figure 4: Single-pole mounting bracket minimum dimensions

4.17 Electrical clearances

a) A minimum electrical clearance, as specified in table 3, shall be maintained between live parts and any item at ground potential, including the single or H-pole structure.

Table 3: Electrical clearances

1	2
Nominal system voltage (U_n) (kV)	**Electrical clearance phase-to-ground (mm)**
22	320
33	430
Note: These dimensions are not applicable to clearances that have been proven to meet the BIL requirements as specified in table 1. The relevant type test reports must however be submitted.	

4.18 Drawings

The following drawings shall be submitted for approval:

a) Outline and general arrangement drawings, showing full details of outline and mounting dimensions and main terminals.

b) Drawings with details of insulators, contacts, terminals, operating mechanisms, bearings, current transfer arrangements, arc extinguishing arrangements and general construction.

4.19 Rating plates

a) Disconnectors shall be fitted with rating plates.

b) Rating plates shall be manufactured of intrinsically corrosion-resistant material.

c) Rating plates shall be securely fixed with screws or pop rivets

d) Rating plates shall contain at least the following information:

- Name of manufacturer
- Product code
- Batch number or date of manufacture
- Rated voltage
- Rated lightning impulse withstand voltage
- Rated normal current
- Rated load break current
- Rated short-time withstand current
- Rated load break current

5. Tests

5.1 Routine tests

Routine tests shall be carried out in accordance with SANS 60265-1

5.1.1 Type tests

The following type tests shall be carried out by a certified independent test authority, on the complete disconnector, in accordance with SANS 60265-1. Type test reports shall be submitted for approval.

5.1.1.1 Power frequency wet withstand test. (Need not be conducted on a fully assembled disconnector).

5.1.1.2 Lightning impulse test (This test shall preferably be conducted on a fully assembled disconnector or alternatively, one pole/phase of the disconnector can be tested. Tests conducted on individual insulators are not accepted).

5.1.1.3 Temperature rise test.

5.1.1.4 Measurement of the resistance of the main circuit.

5.1.1.5 Short-time withstand and peak withstand current tests.

5.1.1.6 Breaking current test (TPSD only)

5.1.1.7 Short-circuit making current test (TPSD only)

a) This test shall be conducted in accordance the requirements of a general purpose switch, utilizing test duty 5. The making test shall be conducted at a closing speed of 0.5 m/s i.e. measured at the tip of the switch blade. This speed simulates the average closing speed of the switch by an operator.

5.1.1.8 Mechanical endurance test (Class M1).

5.1.2 KIPTS natural ageing and pollution performance test

5.1.2.1 This test shall be conducted in accordance with the KIPTS natural ageing and pollution performance test procedure for outdoor insulator products, Section 4 – Particular requirements for switch disconnectors, 240-75661213 (DPC 34-216).

6. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Sakkie van Aarde	MV Care group Chair person
Bheki Ntshangase	Senior Manager PDE HV Plant
Mohamed Khan	MV/LV SC Chairperson

7. Revisions

This revision cancels and replaces revision no 4 of specification no. SCSSCAAV8.

Date	Rev	Compiler	Remarks
Feb 2019	2	S van Aarde	Update clause 5.1.2.1 to new 240 number
Sept 2014	1	S van Aarde	New format and new 240 number added 3.2.1 &3.2.2 Rated current change from 400 to 630 amp, which is the rated current of all evaluated units 4.7 Clause added to prevent jumper movement

