

 <b>Eskom</b>	<b>Standard</b>	<b>Technology</b>
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Title: **SPECIFICATION FOR A PLATFORM MOUNTED RING MAIN UNIT SWITCHBOARD FOR SYSTEMS WITH NOMINAL VOLTAGE OF 11 KV UP TO 22 KV** Unique Identifier: **240-76366372**  
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Compiled by



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Date: 06/10/2014

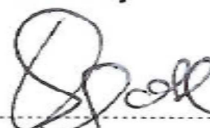
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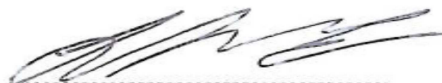
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## **1. Introduction**

Raised platform mobile ring main unit switchboards are normally required for emergency breakdowns or substation projects where they are used to construct temporary by-pass solutions.

## **2. Supporting clauses**

### **2.1 Scope**

This specification details the Eskom Distribution and Transmission requirements applicable to raised platform mobile RMU switchboards used in systems with nominal voltages from 11 kV up to 22 kV and is designed for outdoor operation at a rated frequency of 50 Hz.

#### **2.1.1 Purpose**

This standard is required to provide the specification requirements for raised platform mobile medium voltage ring main unit (RMU) switchboards for use in the Eskom Distribution and Transmission Division.

#### **2.1.2 Applicability**

This document shall apply in the Eskom Holdings Limited Distribution and Transmission 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] DSP 34-210 Free-standing metal-enclosed ring main units for systems with nominal voltages from 11 kV to 33 kV.
- [3] SANS 1874: Switchgear — Metal-enclosed ring main units for rated a.c. voltages above 1 kV and up to and including 36 kV.
- [4] SANS 876: Cable terminations and live conductors within air-filled enclosures (insulation coordination) for rated a.c. voltages from 7,2 kV and up to and including 36 kV.
- [5] SANS 1507-2: Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) – Part 2: Wiring cables.
- [6] SANS 60044-2: Instrument transformers – Part 2: Inductive voltage transformers.
- [7] SANS 60529: Degrees of protection provided by enclosures (IP Code).
- [8] SANS 60815-1: Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles.
- [9] SANS 61243-5: Live working – Voltage detectors – Part 5: Voltage detecting systems (VDS).
- [10] 32-9: Definition of Eskom documents.
- [11] 32-644: Eskom documentation management standard. 474-65: Operating Manual of the Steering Committee of Wires Technologies (SCOWT).
- [12] 34-253: Distribution Standard Part 15: Distribution specification for electrical terminal blocks.
- [13] 34-462: Distribution Standard Part 15: Standard design for distribution protection schemes.
- [14] 34-1080: Distribution Standard Part 4: Specification for fault indicators for MV cables and overhead lines up to 66kV.

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- [15] 34-1622: Distribution Standard Part 22: Accessories for medium-voltage power cables for systems with nominal voltages of 11 kV to 33 kV.
- [16] 34-1658: Distribution Standard Part 4: Corrosion protection specification for distribution outdoor equipment manufactured from steel.
- [17] 34-2123: Telecontrol requirements for ring main units
- [18] 32-333: Distribution Standard Part 15: Standard for electronic protection and fault monitoring equipment for power systems.
- [19] 240-56065202: Switchgear training requirements from original equipment manufacturers standard
- [20] D-DT-6073: Sign ABC MV
- [21] D-DT-3202: Sign, DE First Aid
- [22] D-DT-6050: Padlock and padlock keys
- [23] D-DT-6081: Ball joint portable earth

### **2.2.2 Informative**

- [24] 10TB-011: Approved coating suppliers and products for DSP 34-1658.

## **2.3 Definitions**

### **2.3.1 General**

Definition	Description
<b>Indoor</b>	Switchgear and control gear designed solely for installation in a building or other housing, where the switchgear and control-gear is protected against wind, rain, snow, abnormal dirt deposits, abnormal condensation, ice and frost.
<b>Metal-enclosed</b>	Switchgear and control-gear assemblies with an external metal enclosure intended to be earthed, and complete except for external connections.
<b>Main circuit</b>	All the conductive parts of an assembly of switchgear and control-gear included in a circuit that is intended to transmit electrical energy.
<b>Ring main unit</b>	Switchgear assembly that has an external metal enclosure and that comprises switch dis-connectors, switch-fuse combinations or circuit breakers. These would incorporate integral cable earthing and can have facilities for cable testing.
<b>Outdoor</b>	Switchgear and control-gear suitable for installation in the open air, i.e. capable of withstanding wind, rain, snow, dirt deposits, condensation, ice and frost.
<b>Switchgear</b>	General term that cover switching devices and their combination with associated control, measuring, protective and regulating equipment, and that also covers assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures, intended for use in connection with the generation, distribution and conversion of electrical energy.

### **2.3.2 Disclosure classification**

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

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## 2.4 Abbreviations

Abbreviation	Description
AC	Alternating current
RMU	Ring main unit
kV	Kilovolt
MV	Medium Voltage
SSC	Screened separable connector

## 3. Requirements

This document is the specification for 11 kV to 22 kV raised platform mobile RMU switchboards with an option to fit an Integrated Remote Terminal Unit (IRTU).

### 3.1 General

The raised platform mobile RMU switchboard shall be designed and constructed in accordance to the relevant requirements of DSP 34-210 and SANS 1874 for the metal enclosed RMU, DSP 34-2123 for the optional IRTU, and the additional requirements given in this specification. The raised platform mobile RMU switchboard without an IRTU shall be rated at 22 kV, and shall be suitable to operate on either 11 kV or 22 kV systems. The platform mounted mobile RMU switchboard fitted with an IRTU shall be rated at 11 kV or 22 kV due to the specific voltage rating of the voltage transformer to supply the IRTU.

The RMU switchgear shall be housed in a single outdoor metal enclosure as described in this document. It is intended that the switchgear will be used under emergency conditions or temporary bypass solutions only.

Only Eskom pre-approved outdoor RMU's evaluated and found compliant on the Eskom List of Accepted products are to be used for the skid mounted mobile RMU switchboard.

