

LESEDI LOCAL MUNICIPALITY

BID NO: 19/2026

APPOINTMENT OF SERVICE PROVIDER FOR THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA, 132/22Kv SUBSTATION (ESKOM SELF BUILD PROJECT)

ISSUED BY:
MUNICIPAL MANAGER
LESEDI LOCAL MUNICIPALITY
P O Box 201
HEIDELBERG
1438



CONSULTING ENGINEERS:
LYON AND PARTNERS (PTY) LTD
P O Box 3925
VANDERBIJLPARK, 1900



TO BE COMPLETED BY TENDERER

NAME OF COMPANY:

CONTACT NAME:

CONTACT NUMBER:

E-MAIL:

ESKOM VENDOR NO.:

CIDB/CRS NUMBER:

CSD NO:

TENDER AMOUNT (INCL VAT): R.....

SIGNED BY TENDERER:

CLOSING DATE: 05 October 2026, at 12:00,
Tender Box, Ground Floor, Lesedi Local Municipality, Heidelberg



DOCUMENT CONTROL: LYON FILEPATH Y:_Lesedi\VE 9724-27-5 Impumelelo 132kV Substation\T - TENDER\132 kV Substation tender\Impumelelo Substation Tender 2026-06-02\0 - COVER AND CONTENT - Impumelelo 2026-06-02.docx

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NOTE:

All writing to be done in this document must be in black ink to facilitate clear photocopying.

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LESEDI LOCAL MUNICIPALITY
P O Box 201
HEIDELBERG
1438

**THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA,
132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)**

SECTION 1:
T1 - TENDER CONDITIONS



LYON AND PARTNERS (Pty) Ltd
Electrical Consulting Engineers
P O Box 3925
VANDERBIJLPARK
1900

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**T1.1 – TENDER NOTICE AND INVITATION
TO TENDER**

T1.1.1. MBD 1 - INVITATION TO BID – PART A

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE LESEDI LOCAL MUNICIPALITY					
BID NUMBER:	19/2026	CLOSING DATE:	5 OCTOBER 2026	CLOSING TIME:	12:00
DESCRIPTION	THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA, 132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)				
THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT.					

BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN
THE BID BOX SITUATED AT:

Supply Chain Management Unit					
Lesedi Local Municipal Building					
Corner HF Verwoerd and Du Preez Street					
Heidelberg					
1438					
SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
CSD NUMBER					
B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE [TICK APPLICABLE BOX]	☐ Yes ☐ No		B-BBEE STATUS LEVEL SWORN AFFIDAVIT	☐ Yes ☐ No	
[A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE/ SWORN AFFIDAVIT (FOR EMES & QSEs) MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE]					

ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES/WORKS OFFERED?	☐ Yes ☐ No [IF YES ENCLOSE PROOF]	ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES/WORKS OFFERED?	☐ Yes ☐ No [IF YES, ANSWER PART B:3]
TOTAL NUMBER OF ITEMS OFFERED		TOTAL BID PRICE	R
SIGNATURE OF BIDDER		DATE	
CAPACITY UNDER WHICH THIS BID IS SIGNED			
BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO:		TECHNICAL INFORMATION MAY BE DIRECTED TO:	
DEPARTMENT	SUPPLY CHAIN MANAGEMENT	INFRASTRUCTURE SERVICES - ELECTRICAL	
CONTACT PERSON	Ms. Sibulelo Mokoena	CONTACT PERSON	Mrs. Jacqueline Mbewe
TELEPHONE NUMBER	016 466 1947	TELEPHONE NUMBER	016 466 1952
E-MAIL ADDRESS	sibulelom@lesedi.gov.za	E-MAIL ADDRESS	jacquelinem@lesedi.gov.za



Tenders are hereby invited for the following Office: Electricity

TENDER NO: 19/2026

THE LESEDI LOCAL MUNICIPALITY, ELECTRICITY DEPARTMENT, REQUIRES THE SERVICES OF A SERVICE PROVIDER FOR THE SUPPLY, DELIVERY AND CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA, 132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)

Bid No.	Bid Description	Evaluation Criteria	Briefing Meeting	CIDB Grading	Functionality Qualifying Criteria	Closing Date	Technical Contact Person
19/2026	RFP: APPOINTMENT OF SERVICE PROVIDER FOR THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA, 132/22Kv SUBSTATION (ESKOM SELF BUILD PROJECT)	90/10	10 September 2026, 10h00 at the Infrastructure Services Boardroom, Lesedi Municipal Building, Second floor, c/o of Du Preez and H.F Verwoerd Street, Heidelberg, 1441	8 EP OR HIGH ER	Functionality minimum 80/100 points	05 October @ 12h00	Ms. Jacqueline Mbewe

Adjudication:

Bids shall be evaluated and adjudicated in accordance with the Supply Chain Management Policy of Lesedi Local Municipality.

- Technical Enquiries: Ms. Jacqueline Mbewe Tel: 016 466 1952
- Tender Documents : Ms. Sibulelo Mokoena Tel : (016) 466 1947
- Documents available: As from 4 September 2026 on <https://lesedi-lm.gauteng.gov.za> or www.etenders.gov.za
- Closing date: 05 October 2026 Time: 12h00
- Tender Box: Venue: Tender boxes are situated at the Supply Chain Management Unit, situated on the upper level of the West Wing of the Lesedi Local Municipality Civic Centre, Corner Du Preez and HF Verwoerd Streets in Heidelberg.

COMPULSORY TENDER DOCUMENTS:

1. Tax Clearance Certificate / Tax Compliance Status documents with Pin. Each company within the Joint Venture / Consortium must submit Tax Clearance Certificate or a copy of Tax Compliance Status document with Pin and VAT certificate if applicable.
2. Certified copies of all directors ID.
3. Copy of company registration documents.
4. Copy of latest municipal account (Rates, Taxes and Services Account). which is not more than 3 months old at the time of closing. The bidding entity as well as all its directors must submit a Municipal account which is not more than three (3) months in arrears or valid lease agreement which is in the name of the entity. If the director is leasing, they must also provide a valid lease agreement on their names.
 - 4.1 If the business operates from the different address as per CIPC document, an affidavit must be provided.
 - 4.2 Properties where businesses are leased at must submit municipal accounts not owing 90 days or more.

5. Central Supplier Database (CSD) registration full report.
6. Tenderers must submit the relevant copy of Workmen's Compensation Registration Certificate, COIDA Certificate (Electrical related)
7. Completed and Signed Schedule of Quantities.
8. In the event that an item is not going to be charged on the schedule of quantities the number "0" must be inserted and not a dash (-).
9. Authority of Signatory must be completed and signed in case of a business not sole proprietor or one-person business or board of director's resolution authorizing signature to sign off the bid documents.
10. Personal Information Process Form.
11. MBD 1: Invitation to tender.
12. MBD 4. Declaration of Interest.
13. MDB 5. Declaration of procurement above R10 million (vat included) (If Applicable).
14. MBD 6.1 Preferential Points.
15. MBD 7.1: Contract form - Purchase of goods/works.
16. MBD 8: Declaration of bidder's past supply chain management practices.
17. MBD 9: Certificate of independent bid determination.
18. Bidders must sign or initial each page.
19. Bid Documents must be completed in full.
22. Tenderer to provide signed Eskom Technical Evaluation/ Approval for a previous/current project on the construction and implementation of Eskom Self-Build projects involving the high voltage network on substations and overhead lines (from 44kV and above).
25. Attach valid ECSA/ SACPCMP personnel registration for Engineers and Project Managers. Ensure all necessary information is included in order for verification to be confirmed.
27. ISO 45001 certification-Occupational Health and Safety Management.
28. ISO 14001 certification-Environmental Management.
29. ISO 9001 certification-Quality Management.
30. Public Liability (minimum of R10 million).
31. CIDB Grading of 8EP or Higher.
32. Bidders must complete and sign all technical A-B schedules and comply with specifications
33. Confirmation letter to be provided by the tenderer's guarantor that the 10% performance security guarantee can be obtained in accordance with the conditions of the contract.
34. Completed and signed Programme submitted according to the requirements of the Tender Conditions (T1.2.4)
35. Eskom vendor number, Complete bid document front page (to be verified).
36. Attach certified personnel proof of ORHVS registration for the commissioning engineer.
37. Signing of certificate T2.2.22. CERTIFICATE OF CONVERSANCE WITH MATERIAL REQUIREMENTS stipulating the Eskom requirements for material procurement

Bids terms and conditions:

1. All suppliers of good & services are urged to register in the National Treasury web based Central Suppliers Database with Effect from 1 July 2016 @ www.csd.gov.za.
2. As per National Treasury Instruction No.4 A of 2016/2017 National Treasury Supplier Database, organs of state must ensure that suppliers awarded business with the State, excluding instances mentioned in paragraph 3.3, are registered on the CSD prior to award letter/purchase order/signed contract being issued.
3. Tenders by joint ventures are to be accompanied by the Document Formation of the joint venture, duly registered and authenticated by a Notary Public or other official deputized to witness sworn statements. This document must define precisely the conditions under which the joint venture will function, the period for which it will function, the persons authorized to represent and obligate it, the address for correspondence, the participation of several firms forming the joint venture and any information necessary to permit a full appraisal of its functioning, including a clause to the effect that the members of the joint venture are jointly and severally bound.
4. No late tender will be accepted.
5. Telefax or e-mail tenders will not be accepted.
6. Tenders may only be submitted on the bid documents provided by Lesedi Local Municipality.
7. The use of tippex is not allowed on the bid documents. Bids completed in pencil will be regarded as invalid bids.
8. Bidders must sign or initial each page
9. No page(s) may be removed from the original tender document
10. Requirements for sealing, addressing, delivery, opening and assessment of tenders are stated in the tender document.

11. In the event of a mistake having been made it shall be crossed out in ink and be accompanied by a full signature of the authorized person at each and every alteration.
12. The Municipality reserves the right to reject the Bid if corrections are not made in accordance with the above.
13. The lowest or any tender will not necessarily be accepted, and Lesedi Local Municipality reserves the right to accept a tender in whole or in part.
14. The validity period for this tender is ninety (90) days.
15. The Municipality reserves the right to negotiate a fair market-related price with recommended bidders after a competitive bidding process or price quotations
16. The Municipality reserves the right to appoint and not to appoint.
17. All tender prices must be inclusive of VAT for all registered VAT vendors.
18. The bid will be evaluated on a 90/10 principle where 90 points will be price, and 10 points is Specific goals
19. Tender documents may be downloaded from <https://lesedi-lm.gauteng.gov.za> or www.etenders.gov.za.

NB* NO TENDER DOCUMENTS ON USB WILL BE CONSIDERED FOR EVALUATION

T1.1.1.1 MBD 1 – TERMS & CONDITIONS FOR BIDDING – PART B

1. BID SUBMISSION:

- 1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
- 1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED–(NOT TO BE RE-TYPED) OR ONLINE**
- 1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

2. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

- | | |
|---|--|
| 2.1 IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? | ☐ YES ☐ NO |
| 2.2 DOES THE ENTITY HAVE A BRANCH IN THE RSA? | ☐ YES ☐ NO |
| 2.3 DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA? | ☐ YES ☐ NO |
| 2.4 DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA? | ☐ YES ☐ NO |
| 2.5 IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION? | ☐ YES ☐ NO |

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.

SIGNATURE OF BIDDER:

CAPACITY UNDER WHICH THIS BID IS SIGNED:

DATE:

T1.1.2. REFERENCE NUMBER AND TITLE

The contract number and title shall be:

THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA, 132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)

T1.1.3. BRIEF DESCRIPTION OF THE WORKS

The Contractor to be appointed by Lesedi Local Municipality will undertake the full scope of work which, at high level, comprises of the supply, delivery, installation, testing, commissioning, and handing over, complete with auxiliary equipment, of:

a) New substation platform, earth grid and construction of a new fence to accommodate the following:

- 1 x 132 kV 2500A 40kA sectional Isolator CRDB H/O 31mm/kV
- 1 x 132kV 3150A 40kA 3P Circuit Breaker 31mm/kV
- 3 x 132kV 2500A 25kA 2P2M2B (1600) Current Transformer 31mm/kV
- 1 x 20MVA 132 / 22kV Transformer
- Transformer Plinths size = 20 – 40 MVA (D-DT-5232s3A)
- 3 x 22 kV Bus bar Tube 120mm x 4mm onto Road Crossing.
- 1 x NEC/NER/AUX Transformer 22kV 360A
- 3 x 22kV 110V 100VA CLASS 3P/0.2 Voltage Transformers
- 1 x 22kV 1250A 20kA Transformer Breaker 31mm/kV
- 1 x 22kV 2500A 25kA Isolator CRDB H/O 31mm/kV
- Eskom Control Building
- Lesedi Control Building
- Cable ducts

T1.1.4. SUBMISSION AND VALIDITY OF TENDERS

Tenders are to be delivered to:

THE TENDER BOX,

**Supply Chain Management Unit
Lesedi Local Municipal Building
Corner HF Verwoerd and Du Preez Street
Heidelberg
1438**

Tenders are to be submitted in a robust sealed parcel clearly marked as follows:

**THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA,
132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)**

BID NO : 19/2026

CLOSING DATE : 05 OCTOBER 2026

NAME OF TENDERER :

The name of the Tenderer shall appear prominently on the cover of the parcel.

Tenders will not be considered unless all relevant schedules and Form of Tender contained herein have been completed.

Any alternative offers by the Tenderer must be presented on the Tenderer's official stationary as part of the Cover Letter. Alternatively, offers shall be subject to all the conditions set out in this document.

Tenderer's "Condition of Sale" or "Contract" printed on their own stationary will be disregarded. The only applicable Conditions shall be those contained in these documents, unless the Tenderer specifically absolves himself from any such conditions on the form "Alterations by Tenderer" provided herein (under Tender Data).

On no account shall any alterations be made to the text of these documents or any pages removed from the binding

Tenders received after the closing date and time shall not be considered.

Faxed, e-mailed or telephonic tenders will NOT be accepted.

Tenders are to be valid for the period as indicated in C1.1: "Form of Offer", within the "Letter of Tender". (90 days from date of submission)

Tender prices shall remain fixed and firm for the entire validity period.

The Tenderer shall submit one completed original tender document, one copy of the original tender document and two electronic version of the completed tender document.

T1.1.5. SITE MEETING

THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA, 132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)

You are hereby notified that a site meeting will be held as part of the tender process for the above-mentioned project. Attendance at this meeting is a mandatory requirement for eligibility to submit a tender:

10 September 2026 @ 10:00
Infrastructure Services Boardroom
Lesedi Local Municipal Building
Corner HF Verwoerd and Du Preez Street
Heidelberg
1438
GPS Co-ordinates: -26.515083, 28.044598

Purpose of Meeting

- Provide project briefing and scope clarification
- Conduct site inspection and address queries
- Issue instructions relevant to tender submission

Confirmation

I hereby confirm that I attended the compulsory site meeting and understand that attendance is a prerequisite for tender submission.

Name & Signature of Attendee: _____

Date: _____

Official Use

Facilitator/Engineer: _____

Signature: _____

Failure to attend will result in disqualification from the tender process.

SIGNATURE LESEDI LM REPRESENTATIVE

--

T1.2 – TENDER DATA

T1.2 TENDER DATA

T1.2. TENDER DATA

The Contractor shall supply, install and commission all material for this project and deliver the project up to the final handing over stage, including the Defects Notification Period.

The tenderer shall allow for construction over multiple financial years as funding is made available. As provided in the Bill of Quantities, the tender shall allow for de-establishment and re-establishment costs, and renewal or extension of contractual obligations for an extended construction period.

The Contract shall include all costs for the design and preparation of detail manufacturing drawings, all supply and delivery costs, all costs for commissioning the Works, costs for handing over of the Works to the relevant authority, all supervision costs, labour costs and tools and materials cost necessary for constructing and testing of the works.

The Contract shall also include a warranty/defects notification period, as indicated in the Contract Data under the Conditions of Contract (Defects Notification Period), all in accordance with the Conditions of Contract and Schedule of Requirements. The Contractor shall supply, install and commission all material for this project and deliver the project up to the final handing over stage, including the Defects Notification Period.

T1.2 TENDER DATA

T1.2.1. TENDER VALIDITY

The tender offer validity shall be 90 calendar days from the tender closing date, as indicated in the Letter of Tender under C1.1 Form of Offer and Form of Acceptance. The tender offer validity period shall not exceed 12 weeks without approval granted by the Accounting Officer.

T1.2.2. DOCUMENTS

The Tender Documents comprise of a complete set which includes one (1) bound volume: (Ref. No. 19/2026 containing consecutively numbered pages per section scheduled in the List(s) of Contents, and drawings which are listed in the “Drawings Section” of the document and included as an annexure.

Tenderers are advised to check the number of pages in the Tender Document and verify the inclusion of all drawings listed. If any pages or drawings are missing or duplicated, or if there are any discrepancies or obvious errors noticed, the Tenderer is liable for any errors and ambiguities in the tender submitted. The Tenderer shall immediately request clarification.

T1.2.3. CONSULTING ENGINEERS

The Employer has appointed Lyon and Partners (Pty) Ltd as Consulting Engineers and Project Managers.

TECHNICAL ENQUIRIES MAY BE DIRECTED TO:

Consulting Engineers (Lyon and Partners):

Name : Mr. Max Swanepoel

Telephone : 016 981 6270

Email : lyon@lyon.co.za

Name : Mrs. Jacqueline Mbewe

Telephone : 016 466 1952

Email : jacquelinem@lesedi.gov.za

SUPPLY CHAIN ENQUIRIES MAY BE DIRECTED TO:

Name : Ms. Sibulelo Mokoena

Telephone : 016 466 1947

E-Mail : sibulelom@lesedi.gov.za

Queries shall be in writing and no queries will be entertained within seven (7) calendar days of the tender closing date.

T1.2.4. PROGRAMME & CASH FLOW

Tenderers are required to submit programmes for the main activities of each section of work as well as a proposed cash flow.

The program shall indicate the following items as a minimum:

T1.2 TENDER DATA

1. Time for site establishment.
2. Time for obtaining H & S permit (if required)
3. Factory Acceptance Testing.
4. Site Acceptance Testing.
5. Handover.
6. "Float" for unforeseen delays
7. Any items in the Conditions of Contract, i.e.:
 - a) Commencement date, time for completion
 - b) Date for right of access to, and possession of, the site
 - c) Order in which the Works are to be executed, including:
 - i) preparation and submission of the Contractor documents
 - ii) procurement
 - iii) manufacture of equipment
 - iv) inspection
 - v) delivery to site
 - vi) construction
 - vii) erection
 - viii) installation
 - ix) work by sub-contractor
 - x) testing and commissioning
 - d) Revision periods
 - e) Sequence and timing of inspections and tests
 - f) Holidays, weekends, etc.
 - g) Key delivery dates
 - h) Progress reports, etc.

T1.2.5. COMPLIANCE WITH SPECIFICATIONS AND STANDARDS

The Tenderer is responsible for the aptitude and efficiency of the proposal submitted, which is offered as a complete working unit, it follows that the tenderer is entirely responsible for the inclusion in the tender offer for every item of plant and every accessory which may be necessary including the means of fixture into its required position, and also including all measures required by any Act or Regulation in force governing the operations of electrical equipment, wiring and installations. It is also incumbent on the Tenderer to make provision in the tender offer for the highest quality of workmanship, in both the manufacture of the equipment and its accessories, and in the erection thereof.

If it is found, whilst the plant is being erected or when it is about to be commissioned or during its test period or period of warranty, that any item necessary for the continuous and efficient operations of the Works to the full capacity required was omitted from the tender or was included, but has since been found not to be entirely satisfactory, or that the workmanship during manufacture or erection was not of the best standard, it shall be the responsibility of the Tenderer to supply such an item, replace it with a satisfactory one, or re-erect any portion of the Works, as the case may be, at his/her own expense.

Under the provisions above, it follows that there shall be no extras of any kind except such extras as may be ordered in writings by the Engineer to be supplied or erected by way of additional plant or accessories, or such extras which may arise as a result of the building work not having been carried out in conformity with the working drawings supplied by the Contractor.

T1.2 TENDER DATA

T1.2.6. WITHDRAWAL OF TENDER

If the tenderer withdraws his/her tender before the validity period expires, fails to sign the Contract or fails to provide security, to the satisfaction of the Employer and the Engineer after his/her tender has been accepted, the tenderer shall pay any additional expenses incurred by the Employer, to call for new tenders, or to pay the difference between his/her tender price and the next suitable tender price.

T1.2.7. COPYRIGHT

Copyright is reserved for all designs, specifications and information contained as part of this document. No part of this document in full or in part may be reproduced or used in any form without written consent by the Engineer.

T1.2.8. ASSESSMENT OF TENDERS

Tenders will be adjudicated solely on the information submitted with the tender before tender closure. No alteration shall be considered after tender closure. The Engineer / Adjudicator reserves the right to adjust obvious arithmetic errors in the Bill of Quantities and subsequent calculation of the total tender amount. Tenders shall firstly be evaluated for responsiveness which requires full compliance to compulsory returnables, to be deemed responsive. Responsive tenders shall be evaluated for functionality.

Responsive tenders scoring above the minimum functionality threshold shall be evaluated in accordance with the Preferential Procurement Policy Framework Act (2000), to determine the preferred bidder.

T1.2.9. ACCEPTANCE OF TENDERS

The successful tenderer shall enter into a Contract with the Employer, in accordance with the Conditions of Contract, for the execution of the specified works.

The Employer does not bind himself to accept the lowest or any tender or to give any explanation for decisions made in connection with the tenders, further, the Employer reserves the right not to award the contract.

The Employer reserves the right to accept any one or more or all of the sections of the Works as specified in this document, and that no liability is accepted for any expenses incurred by a tenderer in submitting a tender offer. The Employer therefore reserves the right to scale down the project to fall within the values of the available funds even if the reduced Scope of Works exceeds 20 % of the tender amount. No alteration of unit prices will be allowed for scaling down on the project.

Limited, non-guaranteed funds are available for this project.

The tender shall be disqualified if the materials offered by the tenderer do not comply with the relevant specifications.

T1.2 TENDER DATA

T1.2.11. CURRENCY AND FOREIGN TENDERS

All prices quoted and all transactions are to be in the currency of the Republic of South Africa (South African Rand).

Tenders not domiciled in the Republic of South Africa (R.S.A.) shall state the name and address of their accredited or intended agents within the R.S.A, failure to do so will invalidate the tender.

T1.2.12. HEALTH AND SAFETY

The Tenderer shall comply with the provisions of the Occupational Health and Safety Act no 85 of 1993, as amended, and shall undertake to acquaint his/her employees with the provisions, regulations, duties, obligations and prohibitions, and shall accept sole liability for due compliance with the duties, obligations and prohibitions and absolve the Employer from being obliged to comply with the aforesaid duties, obligations and prohibitions.

T1.2.13. TECHNICAL FUNCTIONALITY

After evaluating tenders for responsiveness, the functionality of the tenderer will be evaluated and to qualify for the next round of evaluation, the tenderer must score a minimum threshold percentage. Only tenders scoring above the minimum threshold score will advance to the preferential procurement evaluation.

The responsiveness check determines if all information and documents required are submitted with the tender, non-responsive tenders shall not be considered for functionality evaluation. The functionality evaluation involves detailed adjudication of all forms, technical schedules, returnables etc. to be populated or included by the tenderer.

The tenderers shall take note that Lesedi Local Municipality shall audit the technical evaluation done by the appointed Consulting Engineer.

For the point allocations, refer to Section 2: T2 – Tender Form, under Returnables: Claim for Functionality Points.

T1.2.14. PREFERENTIAL PROCUREMENT

The following preference point systems are applicable to all bids in terms of the “PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000: PREFERENTIAL PROCUREMENT REGULATIONS, 2022”:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

The value of this bid is estimated to exceed R 50 000 000 (all applicable taxes included) therefore the 90/10 system shall be applicable.

T1.2 TENDER DATA

Preference points for this bid shall be awarded for:

The maximum points for this bid are allocated as follows:

POINTS

PRICE	90
SPECIFIC GOALS	10
Total points for Price and SPECIFIC GOALS	100

T1.2.15. ELIGIBILITY TO TENDER

Only those tenderers who satisfy the following eligibility criteria shall be eligible to submit tenders:

- a) The Tenderer or any of its directors/ shareholders is not listed on the Register of Tenderer Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004, as a person prohibited from doing business with the public sector.
- b) Has the legal capacity to enter into the contract,
- c) Is not insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act, 2008, bankrupt or being wound up, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceedings in respect of any of the foregoing.
- d) The Tenderer is registered with the CIDB with an appropriate category of registration.
- e) The Tenderer has not:
 - Abused the Employer's Supply Chain Management System; or
 - Failed to perform on any previous contract and has been given a written notice to the effect.
 - Failed to pay municipal rates and taxes or service charges and such rates, taxes and charges are in arrears for more than three months.
- f) Latest Municipal rates & taxes account which is not in arrears for more than 3 months (In a case of Rates & Taxes Account being in a family member's name, **ONLY A MUNICIPAL** account where the address of the account matches the address on the CK

T1.2 TENDER DATA

document will be accepted) for the **COMPANY AND DIRECTORS / TRUSTEES / MEMBERS / SHAREHOLDERS**.

In the event of a tenant (renting) a copy of a valid and signed (both Lessor and lessee) Lease Agreement (the lease agreement must indicate dates of commencement and expiry, in the occasion where the lease has expired the original lease **AND** extension must be attached with commencement and expiry dates) for the **COMPANY AND DIRECTORS / TRUSTEES / MEMBERS / SHAREHOLDERS**.

NOTE - The following documents will not be accepted:

- Affidavits;
- Address confirmation letter;
- Invoices from the body corporates or agents,
- Rates and taxes of the lessor and;
- Municipal tender/rates clearance letter.

As per the Local Government: Municipal Finance Management Act 56 of 2003 updated in 20 January 2017 on Section 28 (1) (c) and Section 38 (1) (d) (i):

28 (1) (c) check in respect of the recommended bidder whether municipal rates and taxes and municipal service charges are not in arrears;

38 (1) (d) to reject any bid from a bidder;

(i) if any municipal rates and taxes or municipal service charges owed by that bidder or any of its directors to the municipality or municipal entity, or to any other municipality or municipal entity, are in arrears for more than three months.

- g) There is no conflict of interest which may impact on the Tenderer's ability to perform the Contract in the best interests of the Employer or potentially compromise the tender process.
- h) Competency of management and supervisory staff:
 - Only tenderers with staff satisfying the requirements of the Scope of Works, are eligible to submit tender.
- i) Joint ventures are eligible provide that:
 - Every member of the joint venture is registered with the CIDB.
 - The lead partner has a grading equal to or higher than the grading specified.
 - The combined contractor grading designation calculated in accordance with the CIDB Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered, or a value determined in accordance with Regulation 25(1B) or 25(7A) of the Construction Industry Development Regulations

T1.2.16. ALTERATIONS BY TENDERER

Tenderer's Condition of Sale or Contract printed on their own stationary will be disregarded, the Conditions which shall apply shall be those contained in these documents unless the

T1.2 TENDER DATA

Tenderer specifically absolves himself from any such conditions on the form "Alterations by Tenderer" contained in the "Alterations to Tender" table.

On no account shall any alterations be made to the text of these documents or any pages removed from the binding.

Should the Tenderer desire to make any departures or modifications to the General Conditions of Contract, Specifications, Bill of Quantities or Drawings, or to qualify his/her tender in any way, he shall set out his/her proposals clearly in the table hereunder.

If no departures or modifications are desired, the Schedule hereunder is to be marked NIL and signed by the Tenderer.

FAILURE TO POPULATE AND SIGN "*Table 1: Alterations by tenderer*" SHALL RESULT IN THE TENDER OFFER BEING NON-RESPONSIVE.

