TRANSNET

Transnet Freight Rail RME, a division of

TRANSNET SOC LTD

Registration Number 1990/000900/30

[hereinafter referred to as **Transnet**]

REQUEST FOR QUOTATION [RFQ] No RME-DBN-014/2014

FOR THE DESIGN, SUPPLY, DELIVERY & OFFLOADING OF:
MINIATURE SUBSTATIONS

FOR DELIVERY TO: **150 Eel Road, Bayhead, Durban**

ISSUE DATE: **28 March 2014 -7 April 2014**

CLOSING DATE: **10 April 2014**

CLOSING TIME: **10:00**

Section 1
NOTICE TO BIDDERS

Quotations which must be completed as indicated in Section 2 of this RFQ are to be submitted as follows:

METHOD:	Tender box
CLOSING VENUE:	Transnet Freight Rail (RME) The Chairman of the Acquisition Council Inyanda House 1 21 Wellington Road Park Town, Gauteng

1 Responses to RFQ

Responses to this RFQ [**Quotations**] must not include documents or reference relating to any other quotation or proposal. Any additional conditions must be embodied in an accompanying letter.

2 Broad-Based Black Economic Empowerment [B-BBEE]

Transnet fully endorses and supports the Government's Broad-Based Black Economic Empowerment Programme and it would therefore prefer to do business with local business enterprises who share these same values. Transnet will accordingly allow a "preference" to companies who provide a valid B-BBEE Verification Certificate. All procurement transactions will be evaluated accordingly.

2.1 B-BBEE Scorecard and Rating

As prescribed in terms of the Preferential Procurement Policy Framework Act (PPPFA), Act 5 of 2000 and its Regulations, Respondents are to note that the following preference point system is applicable to all bids:

- the 80/20 system for requirements with a Rand value of up to R1 000 000 (all applicable taxes included).
- Bidders are to note that if the 80/20 preference point system is stipulated in this RFP and all Bids received exceed R1 000 000.00, the RFP must be cancelled.

The value of this bid is estimated to be below R1000 000 (all applicable taxes included) and therefore the **80/20** system shall be applicable.

When Transnet invites prospective suppliers to submit Proposals for its various expenditure programmes, it requires Respondents to have their B-BBEE status verified in compliance with the Codes of Good Practice issued in terms of the Broad Based Black Economic Empowerment Act No. 53 of 2003.

The Department of Trade and Industry recently revised the Codes of Good Practice on 11 October 2013 [Government Gazette No. 36928]. The Revised Codes will replace the Black Economic Empowerment Codes of Good Practice issued on 9 February 2007. The Revised Codes provide for a one year transitional period starting 11 October 2013. During the transitional period, companies may elect to be measured in terms of the Revised Codes or the 2007 version of the Codes. After

the first year of the implementation of the Revised Codes, B-BBEE compliance will be measured in terms of the Revised Codes without any discretion. Companies which are governed by Sector-specific Codes will be measured in terms of those Sector Codes.

As such, Transnet will accept B-BBEE certificates issued based on the Revised Codes. Transnet will also continue to accept B-BBEE certificates issued in terms of the 2007 version of the Codes provided it was issued before 10 October 2014. Thereafter, Transnet will only accept B-BBEE certificates issued based on the Revised Codes.

Respondents are required to complete Annexure A [the B-BBEE Preference Point Claim Form] and submit it together with proof of their B-BBEE Status as stipulated in the Claim Form in order to obtain preference points for their B-BBEE status.

Note: Failure to submit a valid and original B-BBEE certificate or a certified copy thereof at the Closing Date of this RFQ will result in a score of zero being allocated for B-BBEE.

[Refer clause 20 below for Returnable Documents required]

2.2 B-BBEE Improvement Plan

Not applicable

2.3 Supplier Development Initiatives

Not applicable

3 Communication

a) Respondents are warned that a response will be liable for disqualification should any attempt be made by a Respondent either directly or indirectly to canvass any officer(s) or employee of Transnet in respect of this RFQ between the closing date and the date of the award of the business.

b) A Respondent may, however, before the closing date and time, direct any written enquiries relating to the RFQ to the following Transnet employee:

Name: Janet Koekemoer Email: Janet.Koekemoer2@transnet.net

c) Respondents may also, at any time after the closing date of the RFQ, communicate with Boitumelo Manyakalle. on any matter relating to its RFQ response:

Telephone 031 361 1016 Email Boitumelo.Manyakalle@transnet.net

4 Tax Clearance

The Respondent's original and valid Tax Clearance Certificate must accompany the Quotation. Note that no business shall be awarded to any Respondent whose tax matters have not been declared by SARS to be in order.

5 VAT Registration

The valid VAT registration number must be stated here: _____ *[if applicable]*.

6 Legal Compliance

The successful Respondent shall be in full and complete compliance with any and all applicable national and local laws and regulations.

7 Changes to Quotations

Changes by the Respondent to its submission will not be considered after the closing date and time.

8 Pricing

All prices must be quoted in South African Rand on a fixed price basis, excluding VAT.

9 Prices Subject to Confirmation

Prices quoted which are subject to confirmation will not be considered.

10 Negotiations

Transnet reserves the right to undertake post-tender negotiations with selected Respondents or any number of short-listed Respondents.

11 Binding Offer

Any Quotation furnished pursuant to this Request shall be deemed to be an offer. Any exceptions to this statement must be clearly and specifically indicated.

12 Disclaimers

Transnet is not committed to any course of action as a result of its issuance of this RFQ and/or its receipt of a Quotation in response to it. Please note that Transnet reserves the right to:

- modify the RFQ's goods / service(s) and request Respondents to re-bid on any changes;
- reject any Quotation which does not conform to instructions and specifications which are detailed herein;
- disqualify Quotations submitted after the stated submission deadline;
- not necessarily accept the lowest priced Quotation;
- reject all Quotations, if it so decides;
- place an order in connection with this Quotation at any time after the RFQ's closing date;
- award only a portion of the proposed goods / service/s which are reflected in the scope of this RFQ;
- split the award of the order/s between more than one Supplier/Service Provider; or
- make no award at all.

Transnet reserves the right to award business to the highest scoring bidder/s unless objective criteria justify the award to another bidder.

13 Transnet's supplier integrity pact

Transnet's Integrity Pact requires a commitment from suppliers and Transnet that they will not engage in any corrupt and fraudulent practices, anti-competitive practices; and act in bad faith towards each other. The Integrity Pact also serves to communicate Transnet's Gift Policy as well as the remedies available to Transnet where a Respondent contravenes any provision of the Integrity Pact.

Respondents are required to familiarise themselves with the contents of the Integrity Pact which is available on the Transnet Internet site [www.transnet.net/Tenders/Pages/default.aspx] or on request. Furthermore, Respondents are required to certify that they have acquainted themselves with all the documentation comprising the Transnet Integrity Pact and that they fully comply with all the terms and conditions stipulated in the Transnet Supplier Integrity Pact as follows:

YES		NO	

Should a Respondent need to declare previous transgressions or a serious breach of law in the preceding 5 years as required by Annexure A to the Integrity Pact, such declaration must accompany the Respondent's bid submission.

