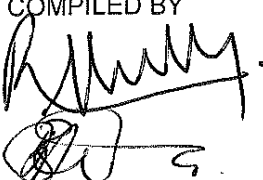





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Title: **Distribution Specification – Part 22:
MEDIUM-VOLTAGE MINIATURE
SUBSTATIONS FOR SYSTEMS WITH
NOMINAL VOLTAGES OF 11 KV AND
22 KV**

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Foreword

The requirements for medium-voltage mini-substations for systems with nominal voltages of 11 kV and 22 kV in this specification are based on NRS 004 / SANS 1029, *Mini-substations for rated A.C voltages up to and including 24 kV*.

Revision history

This revision cancels and replaces revision no 4 of document no. **DISSCAAM7**.

Date	Rev.	Clause	Remarks
08/2010	0	-	Compiled By: B Mwarehwa
		-	Document revised according to revision cycle and latest TESCO document template. The requirements of revision no. 4 of specification no DISSCAAM7, revision no.2 of specification DISSCABG7, revision no. 4 of specification DISSCAAM6, 04TI-01, 05T-014, 07TI-019, 09TI-01 and 09TI-04 have been incorporated into this specification.
		2	Normative references updated.
		3.1	Definition for ring main unit (RMU) added
		4.1.3.1.7	A padlock protection facility shall be provided for outdoor mini-sub as shown in Figure 3 Figure 3 added
		4.1.3.1.8	The padlock protection facility shall provide access to the padlock from both sides
		4.1.3.1.9	A Ø15 mm hole shall be provided in the front of the facility that corresponds with the position of the captive 10 mm Allen cap screw fitted in the door in accordance with NRS 006.
		4.1.3.2	Corrosion protection specification revised.
		4.1.3.3	Requirements for "high-risk" mini-substations added.
		4.3.1.1.5	An "integrated" voltage detection system (VDS) with fixed voltage indicators and test points in accordance with SANS 61243-5 shall be provided for each functional unit
		4.3.1.6	Remote control and monitoring of mini-sub (if applicable) a) If specified in schedule A, the mini-sub shall be supplied and fitted with a remote terminal unit (RTU) for remote monitoring and control of the RMU. b) The RTU shall comply with the requirements of DSP 34-2123. c) The RTU auxiliary supply shall be provided from the LV busbars of the mini-sub. d) The 230 V a.c. auxiliary supply for the RTU shall be fitted with the following:

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			i) a suitably rated HRC fuse; and ii) a neutral fuse link.
		4.3.2.3	Provision for holding down the outdoor mini-sub The outdoor mini-sub base shall have four Ø18 mm slotted mounting holes dimensioned and positioned as shown in figure 4 that are suitable for M16 holding-down set-screws. Figure 6 added
		4.3.3	The protection relays shall be configured, set and tested by the mini-sub manufacturer in accordance with the requirements given in Annex A. The protection relays and current transformers shall be installed, completely wired, tested and ready for commissioning prior to delivery to Eskom. Annex for protection settings added.
		4.4.2.3	Various changes made to LV metering and control panel specification for 1 MVA mini-sub.
		4.4.3	The LV main circuit breaker protection relay shall be configured and set by the mini-sub manufacturer in accordance with the requirements given in Annex B. The protection relay shall be installed, completely wired and ready for commissioning prior to delivery to Eskom Annex for 1000 kVA LV mains breaker protection settings added
		6.1.1.1	In addition to the mini-sub rating plate, the statement "MANUFACTURED TO ESKOM SPECIFICATION DSP 34-1621"
			Various changes made to heading and subheadings.
			Draft 0.1 added

Authorisation

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This specification shall apply throughout the Eskom Distribution Division.

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Introduction

This specification has been prepared on behalf of the Technical Steering Committee for Distribution (TESCOD). It has been approved by the committee for use by the Distribution Group as a requirement specification when purchasing mini-subs for medium-voltage systems with nominal voltages from 11 kV up to and including 22 kV.

Keywords

mini-sub, miniature substation, mini-substation, RMU, ring main unit, power distribution, MV, Medium Voltage, transformer

Bibliography

None

1 Scope

This specification covers the Distribution Division's minimum requirements for the selection, manufacture, testing and supply of outdoor type mini-subs. It is applicable to medium voltage pre-fabricated MV/LV substations for systems with a.c. rated nominal voltages from 11 kV up to and including 22 kV. The specification covers both Type A and Type B mini-subs up to and including a power rating of 1000 kVA and distinguishes between mini-subs for inland and coastal applications.

The requirements for mini-subs are based on NRS 004 / SANS 1029 Edition 3.

2 Normative references

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below. Information on currently valid national and international standards and specifications can be obtained from the Information Centre and Technology Standardization Department at Megawatt Park.

Parties using this document shall apply the most recent edition of the documents listed below

DSP 34-253, *Distribution Standard Part 15: Distribution specification for electrical terminal blocks.*

DSP 34-462, *Distribution Standard Part 15: Standard design for distribution protection schemes.*

DSP 34-1080 (DSP 0003), *Distribution Standard – Part 4: Specification for earth fault indicators used for MV cable networks.*

DSP 34-1658 (DISSCAAP9), *Distribution Standard – Part 4: Corrosion protection specification for distribution outdoor equipment manufactured from steel.*

DSP 34-2123, *Distribution Standard – Part 18: Specification for telecontrol requirements for ring main units.*

ESKASAAO4 (DST 32-333), *Distribution Standard Part 15: Standard for electronic protection and fault monitoring equipment for power systems.*

NRS 004 / SANS 1029, *Mini-substations for rated A.C voltages up to and including 24 kV.*

NRS 012 / 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.*

NRS 053: Edition 2, *Accessories for medium-voltage power cables (3,8/6,6 kV to 19/33 kV)..*

SANS 121 / ISO 1461, *Hot-dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods.*

SANS 1019, *Standard voltages, currents and insulation levels for electricity supply.*

SANS 1091, *National colour standard.*

SANS 60076-7, *Power transformers – Part 7: Loading guide for oil-immersed power transformers.*

SANS 60269-2:2007/IEC 60269-2:2006, *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) - Examples of standardized systems of fuses A to I.*

SANS 60529, *Degrees of protection provided by enclosures (IP Code).*

SANS 60815-1:2009, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles.*

SANS 60947-3:2009/IEC 60947-3:2008, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units.*

SANS 61243-5, *Live working – Voltage detectors – Part 5: Voltage detecting systems (VDS).*

SANS 61439-1, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules.*

2.1 Buyers Guide drawings

D-DT-0853 *11 kV air-insulated cable junction box detail (Type A mini-sub)*

D-DT-0859 *Type 'B' mini-substation plinth details*

D-DT-0860 *11 kV and 22 kV Type A mini-sub cable termination detail*

D-DT-0868 *Schematic and wiring diagram*

D-DT-1013 *Mini-sub meter plate details*

2.2 Buyers Guide Items

D-DT-3034 *LV circuit breakers*

D-DT-3088 *Distribution transformer LV neutral surge arrester*

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D-DT-3132	<i>Wire, meter sealing s/steel</i>
D-DT-3181	<i>LV fuses</i>
D-DT-3409	<i>Fuse holder, vertical 3P 440V</i>
D-DT-3196	<i>Ferrule, tinned Cu sealing 12mm LG</i>
D-DT-3202	<i>Danger sign (unauthorised entry prohibited)</i>
D-DT-6073	<i>Signs D & E (Treatment and Full First Aid Instructions)</i>
D-DT-8016	<i>Unscreened separable connectors (11kV)</i>
D-DT-8017	<i>Screened separable connectors (22kV)</i>
D-DT-8019	<i>Cable Clamp (black polypropylene)</i>
D-DT-8026	<i>LV flexible cables</i>
D-DT-8029	<i>Sealant strip for mini-sub/rmu</i>
D-DT-8050	<i>Mini-substation 11 kV, Type B</i>
D-DT-8051	<i>Mini-substation 22 kV, Type B</i>
D-DT-8052	<i>Mini-substation 11 kV, Type A</i>
D-DT-8053	<i>Mini-substation 22 kV, Type A</i>

3 Definitions and abbreviations

3.1 Definitions

The definitions given in NRS 004 / SANS 1029, IEC and the following shall apply:

Nominal voltage: The stated r.m.s. phase-to-phase voltage of the supply to which equipment is connected.

Rated voltage: The highest r.m.s. phase-to-phase voltage of the supply for which equipment is designed to operate continuously.

Ring main unit (RMU): A medium voltage metal-enclosed switchgear assembly that comprises a combination of two ring switch-disconnectors and a circuit-breaker tee-off function. These functions incorporate integral cable earthing switches and have facilities for cable testing.

Type A mini-sub: A mini-sub that is fitted with an off-load, dead-break isolating arrangement in the MV compartment, that consists of unscreened jumpers at 11 kV and extensible screened separable connectors at 22 kV.

Type B mini-sub: A mini-sub that is equipped with a ring main unit in the MV compartment.

3.2 Abbreviations

PECU: Photo-electric control unit

mini-sub : Miniature substation

4 Requirements

4.1 General requirements for all mini-sub

Mini-sub shall be manufactured in accordance with NRS 004 / SANS 1029 and the requirements of this specification. Where conflicting requirements with the relevant NRS or SANS specifications occur, this specification shall take precedence. Nothing in this specification shall lessen the obligations of the supplier. The supplier shall be fully responsible for the design and its satisfactory performance in service. Approval or acceptance by Eskom shall not relieve the supplier of the responsibility for the adequacy of the design.

This specification covers the requirements for both Type A and Type B mini-sub up to and including a maximum power rating of 1000 kVA. The specific requirements for Type A and Type B units are specified in sections 4.3, 4.4, 4.5 and 4.6.

The specification distinguishes between mini-sub for inland application and coastal application. The technical schedules of an enquiry document will be arranged to cater for both inland and coastal applications. It is assumed that except for corrosion protection, units will be exactly the same for the two different applications. If there are differences they shall be indicated in schedule B.

4.1.1 Standard operating conditions

- a) In addition to the requirements of NRS 004, the mini-sub units shall be suitable for operation under the following service conditions:
- b) pollution level: "very heavy" for coastal (corrosive) applications / "medium" for inland (low-corrosive) application;
- c) pollution conditions inside the mini-sub enclosure shall be considered to be in accordance with 'pollution degree 3' of SANS 61439-1.

4.1.2 Electrical requirements

4.1.2.1 Rated lightning impulse peak withstand level

4.1.2.1.1 The rated lightning impulse peak withstand level for all MV equipment shall be in accordance with "List 3" of table 1 given in NRS 012.

4.1.2.2 Transformer

4.1.2.2.1 The standard transformer power ratings for Type A and Type B mini-sub shall be:

- 1) 200 kVA (Type A only);
- 2) 315 kVA;
- 3) 500 kVA; and

4) 1000 kVA.

4.1.2.2.2 The MV nominal voltage shall be 11 kV or 22 kV, as specified in schedule A of the enquiry document.

4.1.2.2.3 The rated lightning impulse withstand voltage level for all MV equipment shall be in accordance with "List 3" in accordance with SANS 1019.

4.1.2.2.4 The transformer unit shall be sealed and have a welded cover. The unit shall have no drain valve or pressure release device / breather. An oil level indicator shall not be fitted.

4.1.2.3 Earthing

4.1.2.3.1 In the case of mini-sub of rating up to and including 500 kVA, a combined LV neutral-earth busbar (called the 'LV neutral-earth' bar) shall be provided. No separate LV earth bar shall be provided. See figure 1.

4.1.2.3.2 In the case of mini-sub of rating 1000 kVA, a separate LV earth bar and LV neutral busbar (called the 'LV earth' and 'LV neutral' bar respectively) shall be provided in the customer panel. See Figure 2.

4.1.2.3.3 The earthing configuration for the mini-sub shall make provision for a separate MV and LV earthing system. A 70 mm² copper connection between the LV neutral-earth (for mini-sub of rating up to and including 500 kVA) or LV earth bar (for mini-sub of rating 1000 kVA) and the MV earth bar shall be provided and installed in accordance with NRS 004.

4.1.2.3.4 A LV neutral surge arrester in accordance with D-DT-3088 shall be provided and positioned such that the 250 mm insulated jumper is connected to the LV neutral-earth (for mini-sub of rating up to and including 500 kVA) or LV earth bar (for mini-sub of rating 1000 kVA).

NOTE According to the Eskom earthing philosophy, if the MV and LV earth electrodes are to be separated on site, the electrical bridge between the mini-sub earth bar and the LV neutral-earth bar would then be removed as required, and the neutral surge-arrester would be made effective.

4.1.2.3.5 Two insulated electrolytic copper conductors of cross-sectional area of at least 70 mm² each shall be fitted to provide an electrical bridge between the cable gland plate support structure and the LV neutral-earth (for mini-sub of rating up to and including 500 kVA) or LV earth bar (for mini-sub of rating 1000 kVA) as shown in figure 2.

4.1.2.3.6 The neutral terminal of the transformer LV winding shall be connected to the LV neutral-earth or LV neutral bar.

4.1.2.4 LV ASSEMBLY

4.1.2.4.1 The LV ASSEMBLY shall be fitted with LV phase and neutral busbars as shown in figures 1 and 2.

4.1.2.4.2 The LV panel shall be constructed and designed for the use of either vertical fuse-bases or large frame MCCBs as specified in schedule A of the enquiry document.

4.1.2.4.3 In the case of Type A mini-sub of rating up to and including 500 kVA, the LV ASSEMBLY shall be designed to accommodate a minimum of five outgoing LV cable feeder bays.

4.1.2.4.4 In the case of Type B mini-sub of rating up to and including 500 kVA, the LV ASSEMBLY shall be designed to accommodate a minimum of six outgoing LV cable feeder bays.

4.1.2.4.5 In the case of mini-sub of rating 1000 kVA (both Type A and Type B), the LV customer panel shall be designed to accommodate a minimum of six outgoing LV cable feeder bays.

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4.1.2.4.6 If LV feeder MCCBs are called for at the time of tender, they shall be in accordance with the requirements of SANS 556-1 (see D-DT-3034). LV flexible cable used to connect the MCCBs from the LV busbars shall be in accordance with the requirements of D-DT-8026. MCCBs shall be fitted with individual inter-phase flash barriers. The spacing between the outer live terminals (metal) of adjacent MCCBs shall not be less than 25 mm. This is to ensure that the risk of a flashover occurring between adjacent MCCBs (i.e. between the blue and red phases) is minimised during a short circuit interruption event. The lug barrel and any exposed conductor of the single core flexible jumpers shall be adequately insulated.

4.1.2.4.7 If LV feeder vertical fuse holders are called for at the time of tender, they shall be in accordance with the requirements of SANS 60947-3 (see D-DT-3409) and suitable for type 'gG-gL' NH 2 (DIN) fuses for fuse system A in accordance with the requirements of SANS 60269-2 (see D-DT-3181).

4.1.2.4.8 The minimum diameter of the LV insulators used shall be 40 mm. The insulators shall have a cylindrical shape. The minimum diameter of the flat circular surface where the insulator makes contact with the frame and busbar shall be 25 mm. The insulators shall be at least 40 mm long (not including the projecting studs).

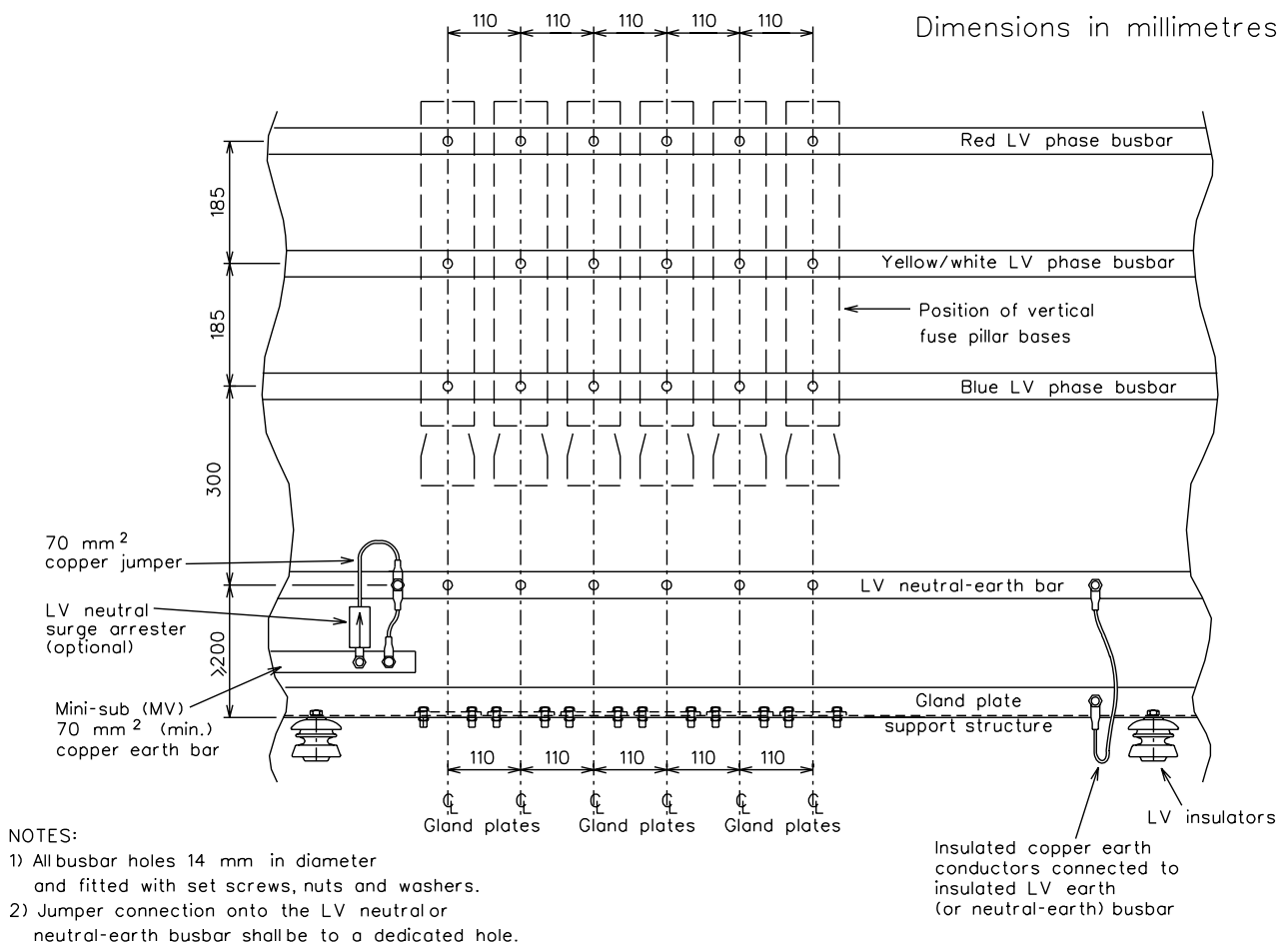


Figure 1 – LV panel showing busbar and gland plate arrangement (mini-sub of rating up to and including 500 kVA)

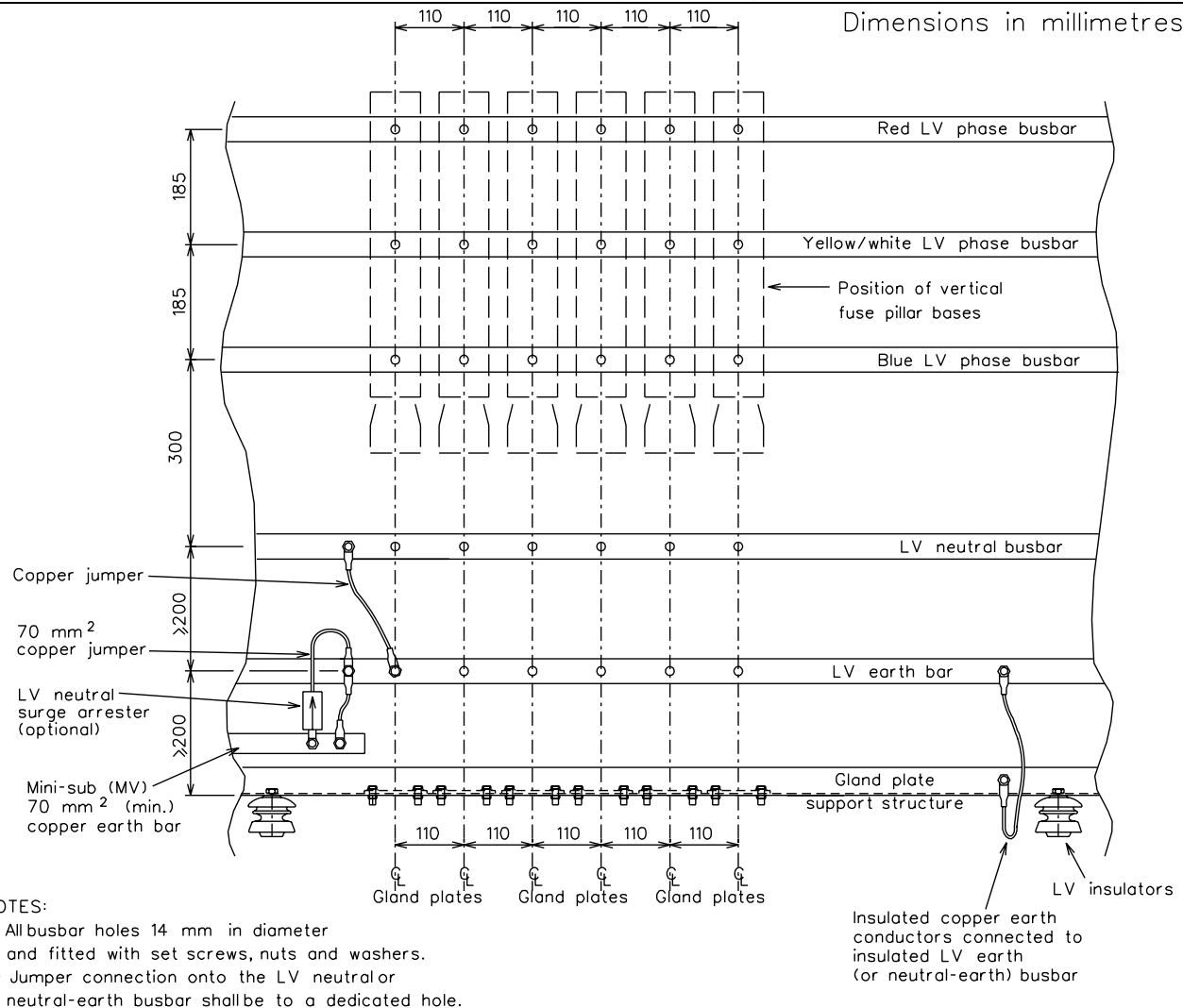


Figure 2 – LV customer panel showing busbar and gland plate arrangement (mini-sub's of rating 1000 kVA)

4.1.2.5 LV busbars

4.1.2.5.1 The rated normal current of the busbars of the LV ASSEMBLY shall be equal to 1,2 times the rated secondary current of the transformer and are given in table 1.

Table 1 – LV busbar current ratings

1	2
Transformer rating	LV busbar current rating
kVA	A
200	330
315	520
500	825
1000	1650

4.1.2.5.2 Stainless steel M12 set screws, nuts, washers and spring washers shall be provided for each of the 14 mm holes drilled on the LV phase, neutral and earth busbars.

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4.1.2.6 LV gland plate arrangement

A LV gland plate arrangement with outgoing feeder cable gland plates shall be provided.

4.1.2.7 The following LV auxiliary equipment shall be provided:**4.1.2.7.1** LV ammeters shall be provided for all three phases.**4.1.2.7.2** One voltmeter shall be provided with a selector switch.**4.1.2.7.3** A three pin socket outlet and associated protection equipment in accordance with NRS 004;

4.1.2.7.4 A removable blank plate shall be provided in the LV compartment for the installation of a street-lighting Photo Electric Control Unit (PECU) as and when required. The plate dimensions shall be approximately 300 mm x 300 mm and it shall be located as near as possible to or adjacent to the photocell compartment.

4.1.2.7.5 All auxiliary wiring shall be numbered using an approved type of numbering ferrule at both ends of the wire. All wiring and ferruling shall be in accordance with D-DT-0868.

4.1.2.7.6 An earth-fault indicator (EFI) shall be provided with the mini-sub i.e. Type A and Type B mini-subs. The EFI control unit shall be positioned on the right-hand side of the MV compartment and the current sensor shall be fitted to the left-side ring cable. The EFI shall comply with the requirements of DSP 34-1080 (DSP 0003). The remote indicating unit shall be mounted on the outside of the mini-sub enclosure in such a manner that it can be clearly viewed from the front of the mini-sub (street-front). The type (make / product) of EFI shall be stated in schedule B and the design details shall be submitted to Eskom for approval at the tender stage.

4.1.2.8 General electrical requirements

- a) The mini-sub wiring shall be in accordance with D-DT-0868.
- b) All LV auxiliary fuses shall comply with the requirements of fuse system G in accordance with SANS 60269-2 and shall be of size E1.
- c) The current rating of the connections between the transformer LV bushings and the LV busbars (including those to and from the main LV interrupting device) shall be in accordance with table 1.
- d) The LV panel shall be so designed as to ensure thermal interaction does not unduly affect the performance of any of the components.
- e) All terminal blocks shall be in accordance with DSP 34-253 and shall have spring loaded screw terminals.

4.1.3 Construction requirements**4.1.3.1 Design**

4.1.3.1.1 In the case of Type A mini-substations of rating up to and including 500 kVA, the general arrangement shall be in accordance with the Type A layout specified in NRS 004.

4.1.3.1.2 In the case of Type A mini-substations of rating 1000 kVA, the general arrangement shall be in accordance with the Type B layout specified in NRS 004.

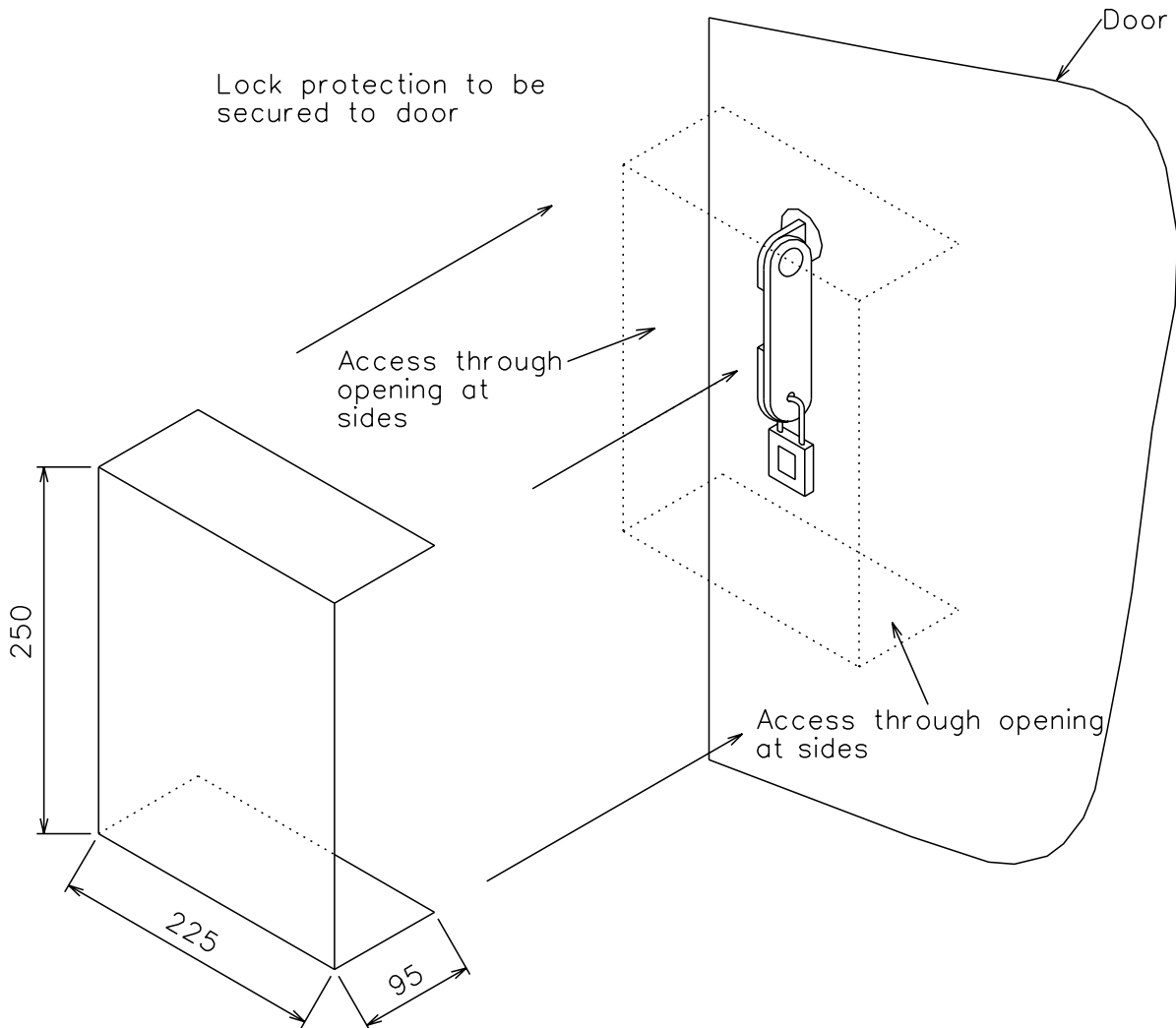
4.1.3.1.3 In the case of Type B mini-substations, the general arrangement shall be in accordance with the Type B layout specified in NRS 004.