Table 1: Alterations by tenderer[illegible]

NAME & SIGNATURE OF TENDERER:

DATE :

NAME & SIGNATURE OF WITNESS :



LESEDI LOCAL MUNICIPALITY
P O Box 201
HEIDELBERG
1438

**THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA,
132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)**

SECTION 2:
T2 - TENDER FORM



LYON AND PARTNERS (Pty) Ltd
Electrical Consulting Engineers
P O Box 3925
VANDERBIJLPARK
1900

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T2.1 – LIST OF COMPLIANCE/RETURNABLE DOCUMENTS

T2. TENDER FORM

T2.1. LIST OF RETURNABLE DOCUMENTS

It is a condition of tender that the tender offer must be accompanied with the following documentation. Failure to submit the following documentation will result in the tender offer being non-responsive:

T2.1.1. COMPULSORY RETURNABLES

Table 1: Table of Compulsory Returnables

NO	RETURNABLES	NOTES	COMPLIANCE (TICK)	
			YES	NO
1	Form of Offer	Fully completed and signed in black ink pen.		
2	COID	Proof of compliance with the Compensation for Occupational Injuries and Diseases Act 130 of 1993 (as amended)		
3	A copy of a CSD Full Report.	CSD full Report		
4	Proof of company registration documents with the Director's details must be attached.	The company registration documents must indicate the company and Director's details.		
5	Fully completed MBD forms	Fully Completed and signed, handwritten and in black ink pen.		
6	Audited Financial Statements signed by the CA or Auditor & Director of the company (MBD 5 form)	If required by law submit audited financial statements for the past 3 years or since the date of establishment if established during the past 3 years.		
7	Joint Venture Agreement ALL OF THE DOCUMENTS FROM ROWS 1 TO 6 ABOVE ARE REQUIRED FOR EACH COMPANY IN THE JV AGREEMENT.	- If applicable submit a complete and signed JV agreement. - JV agreement stating who the lead partner is with the shared percentages. - Note: JV agreement must be as per CIDB Regulation of 2008 regulation 25 (5)(a), (b) and (6)		
8	In the event of a tenant renting a lease agreement MUST be attached for the COMPANY AND DIRECTORS/TRUSTEES/ MEMBERS/SHAREHOLDERS.	The lease agreement must include the following:		

NO	RETURNABLES	NOTES	COMPLIANCE (TICK)	
			YES	NO
		- A valid copy of the lease agreement must be signed by (both Lessor and lessee). - The lease agreement must indicate dates of commencement and expiry or duration. NOTE: The lease agreement for the company must indicate that the premises are for business purpose. - In a case where the lease agreement has expired and there is a clause indicating an automatic renewal the original lease agreement and a confirmation letter signed by Lessor must be attached. - In the occasion where the lease agreement has expired the original lease agreement AND extension must be attached with commencement and expiry dates or duration.		
9	Municipal rates and taxes for bidders who are from the rural areas for the COMPANY AND DIRECTORS / TRUSTEES / MEMBERS / SHAREHOLDERS.	In the event that the bidder is from the rural area a letter from the municipality that the area is not liable to pay municipal rates and taxes OR a signed letter from the chief indicating that the bidder is from that particular rural/tribal area.		
11	CIDB Grading	Copy of Company CIDB Grading designation 8EP or higher.		
12	Fully Completed BOQ	BOQ completed in handwriting and black ink pen.		

NO	RETURNABLES	NOTES	COMPLIANCE (TICK)	
			YES	NO
13	Technical Schedules	All technical A-B schedules populated and compliant to specification.		
14	Confirmation by guarantor	Confirmation letter to be provided by the tenderer's guarantor that the 10% performance security guarantee can be obtained in accordance with the condition of the contract.		
15	Programme	Programme submitted according to the requirements of the Tender Conditions (T1.2.4)		
16	Eskom Vendor Number	Complete bid document front page (to be verified) and no. and no. 2.29.1.		
17	ORHVS Qualification/ Authorization	Attach certified personnel proof of ORHVS registration.		
18	ECSA/ SACPCMP registration	Attach valid ECSA/ SACPCMP personnel registration for Engineers and Project Managers.		
19	Signing of certificate T2.2.22. CERTIFICATE OF CONVERSANCE WITH MATERIAL REQUIREMENTS stipulating the Eskom requirements for material procurement	Signing of certificate T2.2.22. CERTIFICATE OF CONVERSANCE WITH MATERIAL REQUIREMENTS stipulating the Eskom requirements for material procurement		

BIDDER'S AUTHORISED SIGNATORY:

Full Names and Surname:

Signature:

T2.2 – RETURNABLE SCHEDULES

T2.2 RETURNABLE SCHEDULES

T2.2. RETURNABLE SCHEDULES

T2.2.1. ESKOM VENDOR NUMBER

It is confirmed that.....(*company name*)
is registered on the Eskom Supplier Database with vendor number,
proof of which is included in the returnables.

OR

(the following subcontractor appointment must be populated if the main contractor/tenderer is not registered with Eskom as a vendor) – refer to T2.2.10 for subcontracting by designated group

ESKOM SUBCONTRACTOR APPOINTMENT

("the Contractor")

("the Subcontractor")

The Contractor hereby conditionally appoints the Subcontractor for:

THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA,132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)

The provisions for the conditional appointment includes that:

- The Contractor and Subcontractor shall enter into a supplemental agreement based on the Main Contract if the Contractor's bid is successful.
- There shall be no claim by the Subcontractor if the Contractor's bid is unsuccessful.
- The Subcontractor shall be authorized to execute self-build work on Eskom infrastructures.
- The supplemental agreement shall be subject to approval by the Main Contract's Engineer.
- The Subcontractor shall comply and be subjected to all the conditions of the Main Contract.

Subcontractor details

Company Registration Number : _____

herein represented by : _____

in the capacity of : _____

T2.2 RETURNABLE SCHEDULES

It is confirmed that (subcontractor name) is registered on the Eskom Supplier Database with vendor number , proof of which is included in the returnables.

Signed at _____ on _____ 20__.

Witnesses:

For: **THE CONTRACTOR**

1.

2.

Name :

Designation :

Signed at _____ on _____ 20__.

Witnesses:

For: **THE SUBCONTRACTOR**

1.

2.

Name :

Designation :

T2.2 RETURNABLE SCHEDULES

T2.2.2. CIDB REQUIREMENTS

In terms of Clause 3 of the Notes on the use of Standardized Procurement Documents for Engineering and Construction Works, October 2005, all Prime or Main Contractors must register with the Construction Industry Development Board (CIDB) according to Act 38 of 2000.

After receipt of an application the CIDB will grade the applicant according to experience in the various sections of works and financial capability.

The CIDB requirements for all contractors tendering on this project are as follows:

1. Tenderers and his subcontractor must be registered with the CIDB in an EP a class of construction works.
2. Tenderers must have a CIDB Contractor Grading Designation of 8 EP or higher. Please note that this tender will not be split and that no portion of the contract may be outsourced unless specified.
3. The tenderer shall submit the company profile and CIDB registration of the proposed sub-contractor for this project.

NAME & SIGNATURE OF TENDERER :

DATE :

NAME & SIGNATURE OF WITNESS :

T2.2 RETURNABLE SCHEDULES

T2.2.3. MBD 4 – DECLARATION OF INTEREST

1. No bid will be accepted from persons in the service of the state¹.
2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favoritisms, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority.
- 3 **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**
 - 3.1 Full Name of bidder or his or her representative:
.....
 - 3.2 Identity Number:
 - 3.3 Position occupied in the Company (director, trustee, shareholder²):.....
.....
 - 3.4 Company Registration Number:
 - 3.5 Tax Reference Number:
 - 3.6 VAT Registration Number:
 - 3.7 The names of all directors / trustees / shareholders members, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.
 - 3.8 Are you presently in the service of the state? YES / NO
 - 3.8.1 If yes, furnish particulars.
.....

¹MSCM Regulations: “in the service of the state” means to be –

- (a) a member of –
 - (i) any municipal council;
 - (ii) any provincial legislature; or
 - (iii) the national Assembly or the national Council of provinces;
- (b) a member of the board of directors of any municipal entity;
- (c) an official of any municipality or municipal entity;
- (d) an employee of any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999);
- (e) a member of the accounting authority of any national or provincial public entity; or
- (f) an employee of Parliament or a provincial legislature.

² Shareholder” means a person who owns shares in the company and is actively involved in the management of the company or business and exercises control over the company.

T2.2 RETURNABLE SCHEDULES

3.9 Have you been in the service of the state for the past twelve months? YES / NO

3.9.1 If yes, furnish particulars

.....

3.10 Do you have any relationship (family, friend, other) with persons in the service of the state and who may be involved with the evaluation and or adjudication of this bid? YES / NO

3.10.1 If yes, furnish particulars.

.....

3.11 Are you, aware of any relationship (family, friend, other) between any other bidder and any persons in the service of the state who may be involved with the evaluation and or adjudication of this bid?..... YES / NO

3.11.1 If yes, furnish particulars:.....

.....

3.12 Are any of the company's directors, trustees, managers, principle shareholders or stakeholders in service of the state? YES / NO

3.12.1 If yes, furnish particulars.....

.....

3.13 Are any spouse, child or parent of the company's directors trustees, managers, principle shareholders or stakeholders in service of the state? YES / NO

3.13.1 If yes, furnish particulars

.....

3.14 Do you or any of the directors, trustees, managers, principle shareholders, or stakeholders of this company have any interest in any other related companies or business whether or not they are bidding for this contract YES / NO

3.14.1 If yes, furnish particulars:.....

.....

T2.2 RETURNABLE SCHEDULES

Full details of directors / trustees / members / shareholders.

Table 2: Details – Directors/Trustees/Members & Shareholders

Full Name	Identity Number	State Employee Number

CERTIFICATION

I, THE UNDERSIGNED.....(*Full Name*)

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.2 RETURNABLE SCHEDULES

T2.2.4. MBD 5 – DECLARATION FOR PROCUREMENT ABOVE R 10 MILLION (ALL APPLICABLE TAXES INCLUDED)

For all procurement expected to exceed R10 million (all applicable taxes included), bidders must complete the following questionnaire *(Delete if not applicable)*:

T2.2.4.1. Are you by law required to prepare annual financial statements for auditing?
(YES/NO)

.....
.....

T2.2.4.2. If yes, submit audited annual financial statements for the past three years or since the date of establishment if established during the past three years.

.....
.....

T2.2.4.3. Do you have any outstanding undisputed commitments for municipal services towards any municipality for more than three months or any other service provider in respect of which payment is overdue for more than 30 days?
(YES/NO)

.....

T2.2.4.4. If no, this serves to certify that the bidder has no undisputed commitments for municipal services towards any municipality for more than three months or other service provider in respect of which payment is overdue for more than 30 days.

.....
.....

T2.2.4.5. If yes, provide particulars.

.....
.....

T2.2.4.6. Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract?
(YES/NO)

.....
.....

T2.2 RETURNABLE SCHEDULES

T2.2.4.7. If yes, furnish particulars

.....

.....

T2.2.4.8. Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality / municipal entity is expected to be transferred out of the Republic?
(YES/NO)

.....

.....

T2.2.4.9. If yes, furnish particulars

.....

.....

CERTIFICATION

I, THE UNDERSIGNED (NAME)

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT.

I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.2.5. MBD 6.1 - PREFERENTIAL PROCUREMENT CLAIM FORM

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022

T2.2.5.1. GENERAL CONDITIONS

- a) The following preference point systems are applicable to all bids:
- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
 - the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).
- b) **To be completed by the organ of state**
(delete whichever is not applicable for this tender)
- (i) The applicable preference point system for this tender is the 90/10 preference point system.
 - (ii) The applicable preference point system for this tender is the 80/20 preference point system.
 - (iii) Either the 90/10 or 80/20 preference point system will be applicable in this tender. The lowest/ highest acceptable tender will be used to determine the accurate system once tenders are received.
- c) Points for this tender (even in the case of a tender for income-generating contracts) shall be awarded for:
- (a) Price; and
 - (b) Specific Goals.
- d) **To be completed by the organ of state**
The maximum points for this bid are allocated as follows:

	POINTS
PRICE	90
SPECIFIC GOALS	10
Total points for Price and Specific goals	100

T2.2 RETURNABLE SCHEDULES

- e) Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.
- f) The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

T2.2.5.2. DEFINITIONS

- a) “**tender**” means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;
- b) “**price**” means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
- c) “**rand value**” means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
- d) “**tender for income-generating contracts**” means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
- e) “**the Act**” means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

T2.2.5.3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

A) POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 PREFERENCE POINT SYSTEMS

A maximum of 80 points is allocated for price on the following basis:

80/20

$$Ps = 80 \left(1 - \frac{Pt - Pmin}{Pmin} \right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

b) FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

3.2.1 POINTS AWARDED FOR PRICE

T2.2 RETURNABLE SCHEDULES

A maximum of 80 or 90 points is allocated for price on the following basis:

$$\begin{array}{ccc} \mathbf{80/20} & \mathbf{or} & \mathbf{90/10} \\ \mathbf{Ps = 80 \left(1 + \frac{Pt - P_{max}}{P_{max}} \right)} & \mathbf{or} & \mathbf{Ps = 90 \left(1 + \frac{Pt - P_{max}}{P_{max}} \right)} \end{array}$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmax = Price of highest acceptable tender

T2.2.5.4.POINTS AWARDED FOR SPECIFIC GOALS

- a) In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:
- b) In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—
- (a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or
 - (b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,
- then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

Table 1: Specific goals for the tender and points claimed are indicated per the table below.

(Note to organs of state: Where either the 90/10 or 80/20 preference point system is applicable, corresponding points must also be indicated as such.

Note to tenderers: The tenderer must indicate how they claim points for each preference point system.)

T2.2 RETURNABLE SCHEDULES

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system) (To be completed by the organ of state)	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (90/10 system) (To be completed by the tenderer)	Number of points claimed (80/20 system) (To be completed by the tenderer)
Youth	2			
Woman	3			
Disabled	1			
Black	2			
Lesedi	1			
Gauteng (Province)	1			
Total points	10			

DECLARATION WITH REGARD TO COMPANY/FIRM

c) Name of company/firm

d) Company registration number

e) TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
- ☐ One person business/sole propriety
- ☐ Close corporation
- ☐ Public Company
- ☐ Personal Liability Company
- ☐ (Pty) Limited
- ☐ Non-Profit Company
- ☐ State Owned Company

[TICK APPLICABLE BOX]

f) I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

- i) The information furnished is true and correct;
- ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
- iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;
- iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –

T2.2 RETURNABLE SCHEDULES

- a) disqualify the person from the tendering process;
- b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
- c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

T2.2 RETURNABLE SCHEDULES

- d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the audi alteram partem (hear the other side) rule has been applied; and
- e) forward the matter for criminal prosecution, if deemed necessary.

WITNESSES:

1.

2.

.....
SIGNATURE(S) OF BIDDER(S)

DATE:

ADDRESS:

.....

T2.2 RETURNABLE SCHEDULES

T2.2.6. MBD 8 – DECLARATION OF BIDDER’S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

- a) This Municipal Bidding Document must form part of all bids invited.
- b) It serves as a declaration to be used by municipalities and municipal entities in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.
- c) The bid of any bidder may be rejected if that bidder, or any of its directors have:
 - i. abused the municipality’s / municipal entity’s supply chain management system or committed any improper conduct in relation to such system;
 - ii. been convicted for fraud or corruption during the past five years;
 - iii. wilfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years; or
 - iv. been listed in the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004).
- d) In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

Item	Question	Yes	No
T2.2.12.d)1	Is the bidder or any of its directors listed on the National Treasury’s Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector? (Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the <i>audi alteram partem</i> rule was applied). The Database of Restricted Suppliers now resides on the National Treasury’s website(www.treasury.gov.za) and can be accessed by clicking on its link at the bottom of the home page.	Yes ☐	No ☐
	If so, furnish particulars: 		
T2.2.12.d)2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? The Register for Tender Defaulters can be accessed on the National Treasury’s website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.	Yes ☐	No ☐

T2.2 RETURNABLE SCHEDULES

Item	Question	Yes	No
T2.2.12.d)2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.	Yes ☐	No ☐
	If so, furnish particulars:		
T2.2.12.d)3	Was the bidder or any of its directors convicted by a court of law (including a court of law outside the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
	If so, furnish particulars:		
T2.2.12.d)4	Does the bidder or any of its directors owe any municipal rates and taxes or municipal charges to the municipality / municipal entity, or to any other municipality / municipal entity, that is in arrears for more than three months?	Yes ☐	No ☐
	If so, furnish particulars:		
T2.2.12.d)5	Was any contract between the bidder and the municipality / municipal entity or any other organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
	If so, furnish particulars:		

T2.2 RETURNABLE SCHEDULES

CERTIFICATION

I, THE UNDERSIGNED.....(*Full Name*)

**CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION
FORM TRUE AND CORRECT.**

**I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION
MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE
FALSE.**

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.2.7. MBD 9 - CERTIFICATE OF INDEPENDENT BID DETERMINATION

- a) This Municipal Bidding Document (MBD) must form part of all bids¹ invited.
- b) Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging).² Collusive bidding is a *per se* prohibition meaning that it cannot be justified under any grounds.
- c) Municipal Supply Regulation 38 (1) prescribes that a supply chain management policy must provide measures for the combating of abuse of the supply chain management system, and must enable the accounting officer, among others, to:
 - i. take all reasonable steps to prevent such abuse;
 - ii. reject the bid of any bidder if that bidder or any of its directors has abused the supply chain management system of the municipality or municipal entity or has committed any improper conduct in relation to such system; and
 - iii. cancel a contract awarded to a person if the person committed any corrupt or fraudulent act during the bidding process or the execution of the contract.
- d) This MBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.
- e) In order to give effect to the above, the attached Certificate of Bid Determination (MBD 9) must be completed and submitted with the bid:

¹ Includes price quotations, advertised competitive bids, limited bids and proposals.

² Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

T2.2.8. CERTIFICATE OF INDEPENDENT BID DETERMINATION (MBD 9)

I, the undersigned, in submitting the accompanying bid:

(Bid Number and Description)

in response to the invitation for the bid made by:

(Name of Municipality / Municipal Entity)

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of: _____ that:
(Name of Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word “competitor” shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:
 - (a) has been requested to submit a bid in response to this bid invitation;
 - (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
 - (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder
6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium³ will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
 - (a) prices;
 - (b) geographical area where product or service will be rendered (market allocation)
 - (c) methods, factors or formulas used to calculate prices;

T2.2 RETURNABLE SCHEDULES

- (d) the intention or decision to submit or not to submit, a bid;
- (e) the submission of a bid which does not meet the specifications and conditions of the bid; or
- (f) bidding with the intention not to win the bid.

8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

³ Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.2 RETURNABLE SCHEDULES

T2.2.9. FINANCIAL STATEMENTS

I / We agree, if required, to furnish audited copies of the required financial statements, together with my / our Director's and Auditor's report, for the current, unaudited financial year, including management statements for each month, for consideration by the Employer.

T2.2.15.1. FINANCIAL INFORMATION

a) Turnover in the last three (3) financial years:

2022 / 2023:

2023 / 2024:

2024 / 2025:

b) Financial Year starts on and ends on

c) Average monthly **income** over the last three financial years:

d) Average monthly **expenses** over the last three financial years:

e) Average monthly **profit** over the last three financial years:

f) Average monthly **cash funds** over the last three financial years:

g) Value of the **largest completed** project in the last three years (excluding VAT):

R.....

h) **Average** value of projects completed in the last five years (excluding VAT):

R.....

i) Highest (combined) total value of debtors at any given period during the last three financial years: R.....

j) Lowest (combined) total value of debtors at any given period during the last three financial years: R.....

k) Debtors at tender closing:

> Current (excl. VAT):

> 30 days (excl. VAT):

> 60 days (excl. VAT):

> 90 days (excl. VAT):

In excess of 120 days :
(excl. VAT)

T2.2 RETURNABLE SCHEDULES

l) Creditors at tender closing:

> Current (excl. VAT):

> 30 days (excl. VAT):

> 60 days (excl. VAT):

> 90 days (excl. VAT):

In excess of 120 days :
(excl. VAT)

m) Management statements for all months in the current financial year included: Yes / No
(delete which is not applicable)

n) Name of accountant :

Qualifications :

Signature :

Date :

SIGNED AT

ON THIS.....DAY OF2026.

ON BEHALF OF

.....

SIGNATURE:

AS WITNESSES:

1.

2.

T2.2 RETURNABLE SCHEDULES

T2.2.10. PROGRAMME

1. Has the site been inspected by the Tenderer? YES / NO
2. Date of inspection _____
3. Has a thorough method study been made of the proposed execution of the project? YES / NO
4. Has a preliminary construction programme been prepared of the project and accompanying the tender? YES / NO

(ALL PERIODS TO BE CALCULATED FROM DATE OF RECEIVING AN APPOINTMENT LETTER)

5. Period required to commence work: _____ days
6. Period required to establish site: _____ days
7. Period required for material delivery: _____ days
8. Period to first delivery of material: _____ days
9. Period to last delivery of material: _____ days
10. Period required to complete the project: _____ weeks
(should be the same as the Letter of Tender AND the project programme)

I / We accept responsibility for late delivery of material and will enter into agreements with our suppliers of material to forward penalties accruing from claims due to late delivery of materials.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.2 RETURNABLE SCHEDULES

T2.2.11. DAYWORK SCHEDULE

No daywork will apply to this Contract. The provision of the rates below is for information purposes only.

T2.2.17.1. LABOUR

The daywork rate for labour shall be the total hourly rate for the use of the labour inclusive of overhead and supervision costs. The time of Gangers or Charge Hands actually working with the gangs may be included in the daywork claim but the time of Foremen and Gangers is not to be included but is to be covered in the tendered rates.

Table 3: Hourly Rates

CLASS OF LABOUR	HOURLY RATE FOR		
	NORMAL HOURS	OVERTIME	SUNDAYS
Supervisor			
Artisan			
Semi-skilled			
Labour or unskilled			

T2.2.17.2. TRANSPORT

Transport cost per km for:

Vehicles less than 1 ton :

Vehicles above 1 ton :

T2.2.12. LIST OF CONSTRUCTION EQUIPMENT

The Tenderer is requested to indicate what equipment and plant is immediately available, what equipment is ordered but not yet delivered and what equipment will be purchased in the event of this Contract being awarded to the Tenderer.

EQUIPMENT IMMEDIATELY (WITH HOURLY RATES) AVAILABLE FOR THIS CONTRACT

Table 4: Equipment Available

TYPE OF EQUIPMENT	CONDITION	RATE (R/h)

T2.2 RETURNABLE SCHEDULES

EQUIPMENT (WITH HOURLY RATES) ON ORDER WHICH ON DELIVERY WILL BE USED FOR THIS CONTRACT

Table 5: Equipment on order

TYPE OF EQUIPMENT	SUPPLIER	DELIVERY PERIOD	RATE (R/h)

EQUIPMENT (WITH HOURLY RATES) TO BE PURCHASED IF THIS TENDER IS ACCEPTED

Table 6: Equipment to be ordered

TYPE OF EQUIPMENT	SUPPLIER	DELIVERY PERIOD	RATE (R/h)

After the Contract has been awarded the Contractor will have to satisfy the Engineer that the above-mentioned equipment, or equivalent, will be on site when required. The Contractor will maintain the equipment in good working order for the full duration of the Contract. The Contractor also undertakes to bring any additional equipment, without additional cost to the Employer, onto the Site when it is in the opinion of the Employer necessary to complete the Contract within the Contract period.

NOTE:

The hourly rates for equipment, must include diesel, operator / driver and all maintenance and transport cost to and from the site.

T2.2 RETURNABLE SCHEDULES

T2.2.13. PREVIOUS EXPERIENCE – PROJECT REFERENCES

Particulars of projects of similar nature to that contained in this contract to which the Tenderer is at present committed and / or involved during the last 3 years to be submitted hereunder.

Table 7: Previous Experience

	PROJECT	PLACE	ENGINEER & TEL NO	CONTRACT AMOUNT	CONTRACT PERIOD	DATE COMPLETED	COMPLETION IN TIME (YES / NO)
1.							
2.							
3.							
4.							
5.							

Is the information provided in compliance with the POPI (Protection of Personal Information) Act?

Yes ☐
No ☐

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.2 RETURNABLE SCHEDULES

T2.2.14. ESTIMATED MONTHLY EXPENDITURE (CASH FLOW)

The Tenderer shall, in the table below, state the estimated value of work to be completed every month, based on his preliminary program and his tendered unit rates. Amounts for contingencies and contract price adjustment shall not be included.

Table 8: Cash Flow

MONTH	VALUE
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	
21.	
22.	
23.	
24.	

T2.2 RETURNABLE SCHEDULES

MONTH	VALUE
25.	
26.	
27.	
28.	
29.	
30.	
31.	
32.	
33.	
34.	
35.	
36.	
SUBTOTAL	R
Plus: 5 % Retention	R
TOTAL	R

Note: Preference will be given to tenderers that can provide bridging financing.

T2.2 RETURNABLE SCHEDULES

T2.2.15. MATERIAL INFORMATION

Where a specific manufacturer's material or apparatus are mentioned in the drawings or specifications, such materials or apparatus shall be provided as specified, excepting where an alternative to this condition is allowed in the specifications. Where a detailed specification for material or apparatus is not provided, it shall be understood that all normal requirements for the use of such material or equipment shall apply.

Where certain products of a specified manufacturer are unobtainable, substitutes may be offered, but shall only be supplied after written consent has been given by the Engineer.

All apparatus, components, fittings and material supplied and / or installed, whether expressly specified herein or not, shall conform in respect of quality, manufacture, tests and performance, with the requirements of the South African Bureau of Standards and / or the appropriate current "British Standard Specifications and Addenda thereto", except where otherwise specified or permitted by the Engineer in writing.

The Engineer may order the elected contractor to supply and / or deliver and / or install any other make or manufacture of article(s) than that / those for which the contractor tendered. The unit total cost of such item(s) taken out, shall then be subtracted from the tender sum of the contractor and the unit total of such other apparatus, component parts, fittings and / or materials, with which these are replaced, if any, shall be added to the tender price.

The price of such items added or omitted shall be calculated by using the current general wholesale prices at which the Electrical Contractor can buy such equipment. The Engineer's decision for the determination of such prices shall be final.

Installation work which has been started with certain materials and / or equipment shall be completed by using the same manufacture of articles or equipment throughout the whole project, for that specific application, unless specified otherwise.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.2 RETURNABLE SCHEDULES

NO CHANGE OF SUPPLIER OF MATERIALS AS QUOTED WILL BE CONSIDERED

Table 9: Equipment Delivery & Manufacturers

	DELIVERY PERIOD	TYPE	MANUFACTURER
Isolator 132 kV 2500 A 40 kA CRDB			
CT 132 kV 2500 A 40 kA 2P2M			
Breaker 132 kV 3150 A 40 kA 3P			
VT 132 kV / 110V Class 3P/0.2			
20 MVA, 132 / 22 kV Transformer			
Isolator 22 kV 2500 A 25 kA CRDB			
NEC/NER/AUX Trfr 22 kV, 360 A,			
132 kV Surge Arrestor			
66 kV Surge Arrestor			
22 kV Surge Arrestor			
Post Insulator 132 kV			
Post Insulator 66 kV			
Post Insulator 22 kV			
Long Rod Insulator 132 kV			
Medium Voltage Outdoor Switchgear			
Control Panels			
Battery charger			
SCADA			
Telemetry			

T2.2 RETURNABLE SCHEDULES

T2.2.16. IMPORTED EQUIPMENT

The tenderer shall, in the table below, state the value of equipment to be imported every month, based on his preliminary program and his tendered unit rates. Amounts for contingencies and contract price adjustment shall not be included.

Table 10: Imported Equipment

EQUIPMENT	MONTH	VALUE
	1	R
	2	R
	3	R
	4	R
	5	R
	6	R
	7	R
	8	R
	9	R
	10	R
	11	R
	12	R
	13	R
	14	R
	15	R
	16	R
	17	R
	18	R
	19	R
	20	R
	21	R
	22	R
	23	R
	24	R
SUBTOTAL		R
TOTAL		R

T2.2 RETURNABLE SCHEDULES

T2.2.17. COMPOSITION OF TENDERER'S COMPANY

T2.2.23.1. GENERAL

State whether the Tenderer is a company, a partnership, a person or a closed corporation.

Company		Partnership		Person		Closed Corporation	
---------	--	-------------	--	--------	--	--------------------	--

T2.2.18. INFORMATION TO BE PROVIDED

(A) IF THE TENDERER IS A COMPANY:

- Affix a certified copy of the Certificate of Incorporation to this page.
- List the Directors and each Director's date of appointment:

Table 11: Directors' appointment dates

DIRECTORS	DATE OF APPOINTMENT
1.	
2.	
3.	
4.	
5.	
6.	

- List the Shareholders and percentage of shareholding:

Table 12: Shareholders' percentages

SHAREHOLDERS	PERCENTAGE OF SHARE HOLDING
1.	
2.	
3.	
4.	
5.	
6.	

T2.2 RETURNABLE SCHEDULES

- List all companies of which your Company is a shareholder and percentage shares:

Table 13: Company shareholding

COMPANIES	PERCENTAGE SHARES
1.	
2.	
3.	
4.	
5.	
6.	

(B) IF THE TENDERER IS A PARTNERSHIP:

- List the partners and state each partner's share in the partnership:

Table 14: Partnership shares

PARTNER	PARTNER'S SHARE
1.	
2.	
3.	
4.	
5.	
6.	