14 Respondent's Samples

Not applicable

15 Evaluation Criteria

Transnet will utilise the following criteria [not necessarily in this order] in choosing a Supplier/Service Provider, if so required:

Criterion/Criteria	Explanation
Administrative responsiveness	Completeness of response and returnable documents
Substantive responsiveness	Prequalification criteria, if any, must be met and whether the Bid materially complies with the scope and/or specification given.
Functionality Threshold	As prescribed in terms of the Preferential Procurement Policy Framework Act (PPPFA), Act 5 of 2000 and its Regulations, Respondents are to note that functionality is included as threshold with a prescribed percentage threshold of **60%.** Compliance to specification / quality, previous performance, delivery lead-time will be considered as part of the technical evaluation[complete **Annexure C – Technical/ Functionality Criteria]**
Final weighted evaluation based on 80/20 preference point system as indicated in paragraph	• Pricing and price basis [firm] - whilst not the sole factor for consideration, competitive pricing and overall level of unconditional discounts[1] will be critical • B-BBEE status of company - Preference points will be awarded to a bidder for attaining the B-BBEE status level of contribution in accordance with the table indicated in Annexure A.

[1] *Only unconditional discounts will be taken into account during evaluation. A discount which has been offered conditionally will, despite not being taken into account for evaluation purposes, be implemented when payment is effected.*

16 Validity Period

Transnet desires a validity period of 60 [Sixty] days from the closing date of this RFQ.

This RFQ is valid until _____.

17 Banking Details

BANK: _____

BRANCH NAME / CODE: _____

ACCOUNT HOLDER: _____

ACCOUNT NUMBER: _____

18 Company Registration

Registration number of company / C.C. _____

Registered name of company / C.C. _____

19 Disclosure of Prices Quoted

Respondents must indicate here whether Transnet may disclose their quoted prices and conditions to other Respondents:

YES ☐ NO ☐

20 Returnable Documents

Returnable Documents means all the documents, Sections and Annexures, as listed in the tables below.

a) Respondents are required to submit with their Quotations the **Returnable Documents,** as detailed below.

Failure to provide all these Returnable Documents at the Closing Date and time of this RFQ may result in a Respondent's disqualification. Respondents are therefore urged to ensure that all these Documents are returned with their Quotations.

All Sections, as indicated in the footer of each page, must be signed, stamped and dated by the Respondent. Please confirm submission of these Returnable Documents by so indicating [Yes or No] in the table below:

Returnable Documents	Submitted [Yes or No]
SECTION 1 : Notice to Bidders	
- Valid and original B-BBEE Verification Certificate or certified copy thereof [Large Enterprises and QSEs] Note: failure to provide a valid B-BBEE Verification Certificate at the closing date and time of the RFQ will result in an automatic score of zero for preference	
- Valid and original B-BBEE certificate/sworn affidavit or certified copy thereof from auditor, accounting officer or SANAS accredited Verification Agency	

Returnable Documents	Submitted [Yes or No]
[EMEs] Note: failure to provide a valid B-BBEE Verification Certificate at the closing date and time of the RFQ will result in an automatic score of zero being allocated for preference	
- In the case of Joint Ventures, a copy of the Joint Venture Agreement or written confirmation of the intention to enter into a Joint Venture Agreement	
- Original valid Tax Clearance Certificate [Consortia / Joint Ventures must submit a separate Tax Clearance Certificate for each party]	
SECTION 2 : Quotation Form	
SECTION 3: Vendor Application Form	
• Original cancelled cheque or bank verification of banking details	
• Certified copies of IDs of shareholder/directors/members [as applicable]	
• Certified copies of the relevant company registration documents from Companies and Intellectual Property Commission (CIPC)	
• Certified copies of the company's shareholding/director's portfolio	
• Entity's letterhead	
• Certified copy of VAT Registration Certificate [RSA entities only]	
• Certified copy of valid Company Registration Certificate [if applicable]	
ANNEXURE A – B-BBEE Preference Points Claim Form	
ANNEXURE B – Specification of Goods	
ANNEXURE C – Technical / Functionality Criteria:	
ANNEXURE D – Drawing – Proposed minisubstation MV AND LV layout	

Section 2

QUOTATION FORM

I/We_____

hereby offer to supply the goods/services at the prices quoted in the Price Schedule below, in accordance with the conditions related thereto.

I/We agree to be bound by those terms and conditions in:

- the Standard Terms and Conditions for the Supply of Goods or Services to Transnet [available on request]; and
- any other standard or special conditions mentioned and/or embodied in this Request for Quotation.

I/We accept that unless Transnet should otherwise decide and so inform me/us, this Quotation [and, if any, its covering letter and any subsequent exchange of correspondence], together with Transnet's acceptance thereof shall constitute a binding contract between Transnet and me/us.

I/We further agree that if, after I/we have been notified of the acceptance of my/our Quotation, I/we fail to deliver the said goods/service/s within the delivery lead-time quoted, Transnet may, without prejudice to any other legal remedy which it may have, cancel the order and recover from me/us any expenses incurred by Transnet in calling for Quotations afresh and/or having to accept any less favourable offer.

Price Schedule

I/We quote as follows for the goods required, on a "delivered nominated destination" basis, excluding VAT:

Item No	Description of Goods /Services	Qty	Rate	Total Price (ZAR)
1	Mini Substation with a dual voltage transformer 6.6kv/11kv/400V	1	R_____	R_____
2	Deliver a complete mini substation	1	R_____	R_____

Delivery Lead-Time from date of purchase order: _____ [days/weeks]

Notes to Pricing:

a) All Prices must be quoted in South African Rand, exclusive of VAT

b) To facilitate like-for-like comparison bidders must submit pricing strictly in accordance with this price schedule and not utilise a different format. Deviation from this pricing schedule could result in a bid being disqualified.

c) Please note that should you have offered a discounted price(s), Transnet will only consider such price discount(s) in the final evaluation stage if offered on an unconditional basis.

Section 3

VENDOR APPLICATION FORM

Respondents are to furnish the following documentation and complete the Vendor Application Form below:

1. **Original** cancelled cheque **OR** letter from the Respondent's bank verifying banking details [**with bank stamp]**
2. **Certified** copy of Identity Document(s) of Shareholders/Directors/Members [where applicable]
3. **Certified copies** of the relevant company registration documents from Companies and Intellectual Property Commission (CIPC)
4. **Certified copies** of the company's shareholding/director's portfolio
5. A letter on the company's letterhead confirm physical and postal addresses
6. **Original** valid SARS Tax Clearance Certificate
7. **Certified copy** of VAT Registration Certificate
8. **A valid and original** B-BBEE Verification Certificate / sworn affidavit **or certified copy** thereof meeting the requirements for B-BBEE compliance as per the B-BBEE Codes of Good Practice
9. **Certified copy** of valid Company Registration Certificate [if applicable]

Vendor Application Form

Company trading name						
Company registered name						
Company Registration Number or ID Number if a Sole Proprietor						
Form of entity [√]	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor
VAT number [if registered]						
Company telephone number						
Company fax number						
Company email address						
Company website address						
Bank name			Branch & Branch code			
Account holder			Bank account number			
Postal address						

Respondent's Signature

Date & Company Stamp

			Code
Physical Address			
			Code
Contact person			
Designation			
Telephone			
Email			

Annual turnover range [last financial year]	< R5 m		R5 - 35 m	> R35 m
Does your company provide	Products		Services	Both
Area of delivery	National		Provincial	Local
Is your company a public or private entity			Public	Private
Does your company have a Tax Directive or IRP30 Certificate			Yes	No
Main product or services [e.g. Stationery/Consulting]				

Complete B-BBEE Ownership Details:

% Black ownership	% Black women ownership	% Disabled Black ownership	% Youth ownership

Does your entity have a B-BBEE certificate	Yes	No
What is your B-BBEE status [Level 1 to 9 / Unknown]		
How many personnel does the entity employ	Permanent	Part time

If you are an existing Vendor with Transnet please complete the following:

Transnet contact person	
Contact number	
Transnet Operating Division	

Duly authorised to sign for and on behalf of Company / Organisation:

Name		Designation	
Signature		Date	

FOR THE DESIGN, SUPPLY, DELIVERY & OFFLOADING OF: MINIATURE SUBSTATIONS

ANNEXURE B: SPECIFICATION OF GOODS

INDEX

FOR THE DESIGN, SUPPLY, DELIVERY & OFFLOADING OF: MINIATURE SUBSTATIONS

ANNEXURE No. 01:

DETAILS OF TENDERER'S OFFER

B.1.1	Type of mini-substation	
B.1.2	Total mass of mini-substation (kg)	
B.1.3	Manufacturer's name	
B.1.4	Overall Dimensions (mm)	
	With all doors closed	
	- Length	
	- Width	
	- Height	
	With all doors open	
	- Length	
	- Width	
	- Height	
B.1.5	Is provision made for lifting the complete mini-substation without dismantling?	
B.1.6	Details of corrosion protection of 3CR12	
B.1.7	Details of MV cable terminations	
B.1.8	Details of MV fuse	
	- Manufacturer	
	- Current rating	
	- Breaking capacity	
B.1.9	Busbar rating (A)	
B.1.10	Busbar insulation	
B.1.11	Make of MV switchgear	
B.1.12	Model No. of MV switchgear	
B.1.13	Make of main MCB	
	- Breaking capacity (kA)	
B.1.14	Make of other MCB's	
	- Breaking capacity (kA)	

Scope of Work

1.1 This specification covers Transnet Project's requirement for the Design, Supply, Delivery, and Offloading of a Miniature Substation for rated ac voltages up to and including 11/6.6kV dual on the primary side and 400 V on the secondary side, and of power rating up to 1000kVA at Bayhead 150 Eel Road.

2. Normative References

The following standards contain provisions that, through reference in the text, constitute provisions of this specification. At the time of publication, the editions indicated were valid. All standards are subject to revision, of applying the most recent editions of the standards listed below. Information on currently valid national and international standards may be obtained from the South African Bureau of Standards.

ASTM/E822-81 (Re-approved 1987), Standard practice for determining resistance of solar collector covers to hail by impact with propelled ice balls (Vol. 12.02 – Nuclear (II), Solar and Geothermal Energy).

IEC 71-1: 1976, Insulation co-ordination – Part 1: Terms, definitions, principles and rules.

IEC 71-2: 1976, Insulation co-ordination – Part 2: Application guide

IEC 71-3: 1976, Insulation co-ordination – Part 3: Phase-to-phase insulation co-ordination. Principles, rules and application guide.

ISO 8501-1: 1988, Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.

NRS 005: 1990, Distribution transformers - Preferred requirements for application in the Electricity Supply Industry.

NRS 006: 1991, Switchgear – Metal –enclosed ring main units – For rated a.c voltages above 1 kV and up to and including 24kV – Preferred requirements for application in the Electricity Supply Industry.

NRS 008: 1971, Enclosures for cable terminations in air – For rated a.c voltages of 7,2 kV and up to and including 36 kV - Preferred requirements for application in the Electricity Supply Industry.

SABS 141: 1971, Glass-reinforced polyester (GRP) laminated products.
Amendment No. 3: 1979.

SABS 152: 1977, Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors, and fuse-combination units.
Amendment No. 1: 1987.

SABS 156: 1977, Moulded-case circuit breakers.

Amendment No. 1: 1987.
SABS 172: 1977, Cartridge type fuse-links for low voltage electric fuses.

SABS 763: 1988, Hot-dip (galvanized) zinc coatings (other than on continuously zinc-coated sheet and wire).

SABS 780: 1979, Distribution transformers.
Amendment No. 5: 1990.

SABS 1019: 1985, Standard voltages, currents and insulation levels for electricity supply.

SABS 1091: 1975, National colour standards for paint.
Amendment No. 2: 1989.

SABS 1186: 1978,Symbolic safety signs.
Amendment No. 7: 1990.

SABS 1195: 1978, Busbars.

SABS 1222 : 1985, Enclosures for electrical equipment (classified according to the degree of protection that the enclosure provides).
Amendment No. 1: 1989.

SABS 1473-1: 1989, Low-voltage switchgear and control gear assemblies Part 1: Requirements for type-tested and partially type tested assemblies.

SABS 064: 1979, Preparation of steel surfaces for coating.
Amendment No. 1: 1988.

SABS method 140: 1975, Dry film thickness of paints by means of a mechanical dial-indicator-type gauge.

SABS method 141: 1988, Dry film thickness of paints by means of a electro-magnetic flux or eddy current type gauges.

SABS method 147: 1975, Resistance to scratching of paint films.

SABS method 155: 1975, Resistance to salt fog of paint films.

SABS method 159: 1975, Adhesion of paint and varnish films (cross-cut test).

3. Method of Tendering

3.1 Tenderer's shall submit their main offers in accordance with the requirements of this specification. Deviations from the requirements of this specification which are of a minor nature and do not depart materially, will be considered at the discretion of Transnet Freight Rail (RME). The acceptance of alternative tenders will be considered only if a main tender is submitted as per this specification.

3.2 All Technical Data Sheets shall be signed by the Tenderer and returned.

3.3 All documents forming part of the Tender shall be firmly bound. No loose documents will be considered.

3.4 Failure to comply with the above requirements may preclude a tender from consideration.

4. Main Specification

4.1 The specification referred to herein is NRS 004-1, Mini-substations Part 1 (latest edition).

4.2 This document must be read in conjunction with NRS 004-1, and where any conflict may occur, refer back to the Technical Officer.

5 Construction Requirements

5.1 General

The mini substation shall comprise of the following:

a) a medium voltage compartment for housing the elements required from the following:
- switch-disconnectors,
- fuses,
- ring main units,
- cable terminations/boxes, and
- cable boxes;

b) a transformer compartment having a transformer of power rating not exceeding 1000 kVA and a rated voltage not exceeding 11 kV; and

c) a low-voltage compartment with rated voltage up to and including 400 V.

The mini-substations are intended to be used under the standardized ambient conditions set out in SABS 780 for transformers on their own.

5.2 Design

5.2.1 The general arrangement of a mini-substation shall be in accordance with either the type A (in-line or longitudinal) or the type B (lateral) layout. (In the type B arrangement the LV compartment is located on the side of the transformer, and the MV and LV compartments appear from the front to be side by side). The required layout shall be as specified in annexure 1.

5.2.2 A mini-substation shall have a steel base of sufficient rigidity to allow the mini-substation to be lifted and clamped to its plinth without being permanently deformed or damaged.

5.2.3 The mini-substation shall have lifting lugs by which it can be lifted as a unit after removal of the roof. After disconnection of the cables and fastenings (and removal of the roof) it shall be possible to lift the entire mini-substation from its plinth).

5.2.4 The roof shall be so designed that it does not retain water.

5.2.5 A mini-substation shall be of either the "unitary" design (see (a) below) or the "modular" design (see (b) below) as specified in schedule 1:

a) unitary design: the compartments and transformer provided in a "unitary" design are constructed to make up a non-dismountable whole, i.e. a unit which is not intended to be disassembled in the field to allow removal of the compartments or the transformer; or

b) modular design: the compartment provided in a "modular" design are constructed to be dismountable. The compartments shall be so designed and assembled that the transformer can be removed in its entirety without appreciable disturbance of the medium-voltage and low-voltage compartments. Conversely, the compartment housings shall be removable, after removal of the common roof, without disturbance of the transformer, the contents of the compartments or the underground cables.