### 3.2 Degree of protection

The different parts or types of the RMU switchgear shall have at least the following degree of protection (as defined in SANS 60529):

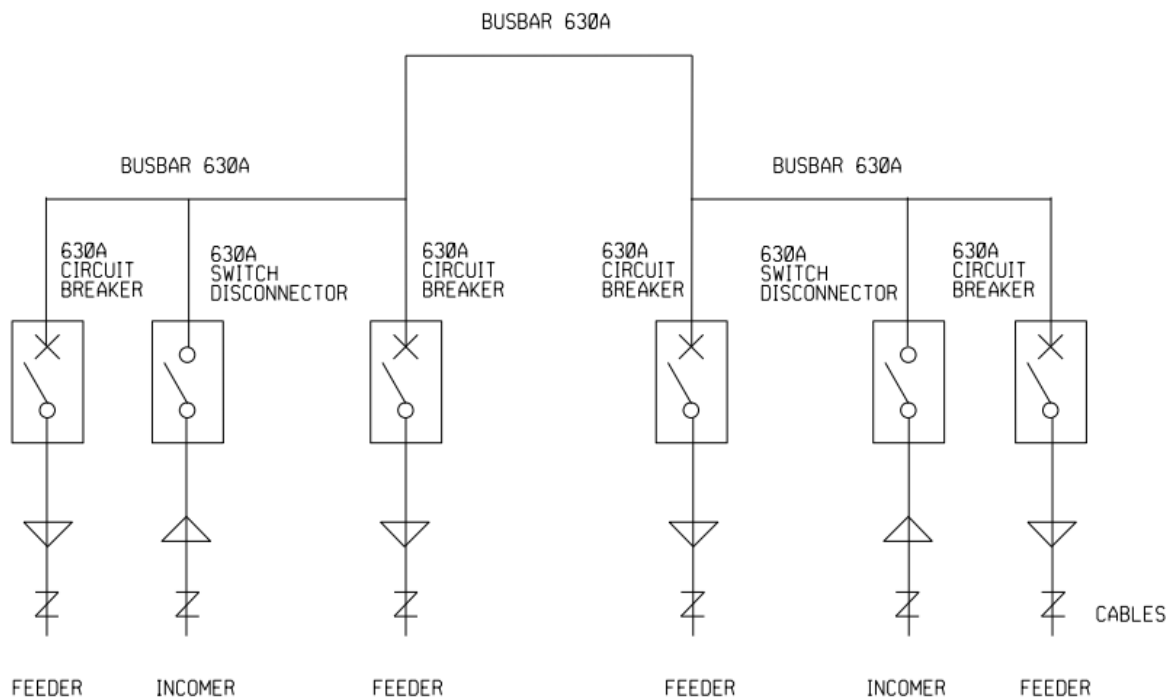
- 3.2.1 IP 2X for moving parts;
- 3.2.2 IP 3X for live parts;
- 3.2.3 IP 3X for cable boxes; and
- 3.2.4 IP 44 for outdoor kiosk.

### 3.3 Configuration

The configuration of the skid mounted mobile RMU switchboards shall be as shown in figure 1 and shall consist of the following:

**3.3.1 Switchboard configuration**

- a) 2 x 630 A incomer switch disconnectors suitable for the termination of either a 3-core XLPE-insulated cable up to 185 mm<sup>2</sup> or a 1 core XLPE-insulated cable up to 300 mm<sup>2</sup> per phase;
- b) 4 x 630 A feeder circuit-breakers suitable for termination of either a 3-core XLPE-insulated cable up to 185 mm<sup>2</sup> or a 1 core XLPE-insulated cable up to 300 mm<sup>2</sup> per phase;
- c) The configuration shall be made up of two extensible 3-way RMU switchgear modules, each RMU switchgear module shall be 2 x feeder circuit-breaker panels and 1 x incomer switch disconnector panel as illustrated in figure 1.

**Figure 1: parallel switchboards configuration****3.4 Cable test facility**

- 3.4.1 Integral cable test facilities shall be included for the circuit-breaker feeder panels if possible; alternatively a suitable method for testing the circuit breaker panel connected cables shall be stated.
- 3.4.2 Each cable test facility shall be interlocked with its associated earth switch to ensure that the test terminals of the cable test facility are not accessible when the cable is energized.

**3.5 Protection**

- 3.5.1 All protection, CT and wiring requirements shall be in accordance with DSP 34-210.

**3.6 Busbars**

- 3.6.1 The busbars rating shall be a minimum of 630 A as indicated in figure 1.
- 3.6.2 The busbars interconnecting the two RMU switchgear modules shall be a minimum of 630 A.

**3.6.3** Access to external mounted solid dielectric busbars that may be used to connect the two RMU switchgear modules shall be restricted and only possible with the use of tools to prevent accidental access.

**3.6.4** The interconnecting busbars shall be electrically screened.

### **3.7 Cable boxes and terminations**

**3.7.1** All cable boxes shall be air-filled.

**3.7.2** Each incomer switch disconnector and circuit-breaker cable box shall be suitable for the termination of either 3-core XLPE- insulated cables up to 185 mm<sup>2</sup> or 1 core XLPE- insulated cable up to 300 mm<sup>2</sup> per phase by means of trifurcating kits and screened separable connectors (SSCs) for both 11 kV and 22 kV.

**3.7.3** Cable support clamps shall be provided in each incomer switch disconnector panel and each circuit-breaker panel for supporting both an option for a three core cable with a diameter of 75 mm to 100 mm and an option for single core cables with a diameter 25 mm to 50 mm per phase.

**3.7.4** The minimum distance from the cable support clamp to the bushing centres shall be 800 mm, and the minimum cable termination enclosure size from the cable entry base plate (if applicable) to the bushing centres shall be 800 mm.

**3.7.5** The main earth bars / terminals of each panel (i.e. within each cable box) shall be interconnected using copper conductors of cross sectional area not less than 120mm<sup>2</sup>.

### **3.8 Bushings**

**3.8.1** The incomer and circuit-breaker bushings shall comply with the requirements of EN 50181 and shall be type C with a M16x2 threads.