(C) IF THE TENDERER IS A PERSON:

- Provide the full name and qualifications of the person:

Table 15: Tenderer qualification

FULL NAME OF PERSON	QUALIFICATIONS
1.	
2.	
3.	
4.	
5.	
6.	

T2.2 RETURNABLE SCHEDULES

(D) IF THE TENDERER IS A CLOSED CORPORATION:

- State each member's share in the closed corporation:

Table 16: Member shares in Close Corporation

MEMBER	MEMBER'S SHARE
1.	
2.	
3.	
4.	
5.	
6.	

- It shall be expected from the above members of the closed corporation to be responsible in their personal capacity for any transaction relating to this project.

T2.2.19. SCHEDULE OF SUBCONTRACTORS:

Table 17: Complete Schedule of Sub-contractors

Name of Sub-contractor	Proposed Duties	% of Overall Scope	Experience (Years)
1.			
2.			
3.			
4.			
5.			
6.			
7.			

TOTAL PERCENTAGE SUB-CONTRACTING..... %

T2.2 RETURNABLE SCHEDULES

T2.2.20. POWER OF ATTORNEY

RESOLUTION PASSED BY THE BOARD OF DIRECTORS OF:

.....

.....

AT ON THE DAY OF 20.....

RESOLVED

THAT

IN THE CAPACITY OF

is hereby authorised and empowered to sign the Tender and Contract Documents on behalf

of the Company for the supply,
delivery, erection and testing of all Works covered in the attached document.

SIGNATURE: 1.

2.

CERTIFIED A TRUE COPY:

T2.2 RETURNABLE SCHEDULES

T2.2.21. CERTIFICATE OF CONVERSANCE WITH THE TENDER DOCUMENTS

I / We, the undersigned hereby certify that I / We am / are fully conversant with the General and Special Conditions of Contract, Conditions of Tender, Specifications, Schedules of Quantities and Drawings. I / We declare that I / We am / are satisfied with the description of the work and the explanations furnished by the Engineer, and that I / We fully understand the nature and extent of the work required to be executed, as specified and according to the intent of the Contract. I / We declare that all the equipment offered in my / our tender comply to the Specifications of these Tender Documents and that the relevant Data Sheets have been completed correctly and in full. I / We have ascertained all factors which may have a bearing on the execution of the works and the costs thereof.

SIGNED AT ON BEHALF OF THE FIRM

ON THIS DAY OF 20.....

SIGNATURE

CAPACITY

T2.2 RETURNABLE SCHEDULES

T2.2.22. CERTIFICATE OF CONVERSANCE WITH THE PROJECT PHASING

I / We, the undersigned hereby acknowledge that the project will be phased over multiple years as from the date of tender award up to June 2029.

I / We, the undersigned hereby further acknowledge that I / We am / are fully conversant that the funding is not guaranteed and the construction works will be subject to the availability of funds.

I / We declare that I / We has / have adequately allowed for all costs associated with site de-establishing and site re-establishment over multiple years as from the date of tender award up to June 2029.

I / We declare that I / We am / are fully conversant with the envisaged Scope of Works for phases.

I / We, the undersigned hereby acknowledge that the Scope of Works for phases might be adjusted in excess of 20 % as dictated by the funds allocations and that our unit rates will remain fixed.

SIGNED AT

ON BEHALF OF THE FIRM

ON THIS DAY OF 20.....

SIGNATURE

CAPACITY

T2.2 RETURNABLE SCHEDULES

T2.2.23. CLAIM FOR FUNCTIONALITY POINTS

For the technical functionality a minimum score of **80 points** must be obtained to qualify for the next round of the evaluation. The weighting per section is indicated in the table below:

Table 18: Technical Functionality Summary

Functionality	Maximum Points
a) Experience on similar projects	40
b) Interpretation of Scope of Works	20
c) Resources relevant to Scope of Works	10
d) Capacity relevant to Scope of Works	30
Total	100

Table 19: Technical Functionality Point Allocation

a) EXPERIENCE ON SIMILAR PROJECTS		
Client signed Letters of Appointment with matching reference letters and Completion Letter/Certificate which must indicate project value and scope of work completed within the last 10 years and more than R40 million If appointment/completion confirmations do not include the scope and project value, please attach a client signed confirmation that confirms the scope and project value that was implemented.	4 x Appointment letters with matching reference letters and completion confirmations (substation) signed by relevant senior official/MM/CFO/HOD/CEO. TOTAL: 40 (10 points/letter)	Max. 40 points
1) SIGNED LETTERS OF APPOINTMENT & COMPLETION CONFIRMATIONS WHICH MUST INDICATE THE FOLLOWING: 1.1) Substation project 2) MINIMUM PROJECT VALUE PER LETTER MUST BE AS FOLLOWS TO BE CONSIDERED FOR POINTS: 2.1) Min Project Value of R 30 m for Substation		
3) CONDITIONS 3.1) Non-attachment of Appointment and completion letter/ certificate of the same project will result in zero points		

T2.2 RETURNABLE SCHEDULES

b) INTERPRETATION OF SCOPE OF WORKS		
Submission of a proposed project programme in a Gantt format.	Attached: 10 points	Max. 10 Points
	Not Attached: 0 points	
Submission of Method Statement of Contract Works based on Scope of Works and contractual requirements (max. 5 pages).	Attached: 10 points	Max. 10 Points
	Not Attached: 0 points	
c) RESOURCES		
5-ton crane truck Company/Director Vehicle Registration Certificates/ signed Letter of intent to hire from Rental Company on the rental company letterhead	1 x 5-ton crane truck: 5 points	Max. 5 points
	0 x 5-ton crane truck: 0 points	
LDV's Vehicle Registration Certificates in a Company/Director's name / Signed letter of intent to hire from Rental Company on the rental company's letterhead.	2 x LDV: 5 points	Max. 5 points
	1 x LDV: 3 points	
	0 x LDV: 0 points	

T2.2 RETURNABLE SCHEDULES

d) CAPACITY No CV's will be considered for point allocation. Complete pages 43, 44 & 45 for company personnel.		
Qualified Electrician with minimum N4 or higher qualification Attach: Certified Qualifications NB: Fully complete and list all projects on the compulsory personnel form on Page 45(T2.2.24) to claim points	5 projects: 10 points	Max. 10 points
	4 projects: 8 points	
	3 projects: 6 points	
	2 projects: 4 points	
	1 project: 2 points	
	None or No submission: 0 points	
SHEQ representative with a minimum qualification of a Safety Certificate or higher. Attach: Certified Relevant safety qualification NB: Fully complete and list all projects on the compulsory personnel form on page 46 (T2.2.25) to claim points	5 projects : 10 points	Max. 10 points
	None or No submission: 0 points	
Commissioning Engineer with minimum National Diploma or higher qualification Attach: Certified Qualification & Commissioning Report. NB: Fully complete and list all projects on the compulsory personnel form on page 47 (T2.2.26) to claim points	5 projects: 10 points	Max. 10 points
	4 projects: 8 points	
	3 projects: 6 points	
	2 projects: 4 points	
	1 project: 2 points	
	None or No submission: 0 points	

In order to qualify for the second round of evaluation, the tenders must score a minimum of 80 functionality points.

The recommended bidder's company personnel and completed projects may be verified before appointments can be finalised. Misrepresentation of information will lead to the application of PPPFA 2022 (9) on the bidder.

T2.2 RETURNABLE SCHEDULES

NOTE - THE MUNICIPALITY RESERVES THE RIGHT TO VERIFY THE SUBMITTED FUNCTIONALITY DOCUMENTS

I HEREBY CONFIRM THAT THE INCLUDED COMPANY FINANCIAL RATIOS ARE TRUE AND CORRECT AND THAT MISREPRESENTATION OF THE FINANCIALS WILL LEAD TO DISQUALIFICATION OF THE BID SUBMISSION

NAME OF PR ACCOUNTANT / RA / CA :

QUALIFICATION :

SIGNATURE :

DATE :

As part of the responsiveness evaluation for functionality, the tenderer shall populate all forms included under this section (next page).

T2.2 RETURNABLE SCHEDULES

T2.2.24. QUALIFIED ELECTRICIAN

NB: Attach: Copy of qualification *(Failure to fully complete will lead to no point scoring for functionality)*

Name & Surname		
ID/Passport Number		
Highest Qualification		
Employer & Contact reference No.	Project	Project Duration (Year)

T2.2 RETURNABLE SCHEDULES

T2.2.25. SHEQ REPRESENTATIVE

NB: Attach: Qualification *(Failure to fully complete will lead to no point scoring for functionality)*

Name & Surname		
ID/Passport Number		
Highest Qualification		
Employer & Contact reference No.	Project	Project Duration (Year)

T2.2 RETURNABLE SCHEDULES

T2.2.26. COMMISIONING ENGINEER

NB: Attach: Copy of qualification & Commissioning report (Failure to fully complete will lead to no point scoring for functionality)

Name & Surname		
ID/Passport Number		
Highest Qualification		
Employer & Contact reference No.	Project	Project Duration (Year)

T2.2.27. PROTECTION OF PERSONAL INFORMATION ACT 2013 (POPIA)

This section sets out how personal information will be collected, used and protected by LESEDI LOCAL MUNICIPALITY, as required by the Protection of Personal Information Act. The use of the words “the individual” for the purposes of this document shall be a reference to any individual communicating with LESEDI LOCAL MUNICIPALITY and/or concluding any agreement, registration or application, with the inclusion of each of those individuals referred to or included in terms of such agreement, registration or application.

1. What is personal information?

The personal information that LESEDI LOCAL MUNICIPALITY requires relate to names and surnames, birth dates, identity numbers, passport numbers, demographic information, education information, occupation information, health information, addresses, memberships, and personal and work email and contact details.

2. What is the purpose of the collection, use and disclosure (the processing) of personal information?

LESEDI LOCAL MUNICIPALITY is legally obligated to collect, use and disclose personal information for the purposes of:

- reporting LESEDI LOCAL MUNICIPALITY initiatives to the Gauteng Provincial Treasury and Sedibeng District Municipality;
- reporting to National Treasury all contracts awarded;
- obtaining information related to Tax Compliance information from SARS;
- Verifying information on the National Treasury database of defaulters;
- evaluating and processing applications for registration on the database;
- compiling statistics and other reports;
- providing personalised communications;
- complying with the law; and/or
- for a purpose that is ancillary to the above. Personal information will not be processed for a purpose other than what is identified (the purpose) above without obtaining consent beforehand.

3. How will LESEDI LOCAL MUNICIPALITY process personal information?

LESEDI LOCAL MUNICIPALITY will only collect personal information for the purpose as stated above. Information will be collected in the following manner:

- directly from the individual;
- from service providers who provided with services or goods to LESEDI LOCAL MUNICIPALITY;
- from LESEDI LOCAL MUNICIPALITY’s own records relating to previous supply of services or goods; and/or
- from a relevant public or equivalent entity.

4. To whom will personal information be disclosed?

The personal information may be disclosed to other relevant public or other entities on whose behalf we act as intermediaries, other third parties referred to above in relation to the purpose or who are sources of personal information, service providers such as professional bodies who operate across the borders of this country (transborder flow of information) where personal information must be sent in order to provide the information and/or services and/or benefits requested or applied for. In the event of another party/ies acquiring all of or a portion of LESEDI LOCAL MUNICIPALITY's mandate or functions, personal information will be disclosed to that party but they will equally be obliged as we are, to protect personal information in terms of this policy and the law.

5. Consent and Permission to process personal information:

I hereby agree with the policy and provide authorisation to LESEDI LOCAL MUNICIPALITY to process the personal information provided for the purpose stated.

- I understand that withholding of or failure to disclose personal information will result in LESEDI LOCAL MUNICIPALITY being unable to perform its functions and/or any services or benefits I may require from LESEDI LOCAL MUNICIPALITY.
- Where I shared personal information of individuals other than myself with LESEDI LOCAL MUNICIPALITY I hereby provide consent on their behalf to the collection, use and disclosure of their personal information in terms of this personal information policy and I warrant that I am authorised to give this consent on their behalf.
- To this end, I indemnify and hold LESEDI LOCAL MUNICIPALITY not responsible in respect of any claims by any other person on whose behalf I have consented, against LESEDI LOCAL MUNICIPALITY should they claim that I was not so authorised.
- I understand that in terms of POPI and other laws of the country, there are instances where my express consent is not necessary in order to permit the processing of personal information, which may be related to police investigations, litigation or when personal information is publicly available.
- I will not hold LESEDI LOCAL MUNICIPALITY responsible for any improper or unauthorised use of personal information that is beyond its reasonable control.

6. Rights regarding the processing of personal information:

- The individual may withdraw consent to the processing of personal information at any time, and should they wish to do so, must provide LESEDI LOCAL MUNICIPALITY with reasonable notice to this effect. Please note that withdrawal of consent is still subject to the terms and conditions of any contract that is in place. Should the withdrawal of consent result in the interference of legal obligations, then such withdrawal will only be effective if LESEDI LOCAL MUNICIPALITY agrees to same in writing. LESEDI LOCAL MUNICIPALITY specifically draws to the attention that the withdrawal of consent may result in it being unable to provide the requested information and/or services and/or financial or other benefits.
- In order to withdraw consent, please contact the Information Officer at Lesedi Local Municipality.

T2.2 RETURNABLE SCHEDULES

- A copy of the full LESEDI LOCAL MUNICIPALITY policy is available at our offices.
- Individuals are encouraged to ensure that where personal information has changed in any respect to notify LESEDI LOCAL MUNICIPALITY so that our records may be updated. LESEDI LOCAL MUNICIPALITY will largely rely on the individual to ensure that personal information is correct and accurate.
- The individual have the right to access their personal information that LESEDI LOCAL MUNICIPALITY may have in its possession and are entitled to request the identity of which third parties have received and/or processed personal information for the purpose. Please note however, that any request in this regard may be declined if:
 - the information comes under legal privilege in the course of litigation,
 - the disclosure of personal information in the form that it is processed may result in the disclosure of confidential or proprietary information,
 - giving access may cause a third party to refuse to provide similar information to LESEDI LOCAL MUNICIPALITY,
 - the information was collected in furtherance of an investigation or legal dispute, instituted or being contemplated,
 - the information as it is disclosed may result in the disclosure of another person's information,
 - the information contains an opinion about another person and that person has not consented, and/or
 - the disclosure is prohibited by law.

7. Requesting access and lodging of complaints:

- Please submit any requests for access to personal information in writing to LLMs information officer at Lesedi
- With any request for access to personal information, LLM will require the individual to provide personal information in order to verify identification and therefore the right to access the information.
- There may be a reasonable charge for providing copies of the information requested.
- If any request has not been addressed to satisfaction a complaint may be lodged at the office of the Information Regulator.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.2 RETURNABLE SCHEDULES

T2.2.29. LESEDI LOCAL MUNICIPALITY INDEMNITY

1. The Contractor hereby agrees to indemnify, hold harmless and defend Lesedi Local Municipality and their officers, employees, agents and representatives, from and against the following liabilities arising as a result of the execution of the work:
 - 1.1 Any liability with regard to claims by governmental authorities or others for non-compliance by Contractor of any Act of Parliament, law, ordinance, regulation or by-law made by a lawful authority provided that such compliance therewith was required for the execution of the Contract or at Law.
 - 1.2 Any liability arising from actual or alleged public or private nuisance arising out of negligent acts or omissions to act of Contractor or its Subcontractors, or of their employees.
 - 1.3 Any liability arising from loss or damage to Contractor and/or Subcontractor's equipment and their other property on site.
 - 1.4 Any liability arising from claims with regard to the death of/or injury or sickness or disease to Contractor's employees or the death of/or injury or sickness or disease to third parties.
 - 1.5 Any liability arising from any loss of/or damage to property belonging to a third party.
 - 1.6 Any liability arising from actual or asserted infringement or improper appropriation or use of patents, copyrights, proprietary information or know-how in respect of the work designed by/or under the responsibility of the Contractor.
 - 1.7 Any liability arising from the death or injury or loss or damage to property of third parties or Lesedi Local Municipality's property as a result of the negligent acts or omissions of contractors or its subcontractor's employees.
 - 1.8 Contractor shall indemnify Lesedi Local Municipality against all claims, proceedings, damages and costs of whatsoever nature arising out of contravention of environmental legislation.

I, the undersigned (duly authorised to sign) hereby declare that I have read and understood the abovementioned and agree to all the above.

BIDDER'S AUTHORISED SIGNATORY:

.....
Full Names and Surname

.....
Signature

T2.2 RETURNABLE SCHEDULES

T2.2.30. PERFORMANCE MANAGEMENT SYSTEM

The Municipal Finance Management Act (No. 56 of 2003) Section 116 (2) (d) determines that a Municipality must enter into a Performance Management System (PMS) with all service providers.

CONTRACT	THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA, 132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)	
BIDDER		
TERM OF CONTRACT	From date of award to June 2029	TENDER NUMBER: 19/2026
PERIOD OF ASSESSMENT		RESPONSIBLE OFFICIALS: Director: Electrical

KEY PERFORMANCE AREA	KEY PERFORMANCE INDICATOR	RESPONSIBLE PERSON & TARGET DATE	OUTCOME OF PERFORMANCE ASSESSMENT	RECTIFICATION MEASURES TO BE IMPLEMENTED IN THE CASE OF REPORTED DEVIATIONS	AGREED RECTIFICATION MEASURES TO COMPLY
KEY DELIVERABLES AS PER TENDER SPECIFICATIONS					
Project Initiation	Scheduled vs actual date	Contractor / Consultant	Complaint / Non-Compliant		
Quality Assurance	Inspection reports	Contractor / Consultant	Complaint / Non-Compliant		
Occupational Health and Safety	Scheduled Meetings	Contractor / Consultant	Complaint / Non-Compliant		
Compliance	SANS 1200	Contractor / Consultant	Complaint / Non-Compliant		
Adherence to set Milestones	Gant Chart	Contractor / Consultant	Complaint / Non-Compliant		
Local Support and Training	Value	Contractor / Consultant	Complaint / Non-Compliant		

Accepted and agreed upon:

ON BEHALF OF CONTRACTOR

ON BEHALF OF CONSULTANT

ON BEHALF OF LESEDI LM

DATE

DATE

DATE

T2.2 RETURNABLE SCHEDULES

T2.2.31. TECHNICAL SCHEDULES

The Technical Schedules shall be populated by the contractor / OEM. Failure to complete any schedule may result in the bid submitted being disqualified.

At no stage during the delivery of the works may the contractor change supplier / manufacturer without the written consent from the Engineer.

TECHNICAL A-B SCHEDULES:

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied (to be completed by tenderer)

SIGNED ON BEHALF OF TENDERER: : _____

COMPANY NAME : _____

NAME IN BLOCK LETTERS : _____

DATE : _____

T2.2 RETURNABLE SCHEDULES

MV SWITCHGEAR

The general requirements for Medium Voltage Indoor Switchgear is covered by SANS1885:2004. The detail project requirements shall be covered in the Project Specification, Drawings and Bill of Quantities.

Table 20: Switchgear Technical Schedule

Item	Clause	Description	Schedule A	Schedule B
1	4.1.1.1	Rated voltage s kV	22	
	4.1.1.3	Rated current of Feeders A	800	
	4.1.1.3	Rated current of Busbar A	1250	
		Busbar Configuration	Single	
	4.1.1.4.2	Is 75 kV impulse required for 12 kV switchgear? kV	125	
	4.1.1.5.2	Rated short time withstand current for 12 kV switchgear kA	25 / 3 sec	
	4.1.2	Auxiliary supply voltage of other than d.c. 110 V? V	110 V _{DC}	
2	4.2.1.3	Switchgear information: a) manufacturer b) country of origin c) catalogue/type designation d) total switchgear mass kg	xxxxxxx xxxxxxx xxxxxxx xxxxxxx	
	4.2.4.1	Is installation and on-site operational testing to be carried out by the supplier?	Yes	
	4.2.5.1	Is the switchgear to be joined to an existing switchboard?	Yes	
	4.2.5.2	Details of existing switchboard (if applicable)	Refer to project drawings	xxxxxxx
	4.2.6.1	Are heaters to be installed in the switchgear?	Yes	
	4.2.6.2	Type of heater offered	xxxxxxx	
	4.2.7.1	Are surge arresters to be installed in feeder panels?	No	
	4.2.7.2	If yes, state type and position of arrester	N/A	
	4.2.8.1	What is the earth fault current? A	360 A	
		System earthing type?	Resistive	
	4.2.8.2	Clearance hole or stud size of earthing bar offered	xxxxxxx	
	4.2.9.1	Is SF ₆ used for insulation?	No	
		If yes, in which compartments?	N/A	
	4.2.9.4	Is a device for monitoring the SF ₆ pressure required?	No	
	4.2.9.6	Quantity of SF ₆ to be used in each separately filled compartment?	N/A	xxxxxxx
3.1	4.3.1.1.3	Circuit-breaker interrupting medium?	Vacuum	
	4.3.1.4.1	Are earthing facilities required for all main circuits?	Yes	
	4.3.1.4.2	Is a busbar earthing facility required?	No	
	4.3.1.4.3	Is a bus-section earthing facility required?	No	
	4.3.1.4.4	Details of earthing facilities offered	xxxxxxx	
	4.3.1.4.5	Diameter of earth switch clamping screw	xxxxxxx	
	4.3.1.4.7	Details of the use of bus-section or bus-coupler panels for integral busbar earthing	xxxxxxx	

T2.2 RETURNABLE SCHEDULES

Item	Clause	Description	Schedule A	Schedule B
	4.3.1.6.1	Are open/close switches for local electrical operation required?	Yes, Remote Stand-Off T/C Only	
	4.3.1.7.3	Are pins 5 and 6 required for charging?	Yes	
	4.3.1.8.2	Is mechanical close required?	Yes	
	4.3.1.9.1	Circuit-breaker closing mechanism if other than manually charged, stored energy with mechanical close?	Motor Charge Spring Release & Manual Charge	
	4.3.1.9.3	A.C. supply voltage of spring charge motor V A.C. ratings of spring charge motor	xxxxxxx xxxxxxx	
	4.3.1.9.4	D.C. supply voltage of spring charge motor V Peak power kW Steady power kW	110 V _{DC} xxxxxxx xxxxxxx	
	4.3.1.9.6	Type of circuit-breaker closing mechanism offered	xxxxxxx	
	4.3.1.9.7	Ratings of each circuit-breaker closing device: a) voltage V b) current A c) power k W	xxxxxxx xxxxxxx xxxxxxx	
	4.3.1.9.9	If applicable, state alternative circuit-breaker tripping mechanism required	Manual	
	4.3.1.10.4	Ratings of circuit-breaker coils: a) voltage V b) peak power kW	xxxxxxx xxxxxxx xxxxxxx	
	4.3.1.11.3	Number of spare contacts required for: a) SF ₆ alarm b) lock-out SF ₆ c) circuit-breaker auxiliary 'a' d) circuit-breaker auxiliary 'b' e) spring limit f) circuit-breaker earthed	N/A N/A xxxxxxx xxxxxxx xxxxxxx xxxxxxx	
	4.3.1.11.6	Should <u>all</u> the circuit-breaker auxiliary contacts be wired to the compartment behind the relay chamber doors	Yes	
3.2	4.3.2.1.5	Circuit-breaker details: a) manufacturer b) country of origin c) model/type designation d) total mass (cart included) kg e) rating nameplate position	Actom xxxxxxx SBV24L xxxxxxx xxxxxxx	
	4.3.2.1.7	Isolation displacement of circuit-breaker	Vertical/ horizontal	
	4.3.2.4.2	Type of earthing switch offered	Integral (cable)	
	4.3.2.7.2	Type of circuit-breaker transporting device	integral	
3.3	4.3.3.1.2	Circuit-breaker details: a) manufacturer b) country of origin c) model/type designation d) total mass kg e) rating nameplate position	xxxxxxx xxxxxxx xxxxxxx xxxxxxx xxxxxxx	

T2.2 RETURNABLE SCHEDULES

Item	Clause	Description	Schedule A	Schedule B
	4.3.3.1.3	Number of in-line disconnectors?	N/A	
	4.3.3.1.4	Are two or three position disconnectors offered?	N/A	
	4.3.3.6.1	Is an integral type circuit test facility required?	Yes	
	4.3.3.6.4	Type of test facility offered?	xxxxxxxxxx	
	4.3.3.6.5	Description of test plugs	xxxxxxxxxx	
4	4.4.1.4	Is an integral three-pole earthing switch required?	Yes	
	4.4.1.5	Type of switch disconnector offered	xxxxxxxxxx	
	4.4.3.1	Is an integral type circuit test facility required?	Yes	
	4.4.3.4	Type of test facility offered	xxxxxxxxxx	
	4.4.3.5	Description of test plugs	xxxxxxxxxx	
5	4.5.1.4	Is an integral earthing facility in the circuit side required?	Yes	
	4.5.1.5	Type of switch-fuse combination offered	xxxxxxxxxx	
	4.5.1.6	Operating temperatures if higher than 40 °C	xxxxxxxxxx	
	4.5.1.7	Type of fuse links required a) length mm b) diameter	N/A N/A	xxxxxxxxxx xxxxxxxxxx
	4.5.4.1	Is an integral type circuit test facility required?	Yes	
	4.5.4.4	Type of circuit test facility offered	xxxxxxxxxx	
	4.5.4.5	Description of test plugs	xxxxxxxxxx	
6	4.6.2	Type of cable termination offered	xxxxxxxxxx	
7	4.7.1	Is a substation battery required?	No	
	4.7.3	Type of battery offered	N/A	xxxxxxxxxx
	4.7.4	Is a substation battery charger required?	No	
	4.7.6	Type of battery charger offered	N/A	xxxxxxxxxx
	4.7.7	Voltages and types of auxiliary power supply available Maximum current that can be drawn from power supply A	230 V 23	
	4.7.8	Peak and standby power requirements of the switchgear VA		
8	4.8.1	Number of current transformers & cores required per Feeder: a) protection b) metering c) instrumentation	SEE SWITCHGEAR SCHEDULE	
	4.8.2	State the following requirements for each current application a) class b) burden c) tap ratios d) tap points e) knee-point voltage V f) secondary resistance Ω g) excitation current at knee-point voltage mA	SEE SWITCHGEAR SCHEDULE	
	4.8.3	Is permission required for metering current transformers to be used for other instruments?	Yes	
	4.8.4	Details of terminal block/rail mounted terminals offered for current transformers	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

Item	Clause	Description	Schedule A	Schedule B
10	4.10.2	Requirements for protection equipment	SEE SWITCHGEAR SCHEDULE	
	4.10.4	Details of protection equipment offered a) manufacturer b) type c) rating	xxxxxxx xxxxxxx xxxxxxx	
11	4.11.1.1	Details of instruments required	Indications	
		Details of transducers required	N/A	xxxxxxx
		Details of metering equipment required	Enerdis	
		Details of instruments offered	xxxxxxx	
		Details of transducers offered	xxxxxxx	
		Details of metering equipment offered	xxxxxxx	
	4.11.1.2	Scale length of indicating instruments if there is preference mm	xxxxxxx	
	4.11.2.4	Are ammeters with a thermal maximum demand indicator required?	No	
	4.11.2.7	Accuracy of ammeters offered %	xxxxxxx	
	4.11.2.8	Scale plate required on ammeter	xxxxxxx	
	4.11.3.2	Are voltmeters with a range of 0 % to 120 % required?	No	
	4.12.1.2	Details of indicators offered	xxxxxxx	
12	4.12.2.1	What live circuit indication of the circuit side is required?	VDS	
		On which panels?	All	
	4.12.2.3	Details of bushing and voltage dividers	xxxxxxx	
	4.12.3.1	What signal indicators are required?	Open/Close/Trip	
		On which panels?	All	
	4.12.3.2	What trip indicators are required?	Fault	
		On which panels?	All	
13	4.13	Details of alarm circuits required	DC Voltage	
14	4.14.2.2	Are there alternative wiring requirements? If yes, state details Is approval required for any alternative wiring offered?	No xxxxxxx Yes	
	4.14.3.1	D.C. circuit protection	Fuses/MCCBs	
	4.14.4.2	Where are ammeter selector switches required?	N/A	
	4.14.4.3	Details of ammeter selector switches offered	xxxxxxx	
	4.14.4.5	Where are voltmeter selector switches required?	N/A	xxxxxxx
	4.14.4.6	Details of voltmeter selector switches offered	N/A	xxxxxxx
	4.14.6.5	Where should the external termination box be positioned?	Back	
	4.14.7.1	If relevant, state alternative termination of auxiliary wiring required	N/A	xxxxxxx
	4.14.8.1	Details of terminal blocks offered	xxxxxxx	
	4.14.9.1	Markings of current and voltage transformers terminals if other than as specified	xxxxxxx	

T2.2 RETURNABLE SCHEDULES

Item	Clause	Description	Schedule A	Schedule B
	4.14.9.4	State alternative circuit designations required	xxxxxxxxxx	
15	4.15.7	Details of test pack required	As per Annex D of SANS 1885:2004	
	4.15.9	Quantities of each type of pack to be supplied	xxxxxxxxxx	
	4.15.11	Mounting of accessories cabinet required?	No	
	4.15.12	Is a circuit-breaker maintenance trolley required?	xxxxxxxxxx	
16	4.16.1.1	State method used to attach rating plates	xxxxxxxxxx	
17	4.17.1.1	State method used to attach labels	xxxxxxxxxx	
	14.17.2.4	State requirements for main circuit designation labels	As per Dwg.	
		State details of labels	xxxxxxxxxx	
18	4.18.2	State special coating requirements	SANS 1091	
	4.18.3	State other colours required	As per Dwg.	
19	5.1.3	Number of South African manufactured overseas products produced and installed in South Africa	xxxxxxxxxx	
	5.3.8	Details of points, test burden and current for routine accuracy tests on current and voltage transformers	xxxxxxxxxx	
20	6	Spares readily available in South Africa with short lead time.	xxxxxxxxxx	

T2.3.1 TECHNICAL SCHEDULES (IMPUMELELO SUBSTATION)

The Technical Schedules shall be populated by the contractor / OEM. Failure to complete any schedule may result in the bid submitted being disqualified.