4.1.3.1.4 The base channel and sills of the doors shall be constructed with removable sections adjacent to the MV compartment door(s) to allow the MV cables to be moved into position. These sections shall be lap bolted with the nuts on the inside of the base channel and housing. The cable entry position shall correspond to that of the pre-cast plinth shown in drawing D-DT-0859.

4.1.3.1.5 The three-point locking mechanism on each compartment door shall have an additional, captive, 10 mm Allen cap screw.

4.1.3.1.6 All door handles shall be classified as "heavy-duty" and shall be manufactured from stainless steel.

4.1.3.1.7 A padlock protection facility shall be provided for outdoor mini-sub as shown in Figure 3.

**Figure 3 – Lock protection facility**

4.1.3.1.8 The padlock protection facility shall provide access to the padlock from both sides.

4.1.3.1.9 A Ø15 mm hole shall be provided in the front of the facility that corresponds with the position of the captive 10 mm Allen cap screw fitted in the door in accordance with NRS 006.

4.1.3.2 Materials and corrosion protection

4.1.3.2.1 It will be specified in schedule A whether the mini-sub is required for inland or coastal environments.

4.1.3.2.2 For mini-subs classified as “inland”, the class of pollution characterising the site severity shall be “b” (i.e. “light”) in accordance with SANS 60815-1:2009.

4.1.3.2.3 For mini-subs 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.

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4.1.3.2.4 For inland applications, the mini-sub enclosure (lock protection facility, roof, compartments and doors), LV ASSEMBLY steelwork and transformer tank shall be mild steel.

4.1.3.2.5 For coastal applications, the mini-sub enclosure (lock protection facility, roof, compartments and doors), LV ASSEMBLY steelwork and transformer tank shall be 3CR12, stainless steel or zinc metal sprayed mild steel.

4.1.3.2.6 The transformer-cooling radiator shall be mild steel.

4.1.3.2.7 The mini-sub base shall be hot-dipped galvanized mild steel and shall be finished with a black coating.

4.1.3.2.8 For coastal applications, the gland plate support structure and gland plates shall be stainless steel.

4.1.3.2.9 Where a mini-sub is specified as suitable for "inland" applications, the detailed corrosion protection specification shall correspond to a "corrosivity category" of C2 (i.e. "low") or higher in accordance with DSP 34-1658. The detailed specification (DS) options in accordance with DSP 34-1658 are specified in schedule A. The detailed specification (DS) number offered in accordance with DSP 34-1658 shall be stated in schedule B.

4.1.3.2.10 Where a mini-sub is specified as suitable for "coastal" applications, the detailed corrosion protection specification shall correspond to a "corrosivity category" of C5 (i.e. "very heavy") in accordance with DSP 34-1658. The detailed specification (DS) options in accordance with DSP 34-1658 are specified in schedule A. The detailed specification (DS) number offered in accordance with DSP 34-1658 shall be stated in schedule B.

4.1.3.2.11 A 5 mm thick cork packing shall be installed between the mini-sub end compartments and the transformer tank section, between the base and the end compartments, and between the base and the transformer tank section.

4.1.3.2.12 The final colour of the mini-sub enclosure (roof, compartments and doors) and transformer shall be Avocado C12 in accordance with SANS 1091.

4.1.3.3 Additional requirements for "high-risk" mini-sub

NOTE "High-risk" mini-sub refers to mini-sub intended for use in areas where the probability of vandalism is high – leading to potential safety risks as well as non-technical losses. The following additional requirements are required only for mini-sub classified as "high-risk" – as requested by the Eskom Distribution regions.

4.1.3.3.1 All mini-sub doors (MV and LV) shall be recessed such that they are flush with the sides of the mini-sub enclosure.

4.1.3.3.2 The mini-sub enclosure, doors and lock protection facilities shall be manufactured using 6 mm thick steel.

4.1.3.3.3 The doors shall be re-enforced using additional steel strength members diagonally welded from corner to corner on the inside surface of the door.

4.1.3.3.4 Heavy duty hinges shall be fitted for the doors.

4.1.3.3.5 A four-point locking mechanism (i.e. at the top-centre, bottom-centre, left-centre and right-centre) using bars operated by a heavy duty door handle shall be fitted.

4.2 Specific requirements for Type A mini-sub

A Type A mini-sub shall comprise the following:

- a) a medium-voltage compartment that is fitted with an off-load, dead-break isolating arrangement in the MV compartment, that consists of unscreened jumpers at 11 kV (see Figure 4) and extensible screened separable connectors at 22 kV (see figure 5);
- b) a transformer compartment housing the transformer; and
- c) a low-voltage compartment housing the LV ASSEMBLY for LV equipment.

4.2.1 Electrical requirements**4.2.1.1 Transformer MV bushings**

4.2.1.1.1 For 11 kV mini-sub, the transformer bushing-centre spacing shall be ≥ 135 mm and the distance between the outer bushing-centres and the mini-sub metal enclosure shall be ≥ 90 mm. The actual distances provided shall be indicated in schedule B of the enquiry document.

4.2.1.1.2 For 22 kV mini-sub, the transformer bushing-centre spacing shall be ≥ 180 mm and the distance between the outer bushing-centres and the mini-sub metal enclosure shall be ≥ 80 mm. The actual distances provided shall be indicated in schedule B of the enquiry document. The transformer bushings shall be horizontally positioned.

4.2.1.2 LV main circuit breaker and transformer overload protection facility

4.2.1.2.1 A main LV circuit breaker shall be provided in the LV compartment between the transformer and the LV busbars. The type (i.e. make / product) of circuit breaker offered shall be stated in schedule B. The circuit breaker shall be fitted with a shunt-trip facility that is wired to a temperature-sensing element fitted to the transformer.

4.2.1.2.2 The transformer unit shall be fitted with a top-oil thermoelectric temperature-sensing element. This shall trip the LV circuit breaker through a shunt-trip facility when the transformer top-oil temperature exceeds 105 °C. The relay used to provide the shunt-trip facility shall be housed in an enclosure and sealed with a stainless steel meter sealing wire (see D-DT-3132) and a 12 mm tinned copper ferrule (see D-DT-3196).

4.2.1.2.3 The standard ratings for the main LV circuit breaker shall be as indicated in table 2.

Table 2 – Standard LV circuit breaker ratings

1	2
Transformer rating kVA	Circuit Breaker rating A
200	300
315	450
500	800
1000	1600

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4.2.2 Construction requirements**4.2.2.1 11 kV Type A mini-sub:**

4.2.2.1.1 The MV compartment shall be supplied and fitted with an 11 kV air-insulated cable junction box as shown in D-DT-0853. The arrangement and size of the ring and transformer jumpers shall be in accordance with drawing D-DT-0853. The ring jumper copper bar shall be insulated (covered) with a suitable busbar insulation tube or tape. The jumpers shall be unscreened, single core, flame-retardant PVC insulated, copper conductors in accordance with the requirements of SANS 1507. The transformer jumpers shall be terminated on to the transformer bushings using unscreened separable connectors (USC). The unscreened separable connector (see D-DT-8016) to be used shall be in accordance with the requirements of NRS 053 and the type (i.e. make / product) offered shall be stated in schedule B.

NOTES:

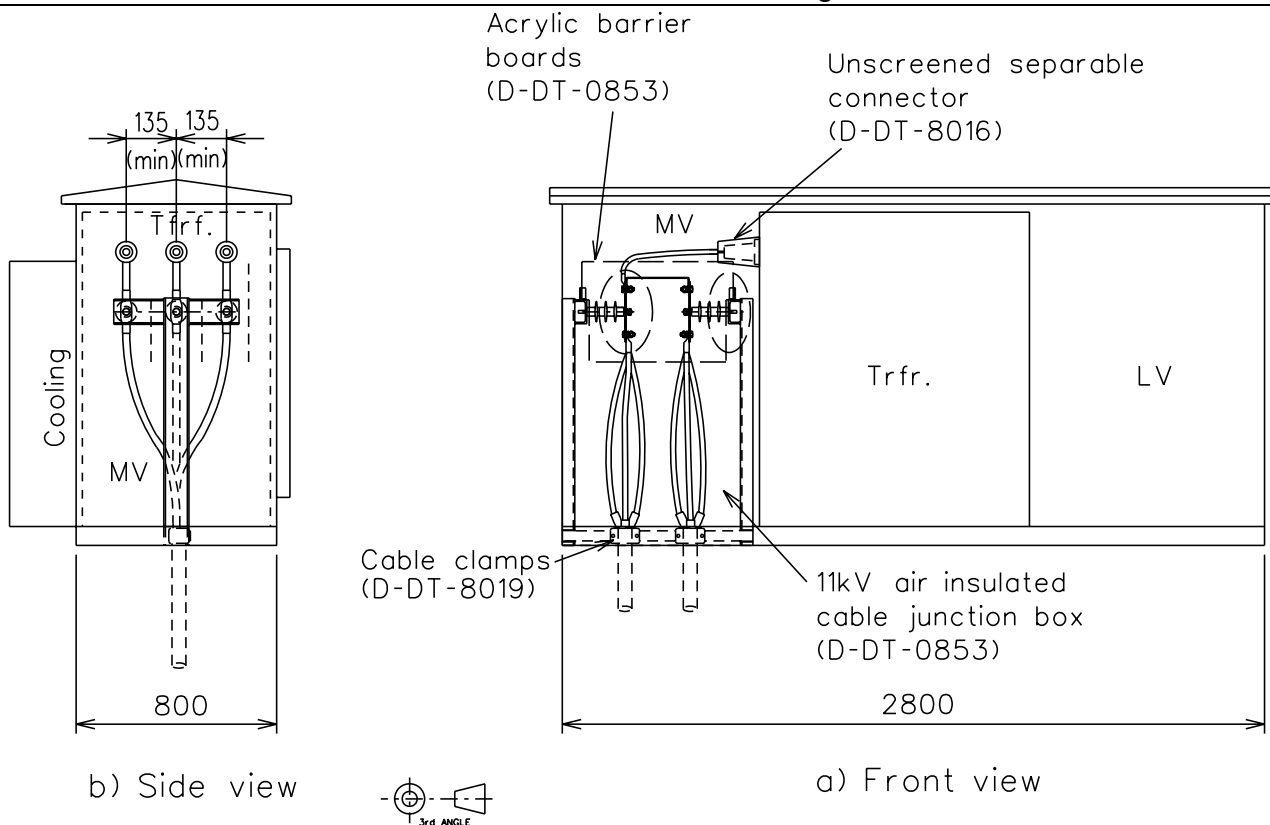
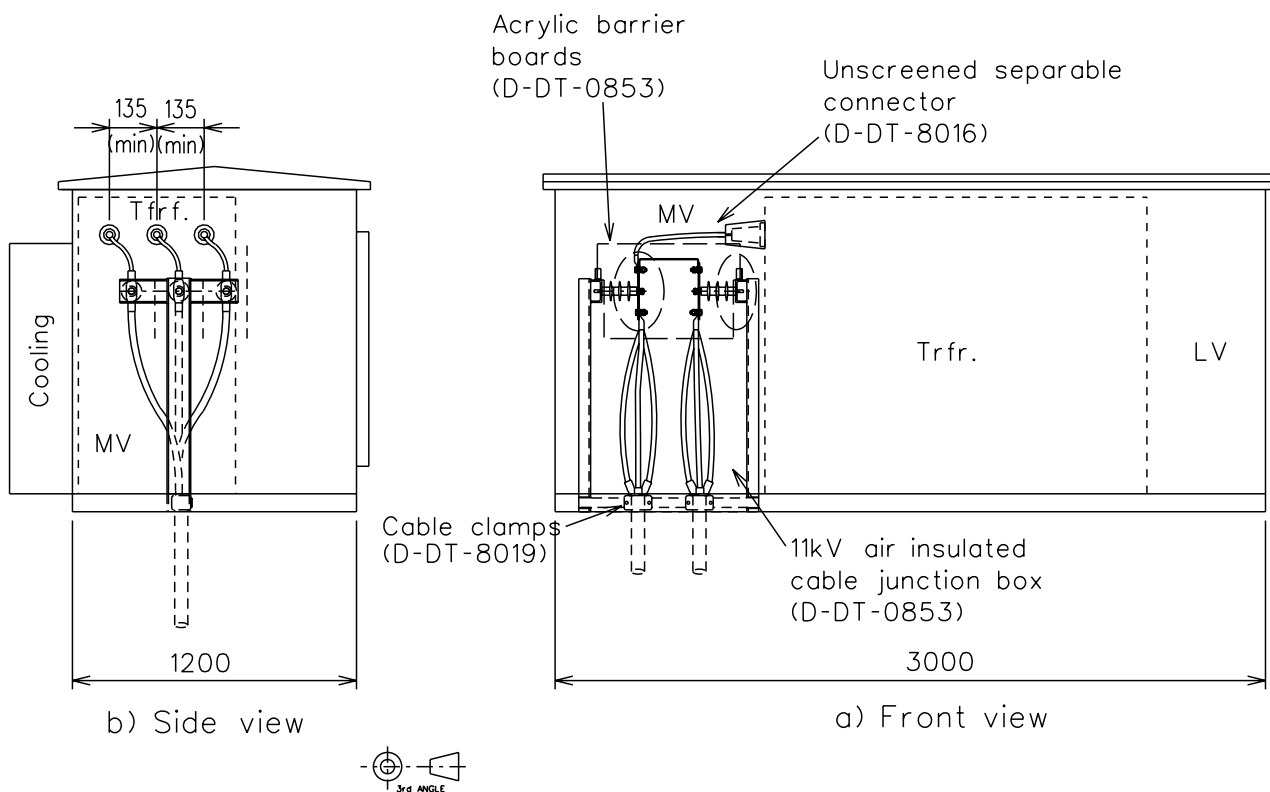
In the case where lugs having M12 fixing holes are used, a stainless steel or brass M16 to M12 reducing stem, washer and spring washer is required to attach each jumper lug flush onto the face of the bushing.

In the case where lugs having M16 fixing holes are used, a stainless steel or brass M16 set screw with nut, washer and spring washer is required used to attach each jumper lug flush onto the face of the bushing.

4.2.2.1.2 Provision shall be made for the support (clamping) of two incoming cables in the MV compartment. Two cable clamps (see D-DT-8019) shall be provided with the mini-sub in accordance with NRS 012. The distance from the cable support point (clamp) to the point of connection shall be 800 mm (as shown in D-DT-0853). The cable support clamps shall range taking for cables with outer diameters of 50 – 75 mm. The clamps shall be securely fitted.

4.2.2.1.3 The two cable clamps shall be positioned such that the respective cables are supported directly below the centre-phase post insulators of the off-load, dead-break isolating arrangement (11 kV air-insulated cable junction box).

4.2.2.1.4 The MV compartment shall only have a front door only (no end or rear doors are required).

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FOR SYSTEMS WITH NOMINAL VOLTAGES OF
11 KV AND 22 KV**Unique Identifier: **34-1621**Type: **DSP**Revision: **0**Page: **17 of 41****Figure 4a – 11 kV Type A mini-sub of rating up to and including 500 kVA****Figure 4b – 11 kV Type A mini-sub of rating 1000 kVA****ESKOM COPYRIGHT PROTECTED**

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11 KV AND 22 KV**Unique Identifier: **34-1621**Type: **DSP**Revision: **0**Page: **18 of 41****4.2.2.2 22 kV Type A mini-sub:**

4.2.2.2.1 The general arrangement of 22 kV mini-sub shall be in accordance with the Type A layout specified in NRS 004.

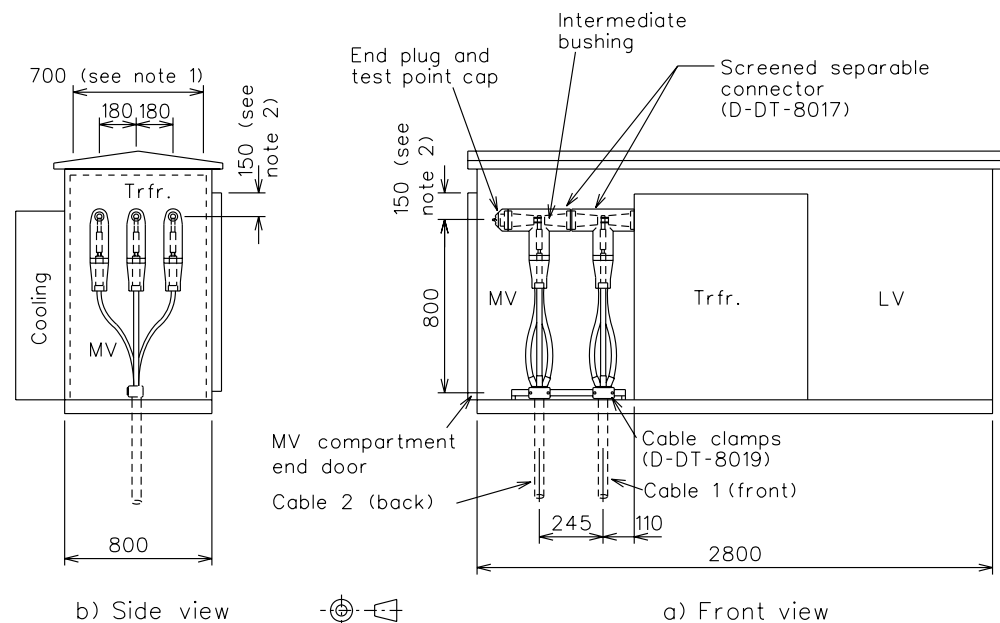
4.2.2.2.2 Provision shall be made for the support (clamping) of two incoming cables in the MV compartment. Two cable clamps (see D-DT-8019) shall be provided with the mini-sub in accordance with NRS 012. The distance from the cable support point (clamp) to the transformer bushing centres shall be at least 800 mm. The cable support clamps shall be range taking for cables with outer diameters of 75 – 100 mm. The clamps shall be securely fitted.

4.2.2.2.3 The transformer bushings shall be horizontally positioned in a straight line.

4.2.2.2.4 The MV compartment shall have a front and end door (no rear door is required).

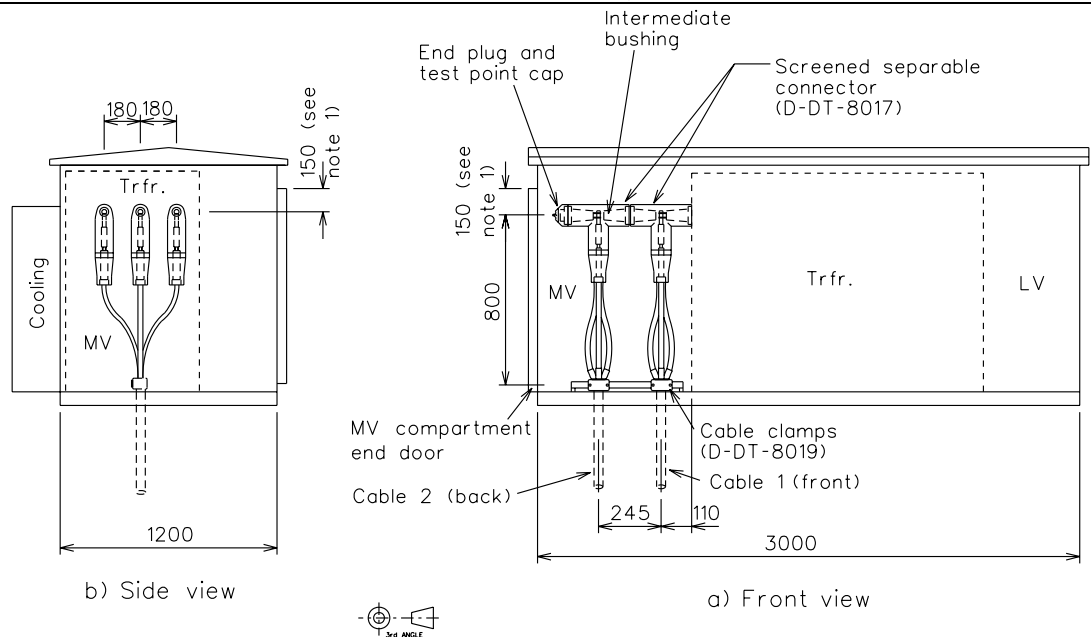
4.2.2.2.5 The MV compartment shall have a minimum internal width of 700 mm.

4.2.2.2.6 The height of the MV compartment door opening shall be at least 150 mm above the horizontal bushing centre-line.

**NOTE:**

1. Minimum internal width of MV compartment.
2. Minimum height of MV compartment door opening relative to connector/bushing centre - line to allow required access to connectors.

Figure 5a – 22 kV Type A mini-sub of rating up to and including 500 kVA

**NOTE:**

1. Minimum height of MV compartment door opening relative to connector/bushing centre - line to allow required access to connectors.

Figure 5b – 22 kV Type A mini-sub of rating 1000 kVA**4.3 Specific requirements for Type B mini-sub**

A Type B mini-sub shall comprise the following:

- a) a medium-voltage compartment that is fitted with a non-extensible '2R-1B' ring main unit;

NOTE A '2R-1B' ring main unit consists of 2 ring switch-disconnectors ('R' functions) and a circuit breaker tee-off ('B' function) which is used to supply the mini-sub transformer. This is equivalent to a '2SD-1CB' ring main unit configuration in accordance with NRS 006.

- b) a transformer compartment housing the transformer; and
- c) a low-voltage compartment housing the LV ASSEMBLY for LV equipment.

4.3.1 Electrical requirements**4.3.1.1 MV ring main unit (RMU)**

4.3.1.1.1 The ring main unit shall comply with the requirements of NRS 006 and the following:

4.3.1.1.2 Integral cable test facilities that do not require access to the cable termination enclosure (i.e. are independent of the cable termination enclosure) shall be provided for all 'R' functions (switch-disconnectors). 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. The cable test facility need not be capable of being padlocked.

4.3.1.1.3 Remote tripping (hand-held push-button remote control unit)

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- a) If provision is required for remote tripping and closing via a hand-held push-button remote control unit (i.e. trip and close pendant control), it will be specified in schedule A.

NOTE Ring main units that are internal arc classified in accordance with NRS 006 do not require this facility.

- b) The plug-in connector for the hand-held remote control unit shall be a circular bayonet type coupler. Details of connector shall be specified in schedule A. The male coupler shall be provided and positioned on the front of the ring main unit.
- c) Details of the provisions offered for remote tripping and closing via a hand-held push-button remote control unit shall be given in schedule B (e.g. stored energy mechanism with latching functions / motorised mechanism, additional trip / close coils, portable battery tripping unit (BTU) power supply specification, BTU charging requirements).

4.3.1.1.4 Ring main unit cable termination enclosures

- a) The ring main cable termination enclosures shall be suitable for the termination of 3-core cables of conductor cross-sectional area up to 185 mm².
- b) For 11 kV ring main units, the minimum spacing between bushing centres and between the outer bushing centres and earthed metal enclosure shall be 105 mm and 55 mm respectively. Where screened separable connectors are used for the tee-off circuit-breaker, the minimum spacing between bushing centres and between the outer bushing centres and earthed metal enclosure of the tee-off circuit-breaker shall be 90 mm and 50 mm respectively.

NOTE These dimensions are based on the fact that for the ring main cable terminations at 11 kV, unscreened separable connectors are currently used in Eskom Distribution. Should screened separable connectors be used in future at 11 kV, the dimensions specified for 22 kV ring main units are applicable.

- c) For 22 kV ring main units, the minimum spacing between bushing centres and between the outer bushing centres and earthed metal enclosure shall be 90 mm and 50 mm respectively.

NOTE These dimensions are based on the fact that at 22 kV, screened separable connectors are used in Eskom Distribution. The dimensions are based on the physical dimensions of screened separable connectors.

- d) The range of the cable support clamp (in accordance with NRS 012 and D-DT-8019) fitted in each cable termination enclosure shall be
- i. in the case of XLPE-insulated cables and 22 kV paper-insulated cables, suitable for an outer cable diameter of 75 – 100 mm; and
 - ii. in the case of 11 kV paper-insulated cables, suitable for an outer cable diameter of 50 - 75 mm.

4.3.1.1.5 An “integrated” voltage detection system (VDS) with fixed voltage indicators and test points in accordance with SANS 61243-5 shall be provided for each functional units.

4.3.1.1.6 Circuit breaker protection relay

- a) The protection tripping of the circuit breaker shall be through a self-powered protection relay.
- b) The protection relay shall be in accordance with DST 32-333 (ESKASAAO4).
- c) The protection CT type and class shall be stated in schedule B.
- d) The protection relay shall provide an over-current function with an HRC fuse characteristic or an extremely inverse (IDMTL) protection element in accordance with DSP 34-462.

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- e) The setting ranges (pick-up settings, time multipliers, delay times) and resolutions of the over-current, earth fault and high-set instantaneous protection elements shall be in accordance with DSP 34-462.
 - f) The setting ranges, resolutions and protection element curves provided shall be stated in schedule B.
 - g) The protection relay and CT combination shall operate according to specification up to the rated short-circuit breaking current of the circuit breaker.
 - h) The relay and terminal blocks of the protection relay shall be easily accessible from the front of the ring main unit (e.g. for testing purposes).
 - i) The relay shall be positioned and installed in such a way that it is possible to exchange it with minimal effort and tools.
 - j) The protection relay, current sensors or current transformers shall be installed and wired complete for service.
 - k) The wiring from the protection relay to the current sensors or current transformers shall be in accordance with DST 32-333 (ESKASAO4) unless otherwise approved by Eskom.
 - l) Once the relay has been set, it shall be sealed with a stainless steel meter sealing wire (see D-DT-3132) and a 12 mm tinned copper ferrule (see D-DT-3196) to indicate evidence of tampering.

4.3.1.1.7 Gas density monitoring device

- a) The device provided for monitoring the gas pressure on each tank shall respond to gas density (i.e. shall indicate pressure compensated for temperature).
- b) If it is specified in schedule A that a RTU is to be supplied for remote monitoring and control, a density monitoring device (which may be integrated into the temperature compensated pressure gauge as a dual function device) shall be provided with contacts which shall operate in two stages as follows:
 - i) on reaching the non-urgent alarm / warning level (i.e. where gas pressure is low but live switching is still possible);
 - ii) on reaching the critical level (i.e. where live switching can no longer be performed and switchgear is to be taken out of service).
- c) Pressure gauges shall be numerically marked and calibrated in Pascal's (kPa or MPa). Only gauge pressure shall be indicated and rated pressure shall be no more than 80% of the full-scale reading. Gauge markings shall be clearly labelled 'Absolute' for gauges measuring absolute pressure or 'Atmospheric' for gauges measuring pressure exclusive of the atmosphere.
- d) The type of gauge utilised shall be designed such to prevent any corrosion of moving parts and contacts inside the gauge.
- e) When provided, the density monitoring device shall also give a positive and reliable response on reaching the operating values (no contact bounce).

4.3.1.2 MV Interconnections between ring main unit and transformer

- a) The screened cables shall be terminated onto the transformer bushings using screened separable connectors (SSCs).

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- b) The screened separable connector (see D-DT-8017) to be used shall be in accordance with the requirements of NRS 053 and the type (i.e. make / product) offered shall be stated in schedule B.
- c) The design details of the interconnection arrangement shall be submitted to Eskom for approval at the tender stage.

4.3.1.3 Transformer MV bushings

The transformer bushing-centre spacing shall be ≥ 90 mm and the distance between the outer bushing-centres and the mini-sub metal enclosure shall be ≥ 50 mm. The actual distances provided shall be indicated in schedule B of the enquiry document.

NOTE The transformer bushings centres are based on the fact that screened separable connectors (SSCs) are used for the termination of the MV interconnections onto the transformer bushings.

4.3.1.4 Transformer overload protection

The transformer unit shall be fitted with a top-oil thermoelectric temperature-sensing element. This shall trip the ring main unit tee-off circuit-breaker through a 240 V shunt-trip facility when the transformer top-oil temperature exceeds 105 °C. The relay used to provide the shunt-trip facility shall be housed in an enclosure and sealed with a stainless steel meter sealing wire (see D-DT-3132) and a 12 mm tinned copper ferrule (see D-DT-3196).

4.3.1.5 LV main switch-disconnector or LV main breaker

- a) For mini-sub of rating up and including 500 kVA, a main LV switch-disconnector shall be provided in the LV end compartment in order to isolate the LV busbars from the transformer. The type (i.e. make / product) of switch-disconnector offered shall be stated in schedule B.
- b) For mini-sub of rating 1000 kVA, a main LV circuit breaker shall be provided in the LV end compartment between the transformer and the LV busbars. The type (i.e. make / product) of circuit breaker offered shall be stated in schedule B.
- c) The standard ratings for the main LV switch-disconnector or circuit breaker shall be as indicated in table 3.