**3.8.2** The bushings shall be horizontally positioned with a minimum distance between bushing centres of 105 mm and a minimum distance from bushing centre to the metal enclosure of 55 mm.

**3.8.3** Bushings shall be fitted with capacitive voltage detection sensor for the VDS input.

**3.8.4** The phase sequence of bushings on all incomers and circuit-breakers shall be marked.

### **3.9 Metal enclosure and raised platform design and construction**

**3.9.1** The metal enclosure that houses the RMU switchboard shall have a raised platform base (skid under base).

**3.9.2** The raised platform base shall make provision for the entry of up to 6 x 185 mm<sup>2</sup> 3 core cables and up to 18 x 185 mm<sup>2</sup> 1 core cables and shall allow for the 1000 mm bending radius of the cables below the cable support clamp. The raised platform base plates shall be designed and installed to ensure neat cable entry and no internal arc venting to the bottom.

**3.9.3** The metal enclosure shall be provided with lifting eyes having a minimum diameter of 30 mm that make it possible to lift the metal enclosed RMU switchboard alone, and the raised platform base shall be provided with lifting eyes having a minimum diameter of 40 mm that make it possible to lift the fully assembled platform mounted mobile RMU switchboard. The design calculations approval for all lifting eyes needs to be provided as part of the tender documentation and the design shall be tested to prove functional performance.

**3.9.4** The unit shall be capable of being locked to prevent unauthorized access and operation.

**3.9.5** A padlock protection facility shall be provided for the RMU switchboard metal enclosure.

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- 3.9.6** The padlock protection facility shall provide access to the padlock from both left and right hand sides.
- 3.9.7** A Ø15 mm hole shall be provided in the front of the padlock protection facility that corresponds with the position of the captive 10 mm Allen cap screw fitted in the door in accordance with SANS 1874.
- 3.9.8** The metal enclosure colour shall be Avocado C12 in accordance with SANS 1091, unless a different colour is specified by Eskom.
- 3.9.9** The metal enclosure shall be provided with the following signs:
- 3.9.10** A sign depicting "Treatment and Full First Aid Instructions" (see D-DT- 6073 "SIGN D, E") shall be permanently attached to the inside of the doors; and
- 3.9.11** External aluminium or 'Chromadek' electrical symbolic warning signs (warning-flash, see D-DT-3202, sheet 6) shall be permanently attached to all the doors that open first (i.e. those that have handles fitted). If pop rivets are used to attach the signs to the doors, only aircraft pop-rivets will be acceptable. Normal pop-rivets are not acceptable.
- 3.9.12** Provision shall be made for the safe-keeping of all relevant documentation (i.e. the installation, operating and maintenance instructions for the RMU switchboard and all routine test certification) on the inside of the metal enclosure doors.
- 3.9.13** The design and construction of the metal enclosed RMU switchboard shall be fully internal arc-test compliant as per SANS 62271-200. Therefore, in the event of an internal arc fault occurring in any air or gas filled chamber within the RMU switchboard, the kiosk shall be designed and type tested for the safe venting (i.e. away from the operator and public) of gases released during an internal arc fault to the top. Design and type test details shall be submitted to Eskom for approval at the time of tendering.
- 3.9.14** A set of steps shall be provided with the raised platform base mounted mobile RMU enclosure for the operator to access the platform. The steps shall be designed in such a way that they can be folded away under the operating platform during transport. The steps must have handrails to prevent slip and trips on the steps.
- 3.9.15** The platform area shall have barriers fitted with warning labels to restrict access and prevent slip and trips on the platform. This must include a padlocked gate or suitable removable padlocked barrier fitted with a MV warning sign in accordance with clause 3.1.8.9 (b) when approaching the platform area from the steps.
- 3.9.16** The platform area shall be designed to ensure safe operation and maintenance in front of the RMU switchboard.
- 3.9.17** The platform area shall be galvanized steel grid plates, which can be removed with the aid of tools to allow cable terminations to be performed from the front of the RMU switchboard.
- 3.9.18** The raised platform base (skid) area shall be a maximum of 2.7 m long by 2.5 m wide.
- 3.9.19** The raised platform base shall be designed to ensure a skid like construction. The raised platform base shall be proven to be stable once the metal enclosed RMU switchboard is mounted. The design calculations approval for all lifting eyes needs to be provided as part of the tender documentation and the design shall be tested to prove functional performance.
- 3.9.20** The total height of the raised platform mounted RMU switchboard shall not exceed 3.2 m.



### **3.10 Padlocking**

- 3.10.1** Each switch disconnect, circuit breaker and earth switch shall be capable of being padlocked in the OFF position or EARTH position
- 3.10.2** Padlocking shall be provided to prevent the selection of the ON position while permitting operation from the OFF position to the EARTH position.
- 3.10.3** All padlocking facilities shall be suitable for padlocks as per D-DT-6050, which has a shackle diameter of 6 mm.

### **3.11 Earthing**

- 3.11.1** Each metal enclosure and the raised platform base shall be provided with a reliable earthing terminal, which has a clamping screw or nut in accordance with D-DT-6081 for connection to an earth conductor that is suitable for the fault conditions specified.
- 3.11.2** In extensible RMUs it shall be possible to extend the earthing bar without additional site work.
- 3.11.3** All metal enclosures, RMU individual tanks and the raised platform base need to be bonded together with the use of a minimum 70 mm<sup>2</sup> copper earth conductor.
- 3.11.4** Suitable precautions are required by the user to ensure anti-theft measures are taken against the theft of earthing.

### **3.12 Accessories**

- 3.12.1** All required accessories such as operating handles, etc. shall be supplied.
- 3.12.2** Operating handles shall be attached inside the mobile RMU kiosk in such a way that they cannot be lost or stolen and are easily accessible when required for operating.
- 3.12.3** A set of lifting slings suitable for the lifting of the assembled kiosk and switchboard shall be provided with each unit.