Date	Rev	Compiler	Remarks
Oct 2008	1	A Biechook	The document reference number was changed from DISSCAAV8 to 34-1665 Rev. 0, in accordance with the Eskom Corporate Document Centre requirements. Changed document to new template 2 - Changed : IEC 60815 to SANS 60815 Deleted : SANS 62271-102. Changed : SCSPVAC17 to DPC 34-21 4.2.1 Removed table 1. Changed I_{4a} requirement to 16 A, as per SANS 602651-1, table Added I_{4b} requirement, as per SANS 602651-1, table 1 Added abbreviations to provide clarity 4.2.2 Removed table 2 4.2.3 Removed insulation material creepage requirement Reworded paragraph, clearly stating flashover requirement 4.3.3 Added latching mechanism requirement 4.3.5 Removed clause as the extra post insulator is no longer required 4.3.7 Added no jumper movement requirement 4.6.2 Removed insulation material creepage requirement and added clause 5.2.2, KIPTS requirement 4.7 Changed mounting arrangement to the horizontal, upright configuration, in line with Eskom's requirement for bird-friendly structures 4.9.4 Load break current should be reflected on TPSD rating plate Figure 1: Revised drawing to reflect the new mounting requirement Figure 2: Revised drawing to reflect the new mounting requirement 5.2.1.1 Revised clause, power frequency wet withstand tests need not be conducted on a full assembled disconnector 5.2.1.2 Revised clause, lightning impulse tests should preferably be conducted on a fully assembled disconnector 5.2.1.8 Changed mechanical endurance requirement to M1, as per SANS 60251-1, 6.102.2 5.2.2 Deleted clause Added clause on KIPTS requirement Schedules: Revised in accordance with abovementioned changes Document published Oct 2008

Date	Rev	Compiler	Remarks
Aug 2006	4	Silas Moloko	Changed document to new template 2.1.1 & 2 Included general information regarding the conditions of application 2.2.2 Included an option of disconnector; without making and breaking requirements 3.2.1.6 The mechanical endurance test class has been set at M2 (5000 operation). This is based of the fact that there have been an increased number of mechanical failures of switches The provision to apply bolted lugs has been replaced by crimped lugs 2.3.4 Post insulators are being added at the back of each phase of the TPSD in order to eliminate excessive jumper movement. This was found to be problematic with the current approved switches 2.7.2 The original drawings were altered to show the additional post insulator introduced to eliminate excessive jumper movement The title of the document was also changed to accommodate the two types of disconnectors. Eight more items were added Short-circuit making current tes 3 The requirement for the fault making capability of the TPSD, set at 20 kA, was not considering the closing speed of the switch which is crucial in achieving the 20 kA. According to IEC 60265 -1, the speed of the switch should be specified for manually operated switches. Hence, the closing speed is now set at 0.5 m/s and the peak current rating at 7.5 kA. Document approved.
May 2005	3	Silas Moloko	Changed specification number to DISSCAAV8 Changed: SABS IEC 60265-1 to SANS 60265-1 Changed: SABS IEC 61109 to SANS 61109 Changed: SABS IEC 60129: 1996 to SANS 62271-102 Changed: SABS ISO 1461 to SANS 121 4.3.4 Increase the margin of the isolating distance to 320 - 10%. The technical schedules were also changed 4.6.2 Added a note on the KIPTS test for costal application of Cyclo, EPDM and ESP insulators 4.7 Included a note specifying mounting bracket Document approved

Date	Rev	Compiler	Remarks
July 2003	2	Rossouw Theron	2 Added SCSPVACI7 and BS 2816 Table 1: Added note Table 3: Added column 4 4.3 New clause 4.4 New clause 4.5 New clause Table 4: Revised in accordance with Insulator WG requirements Figure 2: Added figure 2 4.8 Removed requirement for pull-to-open and pull-to-close operating mechanism Removed requirement for interlocking facility, it is covered in clause 4.3.1 4.10 New clause 5.2.2 Added the relevant KIPTS test procedure Annex B: New annex Schedules: Revised in accordance with the above mentioned changes
Nov 2000	1	Rossouw Theron	Removed the requirement for an earthing pin
Sept 1999	0	Rossouw Theron	Original issue - SCSSCAAV8

8. Development team

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

- Sakkie van Aarde

9. Acknowledgements

- Stefan Terblanche.

Annex A – Impact Assessment

Impact assessment form to be completed for all documents.

1) Guidelines

- All comments must be completed.
- Motivate why items are N/A (not applicable)
- Indicate actions to be taken, persons or organisations responsible for actions and deadline for action.
- Change control committees to discuss the impact assessment, and if necessary give feedback to the compiler of any omissions or errors.

2) Critical points

2.1 Importance of this document. E.g. is implementation required due to safety deficiencies, statutory requirements, technology changes, document revisions, improved service quality, improved service performance, optimised costs.

Comment: Document revision.

2.2 If the document to be released impacts on statutory or legal compliance - this need to be very clearly stated and so highlighted.