Table 3 – Standard LV switch-disconnector / circuit breaker ratings

1	2	3
Transformer rating kVA	LV main switch- disconnector/ circuit breaker rating A	Switch Type
315	450	Switch-disconnector
500	800	Switch-disconnector
1000	1600	Circuit breaker

4.3.1.6 Remote control and monitoring of mini-sub (if applicable)

- a) If specified in schedule A, the mini-sub shall be supplied and fitted with a remote terminal unit (RTU) for remote monitoring and control of the RMU.
- b) The RTU shall comply with the requirements of DSP 34-2123.
- c) The RTU auxiliary supply shall be provided from the LV busbars of the mini-sub.

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d) The 230 V a.c. auxiliary supply for the RTU shall be fitted with the following:

- i) a suitably rated HRC fuse; and
- ii) a neutral fuse link.

4.3.2 Construction requirements (11kV and 22kV Type B mini-sub)

4.3.2.1 For mini-sub designed for the fitting of LV circuit breakers, the LV ASSEMBLY (i.e. busbars, circuit breaker mounting plate, barricades, gland plate support structure etc.) shall be at least 1000 mm in length to allow for the fitting of 6 x LV circuit breakers that are up to 150 mm wide and allowing for a clearance of 20 mm between circuit breakers.

4.3.2.2 The LV busbars and gland plate support structure shall be pre-drilled for the full 1000 mm length (at 110 mm centres) to allow for up to 9 feeder bay positions in accordance with NRS 004.

NOTE Although the gland plate support structure will provide for up to 9 gland plate positions, only 6 gland plates need to be provided.

4.3.2.3 Provision for holding down the outdoor mini-sub

The outdoor mini-sub base shall have four Ø18 mm slotted mounting holes dimensioned and positioned as shown in figure 4 that are suitable for M16 holding-down set-screws.

NOTE Slotted holes are required to in order to make provision for manufacturing tolerances in the concrete plinth holding down positions.

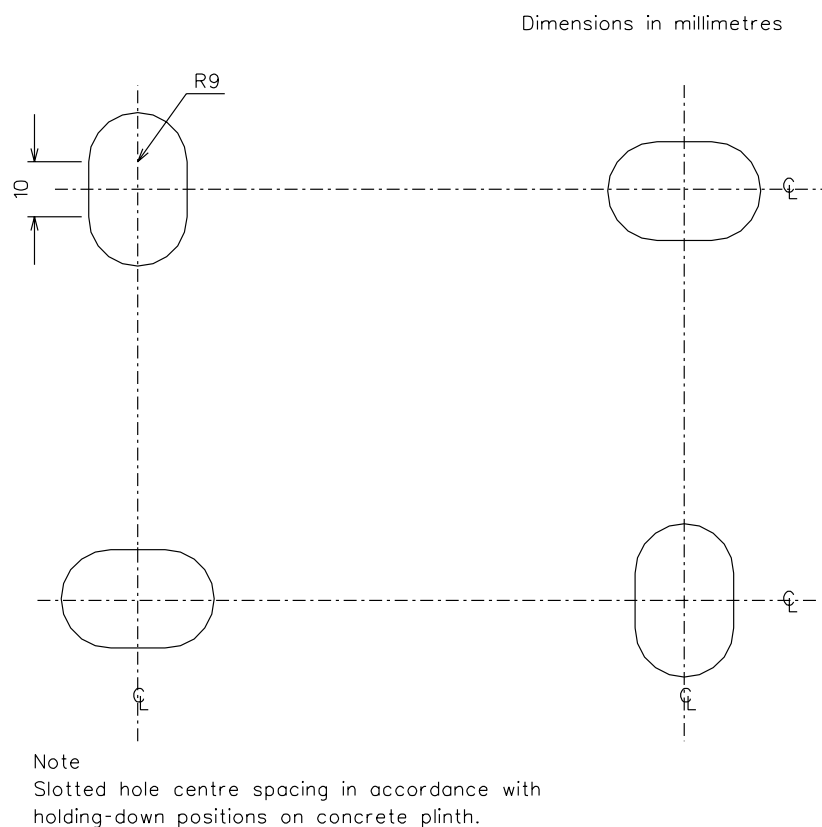


Figure 6 – Outdoor kiosk slotted mounting hole details

4.3.3 Ring main unit protection relay settings and testing

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The protection relays shall be configured, set and tested by the mini-sub manufacturer in accordance with the requirements given in Annex A. The protection relays and current transformers shall be installed, completely wired, tested and ready for commissioning prior to delivery to Eskom.

NOTE No relay settings or commissioning tests will be required to be carried out by Eskom prior to energizing the mini-sub.

4.4 Additional general requirements for 1000 kVA mini-sub

4.4.1 Design and construction

4.4.1.1 The 1 MVA Type B mini-sub shall be suitable for the standard Type B mini-sub plinth and the 1 MVA Type A mini-sub shall be suitable for the special 1 MVA Type A mini-sub plinth in accordance with D-DT-0859.

4.4.1.2 The LV compartment shall be divided into three sub-compartments (see figures 5 and 6) as follows:

- 1) Eskom panel (mini-sub end compartment);
- 2) Metering and control panel (right-hand side LV compartment door); and
- 3) Customer panel (left-hand side LV compartment door).

4.4.1.3 Access to each LV sub-compartment shall be by way of an individual door that is lockable. Barricades shall be used to prevent access between sub-compartments.

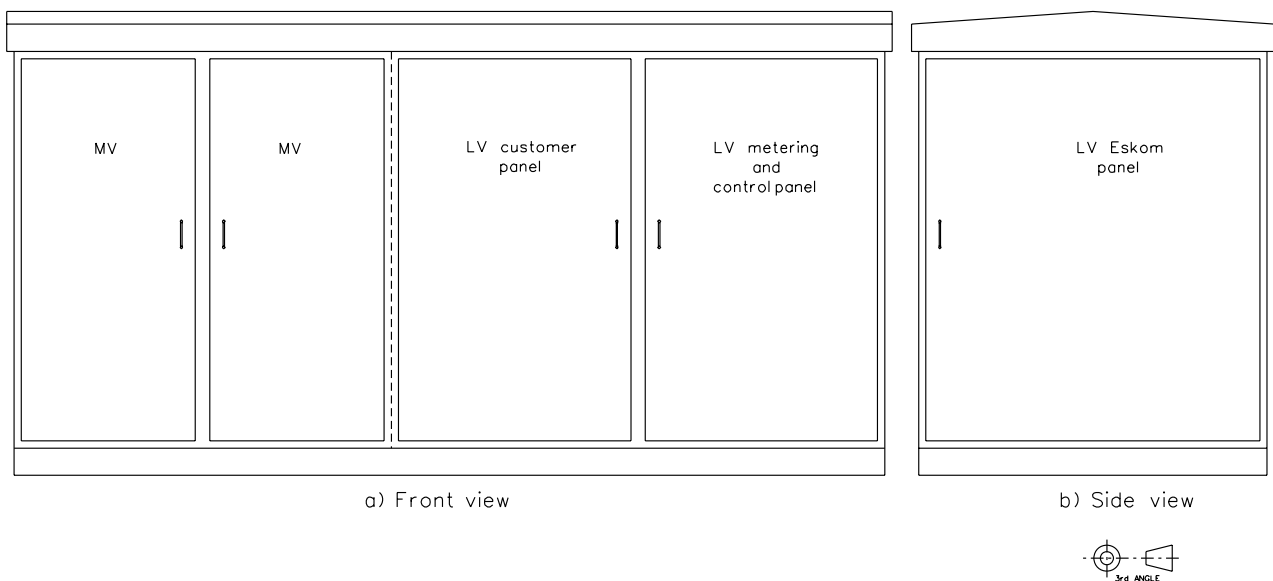


Figure 7 – 1000 kVA Mini-sub housing design

4.4.2 LV Compartment**4.4.2.1 Auxiliary wiring**

All auxiliary wiring in the LV compartment shall be numbered using an approved type of numbering ferrule at both ends of the wire. All wiring and ferruling shall be in accordance with D-DT-0868.

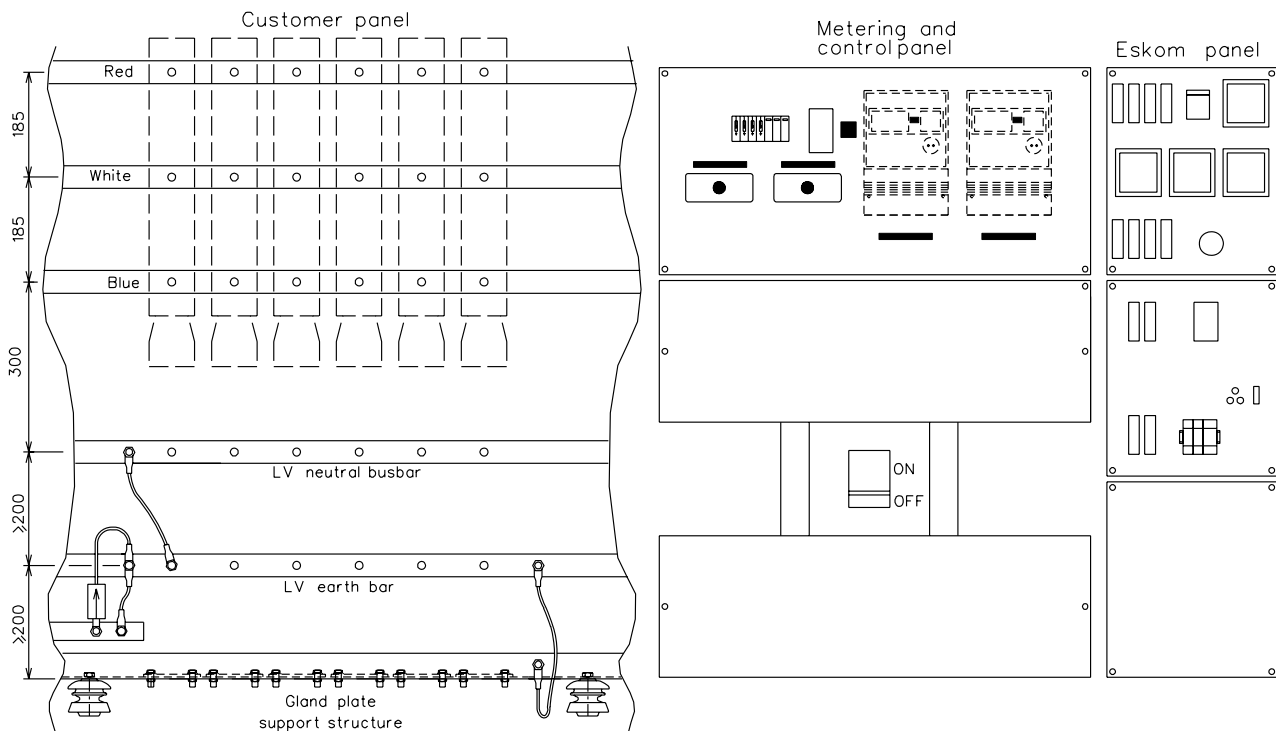


Figure 8 – LV ASSEMBLY design – modify metering panel based on D-DT-1013 revision

4.4.2.2 Eskom panel (see figure 8)

The following equipment shall be fitted in the Eskom panel:

4.4.2.2.1 the single-phase 16 A three pin socket-outlet and protection equipment. The socket outlet supply shall be taken from the LV busbars upstream from the metering current transformers;

4.4.2.2.2 the LV ammeters ;

4.4.2.2.3 the LV voltmeter and selector switch;

4.4.2.2.4 the earth fault indicator (EFI) LV supply ;

4.4.2.2.5 the transformer overload protection facility as specified in 4.2.1.2.2 and 4.3.1.4.

4.4.2.3 Metering and control panel (see figure 8 and D-DT-1013)

- a) A 1600 A main LV circuit-breaker shall be provided at the bottom of the panel in order to isolate the LV busbars from the transformer. The connections onto the circuit-breaker on the line and load side shall be barricaded using removable metallic barriers.

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- b) A hinged meter plate shall be provided at the top of the panel (see D-DT-1013 sheet 1). The meter plate shall be fitted with the following:

- 1) CT and VT test blocks;
- 2) surge arresters;
- 3) HRC fuses; and
- 4) terminals.

Note Meter(s) and modem will be supplied by Eskom.

- c) All wiring indicated on D-DT-1013 sheet 3 shall be provided and shall have sufficient slack to allow the meter plate to be hinged outward to at least 90° relative to the mini-sub LV compartment. The wiring that is to be terminated onto the meters shall be taken through the 32 mm diameter holes in the meter plate and shall have at least 300 mm of excess wire when measured from the 32 mm hole to the wire end with the meter plate hinged outward.
- d) 1600/5 A class 0,5 current transformers (CTs) shall be fitted to the phase busbars and shall only be accessible once the meter plate has been hinged outward.
- e) Adequate space shall be provided for the metering technicians to insert a primary current test probe over the LV busbars in order to confirm the CT ratios on site.
- f) All the current instrument transformers shall be tested for accuracy according to SANS 60044-1 by a SANAS approved laboratory before installation in the kiosk. The test results shall be shipped with the mini-sub in a suitable cover for protection against damage. A test label (sticker) shall be on each instrument transformer, certifying that the instrument transformer has been tested.

4.4.2.3.1 Metering voltage secondary circuit

- a) The voltage circuit shall take its supply from the busbars.
- b) The VT wires shall be connected onto fuse-holders situated on DIN rail A at the back of the panel.
- c) From the fuse-holders the wiring shall go to the bottom connections of a PK2 4-way testblock. The removal of the male adapter of the test block shall ensure the open-circuiting of the voltage circuit. The terminals that protrude into the panel shall be suitably insulated from the steel edges.
- d) Single-pole surge arresters shall be installed between the PK2 4-way testblock and the terminals on the voltage circuit from all three phases – to ground and from neutral – to ground, to protect the meter from lightning.
- e) From the PK2 4-way testblock the wiring shall go to the terminals and from there to the meter.

4.4.2.3.2 Metering current secondary circuit

- a) The current supply wiring shall come from the CTs onto the bottom terminals of the PK2 4-way test block and then to the meter.
- b) On removal of the male adapter, short-circuit parts shall ensure the short-circuiting of the current transformer terminals and earth. The terminals that protrude into the panel shall be suitably insulated from the steel edges.

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4.4.2.3.3 Metering circuit surge arrester specification

- a) The surge arrester shall be the metal oxide, DIN rail mount type with LED indication suitable for Zone 1 protection. The arrester shall comply with SANS 61643-1 and bear the SABS mark.
- b) The technical specification for the surge arresters shall be:
- | | |
|---------------------------|---|
| I_{\max} (8/20 μ s) | 40 kA or 65 kA (4/20 μ s) |
| Response time | < 25 μ s |
| Max. operating voltage | 275 V a.c. (phase-to-neutral)
360 V d.c. |
| Frequency | 50 Hz |
| Internal fuse | Yes |
| Open-circuit | Open-circuit on expiry of the device |
| Indication | Clear change-of-state (functional or non-functional) indication |

4.4.2.3.4 Metering circuit HRC fuse specification

The LV HRC fuses shall comply with the requirements of SANS 60269-2 and the fuse holders shall be suitable for DIN rail mounting.

4.4.2.3.5 Meter and metering modem

The meter(s) and modem shall be supplied by Eskom.

4.4.2.3.6 Metering circuit wiring

- a) The mini-sub metering circuit shall be wired in accordance with the drawing D-DT-1013.
- b) No individual wire numbering is required.
- c) Not more than two conductors shall be connected to a terminal.
- d) No bare wiring or bare part of lugs shall be exposed at termination points on the meter, the circuit-breakers, the relay base, fuse holders and the terminals.
- e) Only JST type YNT or Cembre type HP4 crimping tools shall be used for the crimping of lugs.

4.4.2.4 Customer panel (see figure 8)

- a) The LV busbars, earth bars and a gland plate arrangement shall be fitted in the LV customer panel as shown in figure 2.
- b) The panel shall be designed and constructed for the use of either vertical fuse-bases or large frame MCCBs as specified in schedule A of the enquiry document.

4.4.3 LV main circuit breaker protection relay settings

The LV main circuit breaker protection relay shall be configured and set by the mini-sub manufacturer in accordance with the requirements given in Annex B. The protection relay shall be installed, completely wired and ready for commissioning prior to delivery to Eskom.

NOTE No relay settings or commissioning tests will be required to be carried out by Eskom prior to energizing the mini-sub.

4.5 Transformer losses and capitalization

- a) The following capitalization formula will be used in the evaluation of any tender, to establish the net present value of the total cost of the transformer:

$$\text{Total cost} = A + C_i P_i + C_c P_c$$

where

- A is the cost of purchasing and installing the transformer (capital cost), R;
 - P_i is the no-load (iron) losses, kW;
 - P_c is the load (copper) losses, kW;
 - C_i is the capitalized cost of no-load (iron) loss, R/kW; and
 - C_c is the capitalized cost of load (copper) loss, R/kW.
- b) The economic life of a transformer is assumed to be 25 years.
- c) The values of parameters C_i and C_c are given in the technical schedules. These parameters will be revised with each enquiry.
- d) Regardless of the use of the capitalization formula, the losses shall not be greater than those specified in SANS 780.
- e) Load and no-load losses, the percentage impedance and the X/R ratio of the transformer shall be stated in schedule B of the enquiry document. The load losses and the percentage impedance shall be stated at 75 °C, in accordance with SANS 780.

5 Tests

5.1 General

5.1.1 The supplier shall cover the cost of type testing and may be requested to provide Eskom with the details of when and where these tests will be conducted. Eskom reserves the right to witness any or all of these tests. The supplier or manufacturer shall demonstrate an ability to provide means to enable Eskom to witness such tests.

5.1.2 Type tests are intended to establish design characteristics. They are normally only made once and repeated only when the design, components or the material of the unit are changed. The results of the type tests are recorded as evidence of compliance with design requirements.

5.1.3 Suppliers shall submit all the required type test reports. If the units offered have been tested for compliance with an internationally accepted standard, Eskom may accept those test reports in place of the tests covered by this specification. These type test reports and alternative test standards shall be submitted with the tender, for Eskom's consideration.

5.1.4 The qualifying type tests need not be performed if they were successfully completed on a previous Eskom tender, provided that the design and material have not been changed or modified in any way. The type test certificates of completed successful type tests previously submitted shall be submitted with the current tender. Any change in the components shall be indicated at the time of tender.

5.1.5 The transfer of test certificates between manufacturers will not be allowed.

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5.1.6 The supplier shall ensure that type tests are valid.

5.1.7 If there is reasonable doubt as to the validity of test certificates submitted, for example, by virtue of modifications made to the mini-sub, Eskom may direct that further tests are carried out at a accredited test facility in the presence of a representative of the purchaser, on a sample unit of the mini-sub in question. These tests shall be at the expense of the supplier.

5.1.8 Routine tests are intended to prove conformance of units to specific requirements and are made on every unit. These tests shall be non-destructive.

5.2 Qualifying tests

The tests specified in NRS 004 shall be performed to establish the design characteristics of the mini-sub and assure compliance with the requirements specified in this specification. The tests shall be conducted on new units in the same state as they are normally supplied.

5.2.1 Transformer temperature rise test

In order to account higher average ambient temperatures in South Africa as well as for solar radiation on the mini-sub enclosure, the mini-sub transformer temperature rise limits shall be as follows:

- Top oil- temperature rise 55 K
- Average winding temperature rise 60 K

In addition, the transformer rated current (and thus load-losses) shall be increased by 5 % when carrying out the temperature rise test.

NOTE The additional 5 % current is specified so that the full mini-sub transformer rating plate power can be delivered when calculated using the full load secondary voltage of 400 V.

6 Marking, labeling, packaging and transport

6.1 Marking and labelling

6.1.1 Mini-sub rating plate information

6.1.1.1 In addition to the mini-sub rating plate, the statement "MANUFACTURED TO ESKOM SPECIFICATION DSP 34-1621";

6.1.2 Signs

- a) 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 MV and LV compartment doors. For Type B mini-sub, the sign shall be attached to the inside of the door that opens first.
- b) External aluminium or 'Chromadek' electrical symbolic MV warning signs (warning-flash, see D-DT-3202, sheet 5 of 6) and LV warning signs (warning-flash, see D-DT-3202 sheet 4 of 6) shall be permanently attached to all the doors. If pop-rivets are used to attach the signs to the mini-sub doors, only aircraft or blind pop-rivets will be acceptable. Normal pop-rivets are not acceptable.

6.1.3 Labels

- a) The primary voltage, secondary voltage and 'kVA' rating shall be stencilled on the mini-sub housing.
- b) The corrosion protection category (i.e. "INLAND" or "COASTAL"), total mass (in kg) and Eskom SAP (stock) number shall be neatly and uniformly stencilled on the back of the mini-sub, e.g. "INLAND 3500 kg SAP XXXXXXXX".
- c) Main circuit designation labels shall be blank (orange-black-orange) sandwich-board or equivalent.
 - 1) For Type A mini-sub, the labels shall be located in fixed positions adjacent to the cable support clamps provided. A label need not be provided for the tee-off to the transformer.
 - 2) For Type B mini-sub, the labels shall be located on fixed positions at the front of the ring main unit adjacent to each cable box. A label shall be included for the tee-off to the transformer.
- d) For Type B mini-sub, the ring main unit push buttons provided for switching devices that incorporate stored energy operation shall be labelled accordingly (i.e. "TRIP" for the trip/open button and "CLOSE" for the close button if applicable). The labels shall be in text with black letters at least 10 mm high, on an orange background.
- e) For Type B mini-sub, a short operating procedure shall be provided for the ring main unit tee-off indicating the steps required to a) isolate and earth the tee-off and b) close the tee-off. The operating procedure shall be in text with black letters at least 5 mm high, on an orange background. A drawing depicting the wording of the operating procedure label shall be provided and referenced in schedule B.

6.2 Documentation**6.2.1 Technical schedules**

The full Technical Schedule B and the Deviation Schedule shall be completed and, together with Technical Schedule A, shall be submitted to Eskom for approval at the time of tendering.

6.2.2 Drawings

6.2.2.1 In addition to the drawing requirements specified in NRS 004, the following information shall be shown on the drawings when submitted to Eskom for approval at the time of tendering:

- a) The general assembly drawing shall make reference, where applicable to the following Eskom Distribution Drawings: D-DT-8019, D-DT-3088, D-DT-3202, and D-DT-6073.
- b) Any revision to drawings and diagrams shall clearly indicate the revision number and date.

6.2.2.2 In the case of Type B mini-sub, an additional drawing depicting the wording of the operating procedure label for the ring main unit tee-off (see 6.1.3 e) shall be supplied by the supplier for approval.

6.2.3 Test certificates

All required type test certificates/reports shall be submitted to Eskom, in English, by the manufacturer at the time of tendering and/or pre-qualification.

7 Spares**7.1 Accessories**

7.1.1 For Type B mini-sub, if a hand-held push-button remote control unit with a portable power supply is to be supplied with the ring main unit, it shall be specified in schedule A. Details of the hand-held remote control unit (type of connector, length of umbilical cord, etc.) shall be specified in schedule A. The female coupler of the plug-in connector shall be connected to the end of the umbilical cord. Details of the portable power supply offered shall be given in schedule B.

7.1.2 A suitable quantity (length) of UV-stable sealant strip (e.g. wax-impregnated polyurethane foam strip) shall be supplied with every mini-sub. The sealant is intended for application between the mini-sub steel base and the concrete plinth and shall be in accordance with D-DT-8029. The total quantity (length) may be supplied in several smaller strips with a minimum length of 1,5 m each. The material shall be suitably packaged and stored inside the mini-sub MV compartment.

Annex A – Protection settings for Type B mini-sub RMU circuit breaker relays (Normative)

A.1 VIP 35 relay supplied in Type B mini-sub fitted with Schneider Merlin Gerin RM6 'IDI' type ring main units

A.1.1 The rotating selector switch settings for the VIP 35 relay shall be configured in accordance with the following tables:

Table A.1.1 – Rated primary current of transformer (I_s)

	11 kV			22 kV		
Transformer size [kVA]	315 kVA	500 kVA	1000 kVA	315 kVA	500 kVA	1000 kVA
Rated Primary Current [A]	16.5 A	26.2 A	52.5 A	8.3 A	13.1 A	26.2 A
Primary Current Setting (I_s) [A]	28 A	46 A	80 A	15 A	22 A	46 A

Table A.1.2a – Earth fault current protection parameters

Earth fault current (' $I_o>$ ')	10 A
----------------------------------	------

Table A.1.2b – Earth fault current protection parameters

Tripping time delay for EF (' $t_o>$ ')	0.2 sec
---	---------

A.1.2 The 'inrush current delay' setting on the VIP 35 relay shall be set to 'on'

NOTES:

- 1) The 'CRc 200/500/1 51007005F0' sensors (toroid current transformers incorporated in the transformer tee-off bushings of the RMU) are to be fitted for the VIP 35 relay – with the current range (I_s) adjustable from 8A - 80A (200/1 ratio, S1-S2 wiring).
- 2) The primary current rating I_s has been selected to allow for cyclic loading of the transformer in accordance with the SANS 60076-7 loading guideline applicable to SABS 780 transformers (i.e. allowing 1.5 x I rated for cyclic loading).
- 3) The 'inrush current delay' setting on the VIP 35 relay shall be set to 'on' to prevent spurious earth fault tripping due to a false earth fault detection resulting from the DC component of transformer inrush currents while energizing the transformer.

A.1.3 The relay shall be tested in accordance with the following minimum requirements and a routine test certificate for the relay shall be produced and included with each mini-sub and stored in the documentation holder provided:

- a) A primary current injection test shall be carried out to confirm the correct operation of the relay (i.e. the current sensors, the wiring and the relay settings). Primary current injection shall be carried out at 2 x I_s and the tripping time shall be recorded. According to the protection characteristic, this should result in a protection operating time of between 12 and 22 seconds – with a typical tripping time of 17 seconds.
- b) A routine check shall be included on the test certificate that confirms that the relay rotary selector switch settings have been made in accordance with this specification.

Annex A

(continued)

A.2 SEG WIC1-2 relay supplied in Type B mini-substations fitted with ABB CCV Type ring main units**A.2.1** The DIP switches for the WIC1-2 relay shall be configured in accordance with the following tables:**Table A.2.1 – Rated primary current of transformer (Is):**

	11 kV			22 kV		
Transformer size [kVA]	315 kVA	500 kVA	1000 kVA	315 kVA	500 kVA	1000 kVA
Rated Primary Current [A]	16.5 A	26.2 A	52.5 A	8.3 A	13.1 A	26.2 A
Primary Current Setting (Is) [A]	20 A	30 A	56 A	16 A	16 A	32 A
DIP 1-1	OFF	ON	ON	OFF	OFF	OFF
DIP 1-2	ON	ON	ON	OFF	OFF	OFF
DIP 1-3	OFF	ON	ON	OFF	OFF	OFF
DIP 1-4	OFF	OFF	ON	OFF	OFF	ON

A.2.2 The WIC1-W2 CTs are to be fitted for the ABB WIC1-2 relay**Table A.2.2 – Protection characteristic curve**

IDMT Characteristic Curve	HV-fuse
DIP 1-5	OFF
DIP 1-6	ON
DIP 1-7	ON
DIP 1-8	OFF

Table A.2.3a – Phase overcurrent protection parameters

Phase current threshold ('I>')	1
DIP 2-1	OFF
DIP 2-2	ON
DIP 2-3	OFF
DIP 2-4	OFF

Table A.2.3b – Phase overcurrent protection parameters

	11 kV			22 kV		
Transformer size [kVA]	315 kVA	500 kVA	1000 kVA	315 kVA	500 kVA	1000 kVA
Time factor 'a' ('t1>')	Factor 'a' = 5	Factor 'a' = 6	Factor 'a' = 8	Factor 'a' = 0.8	Factor 'a' = 5	Factor 'a' = 5
DIP 2-5	OFF	ON	ON	OFF	OFF	OFF
DIP 2-6	ON	ON	ON	OFF	OFF	OFF
DIP 2-7	OFF	ON	ON	OFF	OFF	OFF
DIP 2-8	OFF	OFF	ON	OFF	OFF	ON

Annex A

(continued)

Table A.2.4a – Phase short-circuit protection parameters

Phase current threshold ('I>>')	EXIT (OFF)
DIP 3-1	ON
DIP 3-2	ON
DIP 3-3	ON
DIP 3-4	ON

Table A.2.4b – Phase short-circuit protection parameters

Tripping time for DMT ('t1>>')	't1>>'=3.0 (Not in use)
DIP 3-5	ON
DIP 3-6	ON
DIP 3-7	ON
DIP 3-8	ON

Table A.2.5a – Earth fault protection parameters

Earth fault current ('IE')	0.4 (x Is)
DIP 4-1	OFF
DIP 4-2	ON
DIP 4-3	OFF
DIP 4-4	OFF

Table A.2.5b – Earth fault protection parameters

Tripping time for EF ('tIE')	'tIE'=0.6
DIP 4-5	ON
DIP 4-6	ON
DIP 4-7	OFF
DIP 4-8	OFF

NOTES:

- 1) The WIC1-W2 CTs are to be fitted for the ABB WIC1-2 relay.
- 2) The primary current rating I_s has been selected to allow for cyclic loading of the transformer in accordance with the SANS 60076-7 loading guideline applicable to SABS 780 transformers (i.e. allowing $1.5 \times I$ rated for cyclic loading).
- 3) The earth fault current protection parameters have been selected to prevent spurious earth fault tripping due to a false earth fault detection resulting from the DC component of transformer inrush currents while energizing the transformer.