### **3.13 Rating plates**

- 3.13.1** All rating plates shall be securely attached.
- 3.13.2** All rating plates shall be of intrinsically corrosion-resistant metal, with legible and indelible markings.

### **3.14 Main Circuit Designation Labels**

- 3.14.1** Main circuit designation labels shall be provided for each panel. The labels shall be sandwich-board or equivalent (orange-black-orange) and shall be permanently attached.
- 3.14.2** External metallic corrosion-resistant electrical symbolic warning signs (warning flash) in accordance with D-DT 3202 shall be permanently attached to all the doors. If pop-rivets are used to attach the signs to the doors, only aircraft (i.e. blind) pop-rivet will be acceptable.
- 3.14.3** The main circuit designation labels shall be at least 150mm wide and 35mm high with a font size of at least 20mm high.
- 3.14.4** The incomer panels shall be labeled (engraved) from left to right, facing the front of the switchboard, as "INCOMER 1" and "INCOMER 2" respectively.
- 3.14.5** The circuit breaker feeder panels shall be labelled (engraved) from left to right, facing the front of the switchboard, as "FEEDER 1", "FEEDER 2", "FEEDER 3" and "FEEDER 4" respectively.

- 3.14.6** If access to the cable boxes is not only in the front of the switchboard, the outside of the cable boxes of each panel shall be also labelled in accordance with 3.1.13.1 to 3.1.13.5.

### **3.15 Protection against corrosion**

- 3.15.1** The supplier shall ensure that the coating system used on the ring main unit will pass the tests stipulated in clause 5.4. of SANS 1874.

- 3.15.2** It will be specified in schedule A, whether the ring main unit is required for "inland" or "coastal" environments.

- 3.15.3** For ring main units classified as "inland", the class of pollution characterising the site severity shall be "c" (i.e. "medium") in accordance with SANS 60815-1:2009.

**NOTE:** Pollution class "c" in accordance with SANS 60815-1:2009 is equivalent in pollution class "II" in accordance with SANS/IEC 60815:1986.

- 3.15.4** For ring main units classified as "coastal", the class of pollution characterising the site severity shall be "e" (i.e. "very heavy") in accordance with SANS 60815-1:2009.

**NOTE:** Pollution class "e" in accordance with SANS 60815-1:2009 is equivalent in pollution class "IV" in accordance with SANS/IEC 60815:1986.

- 3.15.5** Corrosion protection of free-standing ring main units shall be in accordance with DSP 34-1658 with the following specific requirements:

- 3.15.6** Where a ring main unit is specified as suitable for "inland" applications, the corrosion protection requirements shall conform to a "corrosivity rating" of "LOW TO MEDIUM (C2 to C3)" in accordance with table 1 of DSP 34-1658.

- 3.15.7** Where a ring main unit is specified as suitable for "coastal" applications, the corrosion protection requirements shall conform to a "corrosivity rating" of "HIGH TO VERY HIGH (C4 to C5)" in accordance with table 1 of DSP 34-1658. Maximum Demand Ammeters

- 3.15.8** Maximum demand indication ammeters shall be provided for each feeder (circuit breaker) panel. The ammeters need only indicate the current on the centre phase of each panel (i.e. the white phase). The scale of the ammeters shall be from 0A up to and including 630A.

- 3.15.9** The ammeters shall be thermal maximum demand ammeters, integrating over a 15 min period.

### **3.16 IRTU specific requirements if fitted**

The specification for IRTU shall be in accordance with DSP 34-2123.

### **3.17 Status indications requirements for units without IRTU's**

RMU units without the IRTU option, shall have the "Open" and "Close" status of all circuit breakers and switch - disconnectors made available, via their auxiliary switches to terminals mounted on a defined terminal rail (X3.\*) within the metal enclosure. In addition to the above this terminal rail shall also accommodate the wiring out of the following alarms.

- 1) Earth Fault Indicator- OPERATED (per unit installed).
- 2) Protection IED- Unhealthy (per unit installed).
- 3) SF<sub>6</sub> Gas- LOW
- 4) Door- OPEN

Provision shall be made for termination and routing of 2 \* 10 Pair 0.5mm<sup>2</sup> armoured telephone cables (TPH10AV) to these terminals.

### **3.18 Voltage transformers for units with IRTU's**

RMU units fitted with the optional IRTU need to be fitted with a voltage transformer for the power supply to the IRTU.

**3.18.1** The voltage transformer need to be fuse or circuit breaker protected and need to be connected from the cable compartment or busbar.

**3.18.2** For busbar connected VT's the connection shall not be accessible inside the metal enclosure when the metal enclosure doors are open.

**3.18.3** The VT shall be of the dry type and screened.

**3.18.4** The cable and cable terminations to connect the VT shall be screened.

### **3.19 TRAINING**

The supplier shall provide firsthand training of an international standard on the supplied equipment by OEM accredited instructors.

Refer to 240-56065202 for the switchgear training requirements from original equipment manufacturers.

## **4. Authorization**

This document has been seen and accepted by:

<b>Name and surname</b>	<b>Designation</b>
Vinod Singh	DBOUS Manager
Sidwell Mtetwa	HV Plant Acting Senior Manager
Monde Bala	Limpopo OU O&M Senior Manager

## **5. Revisions**

<b>Date</b>	<b>Rev.</b>	<b>Compiler</b>	<b>Remarks</b>
Jan 2015	1	J Mahlangu / TP Du Plessis	New specification to cater for Mobile RMU base switchboards, based on the informal specification requirements by RA Kelly.

## **6. Development team**

The original informal specification was compiled by R.A Kelly. The following people were involved in the development of this document:

- Thinus du Plessis – HV plant engineering
- Jabu Mahlangu – Limpopo OU SI
- Cobus Bosch – Gauteng OU SI
- Peter Almeida – Gauteng OU SI

## **Annex A – Impact Assessment**

(Normative – for Eskom internal use only)

### **A.1 Guidelines**

- All comments shall be completed.
- Motivate why items are not applicable (N/A).
- Indicate actions to be taken, persons or organizations responsible for actions and deadline for action.
- Technical Change Implementation Forum to discuss the impact assessment and, if necessary, give feedback to the compiler regarding any omissions or errors.