5.2.6 The enclosure shall have a degree of protection of at least IP 35 in accordance with SABS 1222, applicable when the mini-substation is completely assembled and the doors are closed.

5.2.7 Where any bolt head is accessible from outside the enclosure, it shall not be possible to loosen the bolt without having access to the inside of the mini-substation.

5.2.8 The fronts of the transformer and the medium-voltage and low-voltage compartments shall be reasonably flush.

5.2.9 Ventilation shall be by natural air circulation consistent with the enclosure specification (see 5.2.6) and power rating (see 7.2)

5.3 Materials

The roof, walls and doors of the compartments shall be (as specified in annexure 1) either

a) of metal, or

b) of glass-reinforced polyester (GRP) S 141 for type F laminated products that are resistant to accelerated weathering and resistant to prolonged contact with soil and moisture. All GRP laminated products shall carry the standardization mark appropriate to SABS 141.

5.4 Medium-voltage, low voltage and transformer compartments

5.4.1 General

The compartments shall be provided with suitable fixtures for securing all accessories supplied with the mini-substation.

5.4.2 Doors

5.4.2.1 The doors shall be large enough to allow for the installation of and access to the specified equipment, and also for the making-off of cables.

5.4.2.2 Each door shall be fitted with a robust fastening arrangement. Where specified in annexure A, this shall be three-point locking, i.e. at the top, centre and bottom via rods operated by the door handle that shall be capable of being secured by means of a padlock. If specified in annexure 1, the lock protection facility shall be provided.

5.4.2.3 Hinges, locking devices and ventilation screens shall be of a corrosion-resistant metal.

5.4.2.4 Where a gasket is necessary to achieve the required degree of protection specified (see 5.2.6), the frame of each door shall be fitted with a gasket such that, when the door is closed, sufficient pressure is exerted on the gasket to form a seal. The preferred gasket material is closed-cell expanded

neoprene 25 permanently bonded with an adhesive having "tack" strength of 20 N/25 mm width.

5.4.2.5 The degree of protection shall be such that the door fasteners specified shall be capable of withstanding a force of 250 N when any part of the edge of the door is gripped by a hook subjected to a pull of such a force.

5.4.3 Strength of roof, door and wall panels

5.4.3.1 The roof shall be capable of withstanding, without permanent distortion, a mass load of 150 kg evenly distributed over an area of approximately 0,3m x 0,6m on any part of the roof.

5.4.3.2 The roof, door and wall panels shall be capable of withstanding, without damage, the hailstone impact test described in 8.3.6.

5.5 Transformers

5.5.1 The transformer shall comply with the physical and constructional requirements of SABS 780 and NRS 005 except for the following:

5.5.2 The air clearances between terminals are not required to comply with the requirements for outdoor air clearances but shall be sufficient to withstand the appropriate impulse voltages for electrically unexposed installations as set out in table 2 of SABS 1019, which for the typical rated voltages are as follows:

- 40 kV for a rated voltage of 3,6 kV;
- 60 kV for a rated voltage of 7,2 kV; and
- 75 kV for a rated voltage of 12 kV.

5.5.3 The clearance tables in NRS 008 may be regarded as a guide.

5.5.4 Accessories (including, for example, the rating plate of the off-circuit tapping switch (if provided) shall be so positioned that they are either visible or readily accessible (as relevant) when the compartment door is open.

5.6 Protection against Corrosion

5.6.1 General

5.6.1.1 Where 3CR12 material is to be used, treatment after fabrication and painting shall be in accordance with the metal supplier's specification.

5.6.1.2 Glass-reinforced polyester (GRP)

If glass-reinforced polyester is to be used (see 4.3) it shall be protected against corrosion as follows:

The exterior coat shall be (a fire-resistant) crystic gelcoat 7256PA, pigmented to the raw material manufacturer's specification and of uniform thickness. The gelcoat shall be backed by one layer of surface tissue.

The interior surface shall be painted. The laminate shall consist of three layers of 450 g/m² chopped strand mat bound with crystic 7256 PA or a general—purpose orthophthalic polyester resin that contains no fillers or dilutants. The resin to glass ratio shall be not less than 2,5:1 and not more than 3:1. The laminate shall have a uniform thickness throughout and shall have a smooth finish externally.

5.7 Bases

5.7.1 Steel bases shall be hot-dip galvanised in accordance with the relevant requirements of SABS 763 and, when specified in Annexure 1, the bases shall, in addition be coated with black epoxy tar paint.

5.8 Mini-substation (excluding base)

5.8.1 General

All surfaces of the mini-substation and other non-current carrying parts (including screws, nuts, bolts and washers) that are not of a material that is inherently corrosion-resistant shall be protected from corrosion by application of a suitable paint of coating system which satisfies the requirements of the tests given in 8.5

5.8.2 Surface Preparation.

Prior to coating, surfaces shall be free from burrs and sharp edges and shall have been prepared in accordance with SABS 064; alternatively they shall be blast-cleaned to grade SA 2½ of ISO 8501-1. Hot-dip galvanised surfaces shall be prepared for painting in accordance with the pain manufacturer's recommendations for application to this surface.

5.8.3 Painting/coating Processes

The painting/coating processes adopted shall conform to the paint/coating manufacturer's recommendations and shall take account of the intended conditions of use, environment and maintenance. The paint/coating finish shall be smooth, uniformly applied and free from visible defects.

5.8.4 Colour

All external surfaces shall be finished to the colour Orange as defined in SABS 1091.

5.8.5 Plinths

The characteristics of rationalised plinths (e.g. the base fixing details, the opening sizes and hence matching fixings in the mini-substation) which will accommodate the range of mini-substations covered by this specification currently being manufactured, are given in NRS 004-1.

6. DIMENSIONAL REQUIREMENTS

6.1 Transformer

6.1.1 The preferred dimensions of the transformer for a "modular" design (see 4.2.5 (b)) are given in NRS 004-1. The intention is to provide for interchange ability between different ratings. A tolerance of +- 3mm should apply to dimensions (except in the case of the height where a range is indicated on the figure). The internal transformer body dimensions are not restricted.

6.1.2 The terminals of the transformer shall be positioned on the short sides (ends).

6.2 Compartment Dimensions

The overall dimensions of mini-substations are given in NRS 004-1 figures 1 and 2. The dimensions of the mini-substations shall be such that the base, when placed on the standardised plinths shown in NRS 004-1 figures 1 and 2 (as appropriate), will rest on the plinth without protruding or creating gaps. The sizes of the medium-voltage and low-voltage compartments are not laid down individually.

6.3 Steel Base

Steel bases shall have a height of at least 75mm.

Note – Other dimensions are not laid down, since these depend on the dimensions of the compartments used.

7. ELECTRICAL REQUIREMENTS

7.1 General

The mini-substation shall be suitable for use in a three-phase 50 Hz system of nominal voltage as specified in Annexure 1, of which, unless otherwise stated, the LV neutral will be solidly earthed. The mini-substation shall withstand a separate-source withstand voltage test (see 7.3.2) at values as set out in SABS 780 appropriate to the selected voltage rating.

7.2 Power Rating

The power rating of a mini-substation shall be one of the values given in SABS 780 within the range given in 4.1 of this specification as specified in Annexure 1. The preferred ratings are as follows:

- 1000 kVA
- 11/6.6kV/400V

7.3 Earthing

7.3.1 The MV and LV compartments shall be provided with an earth bar of cross-sectional area equal or equivalent to that of an electrolytic copper conductor of cross-sectional area at least 70mm².

7.3.2 All earth connections to busbars shall be made by means of corrosion-protected M12 steel bolts, washers, spring washers and nuts.