A.2.3 The relay shall be tested in accordance with the following minimum requirements and a routine test certificate for the relay shall be produced and included with each mini-sub and stored in the documentation holder provided:

- a) A primary current injection test shall be carried out to confirm the correct operation of the relay (i.e. the CTs, the wiring and the relay settings). Primary current injection shall be carried out at $4 \times I_s$ and the tripping time shall be recorded. According to the HV-fuse characteristic this should result in a protection operating time in accordance with the table provided below. A tolerance of $\pm 10\%$ is considered to be acceptable.

**MEDIUM-VOLTAGE MINIATURE SUBSTATIONS
FOR SYSTEMS WITH NOMINAL VOLTAGES OF
11 KV AND 22 KV**Unique Identifier: **34-1621**Type: **DSP**Revision: **0**Page: **35 of 41****Annex A**

(continued)

	11 kV			22 kV		
Transformer size [kVA]	315 kVA	500 kVA	1000 kVA	315 kVA	500 kVA	1000 kVA
Primary Current Setting (I_s) [A]	20 A	30 A	56 A	16 A	16 A	32 A
Injected primary current ($I = 4 \times I_s$)	80 A	120 A	224 A	64 A	64 A	128 A
Relay tripping time (s)	78 s	95 s	127 s	12 s	81 s	80 s

- b) A routine check shall be included on the test certificate that confirms that the relay DIP switch settings have been made in accordance with this specification.

**Annex B – Protection settings for 1000 kVA mini-sub LV main circuit
breakers**

(Normative)

**B.1 Schneider Merlin Gerin NS1600N, ABB T7S1600 and ABB S7S1600 LV main
circuit-breakers used on 1 MVA mini-sub**

Type B mini-sub having the VIP 35 relay (supplied with the Merlin Gerin RM6 “IDI” type RMU) shall only be fitted with Merlin Gerin NS1600N LV main circuit-breaker.

NOTES

- 1) It is not possible to provide complete protection co-ordination between the VIP 35 RMU relay and the ABB LV main circuit-breaker options.
- 2) The VIP 35 relay is set to provide the maximum allowable over-load current (i.e. 1,8 x rated transformer current) in accordance with SANS 60076-7. It is not recommended that the VIP 35 relay current settings be increased to allow any over-load currents greater than this.

Type B mini-sub having the WIC 1-2 relay (supplied with the ABB Safering CCV type RMU) shall be fitted with the Merlin Gerin NS1600N, ABB T7S1600 or the ABB S7S1600 LV main circuit-breaker.

B.1.1 Merlin Gerin NS1600N settings

The “Micrologic 2.0” control unit supplied in the Merlin Gerin NS1600N shall be configured in accordance with settings specified in table A.1.

Table B.1 – Micrologic 2.0 protection settings for 1 MVA mini-sub

Protection function	Type A mini-sub	Type B mini-sub
“ I_r ” Long time current setting	1 (i.e. 1600 A nominal current setting)	1 (i.e. 1600 A nominal current setting)
“ t_r ” Long time delay setting	24 s	1 s
“ I_{sd} ” Instantaneous pickup current setting	8 (i.e. 8 x 1600 A = 12,8 kA).	8 (i.e. 8 x 1600 A = 12,8 kA)

B.1.2 ABB T7S1600 settings

The PR231/P electronic trip unit supplied in T7S1600 shall be configured in accordance with settings specified in table A.2.

Table B.2 – PR231/P protection settings for 1 MVA mini-sub

Protection function	Type A mini-sub	Type B mini-sub
“ I_1 ” Function “L” trip threshold current.	1 (i.e. 1600 A nominal current setting)	1 (i.e. 1600 A nominal current setting)
“ t_1 ” Function “L” trip curve	12 s	3 s
“ I_3 ” Function “I” Instantaneous trip threshold	8 (i.e. 8 x 1600 A = 12,8 kA).	8 (i.e. 8 x 1600 A = 12,8 kA)

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Annex b

(continued)

B.1.3 ABB S7S1600 settings

The PR211/P electronic trip unit supplied in the S7S1600 shall be configured in accordance with settings specified in table A.3.

Table B.3 – PR211/P protection settings for 1 MVA mini-sub

Protection function	Type A mini-sub	Type B mini-sub
“ I_1 ” Function “L” trip threshold current.	1 (i.e. 1600 A nominal current setting)	1 (i.e. 1600 A nominal current setting)
“ t_1 ” Function “L” trip curve	Curve D or 18 s	Curve B or 6 s
“ I_3 ” Function “I” Instantaneous trip threshold	8 (i.e. $8 \times 1600 \text{ A} = 12,8 \text{ kA}$).	8 (i.e. $8 \times 1600 \text{ A} = 12,8 \text{ kA}$)

Annex C - Impact assessment (Normative)

Impact assessment form to be completed for all documents.

1 Guidelines

- All comments must be completed.
- 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: Revised according to TESCO revision cycle. DISSCAAM7 Rev 4, DISSCAAM6 Rev 4 and DISSCAGB7 Rev 2 and all relevant mini-sub related technical bulletins have been combined into one specification DSP 34-1621 following the publication of NRS 004/SANS 1029:2010.

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: None changed.

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

Comment: No new stock added.

2.4 When will new stock be available?

Comment: N/A

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: N/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: The document has been revised to align with the requirements of the latest NRS 004 / SANS 1029. Note that the option of the switch-fuse combination RMU T-off for Type B mini-sub has been removed.

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

Comment:

Annex C
(continued)

3 Implementation timeframe

3.1 Time period for implementation of requirements.

Comment: Immediately

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

Comment: N/A

4 Buyers Guide and Power Office

4.1 Does the Buyers Guide or Buyers List need updating?

Comment: No

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-0853 and D-DT-0860

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: No changes required to PO packages.

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 major technical changes were made and the existing LAP will be acceptable until the next revision cycle.

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

Comment: Issued as per TESCO revision cycle. DISSCAAM7, DISSCAAM6 and DISSCAGB7 and all relevant technical bulletins have been combined into one specification following the publication of NRS 004:2010.

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

Comment: N/A.

Annex C

(continued)

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: N/A

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

Comment: N/A

6 Training or communication

6.1 Is training required?

Comment: (If NO then 6.2 – 6.6 will be N/A) NO – No new equipment has been introduced.

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

Comment: N/A

6.3 State designations of personnel that will require training.

Comment: N/A

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

Comment: N/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: N/A

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Annex C

(continued)

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

Comment: No

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

Comment: Groupwise

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: No new equipment has been introduced

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?

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:

.....
.....
.....

Impact assessment completed by:

Name: Brighton Mwarehwa_____

Designation: Senior Engineer_____

Enquiry No.: Tenderer's name:

Item no.: Date:

Technical Schedules A and B and Deviation schedule (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 *DSP 34-1621* and provide the tenderers with the relevant schedules A and B.

Schedule A gives the Distribution Group'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.

Enquiry No.: Tenderer's name:

Item no.: Date:

Technical schedules A and B**11 kV or 22 kV Ring main unit (for Type B mini-sub)****Schedule A: Purchaser's specific requirements****Schedule B: Guarantees and technical particulars of equipment offered**

1	2	3		4	5
Item	Subclause	Description		Schedule A	Schedule B
1		Ratings			
		Nominal voltage	kV _{rms}	_____	_____
1.1	NRS 006 4.2.1	Rated power-frequency voltage	kV _{rms}	_____	_____
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 34-1621 4.1.2.1.1 & NRS 006 4.2.3	Rated lightning impulse withstand voltage	kV _{peak}	_____	_____
1.6	NRS 006 4.2.3	Rated short-duration power frequency withstand voltage [50Hz: 1 min]	kV _{rms}	_____	_____
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 disconnecter	A	630	_____
1.9	NRS 006 4.5.1.4	Rated current of switch-fuse combination (if applicable)	A	_____	_____
1.10	NRS 006 4.6.1.3	Rated current of circuit breaker (if applicable)	A	_____	_____
1.11	NRS 006 4.2.4.1	Rated short-time withstand r.m.s. current (3 seconds)	kA _{rms}	___ kA 3 sec	_____
1.12	NRS 006 4.2.4.3	Rated short-time withstand r.m.s. current (3 seconds) of earthing switches	kA _{rms}	___ kA 3 sec	_____
1.13	NRS 006 4.2.4.1	Rated peak withstand current	kA _{peak}	_____	_____
1.14	NRS 006 4.2.6	Rated short circuit breaking current of the circuit breaker	kA _{rms}	_____	_____
1.15	NRS 006 4.2.7	Rated short circuit making current	kA _{peak}	_____	_____
2		Design			
2.1	NRS 006 4.3.2	Extensible unit required?	Y/N	No	xxxxxxx
2.2	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	_____
2.3	DSP 34-1621 4.3	Configuration		2R-1B	_____
2.4	DSP 34-1621 4.3.1.1.2 & NRS 006 4.3.5	Type of cable test facilities offered?	Y/N	Yes	_____

Enquiry No.: Tenderer's name:

Item no.: Date:

1	2	3		4	5
Item	Subclause	Description		Schedule A	Schedule B
2.5	NRS 006 4.3.10.2	Insulating medium		xxxxxxx	_____
2.6	NRS 006 4.3.10.2	Minimum maintenance free period	yrs	30 yrs	_____
2.7	NRS 006 4.3.10.3	Interrupting technology (switch disconnectors)		xxxxxxx	_____
2.8	NRS 006 4.3.10.3	Interrupting technology (circuit breaker)		xxxxxxx	_____
3	NRS 006 4.4	Switch-disconnectors			
3.1	NRS 006 4.4.1.1	Class of switch-disconnector (min)		E2-M1	_____
3.2	NRS 006 4.3.5.1 & DSP 34-1621 4.3.1.1.2	Cable test facility to be independent of cable termination enclosure?	Y/N	Yes	_____
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 34-1621 4.3.1.1.3	Provision for hand-held remote control unit (trip and close) required?	Y/N	_____	_____
3.7	DSP 34-1621 4.3.1.1.3	Type of plug-in connector to be supplied		ITT Cannon type CA 3102 A 14S-2 or equivalent	_____
3.8	DSP 34-1621 4.3.1.1.3	Pins for trip control function		C and D	_____
3.9	DSP 34-1621 4.3.1.1.3	Pins for close control function		A and B	_____
3.10	DSP 34-1621 4.3.1.1.3	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	_____
4	NRS 006 4.8	Cable termination enclosure			
4.1	DSP 34-1621 4.3.1.1.4	Spacing between bushing centres (min)	mm	_____	_____
4.2	DSP 34-210 4.3.1.1.4	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	_____

Enquiry No.: Tenderer's name:

Item no.: Date:

1	2	3		4	5
Item	Subclause	Description		Schedule A	Schedule B
4.5	NRS 006 4.8.4	Type of bushing	mm ²	EN 50181 C-type interface	_____
4.6	NRS 006 4.8	Cross sectional area of earthing bar (min)		120	_____
4.7	NRS 006 4.8.6	Type of cable support clamp		NRS 012 / D-DT-8019	_____
4.8	DSP 34-1621 4.3.1.1.4	Size (range) of cable support clamp		_____	_____
5	NRS 006 4.6	Circuit-breakers for tee-off			
5.1	NRS 006 4.6.1.1	Class of circuit-breaker (min)	A	E2-M1	_____
5.2	NRS 006 4.6.1.3	Rated normal current of the circuit-breaker		200A	_____
5.3	NRS 006 4.3.5.1 & DSP 34-1621 4.3.1.1.2	Cable test facility to be independent of cable termination enclosure?	Y/N	Not mandatory	_____
5.4	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
5.5	NRS 006 4.6.3.4	Details of remote tripping and closing offered		xxxxxxx	_____
5.6	NRS 006 4.9.2	Provision for remote indications and alarms required (i.e. via RTU)?	Y/N	_____	_____
5.7	DSP 34-1621 4.3.1.1.3	Provision for hand-held remote control unit (trip and close) required?	Y/N	_____	_____
5.8	DSP 34-1621 4.3.1.1.3	Type of plug-in connector to be supplied		ITT Cannon type CA 3102 A 14S-2 or equivalent C and D	_____
5.9	DSP 34-1621 4.3.1.1.3	Pins for trip control function		C and D	_____
5.10	DSP 34-1621 4.3.1.1.3	Pins for close control function		A and B	_____
5.11	DSP 34-1621 4.3.1.1.3	Details of provisions offered for hand-held remote control unit	24V/ 110V	_____	_____
5.12	NRS 006 4.9.1.1	Load monitoring (metering) facility required?	Y/N	_____	_____
5.13	NRS 006 4.9.1.4	Accuracy class and burden (VA) of CT offered		_____	_____
5.14	NRS 006 4.9.1.6 / 4.9.2	Provision for communication with an RTU (i.e. remote analogue indication)?	Y/N	_____	xxxxxxx
5.15	NRS 006 4.9.1.7	Type of electronic ammeter/multi-meter offered		xxxxxxx	_____
	DSP 34-1621 4.3.1.1.6	Protection relay			
5.16	DSP 34-1621 4.3.1.1.6	CT ratios offered	A	xxxxxxx	_____
5.17	DSP 34-1621 4.3.1.1.6	Protection CT type and class		xxxxxxx	_____
5.18	DSP 34-1621 4.3.1.1.6	Setting ranges and protection element curves (provide technical manual)		xxxxxxx	_____

Enquiry No.: Tenderer's name:

Item no.: Date:

1	2	3		4	5
Item	Subclause	Description		Schedule A	Schedule B
6	NRS 006 4.8	Cable termination enclosure			
6.1	DSP 34-1621 4.3.1.1.4	Spacing between bushing centres (min)	mm	_____	_____
6.2	DSP 34-1621 4.3.1.1.4	Spacing between outer bushing centres and enclosure side wall (min)	mm	_____	_____
6.3	NRS 006 4.8	Distance from bushing centre line to cable support clamp (min)	mm	xxxxxxx	_____
6.4	NRS 006 4.8	Bushings horizontally positioned?	Y/N	YES	_____
6.5	NRS 006 4.8.4	Type of bushing		EN 50181 C-type or A-type interface	_____
6.6	NRS 006 4.8	Cross sectional area of earthing bar (min)	mm ²	120	_____
6.7	NRS 006 4.8.6	Type of cable support clamp		NRS 012	_____
6.8	DSP 34-1621 4.3.1.1.4	Size (range) of cable support clamps		xxxxxxx	_____
7	NRS 006 4.7	General Busbars			
7.1	NRS 006 4.7.2	Current rating of busbars	A	630	_____
8	NRS 006 4.9	Telecontrol			
8.1	DSP 34-1621 4.3.1.6	RTU to be provided?	Y/N	_____	_____
8.2	NRS 006 4.9.2	Provision for remote status indications and alarms required?	Y/N	_____	_____
8.3	NRS 006 4.9.2	Local indications to be provided?	Y/N	_____	_____
8.4	NRS 006 4.9.2	d.c. voltage required?	110V/24 V	_____	_____
9	NRS 006 4.10	Gas requirements			
9.1	NRS 006 4.10.2	Expected life before replenishment of gas (minimum)	Years	30	_____
9.2	NRS 006 4.10.3 & DSP 34-1621 4.3.1.1.7	Type of gas indication device		Density meter	_____
9.3	NRS 006 4.10.5	Mass of gas:			
		a) Busbar chamber	kg	xxxxxxx	_____
		b) Other	kg	xxxxxxx	_____
9.4	NRS 006 4.10.6	Service offered for replenishment and recovery of gas		xxxxxxx	_____
10	NRS 006 4.11	Earthing			
10.1	NRS 006 4.11.1	Earth fault level and duration	kA-s	2 kA – 3 s	_____
11	NRS 006 4.12	Live circuit indication			

Enquiry No.: Tenderer's name:

Item no.: Date:

1	2	3		4	5
Item	Subclause	Description		Schedule A	Schedule B
11.1	NRS 006 4.12.4 & DSP 34-1621 4.3.1.1.5	Type of live circuit indication required		VDS	_____
12	NRS 006 4.13	Earth fault indication			
12.1	NRS 006 4.13.1	Type of earth fault indicator		LV mains powered	_____
		Earth fault indicator details:			
12.2	NRS 006 4.13.6	a) Cable box location for CT		LHS 'R'	_____
12.3	NRS 006 4.13.7	b) Position of 'remote' indicator		Visible from outside, front of RMU	_____
12.4	NRS 006 4.13.7	c) Method of protecting indicator against vandalism		Welded steel tube	_____
12.5	NRS 006 4.13	Make of earth fault indicator		xxxxxxx	_____
12.6	NRS 006 4.13	Type (model) of earth fault indicator		xxxxxxx	_____
13	NRS 006 4.16	Accessories			
13.1	NRS 006 4.16.4	Description of tool set required		xxxxxxx	_____
13.2	DSP 34-1621 7.1	Hand-held push-button remote control unit with a portable power supply to be supplied with the RMU?	Y/N	_____	_____
13.3	DSP 34-1621 7.1	Type of plug-in connector to be supplied		ITT Cannon type CA 3102 A 14S-2 or equivalent	_____
13.4	DSP 34-1621 7.1	Pins for trip control function		C and D	_____
13.5	DSP 34-1621 7.1	Pins for close control function		A and B	_____
13.6	DSP 34-1621 7.1	Length of umbilical cord to be supplied	m	20 m	_____
13.7	DSP 34-1621 7.1	Details of portable power supply		24 V	_____
14	NRS 006 4.17	Rating plate			
14.1	NRS 006 4.17.1	Method of attaching rating plate		xxxxxxx	_____
15	NRS 006 4.18	Marking and labelling			
15.1	NRS 006 4.18.1.1	Method of attaching labels		xxxxxxx	_____
15.2	NRS 006 4.18.2.1	Method of fixing and removal of main circuit designation labels for engraving purposes		xxxxxxx	_____
15.3	NRS 006 4.18.4.4	Mimic indication system required?	Y/N	Yes	xxxxxxx
15.4	NRS 006 4.18.4.4	Description of mimic indication system		xxxxxxx	_____

Enquiry No.: Tenderer's name:

Item no.: Date:

1	2	3		4	5
Item	Subclause	Description		Schedule A	Schedule B
16	NRS 006 419 & DSP 34-1621 4.1.3.2	Corrosion protection			
16.1	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	_____
17		Testing			
17.1	NRS 006 5.1.3	Origin of design		xxxxxxx	_____
17.2	NRS 006 5.1.3	Place of manufacture		xxxxxxx	_____
17.3	NRS 006 5.1.3	Number of units installed in South Africa		xxxxxxx	_____
17.4	NRS 006 5.2.3	Internal arc test details		xxxxxxx	_____
18		Spares			
18.1	NRS 006 6.1	List of recommended spares		xxxxxxx	_____
19	NRS 006 7.2	Documentation			
19.1	NRS 006 7.2	Tabulated summary of completed type tests required?	Y/N	Yes	_____
19.2	NRS 006 7.2	Full set of type test reports required?	Y/N	Yes	_____
19.3	NRS 006 7.2	Proof of type test laboratory accreditation?	Y/N	Yes	_____
19.4	NRS 006 7.2	Copy of RMU factory routine test certificate?	Y/N	Yes	_____
19.5	NRS 006 7.2	Copy of CT factory routine test certificate?	Y/N	Yes	_____
19.6	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	_____
19.7	NRS 006 7.2	Number of installation, operation and maintenance manuals to be provided with the tender		1	_____

Enquiry No.: Tenderer's name:

Item no.: Date:

Deviation schedule**11 kV or 22 kV Ring main unit (for Type B mini-sub)**

Any deviations from this specification shall be listed below with reasons for the deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than the method specified by Eskom.

Item	Clause	Proposed deviation

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical Schedules A and B and Deviation schedule (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 *DSP 34-1621* and provide the tenderers with the relevant schedules A and B.

Schedule A gives the Distribution Group'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.

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical schedules A and B**11 kV Type A Miniature substation up to 500kVA (without RMU)**

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
1	4.1.1	Standard operating conditions		
1.1	NRS 004 4.2.1.3	a) Altitude m	1800	XXXXXXXXXX
1.2	SANS60694 2.1.2	b) Ambient air temperature °C	–5 to +40	XXXXXXXXXX
1.3		c) Lightning ground flash density Flashes/ km ² /year	High	XXXXXXXXXX
1.4	SANS60694 2.1.2	d) Maximum solar radiation W/m ²	1000	XXXXXXXXXX
1.5		e) Ultraviolet radiation	High	XXXXXXXXXX
1.6	NRS 004 4.2.1.3	f) Relative humidity %	98	XXXXXXXXXX
1.7	NRS 004 4.2.1.3 & DSP 34-1621 4.1.1	g) Pollution level (inland – low- corrosive / coastal – corrosive)	“very heavy” for coastal “medium” for inland	XXXXXXXXXX
1.8	SANS60694 2.1.2	h) wind pressure Pa	700	XXXXXXXXXX
1.9	DSP 34-1621 4.1.1	i) Pollution conditions inside mini-sub	Pollution Degree 3	XXXXXXXXXX
2		Ratings		
2.1	DSP 34-1621 4.1.2.2.1	Transformer power rating kVA (200/315/500kVA)	_____	_____
2.2	DSP 34-1621 4.1.2.2.2	Nominal voltage of system (U _n) kV _{rms}	11	_____
2.3	NRS 004 4.1.4 & SANS 780 1.3	System frequency Hz	50	_____
2.4	NRS 004 4.1.4	Number of phases	3	_____
2.5	SANS 780 8.26	Transformer rated no-load secondary voltage V _{rms}	420	_____
2.6	SANS 1019 5.4.2	Rated power-frequency voltage (U _m) kV _{rms}	12	_____
2.7	SANS 1019 5.4.2	Rated short-duration power frequency withstand voltage [50Hz: 1 min] kV _{rms}	28	_____
2.8	DSP 34-1621 4.1.2.1	Rated lightning impulse withstand voltage (SANS 1019 5.4.2 List 3) kV _{peak}	95	_____
2.9	SANS 780	Transformer induced voltage withstand level (see Table 2 – SANS 780) kV _{rms}	22	_____
3		Construction design		
3.1	DSP 34-1621 4.1.3.1.1	Layout (Type A/Type B)	Type A	_____
3.2	NRS 004 4.2.2.3.1	Enclosure IP rating	IP35	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
3.3	DSP 34-1621 4.1.3.1.4	Removable base sections adjacent to MV compartment (sections to lap bolted with nuts on the inside of the channel and housing)	YES	_____
3.4	NRS 004 4.4.2.5	Concealed door hinges	YES	_____
3.5	DSP 34-1621 4.1.3.1.5	Compartment fastening/locking (pad lockable)	YES – three point locking with 1 additional 10 mm sunken captive Allen cap screw	_____
3.6	DSP 34-1621 4.1.3.1.6	“Heavy-duty” stainless steel door locks	YES	_____
3.7	DSP 34-1621 4.1.3.1.7	Compartment lock protection facility required?	Y/N Yes	_____
3.8		Total mass of mini-substation	kg	XXXXXXXXX
3.9		Overall dimensions		
		a) MV compartment length	mm	XXXXXXXXX
		b) LV compartment length	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	c) Overall length	mm	2800
	NRS 004 4.2.2.1.2	d) Overall width	mm	1200
		e) Overall height	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	f) Base width	mm	800
3.10	NRS 004 4.2.2.5	Provision for lifting of complete mini-sub onto a concrete plinth without need for dismantling (except for roof removal if required)	YES	_____
3.11	NRS 004 4.2.2.4.2	Provision of shear-off lifting lugs on roof for ease of roof removal (where roof removal is required prior to lifting mini-sub)	YES	_____
3.12	NRS 004 6.1.2	Mini-sub housing sections/doors bonded	YES	_____
4		Transformer unit		
4.1	NRS 004 6.4.1	Electrical requirements	As per SANS 780	_____
4.2	NRS 004 6.4.4	Vector group	Dyn11	_____
4.3		MV system earthing (Effective/Non-effective)	Non-effective	XXXXXXXXX
4.4		MV system fault level	kA	20
4.5	DSP 34-1621 4.1.2.3.6	LV transformer neutral earthing	Solid connection to insulated LV neutral/earth bar	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
4.6	DSP 34-1621 5.2.1	Temperature rise limits	As per DSP 34-1621 5.2.1	_____
4.7	SANS 780 8.5.2	Secondary voltage regulation (Off-load) %	+5,0, + 2,5, 0, -2,5, -5,0	_____
4.8	SANS 780 5.6.1	No-load losses W	XXXXXXXXXX	_____
4.9	SANS 780 5.6.1	Load losses W	XXXXXXXXXX	_____
4.10	SANS 780 8.27	Impedance voltage (see Table 9 of SANS 780) %	SANS 780	_____
4.11	DSP 34-1621 4.5	X/R ratio	XXXXXXXXXX	_____
4.12	DSP 34-1621 4.5	Cost /kW of no-load losses R/kW	_____	XXXXXXXXXX
4.13	DSP 34-1621 4.5	Cost /kW of load losses R/kW	_____	XXXXXXXXXX
4.14	SANS 780 8.5.3	Audio-sound level – maximum (see table 6 of SANS 780) dB(A)	_____	_____
4.15	DSP 34-1621 4.1.2.2.4	Sealed transformer unit	YES – welded cover	_____
4.16	NRS 004 6.4.7	Transformer MV bushings (NB internal screen to be earthed)	EN 50180 Type C with M16x2 thread	_____
4.17	DSP 34-1621 4.2.1.1.1	MV bushing-centre clearances (minimum) mm	135	_____
4.18	DSP 34-1621 4.2.1.1.1	Clearances between outer bushing- centres and mini-sub metal enclosure (minimum) mm	90	_____
4.19	DSP 34-1621 4.2.1.2	Transformer overload protection facility	YES	_____
4.20		Winding material (Al / Cu) MV LV	XXXXXXXXXX XXXXXXXXXX	_____ _____
4.21		Manufacturer	XXXXXXXXXX	_____
4.22	DSP 34-1621 4.2.1.2.2	Top-oil thermoelectric temp-sensing element	YES	_____
5		MV compartment		
5.1	DSP 34-1621 4.2.2.1.1	Equipment in MV compartment	11kV air- insulated junction box (D-DT-0853)	_____
5.2		Incoming / outgoing MV cable requirements		
	DSP 34-1621 4.2.2.1.2	a) 3 × single core / 1 x three core	1 × 3 core	_____
	DSP 34-1621 4.2.2.1.2	b) Cable support (clamping) required (NRS 012 & D-DT-8019)	YES (Size 50 – 75 mm OD)	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
	DSP 34-1621 4.2.2.1.2	c) Minimum distance from cable clamp to centre-line of post insulators (NRS 012 & D-DT-8053)	mm 800	_____
	DSP 34-1621 4.2.2.1.1	d) Type of connections to post insulators (NRS 012)	Type 1 (Bare)	_____
	DSP 34-1621 4.2.2.1.1	e) Type of connections to transformer bushings (NRS 012) (1-core jumpers from junction box)	Type 3 (unscreened separable connectors)	_____
5.3	DSP 34-1621 4.2.2.1.1	Make (product) of connector used on transf. bushings	XXXXXXXXX	_____
5.4	NRS 004 6.1.3	Mini-sub (MV) earth bar accessible in MV compartment	YES	_____
5.5	DSP 34-1621 4.1.2.7.6	Make (product) of mains powered earth fault indicator (DSP 34-1080)	XXXXXXXXX	_____
6		LV Compartment		
6.1	NRS 004 6.3.3.1	LV ASSEMBLY complies with SANS 1973-1	YES	_____
6.2	DSP 34-1621 4.1.2.5.1	Busbar-rating (see Table 1)	A Rated at 1.2 transformer secondary rated current	_____
6.3		Busbar-insulation	Air insulated	_____
6.4	DSP 34-1621 4.1.2.3.1	Busbars	Ø 3 + one identical neutral-earth busbar (insulated from frame)	_____
6.5	NRS 004 6.3.3.1	Current density of busbars	A/mm ² SANS 1973-1	_____
6.6	NRS 004 4.1.2.5	Rated short-time withstand current of main circuit – 1 s	kA _{rms} XXXXXXXXX	_____
6.7	NRS 004 6.3.3.2.6	Min clearance to earth and between phases	mm XXXXXXXXX	_____
6.8	DSP 34-1621 4.1.2.3.4	Provision of a LV neutral surge arrester (as per D-DT-3088) fitted between mini-sub (MV) earth bar and LV neutral-earth busbar	YES	_____
6.9	DSP 34-1621 4.1.2.3.3	LV neutral-earth busbar to be earthed (via a 70mm ² Cu electrical bridge to the mini-sub earth bar)	YES	_____
6.10	DSP 34-1621 4.1.2.5.2	Stainless Steel M12 set screws provided	YES	_____
6.11	DSP 34-1621 4.2.1.2.1	Provision of LV main circuit breaker	YES	_____
6.12	DSP 34-1621 4.2.1.2.1	Make (product) of circuit breaker	SANS 556-1	_____
6.13	NRS 004 4.1.2.6	Minimum fault current interrupting capacity	kA XXXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
6.14	DSP 34-1621 4.1.2.4.3	Number of outgoing LV feeder bays to be provided for (drill busbar Ø14mm holes)	5	_____
	NRS 004 6.3.3.2.6	Spacing between LV feeder bays (see Figure 1 of DSP 34-1621) mm	110	_____
6.15	DSP 34-1621 4.1.2.4.2	LV panel designed for vertical fuse-bases (FH) or MCCBs (CB)	FH / CB	_____
6.16	NRS 004 6.3.3.2.6	Spacing (vertical): Between phase busbars mm	185	_____
		Between lowest LV busbar and LV neutral mm	300	_____
		Between LV neutral and gland plates (see Figure 1 of DSP 34-1621) mm	200 (min)	_____
6.17	DSP 34-1621 4.1.2.7.1	LV maximum demand ammeters	Required on all three phases	_____
6.18	NRS 004 6.3.3.5.1	Ammeter type	Thermal integrating over 15 min period	_____
6.19	DSP 34-1621 4.1.2.7.2	LV indicating voltmeter (with a selector switch) (YES/NO)	YES	_____
6.20	NRS 004 6.3.3.5.3	Ammeter and voltmeter size and display mm	96 × 96, 90°	_____
6.21	NRS 004 6.3.3.5.3	Ammeter and voltmeter position	LV compartment (high as practicable)	_____
7		LV outgoing feeder bay gland plates		
7.1	DSP 34-1621 4.1.2.4.3	Number of gland plates to be provided (Figure C.9 of NRS 004)	1 per LV feeder bay	_____
	NRS 004 6.3.3.3.10	Number of gland holes per feeder bay	2	_____
	NRS 004 6.3.3.3.10	Size of holes per feeder bay: mm	1 x 65 mm	_____
		mm	1 x 52 mm	_____
	NRS 004 6.3.3.3.10	Clearances for each hole per feeder bay: mm	1 x 98 mm	_____
		mm	1 x 65 mm	_____
7.2	NRS 004 6.3.3.3.10	Distance between gland plate centre lines. (Figure C.9 of NRS 004) mm	110	_____
8		LV auxiliaries		
8.1	DSP 34-1621 4.1.2.7.3	Provision of three point socket outlet in LV compartment (with instantaneous-trip earth leakage unit [20 A; 5 kA rupturing capacity; 30 mA sensitivity] and 20 A HRC fuse with neutral fuse link) (YES/NO)	YES	_____
8.2	DSP 34-1621 4.1.2.7.4	Provision of a tamperproof compartment for the installation of a photo-cell (YES/NO)	NO	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
8.3	DSP 34-1621 4.1.2.7.4	300 mm x 300 mm blank plate for PECU	YES	_____
8.4	DSP 34-1621 4.1.2.7.5	Numbering ferrules for auxiliary wiring	YES	_____
9		Materials and corrosion protection		
9.1	DSP 34-1621 4.1.3.2.4	Mini-sub enclosure, LV ASSEMBLY and transformer tank:		
	DSP 34-1621 4.1.3.2.5	Inland: mild steel	XXXXXXXXXX	_____
		Coastal: 3CR12 or zinc sprayed mild steel or stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	DS-11 / DS-12 / (DS-14 + DS-16) / (DS-14 + DS-17) / DS-18	_____
9.2	DSP 34-1621 4.1.3.2.6	Transformer radiator:		
		Inland: mild steel	XXXXXXXXXX	_____
		Coastal: hot-dipped galvanized / zinc metal sprayed (if corrugated) mild steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	(DS-13 + DS-16) / (DS-13 + DS-17) / (DS-14 + DS-16) / (DS-14 + DS-17)	_____
9.3	NRS 004 6.3.3.2.2	Tinned copper busbars (YES/NO)	YES	_____
9.4	DSP 34-1621 4.1.3.2.7	Mini-sub base: Material	Steel	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered	(DS-13 + DS-16) / (DS-13 + DS-17)	_____
9.5		Gland plates and support structure:	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.8	Coastal: Material: 3 mm (min) stainless steel		
	NRS 004 6.3.3.3.8	Inland Material: 3 mm (min) mild steel / 3CR12 / stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered if mild steel (Hot-dip. galv. to OR zinc sprayed) – for inland only	DS-13 / DS-14	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
9.7	DSP 34-1621 4.1.3.2.11	5 mm cork packing (between ends and tank, base and ends, and base and tank)(YES/NO)	YES	_____
9.8	DSP 34-1621 4.1.3.2.12	Final colour	Avocado C12 (SANS 1091)	_____
10		Notices, signs and labels		
10.1	NRS 004 8.2.1	Transformer rating plate	YES	_____
10.2	DSP 34-1621 6.1.2	Treatment and Full First Aid Instructions on inside of MV and LV compartment doors	YES	_____
10.3	DSP 34-1621 6.1.2	Elec. warning signs on all doors and barriers	YES	_____
10.4	NRS 004 8.4.11	Transformer phase labels below bushings	YES	_____
10.5	NRS 004 6.3.3.2.5	Colour-coded LV busbars	YES	_____
10.6	DSP 34-1621 6.1.2	Labelling of MV and LV compartment doors (sign – D-DT-3202 sheet 5 and 4)	YES	_____
10.7	NRS 004 8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	YES	_____
10.8	NRS 004 8.4.4	Mini-sub mass and stock number stencilled on side or rear.	YES	_____
10.9	NRS 004 8.4.6	ID markings linking roof to body per batch	YES	_____
10.10	NRS 004 4.2.2.3.9	Provision for the safe-keeping of documents	YES	_____
11		Documentation		
11.1	DSP 34-1621 6.2.3	Type test certificates (provide ref. numbers of reports) Sets	1	_____
11.2	DSP 34-1621 6.2.3	Routine test certificates Sets	1	_____
11.3	DSP 34-1621 6.2.2	Drawings (Mini-sub GA, LV ASSEMBLY, Operating procedure label for RMU tee-off) Sets	1	_____
11.4	DSP 34-1621 6.2.2	Diagrams (Mini-sub schematic – including the LV ASSEMBLY, Rating Plates) Sets	1	_____
12		Accessories		
12.1	DSP 34-1621 7.1.2	Type of sealant provided	XXXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