At no stage during the delivery of the works may the contractor change supplier / manufacturer without the written consent from the Engineer.

TECHNICAL A-B SCHEDULES:

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied (to be completed by tenderer)

SIGNED ON BEHALF OF TENDERER: _____

COMPANY NAME _____

NAME IN BLOCK LETTERS _____

DATE _____

T2.2 RETURNABLE SCHEDULES

TSE18 - POWER TRANSFORMERS

- 20 MVA, 132/22 kV Power Transformer in accordance with Eskom 240-68973110

The general requirements for power transformers rated for 1.25 MVA and above and with highest voltage of 2.2 kV or above are covered by Eskom specification 240-68973110.

Table 21: Technical Schedule (20MVA 132/22kV)

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
1.	Purchasing Details		
1.1	SAP No	0185721	
1.2	Class	Class 1	
2	Delivery and off-loading		
2.1	Transformer delivered to:	Impumelelo S/S	
2.2	Off-loaded from transport vehicle and transferred to intended operating position by supplier.	Yes	
2.3	Distance from off-loading position m	± 10	
2.4	Rise or fall to off-loading position mm	± 500	
2.5	Acceleration limit in any direction g	10	
3	Erection		
3.1	Erected ready for service	Yes	
3.2	Place 3 ply Malthoid on plinth	Yes	
4	Tests (Type Tests are for first of design units only, although Customer has right to request this for any transformer)		
4.1	Temperature rise tests	Yes	
4.2	Lightning Impulse Withstand Test	Yes	
4.3	Chopped Impulse Test	Yes	
4.4	Acoustic noise level measurements	Yes	
4.5	Determination of capacitances, windings to earth & between windings as well as bushing dielectric loss (tan delta)	Yes	
4.6	Zero sequence impedance measurement for three winding transformers	Yes	
4.7	Short-circuit withstand tests	Provide design details	
4.8	Insulation resistance to earth	Yes	
4.9	Short duration AC tests (partial discharge)	Yes	
4.10	Frequency Response Analysis Test (Factory & Site)	Yes	
4.11	Impact Recorders (Active part & Tank)	Yes	

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
4.12	Voltage Ratio and Phase Displacement	Yes	
4.13	Winding DC Resistance	Yes	
4.14	Separate Source Voltage Withstand	Yes	
4.15	Over Voltage Withstand	Yes	
4.16	Short Circuit Impedence and Load Loss	Yes	
4.17	No Load Loss and Magnetizing Current	Yes	
4.18	On Load Tap Changing	Yes	
4.19	Oil DGA	Yes	
4.20	Paint Thickness and Quality	Yes	
4.21	Auxiliary Wiring Functionality and Pressure Test	Yes	
5.	Continuous rated power for all tapping's		
5.1	ONAN MVA	20	
5.2	ONAF MVA	N/A	
6	Rated voltage (Un) on principal tapping		
6.1	Primary kV r.m.s	132	
6.2	Secondary kV r.m.s	22	
7.	Voltage tapping range of Primary/Secondary ratio (% of the ratio on the principal tapping):		
7.1	Max %	5	
7.2	Min %	-15	
7.3	Size of steps %	1.25	
7.4	Number of positions (including transition positions)	17	
8.	Resulting no-load voltage appearing having MV constant		
8.1	On principal tapping kV	xxxxxxxxx	
8.2	On extreme plus tapping kV	xxxxxxxxx	
8.3	On extreme minus tapping kV	xxxxxxxxx	
9.	Transformer Type		
9.1	Vector Group	YNd1	
9.2	Type of transformer	Core	
9.3	Number of limbs	3	
9.4	Winding Arrangement (Core/Secondary/Primary/Regulating)	As Specified	
9.5	Type of cooling	ONAN	

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
10	Operating environment		
10.1	Corrosion protection	Yes	
10.2	Pollution level	Moderate	
11	Maximum current density in windings		
11.1	Primary (outer winding) A/mm ²	≤ 3.0	
11.2	Secondary (inner winding) A/mm ²	≤ 3.2	
12	Transformer losses		
12.1	No load losses (Maximum rated power)		
12.1.1	@ 90% kW	xxxxxxxxxx	
12.1.2	@ 100% (This value will be used in fin evaluation) kW	xxxxxxxxxx	
12.1.3	@ 110% kW	xxxxxxxxxx	
12.2	Load losses		
12.2.1	Extreme Plus tap position kW	xxxxxxxxxx	
12.2.2	Nominal tap position kW	xxxxxxxxxx	
12.2.3	Extreme Minus tap position kW	xxxxxxxxxx	
	(Note: Loss evaluation will be performed using the average of the above three values)		
13.	Core Design		
13.1	Maximum flux density @ Un T	< 1.75	
14	Losses for cooling equipment (Fans)		
14.1	Power kW	N/A	
14.2	Current A	N/A	
15	Primary / Secondary impedance at 75 °C at rated MVA (Refer 7.1 of Design Parameter Schedule)		
15.1	On principal tapping %	10	
15.2	On extreme plus tapping (maximum impedance) %	xxxxxxxxxxxx	
15.3	On extreme minus tapping (minimum impedance) %	9	
16	Primary / Secondary tolerances applicable to guaranteed impedances		
16.1	On principal tapping	IEC	
16.2	On extreme plus tapping	IEC	
16.3	On extreme minus tapping (minimum impedance) %	+10 / -0	
17.	Temperature rises at altitude of 1 800 m		
17.1	Top oil °C	55	

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION		SCHEDULE A	SCHEDULE B
17.2	Windings (by resistance)	°C	60	
17.3	Hotspot of winding	°C	< 68	
17.4	Hotspot of metal parts in contact with oil	°C	< 75	
18.	Maximum acoustic noise	dB(A)	73	
19.	Heavy Duty Type		Yes	
20.	Minimum insulation for windings (Note: Provide detailed test plan for evaluation)			
20.1	Impulse withstand test voltage for line terminal:			
20.1.1	Primary	kV peak	380	
20.1.2	Secondary	kV peak	95	
20.2	Sixty-second, separate source			
20.2.1	Primary	kV r.m.s	150	
20.2.2	Secondary	kV r.m.s	28	
20.3	Sixty-second, induced-overvoltage withstand test voltages			
20.3.1	Primary to earth	kV r.m.s	150	
20.3.2	Secondary	kV r.m.s	22	
21	Main terminals & Bushing			
21.1	Type		Outdoor	
21.2	Details of Primary bushing / terminal (composite)			
21.2.1	Make & Model		xxxxxxxxxx	
21.2.2	Stem size (dia x length)	mm	26 x 125	
21.2.3	Current Rating (incl 20% overcurrent)	A	> 78	
21.2.4	Impulse withstand voltage at sea level	kV peak	550	
21.2.5	Power frequency withstand voltage	kV r.m.s	230	
21.2.6	Total Creepage	mm	> 3100	
21.2.7	Protected Creepage (<50% of Total Creepage)	mm	xxxxxxxxxx	
21.3	Details of Secondary bushing / terminal (composite)			
21.3.1	Make & Model		xxxxxxxxxx	
21.3.2	Stem size (dia x length)	mm	38 x 125	
21.3.3	Current Rating (incl 20% overcurrent)	A	> 314	
21.3.4	Impulse withstand voltage at sea level	kV peak	200	
21.3.5	Power frequency withstand voltage	kV r.m.s	70	

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
21.3.6	Total Creepage mm	375	
21.3.7	Protected Creepage (<50% of Total Creepage) mm	xxxxxxxxxx	
21.4	Details of Neutral bushing / terminal (composite)		
21.4.1	Make & Model	xxxxxxxxxx	
21.4.2	Stem size (dia x length) mm	26 x 125	
21.4.3	Current Rating (incl. 20% overcurrent) A	> 314	
21.4.4	Impulse withstand voltage at sea level kV peak	350	
21.4.5	Power frequency withstand voltage kV r.m.s	140	
21.4.6	Total Creepage mm	1500	
21.4.7	Protected Creepage (<50% of Total Creepage) mm	xxxxxxxxxx	
22	Physical arrangement		
22.1	Compliance with Figure 2 & 3	Yes	
22.2	Overall dimensions of complete unit		
22.2.1	Height mm	< 5500	
22.2.2	Length mm	< 6400	
22.2.3	Width mm	< 5000	
22.3	Overall dimensions of tank only	xxxxxxxxxx	
22.3.1	Base plate type (flat / prefabricated) mm	Flat	
22.3.2	Length mm	± 3200 (< 4400)	
22.3.3	Width mm	≤ 1500	
22.3.4	Base plate thickness mm	± 20	
23	Cooling equipment		
23.1	Radiators		
23.1.1	Material Type (Cooler tubes / press sheet radiators)	xxxxxxxxxx	
23.1.2	Material Thickness mm	xxxxxxxxxx	
23.2	Motors (Forced cooling)		
23.2.1	Make	N/A	
23.2.2	Type	N/A	
24	Safe withstand vacuum at sea level kPa	1.5	
25	Transformer oil type	240-75661431 ESKOM 32-406	
26	Tap-changers		
26.1	Type	OLTC	

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
26.2	Tap-changer	xxxxxxxxxx	
26.2.1	Manufacturer	xxxxxxxxxx	
26.2.2	Model Number	xxxxxxxxxx	
26.2.3	Precise electrical location of tappings.	Y-neutral end	
26.2.4	Diagrammatic arrangement shown on Drawing No.	xxxxxxxxxx	
26.2.5	Number of maintenance free operations	300,000	
26.3	Nominal 50 Hz ratings of tap-changer:		
26.3.1	Voltage kV	> 51	
26.3.2	Current (non-vacuum type) A	> 78	
26.3.3	Current (vacuum type) A	> 78	
26.4	Insulation levels of tap-changer		
26.4.1	phase-to-phase peak kV peak	380	
26.5	Tap-changer 50 Hz withstand		
26.5.1	phase-to-phase kV r.m.s	125	
26.6	Tap-changer contacts		
26.6.1	Selector kV/A	xxxxxxxxxx	
26.6.2	Selector switch kV/A	xxxxxxxxxx	
26.6.3	Diverter switch kV/A	xxxxxxxxxx	
26.6.4	Tie-in Resistor used?	Yes /No	
26.6.5	Value of tie-in resistor Ω	xxxxxxxxxx	
26.7	Tap-changer transition resistor kV/A	xxxxxxxxxx	
26.8	Tap-changer driving motor		
26.8.1	Type of driving motor	3 phase	
26.8.2	Supply voltage to motor V_{ac}	420V	
26.8.3	Power kW	xxxxxxxxxx	
26.8.4	Current A	xxxxxxxxxx	
27	Drawings & Manuals		
27.1	Quantity of drawings as per 3.2.2	1	
27.2	Quantity of Manuals (hard copy + electronic)	5 + 1	
28	Indicating and protective devices		
28.1	Tap-changer protective device (detail)	Specify Type	
28.2	Pressure relief device	Specify Type	
28.3	Oil- and gas-actuated relay	Specify Type	

T2.2 RETURNABLE SCHEDULES

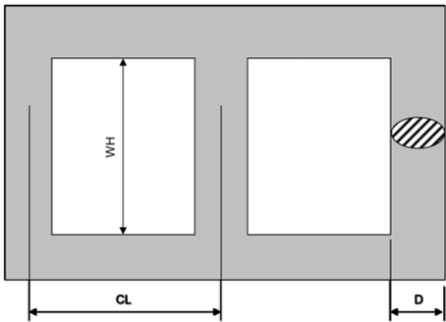
ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
28.4	Conservator bag required	No	
28.5	Conservator bag type	N/A	
28.6	Dehydrating breathers	Specify Type	
28.7	Oil level indicators	Specify Type	
28.8	Oil temperature thermometer	Specify Type	
28.9	Winding temperature thermometer(s)	Specify Type	
29	Schedule of type test & routine test certificates submitted	Yes - compulsory	
30	Spares recommended by manufacturer (Provide detailed list)		

Table 22: Deviations 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 the specification.		
Item	Sub-clause	Proposed deviation

T2.2 RETURNABLE SCHEDULES

Table 23: Design Parameter Schedules and B for a YNd1 Power trfr

Item	Description	Schedule A	Schedule B
1.	Core Steel		
1.1	Manufacturer of core steel	XXXXXXXXXX	
1.2	Grade of core steel	XXXXXXXXXX	
1.3	Thickness of core steel mm	XXXXXXXXXX	
2	Core Dimensions		
2.1	Window height (WH) mm	XXXXXXXXXX	
2.2	Distance between core limb centres (CL) mm	XXXXXXXXXX	
2.3	Core Diameter (D) mm	XXXXXXXXXX	
2.4	Filling Factor	XXXXXXXXXX	
3	Cross sectional areas		
3.1	Wound limbs mm ²		
3.2	Yoke mm ²		
4	Total Core mass Kg		
5	The design flux density at U_n for:		
5.1	Wound limbs T	XXXXXXXXXX	
5.2	Yoke T	XXXXXXXXXX	
6	Volts/turn at the above flux V/turn		
7. Winding Design 			
7.1	Winding arrangement (CORE / LV / HV / TAP)	XXXXXXXXXX	
7.2	Conductor Yield strength N/mm ²	XXXXXXXXXX	
7.3	Winding 1	LV	
7.3.1	Type (i.e. multilayer helix)	XXXXXXXXXX	
7.3.2	Lead type (End Fed / Centre Fed)	XXXXXXXXXX	
7.3.3	Number of turns	XXXXXXXXXX	
7.3.4	Inner Diameter mm	XXXXXXXXXX	

T2.2 RETURNABLE SCHEDULES

Item	Description	Schedule A	Schedule B
7.3.5	Outer Diameter mm	XXXXXXXXXX	
7.3.6	Radial build mm	XXXXXXXXXX	
7.3.7	Magnetic height mm	XXXXXXXXXX	
7.3.8	Conductor configuration	XXXXXXXXXX	
7.3.9	- Size	XXXXXXXXXX	
7.3.10	- Number	XXXXXXXXXX	
7.3.11	Conductor insulation mm	XXXXXXXXXX	
7.3.12	Current density A/mm ²	XXXXXXXXXX	
7.3.13	Temperature gradient winding – oil °C (K)	XXXXXXXXXX	
7.3.14	Total conductor mass kg	XXXXXXXXXX	
7.4	Winding 2	HV	
7.4.1	Type (i.e. multilayer helix)	XXXXXXXXXX	
7.4.2	Lead type (End Fed / Centre Fed)	XXXXXXXXXX	
7.4.3	Number of turns	XXXXXXXXXX	
7.4.4	Inner Diameter mm	XXXXXXXXXX	
7.4.5	Outer Diameter mm	XXXXXXXXXX	
7.4.6	Radial build mm	XXXXXXXXXX	
7.4.7	Magnetic height mm	XXXXXXXXXX	
7.4.8	Conductor configuration	XXXXXXXXXX	
7.4.9	- Size	XXXXXXXXXX	
7.4.10	- Number	XXXXXXXXXX	
7.4.11	Conductor insulation mm	XXXXXXXXXX	
7.4.12	Current density rated A/mm ²	XXXXXXXXXX	
7.4.13	Temperature gradient winding – oil °C (K)	XXXXXXXXXX	
7.4.14	Total conductor mass kg	XXXXXXXXXX	
7.5	Winding 3	TAP	
7.5.1	Type (i.e. multilayer helix)	XXXXXXXXXX	
7.5.2	Lead type (End Fed / Centre Fed)	XXXXXXXXXX	
7.5.3	Number of turns	XXXXXXXXXX	
7.5.4	Inner Diameter mm	XXXXXXXXXX	
7.5.5	Outer Diameter mm	XXXXXXXXXX	
7.5.6	Radial build mm	XXXXXXXXXX	
7.5.7	Magnetic height mm	XXXXXXXXXX	

T2.2 RETURNABLE SCHEDULES

Item	Description	Schedule A	Schedule B
7.5.8	Conductor configuration	XXXXXXXXXX	
7.5.9	- Size	XXXXXXXXXX	
7.5.10	- Number	XXXXXXXXXX	
7.5.11	Conductor insulation mm	XXXXXXXXXX	
7.5.12	Current density A/mm ²	XXXXXXXXXX	
7.5.13	Temperature gradient winding – oil °C (K)	XXXXXXXXXX	
7.5.14	Total conductor mass kg	XXXXXXXXXX	
8.	Inter-winding Insulation	XXXXXXXXXX	
8.1	CORE - LV winding	XXXXXXXXXX	
8.1.1	Number of barriers	XXXXXXXXXX	
8.1.2	Barrier thickness mm	XXXXXXXXXX	
8.1.3	Distance from windings mm	XXXXXXXXXX	
8.1.4	Distance between barriers mm	XXXXXXXXXX	
8.2	LV winding to HV winding	XXXXXXXXXX	
8.2.1	Number of barriers	XXXXXXXXXX	
8.2.2	Barrier thickness mm	XXXXXXXXXX	
8.2.3	Distance from windings mm	XXXXXXXXXX	
8.2.4	Distance between barriers mm	XXXXXXXXXX	
8.3	HV winding to TAP winding	XXXXXXXXXX	
8.3.1	Number of barriers	XXXXXXXXXX	
8.3.2	Barrier thickness mm	XXXXXXXXXX	
8.3.3	Distance from windings mm	XXXXXXXXXX	
8.3.4	Distance between barriers mm	XXXXXXXXXX	

Table 24: Design Parameter Schedules and B for a YNd1 Power trfr

Item	Description	Schedule A	Schedule B
1	Transformer general information		
1.1	Manufacturer	XXXXXXXXXX	
1.2	Place of manufacture	XXXXXXXXXX	
2	Oil quantities:		
2.1	Transformer tank l	XXXXXXXXXX	
2.2	Tap-changer l	XXXXXXXXXX	

T2.2 RETURNABLE SCHEDULES

Item	Description		Schedule A	Schedule B
2.3	Radiators	l	xxxxxxxxxx	
2.4	Conservator (Main & tap-changer)	l	xxxxxxxxxx	
3	Masses			
3.1	Mass of core steel	kg	xxxxxxxxxx	
3.2	Total dry insulation mass	kg	xxxxxxxxxx	
3.3	Total mass of active part	kg	xxxxxxxxxx	
3.4	Mass of tank and fittings	kg	xxxxxxxxxx	
3.5	Mass of coolers (dry)	kg	xxxxxxxxxx	
3.6	Mass of oil	kg	xxxxxxxxxx	
3.7	Greatest transportation mass	kg	xxxxxxxxxx	
4	Primary / Secondary zero sequence impedances	%	xxxxxxxxxx	
4.1	On principal tapping			
4.2	On extreme plus tapping	%	xxxxxxxxxx	
4.3	On extreme minus tapping	%	xxxxxxxxxx	
5	Filling medium for transport		xxxxxxxxxx	
6.	Training of purchaser's staff			
6.1	Training provided on components		Yes	
6.2	Details provided of how training is going to be conducted on purchaser's staff?		Yes	

T2.2 RETURNABLE SCHEDULES

TSE20 – NECRT’S

- 22 kV / 300-360 A: Neutral electromagnetic coupler with neutral earthing resistor and auxiliary transformer (NECRT) in accordance with Eskom specification 240-576488480.

The general requirements for three phase neutral electro-magnetic couplers with neutral earthing resistors and auxiliary transformers (NECRT’S) are covered by Eskom specification 240-57648848.

Eskom standard number: 34-1690 (240-57648848) 2015/03-30

Table 25: Technical Schedule

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
1	Identification		
	a) Supplier’s name	XXXXXXXXXX	
	b) Manufacturer’s name	XXXXXXXXXX	
	c) Type designation	XXXXXXXXXX	
2	Site conditions		
	a) Altitude m	1800	
	b) Maximum ambient temperature °C	45	
	c) Minimum ambient temperature °C	-10	
	d) Maximum diurnal variation °C	35	
	e) Seismic Shocks g	0.3	
	f) Relative humidity %	≤ 100	
	g) Life expectancy y	40	
3	Electrical conditions		
	a) Nominal system voltage (Um) kV	22	
	b) Maximum system voltage (Um) kV	24	
	c) Nominal frequency Hz	50	
4	Rated requirements		
	General		
	a) Nominal short time (10 s) current of NEC and NER (r.m.s.)A	360	
	b) Nominal continuous current of NEC and NER (r.m.s.)A	10	
	c) Zero sequence reactance (X ₀) Ω/ph	47,3 to 56,8	
	d) Zero sequence resistance (R ₀) at 100°C Ω/ph	94,7 to 113,6	

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
	e) Zero sequence impedance (Z_0) at 100 °C Ω/ph	xxxxxxxxxx	
	NEC		
	a) Zero sequence reactance (X_c) Ω	xxxxxxxxxx	
	b) Zero sequence resistance (R_c) at 100 °C Ω	xxxxxxxxxx	
	c) No load loss of NEC at U_n kW	xxxxxxxxxx	
	d) Flux density of NEC core T	xxxxxxxxxx	
	e) Magnetization current (r.m.s.)A	xxxxxxxxxx	
	f) Current density at nominal short time current A/mm²	xxxxxxxxxx	
	NER		
	a) Zero sequence reactance (X_r) Ω	xxxxxxxxxx	
	b) Zero sequence resistance (R_r) at 100 °C Ω	xxxxxxxxxx	
	c) Nominal voltage (U_n) kV	12.7	
	d) Temperature coefficient at 100 °C Ω/°C	xxxxxxxxxx	
	e) Specific heat capacity kJ/kg °C	xxxxxxxxxx	
	f) Temperature range in which (d) and (e) apply °C	xxxxxxxxxx	
4.1	Auxiliary transformer		
	a) Nominal rating kVA	100	
	b) Primary nominal voltage kV	22	
	c) No load secondary voltage V	420	
	d) Vector group Dyn11 or Yzn11	xxxxxxxxxx	
	e) Flux density of aux core T	xxxxxxxxxx	
	f) Magnetizing current A	xxxxxxxxxx	
	g) Load loss kW	xxxxxxxxxx	
	h) No-load loss kW	xxxxxxxxxx	
5	i) Percentage impedance %	As SANS 780	
	Temperature rise (at site altitude)		
	Conditions:		
	I Passage of maximum continuous neutral A	xxxxxxxxxx	
	II Passage of rated current of auxiliary transformer A	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B	
6	III Passage of nominal short time current for A	XXXXXXXXXX		
	Top oil temperature for condition:			
	a) I ☐ C	XXXXXXXXXX		
	b) II ☐ C	XXXXXXXXXX		
	c) III ☐ C	XXXXXXXXXX		
	d) I and II ☐ C	XXXXXXXXXX		
	e) I and II and III ☐ C	XXXXXXXXXX		
	NEC winding temperature (calculated) for condition			
	a) I ☐ C	XXXXXXXXXX		
	b) II ☐ C	XXXXXXXXXX		
	c) III ☐ C	XXXXXXXXXX		
	d) I and II ☐ C	XXXXXXXXXX		
	e) I and II and III ☐ C	XXXXXXXXXX		
	Metallic NER temperature (measured) for condition:			
	a) I ☐ C	XXXXXXXXXX		
	b) II ☐ C	XXXXXXXXXX		
	c) III ☐ C	XXXXXXXXXX		
	Material			
	a) NEC winding	XXXXXXXXXX		
	b) AUX HV winding	XXXXXXXXXX		
	c) AUX LV winding	XXXXXXXXXX		
	d) Grade of NER elements	XXXXXXXXXX		
	7	Material thickness		
		a) Tank top mm	XXXXXXXXXX	
	b) Tank bottom mm	XXXXXXXXXX		
	c) Tank sides mm	XXXXXXXXXX		
	d) Conservator mm	XXXXXXXXXX		
	e) Radiator tubes (if any) mm	XXXXXXXXXX		
8*	Housing and corrosion protection			

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
	a) Material - Inland	xxxxxxxxxx	
	- Coastal	xxxxxxxxxx	
	b) Corrosion protection - Inland	As SCSSCAAP9	
	- Coastal	As SCSSCAAP9	
	c) Tank colour	Admiralty Grey	
	d) Conservator colour	White	
9*	HV Bushings		
	a) Profile characteristics - Inland	As IEC 60815	
	- Coastal	As IEC 60815	
	b) Minimum creepage - Inland mm/kV	25	
	Coastal mm/kV	34	
	c) Material - Inland	xxxxxxxxxx	
	- Coastal	xxxxxxxxxx	
	d) Manufacturer and type - Inland	xxxxxxxxxx	
	- Coastal	xxxxxxxxxx	
10	Current transformers		
	REF and differential		
	a) Manufacturer	xxxxxxxxxx	
	b) Ratio	2400/1	
	c) Accuracy class (on 600/1 ratio)	TPS	
	d) Max excitation current at 300 V mA	100	
	e) Max internal resistance on 600/1 ratio Ω	2,4	
	f) Secondary voltage/turn V/turn	0,5	
	g) Secondary internal resistance/turn m Ω /turn	4	
	h) Location: (earthed end of NER nearer to earthed terminal)	xxxxxxxxxx	
	i) Reference number of mag. curve	xxxxxxxxxx	
	IDMTEF		
	a) Manufacturer	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
	b) Ratio	100/1	
	c) Accuracy class	10P10	
	d) Location: (earthed end of NER near resistor)	XXXXXXXXXX	
	e) Reference number of mag. curve	XXXXXXXXXX	
11	NER elements		
	a) Manufacturer	XXXXXXXXXX	
	b) Type designation	XXXXXXXXXX	
	c) Number of elements	XXXXXXXXXX	
12	Buchholz relay		
	a) Manufacturer	XXXXXXXXXX	
	b) Type designation	XXXXXXXXXX	
	c) Minimum size mm	50	
13	Dial type thermometer	XXXXXXXXXX	
	a) Manufacturer		
	b) Type designation	XXXXXXXXXX	
14	Overall dimensions		
	a) Height mm	XXXXXXXXXX	
	b) Length mm	XXXXXXXXXX	
	c) Width mm	XXXXXXXXXX	
	Mass		
15	a) NEC core and winding kg	XXXXXXXXXX	
	b) NER kg	XXXXXXXXXX	
	c) AUX core and winding kg	XXXXXXXXXX	
	d) Tank and fittings kg	XXXXXXXXXX	
	e) Oil kg	XXXXXXXXXX	
	f) Total kg	XXXXXXXXXX	
16	Documentation Provide reference number for:		
	a) Outline drawings	XXXXXXXXXX	

T2.2 RETURNABLE SCHEDULES

ITEM	DESCRIPTION	SCHEDULE A	SCHEDULE B
	b) Rating and diagram plate	XXXXXXXXXX	
	c) Internal general assembly drawing	XXXXXXXXXX	
	d) AUX transformer wiring diagram	XXXXXXXXXX	
17	Type and special test Provide test report for:		
	a) Power-frequency voltage withstand test.	XXXXXXXXXX	
	b) Impulse test.	XXXXXXXXXX	
	c) Separate source voltage withstand test.	XXXXXXXXXX	
	d) Induced over voltage test.	XXXXXXXXXX	
	e) Measurement of zero sequence	XXXXXXXXXX	
	f) Temperature rise test.	XXXXXXXXXX	
	g) Short-circuit test on AUX	XXXXXXXXXX	
	h) Short-time current test on NEC/NER	XXXXXXXXXX	
	i) Vacuum test	XXXXXXXXXX	
	j) Accelerated ageing test for composite bushings.	XXXXXXXXXX	

NOTE:

*The schedule makes provision for both coastal/high-corrosive environments and inland/low-corrosive applications.