### **A.2 Critical points**

**A.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, and optimized costs.**

Comment: Specification requirements for platform mounted ring main unit switchboard.

**A.2.2 If the document to be released impacts on statutory or legal compliance, this needs to be very clearly stated and so highlighted.**

Comment: N/A.

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

Comment: No current stock exists.

**A.2.4 When will new stock be available?**

Comment: As soon as specification published and procurement process followed.

**A.2.5 Has the interchange ability of the product or item been verified, i.e. when it fails, is a straight swap possible with a competitor's product?**

Comment: RMU and IRTU components are replaceable.

**A.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: None

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

Comment: (n/a during commenting phase).

### **A.3 Implementation timeframe**

**A.3.1 Time period for implementation of requirements.**

Comment: Immediate.

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

Comment: New SAP items required once published.

### **A.4 Buyers Guide and Power Office**

**A.4.1 Does the Buyers Guide or Buyers List need updating?**

Comment: Yes

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

Comment: None.

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

Comment: None.

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

Comment: See 5

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

Comment: None. Only for maintenance.

**A.5 CAP / LAP Pre-Qualification Process related impacts**

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

Comment: No.

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

Comment: New document

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

Comment: N/A

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

Comment: No

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

Comment: N/A

**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

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

Comment: N/A

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

Comment: Metal enclosed RMU switchgear

**A.6 Training or communication**

**A.6.1 Is training required?**

Comment: Yes, installation, maintenance and operation

**A.6.2 State the level of training required to implement this document. (E.g. awareness training, practical / on job, module, etc.)**

Comment: Practical training

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**A.6.3 State designations of personnel that will require training.**

Comment: Operational staff

**A.6.4 Is the training material available? Identify person responsible for the development of training material.**

Comment: No

**A.6.5 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: OEM training

**A.6.6 Was Technical Training Section consulted w.r.t module development process?**

Comment: No

**A.6.7 State communications channels to be used to inform target audience.**

Comment: Technical Change Implementation Forum

**A.7 Special tools, equipment, software**

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

Comment: N/A

**A.7.2 Are there stock numbers available for the new equipment?**

Comment: N/A

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

Comment: N/A

**A.8 Finances**

**A.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: N/A

.....  
.....  
.....  
Impact assessment completed by:

Name: Jabu Mahlangu

Designation: Engineer

## **Annex B – Technical Schedule**

(Informative)

### **B.1 General**

The purchaser is provided with a model form as a convenient aid to the purchasing process. The form is intended to obviate the need for preparing a detailed technical specification.

The purchaser needs only specify compliance with this specification, provide the tenderers with details of their particular requirements, and set out the information they requires the tenderer to provide, as indicated below.

A model form is provided to assist the purchaser in completing a schedule in which the tenderer is required to declare all deviations between their offer and this specification.

### **B.2 Schedules**

The model form provides the purchaser with examples of schedule A and schedule B. In their enquiry, the purchaser should provide their own schedule A and schedule B, based on these examples. The schedules attached in this document must be used as a template when a commercial enquiry is issued.

#### **B.2.1 Schedules A**

Schedule A lists the requirements to be specified by the purchaser in enquiries and orders. These requirements may include references to the relevant subsections in this specification, to assist in compiling the schedules.

Where the text of any referenced standard stipulates that the purchaser shall indicate their requirements, these requirements should also be specified in schedule A.

The purchaser should set out their particular requirements and choices in their own schedule A.

#### **B.2.2 Schedules B**

The purchaser should draw up his/her own schedule B (based on the schedule B in the model form), and require the tenderer to fill in this schedule. By doing this, the tenderer will state compliance with this specification and provide the information the purchaser has requested.

#### **B.2.3 Deviation Schedules**

If a purchaser requires a deviation schedule to be completed, they should state this in the enquiry specification.

#### **NOTES**

- 1) Where this specification allows the purchaser to make a choice, the example of schedule A (in the model form) lists the preferred items/values/quantities. In the interests of standardisation, purchasers are encouraged not to deviate from these preferences.
- 2) When preparing his/her own schedule A and schedule B from the examples in the model form, the purchaser need only include those items that he/she considers to be relevant or necessary.
- 3) These schedules, when completed, become normative annexes to the enquiry specification.

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<b>TECHNICAL SCHEDULES A &amp; B FOR PLATFORM MOUNTED RING MAIN UNITS FOR NOMINAL VOLTAGES FROM 11 KV TO 22 KV</b>				
<b>SAP: _____ Select from list .....</b>				
<b>Schedule A: Purchasers specific requirements</b>				
<b>Schedule B: Guarantees and technical particulars of equipment offered</b>				
1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
	Item Description	Select from list .....		
		SAP Number	_____	
		<b>Ratings</b>		
		Nominal voltage	kV <sub>rms</sub> _____	_____
1.1	NRS 006 4.2.1	Rated power-frequency voltage	kV <sub>rms</sub> _____	_____
1.2	NRS 006 4.2.2	System frequency	Hz 50	_____
1.3		Number of phases	3	_____
1.4		System voltage range	pu 0.9 to 1.1	_____
1.5	DSP 34-210 4.2 & NRS 006 4.2.3	Rated lightning impulse withstand voltage	kV <sub>peak</sub> _____	_____
1.6	NRS 006 4.2.3	Rated short-duration power frequency withstand voltage [50Hz: 1 min]	kV <sub>rms</sub> _____	_____
1.7	NRS 006 4.7.1	Rated normal current of busbars	A 630	_____
1.8	NRS 006 4.4.1.3	Rated normal current of switch disconnector	A 630	_____
1.9	NRS 006 4.6.1.3	Rated current of circuit breaker	A _____	_____
1.1	NRS 006 4.2.4.1	Rated short-time withstand r.m.s. current (3 seconds)	kA <sub>rms</sub> _____	_____
1.11	NRS 006 4.2.4.3	Rated short-time withstand r.m.s. current (3 seconds) of earthing switches	kA <sub>rms</sub> _____	_____
1.12	NRS 006 4.2.4.1	Rated peak withstand current	kA <sub>peak</sub> _____	_____
1.13	NRS 006 4.2.7	Rated short circuit making current	kA <sub>peak</sub> _____	_____