11 kV Type A Mini-substation up to 500kVA (without RMU)**Deviation schedule**

If there are any deviations from this specification they shall be listed below with the reasons for deviation. In addition, evidence shall be provided that the proposed deviations will at least be more cost-effective than the Eskom specification.

Item	Clause	Proposed deviation

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical schedules A and B**11 kV Type B Miniature substation up to 500kVA (with RMU)**

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
1	4.1.1	Standard operating conditions		
1.1	NRS 004 4.2.1.3	a) Altitude m	1800	XXXXXXXXXX
1.2	SANS60694 2.1.2	b) Ambient air temperature °C	–5 to +40	XXXXXXXXXX
1.3		c) Lightning ground flash density Flashes/ km ² /year	High	XXXXXXXXXX
1.4	SANS60694 2.1.2	d) Maximum solar radiation W/m ²	1000	XXXXXXXXXX
1.5		e) Ultraviolet radiation	High	XXXXXXXXXX
1.6	NRS 004 4.2.1.3	f) Relative humidity %	98	XXXXXXXXXX
1.7	NRS 004 4.2.1.3 & DSP 34-1621 4.1.1	g) Pollution level (inland – low- corrosive / coastal – corrosive)	“very heavy” for coastal “medium” for inland	XXXXXXXXXX
1.8	SANS60694 2.1.2	h) wind pressure Pa	700	XXXXXXXXXX
1.9	DSP 34-1621 4.1.1	i) Pollution conditions inside mini-sub	Pollution Degree 3	XXXXXXXXXX
2		Ratings		
2.1	DSP 34-1621 4.1.2.2.1	Transformer power rating (315/500kVA) kVA	_____	_____
2.2	DSP 34-1621 4.1.2.2.2	Nominal voltage of system (U _n) kV _{rms}	11	_____
2.3	NRS 004 4.1.4 & SANS 780 1.3	System frequency Hz	50	_____
2.4	NRS 004 4.1.4	Number of phases	3	_____
2.5	SANS 780 8.26	Transformer rated no-load secondary voltage V _{rms}	420	_____
2.6	SANS 1019 5.4.2	Rated power-frequency voltage (U _m) kV _{rms}	12	_____
2.7	SANS 1019 5.4.2	Rated short-duration power frequency withstand voltage [50Hz: 1 min] kV _{rms}	28	_____
2.8	DSP 34-1621 4.1.2.1	Rated lightning impulse withstand voltage (SANS 1019 5.4.2 List 3) kV _{peak}	95	_____
2.9	SANS 780	Transformer induced voltage withstand level (see Table 2 – SANS 780) kV _{rms}	22	_____
3		Construction design		
3.1	DSP 34-1621 4.1.3.1.3	Layout (Type A/Type B)	Type B	_____
3.2	NRS 004 4.2.2.3.1	Enclosure IP rating	IP35	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
3.3	DSP 34-1621 4.1.3.1.4	Removable base sections adjacent to MV compartment (sections to lap bolted with nuts on the inside of the channel and housing)	YES	_____
3.4	NRS 004 4.4.2.5	Concealed door and roof (if applicable) hinges	YES	_____
3.5	DSP 34-1621 4.1.3.1.5	Compartment fastening/locking (Pad lockable)	YES – three point locking with 1 additional 10 mm sunken captive Allen cap screw	_____
3.6	DSP 34-1621 4.1.3.1.6	“Heavy-duty” stainless steel door locks	YES	_____
3.7	DSP 34-1621 4.1.3.1.7	Compartment lock protection facility required?	Y/N Yes	_____
3.8		Total mass of mini-substation	kg	XXXXXXXXX
3.9		Overall dimensions		
		a) MV compartment length	mm	XXXXXXXXX
		b) LV compartment length	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	c) Overall length	mm	3000
	NRS 004 4.2.2.1.2	d) Overall width	mm	1650
		e) Overall height	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	f) Base width	mm	1200
3.10	NRS 004 4.2.2.5	Provision for lifting of complete mini-sub onto a concrete plinth without need for dismantling (except for roof removal if required)	YES	_____
3.11	NRS 004 4.2.2.4.2	Provision of shear-off lifting lugs on roof for ease of roof removal (where roof removal is required prior to lifting mini-sub)	YES	_____
3.12	NRS 004 6.1.2	Mini-sub housing sections/doors bonded	YES	_____
4		Transformer unit		
4.1	NRS 004 6.4.1	Electrical requirements	As per SANS 780	_____
4.2	NRS 004 6.4.4	Vector group	Dyn11	_____
4.3		MV system earthing (Effective/Non-effective)	Non-effective	XXXXXXXXX
4.4		MV system fault level	kA	20
4.5	DSP 34-1621 4.1.2.3.6	LV transformer neutral earthing	Solid – connection to insulated LV neutral/earth bar	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
4.6	DSP 34-1621 5.2.1	Temperature rise limits	As per DSP 34-1621 5.2.1	_____
4.7	SANS 780 8.5.2	Secondary voltage regulation (Off-load) %	+5,0, + 2,5, 0, -2,5, -5,0	_____
4.8	SANS 780 5.6.1	No-load losses W	XXXXXXXXXX	_____
4.9	SANS 780 5.6.1	Load losses W	XXXXXXXXXX	_____
4.10	SANS 780 8.27	Impedance voltage (see Table 9 of SANS 780) %	SANS 780	_____
4.11	DSP 34-1621 4.5	X/R	XXXXXXXXXX	_____
4.12	DSP 34-1621 4.5	Cost /kW of no-load losses R/kW	_____	XXXXXXXXXX
4.13	DSP 34-1621 4.5	Cost /kW of load losses R/kW	_____	XXXXXXXXXX
4.14	SANS 780 8.5.3	Audio-sound level – maximum (see table 6 of SANS 780) dB(A)	_____	_____
4.15	DSP 34-1621 4.1.2.2.4	Sealed transformer unit	YES –welded cover	_____
4.16	NRS 004 6.4.7	Transformer MV bushings (NB internal screen to be earthed)	EN 50180 Type C with M16x2 thread	_____
4.17	DSP 34 1621 4.3.1.1.4	MV bushing-centre clearances (minimum) mm	90	_____
4.18	DSP 34-1612 4.3.1.1.4	Clearances between outer bushing- centres and mini-sub metal enclosure (minimum) mm	50	_____
4.19	DSP 34-1621 4.3.1.4	Transformer overload protection facility	YES	_____
4.20		Winding material MV LV	XXXXXXXXXX XXXXXXXXXX	_____ _____
4.21		Manufacturer	XXXXXXXXXX	_____
4.22	DSP 34-1621 4.3.1.4	Top-oil thermoelectric temp-sensing element	YES	_____
5		MV compartment		
5.1	DSP 34-1621 4.3.1.1	Equipment in MV compartment	RMU	_____
5.2		Ring Main Unit manufacturer	XXXXXXXXXX	_____
5.3		Incoming / outgoing MV cable requirements		
	DSP 34-1621 4.3.1.1.4	a) 3 × single core / 1 × three core	1 × 3 core	_____
	DSP 34-1621 4.3.1.1.4	b) Cable support (clamping) required (NRS 012 & D-DT-8019) all cables except 11 kV paper insulated.	YES (Size 75 – 100 mm OD)	_____
	DSP 34-1621 4.3.1.1.4	11 kV paper insulated cables	YES (Size 50 – 75 mm OD)	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
		c) Minimum distance from cable clamp to centre-line of RMU bushings	800	_____
		d) Type of connection (NRS 012) to RMU	Type 3 (unscreened separable connectors)	_____
		e) Interconnection arrangement between RMU and transformer MV bushings	Single core screened cable	_____
5.4	DSP 34-1621 4.3.1.3	Make (product) connector used on transf. bushings (SSC)	XXXXXXXXXX	_____
5.5	DSP 34-1621 4.3.1.3	Make (product) of connector used on RMU T-off (USC / SSC)	XXXXXXXXXX	_____
5.6	NRS 004 6.1.3	Mini-sub (MV) earth bar (accessible from front of RMU)	YES	_____
5.7	DSP 34-1621 4.1.2.7.6	Make (product) of mains powered earth fault indicator (DSP 34-1080)	XXXXXXXXXX	_____
6		LV Compartment		
6.1	NRS 004 6.3.3.1	LV ASSEMBLY complies with SANS 1973-1	YES	_____
6.2	DSP 34-1621 4.1.2.5.1	Busbar-rating (see Table 1)	A	Rated at 1.2 transformer secondary rated current
6.3		Busbar-insulation		Air insulated
6.4	DSP 34-1621 4.1.2.3.1	Busbars	Ø	3 + one neutral-earth
6.5	NRS 004 6.3.3.1	Current density of busbars	A/mm ²	SANS 1973-1
6.6	NRS 004 4.1.2.5	Rated short-time withstand current of main circuit – 1 s	kA _{rms}	XXXXXXXXXX
6.7	NRS 004 6.3.3.2.6	Min clearance to earth and between phases	mm	XXXXXXXXXX
6.8	DSP 34-1621 4.1.2.3.4	Provision of a LV neutral surge arrester (as per D-DT-3088) fitted between mini-sub (MV) earth bar and LV neutral-earth busbar	YES	_____
6.9	DSP 34-1621 4.1.2.3.3	LV neutral-earth busbar to be earthed (via a 70mm ² Cu electrical bridge to the mini-sub earth bar)	YES	_____
6.10	4.1.2.5.2	Stainless Steel M12 set screws provided	YES	_____
6.11	DSP 34-1621 4.3.1.5	Provision of LV main switch disconnecter	YES	_____
6.12	DSP 34-1621 4.3.1.5	Make (product) of circuit switch disconnecter	SANS 60947-3	_____
6.13	NRS 004 4.1.2.6	Minimum fault current interrupting capacity	kA	XXXXXXXXXX
6.14	DSP 34-1621 4.3.2	Number of outgoing LV feeder bays to be provided for (drill busbar Ø14mm holes)	9	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
	NRS 004 6.3.3.2.6	Spacing between LV feeder bays (see Figure 1 of DSP 34-1621)	mm 110	_____
6.15	DSP 34-1621 4.1.2.4.2	LV panel designed for vertical fuse-bases (FH) or MCCBs (CB)	FH / CB	_____
6.16	NRS 004 6.3.3.2.6	Spacing (vertical): Between phase busbars	mm 185	_____
		Between lowest LV busbar and LV neutral	mm 300	_____
		Between LV neutral and gland plates (see Figure 1 of DSP 34-1621)	mm 200 (min)	_____
6.17	DSP 34-1621 4.1.2.7.1	LV maximum demand ammeters	Required on all three phases	_____
6.18	NRS 004 6.3.3.5.1	Ammeter type	Thermal integrating over 15 min period	_____
6.19	DSP 34-1621 4.1.2.7.2	LV indicating voltmeter (with a selector switch) (YES/NO)	YES	_____
6.20	NRS 004 6.3.3.5.3	Ammeter and voltmeter size and display	mm 96 × 96, 90°	_____
6.21	NRS 004 6.3.3.5.3	Ammeter and voltmeter position	LV compartment (high as practicable)	_____
6.22	NRS 004 6.3.1.2	Provision of removable barrier to separate LV end compartment and front LV compartment	YES – non flammable	_____
7		LV outgoing feeder bay gland plates		
7.1	DSP 34-1621 4.1.2.4.4	Number of gland plates to be provided (Figure C.9 of NRS 004)	6	_____
	NRS 004 6.3.3.3.10	Number of gland holes per feeder bay	2	_____
	NRS 004 6.3.3.3.10	Size of holes per feeder bay:	mm 1 x 65 mm	_____
	NRS 004 6.3.3.3.10	Clearances for each hole per feeder bay:	mm 1 x 52 mm	_____
	NRS 004 6.3.3.3.10		mm 1 x 98 mm	_____
7.2	NRS 004 6.3.3.3.10	Distance between gland plate centre lines (Figure C.9 of NRS 004)	mm 1 x 65 mm 110	_____
8		LV auxiliaries		
8.1	DSP 34-1621 4.1.2.7.3	Provision of three point socket outlet in LV compartment (with instantaneous-trip earth leakage unit [20 A; 5 kA rupturing capacity; 30 mA sensitivity] and 20 A HRC fuse with neutral fuse link) (YES/NO)	YES	_____
8.2	DSP 34-1621 4.1.2.7.4	Provision of a tamperproof compartment for the installation of a photo-cell (YES/NO)	NO	_____
8.3	DSP 34-1621 4.1.2.7.4	300mmx300mm blank plate for PECU	YES	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
8.4	DSP 34-1621 4.1.2.7.5	Numbering ferrules for auxiliary wiring	YES	_____
8.5	DSP 34 1621 4.3.1.1.3	Push-button fitted to shunt trip RMU tee-off	NO	_____
9		Materials and corrosion protection		
9.1	DSP 34-1621 4.1.3.2.4	Mini-sub enclosure, LV ASSEMBLY and transformer tank:		
	DSP 34-1621 4.1.3.2.5	Inland: mild steel Coastal: 3CR12 or zinc sprayed mild steel or stainless steel	XXXXXXXXXX XXXXXXXXXX	_____ _____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	DS-11 / DS-12 / (DS-14 + DS-16) / (DS-14 + DS-17) / DS-18	_____
9.2	DSP 34-1621 4.1.3.2.6	Transformer radiator: Inland: mild steel Coastal: hot-dipped galvanized / zinc metal sprayed (if corrugated) mild steel	XXXXXXXXXX XXXXXXXXXX	_____ _____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	(DS-13 + DS-16) / (DS-13 + DS-17) / (DS-14 + DS-16) / (DS-14 + DS-17)	_____
9.3	NRS 004 6.3.3.2.2	Tinned copper busbars (YES/NO)	YES	_____
9.4	DSP 34-1621 4.1.3.2.7	Mini-sub base: Material	Steel	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered	(DS-13 + DS-16) / (DS-13 + DS-17)	_____
9.5		Gland plates and support structure:	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.8	Coastal: Material: 3 mm (min) stainless steel		
	NRS 004 6.3.3.3.8	Inland Material: 3 mm (min) mild steel / 3CR12 / stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered if mild steel (Hot-dip. galv. to OR zinc sprayed) – for inland only	DS-13 / DS-14	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
9.7	DSP 34-1621 4.1.3.2.11	5 mm cork packing (between ends and tank, base and ends, and base and tank)(YES/NO)	YES	_____
9.8	DSP 34-1621 4.1.3.2.12	Final colour	Avocado C12 (SANS 1091)	_____
10		Notices, signs and labels		
10.1	NRS 004 8.2.1	Transformer rating plate	YES	_____
10.2	DSP 34-1621 6.1.2	Treatment and Full First Aid Instructions on inside of MV and LV compartment doors	YES	_____
10.3	DSP 34-1621 6.1.2	Elec. warning signs on all doors and barriers	YES	_____
10.4	NRS 004 8.4.11	Transformer phase labels below bushings	YES	_____
10.5	NRS 004 6.3.3.2.5	Colour-coded LV busbars	YES	_____
10.6	DSP 34-1621 6.1.2	Labelling of MV and LV compartment doors (sign – D-DT-3202 sheet 5 and 4)	YES	_____
10.7	NRS 004 8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	YES	_____
10.8	NRS 004 8.4.4	Mini-sub mass and stock number stencilled on side or rear.	YES	_____
10.9	NRS 004 8.4.6	ID markings linking roof to body per batch	YES	_____
10.10	NRS 004 4.2.2.3.9	Provision for the safe-keeping of documents	YES	_____
11		Documentation		
11.1	DSP 34-1621 6.2.3	Type test certificates (provide ref. numbers of reports)	Sets 1	_____
11.2	DSP 34-1621 6.2.3	Routine test certificates	Sets 1	_____
11.3	DSP 34-1621 6.2.2	Drawings (Mini-sub GA, LV ASSEMBLY, Operating procedure label for RMU tee-off)	Sets 1	_____
11.4	DSP 34-1621 6.2.2	Diagrams (Mini-sub schematic – including the LV ASSEMBLY, Rating Plates)	Sets 1	_____
12		Accessories		
12.1	DSP 34-1621 7.1.2	Type of sealant provided	XXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

11 kV Type B Mini-substation up to 500kVA (with RMU)**Deviation schedule**

If there are any deviations from this specification they shall be listed below with the reasons for deviation. In addition, evidence shall be provided that the proposed deviations will at least be more cost-effective than the Eskom specification.

Item	Clause	Proposed deviation

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical schedules A and B**22 kV Type A Miniature substation up to 500kVA (without RMU)**

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
1	4.1.1	Standard operating conditions		
1.1	NRS 004 4.2.1.3	a) Altitude m	1800	XXXXXXXXXX
1.2	SANS60694 2.1.2	b) Ambient air temperature °C	-5 to +40	XXXXXXXXXX
1.3		c) Lightning ground flash density Flashes/ km ² /year	High	XXXXXXXXXX
1.4	SANS60694 2.1.2	d) Maximum solar radiation W/m ²	1000	XXXXXXXXXX
1.5		e) Ultraviolet radiation	High	XXXXXXXXXX
1.6	NRS 004 4.2.1.3	f) Relative humidity %	98	XXXXXXXXXX
1.7	NRS 004 4.2.1.3 & DSP 34-1621 4.1.1	g) Pollution level (inland – low- corrosive / coastal – corrosive)	“very heavy” for coastal “medium” for inland	XXXXXXXXXX
1.8	SANS60694 2.1.2	h) wind pressure Pa	700	XXXXXXXXXX
1.9	DSP 34-1621 4.1.1	i) Pollution conditions inside mini-sub	Pollution Degree 3	XXXXXXXXXX
2		Ratings		
2.1	DSP 34-1621 4.1.2.2.1	Transformer power rating kVA (200/315/500kVA)	_____	_____
2.2	DSP 34-1621 4.1.2.2.2	Nominal voltage of system (U _n) kV _{rms}	22	_____
2.3	NRS 004 4.1.4 & SANS 780 1.3	System frequency Hz	50	_____
2.4	NRS 004 4.1.4	Number of phases	3	_____
2.5	SANS 780 8.26	Transformer rated no-load secondary voltage V _{rms}	420	_____
2.6	SANS 1019 5.4.2	Rated power-frequency voltage (U _m) kV _{rms}	24	_____
2.7	SANS 1019 5.4.2	Rated short-duration power frequency withstand voltage [50Hz: 1 min] kV _{rms}	50	_____
2.8	DSP 34-1621 4.1.2.1	Rated lightning impulse withstand voltage (SANS 1019 5.4.2 List 3) kV _{peak}	150	_____
2.9	SANS 780	Transformer induced voltage withstand level (see Table 2 – SANS 780) kV _{rms}	44	_____
3		Construction design		
3.1	DSP 34-1621 4.1.3.1.1	Layout (Type A/Type B)	Type A	_____
3.2	NRS 004 4.2.2.3.1	Enclosure IP rating	IP35	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
3.3	DSP 34-1621 4.1.3.1.4	Removable base sections adjacent to MV compartment (sections to lap bolted with nuts on the inside of the channel and housing)	YES	_____
3.4	NRS 004 4.4.2.5	Concealed door hinges	YES	_____
3.5	DSP 34-1621 4.1.3.1.5	Compartment fastening/locking (pad lockable)	YES – three point locking with 1 additional 10 mm sunken captive Allen cap screw	_____
3.6	DSP 34-1621 4.1.3.1.6	“Heavy-duty” stainless steel door locks	YES	_____
3.7	DSP 34-1621 4.1.3.1.7	Compartment lock protection facility required?	Y/N Yes	_____
3.8		Total mass of mini-substation	kg	XXXXXXXXX
3.9		Overall dimensions		
		a) MV compartment length	mm	XXXXXXXXX
		b) LV compartment length	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	c) Overall length	mm	2800
	NRS 004 4.2.2.1.2	d) Overall width	mm	1200
		e) Overall height	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	f) Base width	mm	800
3.10	NRS 004 4.2.2.5	Provision for lifting of complete mini-sub onto a concrete plinth without need for dismantling (except for roof removal if required)	YES	_____
3.11	NRS 004 4.2.2.4.2	Provision of shear-off lifting lugs on roof for ease of roof removal (where roof removal is required prior to lifting mini-sub)	YES	_____
3.12	NRS 004 6.1.2	Mini-sub housing sections/doors bonded	YES	_____
4		Transformer unit		
4.1	NRS 004 6.4.1	Electrical requirements	As per SANS 780	_____
4.2	NRS 004 6.4.4	Vector group	Dyn11	_____
4.3		MV system earthing (Effective/Non-effective)	Non-effective	XXXXXXXXX
4.4		MV system fault level	kA	20
4.5	DSP 34-1621 4.1.2.3.6	LV transformer neutral earthing	Solid connection to insulated LV neutral/earth bar	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
4.6	DSP 34-1621 5.2.1	Temperature rise limits	As per DSP 34-1621 5.2.1	_____
4.7	SANS 780 8.5.2	Secondary voltage regulation (Off-load) %	+5,0, + 2,5, 0, -2,5, -5,0	_____
4.8	SANS 780 5.6.1	No-load losses W	XXXXXXXXXX	_____
4.9	SANS 780 5.6.1	Load losses W	XXXXXXXXXX	_____
4.10	SANS 780 8.27	Impedance voltage (see Table 9 of SANS 780) %	SANS 780	_____
4.11	DSP 34-1621 4.5	X/R ratio	XXXXXXXXXX	_____
4.12	DSP 34-1621 4.5	Cost /kW of no-load losses R/kW	_____	XXXXXXXXXX
4.13	DSP 34-1621 4.5	Cost /kW of load losses R/kW	_____	XXXXXXXXXX
4.14	SANS 780 8.5.3	Audio-sound level – maximum (see table 6 of SANS 780) dB(A)	_____	_____
4.15	DSP 34-1621 4.1.2.2.4	Sealed transformer unit	YES –welded cover	_____
4.16	NRS 004 6.4.7	Transformer MV bushings (NB internal screen to be earthed)	EN 50180 Type C with M16x2 thread	_____
4.17	DSP 34-1621 4.2.1.1.2	Transformer bushing-centre clearances (minimum) mm	180	_____
4.18	DSP 34-1621 4.2.1.1.2	Clearances between outer bushing- centres and mini-sub metal enclosure (minimum) mm	80	_____
4.19	DSP 34-1621 4.2.1.2	Transformer overload protection facility	YES	_____
4.20		Winding material MV LV	XXXXXXXXXX XXXXXXXXXX	_____ _____
4.21		Manufacturer	XXXXXXXXXX	_____
4.22	DSP 34-1621 4.2.1.2.2	Top-oil thermoelectric temp-sensing element	YES	_____
5		MV compartment		
5.1	DSP 34-1621 4.2.2.2	Equipment in MV compartment	NO	_____
5.2		Incoming / outgoing MV cable requirements		
	DSP 34-1621 4.2.2.2.2	a) 3 × single core / 1 × three core	1 × 3 core	_____
	DSP 34-1621 4.2.2.2.2	b) Cable support (clamping) required (NRS 012 & D-DT-8019)	YES (Size 75 – 100 mm OD)	_____
	DSP 34-1621 4.2.2.2.2	c) Minimum distance from cable clamp to centre-line of transformer bushings mm	800	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
		d) Type of connections (NRS 012)	Type 4 (screened separable connectors)	_____
5.3	NRS 004 6.1.3	Mini-sub (MV) earth bar accessible in MV compartment	YES	_____
5.4	DSP 34-1621 4.1.2.7.6	Make (product) of mains powered earth fault indicator (DSP 34-1080)	XXXXXXXXX	_____
6		LV Compartment		
6.1	NRS 004 6.3.3.1	LV ASSEMBLY complies with SANS 1973-1	YES	_____
6.2	DSP 34-1621 4.1.2.5.1	Busbar-rating (see Table 1)	A	Rated at 1.2 transformer secondary rated current
6.3		Busbar-insulation		Air insulated
6.4	DSP 34-1621 4.1.2.3.1	Busbars	Ø	3 + one identical neutral-earth busbar (insulated from frame)
6.5	NRS 004 6.3.3.1	Current density of busbars	A/mm ²	SANS 1973- 1
6.6	NRS 004 4.1.2.5	Rated short-time withstand current of main circuit – 1 s	kA _{rms}	XXXXXXXXX
6.7	NRS 004 6.3.3.2.6	Min clearance to earth and between phases	mm	XXXXXXXXX
6.8	DSP 34-1621 4.1.2.3.4	Provision of a LV neutral surge arrester (as per D-DT-3088) fitted between mini- sub (MV) earth bar and LV neutral-earth busbar	YES	_____
6.9	DSP 34-1621 4.1.2.3.3	LV neutral-earth busbar to be earthed (via a 70mm ² Cu electrical bridge to the mini-sub earth bar)	YES	_____
6.10	DSP 34-1621 4.1.2.5.2	Stainless Steel M12 set screws provided	YES	_____
6.11	DSP 34-1621 4.2.1.2.1	Provision of LV main circuit breaker	YES	_____
6.12	DSP 34-1621 4.2.1.2.1	Make (product) of circuit breaker	SANS 556-1	_____
6.13	NRS 004 4.1.2.6	Minimum fault current interrupting capacity	kA	XXXXXXXXX
6.14	DSP 34-1621 4.1.2.4.3	Number of outgoing LV feeder bays to be provided for (drill busbar Ø14mm holes)	5	_____
	NRS 004 6.3.3.2.6	Spacing between LV feeder bays (see Figure 1 of DSP 34-1621)	mm	110
6.15	DSP 34-1621 4.1.2.4.2	LV panel designed for vertical fuse- bases (FH) or MCCBs (CB)	FH / CB	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
6.16	NRS 004 6.3.3.2.6	Spacing (vertical): Between phase busbars mm Between lowest LV busbar and LV neutral mm Between LV neutral and gland plates (see Figure 1 of DSP 34-1621)	185 300 200 (min)	_____
6.17	DSP 34-1621 4.1.2.7.1	LV maximum demand ammeters	Required on all three phases	_____
6.18	NRS 004 6.3.3.5.1	Ammeter type	Thermal integrating over 15 min period	_____
6.19	DSP 34-1621 4.1.2.7.2	LV indicating voltmeter (with a selector switch) (YES/NO)	YES	_____
6.20	NRS 004 6.3.3.5.3	Ammeter and voltmeter size and display mm	96 × 96, 90°	_____
6.21	NRS 004 6.3.3.5.3	Ammeter and voltmeter position	LV compartment (high as practicable)	_____
7		LV outgoing feeder bay gland plates		
7.1	DSP 34-1621 4.1.2.4.3	Number of gland plates to be provided (Figure C.9 of NRS 004)	1 per LV feeder bay	_____
	NRS 004 6.3.3.3.10	Number of gland holes per feeder bay	2	_____
	NRS 004 6.3.3.3.10	Size of holes per feeder bay:	mm	_____
	NRS 004 6.3.3.3.10	Clearances for each hole per feeder bay:	mm	_____
7.2	NRS 004 6.3.3.3.10	Distance between gland plate centre lines. (Figure C.9 of NRS 004)	mm	_____
8		LV auxiliaries		
8.1	DSP 34-1621 4.1.2.7.3	Provision of three point socket outlet in LV compartment (with instantaneous-trip earth leakage unit [20 A; 5 kA rupturing capacity; 30 mA sensitivity] and 20 A HRC fuse with neutral fuse link) (YES/NO)	YES	_____
8.2	DSP 34-1621 4.1.2.7.4	Provision of a tamperproof compartment for the installation of a photo-cell (YES/NO)	NO	_____
8.3	DSP 34-1621 4.1.2.7.4	300 mm x 300 mm blank plate for PECU	YES	_____
8.4	DSP 34-1621 4.1.2.7.5	Numbering ferrules for auxiliary wiring	YES	_____
9		Materials and corrosion protection		