Comment: The document revision does not have statutory or legal compliance implications

2.3 Impact on stock holding and depletion of existing stock prior to switch over.

Comment: No impact, TPSD and TPD that are in accordance with new specification can be loaded in the same bin as previous models.

2.4 When will new stock be available?

Comment: As soon as the next evaluation is completed, and products are procured off the new list of accepted suppliers.

2.5 Has the interchangeability of the product or item been verified - i.e. when it fails is a straight swop possible with a competitor's product?

Comment: Yes, the specification is not supplier specific. Note that the mounting orientation has been revised to alleviate unnecessary long jumpers.

2.6 Identify and provide details of other critical (items required for the successful implementation of this document) points to be considered in the implementation of this document.

Comment: Note that the mounting orientation has been revised to alleviate unnecessary long jumpers.

2.7 Provide details of any comments made by the Regions regarding the implementation of this document.

Comment: (N/A during commenting phase)

3) Implementation timeframe

3.1 Time period for implementation of requirements.

Comment: The specification will be implemented via the next national evaluation of disconnectors.

3.2 Deadline for changeover to new item and personnel to be informed of DX wide change-over.

Comment: When the next List of Approved Products (LAP)/ Contract for disconnectors is published.

4) Buyers Guide and Power Office

4.1 Does the Buyers Guide or Buyers List need updating?

Comment: Yes, the new reference of this specification must be reflected.

4.2 What Buyer's Guides or items have been created?

Comment: None

4.3 List all assembly drawing changes that have been revised in conjunction with this document.

Comment: D-DT 1857 and D-DT 1858 will be revised to reflect the new mounting orientation, once the specification has been approved.

4.4 If the implementation of this document requires assessment by CAP, provide details under 5

4.5 Which Power Office packages have been created, modified or removed?

Comment: None.

5) CAP / LAP Pre-Qualification Process related impacts

5.1 Is an ad-hoc re-evaluation of all currently accepted suppliers required as a result of implementation of this document?

Comment: No.

5.2 If NO, provide motivation for issuing this specification before Acceptance Cycle Expiry date.

Comment: Revised to new format

5.3 Are ALL suppliers (currently accepted per LAP), aware of the nature of changes contained in this document?

Comment: Yes, the revised specification will also be forwarded to the suppliers at the same time the document is sent for comments.

5.4 Is implementation of the provisions of this document required during the current supplier qualification period?

Comment: No.

5.5 If Yes to 5.4, what date has been set for all currently accepted suppliers to comply fully?

Comment: N/A

5.6 If Yes to 5.4, have all currently accepted suppliers been sent a prior formal notification informing them of Eskom's expectations, including the implementation date deadline?

Comment: N/A

5.7 Can the changes made, potentially impact upon the purchase price of the material/equipment?

Comment: No.

5.8 Material group(s) affected by specification: (Refer to Pre-Qualification invitation schedule for list of material groups)

Comment: Switch Disconnectors

6) Training or communication

6.1 State the level of training or communication required to implement this document. (E.g. none, communiqués, awareness training, practical / on job, module, etc.)

Comment: None, no training is required to implement this document.

6.2 State designations of personnel that will require training.

Comment: N/A

6.3 Is the training material available? Identify person responsible for the development of training material.

Comment: N/A

6.4 If applicable, provide details of training that will take place. (E.G. sponsor, costs, trainer, schedule of training, course material availability, training in erection / use of new equipment, maintenance training, etc).

Comment: N/A

6.5 Was Training & Development Section consulted w.r.t training requirements?

Comment: N/A

7) Special tools, equipment, software

7.1 What special tools, equipment, software, etc will need to be purchased by the Region to effectively implement?

Comment: None.

7.2 Are there stock numbers available for the new equipment?

Comment: N/A

7.3 What will be the costs of these special tools, equipment, software?

N/A

8) Finances

8.1 What total costs would the Regions be required to incur in implementing this document? Identify all cost activities associated with implementation, e.g. labour, training, tooling, stock, obsolescence

Comment: None

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……

……

Impact assessment completed by:

Name: Sakkie van Aarde

Designation: Senior Adviser, HV Plant, PDE

Annex B – - Guide to tenderers on completing technical schedules

This specification caters for the following range of disconnectors:

Item 1 - 22 kV TPSD, Single-pole mounted, Inland application

Item 2 - 22 kV TPSD, Single-pole mounted, Coastal application

Item 3 - 22 kV TPSD, H-pole mounted, Inland application

Item 4 - 22 kV TPSD, H-pole mounted, Coastal application

Item 5 - 22 kV TPD, Single-pole mounted, Inland application

Item 6 - 22 kV TPD, Single-pole mounted, Coastal application

Item 7 - 22 kV TPD, H-pole mounted, Inland application

Item 8 - 22 kV TPD, H-pole mounted, Coastal application

Item 9 - 33 kV TPSD, Single-pole mounted, Inland application

Item 10 -33 kV TPSD, Single-pole mounted, Coastal application

Item 11- 33 kV TPSD, H-pole mounted, Inland application

Item 12 -33 kV TPSD, H-pole mounted, Coastal application

Item 13 -33 kV TPD, Single-pole mounted, Inland application

Item 14 -33 kV TPD, Single-pole mounted, Coastal application

Item 15 -33 kV TPD, H-pole mounted, Inland application

Item 16 -33 kV TPD, H-pole mounted, Coastal application

The tenderer shall submit a separate set of technical schedules per item offered. The tick boxes in the heading of each schedule must be ticked to distinguish between the variations. If a particular product is offered for both the inland and coastal application, then both the “Inland and Coastal application” should be ticked.

Tenderers are required to complete the relevant fields in Schedule B.

Technical schedules A and B

for 22 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

☐ Inland application or ☐ Coastal application (← tick relevant box)

☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3		4	5
Item	**Sub-clause**	**Description**		**Schedule A**	**Schedule B**
1	**-**	**Identification**			
		a) Supplier's name		xxxxxxxxxx	_____
		b) Manufacturer's name		xxxxxxxxxx	_____
		c) Type designation		xxxxxxxxxx	_____
		c) Item number (i.e. 1-16, see Annex B)		xxxxxxxxxx	_____
2	**3.1.1**	**Service conditions**			
		a) Altitude	m	up to 1800	xxxxxxxxxx
		b) Maximum, weighted average, ambient temperature	°C	50	xxxxxxxxxx
		c) Minimum, weighted average, ambient temperature	°C	–15	xxxxxxxxxx
		d) Maximum diurnal variation	°C	35	xxxxxxxxxx
		e) Intensity of solar radiation	kW/m^2	1,1	xxxxxxxxxx
		f) Relative humidity	%	up to 100	xxxxxxxxxx
3	**3.1.2**	**System conditions**			
		a) Nominal system voltage (U_n)	kV	33	xxxxxxxxxx
		b) Maximum system voltage (U_m)	kV	36	xxxxxxxxxx
		c) Supply frequency	Hz	50	xxxxxxxxxx
		d) System earthing		Effective & Non-effective	xxxxxxxxxx
4	**3.2.1**	**Rated current carrying capability**			
		a) Rated normal (continuous) current (i_r)	A	630	_____
		b) Rated closed loop making current	A	630	_____
		c) Rated mainly active load circuit making current (I_k)	A	630	_____
		d) Rated peak withstand current	peak kA	20	
		e) Rated short-time (3s) withstand current	kA	8	_____

Technical schedules A and B

for 22 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

☐ Inland application or ☐ Coastal application (← tick relevant box)

☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

1	2	3		4	5
Item	**Sub-clause**	**Description**		**Schedule A**	**Schedule B**
4	**3.2.1**	**f) Rated mainly active load breaking current (I1)**	**A**	**630**	_____
		g) Rated closed loop breaking current (I_{2a})	A	630	_____
		h) Rated no-load transformer breaking current (I_3)	A	5	_____
		i) Rated cable-charging breaking current (I_{4a})	A	16	_____
		j) Rated line-charging breaking current (I_{4b})	A	1.5	_____
		k) Rated short-circuit making current (I_{ma})	kA	7.5	_____
					_____
5	**3.2.3**	**Rated insulation level**			
		a) Power frequency wet withstand (60 s)	r.m.s kV	50	
		b) Impulse withstand (1,2/50 Ph-to-ground)	peak kV	150	_____
		c) Impulse withstand (1,2/50 across isolating distance)	peak kV	170	_____
6	**4**	**Design**			
		a) Isolating distance	mm	xxxxxxxxxx	_____
		b) Lifting lugs		Yes	_____
		c) Latching mechanism		Yes	_____
		d) Method of operation		Ganged	_____
		e) Operating mechanism		Portable link-stick	_____
		f) Opening action		Pull	_____
		g) Closing action		Pull	_____
		h) Min. no. of maintenance free operations		xxxxxxxxxxx	_____
7		**Material**			
		a) Moveable contact		xxxxxxxxxxx	_____
		b) Fixed contact		xxxxxxxxxxx	_____
		c) Contact spring		xxxxxxxxxxx	_____
		d) Current carrying elements		xxxxxxxxxxx	_____
		e) Mounting brackets		xxxxxxxxxxx	_____
		f) Finish on ferrous parts		xxxxxxxxxxx	_____
8		**Contacts**			
		a) Contact pressure method, if not spring		xxxxxxxxxxx	_____