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<b>2</b>		<b>Design</b>			
2.1	NRS 006 4.3.1.5	Indoor or outdoor unit required?	ID/OD	_____	_____
2.2	DSP 34-210 4.13	Is a padlock protection facility required?	Y/N	Yes	_____
2.3	DSP 34-210 4.16.1	Inland or coastal unit required?		_____	_____
2.4	NRS 006 4.3.2	Extensible unit required?	Y/N	Yes	xxxxxxx
2.5	NRS 006 4.3.3.3	Degree of protection offered (RMU):			
	SANS 62271-200	a) moving parts		IP 2X	_____
	SANS 62271-200	b) live parts		IP 2X	_____
	NRS 012	c) cable boxes		IP 3X	_____
		d) outdoor unit		IP 44	_____
2.6	NRS 006 4.3.3.2	Degree of protection of kiosk (if applicable)		IP 44	_____
2.7	DSP 34-210 4.1.1	Configuration		_____	_____
2.8	DSP 34-210 4.3 & NRS 006 4.3.5	Type of cable test facilities offered?	Y/N	Yes	_____
2.9	NRS 006 4.3.9.1	Interlock with remote equipment required? If yes, state details:	Y/N	_____	_____
		a) type of interlock required		_____	_____
		b) auxiliary supply details		_____	_____
		c) interfacing details of remote equipment		_____	_____
2.1	NRS 006 4.3.9.2	Interlocking facilities offered		xxxxxxx	_____
2.11	NRS 006 4.3.10.2	Insulating medium		xxxxxxx	_____
2.12	NRS 006 4.3.10.2	Minimum maintenance free period	yrs	30 yrs	_____
2.13	NRS 006 4.3.10.3	Interrupting technology (switch disconnectors)		xxxxxxx	_____
2.14	NRS 006 4.3.10.3	Interrupting technology (circuit breaker)		xxxxxxx	_____
2.15	NRS 006 4.3.14.1	IAC required for indoor RMUs (AFLR)?		AFLR	_____
<b>3</b>	NRS 006 4.4	<b>Switch-disconnectors</b>			
3.1	NRS 006 4.4.1.1	Class of switch-disconnector (min)		E2-M1	_____
3.2	NRS 006 4.3.5.1 & DSP 34-210 4.3.1	Cable test facility to be independent of cable termination enclosure?	Y/N	Yes	_____

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3.3	NRS 006 4.4.2.2 / 4.9.2	Provision for remote tripping and closing required (i.e. remote control via RTU)?	Y/N	_____	_____
3.4	NRS 006 4.4.2.3	Details of remote tripping and closing offered		xxxxxxx	_____
3.5	NRS 006 4.9.2	Provision for remote indications and alarms required (i.e. via RTU)?	Y/N	_____	_____
3.6	DSP 34-210 4.4.1	Provision for hand-held remote control unit (trip and close) required?	Y/N	_____	_____
3.7	DSP 34-210 4.4.2	Type of plug-in connector to be supplied		ITT Cannon type CA 3102 A 14S-2 or equivalent	_____
3.8	DSP 34-210 4.4.2	Pins for trip control function		C and D	_____
3.9	DSP 34-210 4.4.2	Pins for close control function		A and B	_____
3.1	DSP 34-210 4.4.3	Details of provisions offered for hand-held remote control unit	24V/110V	_____	_____
3.11	NRS 006 4.9.1.1	Load monitoring (metering) facility required?	Y/N	_____	_____
3.12	NRS 006 4.9.1.4	Accuracy class and burden (VA) of CT offered (if applicable)		_____	_____
3.13	NRS 006 4.9.1.6 / 4.9.2	Provision for communication with an RTU (i.e. remote analogue indication)?	Y/N	_____	_____
3.14	NRS 006 4.9.1.7	Type of electronic ammeter/multi-meter offered		xxxxxxx	_____
<b>4</b>	NRS 006 4.8	<b>Cable termination enclosure</b>			
4.1	DSP 34-210 4.8.2 / 4.8.3	Spacing between bushing centres (min)	mm	_____	_____
4.2	DSP 34-210 4.8.2 / 4.8.3	Spacing between outer bushing centres and enclosure side wall (min)	mm	_____	_____
4.3	NRS 006 4.8	Distance from bushing centre line to cable support clamp (min)	mm	800	_____
4.4	NRS 006 4.8	Bushings horizontally positioned?	Y/N	YES	_____
4.5	DSP 34-210 4.8.1	Type of bushing		EN 50181 C-type interface	_____

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4.6	NRS 006 4.8	Cross sectional area of earthing bar (min)	mm <sup>2</sup>	120	_____
4.7	NRS 006 4.8.6	Type of cable support clamp		NRS 012 / D-DT-8019	_____
4.8	DSP 34-210 4.8.2	Size (range) of cable support clamp		_____	_____
<b>5</b>	NRS 006 4.8	<b>Cable termination enclosure</b>			
5.1	DSP 34-210 4.8.2 / 4.8.3	Spacing between bushing centres (min)	mm	_____	_____
5.2	DSP 34-210 4.8.2 / 4.8.3	Spacing between outer bushing centres and enclosure side wall (min)	mm	_____	_____
5.3	NRS 006 4.8	Distance from bushing centre line to cable support clamp (min)	mm	800	_____
5.4	NRS 006 4.8	Bushings horizontally positioned?	Y/N	YES	_____
5.5	DSP 34-210 4.8.1	Type of bushing		EN 50181 C-type interface	_____
5.6	NRS 006 4.8	Cross sectional area of earthing bar (min)	mm <sup>2</sup>	120	_____
5.7	NRS 006 4.8.6	Type of cable support clamp		NRS 012 / D-DT-8019	_____
5.8	DSP 34-210 4.8.2	Size (range) of cable support clamp		_____	_____
<b>6</b>	NRS 006 4.6	<b>Circuit-breakers for tee-offs</b>			
6.1	NRS 006 4.6.1.1	Class of circuit-breaker (min)		E2-M1	_____
6.2	NRS 006 4.6.1.3	Rated normal current of the circuit-breaker (200A/630A).	A	630A	_____
6.3	NRS 006 4.3.5.1 & DSP 34-210 4.3.1	Cable test facility to be independent of cable termination enclosure?	Y/N	Not mandatory	_____
6.4	NRS 006 4.6.3.3 / 4.9.2	Provision for remote tripping and closing required (i.e. remote control via RTU)?	Y/N	_____	xxxxxxx
6.5	NRS 006 4.6.3.4	Details of remote tripping and closing offered		xxxxxxx	_____
6.6	NRS 006 4.9.2	Provision for remote indications and alarms required (i.e. via RTU)?	Y/N	_____	_____
6.7	DSP 34-210 4.4.1	Provision for hand-held remote control unit (trip and close) required?	Y/N	_____	_____