7.3.3 Metal supports of glass-reinforced resin compartments shall be bonded together and connected to an earthing terminal.

7.4 Medium-voltage compartment

7.4.1 Equipment

7.4.1.1 The equipment to be mounted in the medium-voltage compartment shall be as specified in Annexure 1 and should if required to be supplied, normally be selected from one of the following:

a) Two MV cable boxes with cable terminations as described in 7.4.2.1 (if specified in Annexure 1, bolted current-limiting fuses shall be fitted in the tee-off connection); or
b) A ring main unit that complies with the requirements of NRS 006; or
c) A fully insulated compact switching device capable of complying with the performance requirements of NRS 006.
d) Preference may be given to low maintenance VCB switchgear type.
e) Manually operated fault-making, load breaking type switchgear shall be provided.
f) Each switch unit shall have at lease three lockable switching conditions i.e. "ON", "OFF" and "EARTH". Direct operation from "ON" to "EARTH" shall not be possible.
g) Test terminals for the purpose of testing the feeder cables shall be provided. Mechanical interlocking shall be provided so that access to these terminals shall only be possible with the switch in the earthed position.
h) An integral earthing device shall be provided to earth the cable side of the switch or the busbars.
i) It shall be possible to close the door to the HV compartment with the switches in the isolated or earthed position.
j) Access to fuses shall not be possible unless the associated switch is in the isolated position.
k) Fuses shall be of the H.R.C. cartridge type suitable for use on the system of supply as specified in Annexure 1, and shall be fitted with striker pins or special devices to provide single phasing protection.
l) The contractor shall supply two (2) outdoor cable termination kit, suitable for terminating a 70mm² 3 core XLPE with PVC outer sheath, with each mini-substation. The termination kit shall be suitable for anti electrolysis cables where the screen and armouring are not joined in the termination kit, but can be linked if necessary.
m)

7.4.2 Terminations for incoming cables

7.4.2.1 Where MV cable terminations are specified, the type shall be one of the following, as specified in Annexure 1:

a) Vertical-type trifurcating cable boxes suitable for the type and size of cable specified in Annexure 1 and of the type specified in Annexure 1 complete with all accessories such as terminals, plumbing glands and armour clamps and suitable for filling with semi-fluid compound; or
b) Post insulators for dry terminations in air, which comply with the requirements of NRS 008.

7.4.2.2 Where post insulators are specified, a rail for clamping the cables shall be provided.

7.4.2.3 Where ring main units are specified, the cable terminations shall be suitable for the type and size of cable specified in Annexure 1.

7.4.2.4 The gland plate of the cable, where applicable, shall always be positioned above the top of the mini-substation steel base.

7.4.3 Internal Connections

7.4.3.1 Connections between the transformer and cable terminals in the MV compartment shall be made by means of single-core cables insulated for the rated voltage of the connected equipment and having a conductor of minimum cross-sectional area 50mm² for copper material or 70mm² for aluminium. The terminals shall be shrouded or taped in an acceptable manner.

7.4.3.2 Cables that have their semi-conducting screens or copper screen tapes earthed on one side may be bunched or strapped together. Cables without earthed screens shall be separated and the clearances measured between cables and from cables to earth shall, as minimum requirements, comply with the requirements of NRS 008 or, if the applications is not covered, with the requirements of IEC 71.

7.5 Low Voltage Compartment

7.5.1 Transformer Connections

7.5.1.1 The connection between the LV transformer bushings and the LV panel shall comprise single-core, stranded, colour-coded PVC insulated cable. The current density in each phase, including the neutral, shall not exceed 2,5 A/mm² of copper or copper-equivalent area.

7.5.1.2 Where a crimping method is to be used for terminating the ends of these connections, it shall be with long barrel-type lugs crimped by means of a correctly matched crimping tool that only releases after full compression has been employed. Arrangements which result in two lugs on top of each other on one terminal are unacceptable. Each lug shall be crimped in at least two adjacent points on the barrel.

7.5.1.3 Due allowance shall be made for short-circuit effects (such as electrodynamic forces acting on the connections) and for the avoidance of hot-spot creation due to any bracing arrangements.

7.5.1.4 Colour coding may take the form of the colour of the PVC cable itself or a coloured sleeve fitted over the lug barrel (after crimping, if applicable). The required colours are:

RED, WHITE, BLUE	-	Live phases; and
BLACK	-	Neutral

7.5.1.5 If any LV equipment is to be fitted in this compartment, the transformer connections shall be screened to prevent accidental contact.

7.5.2 LV Panel

7.5.2.1 General

The layout of the panel shall be as specified and set out in Annexure 1 When customer metering, such as kWh meters and maximum demand meters, is installed in a common compartment with power circuits, live connections shall be screened against inadvertent contact by persons (such as meter readers) requiring access.

7.5.2.2 Busbars

Busbars shall be made of hard-drawn copper and shall comply with the requirements of SABS 1195 where relevant. They shall extend the full length of the LV panel. The current density shall not exceed 1,8 A/mm² Busbars shall be untinned and bare, with neither heat shrink sleeving nor tape wrapping applied. The neutral busbar shall be dimensioned similarly to the other busbars.

Busbars shall be colour-coded according to the preferred colours of red, white, blue and black by means of a clearly visible painted-on spot of diameter at least 20 mm.

Clearance to earth and between phases shall be at least 20 mm, unless otherwise indicated in Annexure 1.

The LV panel and busbars shall be able to withstand the effects of the rated short-time current available at the terminals of the transformer.

Busbar supports, spacers and insulation systems shall be manufactured from materials whose characteristics for the purpose have been established b tests to an appropriate SABS or IEC standard.

7.5.2.3 Earth Busbar

A rectangular-section earth busbar of bare hard-drawn copper shall be provided to facilitate earthing of cable sheaths and armour. It shall have a cross-sectional area of at least 70 mm² and a minimum width of 25mm.

Centrally located holes to clear M12 bolts shall be provided at intervals of 75mm along the whole length of this earth busbar.

7.5.2.4 Gland Plates

The LV compartment shall be fitted with either a cable-clamping rail or removable individual gland plates (specified in Annexure 1), the latter being undrilled except where holes are called for in Annexure 1.

The distance from the gland plate to the top of the plinth shall be at least 75mm, and there shall be at least 350mm between the gland plate and the nearest terminals of the outgoing LV circuit.

Gland plates shall be made of corrosion-protected mild steel of thickness at least 3mm.

7.5.2.5 Feeder Circuits

Connections from the busbars to LV equipment shall be selected from

a) solid insulated conductor,
b) stranded cable, and
c) laminated busbar.

The size of the busbar or cable shall be selected to suit the current rating of the circuit and the fault rating of the transformer.

Where flexible cable is used, the connection to the busbar shall be by means of lugs. Where crimped lugs are employed, the same requirements shall be observed as for the transformer connections (see 6.5.1). The size

of this connection shall be at least equivalent to that of an electrolytic copper conductor of cross-sectional area 35mm².

When the specified clearance cannot be achieved, the busbars or connections shall be fully insulated.

When aluminium LV cables are used, all outgoing circuit terminations shall be compatible with this material.

All connections to the busbars shall be made by means of corrosion-resistant steel bolts, washers, spring washers and nuts.

7.5.2.6 Auxiliary Circuits

All auxiliary circuits shall be protected by either HRC fuses or moulded-case circuit-breakers (MCCBs). Auxiliary wiring should be of PVC multistrand cable of cross-sectional area at least 2,5mm².

All auxiliary wiring shall be in accordance with a circuit diagram agreed between the parties and, if required by the purchases, numbered by means of an approved type of numbering ferrule at both ends of the wire, as specified in Annexure 1.