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
9.1	DSP 34-1621 4.1.3.2.4	Mini-sub enclosure, LV ASSEMBLY and transformer tank:		
	DSP 34-1621 4.1.3.2.5	Inland: mild steel	XXXXXXXXXX	_____
		Coastal: 3CR12 or zinc sprayed mild steel or stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	DS-11 / DS-12 / (DS-14 + DS-16) / (DS-14 + DS-17) / DS-18	_____
9.2	DSP 34-1621 4.1.3.2.6	Transformer radiator:		
		Inland: mild steel	XXXXXXXXXX	_____
		Coastal: hot-dipped galvanized / zinc metal sprayed (if corrugated) mild steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	(DS-13 + DS-16) / (DS-13 + DS-17) / (DS-14 + DS-16) / (DS-14 + DS-17)	_____
9.3	NRS 004 6.3.3.2.2	Tinned copper busbars (YES/NO)	YES	_____
9.4	DSP 34-1621 4.1.3.2.7	Mini-sub base: Material	Steel	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered	(DS-13 + DS-16) / (DS-13 + DS-17)	_____
9.5		Gland plates and support structure:	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.8	Coastal: Material: 3 mm (min) stainless steel		
	NRS 004 6.3.3.3.8	Inland Material: 3 mm (min) mild steel / 3CR12 / stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered if mild steel (Hot-dip. galv. to OR zinc sprayed) – for inland only	DS-13 / DS-14	_____
9.7	DSP 34-1621 4.1.3.2.11	5 mm cork packing (between ends and tank, base and ends, and base and tank)(YES/NO)	YES	_____
9.8	DSP 34-1621 4.1.3.2.12	Final colour	Avocado C12 (SANS 1091)	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
10		Notices, signs and labels		
10.1	NRS 004 8.2.1	Transformer rating plate	YES	_____
10.2	DSP 34-1621 6.1.2	Treatment and Full First Aid Instructions on inside of MV and LV compartment doors	YES	_____
10.3	DSP 34-1621 6.1.2	Elec. warning signs on all doors and barriers	YES	_____
10.4	NRS 004 8.4.11	Transformer phase labels below bushings	YES	_____
10.5	NRS 004 6.3.3.2.5	Colour-coded LV busbars	YES	_____
10.6	DSP 34-1621 6.1.2	Labelling of MV and LV compartment doors (sign – D-DT-3202 sheet 5 and 4)	YES	_____
10.7	NRS 004 8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	YES	_____
10.8	NRS 004 8.4.4	Mini-sub mass and stock number stencilled on side or rear.	YES	_____
10.9	NRS 004 8.4.6	ID markings linking roof to body per batch	YES	_____
10.10	NRS 004 4.2.2.3.9	Provision for the safe-keeping of documents	YES	_____
11		Documentation		
11.1	DSP 34-1621 6.2.3	Type test certificates (provide ref. numbers of reports)	Sets 1	_____
11.2	DSP 34-1621 6.2.3	Routine test certificates	Sets 1	_____
11.3	DSP 34-1621 6.2.2	Drawings (Mini-sub GA, LV ASSEMBLY, Operating procedure label for RMU tee-off)	Sets 1	_____
11.4	DSP 34-1621 6.2.2	Diagrams (Mini-sub schematic – including the LV ASSEMBLY, Rating Plates)	Sets 1	_____
12		Accessories		
12.1	DSP 34-1621 7.1.2	Type of sealant provided	XXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

22 kV Type A Mini-substation up to 500kVA (without RMU)**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

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical schedules A and B**22 kV Type B Miniature substation up to 500kVA (with RMU)**

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
1	4.1.1	Standard operating conditions		
1.1	NRS 004 4.2.1.3	a) Altitude m	1800	XXXXXXXXXX
1.2	SANS60694 2.1.2	b) Ambient air temperature °C	–5 to +40	XXXXXXXXXX
1.3		c) Lightning ground flash density Flashes/ km ² /year	High	XXXXXXXXXX
1.4	SANS60694 2.1.2	d) Maximum solar radiation W/m ²	1000	XXXXXXXXXX
1.5		e) Ultraviolet radiation	High	XXXXXXXXXX
1.6	NRS 004 4.2.1.3	f) Relative humidity %	98	XXXXXXXXXX
1.7	NRS 004 4.2.1.3 & DSP 34-1621 4.1.1	g) Pollution level (inland – low- corrosive / coastal – corrosive)	“very heavy” for coastal “medium” for inland	XXXXXXXXXX
1.8	SANS60694 2.1.2	h) wind pressure Pa	700	XXXXXXXXXX
1.9	DSP 34-1621 4.1.1	i) Pollution conditions inside mini-sub	Pollution Degree 3	XXXXXXXXXX
2		Ratings		
2.1	DSP 34-1621 4.1.2.2.1	Transformer power rating (315/500kVA) kVA	_____	_____
2.2	DSP 34-1621 4.1.2.2.2	Nominal voltage of system (U _n) kV _{rms}	22	_____
2.3	NRS 004 4.1.4 & SANS 780 1.3	System frequency Hz	50	_____
2.4	NRS 004 4.1.4	Number of phases	3	_____
2.5	SANS 780 8.26	Transformer rated no-load secondary voltage V _{rms}	420	_____
2.6	SANS 1019 5.4.2	Rated power-frequency voltage (U _m) kV _{rms}	24	_____
2.7	SANS 1019 5.4.2	Rated short-duration power frequency withstand voltage [50Hz: 1 min] kV _{rms}	50	_____
2.8	DSP 34-1621 4.1.2.1	Rated lightning impulse withstand voltage (SANS 1019 5.4.2 List 3) kV _{peak}	150	_____
2.9	SANS 780	Transformer induced voltage withstand level (see Table 2 – SANS 780) kV _{rms}	44	_____
3		Construction design		
3.1	DSP 34-1621 4.1.3.1.3	Layout (Type A/Type B)	Type B	_____
3.2	NRS 004 4.2.2.3.1	Enclosure IP rating	IP35	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
3.3	DSP 34-1621 4.1.3.1.4	Removable base sections adjacent to MV compartment (sections to lap bolted with nuts on the inside of the channel and housing)	YES	_____
3.4	NRS 004 4.4.2.5	Concealed door and roof (if applicable) hinges	YES	_____
3.5	DSP 34-1621 4.1.3.1.5	Compartment fastening/locking (Pad lockable)	YES – three point locking with 1 additional 10 mm sunken captive Allen cap screw	_____
3.6	DSP 34-1621 4.1.3.1.6	“Heavy-duty” stainless steel door locks	YES	_____
3.7	DSP 34-1621 4.1.3.1.7	Compartment lock protection facility required?	Y/N Yes	_____
3.8		Total mass of mini-substation	kg	XXXXXXXXX
3.9		Overall dimensions		
		a) MV compartment length	mm	XXXXXXXXX
		b) LV compartment length	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	c) Overall length	mm	3000
	NRS 004 4.2.2.1.2	d) Overall width	mm	1650
		e) Overall height	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	f) Base width	mm	1200
3.10	NRS 004 4.2.2.5	Provision for lifting of complete mini-sub onto a concrete plinth without need for dismantling (except for roof removal if required)	YES	_____
3.11	NRS 004 4.2.2.4.2	Provision of shear-off lifting lugs on roof for ease of roof removal (where roof removal is required prior to lifting mini-sub)	YES	_____
3.12	NRS 004 6.1.2	Mini-sub housing sections/doors bonded	YES	_____
4		Transformer unit		
4.1	NRS 004 6.4.1	Electrical requirements	As per SANS 780	_____
4.2	NRS 004 6.4.4	Vector group	Dyn11	_____
4.3		MV system earthing (Effective/Non-effective)	Non-effective	XXXXXXXXX
4.4		MV system fault level	kA	16
4.5	DSP 34-1621 4.1.2.3.6	LV transformer neutral earthing	Solid – connection to insulated LV neutral/earth bar	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
4.6	DSP 34-1621 5.2.1	Temperature rise limits	As per DSP 34-1621 5.2.1	_____
4.7	SANS 780 8.5.2	Secondary voltage regulation (Off-load) %	+5,0, + 2,5, 0, -2,5, -5,0	_____
4.8	SANS 780 5.6.1	No-load losses W	XXXXXXXXXX	_____
4.9	SANS 780 5.6.1	Load losses W	XXXXXXXXXX	_____
4.10	SANS 780 8.2.7	Impedance voltage (see Table 9 of SANS 780) %	SANS 780	_____
4.11	DSP 34-1621 4.5	X/R	XXXXXXXXXX	_____
4.12	DSP 34-1621 4.5	Cost /kW of no-load losses R/kW	_____	XXXXXXXXXX
4.13	DSP 34-1621 4.5	Cost /kW of load losses R/kW	_____	XXXXXXXXXX
4.14	SANS 780 8.5.3	Audio-sound level – maximum (see table 6 of SANS 780) dB(A)	_____	_____
4.15	DSP 34-1621 4.1.2.2.4	Sealed transformer unit	YES –welded cover	_____
4.16	NRS 004 6.4.7	Transformer MV bushings (NB internal screen to be earthed)	EN 50180 Type C with M16x2 thread	_____
4.17	DSP 34 1621 4.3.1.1.4	MV bushing-centre clearances (minimum) mm	90	_____
4.18	DSP 34-1612 4.3.1.1.4	Clearances between outer bushing- centres and mini-sub metal enclosure (minimum) mm	50	_____
4.19	DSP 34-1621 4.3.1.4	Transformer overload protection facility	YES	_____
4.20		Winding material MV LV	XXXXXXXXXX XXXXXXXXXX	_____ _____
4.21		Manufacturer	XXXXXXXXXX	_____
4.22	DSP 34-1621 4.3.1.4	Top-oil thermoelectric temp-sensing element	YES	_____
5		MV compartment		
5.1	DSP 34-1621 4.3.1.1	Equipment in MV compartment	RMU	_____
5.2		Ring Main Unit manufacturer	XXXXXXXXXX	_____
5.3		Incoming MV / outgoing cable requirements		
	DSP 34-1621 4.3.1.1.4	a) 3 × single core / 1 × three core	1 × 3 core	_____
	DSP 34-1621 4.3.1.1.4	b) Cable support (clamping) required (NRS 012 & D-DT-8019)	YES (Size 75 – 100 mm OD)	_____
		c) Minimum distance from cable clamp to centre-line of RMU bushings mm	800	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
		d) Type of connection (NRS 012) to RMU	Type 4 (screened separable connector)	_____
5.4	DSP 34-1621 4.3.1.2	Interconnecting cables and terminations between RMU and transformer MV bushings	Single core - fully screened	_____
5.5	DSP 34-1621 4.3.1.3	Make (product) connector used on transf. bushings (SSC)	XXXXXXXXXX	_____
5.6	DSP 34-1621 4.3.1.3	Make (product) of connector used on RMU T-off (SSC)	XXXXXXXXXX	_____
5.7	NRS 004 6.1.3	Mini-sub (MV) earth bar (accessible from front of RMU)	YES	_____
5.8	DSP 34-1621 4.1.2.7.6	Make (product) of mains powered earth fault indicator (DSP 34-1080)	XXXXXXXXXX	_____
6		LV Compartment		
6.1	NRS 004 6.3.3.1	LV ASSEMBLY complies with SANS 1973-1	YES	_____
6.2	DSP 34-1621 4.1.2.5.1	Busbar-rating (see Table 1)	A Rated at 1.2 transformer secondary rated current	_____
6.3		Busbar-insulation	Air insulated	_____
6.4	DSP 34-1621 4.1.2.3.1	Busbars	Ø 3 + one identical neutral-earth busbar (insulated from frame)	_____
6.5	NRS 004 6.3.3.1	Current density of busbars	A/mm ² SANS 1973-1	_____
6.6	NRS 004 4.1.2.5	Rated short-time withstand current of main circuit – 1 s	kA _{rms} XXXXXXXXX	_____
6.7	NRS 004 6.3.3.2.6	Min clearance to earth and between phases	mm XXXXXXXXX	_____
6.8	DSP 34-1621 4.1.2.3.4	Provision of a LV neutral surge arrester (as per D-DT-3088) fitted between mini-sub (MV) earth bar and LV neutral-earth busbar	YES	_____
6.9	DSP 34-1621 4.1.2.3.3	LV neutral-earth busbar to be earthed (via a 70mm ² Cu electrical bridge to the mini-sub earth bar)	YES	_____
6.10	DSP 34-1621 4.1.2.5.2	Stainless Steel M12 set screws provided	YES	_____
6.11	DSP 34-1621 4.3.1.5	Provision of LV main switch disconnecter	YES	_____
6.12	DSP 34-1621 4.3.1.5	Make (product) of switch disconnecter	SANS 60947-3	_____
6.13	NRS 004 4.1.2.6	Minimum fault current interrupting capacity	kA XXXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
6.14	DSP 34-1621 4.3.2	Number of outgoing LV feeder bays to be provided for (drill busbar Ø14mm holes)	9	_____
	NRS 004 6.3.3.2.6	Spacing between LV feeder bays (see Figure 1 of DSP 34-1621) mm	110	_____
6.15	DSP 34-1621 4.1.2.4.2	LV panel designed for vertical fuse-bases (FH) or MCCBs (CB)	FH / CB	_____
6.16	NRS 004 6.3.3.2.6	Spacing (vertical): Between phase busbars mm	185	_____
		Between lowest LV busbar and LV neutral mm	300	_____
		Between LV neutral and gland plates (see Figure 1 of DSP 34-1621) mm	200 (min)	_____
6.17	DSP 34-1621 4.1.2.7.1	LV maximum demand ammeters	Required on all three phases	_____
6.18	NRS 004 6.3.3.5.1	Ammeter type	Thermal integrating over 15 min period	_____
6.19	DSP 34-1621 4.1.2.7.2	LV indicating voltmeter (with a selector switch) (YES/NO)	YES	6.19
6.20	NRS 004 6.3.3.5.3	Ammeter and voltmeter size and display mm	96 × 96, 90°	_____
6.21	NRS 004 6.3.3.5.3	Ammeter and voltmeter position	LV compartment (high as practicable)	_____
6.22	NRS 004 6.3.1.2	Provision of removable barrier to separate LV end compartment and front LV compartment	YES – non flammable	_____
7		LV outgoing feeder bay gland plates		
7.1	DSP 34-1621 4.1.2.4.4	Number of gland plates to be provided (Figure C.9 of NRS 004)	6	_____
	NRS 004 6.3.3.3.10	Number of gland holes per feeder bay	2	_____
	NRS 004 6.3.3.3.10	Size of holes per feeder bay: mm	1 x 65 mm	_____
	NRS 004 6.3.3.3.10	Clearances for each hole per feeder bay: mm	1 x 52 mm	_____
	NRS 004 6.3.3.3.10	mm	1 x 98 mm	_____
	NRS 004 6.3.3.3.10	mm	1 x 65 mm	_____
7.2	NRS 004 6.3.3.3.10	Distance between gland plate centre lines (Figure C.9 of NRS 004) mm	110	_____
8		LV auxiliaries		
8.1	DSP 34-1621 4.1.2.7.3	Provision of three point socket outlet in LV compartment (with instantaneous-trip earth leakage unit [20A; 5kA rupturing capacity; 30mA sensitivity] and 20A HRC fuse with neutral fuse link) (YES/NO)	YES	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
8.2	DSP 34-1621 4.1.2.7.4	Provision of a tamperproof compartment for the installation of a photo-cell (YES/NO)	NO	_____
8.3	DSP 34-1621 4.1.2.7.4	300mmx300mm blank plate for PECU	YES	_____
8.4	DSP 34-1621 4.1.2.7.5	Numbering ferrules for auxiliary wiring	YES	_____
8.5	DSP 34 1621 4.3.1.1.3	Push-button fitted to shunt trip RMU tee-off	NO	_____
9		Materials and corrosion protection		
9.1	DSP 34-1621 4.1.3.2.4	Mini-sub enclosure, LV ASSEMBLY and transformer tank:		
	DSP 34-1621 4.1.3.2.5	Inland: mild steel Coastal: 3CR12 or zinc sprayed mild steel or stainless steel	XXXXXXXXXX XXXXXXXXXX	_____ _____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	DS-11 / DS-12 / (DS-14 + DS-16) / (DS-14 + DS-17) / DS-18	_____
9.2	DSP 34-1621 4.1.3.2.6	Transformer radiator: Inland: mild steel Coastal: hot-dipped galvanized / zinc metal sprayed (if corrugated) mild steel	XXXXXXXXXX XXXXXXXXXX	_____ _____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	(DS-13 + DS-16) / (DS-13 + DS-17) / (DS-14 + DS-16) / (DS-14 + DS-17)	_____ _____ _____ _____ _____ _____
9.3	NRS 004 6.3.3.2.2	Tinned copper busbars (YES/NO)	YES	_____
9.4	DSP 34-1621 4.1.3.2.7	Mini-sub base: Material	Steel	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered	(DS-13 + DS-16) / (DS-13 + DS-17)	_____ _____ _____
9.5		Gland plates and support structure:	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.8	Coastal: Material: 3 mm (min) stainless steel		

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
	NRS 004 6.3.3.3.8	Inland Material: 3 mm (min) mild steel / 3CR12 / stainless steel	XXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered if mild steel (Hot-dip. galv. to OR zinc sprayed) – for inland only	DS-13 / DS-14	_____
9.7	DSP 34-1621 4.1.3.2.11	5 mm cork packing (between ends and tank, base and ends, and base and tank)(YES/NO)	YES	_____
9.8	DSP 34-1621 4.1.3.2.12	Final colour	Avocado C12 (SANS 1091)	_____
10		Notices, signs and labels		
10.1	NRS 004 8.2.1	Transformer rating plate	YES	_____
10.2	DSP 34-1621 6.1.2	Treatment and Full First Aid Instructions on inside of MV and LV compartment doors	YES	_____
10.3	DSP 34-1621 6.1.2	Elec. warning signs on all doors and barriers	YES	_____
10.4	NRS 004 8.4.11	Transformer phase labels below bushings	YES	_____
10.5	NRS 004 6.3.3.2.5	Colour-coded LV busbars	YES	_____
10.6	DSP 34-1621 6.1.2	Labelling of MV and LV compartment doors (sign – D-DT-3202 sheet 5 and 4)	YES	_____
10.7	NRS 004 8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	YES	_____
10.8	NRS 004 8.4.4	Mini-sub mass and stock number stencilled on side or rear.	YES	_____
10.9	NRS 004 8.4.6	ID markings linking roof to body per batch	YES	_____
10.10	NRS 004 4.2.2.3.9	Provision for the safe-keeping of documents	YES	_____
11		Documentation		
11.1	DSP 34-1621 6.2.3	Type test certificates (provide ref. numbers of reports)	Sets 1	_____
11.2	DSP 34-1621 6.2.3	Routine test certificates	Sets 1	_____
11.3	DSP 34-1621 6.2.2	Drawings (Mini-sub GA, LV ASSEMBLY, Operating procedure label for RMU tee-off)	Sets 1	_____
11.4	DSP 34-1621 6.2.2	Diagrams (Mini-sub schematic – including the LV ASSEMBLY, Rating Plates)	Sets 1	_____
12		Accessories		
12.1	DSP 34-1621 7.1.2	Type of sealant provided	XXXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

22 kV Type B Mini-substation up to 500kVA (with RMU)**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

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical Schedules A and B and Deviation Schedule

(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 *DSP 34-1621* and provide the tenderers with the relevant schedules A and B.

Schedule A gives the Distribution Group'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.

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical schedules A and B**11 kV Type A 1000kVA Miniature substation (without RMU)**

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
1	2.1.1	Standard operating conditions		
1.1	NRS 004 4.2.1.3	a) Altitude m	1800	XXXXXXXXXX
1.2	SANS60694 2.1.2	b) Ambient air temperature °C	-5 to +40	XXXXXXXXXX
1.3		c) Lightning ground flash density Flashes/ km ² /year	High	XXXXXXXXXX
1.4	SANS60694 2.1.2	d) Maximum solar radiation W/m ²	1000	XXXXXXXXXX
1.5		e) Ultraviolet radiation	High	XXXXXXXXXX
1.6	NRS 004 4.2.1.3	f) Relative humidity %	98	XXXXXXXXXX
1.7	NRS 004 4.2.1.3 & DSP 34-1621 4.1.1	g) Pollution level (inland – low- corrosive / coastal – corrosive)	“very heavy” for coastal “medium” for inland	XXXXXXXXXX
1.8	SANS60694 2.1.2	h) wind pressure Pa	700	XXXXXXXXXX
1.9	DSP 34-1621 4.1.1	i) Pollution conditions inside mini-sub	Pollution Degree 3	XXXXXXXXXX
2		Ratings		
2.1	DSP 34-1621 4.1.2.2.1	Transformer power rating kVA	1000	_____
2.2	DSP 34-1621 4.1.2.2.2	Nominal voltage of system (U _n) kV _{rms}	11	_____
2.3	NRS 004 4.1.4 & SANS 780 1.3	System frequency Hz	50	_____
2.4	NRS 004 4.1.4	Number of phases	3	_____
2.5	SANS 780 8.26	Transformer rated no-load secondary voltage V _{rms}	420	_____
2.6	SANS 1019 5.4.2	Rated power-frequency voltage (U _m) kV _{rms}	12	_____
2.7	SANS 1019 5.4.2	Rated short-duration power frequency withstand voltage [50Hz: 1 min] kV _{rms}	28	_____
2.8	DSP 34-1621 4.1.2.1	Rated lightning impulse withstand voltage (SANS 1019 5.4.2 List 3) kV _{peak}	95	_____
2.9	SANS 780	Transformer induced voltage withstand level (see Table 2 – SANS 780) kV _{rms}	22	_____
3		Design & construction		
3.1	DSP 34-1621 4.1.3.1.2	Layout (Type A/Type B)	Type B (NRS 004)	_____
3.2	NRS 004 4.2.2.3.1	Enclosure IP rating	IP35	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
3.3	DSP 34-1621 4.1.3.1.4	Removable base sections adjacent to MV compartment (sections to lap bolted with nuts on the inside of the channel and housing)	YES	_____
3.4	NRS 004 4.4.2.5	Concealed door hinges	YES	_____
3.5	DSP 34-1621 4.1.3.1.5	Compartment fastening/locking (pad lockable)	YES – three point locking with 1 additional 10 mm sunken captive Allen cap screw	_____
3.6	DSP 34-1621 4.1.3.1.6	“Heavy-duty” stainless steel door locks	YES	_____
3.7	DSP 34-1621 4.1.3.1.7	Compartment lock protection facility required?	Y/N YES	_____
3.8		Total mass of mini-substation	kg	XXXXXXXXX
3.9		Overall dimensions		
		a) MV compartment length	mm	XXXXXXXXX
		b) LV compartment length	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	c) Overall length	mm	3000
	NRS 004 4.2.2.1.2	d) Overall width	mm	1650
		e) Overall height	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	f) Base width	mm	1200
3.10	NRS 004 4.2.2.5	Provision for lifting of complete mini-sub onto a concrete plinth without need for dismantling (except for roof removal if required)	YES	_____
3.11	NRS 004 4.2.2.4.2	Provision of shear-off lifting lugs on roof for ease of roof removal (where roof removal is required prior to lifting mini-sub)	YES	_____
3.12	NRS 004 6.1.2	Mini-sub housing sections/doors bonded	YES	_____
4		Transformer unit		
4.1	NRS 004 6.4.1	Electrical requirements	As per SANS 780	_____
4.2	NRS 004 6.4.4	Vector group	Dyn11	_____
4.3		MV system earthing (Effective/Non-effective)	Non-effective	XXXXXXXXX
4.4		MV system fault level	kA	20
4.5	DSP 34-1621 4.1.2.3.6	LV transformer neutral earthing	Solid – connection to insulated LV neutral bar	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
4.6	DSP 34-1621 5.2.1	Temperature rise limits	As per DSP 34-1621 5.2.1	_____
4.7	SANS 780 8.5.2	Secondary voltage regulation (Off-load) %	+5,0, + 2,5, 0, -2,5, -5,0	_____
4.8	SANS 780 5.6.1	No-load losses W	XXXXXXXXXX	_____
4.9	SANS 780 5.6.1	Load losses W	XXXXXXXXXX	_____
4.10	SANS 780 8.2.7	Impedance voltage (see Table 9 of SANS 780) %	SANS 780	_____
4.11	DSP 34-1621 4.5	X/R ratio	XXXXXXXXXX	_____
4.12	DSP 34-1621 4.5	Cost /kW of no-load losses R/kW	_____	XXXXXXXXXX
4.13	DSP 34-1621 4.5	Cost /kW of load losses R/kW	_____	XXXXXXXXXX
4.14	SANS 780 8.5.3	Audio-sound level – maximum (see table 6 of SANS 780) dB(A)	56	_____
4.15	DSP 34-1621 4.1.2.2.4	Sealed transformer unit	YES – welded cover	_____
4.16	NRS 004 6.4.7	Transformer MV bushings (NB internal screen to be earthed)	EN 50180 Type C with M16x2 thread	_____
4.17	DSP 34-1621 4.2.1.1.1	MV bushing-centre clearances (minimum) mm	135	_____
4.18	DSP 34-1621 4.2.1.1.1	Clearances between outer bushing- centres and mini-sub metal enclosure (minimum) mm	90	_____
4.19	DSP 34-1621 4.2.1.2	Transformer overload protection facility	YES	_____
4.20		Winding material (Al / Cu) MV LV	XXXXXXXXXX XXXXXXXXXX	_____ _____
4.21		Manufacturer	XXXXXXXXXX	_____
4.22	DSP 34-1621 4.2.1.2.2	Top-oil thermoelectric temp-sensing element	YES	_____
5		MV compartment		
5.1	DSP 34-1621 4.2.2.1.1	Equipment in MV compartment	11kV air- insulated junction box (D-DT-0853)	_____
5.2		Incoming / outgoing MV cable requirements		
	DSP 34-1621 4.2.2.1.2	a) 3 × single core / 1 x three core	1 × 3 core	_____
	DSP 34-1621 4.2.2.1.2	b) Cable support (clamping) required (NRS 012 & D-DT-8019)	YES (Size 50 – 75 mm OD)	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
	DSP 34-1621 4.2.2.1.2	c) Minimum distance from cable clamp to centre-line of post insulators (NRS 012 & D-DT-8053)	mm 800	_____
	DSP 34-1621 4.2.2.1.1	d) Type of connections to post insulators (NRS 012)	Type 1 (Bare)	_____
	DSP 34-1621 4.2.2.1.1	e) Type of connections to transformer bushings (NRS 012) (1-core jumpers from junction box)	Type 3 (unscreened separable connectors)	_____
5.3	DSP 34-1621 4.2.2.1.1	Make (product) of connector used on transf. bushings	XXXXXXXXXX	_____
5.4	NRS 004 6.1.3	Mini-sub (MV) earth bar accessible in MV compartment	YES	_____
5.5	DSP 34-1621 4.1.2.7.6	Make (product) of mains powered earth fault indicator (DSP 34-1080)	XXXXXXXXXX	_____
6		LV Compartment		
6.1	NRS 004 6.3.3.1	LV ASSEMBLY complies with SANS 1973-1	YES	_____
6.2	DSP 34-1621 4.1.2.5.1	Busbar-rating (see Table 1)	A	Rated at 1.2 transformer secondary rated current
6.3		Busbar-insulation		Air insulated
6.4	DSP 34-1621 4.1.2.3.2	Busbars	Ø	3 + one identical neutral busbar + earth busbar (insulated from frame)
6.5	NRS 004 6.3.3.1	Current density of busbars	A/mm ²	SANS 1973-1
6.6	NRS 004 4.1.2.5	Rated short-time withstand current of main circuit – 1 s	kA _{rms}	XXXXXXXXXX
6.7	NRS 004 6.3.3.2.6	Min clearance to earth and between phases	mm	XXXXXXXXXX
6.8	DSP 34-1621 4.1.2.3.4	Provision of a LV neutral surge arrester (as per D-DT-3088) fitted between mini-sub earth bar and LV earth busbar	YES	_____
6.9	DSP 34-1621 4.1.2.3.3	LV earth busbar to be earthed (via a 70mm ² Cu electrical bridge to the mini-sub earth bar)	YES	_____
		LV neutral busbar to be bridged to the LV earth bar (see Figure 2)	YES	_____
6.10	DSP 34-1621 4.1.2.5.2	Stainless Steel M12 set screws provided	YES	_____
6.11	DSP 34-1621 4.2.1.2.1	Provision of LV main circuit breaker	YES	_____
6.12	DSP 34-1621 4.2.1.2.1	Make (product) of circuit breaker	SANS 556-1	_____
6.13	NRS 004 4.1.2.6	Minimum fault current interrupting capacity	kA	XXXXXXXXXX