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6.8	DSP 34-210 4.4.2	Type of plug-in connector to be supplied		ITT Cannon type CA 3102 A 14S-2 or equivalent	_____
6.9	DSP 34-210 4.4.2	Pins for trip control function		C and D	_____
6.1	DSP 34-210 4.4.2	Pins for close control function		A and B	_____
6.11	DSP 34-210 4.4.3	Details of provisions offered for hand-held remote control unit	24V/110V	_____	_____
6.12	NRS 006 4.9.1.1	Load monitoring (metering) facility required?	Y/N	_____	_____
6.13	NRS 006 4.9.1.4	Accuracy class and burden (VA) of CT offered		_____	_____
6.14	NRS 006 4.9.1.6 / 4.9.2	Provision for communication with an RTU (i.e. remote analogue indication)?	Y/N	_____	xxxxxxx
6.15	NRS 006 4.9.1.7	Type of electronic ammeter/multi-meter offered		xxxxxxx	_____
6.16	DSP 34-210 4.6	<b>Protection relay</b>			
6.17	DSP 34-210 4.6.3/4	CT ratio required if different to that specified in 4.5.2.3 or 4.5.2.4.	A	As per spec	_____
6.18	DSP 34-210 4.6.5	Protection CT type and class		xxxxxxx	_____
6.19	DSP 34-210 4.6.8	Details of provisions made to ensure minimum earth fault pick-up current of 40A		xxxxxxx	_____
6.2	DSP 34-210 4.6.9	Setting ranges and protection element curves (provide technical manual).		xxxxxxx	_____
<b>7</b>	NRS 006 4.8	<b>Cable termination enclosure</b>			
7.1	DSP 34-210 4.8.2 / 4.8.3	Spacing between bushing centres (min)	mm	_____	_____
7.2	DSP 34-210 4.8.2 / 4.8.3	Spacing between outer bushing centres and enclosure side wall (min)	mm	_____	_____
7.3	NRS 006 4.8	Distance from bushing centre line to cable support clamp (min)	mm	800	_____
7.4	NRS 006 4.8	Bushings horizontally positioned?	Y/N	YES	_____

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7.5	DSP 34-210 4.8.1	Type of bushing		EN 50181 C- type interface	_____
7.6	NRS 006 4.8	Cross sectional area of earthing bar (min)	mm <sup>2</sup>	120	_____
7.7	NRS 006 4.8.6	Type of cable support clamp		NRS 012 / D-DT-8019	_____
7.8	DSP 34-210 4.8.2	Size (range) of cable support clamps		_____	_____
<b>8</b>	NRS 006 4.7	<b>General</b>			
8.1	NRS 006 4.7.2	<b>Busbars</b>	A	630	_____
8.2	NRS 006 4.7.2	Current rating of busbars	L / R /NA	N/A	xxxxxxxx
8.3	NRS 006 4.7.3	Busbars to be extensible left or right?		xxxxxxxx	_____
8.4	NRS 006 4.7.5	Method of extending busbars		xxxxxxxx	_____
<b>9</b>	NRS 006 4.9	Extensible busbar insulating medium			_____
9.1	DSP 34-210 4.9.1	<b>Telecontrol</b>			_____
9.2	NR S 006 4.9.2	RTU to be provided?	Y/N	_____	_____
9.3	NR S 006 4.9.2	Provision for remote status indications and alarms required?	Y/N	_____	_____
9.4	NR S 006 4.9.2	Local indications to be provided?	Y/N	_____	_____
9.5	NR S 006 4.9.2	d.c. voltage required?	110V/24V	_____	_____
9.6	DSP 34-210 4.9.2	Details of auxiliary supply for RTU provided?	Y/N	_____	xxxxxxxx
9.7	DSP 34-210 4.9.2	LV auxiliary supply VT to be provided	Y/N	_____	_____
9.8	DSP 34-210 4.9.2	VT secondary voltage (a.c.) – if applicable	V	xxxxxxxx	_____
<b>10</b>	NRS 006 4.10	VT burden – if applicable	VA	xxxxxxxx	_____
10.1	NRS 006 4.10.2	<b>Gas requirements</b>			_____
10.2	NRS 006 4.10.3 & DSP 34-210 4.10	Expected life before replenishment of gas (minimum)	Years	30	_____
10.3	NRS 006 4.10.5	Type of gas indication device		Density meter	_____
10.4		Mass of gas:			_____
10.5		a) Busbar chamber	kg	xxxxxxxx	_____
		b) Other	kg	xxxxxxxx	_____