The insulation of the wiring and associated equipment in the low-voltage compartment shall be capable of withstanding test voltages as follows:

-300/500 V grade wiring -1 kV; and
-600/1 000 V grade wiring -2 kV.

7.5.2.7 Equipment

Particulars of equipment that shall be supplied are given in Annexure 1. The following requirements apply only where equipment is specified in Annexure 1:

a) Indicating ammeters shall be of the standard 96mm type, phase-identified without internal saturation current transformers;
b) thermal maximum demand ammeters shall have internal saturation current transformers;
c) LV fuse-links for outgoing circuits in fuse carriers shall comply with the requirements of SABS 172, for 50 kA rated breaking capacity, and shall have 82mm between fixing centres; and
d) LV switches, fuse-combination units and MCCBs shall be capable of complying with the performance requirements of the applicable of SABS 152 and SABS 156.

Note - Earth leakage protection is, in general, not required.

7.6 Transformer

7.6.1 The transformer shall comply with all the relevant electrical requirements of SABS 780 and NRS 005 and, in addition, the temperature rise shall not exceed the appropriate limits specified in SABS 780 when the transformer is mounted inside the mini-substation.

7.6.2 Unless otherwise specified in Annexure 1, the rated no-load secondary voltage shall be 242/420 V.

7.6.3 If require, off-circuit tap-changers with a range of +-5% in 2,5% steps may be specified in Annexure 1. (See also 5.5.2).

8. TESTS

8.1 Component Tests

The tests specified for the components to be supplied (for example, the ring main unit, transformer, etc.) shall be carried out in accordance with the relevant component specifications as referenced.

8.2 Clearances

The clearances as specified (see the relevant clauses in NRS 008, and 7.4.3.2 and 7.5.2.2 in this part of NRS 004) shall be verified by inspection.

8.3 Type Tests

The tests need only be repeated for different ratings where the relevant characteristics are affected by the rating. Foe enclosures of the same dimensions, tests in accordance with 8.3.1, 8.3.5 and 8.3.6 might be expected to be independent of rating.

8.1.1 Tests To Prove Enclosure Design

The tests set out in SABS 1222 to prove compliance with the class of protection shall be performed, in particular tests to prove protection of persons against contact with live parts inside the enclosure, and tests to prove protection of equipment against ingress of solid foreign bodies and ingress of liquid (see also 5.4.2.5). It shall not be necessary to direct water upwards when conducting the water jet test. It shall be sufficient for the mini-substation to be securely mounted on a flat surface.

The test against ingress of solid foreign bodies shall be performed while a hook is being used to grip any part of the locked doors, the hook being subjected to a pull of 250 N.

8.1.2 Voltage Withstand Test

The method given in SABS 780 for the separate-source voltage withstand test shall be used to prove the withstand voltage of the MV equipment. The test shall be carried out with the compartment doors closed for replaced by electrodes that simulate the shut doors).

8.1.3 Temperature Rise Test

The method given in SABS 780 shall be used for the whole mini-substation. The test shall be conducted with the compartment door closed and the mini-substation standing on a solid level surface.

8.1.4 Short-Circuit Test

The short-circuit test described in 8.2.3 of SABS 1473-1 : 1989 shall be used.

8.1.5 Strength of Roof

A test to prove the strength of the roof (see 5.5.3.1) shall be performed by placing an appropriately designed weight on the roof, for one minute. No permanent distortion shall result.

8.3.6 Impact Strength of Roof, Doors and Walls

An impact strength test (see 4.4.3.2) shall be carried out that simulates the effect of hailstones. A perpendicular impact of 160 J approximating an artificial hailstone of diameter 75mm shall be used. A method similar to that described in ASTM/E822-81 is appropriate.

8.2 Routine Test

The insulation of auxiliary circuits of every assembly shall be tested by an appropriate, applied voltage test.

8.3 Tests on painted Surfaces

8.3.1 Protection of coatings against corrosion shall be assessed using test samples subjected to the same painting procedures as the mini-substation components. The following tests shall be performed:

a) Adhesion test in accordance with SABS method 159; The cross cutting coefficient shall be not less than 8.

b) Exposure to salt for 168 h in accordance with SABS method 155;The coated surfaces shall show no visible defects and the underlying metal shall be free from corrosion and scale.

c) Scratch resistance test in accordance with SABS method 147;

d) When a mass load of 1 kg is applied to the test needle, the scratch produced shall not penetrate to the underlying metal. The scratch shall have no jagged edges.

8.3.2 SABS method 140 or SABS method 141 may be used to verify paint thickness where this has been agreed between the parties, and specified in Annexure 1.

8.4 Tests on Glass-Reinforced Polyester Products

Test samples shall be submitted to a laboratory acceptable to the purchaser for routine tests. Tests shall prove compliance with the requirements of SABS 141.

9. MARKING/LABELLING/DOCUMENTATION

9.1 The transformer in each mini-substation shall have a rating plate, positioned in accordance with 4.5.2. In addition to complying with the requirements of SABS 780, the rating plate shall show the total mass of the mini-substation.

9.2 A safety notice or notices complying with the regulations issued in terms of Machinery and Occupational Safety Act, 1983 (Act 6 of 1983), to the design WW7 (See SAVS 1186) and mounted on a square sheet of minimum size 100mm x 100mm and made of a non-plastic durable corrosion-resistant material, shall be securely mounted either on the outside of the door of each outer compartment or in the centre of the front panel of the transformer compartment.

9.3 Any other notices, nameplates or labels required will be specified separately in Annexure 1 or supplied by the purchaser.

9.4 Documentation

9.4.1 Documentation required to be supplied with the tender is detailed in Annexure 1.

9.4.2 The following drawings shall be supplied by the supplier for approval:

9.4.2.1 drawings which shall reflect major dimensions and all components:
- general assembly;
- LV panel layout; and

9.4.2.2 any others called for in Annexure 1.

ANNEXURES

ANNEXURE No.1

1. SCOPE

1.1 This specification covers the deisgn, supply, delivery, and offloading of a mini substation at Transnet in 150 Eel Road Bayhead Electrical Depot, in Durban

2 GENERAL

2.1 This specification is for the design; supply, testing, delivery, and offloading at site in 150 Eel Road Bayhead Electrical Depot, in Durban only. .

3 MINISUBSTATION REQUIREMENTS

3.1 GENERAL

3.1.1 The mini substation shall comprise of the following:

a) A medium voltage compartment for housing the elements required from the following:
- Switch-disconnectors.
- Fuses.
- The ring main unit.
- Cable terminations and
- Cable boxes.

b) A transformer compartment having a transformer of power rating of 1000 kVA and a rated voltage of 11kV; and

c) A low voltage compartment with rated voltage of 420 V.

3.1.2 The mini substation shall be designed for use under the standardized ambient conditions set out in SABS 780 for transformers on their own.

3.2 DESIGN

3.2.1 The general arrangement of the mini substation shall be in accordance with the Type B (lateral) layout.

3.2.2 The mini substation shall have a steel base of sufficient rigidity to allow the mini substation to be fitted and clamped to its plinth without being permanently deformed or damaged.

3.2.3 The mini- substation shall have lifting lugs by which it can be lifted as a unit after removal of the roof and disconnection of cables and fastenings.

3.2.4 The roof shall be so designed such that it does not retain water.

3.2.5 The mini-substation shall be of modular design.

3.2.6 The enclosure shall have a degree of protection of at least IP 35 in accordance with SABS 1222, applicable when the mini-substation is completely assembled and the doors are closed.