*Insulation shall be based on coastal/high-corrosive environments, even if installed inland.

T2.2 RETURNABLE SCHEDULES

Table 26: Deviations 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 the specification.		
Item	Sub-clause	Proposed deviation

Show formulae according to which the zero-sequence inductance and resistance will be designed to limit the fault to 300 A.

T2.2 RETURNABLE SCHEDULES

TSE25 - OUTDOOR HV SWITCHGEAR (ISOLATOR)

- 132 kV Disconnecter (hand-operated) and 132 kV separate earthing switch for use in very heavily polluted conditions (31 mm / kV) in accordance with Eskom specification 240-56063815.
- 22 kV Disconnecter (hand-operated) and 22 kV separate earthing switch for use in very heavily polluted conditions (31 mm / kV) in accordance with Eskom specification 240-56063815.

Table 27: Technical Schedule – HV Outdoor disconnectors 132 kV 2500A hand operated disconnectors

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
1		Purchasing details		
1,1		· Quantity of units required	As per BoQ	
1,2		· SAP No	0642558	
1,3		· Region	N/A	
1,4		· Site Name	Impumelelo SS	
1,5		· Nearest Town	Impumelelo	
1,6		· Province	Mpumalanga	
1,7		· Distance from nearest town km	1.7	
1,8		· Access to site	tar/gravel road	
2		Delivery and off-loading		
2,1		· Disconnecter delivered to:	Impumelelo SS	
2,2		· Delivery effected not before Date	TBA	
2,3		· Erection completed not later than Date	TBA	
2,4		Off-loaded from transport vehicle and transferred to intended operating position by supplier.	Yes	
2,5		· Construction supply available	Yes	
3	1,3	Site conditions of service		
3,1		· Altitude m	1 800	
3,2		· Ambient air temperature range		

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
3,3		· Maximum (Peak) °C	+45	
3,4		· Highest average daily °C	+35	
3,5		· Lowest average daily maximum °C	+5	
3,6		· Minimum °C	-10	
3,7		· Maximum average daily variation °C	25	
3,8		· Design level °C	50	
3,9		· Icing conditions	None	
3,10		· Humidity		
3,11		Relative humidity conditions		
3,12		Minimum %	5	
3,13		Maximum %	99	
3,14		Average %	50	
3,15		· Solar radiation W/m ²	1 100	
3,16		· Wind loadings		
3,17		· Basic design velocity km/hr	115	
3,18		· Maximum wind speed km/hr	144	
3,19		· Wind loadings Pascals	1 000	
3,20		· Lightning flash density flashes /km ² /yr	8	
4	4.2.1.1	System conditions of service		
4,1		· Maximum system voltage kV	145	
4,2		· Number of phases	3	
4,3		· Nominal system frequency Hz	50	
4,4		· System earthing	Effectively earthed	
5	4.2.1.1	Type of Disconnector		
5,1		· Type of disconnector required	CRPDB	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
6	4.2.1.2	Detail of disconnector		
6,1		· Manufacturer	xxxxxxxxxx	
6,2		· Type designation	xxxxxxxxxx	
6,3		· Number of breaks	2	
6,4		· Main contacts	xxxxxxxxxx	
6,5		Type	xxxxxxxxxx	
6,6		Entry	Free/Friction	
6,7		Contact force N	xxxxxxxxxx	
6,8		Materials	xxxxxxxxxx	
6,9		Wear allowance	xxxxxxxxxx	
7	4.2.2	· Disconnector ratings (IEC 62271-102)		
7,1		· Rated nominal voltage kV	132	
7,2		· Rated normal current A	2 500	
7,3		· Rated short-time withstand current kA	25	
7,4		· Rated duration of short circuit s	3	
7,5		· Rated peak withstand current kA	100	
7,6		· Rated short-duration power frequency withstand voltage kV	275	
7,7		· Rated lightning impulse withstand voltage kV	550	
8	4.3	· Mounting of disconnector		
8,1		· Upright, horizontal or vertical	Upright horizontal	
8,2		· Phase spacing mm	2 400	
8,3		· Mounting height (lowest part of insulation above ground level) mm	2 500	
8,4		· Arrangement of phases, in-line or transverse	In-line and transverse	
8,5		· Is mounting structure for the isolator to be provided by the supplier	Yes	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
8,6		Is mounting structure for the separate earth switch to be provided by the supplier	Yes	
9	4.4.1	Type of operation		
9,1		Isolator	Hand	
9,2		Earth switch	Hand	
10	4.4.2	Operating movement (for hand driven mechanism)		
10,1		Isolators	Horizontal	
10,2		Earth switch	Horizontal	
11	4.4.3	Motor driven mechanism		
11,1		Motor voltage V	N/A	
11,2		Rated torque of drive Nm	N/A	
11,3		Maximum starting current A	N/A	
11,4		Operating times		
11,5		Opening s	N/A	
11,6		Closing s	N/A	
12	4,9	Auxiliary switches		
12,1		Number of contacts for disconnectors	DX TX	
12,2		Type G	8 7	
12,3		Type M	5 4	
12,4		Type F	1 N/A	
12,5		Type N	2 5	
12,6		Number of contacts for earthing switches		
12,7		Type M	4	
12,8		Type N	4	
13	4,9	Ratings for auxiliary switches		
13,1		Breaking current A	10	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
13,2		· AC - 110 Volts (power factor 0,5) A	10	
13,3		· DC - 229 Volts (t=60 ms) A	2	
13,4		· Continuous current A	10	
13,5		· Short-time current for 1 second (t= 60 ms)	100	
13,6		· Volt drop across contacts for a current of 10A DC mV	xxxxxxxxxx	
14	4,13	Main terminals		
14,1		· Type	38mm Stem	
14,2		· Material	Aluminium	
14,3		· Orientation: vertical or horizontal	Vertical	
14,4		· Dimension of pads:		
14,5		Number of holes	N/A	
14,6		Diameter of holes mm	N/A	
14,7		Pitch of holes mm	N/A	
14,8		Thickness of pad mm	xxxxxxxxxx	
15		Insulation and clearances		
15,1	4,18	· Details of insulators offered		
15,2		· Manufacturer	xxxxxxxxxx	
15,3		· Type designation	xxxxxxxxxx	
15,4		· Number of units in stack	xxxxxxxxxx	
15,5		· Cantilever strength class N	xxxxxxxxxx	
15,6		· Torsion strength Nm	xxxxxxxxxx	
15,7		· Creepage distance (minimum) mm	4092	
15,8		· Insulator material	Porcelain or silicon rubber	
16	4.18.1	· Insulator test voltage		
16,1		· Lightning impulse withstand voltage (1,2/50 μ s) referred to sea level		

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
16,2		· To earth and between phases in the open position kV	550	
16,3		· Across the isolating distance kV	630	
17		· Power frequency wet withstand voltage (60 second) referred to sea level		
17,1		· To earth and between phases in the open position kV	230	
17,2		· Across the isolating distance kV	265	
18		· Voltage test across isolating distance (bias test)		
18,1		· Value of power frequency voltage kV	N/A	
18,2		· Crest value of lightning impulse wave	N/A	
18,3		· Crest value of switching impulse wave kV	N/A	
19		· Radio influence voltage test		
19,1		· Single phase test voltage applied to disconnector in open and closed position kV	104	
19,2		· Radio influence voltage at 1 MHz μ V	2 500 max	
20		· Electrical clearances		
20,1		· Between live portions of phases mm	xxxxxxxxxx	
20,2		· Between live portions at system voltage and earth mm	>3 700	
20,3		· Lowest point of insulation above ground level not to be less than mm	2 500	
21		Miscellaneous		
21,1	4.2.1	Mass details		
21,2		· Complete disconnector without earthing switch	kg	
21,3		· Complete disconnector with single earthing switch	kg	
21,4		· Complete disconnector with double earthing switch	kg	
21,5		· Separate earthing switch	kg	
22		· Protection of housing and mechanism boxes		
22,1		· International Protection rating	IP55	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
22,2		· Material type	316 stainless steel	
23		· Cubicle heating and ventilation		
23,1		· Electrical heating		
23,2		Supply voltage, 50 Hz V	230	
23,3		Power rating W	xxxxxxxxxx	
24		· Secondary terminals, gland plate and cable connections		
24,1		· Terminal type	Spring loaded	
24,2		· Manufacturer		
24,3		· Undrilled gland plate of minimum usable area mm	100 x 50	
24,4		· Control cable type used by Eskom	PVC SWA	
24,5		· Minimum distance between terminal board and gland plate mm	150	
25		· Supporting structures to be provided	No, unless part of construction	
26		· Testing authority certificates held to prove all ratings	Yes and must be less than 7 years old	
27		· Number of complete sets of instruction manuals and routine test results to be supplied with each equipment	One per equipment supplied in weather protective envelop inside mechanism door	
28		Number of complete sets of instruction manuals to be supplied on award of contract	5	
29		· Terminal mechanical loading		
29,1		· Maximum continuous loading:		
29,2		Horizontal kN	xxxxxxxxxx	
29,3		30° to horizontal kN	xxxxxxxxxx	
29,4		60° to horizontal kN	xxxxxxxxxx	
30		Documentation (to be submitted with tender)		

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
		Note: All documentation to be provided in electronic format.		
30,1		· Type test certificates Sets	1	
30,2		· Outline drawings of disconnectors Sets	1	
30,3		· Wiring diagrams Sets	1	
30,4		· Operation and maintenance manuals Sets	1	

Table 28: Deviation Schedule – HV Outdoor disconnectors 132 kV 2500A hand operated disconnectors

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 the specification.		
Item	Sub-clause	Proposed deviation

T2.2 RETURNABLE SCHEDULES

Table 29: Technical Schedule – HV Outdoor disconnectors 22 kV 2500A hand operated disconnectors

ITEM	CLAUSE OF NRS 003	DESCRIPTION	SCHEDULE A	SCHEDULE B
1		Purchasing details		
1,1		· Quantity of units required	As per BoQ	
1,2		· SAP No	N/A	
1,3		· Region	N/A	
1,4		· Site Name	Impumelelo SS	
1,5		· Nearest Town	Impumeleo	
1,6		· Province	Mpumalanga	
1,7		· Distance from nearest town km	1.7	
1,8		· Access to site	tar/gravel road	
2		Delivery and off-loading		
2,1		· Disconnector delivered to:	Impumelelo SS	
2,2		· Delivery effected not before Date	TBA	
2,3		· Erection completed not later than Date	TBA	
2,4		· Off-loaded from transport vehicle and transferred to intended operating position by supplier.	Yes	
2,5		· Construction supply available	Yes	
3	1,3	Site conditions of service		
3,1		· Altitude m	1 800	
3,2		· Ambient air temperature range		
3,3		· Maximum (Peak) °C	+45	
3,4		· Highest average daily °C	+35	
3,5		· Lowest average daily maximum °C	+5	
3,6		· Minimum °C	-10	
3,7		· Maximum average daily variation °C	25	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF NRS 003	DESCRIPTION	SCHEDULE A	SCHEDULE B
3,8		· Design level °C	50	
3,9		· Icing conditions	None	
3,10		· Humidity		
3,11		Relative humidity conditions		
3,12		Minimum %	5	
3,13		Maximum %	99	
3,14		Average %	50	
3,15		· Solar radiation W/m ²	1 100	
3,16		· Wind loadings		
3,17		· Basic design velocity km/hr	115	
3,18		· Maximum wind speed km/hr	144	
3,19		· Wind loadings Pascals	1 000	
3,20		· Lightning flash density flashes/ km ² /yr	8	
4	4.2.1.1	System conditions of service		
4,1		· Maximum system voltage kV	24	
4,2		· Number of phases	3	
4,3		· Nominal system frequency Hz	50	
4,4		· System earthing	Effectively earthed	
5	4.2.1.1	Type of Disconnector		
5,1		· Type of disconnector required	CRPDB	
6	4.2.1.2	Detail of disconnector		
6,1		· Manufacturer	xxxxxxxxxx	
6,2		· Type designation	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF NRS 003	DESCRIPTION	SCHEDULE A	SCHEDULE B
6,3		· Number of breaks	2	
6,4		· Main contacts	xxxxxxxxxx	
6,5		Type	xxxxxxxxxx	
6,6		Entry	Free/Friction	
6,7		Contact force N	xxxxxxxxxx	
6,8		Materials	xxxxxxxxxx	
6,9		Wear allowance	xxxxxxxxxx	
7	4.2.2	· Disconnecter ratings (IEC 62271-102)		
7,1		· Rated nominal voltage kV	22	
7,2		· Rated normal current A	2 500	
7,3		· Rated short-time withstand current kA	25	
7,4		· Rated duration of short circuit s	3	
7,5		· Rated peak withstand current kA	63	
7,6		· Rated short-duration power frequency withstand voltage kV	50	
7,7		· Rated lightning impulse withstand voltage kV	150	
8	4,3	· Mounting of disconnecter		
8,1		· Upright, horizontal or vertical	Upright horizontal	
8,2		· Phase spacing mm	1 000	
8,3		· Mounting height (lowest part of insulation above ground level) mm	2 500	
8,4		· Arrangement of phases, in-line or transverse	Transverse	
8,5		· Is mounting structure for the isolator to be provided by the supplier	Yes	
8,6		· Is mounting structure for the separate earth switch to be provided by the supplier	N.A.	
9	4.4.1	· Type of operation		
9,1		· Isolator	Hand	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF NRS 003	DESCRIPTION	SCHEDULE A	SCHEDULE B
9,2		· Earth switch	Hand	
10	4.4.2	· Operating movement (for hand driven mechanism)		
10,1		· Isolators	Horizontal	
10,2		· Earth switch	Horizontal	
11	4.4.3	· Motor driven mechanism		
11,1		· Motor voltage V	N/A	
11,2		· Rated torque of drive Nm	N/A	
11,3		· Maximum starting current A	N/A	
11,4		· Operating times		
11,5		Opening s	N/A	
11,6		Closing s	N/A	
12	4,9	· Auxiliary switches		
12,1		· Number of contacts for disconnectors	DX TX	
12,2		Type G	8 7	
12,3		Type M	5 4	
12,4		Type F	1 N/A	
12,5		Type N	2 5	
12,6		· Number of contacts for earthing switches		
12,7		Type M	4	
12,8		Type N	4	
13	4,9	· Ratings for auxiliary switches		
13,1		· Breaking current A	10	
13,2		· AC - 110 Volts (power factor 0,5) A	10	
13,3		· DC - 229 Volts (t=60 ms) A	2	
13,4		· Continuous current A	10	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF NRS 003	DESCRIPTION	SCHEDULE A	SCHEDULE B
13,5		Short-time current for 1 second (t= 60 ms)	100	
13,6		Volt drop across contacts for a current of 10A DC mV	xxxxxxxxxx	
14	4,13	Main terminals		
14,1		Type	38mm Stem	
14,2		Material	Aluminium	
14,3		Orientation: vertical or horizontal	Vertical	
14,4		Dimension of pads:		
14,5		Number of holes	N/A	
14,6		Diameter of holes mm	N/A	
14,7		Pitch of holes mm	N/A	
14,8		Thickness of pad mm	xxxxxxxxxx	
15		Insulation and clearances		
15,1	4,18	Details of insulators offered		
15,2		Manufacturer	xxxxxxxxxx	
15,3		Type designation	xxxxxxxxxx	
15,4		Number of units in stack	xxxxxxxxxx	
15,5		Cantilever strength class N	xxxxxxxxxx	
15,6		Torsion strength Nm	xxxxxxxxxx	
15,7		Creepage distance (minimum) mm	744	
15,8		Insulator material	Porcelain or silicon rubber	
16	4.18.1	Insulator test voltage		
16,1		Lightning impulse withstand voltage (1,2/50 μ s) referred to sea level		
16,2		To earth and between phases in the open position kV	150	
16,3		Across the isolating distance kV	172	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF NRS 003	DESCRIPTION	SCHEDULE A	SCHEDULE B
17		Power frequency wet withstand voltage (60 second) referred to sea level		
17,1		To earth and between phases in the open position kV	50	
17,2		Across the isolating distance kV	55	
18		Voltage test across isolating distance (bias test)		
18,1		Value of power frequency voltage kV	N/A	
18,2		Crest value of lightning impulse wave	N/A	
18,3		Crest value of switching impulse wave kV	N/A	
19		Radio influence voltage test		
19,1		Single phase test voltage applied to disconnecter in open and closed position kV	N/A	
19,2		Radio influence voltage at 1 MHz μ V	N/A	
20		Electrical clearances		
20,1		Between live portions of phases mm	xxxxxxxxxx	
20,2		Between live portions at system voltage and earth mm	>2 700	
20,3		Lowest point of insulation above ground level not to be less than mm	2 500	
21		Miscellaneous		
21,1	4.2.1	Mass details		
21,2		Complete disconnecter without earthing switch	kg	
21,3		Complete disconnecter with single earthing switch	kg	
21,4		Complete disconnecter with double earthing switch	kg	
21,5		Separate earthing switch	kg	
22		Protection of housing and mechanism boxes		
22,1		International Protection rating	IP55	
22,2		Material type	316 stainless steel	
23		Cubicle heating and ventilation		

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF NRS 003	DESCRIPTION	SCHEDULE A	SCHEDULE B
23,1		· Electrical heating		
23,2		Supply voltage, 50 Hz V	230	
23,3		Power rating W	xxxxxxxxxx	
24		· Secondary terminals, gland plate and cable connections		
24,1		· Terminal type	Spring loaded	
24,2		· Manufacturer		
24,3		· Undrilled gland plate of minimum usable mm area	100 x 50	
24,4		· Control cable type used by Eskom	PVC SWA	
24,5		· Minimum distance between terminal board mm and gland plate	150	
25		· Supporting structures to be provided	No, unless part of construction	
26		· Testing authority certificates held to prove all ratings	Yes and must be less than 7 years old	
27		· Number of complete sets of instruction manuals and routine test results to be supplied with each equipment	One per equipment supplied in weather protective envelop inside mechanism door	
28		Number of complete sets of instruction manuals to be supplied on award of contract	5	
29		· Terminal mechanical loading		
29,1		· Maximum continuous loading:		
29,2		Horizontal kN	xxxxxxxxxx	
29,3		30° to horizontal kN	xxxxxxxxxx	
29,4		60° to horizontal kN	xxxxxxxxxx	
30		Documentation (to be submitted with tender)		
		Note: All documentation to be provided in electronic format.		
30,1		· Type test certificates Sets	1	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF NRS 003	DESCRIPTION	SCHEDULE A	SCHEDULE B
30,2		· Outline drawings of disconnectors Sets	1	
30,3		· Wiring diagrams Sets	1	
30,4		· Operation and maintenance manuals Sets	1	

Table 30: Deviations Schedule – MV Outdoor disconnectors 22 kV 2500A hand operated disconnectors

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 the specification.		
Item	Sub-clause	Proposed deviation

T2.2 RETURNABLE SCHEDULES

TSE25 - OUTDOOR HV SWITCHGEAR (CIRCUIT BREAKER)

- 132 kV circuit breaker for use in very heavily polluted conditions (31 mm / kV) in accordance with Eskom 240-56063756.
- 22 kV outdoor kiosk for use in very heavily polluted conditions (31 mm / kV) in accordance with Eskom 240-66581487 (Combi-unit, not “dog-box”).

Table 31: SAP: 0218735 BKR 132kV 3150A 40kA 3P 110VDC 31

ITEM	CLAU SE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
1		Item and system description			
		BKR 132kV 3150A 40kA 3P 110VDC 31			
1.1		· SAP No		0218735	xxxxxxxxxx
1.2		· Buyers Guide Drawing		D-DT-6250	xxxxxxxxxx
1.3	5.3	· Circuit-breaker application		General-purpose	xxxxxxxxxx
1.4	4.1	· Nominal system voltage (U_n)	kV	88&132	xxxxxxxxxx
1.5		· System voltage range	pu	0,9 to 1,1	xxxxxxxxxx
1.6	5.1.2	· System earthing (effective/non effective)		Non-effective	xxxxxxxxxx
2		Ratings			
2.1	4.1	· Rated voltage (U_i)	kV	145	
2.2	4.1	· Number of phases		3	
2.3	4.2	· Rated short-duration power-frequency withstand voltage (U_d)	kV	275	
2.4	4.2	· Rated peak lightning impulse withstand voltage (U_p)	kV	650	
2.5	4.3	· Rated frequency (f_i)	Hz	50	
2.6	4.4	· Rated normal current (I_r) - main circuit	A	3150	
2.7	4.4	· Calculated maximum continuous current - main circuit @ 40 °C ambient	A	xxxxxxxxxx	
2.8	4.4	· Calculated maximum continuous current - main circuit @ 45 °C ambient	A	xxxxxxxxxx	
2.9	4.4	· Maximum allowable temperature of main contacts (refer to Table 3 of SANS 62271-1)	°C	xxxxxxxxxx	
2.10	4.4	· Measured temperature rise (highest) of main contacts @ rated current (type test)	K	xxxxxxxxxx	
2.11	4.4	· Maximum allowable temperature of bolted or equiv connections (refer to Table 3 of SANS 62271-1)	°C	xxxxxxxxxx	
2.12	4.4	· Measured temperature rise (highest) of bolted or equiv connections @ rated current (type test)	K	xxxxxxxxxx	
2.13	4.4	· Maximum allowable temperature of terminals for the connection to external conductors (refer to Table 3 of SANS 62271-1)	°C	xxxxxxxxxx	
2.14	4.4	· Measured temperature rise (highest) of terminals for the connection to external conductors @ rated current (type test)	K	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
2.15	4.5	Rated short-time withstand current (I_k and I_{ke})	kA	40	
2.16	4.6	Rated peak withstand current (I_p and I_{pe})	kA	100	
2.17	4.7	Rated duration of short circuit (t_k)	s	3	
2.18	4.8	Rated d.c. supply voltage of closing and opening devices and of auxiliary and control circuits (U_a)	V	110	
2.19	4.8	Rated a.c. supply voltage of heaters and other a.c. auxiliary circuits (U_a)	V	230	
2.20	4.9	Rated supply frequency of closing and opening devices and of auxiliary and control circuits	Hz	d.c.	
2.21	4.9	Rated supply frequency of heaters and other a.c. auxiliary circuits	Hz	50	
2.22	4.101.1	Rated short-circuit breaking current (I_{sc}) of circuit-breaker	kA	40	
2.23	4.101.2	Factor by which the 100 % symmetrical and asymmetrical single-phase rated short-circuit breaking current exceeds the three-phase rating	kA	xxxxxxxxxx	
2.24	4.102	Circuit-breaker class		N/A	
2.25	4.102	First-pole-to-clear factor (k_{pp}) for circuit-breaker		1,5	
2.26	4.102	Standard values of TRV related to the rated short-circuit breaking current (SANS 62271-100)		SANS 62271-100 Table 4	
2.27	4.103	Rated short-circuit making current of circuit-breaker	kA	100	
2.28	4.104	Rated operating sequence for circuit-breaker		O-0,3s-CO-3m-CO (all poles)	
2.29	4.104	Minimum resting time following rated operating sequence	min	xxxxxxxxxx	
2.30	4.105	Characteristics for short-line faults		SANS 62271-100 4.105 for Class S2 circuit-breakers only	
2.31	4.106	Rated out-of-phase making and breaking current for circuit-breakers	kA	xxxxxxxxxx	
2.32	4.107	Classification of circuit-breaker according to its restrike performance (line- and cable-charging breaking current)		Class C2	
2.33	4.107	Rated capacitive switching currents for circuit-breaker - line-charging breaking current	A	50	
2.34	4.107	Rated capacitive switching currents for circuit-breaker - cable-charging breaking current	A	160	
2.35	4.107	Classification of circuit-breaker according to its restrike performance (capacitor bank switching)		xxxxxxxxxx	
2.36	4.107	Rated capacitive switching currents for circuit-breaker - single capacitor bank breaking current	A	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION			SCHEDULE A	SCHEDULE B
2.37	4.107	·	Rated capacitive switching currents for circuit-breaker - back-to-back capacitor bank breaking current	A	xxxxxxxxxx	
2.38	4.107	·	Rated capacitive switching currents for circuit-breaker - back-to-back capacitor bank inrush making current	kA	xxxxxxxxxx	
2.39	4.108	·	Chopping number of the circuit-breaker	λ	xxxxxxxxxx	
2.40	4.109	·	Rated opening time for circuit-breaker	ms	xxxxxxxxxx	
2.41	4.109	·	Rated break-time for circuit-breaker	ms	xxxxxxxxxx	
2.42	4.109	·	Rated closing time for circuit-breaker	ms	xxxxxxxxxx	
2.43	4.109	·	Rated open-close time for circuit-breaker	ms	xxxxxxxxxx	
2.44	4.109	·	Rated reclosing time for circuit-breaker	ms	xxxxxxxxxx	
2.45	4.109	·	Rated close-open time for circuit-breaker	ms	xxxxxxxxxx	
2.46	4.109	·	Rated pre-insertion time for circuit-breaker	ms	xxxxxxxxxx	
2.47	4.110	·	Circuit-breaker mechanical endurance class		Class M2	
2.48	4.110	·	Number of mechanical operations for circuit-breaker		10000	
2.49	4.111	·	Classification of circuit-breakers as a function of electrical endurance		N/A	
3	5.1		Service conditions			
3.1	5.1.1	·	Location (indoors/outdoors)		Outdoors	
3.2	5.1.1	·	Ambient air temperature range	°C	-10 to +40	
3.3	5.1.1	·	Solar radiation	W/m ²	up to 1100	
3.4	5.1.1	·	Altitude (amsl)	m	up to 1800	
3.5	5.1.1	·	Class of pollution (SANS 60815-1:2009)		Very heavy ('e')	
3.6	5.1.1	·	Average humidity	%	up to 95	
3.7	5.1.1	·	Wind speed	m/s	up to 34	
3.8	5.1.1	·	Condensation and precipitations		Yes	
3.9	5.1.1	·	Seismic activity	g	0,3	
4	5.2		General			
4.1	5.2.1	·	Circuit-breaker compliant to SANS 62271-100		Yes	
4.2	5.2.2	·	Circuit-breaker design (live-tank / dead-tank)		Live-tank	
4.3		·	Circuit-breaker manufacturer		xxxxxxxxxx	
4.4		·	Circuit-breaker country of origin		xxxxxxxxxx	
4.5		·	Circuit-breaker model/type designation		xxxxxxxxxx	
4.6		·	Circuit-breaker total mass	kg	xxxxxxxxxx	
4.7	5.2.3	·	CTs required		No	
4.8			- CT manufacturer		N/A	
4.9			- CT country of origin		N/A	
4.10	5.2.4	·	Support structure design		2 column support with common base frame	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
4.11	5.2.4	- Steel support structure to be supplied with circuit-breaker	Y/N	No	
4.12	5.2.5.1	- Circuit-breaker pole operation		3-pole operated (3P)	
4.13	5.2.5.2	- Stored energy operation for circuit-breaker mechanism		Yes	
4.14	5.2.5.2	- Energy storage device		Spring	
	5.2.5.2	NOTE: When a feeder circuit-breaker is in the closed position and the spring has been charged, it shall be able to "TRIP-CLOSE-TRIP" before the spring needs to be recharged			
4.15	5.2.5.2	- Manual and motorised spring charging		Yes	
4.16	5.2.5.2	- Manual and electric energy release		Yes	
4.17	5.2.5.2	- Mechanical energy stored in charged spring	kJ	xxxxxxxxxx	
4.18	5.2.5.2	- Mechanical device provided to prevent over-charging of the closing spring for manual charging		Yes	
4.19	5.2.5.3	- Safe conditions produced in the case of failure to latch		Yes	
4.20	5.2.6	- Circuit-breaker interrupting technology (Vacuum/SF ₆)		Vacuum/SF ₆	
4.21	5.2.6	- Type of interrupter design (puffer, self-blast, etc.)		xxxxxxxxxx	
4.22	5.2.6	- Configuration of moving contacts (single, double or triple motion)		xxxxxxxxxx	
4.23	5.2.7	- Minimum expected life-span of circuit-breaker	years	> 30	
5	5.3	Construction requirements			
	5.3.1	Design and layout of the circuit-breaker :			
5.1		- standardised circuit-breaker elements to maximise interchangeability	Y/N	Yes	
5.2		- modular, pre-assembled elements shall be designed to facilitate handling and installation	Y/N	Yes	
5.3		- designed to facilitate ease of construction and maintenance	Y/N	Yes	
5.4		- SF ₆ filter material housing located to provide easy access during maintenance	Y/N	Yes	
6	5.4	Circuit-breaker operating mechanism enclosure requirements			
6.1	5.4.1	Operating mechanisms, local control facilities and all parts requiring lubrication protected by weatherproof enclosures	Y/N	Yes	
6.2	5.4.1	- degree of protection for enclosures containing exposed bearings, auxiliary switches, motors and other electrical devices	IP	IP 55	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
6.3	5.4.1	- degree of protection for all open areas in the circuit-breaker common base frame as well as externally mounted indicating devices (where applicable)	IP	IP 2X	
6.4	5.4.1	- degree of protection for all other enclosures	IP	IP 54	
6.5	5.4.2	Operating mechanism enclosure material		3CR12 / Stainless steel	
6.6	5.4.2	Operating mechanism enclosure corrosion protection in accordance with 5.6 of DSP 32-1166	Y/N	Yes	
6.7	5.4.3	Operating mechanism enclosures arranged to facilitate easy access from all sides	Y/N	Yes	
6.8	5.4.3	- all fastenings compliant with ESP 32-1166	Y/N	Yes	
6.9	5.4.4	Circuit-breaker designed for operation from the front of the operating mechanism enclosure	Y/N	Yes	
6.10	5.4.5	Access to the operating mechanism controls, LV terminals strips etc. provided through hinged front access door	Y/N	Yes	
6.11	5.4.6	Maximum height to top of mechanism enclosure equipment requiring access	mm	2000	
6.12	5.4.7	Front access door secured with a heavy-duty locking mechanism	Y/N	Yes	
6.13	5.4.8	Padlocking facility shackle diameter	Y/N	6	
6.14	5.4.9	Front access door equipped with travel stop	Y/N	Yes	
6.15	5.4.10	Steel documentation pocket provided on inside of front access door	Y/N	Yes	
6.16	5.4.11	Facilities provided for securing operating tools on inside of front access door	Y/N	Yes	
6.17	5.4.12	Earthing of operating mechanism enclosure in accordance with ESP 32-1166	mm	Yes	
6.18	5.4.13	Provision for bottom entry of all control cabling into operating mechanism enclosure	Y/N	Yes	
6.19	5.4.14	Metallic cable racking provided for inter-pole cabling?	Y/N	No	
6.20	5.4.15	Upper surfaces of enclosure shaped/sloped to prevent the accumulation of water	Y/N	Yes	
6.21	5.4.16	Gasket material offered		Neoprene / Heavy-duty foam-plastic	
6.22	5.4.17	Gauze-covered drain hole provided (> 25 mm)	Y/N	Yes	
6.23	5.4.18	Enclosure lifting eyes provided		Top	
6.24	5.4.19	Enclosure colour		Light grey (G29)	
7	5.5	Circuit-breaker supporting structure			
	5.5.1	Mechanical loads and parameters relating to the design of the circuit-			