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10.6	NRS 006 4.10.6	Service offered for replenishment and recovery of gas		xxxxxxx	_____
11	NRS 006 4.11	<b>Earthing</b>			_____
11.1	NRS 006 4.11.1	Earth fault level and duration	kA-s	2 kA – 3 s	_____
12	NRS 006 4.12	<b>Live circuit indication</b>			_____
12.1	NRS 006 4.12.4 & DSP 34-210 4.11	Type of live circuit indication required		VDS	_____
<b>13</b>	NRS 006 4.13	<b>Earth fault indication</b>			
13.1	NRS 006 4.13.1	Type of earth fault indicator		Self-powered via CT	_____
		Earth fault indicator details:			_____
13.2	NRS 006 4.13.6	a) Cable box location for CT		LHS 'R'	_____
13.3	NRS 006 4.13.7	b) Position of 'remote' indicator		Visible from outside, front of RMU	_____
13.4	NRS 006 4.13.7	c) Method of protecting indicator against vandalism		Welded steel tube	_____
13.5	NRS 006 4.13	Make of earth fault indicator		xxxxxxx	_____
13.6	NRS 006 4.13	Type (model) of earth fault indicator		xxxxxxx	_____
<b>14</b>	NRS 006 4.14	<b>Kiosk</b>			_____
14.1	NRS 006 4.14.1	Kiosk required (for outdoor units)?	Y/N	Yes	_____
14.2	DSP 34-210 4.15	Slotted mounting holes provided in kiosk base		Yes	_____
<b>15</b>		<b>Raised platform base</b>			_____
15.1		Raised platform required?	Y/N	xxxxxxx	_____
15.2		Height of raised platform base	mm	N/A	_____
<b>16</b>	NRS 006 4.16	<b>Accessories</b>			_____
16.1	NRS 006 4.16.1	Holding down bolts to be supplied with each RMU	Y/N	Yes	_____
16.2	DSP 34-210 7.1.1	Type of sealant provided		xxxxxxx	_____
16.3	NRS 006 4.16.4	Description of tool set required		xxxxxxx	_____
16.4	DSP 34-210 7.1	Hand-held push-button remote control unit with a portable power supply to be supplied with the RMU?	Y/N	_____	_____

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16.5	DSP 34-210 7.1	Type of plug-in connector to be supplied		ITT Cannon type CA 3102 A 14S-2 or equivalent	_____
16.6	DSP 34-210 7.1	Pins for trip control function		C and D	_____
16.7	DSP 34-210 7.1	Pins for close control function		A and B	_____
16.8	DSP 34-210 7.1	Length of umbilical cord to be supplied	m	20 m	_____
16.9	DSP 34-210 7.1	Details of portable power supply		24 V	_____
<b>17</b>	NRS 006 4.17	<b>Rating plate</b>			_____
17.1	NRS 006 4.17.1	Method of attaching rating plate		xxxxxxx	_____
<b>18</b>	NRS 006 4.18	<b>Marking and labelling</b>			
18.1	NRS 006 4.18.1.1	Method of attaching labels		xxxxxxx	_____
18.2	NRS 006 4.18.2.1	Method of fixing and removal of main circuit designation labels for engraving purposes		xxxxxxx	_____
18.3	NRS 006 4.18.4.4	Mimic indication system required?	Y/N	Yes	xxxxxxx
18.4	NRS 006 4.18.4.4	Description of mimic indication system		xxxxxxx	_____
<b>19</b>	NRS 006 419 & DSP 34-210 4.16	<b>Corrosion protection</b>			
19.1	DSP 34-210 4.16	Application with regard to corrosion protection i.e. inland or coastal		_____	_____
19.2	NRS 006 4.19.9	Type of material offered:			
		a) Ring main unit gas enclosure		xxxxxxx	_____
		b) Cable termination enclosures and frame		xxxxxxx	_____
		c) Operating mechanisms		xxxxxxx	_____
		e) Kiosk (where applicable)		xxxxxxx	_____
		f) Raising-base (where applicable)		xxxxxxx	_____
19.3	DSP 34-210 4.16.4.1	Corrosion protection detailed specification number (DSP 34-1658) offered for INLAND applications (Kiosk/base)	DS	DS-6 / DS-7 / DS-8	_____

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19.4	DSP 34-210 4.16.4.2	Corrosion protection detailed specification (DSP 34-1658) number offered for COASTAL applications (Kiosk/base)	DS	DS-11 / DS-12 / (DS-14 + DS- 16) / (DS-14 + DS-17) / DS-18	
<b>20</b>		<b>Testing</b>			
20.1	NRS 006 5.1.3	Origin of design		xxxxxxx	
20.2	NRS 006 5.1.3	Place of manufacture		xxxxxxx	
20.3	NRS 006 5.1.3	Number of units installed in South Africa		xxxxxxx	
20.4	NRS 006 5.2.3	Internal arc test details		xxxxxxx	
<b>21</b>		<b>Spares</b>			
21.1	NRS 006 6.1	List of recommended spares		xxxxxxx	
<b>22</b>	NRS 006 7.2	<b>Documentation</b>			
22.1	NRS 006 7.2	Drawing numbers submitted:		xxxxxxx	
22.2	NRS 006 7.2	General assembly drawing(s)		xxxxxxx	
22.3	NRS 006 7.2	Drawing(s) showing mimic indication system, tee-off operating procedure, other labels & signs		xxxxxxx	
22.4	NRS 006 7.2	Wiring diagram(s)		xxxxxxx	
22.5	NRS 006 7.2	Rating plate drawing		xxxxxxx	
22.6	NRS 006 7.2	Tabulated summary of completed type tests required?	Y/N	Yes	
22.7	NRS 006 7.2	Full set of type test reports required?	Y/N	Yes	
22.8	NRS 006 7.2	Proof of type test laboratory accreditation?	Y/N	Yes	
22.9	NRS 006 7.2	Copy of RMU factory routine test certificate?	Y/N	Yes	
22.1	NRS 006 7.2	Copy of CT factory routine test certificate?	Y/N	Yes	
22.11	NRS 006 7.2	Copies of the latest technical catalogue(s) including protection relay and/or electronic ammeter/multi-meter technical manual (if appl.)?	Y/N	Yes	

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22.12	NRS 006 7.2	Number of installation, operation and maintenance manuals to be provided with the tender		1	
-------	-------------	--	--	---	--

**SIGNATURES**

_____ Supplier	_____ Name (Print)	_____ Sign	_____ Date
_____ Factory	_____ Name (Print)	_____ Sign	_____ Date
_____ Eskom	_____ Name (Print)	_____ Sign	_____ Date

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