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
6.14	DSP 34-1621 4.1.2.4.5	Number of outgoing LV feeder bays to be provided for (drill busbar Ø14mm holes)	6	_____
	NRS 004 6.3.3.2.6	Spacing between LV feeder bays (see Figure 1 of DSP 34-1621) mm	110	_____
6.15	DSP 34-1621 4.1.2.4.2	LV panel designed for vertical fuse-bases (FH) or MCCBs (CB)	FH / CB	_____
6.16	NRS 004 6.3.3.2.6 and DSP 34-1621 4.1.2.3.2	Spacing (vertical): Between phase busbars Mm	185	_____
		Between lowest LV busbar and LV neutral mm	300	_____
		Between LV neutral and LV earth mm	200 (min)	_____
		Between LV earth and gland plates mm (see Figure 2 of DSP 34-1621)	200 (min)	_____
6.17	DSP 34-1621 4.1.2.7.1	LV maximum demand ammeters	Required on all three phases	_____
6.18	NRS 004 6.3.3.5.1	Ammeter type	Thermal integrating over 15 min period	_____
6.19	DSP 34-1621 4.1.2.7.2	LV indicating voltmeter (with a selector switch) (YES/NO)	YES	_____
6.20	NRS 004 6.3.3.5.3	Ammeter and voltmeter size and display mm	96 × 96, 90°	_____
6.21	NRS 004 6.3.3.5.3	Ammeter and voltmeter position	LV compartment (high as practicable)	_____
7		LV outgoing feeder bay gland plates		
7.1	DSP 34-1621 4.1.2.4.5	Number of gland plates to be provided (Figure C.9 of NRS 004)	6	_____
	NRS 004 6.3.3.3.10	Number of gland holes per feeder bay	2	_____
	NRS 004 6.3.3.3.10	Size of holes per feeder bay: mm	1 x 65 mm	_____
	NRS 004 6.3.3.3.10	Clearances for each hole per feeder bay: mm	1 x 52 mm	_____
	NRS 004 6.3.3.3.10	mm	1 x 98 mm	_____
	NRS 004 6.3.3.3.10	mm	1 x 65 mm	_____
7.2	NRS 004 6.3.3.3.10	Distance between gland plate centre lines. (Figure C.9 of NRS 004)	110	_____
8		LV auxiliaries		
8.1	DSP 34-1621 4.1.2.7.3	Provision of three point socket outlet in LV compartment (with instantaneous-trip earth leakage unit [20 A; 5 kA rupturing capacity; 30 mA sensitivity] and 20 A HRC fuse with neutral fuse link) (YES/NO)	YES	_____
8.2	DSP 34-1621 4.1.2.7.4	Provision of a tamperproof compartment for the installation of a photo-cell (YES/NO)	NO	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
8.3	DSP 34-1621 4.1.2.7.4	300 mm x 300 mm blank plate for PECU	YES	_____
8.4	DSP 34-1621 4.1.2.7.5	Numbering ferrules for auxiliary wiring	YES	_____
9		Materials and corrosion protection		
9.1	DSP 34-1621 4.1.3.2.4	Mini-sub enclosure, LV ASSEMBLY and transformer tank:		
	DSP 34-1621 4.1.3.2.5	Inland: mild steel	XXXXXXXXXX	_____
		Coastal: 3CR12 or zinc sprayed mild steel or stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	DS-11 / DS-12 / (DS-14 + DS-16) / (DS-14 + DS-17) / DS-18	_____
9.2	DSP 34-1621 4.1.3.2.6	Transformer radiator:		
		Inland: mild steel	XXXXXXXXXX	_____
		Coastal: hot-dipped galvanized / zinc metal sprayed (if corrugated) mild steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	(DS-13 + DS-16) / (DS-13 + DS-17) / (DS-14 + DS-16) / (DS-14 + DS-17)	_____
9.3	NRS 004 6.3.3.2.2	Tinned copper busbars (YES/NO)	YES	_____
9.4	DSP 34-1621 4.1.3.2.7	Mini-sub base: Material	Steel	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered	(DS-13 + DS-16) / (DS-13 + DS-17)	_____
9.5		Gland plates and support structure:	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.8	Coastal: Material: 3 mm (min) stainless steel		_____
	NRS 004 6.3.3.3.8	Inland Material: 3 mm (min) mild steel / 3CR12 / stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered if mild steel (Hot-dip. galv. to OR zinc sprayed) – for inland only	DS-13 / DS-14	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
9.7	DSP 34-1621 4.1.3.2.11	5 mm cork packing (between ends and tank, base and ends, and base and tank)(YES/NO)	YES	_____
9.8	DSP 34-1621 4.1.3.2.12	Final colour	Avocado C12 (SANS 1091)	_____
10		Notices, signs and labels		
10.1	NRS 004 8.2.1	Transformer rating plate	YES	_____
10.2	DSP 34-1621 6.1.2	Treatment and Full First Aid Instructions on inside of MV and LV compartment doors	YES	_____
10.3	DSP 34-1621 6.1.2	Elec. warning signs on all doors and barriers	YES	_____
10.4	NRS 004 8.4.11	Transformer phase labels below bushings	YES	_____
10.5	NRS 004 6.3.3.2.5	Colour-coded LV busbars	YES	_____
10.6	DSP 34-1621 6.1.2	Labelling of MV and LV compartment doors (sign – D-DT-3202 sheet 5 and 4)	YES	_____
10.7	NRS 004 8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	YES	_____
10.8	NRS 004 8.4.4	Mini-sub mass and stock number stencilled on side or rear.	YES	_____
10.9	NRS 004 8.4.6	ID markings linking roof to body per batch	YES	_____
10.10	NRS 004 4.2.2.3.9	Provision for the safe-keeping of documents	YES	_____
11		Documentation		
11.1	DSP 34-1621 6.2.3	Type test certificates (provide ref. numbers of reports)	Sets 1	_____
11.2	DSP 34-1621 6.2.3	Routine test certificates	Sets 1	_____
11.3	DSP 34-1621 6.2.2	Drawings (Mini-sub GA, LV ASSEMBLY, Operating procedure label for RMU tee-off)	Sets 1	_____
11.4	DSP 34-1621 6.2.2	Diagrams (Mini-sub schematic – including the LV ASSEMBLY, Rating Plates)	Sets 1	_____
12		Accessories		
12.1	DSP 34-1621 7.1.2	Type of sealant provided	XXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

11 kV Type A 1000kVA Mini-substation (without RMU)**Deviation schedule**

If there are any deviations from this specification they shall be listed below with the reasons for deviation. In addition, evidence shall be provided that the proposed deviations will at least be more cost-effective than the Eskom specification.

Item	Clause	Proposed deviation

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical schedules A and B**11 kV Type B 1000kVA Miniature substation (with RMU)**

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
1	2.1.1	Standard operating conditions		
1.1	NRS 004 4.2.1.3	b) Altitude m	1800	XXXXXXXXXX
1.2	SANS60694 2.1.2	b) Ambient air temperature °C	-5 to +40	XXXXXXXXXX
1.3		c) Lightning ground flash density Flashes/ km ² /year	High	XXXXXXXXXX
1.4	SANS60694 2.1.2	d) Maximum solar radiation W/m ²	1000	XXXXXXXXXX
1.5		e) Ultraviolet radiation	High	XXXXXXXXXX
1.6	NRS 004 4.2.1.3	f) Relative humidity %	98	XXXXXXXXXX
1.7	NRS 004 4.2.1.3 & DSP 34-1621 4.1.1	g) Pollution level (inland – low- corrosive / coastal – corrosive)	"very heavy" for coastal "medium" for inland	XXXXXXXXXX
1.8	SANS60694 2.1.2	h) wind pressure Pa	700	XXXXXXXXXX
1.9	DSP 34-1621 4.1.1	i) Pollution conditions inside mini-sub	Pollution Degree 3	XXXXXXXXXX
2		Ratings		
2.1	DSP 34-1621 4.1.2.2.1	Transformer power rating kVA	1000	_____
2.2	DSP 34-1621 4.1.2.2.2	Nominal voltage of system (U _n) kV _{rms}	11	_____
2.3	NRS 004 4.1.4 & SANS 780 1.3	System frequency Hz	50	_____
2.4	NRS 004 4.1.4	Number of phases	3	_____
2.5	SANS 780 8.26	Transformer rated no-load secondary voltage V _{rms}	420	_____
2.6	SANS 1019 5.4.2	Rated power-frequency voltage (U _m) kV _{rms}	12	_____
2.7	SANS 1019 5.4.2	Rated short-duration power frequency withstand voltage [50Hz: 1 min] kV _{rms}	28	_____
2.8	DSP 34-1621 4.1.2.1	Rated lightning impulse withstand voltage (SANS 1019 5.4.2 List 3) kV _{peak}	95	_____
2.9	SANS 780	Transformer induced voltage withstand level (see Table 2 – SANS 780) kV _{rms}	22	_____
3		Design & construction		
3.1	DSP 34-1621 4.1.3.1.3	Layout (Type A/Type B)	Type B	_____
3.2	NRS 004 4.2.2.3.1	Enclosure IP rating	IP35	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
3.3	DSP 34-1621 4.1.3.1.4	Removable base sections adjacent to MV compartment (sections to lap bolted with nuts on the inside of the channel and housing)	YES	_____
3.4	NRS 004 4.4.2.5	Concealed door hinges	YES	_____
3.5	DSP 34-1621 4.1.3.1.5	Compartment fastening/locking (pad lockable)	YES – three point locking with 1 additional 10 mm sunken captive Allen cap screw	_____
3.6	DSP 34-1621 4.1.3.1.6	“Heavy-duty” stainless steel door locks	YES	_____
3.7	DSP 34-1621 4.1.3.1.7	Compartment lock protection facility required?	Y/N YES	_____
3.8		Total mass of mini-substation	kg	XXXXXXXXX
3.9		Overall dimensions		
		a) MV compartment length	mm	XXXXXXXXX
		b) LV compartment length	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	c) Overall length	mm	3000
	NRS 004 4.2.2.1.2	d) Overall width	mm	1650
		e) Overall height	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	f) Base width	mm	1200
3.10	NRS 004 4.2.2.5	Provision for lifting of complete mini-sub onto a concrete plinth without need for dismantling (except for roof removal if required)	YES	_____
3.11	NRS 004 4.2.2.4.2	Provision of shear-off lifting lugs on roof for ease of roof removal (where roof removal is required prior to lifting mini-sub)	YES	_____
3.12	NRS 004 6.1.2	Mini-sub housing sections/doors bonded	YES	_____
4		Transformer unit		
4.1	NRS 004 6.4.1	Electrical requirements	As per SANS 780	_____
4.2	NRS 004 6.4.4	Vector group	Dyn11	_____
4.3		MV system earthing (Effective/Non-effective)	Non-effective	XXXXXXXXX
4.4		MV system fault level	kA	20
4.5	DSP 34-1621 4.1.2.3.6	LV transformer neutral earthing	Solid – connection to insulated LV neutral bar	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
4.6	DSP 34-1621 5.2.1	Temperature rise limits	As per DSP 34-1621 5.2.1	_____
4.7	SANS 780 8.5.2	Secondary voltage regulation (Off-load)	% +5,0, + 2,5, 0, -2,5, -5,0	_____
4.8	SANS 780 5.6.1	No-load losses	W XXXXXXXXXX	_____
4.9	SANS 780 5.6.1	Load losses	W XXXXXXXXXX	_____
4.10	SANS 780 8.27	Impedance voltage (see Table 9 of SANS 780)	% SANS 780	_____
4.11	DSP 34-1621 4.5	X/R ratio	XXXXXXXXXX	_____
4.12	DSP 34-1621 4.5	Cost /kW of no-load losses	R/kW _____	XXXXXXXXXX
4.13	DSP 34-1621 4.5	Cost /kW of load losses	R/kW _____	XXXXXXXXXX
4.14	SANS 780 8.5.3	Audio-sound level – maximum (see table 6 of SANS 780)	dB(A) 56	_____
4.15	DSP 34-1621 4.1.2.2.4	Sealed transformer unit	YES – welded cover	_____
4.16	NRS 004 6.4.7	Transformer MV bushings (NB internal screen to be earthed)	EN 50180 Type C with M16x2 thread	_____
4.17	DSP 34-1621 4.3.1.1.4	MV bushing-centre clearances (minimum)	mm 90	_____
4.18	DSP 34-1621 4.3.1.1.4	Clearances between outer bushing- centres and mini-sub metal enclosure (minimum)	mm 50	_____
4.19	DSP 34-1621 4.2.1.2	Transformer overload protection facility	YES	_____
4.20		Winding material (Al / Cu)	MV LV XXXXXXXXXX XXXXXXXXXX	_____ _____
4.21		Manufacturer	XXXXXXXXXX	_____
4.22	DSP 34-1621 4.2.1.2.2	Top-oil thermoelectric temp-sensing element	YES	_____
5		MV compartment		
5.1	DSP 34-1621 4.3.1.1	Equipment in MV compartment	RMU	_____
5.2		Ring Main Unit manufacturer	XXXXXXXXXX	_____
5.3		Incoming / outgoing MV cable requirements		
	DSP 34-1621 4.3.1.1.4	a) 3 × single core / 1 × three core	1 × 3 core	_____
	DSP 34-1621 4.3.1.1.4	b) Cable support (clamping) required (NRS 012 & D-DT-8019) all cables expect 11 kV paper insulated.	YES (Size 75 – 100 mm OD)	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
	DSP 34-1621 4.3.1.1.4	11 kV paper insulated cables	YES (Size 50 – 75 mm OD)	
		c) Minimum distance from cable clamp to centre-line of RMU bushings mm	800	_____
		d) Type of connection (NRS 012) to RMU	Type 3 (unscreened separable connectors)	_____
		e) Interconnection arrangement between RMU and transformer MV bushings	Single core screened cable	
5.4	DSP 34-1621 4.3.1.3	Make (product) connector used on transf. bushings (SSC)	XXXXXXXXXX	_____
5.5	DSP 34-1621 4.3.1.3	Make (product) of connector used on RMU T-off (USC/SSC)	XXXXXXXXXX	_____
5.6	NRS 004 6.1.3	Mini-sub (MV) earth bar (accessible in front of RMU)	YES	_____
5.7	DSP 34-1621 4.1.2.7.6	Make (product) of mains powered earth fault indicator (DSP 34-1080)	XXXXXXXXXX	_____
6		LV Compartment		
6.1	NRS 004 6.3.3.1	LV ASSEMBLY complies with SANS 1973-1	YES	_____
6.2	DSP 34-1621 4.1.2.5.1	Busbar-rating (see Table 1)	A	Rated at 1.2 transformer secondary rated current
6.3		Busbar-insulation		Air insulated
6.4	DSP 34-1621 4.1.2.3.2	Busbars	Ø	3 + one identical neutral busbar + earth busbar (insulated from frame)
6.5	NRS 004 6.3.3.1	Current density of busbars	A/mm ²	SANS 1973- 1
6.6	NRS 004 4.1.2.5	Rated short-time withstand current of main circuit – 1 s	kA _{rms}	XXXXXXXXXX
6.7	NRS 004 6.3.3.2.6	Min clearance to earth and between phases	mm	XXXXXXXXXX
6.8	DSP 34-1621 4.1.2.3.4	Provision of a LV neutral surge arrester (as per D-DT-3088) fitted between mini- sub (MV) earth bar and LV neutral-earth busbar	YES	_____
6.9	DSP 34-1621 4.1.2.3.3	LV neutral-earth busbar to be earthed (via a 70mm ² Cu electrical bridge to the mini-sub earth bar)	YES	_____
		LV neutral busbar to be bridged to the LV earth bar (see Figure 2)	YES	_____
6.10	4.1.2.5.2	Stainless Steel M12 set screws provided	YES	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
6.11	DSP 34-1621 4.3.1.5	Provision of main LV circuit-breaker	YES	_____
6.12	DSP 34-1621 4.3.1.5	Make (product) of circuit breaker	SANS 556-1	_____
6.13	NRS 004 4.1.2.6	Minimum fault current interrupting capacity	kA XXXXXXXXX	_____
6.14	DSP 34-1621 4.3.2	Number of outgoing LV feeder bays to be provided for (drill busbar Ø14mm holes)	9	_____
	NRS 004 6.3.3.2.6	Spacing between LV feeder bays (see Figure 1 of DSP 34-1621)	mm 110	_____
6.15	DSP 34-1621 4.1.2.4.2	LV panel designed for vertical fuse-bases (FH) or MCCBs (CB)	FH / CB	_____
6.16	NRS 004 6.3.3.2.6 and DSP 34-1621 4.1.2.3.2	Spacing (vertical): Between phase busbars	Mm 185	_____
		Between lowest LV busbar and LV neutral	mm 300	_____
		Between LV neutral and LV earth	mm 200 (min)	_____
		Between LV earth and gland plates (see Figure 2 of DSP 34-1621)	mm 200 (min)	_____
6.17	DSP 34-1621 4.1.2.7.1	LV maximum demand ammeters	Required on all three phases	_____
6.18	NRS 004 6.3.3.5.1	Ammeter type	Thermal integrating over 15 min period	_____
6.19	DSP 34-1621 4.1.2.7.2	LV indicating voltmeter (with a selector switch) (YES/NO)	YES	_____
6.20	NRS 004 6.3.3.5.3	Ammeter and voltmeter size and display	mm 96 × 96, 90°	_____
6.21	NRS 004 6.3.3.5.3	Ammeter and voltmeter position	LV compartment (high as practicable)	_____
6.22	NRS 004 6.3.1.2	Provision of removable barrier to separate LV end compartment and front LV compartment	YES – non flammable	_____
7		LV outgoing feeder bay gland plates		
7.1	DSP 34-1621 4.1.2.4.5	Number of gland plates to be provided (Figure C.9 of NRS 004)	6	_____
	NRS 004 6.3.3.3.10	Number of gland holes per feeder bay	2	_____
	NRS 004 6.3.3.3.10	Size of holes per feeder bay:	mm 1 x 65 mm	_____
	NRS 004 6.3.3.3.10	Clearances for each hole per feeder bay:	mm 1 x 52 mm	_____
	NRS 004 6.3.3.3.10		mm 1 x 98 mm	_____
	NRS 004 6.3.3.3.10		mm 1 x 65 mm	_____
7.2	NRS 004 6.3.3.3.10	Distance between gland plate centre lines. (Figure C.9 of NRS 004)	mm 110	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
8		LV auxiliaries		
8.1	DSP 34-1621 4.1.2.7.3	Provision of three point socket outlet in LV compartment (with instantaneous-trip earth leakage unit [20 A; 5 kA rupturing capacity; 30 mA sensitivity] and 20 A HRC fuse with neutral fuse link) (YES/NO)	YES	_____
8.2	DSP 34-1621 4.1.2.7.4	Provision of a tamperproof compartment for the installation of a photo-cell (YES/NO)	NO	_____
8.3	DSP 34-1621 4.1.2.7.4	300 mm x 300 mm blank plate for PECU	YES	_____
8.4	DSP 34-1621 4.1.2.7.5	Numbering ferrules for auxiliary wiring	YES	_____
9		Materials and corrosion protection		
9.1	DSP 34-1621 4.1.3.2.4	Mini-sub enclosure, LV ASSEMBLY and transformer tank:		
	DSP 34-1621 4.1.3.2.5	Inland: mild steel	XXXXXXXXXX	_____
		Coastal: 3CR12 or zinc sprayed mild steel or stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	DS-11 / DS-12 / (DS-14 + DS-16) / (DS-14 + DS-17) / DS-18	_____
9.2	DSP 34-1621 4.1.3.2.6	Transformer radiator:		
		Inland: mild steel	XXXXXXXXXX	_____
		Coastal: hot-dipped galvanized / zinc metal sprayed (if corrugated) mild steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	(DS-13 + DS-16) / (DS-13 + DS-17) / (DS-14 + DS-16) / (DS-14 + DS-17)	_____
9.3	NRS 004 6.3.3.2.2	Tinned copper busbars (YES/NO)	YES	_____
9.4	DSP 34-1621 4.1.3.2.7	Mini-sub base: Material	Steel	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered	(DS-13 + DS-16) / (DS-13 + DS-17)	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
9.5		Gland plates and support structure:	XXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.8	Coastal: Material: 3 mm (min) stainless steel		
	NRS 004 6.3.3.3.8	Inland Material: 3 mm (min) mild steel / 3CR12 / stainless steel	XXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered if mild steel (Hot-dip. galv. to OR zinc sprayed) – for inland only	DS-13 / DS- 14	_____
9.7	DSP 34-1621 4.1.3.2.11	5 mm cork packing (between ends and tank, base and ends, and base and tank)(YES/NO)	YES	_____
9.8	DSP 34-1621 4.1.3.2.12	Final colour	Avocado C12 (SANS 1091)	_____
10		Notices, signs and labels		
10.1	NRS 004 8.2.1	Transformer rating plate	YES	_____
10.2	DSP 34-1621 6.1.2	Treatment and Full First Aid Instructions on inside of MV and LV compartment doors	YES	_____
10.3	DSP 34-1621 6.1.2	Elec. warning signs on all doors and barriers	YES	_____
10.4	NRS 004 8.4.11	Transformer phase labels below bushings	YES	_____
10.5	NRS 004 6.3.3.2.5	Colour-coded LV busbars	YES	_____
10.6	DSP 34-1621 6.1.2	Labelling of MV and LV compartment doors (sign – D-DT-3202 sheet 5 and 4)	YES	_____
10.7	NRS 004 8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	YES	_____
10.8	NRS 004 8.4.4	Mini-sub mass and stock number stencilled on side or rear.	YES	_____
10.9	NRS 004 8.4.6	ID markings linking roof to body per batch	YES	_____
10.10	NRS 004 4.2.2.3.9	Provision for the safe-keeping of documents	YES	_____
11		Documentation		
11.1	DSP 34-1621 6.2.3	Type test certificates (provide ref. numbers of reports)	Sets 1	_____
11.2	DSP 34-1621 6.2.3	Routine test certificates	Sets 1	_____
11.3	DSP 34-1621 6.2.2	Drawings (Mini-sub GA, LV ASSEMBLY, Operating procedure label for RMU tee- off)	Sets 1	_____
11.4	DSP 34-1621 6.2.2	Diagrams (Mini-sub schematic – including the LV ASSEMBLY, Rating Plates)	Sets 1	_____
12		Accessories		

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
12.1	DSP 34-1621 7.1.2	Type of sealant provided	XXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

11 kV Type B 1000kVA Mini-substation (with RMU)**Deviation schedule**

If there are any deviations from this specification they shall be listed below with the reasons for deviation. In addition, evidence shall be provided that the proposed deviations will at least be more cost-effective than the Eskom specification.