3.2.7 Where any bolt head is accessible from outside the enclosure, it shall not be possible to loosen the bolt without having access to the inside of the mini-substations.

3.2.8 The front of the transformer, the medium-voltage and low voltage compartments shall be reasonable flush

3.2.9 Ventilation shall be by natural air circulation consistent with the enclosure specification.

3.3 MATERIAL

3.3.1 The roof, walls and doors of the compartments shall be of metal (constructed from 3CR12 material).

3.4 MEDIUM-VOLTAGE, LOW-VOLTAGE AND TRANSFORMER COMPARTMENTS

3.4.1 GENERAL

The compartments shall be provided with suitable fixtures for securing all accessories supplied with the mini substation.

3.4.2 DOORS

3.4.1.1 The doors shall be designed in accordance with clauses 5.4.2.1 to 5.4.2.5 of the main specification.

3.4.2 STRENGTH OF ROOF, DOORS AND WALL PANELS

3.4.3.1 The roof, doors and wall panels shall be designed in accordance clauses 5.4.3.1 to 5.4.3.2 of the main specification.

3.5 TRANSFORMERS

3.5.1 The transformers shall comply with the physical and constructional requirements of SABS 780 and NRS 005 except for the items detailed in clauses 5.5.1 to 5.5.2 of the main specification.

3.6 PROTECTION AGAINST CORROSSION.

3.6.1 GENERAL
3.6.1.1 The treatment for the 3CR12 material shall be in accordance with the metal suppliers specification.

3.6.2 BASES

3.6.1.1 Steel bases shall be hot –dip galvanised in accordance with the relevant requirements of SABS 763 and shall be coated with black epoxy tar paint.

3.6.3 MINISUBSTATION (EXCLUDING BASE)

Protection against corrosion for the mini-substations shall be in accordance with clause 5.6.4.1 to 5.6.4.2 in the general specification.

3.6.4 COLOUR

3.6.4.1 All external surface finishes shall be finished to colour Orange as defined in SABS 1091.

4 DIMENSIONAL REQUIREMENTS

4.1 Transformer

4.1.1 All dimensions shall be in accordance with clause 6.1 to 6.3 of the general specification.

5. ELECTRICAL REQUIREMENTS

5.1 The mini-substations shall be suitable for use in a three-phase 50 Hz system of nominal voltage of 11/6.6kV
5.2 The low voltage neutral shall be solidly earthed.
5.3 The power rating of the min- substation shall be 1000 kVA.
5.4 The MV and LV compartments shall be provided with an earth bar of cross-sectional area equal or equivalent to that of an electrolytic copper conductor of cross sectional area of at least 70mm^2.
5.5 All earth connections to busbars shall be made by means of corrosion protected M12 steel bolts, washers, spring washers and nuts.

5.6 MEDIUM VOLTAGE EQUIPMENT

5.6.1 Equipment

5.6.1.1 The equipment to be mounted in the medium-voltage compartment shall be the following:

a) A ring main unit that complies with the requirements of NRS 006.
b) Low maintenance Vacuum manually operated fault-making Load breaking type switchgear.
c) Each switch unit shall have three lockable switching conditions i.e. "ON", "OFF and "EARTH". Direct operation from "ON" to "EARTH" shall not be possible.
d) Terminals for the purpose of testing the feeder cables. Mechanical interlocking shall be provided so that access to these terminals shall not be possible with the switch in the earthed position.
e) An integral earthing device to earth the cable side of the switch or the busbars.
f) It shall be possible to close the door to the HV compartment with the switches in the isolated or earthed position.
g) Access to fuses shall not be possible unless the associated switch is in the isolated position.
h) Fuses of the H.R.C. cartridge type suitable for use on the 11Kv system of supply as specified in appendix 1 of NRS 004. Fuses shall be fitted with strike pins or special devices to provide single phasing protection.
i) The contractor shall supply TWO (2) outdoor termination kits, suitable for terminating a 50mm2 3-core XLPE with PVC outer sheath, with the mini-substation. The termination kit shall be suitable for anti-electrolysis cables where the screen and armouring are not joined in the termination kit, but can be linked if necessary.

5.6.2 Termination for incoming cables

5.6.2.1 The medium voltage cable terminations shall be suitable for a $50mm^2$ three-core XLPE copper cable.
5.6.2.2 The type of termination shall be a Vertical-type trifurcating cable boxes, complete with accessories such as terminals, plumbing glands, and armour clamps and suitable for filling with semi-fluid compound
5.6.2.3 The minimum distance from gland plate to terminal shall be 250mm.
5.6.2.4 The incoming cable to be allowed for in the terminations shall be a $50mm^2$ 3-core XLPE copper cable.

5.6.3 Internal Connection

5.6.3.1 All internal connections shall be in accordance with clause 7.4.3 of the "general technical specification".

5.7 Low Voltage Compartment

5.7.1 Transformer Connection

5.7.1.1 the transformer connections between the low voltage transformer bushings and the low voltage panel shall be in accordance with clause 7.5 of the technical specification.

5.7.2 Low Voltage Panel

5.7.2.1 General

The layout of the panels shall be as shown on the attached drawings. Where the maximum demand meter is installed, all live connections shall be screened against inadvertent contact by person.

5.7.2.2 Bursbars

5.7.2.2.1 The busbar shall be designed as laid down in clause 7.5.2.2 of the technical specification.

5.7.2.3 Earth Busbar

5.7.2.3.1 The earth busbar shall be provided with a cross-sectional area of at least 70mm2 copper and a minimum width of 25mm.
5.7.2.3.2 Centrally located holes to clear M12 bolts shall be provided at intervals of 75mm along the whole length of the earth busbar.

5.7.2.3.3 Gland Plates

5.7.2.3.4 The LV compartment shall be fitted with a cable-clamping rail.
5.7.2.3.5 The distance between the gland plate to the top of the plinth shall be at least 75mm, and there shall be at least 350mm between the gland plate and the nearest terminal of the outgoing LV circuit.

5.7.2.4 Feeder Circuits

5.7.2.4.1 The connection from the busbar to the LV equipment shall use laminated busbars.
5.7.2.4.2 The size of the busbar shall be selected to suit the current rating of the circuit and the fault rating of the transformer.
5.7.2.4.3 Where the specified clearance cannot be achieved, the busbar or connections shall be fully insulated.
5.7.2.4.4 All connections to the busbar shall be made by means of corrosion resistant steel bolt, washers, spring washers and nuts.

5.7.2.6 Auxiliary wiring

5.7.2.6.1 All auxiliary circuits shall be in accordance with clause 7.5.2.6 of the general technical specification.

5.7.2.7 Equipment

5.7.2.7.1 Three maximum demand ammeters shall be supplied with the mini-substation. The indicating ammeters shall be as specified in clause 7.5.2.7 of the general technical specification
5.7.2.7.2 Three current transformers for the abovementioned ammeters shall be supplied with the mini-substation.
5.7.2.7.3 All low voltage fuse-links and MCCB's shall be in accordance to clause 7.5.2.7 of the general technical specification.

5.8 Transformers

5.8.1 The transformers shall be in accordance to clause 7.6 of the general technical specification.
5.8.2 The rated no-load secondary voltage shall be 242/420V.
5.8.3 Off-Circuit tap-changer with the range of +/- 5% in 2.5% steps shall be supplied with the transformer.

6 TESTS

6.1 The tests for the components to be supplied shall be carried out in accordance with clause 8 of the general technical specification.

7 MARKING/LABELLING/DOCUMENTATION

7.1 All markings/Labelling and documentation shall be done in accordance with clause 9 of the general technical specification.