Technical schedules A and B

for 22 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

☐ Inland application or ☐ Coastal application (← tick relevant box)

☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

1	2	3		4	5
Item	**Sub-clause**	**Description**		**Schedule A**	**Schedule B**
8		**b) Type of coating on contacts**		**Silver**	_____
		c) Thickness of coating	μm	25	_____
		d) Wiping action required		Yes	_____
9		**Conductor terminals**			
		a) M12 x 50 mm setscrew or threaded stud complete with flat washer, lock washer and nut required		Yes	_____
10		**Insulators**			
		a) Material type (e.g. Porc/Cyclo/SR)		xxxxxxxxxxx	_____
		b) Creepage	mm/kV	See table 2	_____
		c) Strength class	N	xxxxxxxxxxx	_____
		d) Arcing distance	mm	xxxxxxxxxxx	_____
		SANS 60815 annex D parameters			
		f) c		≥ 20	_____
		g) s/p		≥ 0,65	_____
		h) L_d/d		≤ 5	_____
		j) P1 – P2		≥ 15	_____
		k) CF		≤ 3,5	_____
		l) PF		≥ 0,7	_____
11		**Mounting**			
		a) Mounting (Single-pole or H-pole)		_____	_____
		b) Alignment		Upright Horizontal	_____
		c) Minimum phase spacing	mm	320	_____
		d) Mounting hole centres if H-pole mounted	mm	1800 & 2200	_____
		e) Is the supporting steel to be provided?		Yes	_____
		f) Are accessories such as bolts, nuts and washers to be provided?		Yes	_____
		e) Dimension A	mm	See Fig. 1	_____

Technical schedules A and B

for 22 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

☐ Inland application or ☐ Coastal application (← tick relevant box)

☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

1	2	3	4	5
Item	**Specification sub-clause**	**Description**	**Schedule A**	**Schedule B**
12		**Drawings**		
		Provide the reference number of the relevant drawing		
		a) General outline drawing of disconnector	Drawing no.	_____
		b) Drawing with insulator detail	Drawing no.	_____
		c) Drawing showing details of mounting interfaces	Drawing no.	_____
13		**Rating plates**		
		a) Rating plate material	xxxxxxxxxxx	_____
		b) Fixing method (screws or pop rivets)	xxxxxxxxxxx	_____
		Information provided on rating plate:		_____
		c) Name of manufacturer	xxxxxxxxxxx	_____
		d) Type designation	xxxxxxxxxxx	_____
		e) Year of manufacture	xxxxxxxxxxx	_____
		f) Rated voltage	xxxxxxxxxxx	_____
		g) BIL	xxxxxxxxxxx	_____
		h) Rated normal current	xxxxxxxxxxx	_____
		i) Rated short-time current	xxxxxxxxxxx	_____
		j) Rated load-break current	xxxxxxxxxxx	_____
14	**5**	**Type tests**		
		Provide the reference number of the relevant test report		
		a) Power frequency wet withstand test	Report no.	_____
		b) Lightning impulse test	Report no.	_____
		c) Temperature rise test	Report no.	_____
		d) Measurement of the resistance of the main circuit	Report no.	_____
		e) Short-time withstand and peak withstand current tests	Report no.	_____
		f) Breaking current test	Report no.	_____
		g) Short-circuit making current test	Report no.	_____
		h) Mechanical endurance test	Report no.	_____
		i) KIPTS Artificial ageing test	Report no.	_____