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
		breaker support structure and foundation			
7.1	5.5.1	- "static" dead weight of the circuit-breaker	N	XXXXXXXXXX	
7.2	5.5.1	- rated "static" terminal force F_{shA} of the circuit-breaker due to connected conductors	N	XXXXXXXXXX	
7.3	5.5.1	- rated "static" terminal force F_{shB} of the circuit-breaker due to connected conductors	N	XXXXXXXXXX	
7.4	5.5.1	- rated "static" terminal force F_{sv} of the circuit-breaker due to connected conductors	N	XXXXXXXXXX	
7.5	5.5.1	- "dynamic" horizontal force exerted during operation on the foundation	N	XXXXXXXXXX	
7.6	5.5.1	- "dynamic" vertical force exerted during operation on the foundation	N	XXXXXXXXXX	
7.7	5.5.1	- "dynamic" moment (torque) exerted during operation about the foundation	Nm	XXXXXXXXXX	
7.8	5.5.1	- "dynamic" horizontal force exerted between circuit-breaker poles (centre phase interrupter chamber) during a rated (terminal fault) short-circuit	N	XXXXXXXXXX	
7.9	5.5.1	- wind force (load) exerted on the circuit-breaker	N	XXXXXXXXXX	
7.10	5.5.1	- maximum torque required for the foundation holding down bolt nuts	Nm	XXXXXXXXXX	
7.11	5.5.2	Circuit-breaker steel support structure to be designed by manufacturer	Y/N	No	
7.12	5.5.2	Circuit-breaker concrete foundation to be designed by manufacturer	Y/N	No	
7.13	5.5.3	Common base frame supplied with circuit-breaker ($U_n \leq 132$ kV)	Y / N / N/A	Yes	
7.14	5.5.3 / 5.5.4	Circuit-breaker designed to interface with the standard Eskom steel support structure	Y/N	Yes	
7.15	5.5.3 / 5.5.4	Circuit-breaker support structure designed to interface with the standard Eskom concrete foundation	Y/N	Yes	
7.16	5.5.3 / 5.5.4	Circuit-breaker steel support structure drawing		D-DT-5200 Sh 2	
7.17	5.5.3 / 5.5.4	Circuit-breaker concrete foundation drawing		D-DT-5200 Sh 1	
7.18	5.5.5	Surge arrester mounting brackets supplied and fitted	Y/N	No	
8	5.6	Corrosion protection and lubrication			
8.1	5.6.1	Corrosion specification		DSP 34-1658	
8.2	5.6.1	Corrosivity rating of environment		"high" to "very high"	XXXXXXXXXX
8.3	5.6.2	Minimum detailed specification number for exposed metal	DS	DS-11	XXXXXXXXXX
8.4	5.6.3	- Equivalent detailed specification number offered for operating mechanism enclosures	DS	XXXXXXXXXX	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
8.5	5.6.3	- Equivalent detailed specification number offered for all bolts, nuts and washers	DS	xxxxxxxxxx	
8.6	5.6.3	- Equivalent detailed specification number offered for all structural steel	DS	xxxxxxxxxx	
8.7	5.6.3	- Equivalent detailed specification number offered for all other exposed metal (excluding main terminals)	DS	xxxxxxxxxx	
8.8	5.6.4	Details of lubricants provided with tender documentation	Y/N	Yes	
8.9	5.6.5	Details of flange arrangements, treatments to prevent flange corrosion provided with tender		Yes	
9	5.7	Circuit-breaker operating mechanism enclosure heaters			
9.1	5.7.1	Heater size offered	Watt	xxxxxxxxxx	
9.2	5.7.4	Heater control circuit specification		DST 34-1692	
10	5.8	Terminal requirements			
10.1	5.8.1.1	HV main terminal type: "Flat pad" / "Stem"		Flat pad	
10.2	5.8.1.1.1	Flat pad details:			
10.3	5.8.1.1.1	- Number of holes and pitch	mm	8 x 50	
10.4	5.8.1.1.1	- Thickness (min)	mm	20	
10.5	5.8.1.1.1	- Material		Aluminium	
10.6	5.8.1.1.2	Stem details:			
10.7	5.8.1.1.2	- Diameter	mm	N/A	
10.7	5.8.1.1.2	- Length (min)	mm	N/A	
10.9	5.8.1.1.2	- Material		N/A	
10.10	5.8.1.4	HV main terminals removable without interfering with operation of circuit-breaker	Y/N	Yes	
	5.8.2	Earthing terminals			
10.11	5.8.2.1	- Earthing of circuit-breaker via steel support structure and foundation holding down bolts	Y/N	Yes	
10.12	5.8.2.1	- Additional conductor provided between the circuit-breaker and the support structure	Y/N	xxxxxxxxxx	
10.13	5.8.2.1	- Material		xxxxxxxxxx	
10.14	5.8.2.2	- Additional Ø18 mm hole provided at bottom of steel support structure		N/A	
11	5.9	Safety clearances and personnel safety			
11.1	5.9.1	Live parts isolated by means of elavation	Y/N	Yes	
11.2	5.9.2	Electrical working clearance (min)	mm	3950	
11.3	5.9.3	Distance from lowest part of any high-voltage insulation above ground	mm	2500	
11.4	5.9.4/5.9.5	Type of pressure relief devices provided		xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
12	5.10	Insulation requirements			
	5.10.1	·	Hollow insulators		
12.1	5.10.1.1		- Insulator material	Silicone rubber composite	
12.2	5.10.1.1		- Insulator manufacturer	xxxxxxxxxx	
12.3	5.10.1.2		- Ceramic type insulators in accordance with SANS 62155 and SANS 60815-2	N/A	
12.4	5.10.1.3		- Silicone rubber composite type insulators in accordance with SANS 61462 and SANS 60815-3	Yes	
12.5	5.10.1.4		- Circuit-breaker tested at KIPTS	Yes	
	5.10.2	·	Minimum insulation creepage distances (SANS 60815-1)		
12.6	5.10.2.1/2		- Minimum external unified specific creepage distance	mm/kV	53,7
	5.10.3	·	Clearances in air		
12.7	5.10.3.1		- Phase to phase clearance in air	mm	xxxxxxxxxx
12.8	5.10.3.1		- Phase to earth clearance in air	mm	xxxxxxxxxx
13	5.11	Position / status indication			
		·	Circuit-breaker position indication		
13.1	5.11.1		- Position indication to SANS 62271-1	Yes	
13.2	5.11.1		- Position indication visible with operating mechanism enclosure front access door closed	Yes	
13.3	5.11.2		- Closed position: "I" in white lettering on a red background	Yes	
13.4	5.11.2		- Open position: "O" in white lettering on a green background	Yes	
13.5	5.11.3		- Lettering (symbol) size (min)	mm	30
		·	Closing spring status indication		
13.6	5.11.4		- Status indicated by "SPRING CHARGED" and "SPRING DISCHARGED"	Yes	
13.7	5.11.4		- Lettering size (min)	mm	15
13.8	5.11.5	·	Type of non-resettable circuit-breaker operation counter offered	Mechanical / electrical	
13.9	5.11.6	·	SF ₆ pressure gauge provided (compensated for temperature and responding to SF ₆ gas density) - where applicable	Yes	
13.10	5.11.6	·	SF ₆ pressure gauge sheltered from the elements - where applicable	Yes	
14	5.12	Labels			
	5.12.1	·	Operating labels		
14.1			- Instructions for tripping and closing the circuit-breaker	N/A	
14.2			- Instructions for charging closing springs	N/A	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
14.3	5.12.2	·	Actuator(s) for local opening and closing of the circuit-breaker labelled in accordance with ESP 32-1166	Yes	
14.4	5.12.3 / 5.12.4	·	Warning labels for manual operation	Yes	
	5.12.5	·	Function labels		
14.5			- Function labels provided to identify all LV equipment	Yes	
14.6			- Function label text height (min)	5	
14.7	5.12.6	·	Labels manufactured to DSP 34-1513	Yes	
15	5.13		Requirements for sulphur hexafluoride (SF₆) gas (where applicable)		
15.1	5.13.1	·	SF ₆ in accordance with IEC 60376	Yes	
15.2	5.13.3	·	The maximum SF ₆ gas leakage rate	0,5 / year	
	5.13.4	·	SF ₆ gas purity		
15.3			- SF ₆ content	>98	
15.4			- Dew point at rated filling pressure	>-30	
	5.13.5	·	SF ₆ gas-filled circuit-breaker filling and pressure monitoring		
15.5			- central gas/filling evacuation point connection provided	DILO DN8	
15.6			- height of gas filling/evacuation point above ground (max)	2250	
15.7			- gas filling point and the gas pressure gauge separated	Y/N	Yes
15.8			- dial type gauge responding to SF ₆ density and indicating pressure compensated for temperature provided	Y/N	Yes
15.9			- SF ₆ density monitoring device (density switch) contact requirements	D-DT-5407	
15.10			- SF ₆ density monitoring device suitable for outdoor operation	Y/N	Yes
15.11			- method/system used to prevent corrosion of moving parts and contacts	xxxxxxxxxx	
15.12			- SF ₆ density monitoring device shielded against direct sunshine	Y/N	Yes
15.13			- non-return valves fitted on all DN8/DN20 fittings and pipe work to allow removal of poles and/or density monitoring device while maintaining system pressure	Y/N	Yes
15.14			- details of arrangement offered supplied with tender documentation	Y/N	Yes
15.15			- pipe work material		S/Steel / Cu
15.16			- separate/common SF ₆ filling/evacuating and SF ₆ density monitoring point per pole provided		Common
15.17			- type of electrical connections to the density-monitoring device		xxxxxxxxxx

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
15.18		- cabling protected using compression glands/grommets	Y/N	Yes	
15.19		- details of all pressure devices provided with tender documentation	Y/N	Yes	
15.20		- gas density monitoring device electrical interlocks and alarm requirements		DST 34-1692	
15.21	5.13.8	Management of SF ₆ gas in accordance with NRS 087	Y/N	Yes	
16	5.14	Current Transformers			
16.1	5.14.1	Type of CT design		N/A	
16.2	5.14.1	CT specification		N/A	
16.3	5.14.2	Number of cores		N/A	
16.4	5.14.2	CT specification (drawing number)		N/A	
16.5	4.7	Rated short-time withstand current - magnitude	kA	N/A	
		Rated short-time withstand current - duration	s	N/A	
16.6	5.14.2	Position relative to the circuit-breaker		N/A	
16.7	5.14.3	Terminal numbering and wiring interface (drawing number)		N/A	
		Protection current transformers:			
16.8	5.14.2	a) cores		N/A	
16.9	5.14.2	b) class		N/A	
16.10	5.14.2	c) ratios	A	N/A	
		Bus-zone current transformers:			
16.11	5.14.2	a) cores		N/A	
16.12	5.14.2	b) class		N/A	
16.13	5.14.2	c) ratios	A	N/A	
		Measurement current transformers:			
16.14	5.14.2	a) cores		N/A	
16.15	5.14.2	b) class		N/A	
16.16	5.14.2	c) burden	VA	N/A	
16.17	5.14.2	d) ratios	A	N/A	
16.18	5.14.5	Cross-section of Cu conductors between post-type CT and circuit-breaker (where applicable)	mm ²	N/A	
16.19	5.14.5	Post-type CT main terminals in accordance with 5.8.1 provided (where applicable)		N/A	
16.20	5.14.7	Ring-type CTs interchangeable without dismantling the bushing (where applicable)		N/A	
17	5.15	Switching surge control (where applicable)			
17.1	5.15.1	Pre-insertion closing resistor offered	Y/N	xxxxxxxxxx	
17.1	5.15.1	Pre-insertion closing resistor resistance	Ω	xxxxxxxxxx	
17.2	5.15.2	Controller offered for switching of capacitor banks, reactor banks and transformers	Y/N	xxxxxxxxxx	
17.3	5.15.2	Metal oxide surge arresters offered	Y/N	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
18	5.16	Grading capacitors (where applicable)			
18.1	5.16.1	· Grading capacitors required	Y/N	xxxxxxxxxx	
18.2	5.16.1	· Grading capacitor capacitance	pF	xxxxxxxxxx	
18.3	5.16.2	· Details of how to verify condition of grading capacitors during the life of the circuit-breaker provided with the tender documentation	Y/N	Yes (where applicable)	
19	5.17	Extreme asymmetrical short-circuit interrupting capability (where applicable)			
19.1	5.17	· Circuit-breaker required to interrupt short-circuit currents with a higher degree of asymmetry than required by SANS 62271-100	Y/N	No	
19.2	5.17	· Proof of higher asymmetrical interrupting capability provided with tender documentation	Y/N	Yes (where applicable)	
20	5.18	Requirements for simultaneity of poles during single closing and single opening operations			
20.1	5.18	· Contact synchronism retained within rated values during the expected maintenance interval of circuit-breaker	Y/N	Yes	
20.2	5.18	- time interval between contact touch for all poles of the circuit-breaker	ms	< 5	
20.3	5.18	- time interval between contact touch for interrupters in the same pole	ms	< 1	
20.4	5.18	- time interval between contact touch for individual closing resistors - where applicable	ms	< 10	
20.5	5.18	- time interval between contact touch for individual closing resistors in the same pole (series connected) - where applicable	ms	< 6,6	
20.6	5.18	- time interval between contact separation for all poles of the circuit-breaker	ms	< 3,3	
20.7	5.18	- time interval between contact separation for interrupters in the same pole	ms	< 1	
21	5.19	Controlled switching			
21.1	5.19	· All information and details provided with the tender documentation	Y/N	Yes	
22	5.20	Pole discordance (PD) or phase discrepancy			
22.1	5.20	· All information and details provided with the tender documentation	Y/N	Yes	
23	5.21	Auxiliary and control circuits			
23.1	5.21.1	· Auxiliary and control circuit requirements		DST 34-1692	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
		Auxiliary power supplies:			
23.2		- Provision		On site by Eskom	
23.3		- Peak power requirement (max)	VA	xxxxxxxxxx	
23.4		- Standby power requirements	VA	xxxxxxxxxx	
		Circuit-breaker spring-charging motor control circuit (per mechanism):			
23.5		- d.c. supply voltage range of operation	%	85 to 110	
23.6		- d.c. current (peak starting)	A	< 30	
23.7		- d.c. current (max continuous)	A	< 10	
23.8		- total time taken to charge spring	s	< 10	
23.9		- method offered for protection against continual motor running (over-run)		xxxxxxxxxx	
23.1		- automatic charging of closing spring		Yes	
23.11		- number of spare contacts of SLS provided		D-DT-5407	
		Circuit-breaker closing control circuit (per mechanism):			
23.12		- d.c. supply voltage range of operation	%	85 to 110	
23.13		- d.c. power (peak)	W	≤ 500	
23.14		- number of close coils required		1	
23.15		- close coil current	A	xxxxxxxxxx	
23.16		- close coil resistance @ 20°C	Ω	xxxxxxxxxx	
		Circuit-breaker tripping control circuit (per mechanism):			
23.17		- d.c. supply voltage range of operation	%	70 to 110	
23.18		- d.c. power (peak)	W	≤ 500	
23.19		- number of trip coils required		2	
23.2		- physically and electrically separate trip control circuits		Yes	
23.21		- trip circuit supervision		Yes	
23.22		- trip coils rated to carry 20mA d.c. continuously		Yes	
23.23		- trip coil current	A	xxxxxxxxxx	
23.24		- trip coil resistance @ 20°C	Ω	xxxxxxxxxx	
23.25		Circuit-breaker equipped with anti-pumping circuitry		Yes	
23.26		d.c. isolation switch provided		Yes	
23.27		Circuit-breaker control circuit interlocks specification		DST 34-1692	
23.28		Circuit-breaker alarm circuits wiring specification		DST 34-1692	
		Auxiliary contacts provided (spare for Eskom use):			
		Duty rating			
23.29		- a.c. and d.c. supply current	A	10	
23.30		- N/O and N/C contact reference positions		Circuit-breaker opened, spring discharged, gas low, relay coils de-energised	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
		Low gas alarm			
23.31		- N/O		0	
23.32		- N/C		2	
		Low gas block contacts			
23.33		- N/O		0	
23.34		- N/C		2	
		Spare circuit-breaker auxiliary switch contacts (per mechanism)			
23.35		- N/O		4	
23.36		- N/C		4	
		Spare circuit-breaker spring limit switch contacts (per mechanism)			
23.37		- N/O		3	
23.38		- N/C		3	
		· Terminal blocks and terminal strips:			
23.39		- Number of spare terminals provided		≥ 6	
23.4		- Terminal blocks to DSP 34-253, screw clamp, spring-loaded insertion type		Yes	
23.41		- Terminal block width offered	mm	≥ 8	
23.42		- Make of terminal block offered		xxxxxxxxxx	
23.43		· Lugs (insulated hook blade type)		Crimped	
23.44		· Earth sliding link types/equivalents		Weidmuller TVP SAKA 10	
23.45		· Trunking provided on both sides of each terminal strip		Yes	
23.46		· 'Fine-tooth' trunking tooth width	mm	6,1	
23.47		· Trunking size	mm	60 x 60	
		· Wiring size:			
23.48		- CT and motor control circuit wires	mm ²	2,5	
23.49		- Control and other auxiliary wires	mm ²	1,5	
23.5		- Minimum number of strands		7	
		· Wiring colour:			
23.51		- CT wires		red/white/blue/black	
23.52		- Earth wires		green/yellow	
23.53		- All other wires		grey	
23.54		· Wiring identification		Ferruling	
23.55		· Terminal strips numbered and designated as per drawing		D-DT-5407	
		· LV MCBs:			
23.56		- MCBs to SANS 60947-2 and IEC 60898		Yes	
23.57		- Make and type offered		xxxxxxxxxx	
23.58		- I _{cu}	kA	xxxxxxxxxx	
23.59		- I _{cs}	kA	xxxxxxxxxx	
23.6		- Utilisation category (SANS 60947-2)		'A'	
23.61		- Max service voltage	VA	xxxxxxxxxx	
23.62		- d.c. MCB rated voltage	V	≥ 250	
23.63		- Pollution degree (SANS 60947-2)		≥ 3	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
23.64		- Suitable for isolation (SANS 60947-2)		Yes	
23.65		- Protection curve (SANS 60947-2 / IEC 60898)		'C'	
23.66		- Location		Mechanism enclosure	
23.67	5.21.2	Circuit-breaker auxiliary and control circuit wiring interface (drawing number)		D-DT-5407	
23.68	5.21.3	Bottom entry removable brass/aluminium LV gland plates provided		Yes	
23.69	5.21.4	Terminal strips shall be arranged in a vertical orientation		Yes	
23.70	5.21.5	Earthing stud / terminals provided		Yes	
24	5.22	Nameplates			
		Nameplates provided for the following:			
24.1	5.22.1	- circuit-breaker (SANS 62271-100)	Y/N	Yes	
24.2	5.22.2	- circuit-breaker operating mechanism (SANS 62271-100)	Y/N	Yes	
24.2		- CT (SANS 60044-1 / NRS 029)	Y/N	N/A	
24.3	5.22.4	Method used to attach nameplates		xxxxxxxxxx	
24.4	5.22.4	Nameplate material offered		xxxxxxxxxx	
24.5	5.22.5	Duplicate nameplates provided for CTs on inside of operating mechanism enclosure front access door	Y/N	N/A	
25	5.23 / 8.3	Tools and spares			
		Tools to be supplied with circuit-breaker (minimum requirements):			
25.1	5.23.1	- full set of operating tools (provide list on separate sheet provided)	Sets	1 set per circuit-breaker	
25.2	5.23.2	- tools fitted on inside of the front access door	Y/N	Yes	
25.3	5.23.3	Standard tools available for minor maintenance (provide list on separate sheet provided)	Y/N	Yes	
25.4	5.23.4	Specialised tools available for major maintenance purposes (provide list on separate sheet provided)	Y/N	Yes	
25.5	5.23.5 / 8.3	Spares available for maintenance (provide list on separate sheet provided)	Y/N	Yes	
26	5.24	Documentation			
		Note: All tender documentation to be provided in electronic format.			
	5.24.1	Documentation to be supplied with tender:			
26.1		- GA drawing (provide drawing number on separate sheet provided)	Sets	1	
26.2		- Drawing of all insulators used in the circuit-breaker (provide drawing number on separate sheet provided)	Sets	1	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
26.3		- Generic layout of nameplates (provide drawing number on separate sheet provided)	Sets	1	
26.4		- Generic auxiliary and control circuit schematic wiring diagram (provide drawing number on separate sheet provided)	Sets	1	
26.5		- GA drawing of the operating mechanism enclosure	Sets	1	
26.6		- list of spare parts with prices for each circuit-breaker offered (provide list on separate sheet provided)	Sets	1	
26.7		- list of all operating tools for each circuit-breaker offered (provide list on separate sheet provided)	Sets	1	
26.8		- list of all standard minor maintenance tools for each circuit-breaker offered (provide list on separate sheet provided)	Sets	1	
26.9		- list of all specialised major maintenance tools for each circuit- breaker offered (provide list on separate sheet provided)	Sets	1	
26.1		- full list as well as copies of type test certificates and reports (provide report numbers on separate sheet provided)	Sets	1	
26.11		- generic routine test certificates for each circuit-breaker	Sets	1	
26.12		- transport, storage, installation, operating and maintenance manuals	Sets	1	
26.13		- training material	Sets	1	
26.14		- all other relevant additional information requested	Sets	1	
	5.24.2	Documentation to be supplied with each circuit- breaker:			
26.15		- Schematic wiring diagram for circuit-breaker	Sets	1	
26.16		- Complete set of routine test certificates for circuit-breaker	Sets	1	
26.17		- Commissioning and hand-over test sheet	Sets	1	
26.18		- Transport, storage, installation, operating and maintenance manuals	Sets	1	
26.19	5.24.4	Submission of documentation requested upon awarding of contract	Y/N	Yes	
26.19		Units used in Republic of South Africa		In tender/offer	
26.20		Project reference list, service to Eskom		In tender/offer	
27	5.25	Packaging requirements			
27.1	5.25.1	Each individual circuit-breaker unit packed	Y/N	Yes	
27.2	5.25.2	Containers (e.g. wooden crates) suitable for transport and storage over long periods (for up to 18 months)	Y/N	Yes	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE OF 240- 56063756	DESCRIPTION		SCHEDULE A	SCHEDULE B
27.3	5.25.3	·	Packaging designed prevent damage to components during transportation and storage on site	Y/N	Yes
27.4	5.25.3	·	Suitable ventilation provided to minimise condensation	Y/N	Yes
27.5	5.25.4	·	Packaging able to withstand impact loadings of at least 18 kN	Y/N	Yes
27.6	5.25.5	·	Each crate clearly and sequentially marked	Y/N	Yes
27.7	5.25.6	·	Each container/crate clearly marked with a durable label using an indelible font with all specified information in ESP 32-1166	Y/N	Yes
27.8	5.25.7	·	Exposed shafts, bearings and machined surfaces treated with a temporary anti-corrosive coating	Y/N	Yes
27.9	5.25.8	·	Loose components or components that are subject to damage from exposure to dust or water packed in hermetically sealed plastic bags	Y/N	Yes
27.10	5.25.9	·	All components clearly marked	Y/N	Yes
27.11	5.25.10	·	Fork-lift lifting points provided on the packaging - where applicable	Y/N	Yes
27.12	5.25.11	·	External temporary 230 V a.c. connection point for the heater circuit provided	Y/N	Yes
27.13	5.25.12	·	Non-resettable impact recorder/detector provided	Y/N	Yes
27.14	5.25.13	·	Circuit-breaker transported with a positive gas pressure of maximum 150 kPa - where applicable	Y/N	Yes
27.15	5.25.14	·	Copy of the BOM shall be provided with the delivery note	Y/N	Yes
28			Miscellaneous		
		·	General		
28.1			Guarantee period	Years	xxxxxxxxxx
28.2	8.3.2		Required period for spares availability	Years	25 years after discontinuation of switchgear
29			Training Requirements		
29.1		·	Training offered in accordance with DSP 34-2207	Y/N	Yes

T2.2 RETURNABLE SCHEDULES

TSE53 - VOLTAGE AND POWER VOLTAGE TRANSFORMERS

- 22kV Voltage Transformer for use in very heavily polluted conditions (31mm/kV) in accordance with Eskom specification 240-56062765.