SIGNATURE OF TENDERER _____

DATE _____

FOR THE DESIGN, SUPPLY, DELIVERY & OFFLOADING OF: MINIATURE SUBSTATIONS

ANNEXURE C: TECHNICAL / FUNCTIONALITY CRITERIA

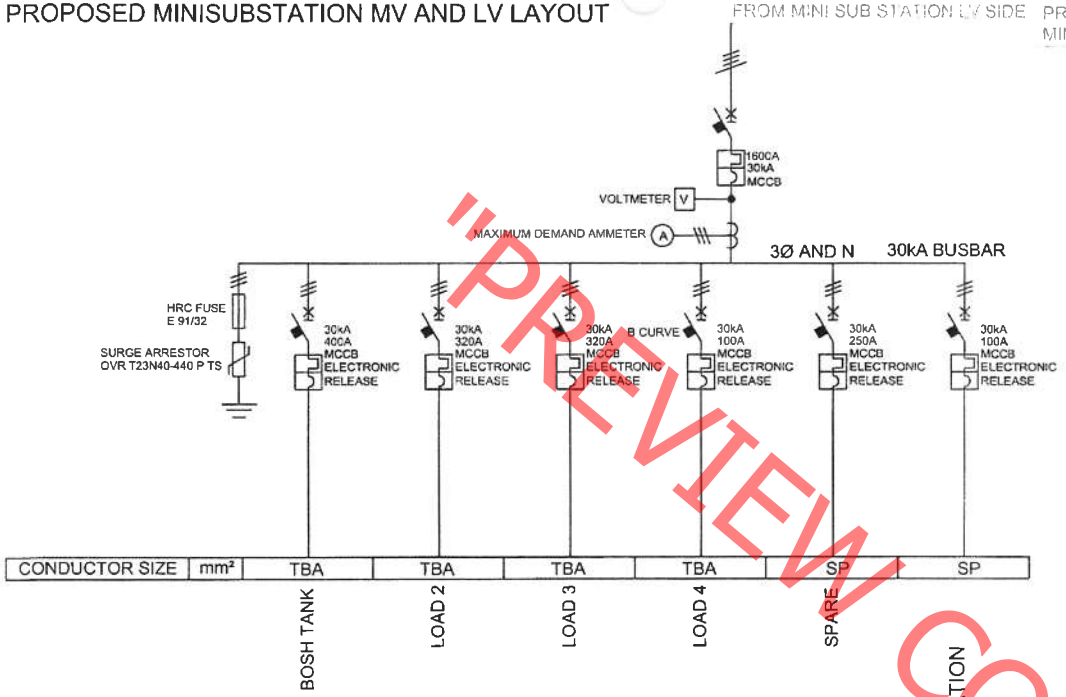
Quality Criteria	Specification	Yes	No
	Any Deviation		
Quality Criteria	Specification	Yes	No
	Number of years and details of previous and relevant experience (Proof required)		
Quality Criteria	Specification	Number of weeks	
	Delivery period in working weeks from date of order		

FOR THE DESIGN, SUPPLY, DELIVERY & OFFLOADING OF: MINIATURE SUBSTATIONS

ANNEXURE D: DRAWING – PROPOSED MINISUBSTATION MV AND LV LAYAOUT

ANNEXURE D

PROPOSED MINISUBSTATION MV AND LV LAYOUT

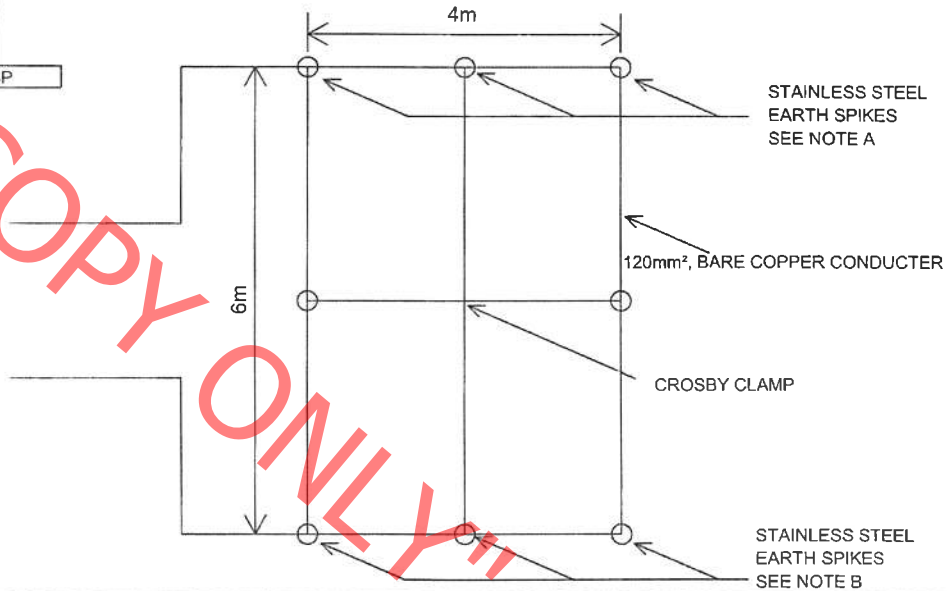


NOTES

A. CONTRACTOR TO ENSURE THAT THE EARTH RESISTANCE AT EACH OF THE SPIKES IS APPROXIMATELY 2 OHMS.

B. CONTRACTOR TO ISSUE A CERTIFICATE OF COMPLIANCE ON COMPLETION OF WORK

TYPICAL DETAIL OF MINISUBSTATION EARTH MAT LAYOUT (NTS)



MINI SUBSTATION SPECIFICATION

MATERIAL	3CR12
THICKNESS OF MATERIAL	2mm
PAINT TYPE	POWDER COATED (40 MICRONS)
FRAME COLOUR	ORANGE
IP RATING	30
SWITCHGEAR MAKE	EQUAL OR SIMILAR APPROVED TO ABB
SWITCHGEAR TYPE	ALL INCLUSIVE OF ELECTRONIC TRIP UNIT

NOTES

1. DO NOT SCALE DRAWING - ONLY DIMENSIONS SHOWN TO BE USED.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS, DIMENSIONS AND LEVELS ON THE SITE AND NOTIFY THE NEC SUPERVISOR OF ANY VARIATIONS BEFORE CONSTRUCTION.

DRAWING NO | REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
01	ISSUED FOR CONSTRUCTION	YL	SM	LP	03/12/2013

REVISIONS

CONTRACTOR / CONSULTANT

TITLE	NAME	SIGN	DATE

OPERATING DIVISIONS

TITLE	NAME	SIGN	DATE

TRANSNET CAPITAL PROJECTS

TITLE	NAME	SIGN	DATE
DRAWN	YL		03 12 13
CHECKED	SM		03 12 13
DESIGNED	YL		03 12 13
CHECKED	LP		03 12 13

PR.ENG. / PR.TECH./PR. ARCH

NAME	SIGNATURE	DATE	REG. NUMBER	SCALE
LWANDILE POSWA		03 12 13	20133001	NOTED

Transnet Capital Projects
237 MAHATMA GANDHI ROAD
DURBAN
P.O BOX 1073 DURBAN
TEL 031 361 1095
FAX 0866 /0815

TRANSNET

DURBAN

TRANSNET RAIL ENGINEERING

PROPOSED NEW 1000kVA MINI SUBSTATION

PROJECT NUMBER	QD	FBS	DIS	TYPE	DRAWING NO.	SHEET	REV	ID
2534059-5000E	LA	0001	09	01	TD			

A3