Deviation schedule

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

Type test report summary sheet

for 22 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

☐ Inland application or ☐ Coastal application

☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

Test report summary sheet

Test		**Report no.**	**Test facility**	**Comments**	**Report submitted (Y/N)**
5.1.1.1	Power frequency wet withstand test				
5.1.1.2	Lightning impulse test				
5.1.1.3	Temperature rise test				
5.1.1.4	Measurement of resistance				
5.1.1.5	Short-time withstand current test				
5.1.1.6	Breaking current test				
5.1.1.7	Short-circuit making current test.				
5.1.1.8	Mechanical endurance test				
5.2.2	KIPTS Artificial ageing test				

Technical schedules A and B

for 33 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

☐ Inland application or ☐ Coastal application (← tick relevant box)

☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3		4	5
Item	**Sub-clause**	**Description**		**Schedule A**	**Schedule B**
1	**-**	**Identification**			
		a) Supplier's name		xxxxxxxxxx	_____
		b) Manufacturer's name		xxxxxxxxxx	_____
		c) Type designation		xxxxxxxxxx	_____
		c) Item number (i.e. 1-16, see Annex B)		xxxxxxxxxx	_____
2	**4.1.1**	**Service conditions**			
		a) Altitude	m	up to 1800	xxxxxxxxxx
		b) Maximum, weighted average, ambient temperature	°C	50	xxxxxxxxxx
		c) Minimum, weighted average, ambient temperature	°C	–15	xxxxxxxxxx
		d) Maximum diurnal variation	°C	35	xxxxxxxxxx
		e) Intensity of solar radiation	kW/m^2	1,1	xxxxxxxxxx
		f) Relative humidity	%	up to 100	xxxxxxxxxx
3	**4.1.2**	**System conditions**			
		a) Nominal system voltage (U_n)	kV	33	xxxxxxxxxx
		b) Maximum system voltage (U_m)	kV	36	xxxxxxxxxx
		c) Supply frequency	Hz	50	xxxxxxxxxx
		d) System earthing		Effective & Non-effective	xxxxxxxxxx
4	**4.2.1**	**Rated current carrying capability**			
		a) Rated normal (continuous) current (i_r)	A	630	_____
		b) Rated closed loop making current	A	630	_____
		c) Rated mainly active load breaking circuit making current (I_k)	A	630	_____
		d) Rated short-time (3 s) withstand current	kA	8	_____

Technical schedules A and B

for 33 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

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☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

1	2	3		4	5
Item	**Sub-clause**	**Description**		**Schedule A**	**Schedule B**
4	**4.2.1**	**e) Rated mainly active load breaking current (I1)**	**A**	**630**	_____
		f) Rated closed loop breaking current (I_{2a})	A	630	_____
		g) Rated no-load transformer breaking current (I_3)	A	5	_____
		h) Rated cable-charging breaking current (I_{4a})	A	20	_____
		i) Rated line-charging breaking current (I_{4b})	A	2	_____
		j) Rated short-circuit making current (I_{ma})	kA	7.5	_____
		k) Rated peak withstand current	peak kA	20	_____
5	**4.2.3**	**Rated insulation level**			
		a) Power frequency wet withstand (60 s)	r.m.s kV	70	
		b) Impulse withstand (1,2/50 Ph-to-ground)	peak kV	150	_____
		c) Impulse withstand (1,2/50 across isolating distance)	peak kV	170	_____
6	**4.3**	**Design**			
		a) Isolating distance	mm	xxxxxxxxxx	_____
		b) Lifting lugs		Yes	_____
		c) Latching mechanism		Yes	_____
		d) Method of operation		Ganged	_____
		e) Operating mechanism		Portable link-stick	_____
		f) Opening action		Pull	_____
		g) Closing action		Pull	_____
		h) Min. no. of maintenance free operations		xxxxxxxx	_____
7	**4.4**	**Material**			
		a) Moveable contact		xxxxxxxx	_____
		b) Fixed contact		xxxxxxxx	_____
		c) Contact spring		xxxxxxxx	_____
		d) Current carrying elements		xxxxxxxx	_____
		e) Mounting brackets		xxxxxxxx	_____
		f) Finish on ferrous parts		xxxxxxxx	_____
8	**4.5.2**	**Contacts**			
		a) Contact pressure method, if not spring		xxxxxxxx	_____