Table 32: 22kV VT Technical Schedule

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
1	4.1	General requirements		
	4.1a)	Service conditions		
		a) Altitude m	1800	
		b) Climate conditions	Humid and salt air	
		c) Lightning area	Yes	
		d) Level of pollution that the equipment will be subjected to	Very heavy	
		When erection is not required:		
		a) Access to stores by	Road	
		b) To be off-loaded from transport by supplier?	No	
		When erection is required		
		a) Access to site by	Tar/Gravel road	
		b) To be off-loaded from transport by supplier?	Yes	
		c) Crane available for off-loading?	No	
		d) Distance from off-loading point to operation position m	100	
		e) Nature of ground to be traversed	Soft earth	
		f) Rise to fall m	3	
		g) Erection on prepared steel support structures	Yes	
		h) Construction power supply available	Yes	
		i) Is mounting structure to be provided by the supplier	No	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
2	4.1b)	System details		
		a) Outdoor use		
		b) Measuring or protection application Measuring / Protection		
		1) Rated burden per phase VA	50	
		2) Accuracy class	3P/0.2	
		Voltage transformer ratio: primary voltage secondary voltage kV V	22 /	
		c) Nominal system r.m.s. phase-to-phase voltage (Un) kV	22	
		d) Higher r.m.s. voltage phase-to-phase voltage of equipment (Um) kV	24	
		e) Number of phases	3	
		f) Rated frequency Hz	50	
		g) Method of earthing: effective or non- effective	Effective	
		h) 3 off single-phase voltage transformers	Yes	
		i) Power frequency short-duration withstand voltage kV (r.m.s.)	50 (min)	
		j) Lightning impulse withstand voltage kV (peak)	150 (min)	
	4.1	Is a power winding required?	No	
3	4.1c)	Type of voltage transformer offered	xxxxxxxxxx	
		a) Manufacturer of voltage transformer		
		b) Manufacturer type designation	xxxxxxxxxx	
		Creepage distance Minimum creepage distance for other than medium pollution (IEC 60815) mm/kV	31	
4	4.1.3	Insulation materials	xxxxxxxxxx	
		a) Outdoor type voltage transformers		
		1) Primary insulation medium		
		2) Secondary insulation medium	xxxxxxxxxx	
		3) Core insulation medium	xxxxxxxxxx	
		4) Main insulation (oil, gas or resin)	Oil	
5	4.1.4	Oil-insulated voltage transformers		

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
		Details to be supplied for approval		
		a) Sealing arrangement	XXXXXXXXXX	
		b) Oil-level indicators	XXXXXXXXXX	
	4.1.5	Dry-type insulation	N/A	
		Is the core included in the encapsulation?	N/A	
	4.1.6	Gas insulated voltage transformers	N/A	
		Method of sealing	N/A	
	4.2.1.2/3/4	Voltage factor	2.1	
		Time for voltage factor	Continuous	
	4.2.3.1/2	Are primary fuses required?	No	
	4.2.3.1/3	Is secondary protection required?	Yes	
		a) By means of fuses or MCCBs?	Fuses	
		b) Current rating A	32	
		c) Make and type of protection	XXXXXXXXXX	
	4.2.3.4	Short-circuit currents		
		d) Calculated secondary short-circuits current A	XXXXXXXXXX	
		e) Maximum permissible duration of secondary short-circuits current s	1	
		f) Operating time for secondary short-circuit s	XXXXXXXXXX	
		g) Calculated primary current for a secondary short-circuit assuming zero source impedance A	XXXXXXXXXX	
		h) Drawing showing method of mounting secondary fuses	XXXXXXXXXX	
	4.3.1	Windings and connections		
		Is a residual voltage winding required?	No	
		If yes,	N/A	
		a) Rated burden VA	N/A	
		b) Rated secondary voltage	N/A	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
		c) Are tapped windings for providing both rated secondary residual voltages required?	N/A	
	4.3.1.6	Details of primary winding neutral (earth) terminal	XXXXXXXXXX	
		a) Drawing number of magnetisation curve showing voltage/magnetising current for built up core	XXXXXXXXXX	
		b) Core steel details required	XXXXXXXXXX	
		1) B/H curve	XXXXXXXXXX	
		2) Core steel thickness mm	XXXXXXXXXX	
8	4.3.4	Secondary terminal box		
	4.3.4.1	Number of fuses	XXXXXXXXXX	
		Manufacturer of fuses	XXXXXXXXXX	
		Type of fuses	XXXXXXXXXX	
		Current rating of fuses A	XXXXXXXXXX	
		Diameter of secondary earthing terminal mm	XXXXXXXXXX	
	4.3.4.2	HV winding earth end to be brought out, with link to earth terminal	Yes	
	4.3.4.4	Dimension of terminal box		
		Length mm	XXXXXXXXXX	
		Height mm	XXXXXXXXXX	
		Depth mm	XXXXXXXXXX	
9	4.3.5	Mounting arrangement		
		Holding down bolts to be arranged to fall within a square of maximum dimensions. mm mm	706 × 706	
		Diameter of the hole to be mm	18	
10	4.3.6	Finish	No	
		Finish offered on ferrous parts	XXXXXXXXXX	
		Finish offered on non-ferrous parts	XXXXXXXXXX	
11	4.4	Primary terminals (Post-type voltage transformer)		
		Type of primary terminal	Stem	
		Material of primary terminal	XXXXXXXXXX	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
		Overall dimensions of primary terminal		
		Length mm	125	
		Diameter mm	26	
		Orientation	Vertical	
		Diameter of tank earthing terminal mm	xxxxxxxx	
13	4.3.2	Core material details and B/ H curve required with tender?	Yes	
14	4.7	Drawing numbers for post type voltage transformers Outline dimension	xxxxxxxx	
		Assembly	xxxxxxxx	
		Terminal box	xxxxxxxx	
		Terminal marking	xxxxxxxx	
		Rating plate	xxxxxxxx	
		Diagram plate	xxxxxxxx	
		Miscellaneous Oil quantity l	xxxxxxxx	
		a) Overall dimensions of voltage transformer		
		Height mm	xxxxxxxx	
		Length mm	xxxxxxxx	
		Width mm	xxxxxxxx	
		Total mass of voltage transformer kg	xxxxxxxx	
		Number of instruction books if other than three	6	
		Number of copies of routine test certificates	6	
		Storage for outdoor-type voltage transformers Guides on	xxxxxxxx	
		Storage	xxxxxxxx	
		Transportation	xxxxxxxx	
		Handling and slinging	xxxxxxxx	

T2.2 RETURNABLE SCHEDULES

ITEM	CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
17	4.8	Spare fuses	N/A	
18	5.1.1.1	Type tests Are type test results available?	xxxxxxxxxx	
		If No, are type tests to be performed?	Yes	
		If required where are type tests to be carried out?	xxxxxxxxxx	
19	5.2	Routine tests Is a tangent delta test required?	No	
	5.2.7.5	Test procedure for cast resin encapsulated voltage transformers	N/A	
		Marking/labelling/documentation Materials used for rating plates	xxxxxxxxxx	
		Material used for diagram plates	xxxxxxxxxx	
		Method of fixing diagram and rating plates	xxxxxxxxxx	

Table 33: 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 the specification.		
Item	Sub-clause	Proposed deviation

T2.2 RETURNABLE SCHEDULES

TSE56 - SURGE ARRESTORS

The general requirements for station class surge arresters are covered by Eskom specification 240-75540566.

- Station class surge arresters for a 22 kV system in accordance with Eskom specification DSP_34-419.
- Station class surge arresters for a 66 kV system in accordance with Eskom specification DSP_34-419.
- Station class surge arresters for an 132 kV system in accordance with Eskom specification DSP_34-419.

Table 34: Technical Schedule – 22 kV Surge Arrester

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	1. SURGE ARRESTER IDENTIFICATION		
	a) Supplier	xxxxxxxxxx	
	b) Manufacturer	xxxxxxxxxx	
	c) MOV block manufacturer	xxxxxxxxxx	
	d) Product code: Item 3 (Coastal)	xxxxxxxxxx	
	• Item 4 (Inland)	xxxxxxxxxx	
4.1	2. OPERATING CONDITIONS		
	a) Altitude m	up to 1800	xxxxxxxxxx
	b) Average humidity %	30 to 90	xxxxxxxxxx
	c) Minimum ambient temperature °C	–10	xxxxxxxxxx
	• Maximum ambient temperature °C	40	xxxxxxxxxx
	• Maximum diurnal variation °C	30	xxxxxxxxxx
	d) Intensity of solar radiation kW/m ²	1,1	xxxxxxxxxx
	e) IEC pollution level: Item 3 (Coastal)	HVH	xxxxxxxxxx
	• Item 4 (Inland)	LM	xxxxxxxxxx
	f) Lightning activity	High	xxxxxxxxxx
	g) System earthing	Non-effective	xxxxxxxxxx

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	h) System configuration	3-phase, 3-wire	xxxxxxxxxx
	i) Nominal system voltage (Un) kV	22	xxxxxxxxxx
	j) Maximum system voltage (Um) kV	24	xxxxxxxxxx
	k) Supply frequency Hz	50	xxxxxxxxxx
	l) BIL of equipment to be protected kV peak	150	xxxxxxxxxx
4.3	3. ELECTRICAL CHARACTERISTICS OF ARRESTER		
	a) Arrester classification	Station class	
	b) IEC line discharge class	2	
	c) Nominal lightning discharge current (8/20µs) kA	10	
	d) Minimum energy absorption capability for a single high current impulse, 100kA 4/10µs in per unit of MCOV kJ/kV	xxxxxxxxxx	
	e) Arrester rated voltage (Ur) kV	xxxxxxxxxx	
	f) MCOV (Uc) kV	24	
	g) Maximum residual voltage (Ures) at 10kA (8/20µs) kV	85	
4.4	4. ARRESTER HOUSING		
	a) Housing material		
	• Item 3 (Coastal)	xxxxxxxxxx	
	• Item 4 (Inland)	xxxxxxxxxx	
	b) Minimum external creepage distance:		
	• Item 3 (Coastal) [Um x 31 mm/kV] mm	372	
	• Item 4 (Inland) [Um x 20 mm/kV] mm	240	
4.4.3	5. ARRESTER HOUSING PROFILE DESIGN		
	IEC 60815 annex D parameters:		
	a) c	≥ 20	
	b) s/p	≥ 0,65	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	c) Ld/d	≤ 5	
	d) P1 – P2	≥ 15	
	e) CF	$\leq 3,5$	
	f) PF	$\geq 0,7$	
4.5	6. ARRESTER MOUNTING DETAILS		
	a) Orientation	Vertical	xxxxxxxxxx
	b) Method of mounting	Base	xxxxxxxxxx
	c) Reference number of drawing showing mounting details	xxxxxxxxxx	
4.6.1	7. ARRESTER LINE TERMINAL		
	a) Type	Threaded	
	b) Diameter	M12	
	c) Minimum length mm	50	
	d) Orientation	Vertical	
	e) Supplied with: M12 nut, two flat washers and spring washer	Yes	
	f) Material	xxxxxxxxxx	
	g) Reference number of drawing showing details of line terminal	xxxxxxxxxx	
4.6.2	8. ARRESTER EARTH TERMINAL		
	a) Type	Threaded	
	b) Diameter	M12	
	c) Minimum length mm	50	
	d) Orientation	Vertical	
	e) Supplied with nut, two flat washers and spring washer	Yes	
	f) Material	xxxxxxxxxx	
	g) Reference number of drawing showing details of line terminal	xxxxxxxxxx	
4.7.1	9. DRAWINGS TO BE SUBMITTED WITH TENDER		

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	Single copies of drawings shall be submitted as part of the original tender showing the following detail:		
	a) Outline dimensions of arrester, fit as for service	Reference number	
	b) Mounting details	Reference number	
	c) Line and earth terminal, conductor clamping arrangement	Reference number	
	d) Details of grading rings	Reference number	
4.7.2	10. ARRESTER CHARACTERISTIC DATA REQUIRED		
	a) V-I characteristic curve, AC	Reference Number:	
	b) V-I characteristic curve, DC	Reference Number:	
	c) Temporary overvoltage withstands capability curve in per unit of MCOV, with and with-out prior duty.	Reference Number:	
	11. ARRESTER TEMPORARY OVERVOLTAGE CAPABILITY, WITH PRIOR DUTY. (prior duty as defined in annex D, IEC 60099-4)		
	a) Overvoltage applied for 1 s pu of MCOV	xxxxxxxxx	
	b) Overvoltage applied for 5 s pu of MCOV	xxxxxxxxx	
	c) Overvoltage applied for 10 s pu of MCOV	xxxxxxxxx	
	12. PHYSICAL DIMENSIONS OF ARRESTERS		
	d) Overall height of arrester mm	xxxxxxxxx	
	e) Minimum external flashover distance mm	320	
	f) External diameter of arrester housing mm	xxxxxxxxx	
	g) Diameter of voltage grading rings mm	xxxxxxxxx	
	h) Distance of grading ring from top of arrester mm	xxxxxxxxx	
	13. MOV ELEMENTS		
	a) Diameter of elements mm	xxxxxxxxx	
	b) Thickness of elements mm	xxxxxxxxx	
	c) Number of elements per arrester	xxxxxxxxx	
4.2.2	d) Number of stacks in parallel	0	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	14. MISCELLANEOUS		
4.2.1	a) Live spray washing (Yes/No)	No	xxxxxxxxxx
	b) Total mass of assembled unit kg	xxxxxxxxxx	
	c) Minimum expected life of arrester at 40 °C and MCOV yrs	30	
4.2.7	d) Sample available for inspection	Yes	
5.2.10	e) Declared specified long-term load kN	xxxxxxxxxx	
5.2.1	15. INSULATION WITHSTAND TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Lightning impulse (1,2/50µs) withstand level [(1,3/0,82) × U _{res}] kV	150	
	c) 60 s wet power frequency withstand r.m.s kV	50	
5.2.2	16. RESIDUAL VOLTAGE TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Maximum residual voltage for a 10 kA steep current impulse (1/20µs) kV	85	
	c) Maximum residual voltage for a lightning current impulse (8/20µs) of magnitude:		
	• 5 kA kV	xxxxxxxxxx	
	• 10 kA kV	85	
	• 20 kA kV	xxxxxxxxxx	
	d) Maximum residual voltage for a 500 A switching current impulse kV	xxxxxxxxxx	
5.2.3	17. LONG DURATION CURRENT IMPULSE WITHSTAND TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Charging voltage pu of U _r	3,2	
	or		
	• charging current A	xxxxxxxxxx	
	c) Virtual duration of peak µs	2000	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	d) Number of discharge operations	18	
	e) Number of grouped operations	6	
	f) Operations per group	3	
	g) Maximum interval between operations s	60	
	h) Interval between groups	Cool to ambient	
	i) Maximum permitted change in residual voltage after long duration current impulse withstand test %	5	
5.2.4	18. OPERATING DUTY TESTS		
	a) Reference number of test report	xxxxxxxxxx	
	Conditioning part 1:		
	b) 10 kA current impulse (8/20μs), energized at 1,2 x MCOV kV	14.5	
	c) Number of discharge operations	20	
	d) Number of grouped operations	4	
	e) Operations per group	5	
	f) Interval between operations s	60	
	g) Intervals between groups min	30	
	Conditioning part 2:		
	h) High current impulse (4/10μs) kA	100	
	i) Number of applications	2	
	Conditions for switching surge test:		
	j) Charging voltage pu of U _r	3.2	
	or		
	• charging current A	xxxxxxxxxx	
	k) Virtual duration of peak μs	2000	
	l) Number of discharge operations	2	
	m) Interval between operations s	60	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	n) Starting temperature for first impulse °C	60	
	o) Energy dissipated during second impulse kJ	xxxxxxxxxx	
	Conditions for power frequency test at elevated levels as in IEC 60099-4, 7.5.2:		
	p) Interval between last long duration current impulse and power frequency test ms	100	
	q) Elevated rated voltage (Ur*) applied for 10 s kV	xxxxxxxxxx	
	r) Elevated continuous operating voltage (Uc*) applied for 30 min kV	xxxxxxxxxx	
	s) Maximum permitted change in residual voltage after long duration current impulse withstand test %	5	
5.2.5	19. POWER FREQUENCY VOLTAGE VERSUS TIME CHARACTERISTIC		
	a) Reference number of test report	xxxxxxxxxx	
5.2.6	20. SHORT-CIRCUIT TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) High current kA r.m.s.	40	
	c) Low current kA r.m.s.	0,6 ± 0,2	
5.2.7	21. NATURAL AGEING AND POLLUTION PERFORMANCE TEST		
	a) Reference number of test report	xxxxxxxxxx	
5.2.8	22. INTERNAL PARTIAL DISCHARGE TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Power frequency voltage applied [1,05 x MCOV] kV	xxxxxxx	
	c) Maximum partial discharge pC	10	
5.2.9	23. MOISTURE INGRESS TEST		
	a) Reference number of test report	xxxxxxxxxx	
5.2.10	24. BENDING MOMENT TEST		
	a) Reference number of test report	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

Table 35: Deviation Schedule – 22 kV Surge Arrester

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 the specification.

Item	Sub-clause	Proposed deviation

T2.2 RETURNABLE SCHEDULES

Table 36: Technical Schedule - 66 kV Surge Arrester

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	1. SURGE ARRESTER IDENTIFICATION		
	a) Supplier	xxxxxxxxxx	
	b) Manufacturer	xxxxxxxxxx	
	c) MOV block manufacturer	xxxxxxxxxx	
	d) Product code: Item 9 (Coastal)	xxxxxxxxxx	
	• Item 10 (Inland)	xxxxxxxxxx	
4.1	2. OPERATING CONDITIONS		
	a) Altitude m	up to 1800	xxxxxxxxxx
	b) Average humidity %	30 to 90	xxxxxxxxxx
	c) Minimum ambient temperature °C	−10	xxxxxxxxxx
	• Maximum ambient temperature °C	40	xxxxxxxxxx
	• Maximum diurnal variation °C	30	xxxxxxxxxx
	d) Intensity of solar radiation kW/m ²	1,1	xxxxxxxxxx
	e) IEC pollution level: Item 9 (Coastal)	HVH	xxxxxxxxxx
	• Item 10 (Inland)	LM	xxxxxxxxxx
	f) Lightning activity	High	xxxxxxxxxx
	g) System earthing	Effective	xxxxxxxxxx
	h) System configuration	3-phase, 3-wire	xxxxxxxxxx
	i) Nominal system voltage (Un) kV	66	xxxxxxxxxx
	j) Maximum system voltage (Um) kV	73	xxxxxxxxxx
	k) Supply frequency Hz	50	xxxxxxxxxx
4.3	3. ELECTRICAL CHARACTERISTICS OF ARRESTER		
	a) Arrester classification	Station class	
	b) IEC line discharge class	2	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	c) Nominal lightning discharge current (8/20µs) kA	10	
	d) Minimum energy absorption capability for a single high current impulse, 100kA 4/10µs in per unit of MCOV kJ/kV	3,4	
	e) Arrester rated voltage (Ur) kV	xxxxxxxxxx	
	f) MCOV (Uc) kV	48	
	g) Maximum residual voltage (Ures) at 10kA (8/20µs) kV	165	
4.4	4. ARRESTER HOUSING		
	a) Housing material		
	• Item 9 (Coastal)	xxxxxxxxxx	
	• Item 10 (Inland)	xxxxxxxxxx	
	b) Minimum external creepage distance:		
	• Item 9 (Coastal) [Um x 31 mm/kV] mm	2263	
	• Item 10 (Inland) [Um x 20 mm/kV] mm	1460	
4.4.3	5. ARRESTER HOUSING PROFILE DESIGN		
	IEC 60815 annex D parameters:		
	a) c	≥ 20	
	b) s/p	≥ 0,65	
	c) Ld/d	≤ 5	
	d) P1 – P2	≥ 15	
	e) CF	≤ 3,5	
	f) PF	≥ 0,7	
4.5	6. ARRESTER MOUNTING DETAILS		
	a) Orientation	Vertical	xxxxxxxxxx
	b) Method of mounting	Tripod base	xxxxxxxxxx
	c) Diameter of mounting holes in base mm	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	d) PCD (see Figure 1 of SCSSCAA00) mm	110 - 255	
	e) Supplied with: 3 bolts, 3 nuts, 3 tapered washers and 6 flat washers.	Yes	
	f) Reference number of drawing showing mounting details	xxxxxxxxxx	
4.6.1	7. ARRESTER LINE TERMINAL		
	a) Type	Stem	
	b) Diameter	26	
	c) Minimum length mm	100	
	d) Orientation	Vertical	
	e) Material	xxxxxxxxxx	
	f) Reference number of drawing showing details of line terminal	xxxxxxxxxx	
4.6.2	8. ARRESTER EARTH TERMINAL		
	Earth terminal to be provided with clamping arrangement suitable for clamping of the following conductor:		
	a) Conductor material	Copper	
	b) Conductor type	Strap	
	c) Conductor dimensions mm	50 x 3	
	d) Material used for clamping arrangement	xxxxxxxxxx	
	e) If dissimilar metals are used for clamping arrangement, state types	xxxxxxxxxx	
	f) Reference number of drawing showing details of earth terminal	xxxxxxxxxx	
4.7.1	9. DRAWINGS TO BE SUBMITTED WITH TENDER		
	Single copies of drawings shall be submitted as part of the original tender showing the following detail:		
	a) Outline dimensions of arrester, fit as for service	Reference number	
	b) Mounting details	Reference number	
	c) Line and earth terminal, conductor clamping arrangement	Reference number	
	d) Details of grading rings	Reference number	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
4.7.2	10. ARRESTER CHARACTERISTIC DATA REQUIRED		
	a) V-I characteristic curve, AC	Reference Number:	
	b) V-I characteristic curve, DC	Reference Number:	
	c) Temporary overvoltage withstands capability curve in per unit of MCOV, with and with-out prior duty.	Reference Number:	
	11. ARRESTER TEMPORARY OVERVOLTAGE CAPABILITY, WITH PRIOR DUTY. (prior duty as defined in annex D, IEC 60099-4)		
	a) Overvoltage applied for 1 s pu of MCOV	xxxxxxxxx	
	b) Overvoltage applied for 5 s pu of MCOV	xxxxxxxxx	
	c) Overvoltage applied for 10 s pu of MCOV	xxxxxxxxx	
	12. PHYSICAL DIMENSIONS OF ARRESTERS		
	a) Overall height of arrester mm	xxxxxxxxx	
	b) Minimum external flashover distance mm	450	
	c) External diameter of arrester housing mm	xxxxxxxxx	
	d) Diameter of voltage grading rings mm	xxxxxxxxx	
	e) Distance of grading ring from top of arrester mm	xxxxxxxxx	
	13. MOV ELEMENTS		
	a) Diameter of elements mm	xxxxxxxxx	
	b) Thickness of elements mm	xxxxxxxxx	
	c) Number of elements per arrester	xxxxxxxxx	
4.2.2	d) Number of stacks in parallel	0	
	14. MISCELLANEOUS		
4.2.1	a) Live spray washing (Yes/No)	No	xxxxxxxxx
	b) Total mass of assembled unit kg	xxxxxxxxx	
	c) Minimum expected life of arrester at 40 °C and MCOV yrs	25	
4.2.7	d) Sample available for inspection	Yes	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
5.2.10	e) Declared specified long-term load kN	xxxxxxxxxx	
5.2.1	15. INSULATION WITHSTAND TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Lightning impulse (1,2/50µs) withstand level [(1,3/0,82) × Ures] kV	262	
	c) 60 s wet power frequency withstand r.m.s kV	90	
5.2.2	16. RESIDUAL VOLTAGE TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Maximum residual voltage for a 10 kA steep current impulse (1/20µs) kV	183	
	c) Maximum residual voltage for a lightning current impulse (8/20µs) of magnitude:		
	• 5 kA kV	xxxxxxxxxx	
	• 10 kA kV	165	
	• 20 kA kV	xxxxxxxxxx	
	d) Maximum residual voltage for a 500 A switching current impulse kV	xxxxxxxxxx	
5.2.3	17. LONG DURATION CURRENT IMPULSE WITHSTAND TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Charging voltage pu of U_r	3,2	
	or		
	• charging current A	xxxxxxxxxx	
	c) Virtual duration of peak µs	2000	
	d) Number of discharge operations	18	
	e) Number of grouped operations	6	
	f) Operations per group	3	
	g) Maximum interval between operations s	60	
	h) Interval between groups	Cool to ambient	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	i) Maximum permitted change in residual voltage after long duration current impulse withstand test %	5	
5.2.4	18. OPERATING DUTY TEST		
	a) Reference number of test report	xxxxxxxxxx	
	Conditioning part 1:		
	b) 10 kA current impulse (8/20μs), energized at 1,2 x MCOV kV	58	
	c) Number of discharge operations	20	
	d) Number of grouped operations	4	
	e) Operations per group	5	
	f) Interval between operations s	60	
	g) Intervals between groups min	30	
	Conditioning part 2:		
	h) High current impulse (4/10μs) kA	100	
	i) Number of applications	2	
	Conditions for switching surge test:		
	j) Charging voltage pu of U _r	3.2	
	or		
	• charging current A	xxxxxxxxxx	
	k) Virtual duration of peak μs	2000	
	l) Number of discharge operations	2	
	m) Interval between operations s	60	
	n) Starting temperature for first impulse °C	60	
	o) Energy dissipated during second impulse kJ	xxxxxxxxxx	
	Conditions for power frequency test at elevated levels as in IEC 60099-4, 7.5.2:		
	p) Interval between last long duration current impulse and power frequency test ms	100	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	q) Elevated rated voltage (Ur*) applied for 10 s kV	xxxxxxxxxx	
	r) Elevated continuous operating voltage (Uc*) applied for 30 min kV	xxxxxxxxxx	
	s) Maximum permitted change in residual voltage after long duration current impulse withstand test %	5	
5.2.5	19. POWER FREQUENCY VOLTAGE VERSUS TIME CHARACTERISTIC		
	a) Reference number of test report	xxxxxxxxxx	
5.2.6	20. SHORT-CIRCUIT TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) High current kA r.m.s.	40	
	c) Low current kA r.m.s.	0,6 ± 0,2	
5.2.7	21. NATURAL AGEING AND POLLUTION PERFORMANCE TEST		
	a) Reference number of test report	xxxxxxxxxx	
5.2.8	22. INTERNAL PARTIAL DISCHARGE TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Power frequency voltage applied [1,05 x MCOV] kV	50.5	
	c) Maximum partial discharge pC	10	
5.2.9	23. MOISTURE INGRESS TEST		
	a) Reference number of test report	xxxxxxxxxx	
5.2.10	24. BENDING MOMENT TEST		
	a) Reference number of test report	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

Table 37: Deviation Schedule - 66 kV Surge Arrester

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 the specification.