Item	Clause	Proposed deviation

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical schedules A and B**22 kV Type A 1000kVA Miniature substation (without RMU)**

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
1	2.1.1	Standard operating conditions		
1.1	NRS 004 4.2.1.3	a) Altitude m	1800	XXXXXXXXXX
1.2	SANS60694 2.1.2	b) Ambient air temperature °C	-5 to +40	XXXXXXXXXX
1.3		c) Lightning ground flash density Flashes/ km ² /year	High	XXXXXXXXXX
1.4	SANS60694 2.1.2	d) Maximum solar radiation W/m ²	1000	XXXXXXXXXX
1.5		e) Ultraviolet radiation	High	XXXXXXXXXX
1.6	NRS 004 4.2.1.3	f) Relative humidity %	98	XXXXXXXXXX
1.7	NRS 004 4.2.1.3 & DSP 34-1621 4.1.1	g) Pollution level (inland – low- corrosive / coastal – corrosive)	"very heavy" for coastal "medium" for inland	XXXXXXXXXX
1.8	SANS60694 2.1.2	h) wind pressure Pa	700	XXXXXXXXXX
1.9	DSP 34-1621 4.1.1	i) Pollution conditions inside mini-sub	Pollution Degree 3	XXXXXXXXXX
2		Ratings		
2.1	DSP 34-1621 4.1.2.2.1	Transformer power rating kVA	1000	_____
2.2	DSP 34-1621 4.1.2.2.2	Nominal voltage of system (U _n) kV _{rms}	22	_____
2.3	NRS 004 4.1.4 & SANS 780 1.3	System frequency Hz	50	_____
2.4	NRS 004 4.1.4	Number of phases	3	_____
2.5	SANS 780 8.26	Transformer rated no-load secondary voltage V _{rms}	420	_____
2.6	SANS 1019 5.4.2	Rated power-frequency voltage (U _m) kV _{rms}	24	_____
2.7	SANS 1019 5.4.2	Rated short-duration power frequency withstand voltage [50Hz: 1 min] kV _{rms}	50	_____
2.8	DSP 34-1621 4.1.2.1	Rated lightning impulse withstand voltage (SANS 1019 5.4.2 List 3) kV _{peak}	150	_____
2.9	SANS 780	Transformer induced voltage withstand level (see Table 2 – SANS 780) kV _{rms}	44	_____
3		Design & construction		
3.1	DSP 34-1621 4.1.3.1.2	Layout (Type A/Type B)	Type B (NRS 004)	_____
3.2	NRS 004 4.2.2.3.1	Enclosure IP rating	IP35	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
3.3	DSP 34-1621 4.1.3.1.4	Removable base sections adjacent to MV compartment (sections to lap bolted with nuts on the inside of the channel and housing)	YES	_____
3.4	NRS 004 4.4.2.5	Concealed door hinges	YES	_____
3.5	DSP 34-1621 4.1.3.1.5	Compartment fastening/locking (pad lockable)	YES – three point locking with 1 additional 10 mm sunken captive Allen cap screw	_____
3.6	DSP 34-1621 4.1.3.1.6	“Heavy-duty” stainless steel door locks	YES	_____
3.7	DSP 34-1621 4.1.3.1.7	Compartment lock protection facility required?	Y/N YES	_____
3.8		Total mass of mini-substation	kg	XXXXXXXXX
3.9		Overall dimensions		
		a) MV compartment length	mm	XXXXXXXXX
		b) LV compartment length	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	c) Overall length	mm	3000
	NRS 004 4.2.2.1.2	d) Overall width	mm	1650
		e) Overall height	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	f) Base width	mm	1200
3.10	NRS 004 4.2.2.5	Provision for lifting of complete mini-sub onto a concrete plinth without need for dismantling (except for roof removal if required)	YES	_____
3.11	NRS 004 4.2.2.4.2	Provision of shear-off lifting lugs on roof for ease of roof removal (where roof removal is required prior to lifting mini-sub)	YES	_____
3.12	NRS 004 6.1.2	Mini-sub housing sections/doors bonded	YES	_____
4		Transformer unit		
4.1	NRS 004 6.4.1	Electrical requirements	As per SANS 780	_____
4.2	NRS 004 6.4.4	Vector group	Dyn11	_____
4.3		MV system earthing (Effective/Non-effective)	Non-effective	XXXXXXXXX
4.4		MV system fault level	20	XXXXXXXXX
4.5	DSP 34-1621 4.1.2.3.6	LV transformer neutral earthing	Solid connection to insulated LV neutral/earth bar	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
4.6	DSP 34-1621 5.2.1	Temperature rise limits	As per DSP 34-1621 5.2.1	_____
4.7	SANS 780 8.5.2	Secondary voltage regulation (Off-load) %	+5,0, + 2,5, 0, -2,5, -5,0	_____
4.8	SANS 780 5.6.1	No-load losses W	XXXXXXXXXX	_____
4.9	SANS 780 5.6.1	Load losses W	XXXXXXXXXX	_____
4.10	SANS 780 8.2.7	Impedance voltage (see Table 9 of SANS 780) %	SANS 780	_____
4.11	DSP 34-1621 4.5	X/R ratio	XXXXXXXXXX	_____
4.12	DSP 34-1621 4.5	Cost /kW of no-load losses R/kW	_____	XXXXXXXXXX
4.13	DSP 34-1621 4.5	Cost /kW of load losses R/kW	_____	XXXXXXXXXX
4.14	SANS 780 8.5.3	Audio-sound level – maximum (see table 6 of SANS 780) dB(A)	_____	_____
4.15	DSP 34-1621 4.1.2.2.4	Sealed transformer unit	YES –welded cover	_____
4.16	NRS 004 6.4.7	Transformer MV bushings (NB internal screen to be earthed)	EN 50180 Type C with M16x2 thread	_____
4.17	DSP 34-1621 4.2.1.1.2	Transformer bushing-centre clearances (minimum) mm	180	_____
4.18	DSP 34-1621 4.2.1.1.2	Clearances between outer bushing- centres and mini-sub metal enclosure (minimum) mm	80	_____
4.19	DSP 34-1621 4.2.1.2	Transformer overload protection facility	YES	_____
4.20		Winding material MV LV	XXXXXXXXXX XXXXXXXXXX	_____
4.21		Manufacturer	XXXXXXXXXX	_____
4.22	DSP 34-1621 4.2.1.2.2	Top-oil thermoelectric temp-sensing element	YES	_____
5		MV compartment		
5.1	DSP 34-1621 4.2.2.2	Equipment in MV compartment	NO	_____
5.2		Incoming / outgoing MV cable requirements		
	DSP 34-1621 4.2.2.2.2	a) 3 × single core / 1 × three core	1 × 3 core	_____
	DSP 34-1621 4.2.2.2.2	b) Cable support (clamping) required (NRS 012 & D-DT-8019)	YES (Size 75 – 100 mm OD)	_____
	DSP 34-1621 4.2.2.2.2	c) Minimum distance from cable clamp to centre-line of transformer bushings mm	800	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
		d) Type of connections (NRS 012)	Type 4 (screened separable connectors) XXXXXXXXX	_____
5.3		Make (product) of connector used on transf. bushings	XXXXXXXXX	_____
5.4	NRS 004 6.1.3	Mini-sub (MV) earth bar (accessible from front of RMU)	YES	_____
5.5	DSP 34-1621 4.1.2.7.6	Make (product) of mains powered earth fault indicator (DSP 34-1080)	XXXXXXXXX	_____
6		LV Compartment		
6.1	NRS 004 6.3.3.1	LV ASSEMBLY complies with SANS 1973-1	YES	_____
6.2	DSP 34-1621 4.1.2.5.1	Busbar-rating (see Table 1)	A	Rated at 1.2 transformer secondary rated current _____
6.3		Busbar-insulation		Air insulated _____
6.4	DSP 34-1621 4.1.2.3.2	Busbars	Ø	3 + one identical neutral busbar + earth busbar (insulated from frame) _____
6.5	NRS 004 6.3.3.1	Current density of busbars	A/mm ²	SANS 1973- 1 _____
6.6	NRS 004 4.1.2.5	Rated short-time withstand current of main circuit – 1 s	kA _{rms}	XXXXXXXXX _____
6.7	NRS 004 6.3.3.2.6	Min clearance to earth and between phases	mm	XXXXXXXXX _____
6.8	DSP 34-1621 4.1.2.3.4	Provision of a LV neutral surge arrester (as per D-DT-3088) fitted between mini- sub (MV) earth bar and LV neutral-earth busbar	YES	_____
6.9	DSP 34-1621 4.1.2.3.3	LV neutral-earth busbar to be earthed (via a 70mm ² Cu electrical bridge to the mini-sub earth bar)	YES	_____
		LV neutral busbar to be bridged to the LV earth bar (see Figure 2)	YES	_____
6.10	4.1.2.5.2	Stainless Steel M12 set screws provided	YES	_____
6.11	DSP 34-1621 4.3.1.5	Provision of main LV circuit-breaker	YES	_____
6.12	DSP 34-1621 4.3.1.5	Make (product) of circuit breaker	SANS 556-1	_____
6.13	NRS 004 4.1.2.6	Minimum fault current interrupting capacity	kA	XXXXXXXXX _____
6.14	DSP 34-1621 4.3.2	Number of outgoing LV feeder bays to be provided for (drill busbar Ø14mm holes)	9	_____
	NRS 004 6.3.3.2.6	Spacing between LV feeder bays (see Figure 1 of DSP 34-1621)	mm	110 _____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
6.15	DSP 34-1621 4.1.2.4.2	LV panel designed for vertical fuse-bases (FH) or MCCBs (CB)	FH / CB	_____
6.16	NRS 004 6.3.3.2.6 and DSP 34-1621 4.1.2.3.2	Spacing (vertical): Between phase busbars Between lowest LV busbar and LV neutral Between LV neutral and LV earth Between LV earth and gland plates (see Figure 2 of DSP 34-1621)	Mm 185 mm 300 mm 200 (min) mm 200 (min)	_____ _____ _____ _____
6.17	DSP 34-1621 4.1.2.7.1	LV maximum demand ammeters	Required on all three phases	_____
6.18	NRS 004 6.3.3.5.1	Ammeter type	Thermal integrating over 15 min period	_____
6.19	DSP 34-1621 4.1.2.7.2	LV indicating voltmeter (with a selector switch) (YES/NO)	YES	_____
6.20	NRS 004 6.3.3.5.3	Ammeter and voltmeter size and display	mm 96 × 96, 90°	_____
6.21	NRS 004 6.3.3.5.3	Ammeter and voltmeter position	LV compartment (high as practicable)	_____
6.22	NRS 004 6.3.1.2	Provision of removable barrier to separate LV end compartment and front LV compartment	YES – non flammable	_____
7		LV outgoing feeder bay gland plates		
7.1	DSP 34-1621 4.1.2.4.5	Number of gland plates to be provided (Figure C.9 of NRS 004)	6	_____
	NRS 004 6.3.3.3.10	Number of gland holes per feeder bay	2	_____
	NRS 004 6.3.3.3.10	Size of holes per feeder bay:	mm 1 x 65 mm	_____
	NRS 004 6.3.3.3.10	Clearances for each hole per feeder bay:	mm 1 x 52 mm	_____
	NRS 004 6.3.3.3.10		mm 1 x 98 mm	_____
	NRS 004 6.3.3.3.10		mm 1 x 65 mm	_____
7.2	NRS 004 6.3.3.3.10	Distance between gland plate centre lines. (Figure C.9 of NRS 004)	mm 110	_____
8		LV auxiliaries		
8.1	DSP 34-1621 4.1.2.7.3	Provision of three point socket outlet in LV compartment (with instantaneous-trip earth leakage unit [20 A; 5 kA rupturing capacity; 30 mA sensitivity] and 20 A HRC fuse with neutral fuse link) (YES/NO)	YES	_____
8.2	DSP 34-1621 4.1.2.7.4	Provision of a tamperproof compartment for the installation of a photo-cell (YES/NO)	NO	_____
8.3	DSP 34-1621 4.1.2.7.4	300 mm x 300 mm blank plate for PECU	YES	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
8.4	DSP 34-1621 4.1.2.7.5	Numbering ferrules for auxiliary wiring	YES	_____
9		Materials and corrosion protection		
9.1	DSP 34-1621 4.1.3.2.4	Mini-sub enclosure, LV ASSEMBLY and transformer tank:		
	DSP 34-1621 4.1.3.2.5	Inland: mild steel Coastal: 3CR12 or zinc sprayed mild steel or stainless steel	XXXXXXXXXX XXXXXXXXXX	_____ _____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	DS-11 / DS-12 / (DS-14 + DS-16) / (DS-14 + DS-17) / DS-18	_____
9.2	DSP 34-1621 4.1.3.2.6	Transformer radiator: Inland: mild steel Coastal: hot-dipped galvanized / zinc metal sprayed (if corrugated) mild steel	XXXXXXXXXX XXXXXXXXXX	_____ _____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	(DS-13 + DS-16) / (DS-13 + DS-17) / (DS-14 + DS-16) / (DS-14 + DS-17)	_____
9.3	NRS 004 6.3.3.2.2	Tinned copper busbars (YES/NO)	YES	_____
9.4	DSP 34-1621 4.1.3.2.7	Mini-sub base: Material	Steel	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered	(DS-13 + DS-16) / (DS-13 + DS-17)	_____
9.5		Gland plates and support structure:	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.8	Coastal: Material: 3 mm (min) stainless steel		
	NRS 004 6.3.3.3.8	Inland Material: 3 mm (min) mild steel / 3CR12 / stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered if mild steel (Hot-dip. galv. to OR zinc sprayed) – for inland only	DS-13 / DS-14	_____
9.7	DSP 34-1621 4.1.3.2.11	5 mm cork packing (between ends and tank, base and ends, and base and tank)(YES/NO)	YES	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
9.8	DSP 34-1621 4.1.3.2.12	Final colour	Avocado C12 (SANS 1091)	_____
10		Notices, signs and labels		
10		Notices, signs and labels		
10.1	NRS 004 8.2.1	Transformer rating plate	YES	_____
10.2	DSP 34-1621 6.1.2	Treatment and Full First Aid Instructions on inside of MV and LV compartment doors	YES	_____
10.3	DSP 34-1621 6.1.2	Elec. warning signs on all doors and barriers	YES	_____
10.4	NRS 004 8.4.11	Transformer phase labels below bushings	YES	_____
10.5	NRS 004 6.3.3.2.5	Colour-coded LV busbars	YES	_____
10.6	DSP 34-1621 6.1.2	Labelling of MV and LV compartment doors (sign – D-DT-3202 sheet 5 and 4)	YES	_____
10.7	NRS 004 8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	YES	_____
10.8	NRS 004 8.4.4	Mini-sub mass and stock number stencilled on side or rear.	YES	_____
10.9	NRS 004 8.4.6	ID markings linking roof to body per batch	YES	_____
10.10	NRS 004 4.2.2.3.9	Provision for the safe-keeping of documents	YES	_____
11		Documentation		
11.1	DSP 34-1621 6.2.3	Type test certificates (provide ref. numbers of reports)	Sets 1	_____
11.2	DSP 34-1621 6.2.3	Routine test certificates	Sets 1	_____
11.3	DSP 34-1621 6.2.2	Drawings (Mini-sub GA, LV ASSEMBLY, Operating procedure label for RMU tee- off)	Sets 1	_____
11.4	DSP 34-1621 6.2.2	Diagrams (Mini-sub schematic – including the LV ASSEMBLY, Rating Plates)	Sets 1	_____
12		Accessories		
12.1	DSP 34-1621 7.1.2	Type of sealant provided	XXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

22 kV Type A 1000kVA Mini-substation (without RMU)**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

Enquiry No.: Tenderer's name:

Project Name: Date:

Technical schedules A and B**22 kV Type B 1000kVA Miniature substation (with RMU)**

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
1	2.1.1	Standard operating conditions		
1.1	NRS 004 4.2.1.3	a) Altitude m	1800	XXXXXXXXXX
1.2	SANS60694 2.1.2	b) Ambient air temperature °C	-5 to +40	XXXXXXXXXX
1.3		c) Lightning ground flash density Flashes/ km ² /year	High	XXXXXXXXXX
1.4	SANS60694 2.1.2	d) Maximum solar radiation W/m ²	1000	XXXXXXXXXX
1.5		e) Ultraviolet radiation	High	XXXXXXXXXX
1.6	NRS 004 4.2.1.3	f) Relative humidity %	98	XXXXXXXXXX
1.7	NRS 004 4.2.1.3 & DSP 34-1621 4.1.1	g) Pollution level (inland – low- corrosive / coastal – corrosive)	"very heavy" for coastal "medium" for inland	XXXXXXXXXX
1.8	SANS60694 2.1.2	h) wind pressure Pa	700	XXXXXXXXXX
1.9	DSP 34-1621 4.1.1	i) Pollution conditions inside mini-sub	Pollution Degree 3	XXXXXXXXXX
2		Ratings		
2.1	DSP 34-1621 4.1.2.2.1	Transformer power rating kVA	1000	_____
2.2	DSP 34-1621 4.1.2.2.2	Nominal voltage of system (U _n) kV _{rms}	11	_____
2.3	NRS 004 4.1.4 & SANS 780 1.3	System frequency Hz	50	_____
2.4	NRS 004 4.1.4	Number of phases	3	_____
2.5	SANS 780 8.26	Transformer rated no-load secondary voltage V _{rms}	420	_____
2.6	SANS 1019 5.4.2	Rated power-frequency voltage (U _m) kV _{rms}	12	_____
2.7	SANS 1019 5.4.2	Rated short-duration power frequency withstand voltage [50Hz: 1 min] kV _{rms}	28	_____
2.8	DSP 34-1621 4.1.2.1	Rated lightning impulse withstand voltage (SANS 1019 5.4.2 List 3) kV _{peak}	95	_____
2.9	SANS 780	Transformer induced voltage withstand level (see Table 2 – SANS 780) kV _{rms}	22	_____
3		Design & construction		
3.1	DSP 34-1621 4.1.3.1.3	Layout (Type A/Type B)	Type B	_____
3.2	NRS 004 4.2.2.3.1	Enclosure IP rating	IP35	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
3.3	DSP 34-1621 4.1.3.1.4	Removable base sections adjacent to MV compartment (sections to lap bolted with nuts on the inside of the channel and housing)	YES	_____
3.4	NRS 004 4.4.2.5	Concealed door and roof (if applicable) hinges	YES	_____
3.5	DSP 34-1621 4.1.3.1.5	Compartment fastening/locking (Pad lockable)	YES – three point locking with 1 additional 10 mm sunken captive Allen cap screw	_____
3.6	DSP 34-1621 4.1.3.1.6	“Heavy-duty” stainless steel door locks	YES	_____
3.7	DSP 34-1621 4.1.3.1.7	Compartment lock protection facility required?	Y/N YES	_____
3.8		Total mass of mini-substation	kg	XXXXXXXXX
3.9		Overall dimensions		
		a) MV compartment length	mm	XXXXXXXXX
		b) LV compartment length	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	c) Overall length	mm	3000
	NRS 004 4.2.2.1.2	d) Overall width	mm	1650
		e) Overall height	mm	XXXXXXXXX
	NRS 004 4.2.2.1.2	f) Base width	mm	1200
3.10	NRS 004 4.2.2.5	Provision for lifting of complete mini-sub onto a concrete plinth without need for dismantling (except for roof removal if required)	YES	_____
3.11	NRS 004 4.2.2.4.2	Provision of shear-off lifting lugs on roof for ease of roof removal (where roof removal is required prior to lifting mini-sub)	YES	_____
3.12	NRS 004 6.1.2	Mini-sub housing sections/doors bonded	YES	_____
4		Transformer unit		
4.1	NRS 004 6.4.1	Electrical requirements	As per SANS 780	_____
4.2	NRS 004 6.4.4	Vector group	Dyn11	_____
4.3		MV system earthing (Effective/Non-effective)	Non-effective	_____
4.4		MV system fault level	16	XXXXXXXXX
4.5	DSP 34-1621 4.1.2.3.6	LV transformer neutral earthing	Solid – connection to insulated LV neutral/earth bar	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
4.6	DSP 34-1621 5.2.1	Temperature rise limits	As per DSP 34-1621 5.2.1	_____
4.7	SANS 780 8.5.2	Secondary voltage regulation (Off-load) %	+5,0, + 2,5, 0, -2,5, -5,0	_____
4.8	SANS 780 5.6.1	No-load losses W	XXXXXXXXXX	_____
4.9	SANS 780 5.6.1	Load losses W	XXXXXXXXXX	_____
4.10	SANS 780 8.2.7	Impedance voltage (see Table 9 of SANS 780) %	SANS 780	_____
4.11	DSP 34-1621 4.5	X/R	XXXXXXXXXX	_____
4.12	DSP 34-1621 4.5	Cost /kW of no-load losses R/kW	_____	XXXXXXXXXX
4.13	DSP 34-1621 4.5	Cost /kW of load losses R/kW	_____	XXXXXXXXXX
4.14	SANS 780 8.5.3	Audio-sound level – maximum (see table 6 of SANS 780) dB(A)	_____	_____
4.15	DSP 34-1621 4.1.2.2.4	Sealed transformer unit	YES –welded cover	_____
4.16	NRS 004 6.4.7	Transformer MV bushings (NB internal screen to be earthed)	EN 50180 Type C with M16x2 thread	_____
4.17	DSP 34 1621 4.3.1.1.4	MV bushing-centre clearances (minimum) mm	90	_____
4.18	DSP 34-1612 4.3.1.1.4	Clearances between outer bushing-centres and mini-sub metal enclosure (minimum) mm	50	_____
4.19	DSP 34-1621 4.3.1.4	Transformer overload protection facility	YES	_____
4.20		Winding material MV LV	XXXXXXXXXX XXXXXXXXXX	_____ _____
4.21		Manufacturer	XXXXXXXXXX	_____
4.22	DSP 34- 16214.3.1.4	Top-oil thermoelectric temp-sensing element	YES	_____
5		MV compartment		
5.1	DSP 34-1621 4.3.1.1	Equipment in MV compartment	RMU	_____
5.2		Ring Main Unit manufacturer	XXXXXXXXXX	_____
5.3		Incoming MV / outgoing cable requirements		_____
	DSP 34-1621 4.3.1.1.4	a) 3 × single core / 1 × three core	1 × 3 core	_____
	DSP 34-1621 4.3.1.1.4	b) Cable support (clamping) required (NRS 012 & D-DT-8019)	YES (Size 75 – 100 mm OD)	_____
		c) Minimum distance from cable clamp to centre-line of RMU bushings mm	800	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
		d) Type of connection (NRS 012) to RMU	Type 4 (screened separable connector)	_____
5.4	DSP 34-1621 4.3.1.2	Interconnecting cables and terminations between RMU and transformer MV bushings	Single core - fully screened	_____
5.5	DSP 34-1621 4.3.1.3	Make (product) connector used on transf. bushings (SSC)	XXXXXXXXXX	_____
5.6	DSP 34-1621 4.3.1.3	Make (product) of connector used on RMU T-off (SSC)	XXXXXXXXXX	_____
5.7	NRS 004 6.1.3	Mini-sub (MV) earth bar (accessible in front of RMU)	YES	_____
5.8	DSP 34-1621 4.1.2.7.6	Make (product) of mains powered earth fault indicator (DSP 34-1080)	XXXXXXXXXX	_____
6		LV Compartment		
6.1	NRS 004 6.3.3.1	LV ASSEMBLY complies with SANS 1973-1	YES	_____
6.2	DSP 34-1621 4.1.2.5.1	Busbar-rating (see Table 1)	A Rated at 1.2 transformer secondary rated current	_____
6.3		Busbar-insulation	Air insulated	_____
6.4	DSP 34-1621 4.1.2.3.2	Busbars	Ø 3 + one identical neutral busbar + earth busbar (insulated from frame)	_____
6.5	NRS 004 6.3.3.1	Current density of busbars	A/mm ² SANS 1973-1	_____
6.6	NRS 004 4.1.2.5	Rated short-time withstand current of main circuit – 1 s	kA _{rms} XXXXXXXXX	_____
6.7	NRS 004 6.3.3.2.6	Min clearance to earth and between phases	mm XXXXXXXXX	_____
6.8	DSP 34-1621 4.1.2.3.4	Provision of a LV neutral surge arrester (as per D-DT-3088) fitted between mini-sub earth bar and LV earth busbar	YES	_____
6.9	DSP 34-1621 4.1.2.3.3	LV earth busbar to be earthed (via a 70mm ² Cu electrical bridge to the mini-sub earth bar)	YES	_____
		LV neutral busbar to be bridged to the LV earth bar (see Figure 2)	YES	_____
6.10	DSP 34-1621 4.1.2.5.2	Stainless Steel M12 set screws provided	YES	_____
6.11	DSP 34-1621 4.2.1.2.1	Provision of LV main circuit breaker	YES	_____
6.12	DSP 34-1621 4.2.1.2.1	Make (product) of circuit breaker	SANS 556-1	_____
6.13	NRS 004 4.1.2.6	Minimum fault current interrupting capacity	kA XXXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
6.14	DSP 34-1621 4.1.2.4.5	Number of outgoing LV feeder bays to be provided for (drill busbar Ø14mm holes)	6	_____
	NRS 004 6.3.3.2.6	Spacing between LV feeder bays (see Figure 1 of DSP 34-1621) mm	110	_____
6.15	DSP 34-1621 4.1.2.4.2	LV panel designed for vertical fuse-bases (FH) or MCCBs (CB)	FH / CB	_____
6.16	NRS 004 6.3.3.2.6 and DSP 34-1621 4.1.2.3.2	Spacing (vertical): Between phase busbars Mm	185	_____
		Between lowest LV busbar and LV neutral mm	300	_____
		Between LV neutral and LV earth mm	200 (min)	_____
		Between LV earth and gland plates mm (see Figure 2 of DSP 34-1621)	200 (min)	_____
6.17	DSP 34-1621 4.1.2.7.1	LV maximum demand ammeters	Required on all three phases	_____
6.18	NRS 004 6.3.3.5.1	Ammeter type	Thermal integrating over 15 min period	_____
6.19	DSP 34-1621 4.1.2.7.2	LV indicating voltmeter (with a selector switch) (YES/NO)	YES	_____
6.20	NRS 004 6.3.3.5.3	Ammeter and voltmeter size and display mm	96 × 96, 90°	_____
6.21	NRS 004 6.3.3.5.3	Ammeter and voltmeter position	LV compartment (high as practicable)	_____
7		LV outgoing feeder bay gland plates		
7.1	DSP 34-1621 4.1.2.4.5	Number of gland plates to be provided (Figure C.9 of NRS 004)	6	_____
	NRS 004 6.3.3.3.10	Number of gland holes per feeder bay	2	_____
	NRS 004 6.3.3.3.10	Size of holes per feeder bay: mm	1 x 65 mm	_____
			mm	1 x 52 mm
	NRS 004 6.3.3.3.10	Clearances for each hole per feeder bay: mm	1 x 98 mm	_____
			mm	1 x 65 mm
7.2	NRS 004 6.3.3.3.10	Distance between gland plate centre lines. mm (Figure C.9 of NRS 004)	110	_____
8		LV auxiliaries		
8.1	DSP 34-1621 4.1.2.7.3	Provision of three point socket outlet in LV compartment (with instantaneous-trip earth leakage unit [20 A; 5 kA rupturing capacity; 30 mA sensitivity] and 20 A HRC fuse with neutral fuse link) (YES/NO)	YES	_____
8.2	DSP 34-1621 4.1.2.7.4	Provision of a tamperproof compartment for the installation of a photo-cell (YES/NO)	NO	_____
8.3	DSP 34-1621 4.1.2.7.4	300 mm x 300 mm blank plate for PECU	YES	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
8.4	DSP 34-1621 4.1.2.7.5	Numbering ferrules for auxiliary wiring	YES	_____
9		Materials and corrosion protection		
9.1	DSP 34-1621 4.1.3.2.4	Mini-sub enclosure, LV ASSEMBLY and transformer tank:		
	DSP 34-1621 4.1.3.2.5	Inland: mild steel	XXXXXXXXXX	_____
		Coastal: 3CR12 or zinc sprayed mild steel or stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	DS-11 / DS-12 / (DS-14 + DS-16) / (DS-14 + DS-17) / DS-18	_____
9.2	DSP 34-1621 4.1.3.2.6	Transformer radiator: Inland: mild steel	XXXXXXXXXX	_____
		Coastal: hot-dipped galvanized / zinc metal sprayed (if corrugated) mild steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered for inland applications	DS-6 / DS-7 / DS-8	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered for coastal applications	(DS-13 + DS-16) / (DS-13 + DS-17) / (DS-14 + DS-16) / (DS-14 + DS-17)	_____
9.3	NRS 004 6.3.3.2.2	Tinned copper busbars (YES/NO)	YES	_____
9.4	DSP 34-1621 4.1.3.2.7	Mini-sub base: Material	Steel	_____
	DSP 34-1621 4.1.3.2.10	Corrosion protection detailed specification number (DSP 34-1658) offered	(DS-13 + DS-16) / (DS-13 + DS-17)	_____
9.5		Gland plates and support structure:	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.8	Coastal: Material: 3 mm (min) stainless steel		
	NRS 004 6.3.3.3.8	Inland Material: 3 mm (min) mild steel / 3CR12 / stainless steel	XXXXXXXXXX	_____
	DSP 34-1621 4.1.3.2.9	Corrosion protection detailed specification number (DSP 34-1658) offered if mild steel (Hot-dip. galv. to OR zinc sprayed) – for inland only	DS-13 / DS-14	_____
9.7	DSP 34-1621 4.1.3.2.11	5 mm cork packing (between ends and tank, base and ends, and base and tank)(YES/NO)	YES	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

1	2	3	4	5
Item	Subclause	Description	Schedule A	Schedule B
9.8	DSP 34-1621 4.1.3.2.12	Final colour	Avocado C12 (SANS 1091)	_____
10		Notices, signs and labels		
10.1	NRS 004 8.2.1	Transformer rating plate	YES	_____
10.2	DSP 34-1621 6.1.2	Treatment and Full First Aid Instructions on inside of MV and LV compartment doors	YES	_____
10.3	DSP 34-1621 6.1.2	Elec. warning signs on all doors and barriers	YES	_____
10.4	NRS 004 8.4.11	Transformer phase labels below bushings	YES	_____
10.5	NRS 004 6.3.3.2.5	Colour-coded LV busbars	YES	_____
10.6	DSP 34-1621 6.1.2	Labelling of MV and LV compartment doors (sign – D-DT-3202 sheet 5 and 4)	YES	_____
10.7	NRS 004 8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	YES	_____
10.8	NRS 004 8.4.4	Mini-sub mass and stock number stencilled on side or rear.	YES	_____
10.9	NRS 004 8.4.6	ID markings linking roof to body per batch	YES	_____
10.10	NRS 004 4.2.2.3.9	Provision for the safe-keeping of documents	YES	_____
11		Documentation		
11.1	DSP 34-1621 6.2.3	Type test certificates (provide ref. numbers of reports)	Sets 1	_____
11.2	DSP 34-1621 6.2.3	Routine test certificates	Sets 1	_____
11.3	DSP 34-1621 6.2.2	Drawings (Mini-sub GA, LV ASSEMBLY, Operating procedure label for RMU tee- off)	Sets 1	_____
11.4	DSP 34-1621 6.2.2	Diagrams (Mini-sub schematic – including the LV ASSEMBLY, Rating Plates)	Sets 1	_____
12		Accessories		
12.1	DSP 34-1621 7.1.2	Type of sealant provided	XXXXXXXX	_____

Enquiry No.: Tenderer's name:

Project Name: Date:

22 kV Type B 1000kVA Mini-substation (with RMU)**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