Technical schedules A and B

for 33 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

☐ Inland application or ☐ Coastal application (← tick relevant box)

☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

1	2	3		4	5
Item	**Sub-clause**	**Description**		**Schedule A**	**Schedule B**
8		b) Type of coating on contacts		Silver	_____
		c) Thickness of coating	µm	25	_____
		d) Wiping action required		Yes	_____
9	**4.5.3**	**Conductor terminals**			
		a) M12 x 50 mm setscrew or threaded stud complete with flat washer, lock washer and nut required		Yes	_____
10	**4.6**	**Insulators**			
		a) Material type (e.g. Porc/Cyclo/SR)		xxxxxxx	_____
		b) Creepage	mm/kV	See table 2	_____
		c) Strength class	N	xxxxxxx	_____
		d) Arcing distance	mm	xxxxxxx	_____
		SANS 60815 annex D parameters			
		f) c		≥ 20	_____
		g) s/p		≥ 0,65	_____
		h) L_d/d		≤ 5	_____
		j) P1 – P2		≥ 15	_____
		k) CF		≤ 3,5	_____
		l) PF		≥ 0,7	_____
11	**4.7**	**Mounting**			
		a) Mounting (Single-pole or H-pole)		_____	_____
		b) Alignment		Upright Horizontal	_____
		c) Minimum phase spacing	mm	320	_____
		d) Mounting hole centres if H-pole mounted	mm	1800 & 2200	_____
		e) Is the supporting steel to be provided?		Yes	_____
		f) Are accessories such as bolts, nuts and washers to be provided?		Yes	_____
		e) Dimension A	mm	See Fig. 1	_____

Technical schedules A and B

for 33 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

☐ Inland application or ☐ Coastal application (← tick relevant box)

☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

1	2	3	4	5
Item	**Specification sub-clause**	**Description**	**Schedule A**	**Schedule B**
12	**4.9**	**Drawings**		
		Provide the reference number of the relevant drawing		
		a) General outline drawing of disconnector	Drawing no.	_____
		b) Drawing with insulator detail	Drawing no.	_____
		c) Drawing showing details of mounting interfaces	Drawing no.	_____
13	**4.10**	**Rating plates**		
		a) Rating plate material	xxxxxxx	_____
		b) Fixing method (screws or pop rivets)	xxxxxxx	_____
		Information provided on rating plate:		_____
		c) Name of manufacturer	xxxxxxx	_____
		d) Type designation	xxxxxxx	_____
		e) Year of manufacture	xxxxxxx	_____
		f) Rated voltage	xxxxxxx	_____
		g) BIL	xxxxxxx	_____
		h) Rated normal current	xxxxxxxxxxx	_____
		i) Rated short-time current	xxxxxxxxxxx	_____
		j) Rated load-break current	xxxxxxx	_____
14	**5**	**Type tests**		
		Provide the reference number of the relevant test report		
		a) Power frequency wet withstand test	Report no.	_____
		b) Lightning impulse test	Report no.	_____
		c) Temperature rise test	Report no.	_____
		d) Measurement of the resistance of the main circuit	Report no.	_____
		e) Short-time withstand and peak withstand current tests	Report no.	_____
		f) Breaking current test	Report no.	_____
		g) Short-circuit making current test	Report no.	_____
		h) Mechanical endurance test	Report no.	_____
		i) KIPTS Artificial ageing test	Report no.	_____

Deviation schedule

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

Type test report summary sheet

for 33 kV , gang-operated disconnectors

☐ TPSD or ☐ TPD (← tick relevant box)

☐ Inland application or ☐ Coastal application (← tick relevant box)

☐ Single-pole mounted or ☐ H-pole mounted (← tick relevant box)

Test		Report no.	Test facility	Comments	Report submitted (Y/N)
5.2.1.1	Power frequency wet withstand test				
5.2.1.2	Lightning impulse test				
5.2.1.3	Temperature rise test				
5.2.1.4	Measurement of resistance				
5.2.1.5	Short-time withstand current test				
5.2.1.6	Breaking current test				
5.2.1.7	Short-circuit making current test.				
5.2.1.8	Mechanical endurance test				
5.2.2	KIPTS Artificial ageing test				