Item	Sub-clause	Proposed deviation

T2.2 RETURNABLE SCHEDULES

Table 38: Technical Schedule – 132 kV Surge Arresters

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	1. SURGE ARRESTER IDENTIFICATION		
	a) Supplier	xxxxxxxxxx	
	b) Manufacturer	xxxxxxxxxx	
	c) MOV block manufacturer	xxxxxxxxxx	
	d) Product code: Item 11(Coastal)	xxxxxxxxxx	
	• Item 12 (Inland)	xxxxxxxxxx	
4.1	2. OPERATING CONDITIONS		
	a) Altitude m	up to 1800	xxxxxxxxxx
	b) Average humidity %	30 to 90	xxxxxxxxxx
	c) Minimum ambient temperature °C	–10	xxxxxxxxxx
	• Maximum ambient temperature °C	40	xxxxxxxxxx
	• Maximum diurnal variation °C	30	xxxxxxxxxx
	d) Intensity of solar radiation kW/m ²	1,1	xxxxxxxxxx
	e) IEC pollution level: Item 11 (Coastal)	HVH	xxxxxxxxxx
	• Item 12 (Inland)	LM	xxxxxxxxxx
	f) Lightning activity	High	xxxxxxxxxx
	g) System earthing	Effective	xxxxxxxxxx
	h) System configuration	3-phase, 3-wire	xxxxxxxxxx
	i) Nominal system voltage (Un) kV	132	xxxxxxxxxx
	j) Maximum system voltage (Um) kV	145	xxxxxxxxxx
	k) Supply frequency Hz	50	xxxxxxxxxx
	l) BIL of equipment to be protected kV peak	550	xxxxxxxxxx
4.3	3. ELECTRICAL CHARACTERISTICS OF ARRESTER		
	a) Arrester classification	Station class	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	b) IEC line discharge class	3	
	c) Nominal lightning discharge current (8/20μs) kA	10	
	d) Minimum energy absorption capability for a single high current impulse, 100kA 4/10μs in per unit of MCOV kJ/kV	7	
	e) Arrester rated voltage (Ur) kV	xxxxxxxxxx	
	f) MCOV (Uc) kV	84	
	g) Maximum residual voltage (Ures) at 10kA (8/20μs) kV	3000	
4.4	4. ARRESTER HOUSING		
	a) Housing material Item 11 (Coastal)	xxxxxxxxxx	
	• Item 12 (Inland)	xxxxxxxxxx	
	b) Minimum external creepage distance:		
	• Item 11 (Coastal) [Um x 31 mm/kV] mm	3007	
	• Item 12 (Inland) [Um x 20 mm/kV] mm	1940	
4.4.3	5. ARRESTER HOUSING PROFILE DESIGN		
	IEC 60815 annex D parameters:		
	a) c	≥ 20	
	b) s/p	≥ 0,65	
	c) Ld/d	≤ 5	
	d) P1 – P2	≥ 15	
	e) CF	≤ 3,5	
	f) PF	≥ 0,7	
4.5	6. ARRESTER MOUNTING DETAILS		
	a) Orientation	Vertical	xxxxxxxxxx
	b) Method of mounting	Tripod base	xxxxxxxxxx
	c) Diameter of mounting holes in base mm	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	d) PCD (see Figure 1 of SCSSCAA00) mm	110 - 255	
	e) Supplied with: 3 bolts, 3 nuts, 3 tapered washers and 6 flat washers.	Yes	
	f) Reference number of drawing showing mounting details	xxxxxxxxxx	
4.6.1	7. ARRESTER LINE TERMINAL		
	g) Type	Stem	
	h) Diameter	26	
	i) Minimum length mm	100	
	j) Orientation	Vertical	
	k) Material	xxxxxxxxxx	
	l) Reference number of drawing showing details of line terminal	xxxxxxxxxx	
4.6.2	8. ARRESTER EARTH TERMINAL		
	Earth terminal to be provided with clamping arrangement suitable for clamping of the following conductor:		
	a) Conductor material	Copper	
	b) Conductor type	Strap	
	c) Conductor dimensions mm	50 x 3	
	d) Material used for clamping arrangement	xxxxxxxxxx	
	e) If dissimilar metals are used for clamping arrangement, state types	xxxxxxxxxx	
	f) Reference number of drawing showing details of earth terminal	xxxxxxxxxx	
4.7.1	9. DRAWINGS TO BE SUBMITTED WITH TENDER		
	Single copies of drawings shall be submitted as part of the original tender showing the following detail:		
	a) Outline dimensions of arrester, fit as for service	Reference number	
	b) Mounting details	Reference number	
	c) Line and earth terminal, conductor clamping arrangement	Reference number	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	d) Details of grading rings	Reference number	
4.7.2	10. ARRESTER CHARACTERISTIC DATA REQUIRED		
	a) V-I characteristic curve, AC	Reference Number:	
	b) V-I characteristic curve, DC	Reference Number:	
	c) Temporary overvoltage withstands capability curve in per unit of MCOV, with and with-out prior duty.	Reference Number:	
	11. ARRESTER TEMPORARY OVERVOLTAGE CAPABILITY, WITH PRIOR DUTY. (prior duty as defined in annex D, IEC 60099-4)		
	a) Overvoltage applied for 1 s pu of MCOV	xxxxxxxxx	
	b) Overvoltage applied for 5 s pu of MCOV	xxxxxxxxx	
	c) Overvoltage applied for 10 s pu of MCOV	xxxxxxxxx	
	12. PHYSICAL DIMENSIONS OF ARRESTERS		
	a) Overall height of arrester mm	xxxxxxxxx	
	b) Minimum external flashover distance mm	900	
	c) External diameter of arrester housing mm	xxxxxxxxx	
	d) Diameter of voltage grading rings mm	xxxxxxxxx	
	e) Distance of grading ring from top of arrester mm	xxxxxxxxx	
	13. MOV ELEMENTS		
	a) Diameter of elements mm	xxxxxxxxx	
	b) Thickness of elements mm	xxxxxxxxx	
	c) Number of elements per arrester	xxxxxxxxx	
4.2.2	d) Number of stacks in parallel	0	
	14. MISCELLANEOUS		
4.2.1	a) Live spray washing (Yes/No)	No	xxxxxxxxx

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	b) Total mass of assembled unit kg	xxxxxxxxxx	
	c) Minimum expected life of arrester at 40 °C and MCOV yrs	25	
4.2.7	d) Sample available for inspection	Yes	
5.2.10	e) Declared specified long-term load kN	xxxxxxxxxx	
5.2.1	15. INSULATION WITHSTAND TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Lightning impulse (1,2/50µs) withstand level [(1,3/0,82) × Ures] kV	550	
	c) 60 s wet power frequency withstand r.m.s kV	150	
5.2.2	16. RESIDUAL VOLTAGE TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Maximum residual voltage for a 10 kA steep current impulse (1/20µs) kV	227	
	c) Maximum residual voltage for a lightning current impulse (8/20µs) of magnitude:		
	• 5 kA kV	xxxxxxxxxx	
	• 10 kA kV	210	
	• 20 kA kV	xxxxxxxxxx	
	d) Maximum residual voltage for a 500 A switching current impulse kV	xxxxxxxxxx	
5.2.3	17. LONG DURATION CURRENT IMPULSE WITHSTAND TEST		
	a) Reference number of test report	xxxxxxxxxx	
	b) Charging voltage pu of U_r	3,2	
	or		
	• charging current A	xxxxxxxxxx	
	c) Virtual duration of peak µs	2000	
	d) Number of discharge operations	18	
	e) Number of grouped operations	6	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION	SCHEDULE A	SCHEDULE B
	f) Operations per group	3	
	g) Maximum interval between operations s	60	
	h) Interval between groups	Cool to ambient	
	i) Maximum permitted change in residual voltage after long duration current impulse withstand test %	5	
5.2.4	18. OPERATING DUTY TEST		
	a) Reference number of test report	xxxxxxxxxx	
	Conditioning part 1:		
	b) 10 kA current impulse (8/20μs), energized at 1,2 x MCOV kV	67	
	c) Number of discharge operations	20	
	d) Number of grouped operations	4	
	e) Operations per group	5	
	f) Interval between operations s	60	
	g) Intervals between groups min	30	
	Conditioning part 2:		
	h) High current impulse (4/10μs) kA	100	
	i) Number of applications	2	
	Conditions for switching surge test:		
	j) Charging voltage pu of U _r	3.2	
	or		
	• charging current A	xxxxxxxxxx	
	k) Virtual duration of peak μs	2000	
	l) Number of discharge operations	2	
	m) Interval between operations s	60	
	n) Starting temperature for first impulse °C	60	

T2.2 RETURNABLE SCHEDULES

SUB CLAUSE OF 34-419	DESCRIPTION		SCHEDULE A	SCHEDULE B
	o) Energy dissipated during second impulse	kJ	xxxxxxxxxx	
	Conditions for power frequency test at elevated levels as in IEC 60099-4, 7.5.2:			
	p) Interval between last long duration current impulse and power frequency test	ms	100	
	q) Elevated rated voltage (Ur*) applied for 10 s	kV	xxxxxxxxxx	
	r) Elevated continuous operating voltage (Uc*) applied for 30 min	kV	xxxxxxxxxx	
	s) Maximum permitted change in residual voltage after long duration current impulse withstand test	%	5	
5.2.5	19. POWER FREQUENCY VOLTAGE VERSUS TIME CHARACTERISTIC			
	a) Reference number of test report		xxxxxxxxxx	
5.2.6	20 Short-circuit test			
	a) Reference number of test report		xxxxxxxxxx	
	b) High current	kA r.m.s.	40	
	c) Low current	kA r.m.s.	0,6 ± 0,2	
5.2.7	20. NATURAL AGEING AND POLLUTION PERFORMANCE TEST			
	a) Reference number of test report		xxxxxxxxxx	
5.2.8	21. INTERNAL PARTIAL DISCHARGE TEST			
	a) Reference number of test report		xxxxxxxxxx	
	b) Power frequency voltage applied [1,05 x MCOV]	kV	59	
	c) Maximum partial discharge	pC	10	
5.2.9	22. MOISTURE INGRESS TEST			
	a) Reference number of test report		xxxxxxxxxx	
5.2.10	23. BENDING MOMENT TEST			
	a) Reference number of test report		xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

Table 39: Deviation Schedule - 132 kV Surge Arrester

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 the specification.		
Item	Sub-clause	Proposed deviation

T2.2 RETURNABLE SCHEDULES

TSE57 - CURRENT TRANSFORMERS

- 132 kV Distribution Current Transformers for use in very heavily polluted conditions (31mm / kV) in accordance with Eskom specification 34-1689.
- 22 kV Combined Current Transformers for outdoor air insulated MV circuit-breaker in accordance with Eskom specification 240-66581487.

T2.2 RETURNABLE SCHEDULES

Measuring core ratio: 2400/1 MR

Protection core ratio: 1/2400T MR

Bus zone core ratio: 1/1600T MR

Table 40 Technical Schedule - 132 kV Distribution Current Transformers

Item	Sub-clause	Description	Schedule A	Schedule B
C.1	1.2	Service conditions		
		a) Altitude m	1800	
		b) Climate conditions	Inland	
		c) Level of pollution that equipment will be subjected to	Very Heavy	
		d) Lightning g area	Yes	
		When erection is required		
		a) Access to site by	Road	
		b) To be off-loaded from transport by supplier?	Yes	
		c) Crane available for off-loading?	No	
		d) Distance from off-loading point to operation position m	100	
		e) Nature of ground to be traversed	Soft earth	
		f) Rise to fall m	3	
		g) Erection prepared steel support structures	Yes	
		h) Construction power supply available	No	
		i) Is mounting structure to be provided by the supplier?		
C.3	4.1	General requirements		
		a) Nominal system voltage (line-to-line) voltage (Un) kV	132	
		b) Maximum system voltage (line-to-line) voltage (Um) kV	145	
		c) Frequency Hz	50	XXXXXXXXXX
		d) Number of phases	3	XXXXXXXXXX
		e) Nominal continuous primary current A	2500	
		f) Nominal short time current (Thermal) kA	25	

T2.2 RETURNABLE SCHEDULES

Item	Sub-clause	Description	Schedule A	Schedule B
		g) Nominal short time current (Dynamic) kA	64	
		h) Time for which thermal applies s	3	
		i) Power frequency short-duration withstand voltage kV	275 (min)	
		j) Lightning impulse withstand voltage kV	650 (min)	
C.4	4.1	Type of current transformers offered		
		a) Manufacturer of current transformer	xxxxxxxxxx	
		b) Manufacturer type designation	xxxxxxxxxx	
C.5	4.1.4.1	Details of insulation materials	xxxxxxxxxx	
4.	1.4.2	a) Manufacturer of HV porcelain insulators	xxxxxxxxxx	
		b) Detailed drawing of insulator	Yes	
C6	4.1.5	Details of oil-insulated current transformers to be submitted for approval		
		a) Expansion accommodation method	xxxxxxxxxx	
		b) Sealing arrangements	xxxxxxxxxx	
		c) Oil- level indicators	xxxxxxxxxx	
C.7	4.1.6	Gas-insulated current transformers		
	4.1.6.5	Method of sealing	xxxxxxxxxx	
C.8	4.1.3	Each main terminal to be electro tinned copper flat pad of the following dimensions		
		a) Diameter holes mm	Stem	xxxxxxxxxx
		b) size mm	38 x 125	xxxxxxxxxx
		c) hole centres mm	N/A	
C.10	4.3.5	Mounting arrangement		
		a) Holding down bolts to be arranged to fall within a square of maximum dimensions mm	706 × 706	xxxxxxxxxx
		b) Diameter of the holes mm	18	xxxxxxxxxx
C.11	4.3.6	Finish		

T2.2 RETURNABLE SCHEDULES

Item	Sub-clause	Description	Schedule A	Schedule B
		a) Finish offered on ferrous parts	XXXXXXXXXX	
		b) Finish offered on non-ferrous parts	XXXXXXXXXX	
C.12	4.4	Rating and diagram plates		
	4.4.1	a) Materials used for rating plates	XXXXXXXXXX	
	4.4.5	b) Material used for diagram plates	XXXXXXXXXX	
	4.4.5	c) Method of fixing diagram and rating plates	XXXXXXXXXX	
C.13	4.5	Drawings and literature required with tender		
		a) Number of instruction books required if other than three	5	XXXXXXXXXX
		b) Number of descriptive pamphlets required if other than three	5	XXXXXXXXXX
		Details of CT cores		
		a) Number of cores	6	
		b) Number of measuring cores	2M	
		c) Number of protection cores for	2P	
		d) General purposes	N/A	
		e) Bus zone	2P	
		f) Differential	XXXXXXXXXX	
C.15	4.2.2	Details of measuring core		
		Details of core number	Core 5 & 6	
		a) Nominal ratio A/A	2400/1 MR	
		b) Rated burden VA	10	
		c) Accuracy class	0,2	XXXXXXXXXX
		d) Ratio for which (b) and (c) apply	See drg	
		e) Means used to effect ratio changes if required	XXXXXXXXXX	
		Instrument security factor at 400/1 ratio	20	
		Are core steel details required?	Yes	XXXXXXXXXX

T2.2 RETURNABLE SCHEDULES

Item	Sub-clause	Description	Schedule A	Schedule B
		Is B/H curve of annealed core required?	Yes	xxxxxxxxxx
C.16	4.2.3	Details of protection core		
		a) Details core number	Core 1 to 4	
		b) Nominal turns ratio Turns	1/2400T MR	
		c) Continuous current rating		
		1. Primary A	2 500	
		2. Secondary A	1	
		d) Accuracy class	PX	xxxxxxxxxx
		e) Rated knee-point voltage V_k V	See drg	
		f) Magnetising current mA	See drg	
		g) Maximum total secondary winding resistance R_i Ω	See drg	
		h) Drawing number of magnetisation curve	xxxxxxxxxx	
		Are core steel details required?	Yes	xxxxxxxxxx
		Is B/H curve of annealed core required?	Yes	xxxxxxxxxx
		Earth terminal to be provided with a clamp suitable for		
		a) Material	Copper	xxxxxxxxxx
		b) Type	Flat	xxxxxxxxxx
		c) Size mm	50 × 3	xxxxxxxxxx
		Manufacturer of HV porcelain insulators	xxxxxxxxxx	
		Rated short-duration primary current I_{th} kA	25	
		Miscellaneous		
		a) Oil quantity ℓ	xxxxxxxxxx	
		b) Minimum effective gland area of terminal box table gland plate mm	130 × 75	
		c) Overall dimensions of current transformer		
		Height mm	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

Item	Sub-clause	Description	Schedule A	Schedule B
		Length mm	xxxxxxxxxx	
		Width Mm	xxxxxxxxxx	
		Total mass of current transformer kg	xxxxxxxxxx	
		d) Type of terminal box	xxxxxxxxxx	
		Creepage distance		
		Minimum Creepage distance for other than medium pollution level (heavy) / very heavy (IEC 60815) mm/kV	31	
C.18	5.1.1	Tests		
		Are type test results available?	xxxxxxxxxx	
		If No, are type tests to be carried out?	Yes	xxxxxxxxxx
		If required where are the type tests to be carried out?	xxxxxxxxxx	
C.19	5.12	Characteristic of impulse wave μ s	1/50, 1,2/50 or 1,5/50	
		Results of routine tests to be included into the terminal box (water proof packaging)		
C.20		High voltage power frequency withstands tests		
		Minimum 60 s power-frequency wet withstand kV	xxxxxxxxxx	
		Minimum 60 s power-frequency dry withstand kV	xxxxxxxxxx	
C.21	5.1.5	Short-time current test		
		a) short-time withstand current A	xxxxxxxxxx	
		b) time s	xxxxxxxxxx	
C.22	5.2.6.1	Ratio for accuracy test	At the lowest tap See annex. A	
C.23	5.2.7.2	Are details of procedure for determination of the rate of gas leakage submitted for approval?	xxxxxxxxxx	
		Are tangent delta measurements to be made?	Yes	
C.24	5.3	Are special tests required?	No	
		Are valid type test certificates available?	xxxxxxxxxx	

T2.2 RETURNABLE SCHEDULES

Item	Sub-clause	Description	Schedule A	Schedule B
		If No, are type tests to be performed?	Yes	
		If required where are the type tests to be carried out?	xxxxxxxxxx	
	5.3.1	Impulse test	Yes	
	5.3.2	Mechanical strength and sealing test	Yes	
	5.3.3	Dielectric dissipation factor test	Yes	
	5.3.4	Long duration voltage test	Yes	
	5.3.5	Chopped impulse test	Yes	
	5.3.6	Internal arc withstands capability test	Yes	

T2.2 RETURNABLE SCHEDULES

Table 41: 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 the specification.		
Item	Sub-clause	Proposed deviation

SIGNED ON BEHALF OF TENDERER:

: _____

COMPANY NAME

: _____

NAME IN BLOCK LETTERS

: _____

DATE

: _____



LESEDI LOCAL MUNICIPALITY
P O Box 201
HEIDELBERG
1438

**THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA,
132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)**

SECTION 3:
C1 – CONDITIONS OF CONTRACT



LYON AND PARTNERS (Pty) Ltd
Electrical Consulting Engineers
P O Box 3925
VANDERBIJLPARK
1900

CONTENTS: CONDITIONS OF CONTRACT

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C1.1 – FORM OF OFFER AND ACCEPTANCE

C1.1 FORM OF OFFER AND ACCEPTANCE

C1. CONDITIONS OF CONTRACT

C1.1. FORM OF OFFER AND ACCEPTANCE

Tenderers are required to fill up all the blank spaces in this Tender Form and Appendices.

C1.1.1. LETTER OF TENDER (MBD 3.1)

LESEDI LOCAL MUNICIPALITY

P O Box 201
HEIDELBERG
1438

THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA, 132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)

We have examined the Conditions of Contract, Specifications, Drawings, Bill of Quantities, Schedules, the attached Appendix and Addenda for the execution of the above-named Works. We offer to execute and complete the Works and remedy any defects therein in conformity with this Tender which includes all these documents, for the sum of:

TOTAL TENDER AMOUNT (VAT is included)
(carried over from summary of Bill of Quantities)

TIME FOR COMPLETION

R weeks

TENDER AMOUNT IN WORDS.....

.....

We accept your suggestions for the appointment of the Dispute Avoidance and Adjudication Board, as set out in the Schedule.

We agree to abide by this Tender until....., which is a period of **ninety (90)** days, from the date of submission and it shall remain binding upon us and may be accepted at any time before that date. We acknowledge that the Appendix forms part of this Letter of Tender. We further agree to carry all costs incurred by the Employer in the securing of a suitable alternative Tender, if we should withdraw this Tender before the expiry of the tender validity period, which may include the difference between our tender price and the tender price of the next suitable tender.

We undertake, if our tender is accepted, to commence with the Works on receipt of your order and to complete and deliver the Works comprised in the Contract in accordance with the programme set out in the Conditions of Contract, or as mutually agreed between ourselves, the Engineer and the Employer, before acceptance of tender.

We undertake to provide all necessary information, descriptive material, operational procedures, drawings, special circuits where necessary, attend all meetings as required to permit the Engineer to prepare further documents for the Works and to administer the contract to its completion. We further undertake to provide the above data when required by the Employer and the Engineer to ensure that the proposed programme is adhered to.

C1.1 FORM OF OFFER AND ACCEPTANCE

If this offer is accepted, we will provide the specified Performance Security from an accredited FICA/approved NCR Institution, to be jointly and severally bound in the percentage amount of the tender sum, as set out in the Appendix to tender, for the due performance of the Contract, to commence the Works as soon as is reasonably practicable after the Commencement Date, and to complete the Works in accordance with the tender and contract documents within the Time for Completion.

Unless and until a formal Agreement is prepared and executed this Letter of Tender, together with your written acceptance thereof, shall constitute a binding contract between us.

We confirm that we have satisfied ourselves as to the correctness and validity of our bid; that the price(s) and rate(s) quoted cover all the goods and/or works specified in the bidding documents; that the price(s) and rate(s) cover all our obligations and we accept that any mistakes regarding price(s) and rate(s) and calculations will be at our own risk.

We understand that you are not bound to accept the lowest or any tender you may receive and that the tender may be accepted as a whole or partially and that certain items, which may not be required, may be omitted from the Bill of Quantities.

Signature..... in the capacity of

Duly authorised to sign tenders for and on behalf of

.....

Address:

.....

Date :

C1.1 FORM OF OFFER AND ACCEPTANCE

C1.1.2. FORM OF AGREEMENT

This Agreement made the day of 20.....

between

LESEDI LOCAL MUNICIPALITY

herein represented by

.....
(here after called "the Employer") of the one part and

(COMPANY)

herein represented by

(NAME)

(here after called "the Contractor") of the other part

WHEREAS the Employer is desirous that certain Works, hereafter called the Contract Works, should be provided and executed, by the Contractor

viz.

TENDER NO: 19/2026

**THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA,
132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)**

and has appointed **M SWANEPOEL Pr Eng** of the firm **LYON AND PARTNERS (Pty) Ltd** as the Engineer for the purposes thereof (here after called the "Engineer") and has accepted a Tender by the Contractor for the provision, execution and maintenance of such Works under the direction and to the reasonable satisfaction of the Engineer in the sum of

.....

.....

.....

(Here after called "the Contract Sum").

C1.1 FORM OF OFFER AND ACCEPTANCE

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract here after referred to.
2. The Conditions of Contract applicable to this agreement is the FIDIC Conditions of Contract for Building and Engineering Works designed by the Employer, Second Edition 2017.
3. The following documents shall be deemed to form and be read and construed as part of this Agreement viz:
 - a) The Letter of Acceptance dated
 - b) The Letter of Tender dated
 - c) The Conditions of Contract – Part 1: General Conditions of Contract
 - d) The Conditions of Contract – Part 2: Contract Data
 - e) The Specifications / Scope of Work
 - f) The Drawings, and
 - g) The Completed Schedules
4. The Contractor hereby undertakes to execute and complete the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
5. The Employer hereby covenants to pay the Contractor in consideration of the provision, execution and completion of the Works and the remedying of defects therein the Contract sum or such other sum as may become payable under the provisions of the Contract at the time and in the manner prescribed by the Contract.

In Witness whereof the parties hereto have caused this Agreement to be executed the day and year first before written in accordance with their respective laws.

SIGNATURE: SIGNATURE:

SIGNED BY: SIGNED BY:
*for and on behalf of the **EMPLOYER*** *for and on behalf of the **CONTRACTOR***
in the presence of *in the presence of*

Witness (*sign*):..... Witness (*sign*):.....

Name : Name:

Address: Address:

Date: Date:

C1.1 FORM OF OFFER AND ACCEPTANCE

C1.1.3. PRO-FORMA LETTER OF ACCEPTANCE

Our ref.: TENDER 19/2026

(Date)

.....
P O Box
.....
.....

For the attention of: Mr

Sir,

**LETTER OF ACCEPTANCE:
THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA,
132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)**

1. I have pleasure in informing you that *the Employer* has decided to accept your tender, dated *day-month-year* for the above contract.
2. Your contract amount can be composed as follows:

Nett amount of tender	R
<i>Min/Plus: Correction of calculation errors (Refer to item)</i>	<i>R</i>
Nett amended tender amount	R
Plus: Amount allowed for contingencies	R
Plus: Amount allowed for escalation	R
SUBTOTAL	R
Plus: 15 % VAT	R
TOTAL ACCEPTED CONTRACT AMOUNT	R

3. Your attention is drawn to the fact that the above PROVISIONAL AMOUNTS for escalation in costs and for contingencies shall only be spent at the discretion of the Engineer and will fall away in part or in whole if not required.
Prior to any variation, official approval must be given.
4. The date of commencement of the contract is *day-month-year*, on which day you were informed that your tender was accepted. Furthermore, in terms of the months completion period, the completion date of the entire Works will be *day-month-year* (after allowing for 3 weeks builders holiday).
5. The site will be handed over to you on *day-month-year* at.....It is requested that your authorized representative attend this meeting for the signing of the document.

C1.1 FORM OF OFFER AND ACCEPTANCE

6. The Conditions of Contract applicable for administering the project shall be the FIDIC “Red Book” 2017 (ISBN 978-2-88432-084-9), with the General Conditions of Contract (Part 1) and Contract Data (Part 2) as included in the tender documentation.
7. You must furnish us with the following documents or information within the time periods given:
 - 7.1. The Performance Security, correctly completed in duplicate, by a Bank, Insurance or other FICA approved / NCR institution, in the amount set out in the Appendix to Tender, which must remain valid until the date of issue of the Performance Certificate with Final Completion of the project. The provision in respect of the surety amount, as contained in the Contract Data is 10% of the total contract amount i.e. R....., which can be reduced by 50% with issuing of the Taking Over Certificate. The Contractor shall produce a draft Performance Security within 14 days of the commencement date and the Final Performance Security within 28 days of the commencement date.
8. Proof that you have provided, as prescribed by Clause 19 of the Conditions of Contract, adequate insurance in the joint names of the Employer and Contractor as summarised below:
 - 8.1. Insurance cover against loss or damage for the replacement value plus 15% of the works (Contract sum plus 15 % = R.....) valid until the date of the Taking-Over Certificate plus 28 days – Sub-clause 19.2.1.
 - 8.2. Insurance cover to the full replacement value of the Goods and other things brought to site by the Contractor, valid until they are no longer required for the Works – Sub-clause 19.2.2.
 - 8.3. Insurance cover against liability for breach of professional duty for any designs by the Contractor for the permanent Works – Sub-clause 19.2.3.
 - 8.4. Insurance against liability for claims, damages, losses and expenses resulting in injury, sickness, disease, or death of any person employed by the Contractor or any of the Contractor’s other personnel – Sub-clause 19.2.4 and 19.2.5.
 - 8.5. In accordance with South African practice, third party liability insurance against any claims, damages, losses and expenses during the execution of the Works – Sub-clause 19.2.6.
9. You are hereby informed that no payments will be made to you before the completed Performance Security has been returned to us.
10. We confirm that the Employer will not accept any responsibility or liability for making good on any claims or losses resulting from your failure to adequately insure as required in par 8 and 9 above.
11. The following general conditions are applicable to this contract:

C1.1 FORM OF OFFER AND ACCEPTANCE

- 11.1. The defects liability period or period of maintenance of the Works, as described in Clause 11 of the Conditions of Contract is twelve months from the issuing of the Taking-Over Certificate for the Works, and another twelve months for the Goods taken from the issuing of the Performance Security.
- 11.2. The liquidated damages payable in respect of late completion of the Works as described in Clause 8.8 of the Conditions of Contract, is R..... per working day, to a maximum of R.....
12. In terms of the Occupational Health and Safety Act, 85/1993, it is required that you appoint a Safety Officer who must sign the “Written Agreement on Occupational Health and Safety” as well as Safety on Construction Site forms, taking full responsibility of the work carried out on site. He must also compile and submit a Health and Safety Plan and Risk Assessment forming part of the Safety, Health, Environmental and Quality (SHEQ) file. The SHEQ file must contain all appointments of the workforce, duly signed by your company MD or delegated person, and complete list of equipment required to execute the project scope with valid roadworthiness and calibration certificates. No work will be permitted on site until approval of the Health & Safety part of the SHEQ file by the Employer or his Safety Representative.
13. Your attention is finally drawn to the fact that our firm, being the Employer's Consulting Engineers, will administer this project. Consequently, any negotiations that may become necessary during the execution of the work regarding rates, additions, omissions, escalation in costs, etc. will only be carried on with our firm.
14. We respectfully point out that time is of the essence in the completion of this contract. You are earnestly requested to take every effort to ensure the timeous completion of the work or, if in any way possible, to improve thereon.
15. As stated in the Tender Form, this Letter of Acceptance will form part of the FORM OF AGREEMENT between the *Employer* and *Contractor*.
16. We trust that you will carry out the work with earnestness and to the best of your ability. You are assured of our complete co-operation in all aspects of this contract.

Sincerely,

LYON AND PARTNERS (PTY) LTD

M. SWANEPOEL (PR.ENG)

**C1.2 – PART 1: GENERAL CONDITIONS OF
CONTRACT**

C1.2. GENERAL CONDITIONS OF CONTRACT (PART 1)

**CONDITIONS OF CONTRACT IN ACCORDANCE WITH THE FIDIC
CONDITIONS OF CONTRACT FOR CONSTRUCTION FOR BUILDING AND
ENGINEERING WORKS DESIGNED BY THE EMPLOYER**

FIDIC ® SECOND EDITION 2017

The Conditions of Contract comprises of two parts of which Part 1 is the General Conditions of Contract and Part 2 the Particular Conditions of Contract. Furthermore, the Particular Conditions comprise of the Particular Conditions Part A – Contract Data and the Particular Conditions Part B – Special Provisions.

Under the usual arrangement of this Contract, the Contractor is responsible for the construction, in accordance with the design of the Employer, of building and/or engineering Works. These Conditions allow that the Contractor may be required to design a proportion or element of the Permanent Works.

GENERAL CONDITIONS OF CONTRACT: PART 1

The Conditions of Contract comprise of:

“GENERAL CONDITIONS”

Which form part of the:

**“CONDITIONS OF CONTRACT FOR CONSTRUCTION FOR BUILDING AND
ENGINEERING WORKS DESIGNED BY THE EMPLOYER”**

[Second Edition 2017, as published by the Fédération Internationale des Ingénieurs-Conseils (FIDIC) (ISBN 978-2-88432-084-9)]

(Copy obtainable at cost from CESA)

SIGNATURE:

SIGNED BY:

DATE:
(for and on behalf of the Contractor)

PARTICULAR CONDITIONS OF CONTRACT: PART 2

The Conditions of Contract further comprise of the following “Particular Conditions of Contract” (PCC), the General Conditions of Contract shall be amended by the Particular Conditions of Contract as detailed herein.

These “Particular Conditions of Contract” forms an integral part of the Contract and they supersede conditions contained elsewhere in the documents.

The Particular Conditions of Contract comprise of two sub-parts viz:

PART 2 A: CONTRACT DATA

PART 2 B: SPECIAL PROVISIONS

C1.3 - PART 2A: CONTRACT DATA

C1.3 - PART 2A: CONTRACT DATA

C1.3. GENERAL CONDITIONS OF CONTRACT (PART 2A)

PART 2A: PARTICULAR CONDITIONS – CONTRACT DATA

The following Contract Data lays down specific information required by certain Sub-Clauses in the General Condition of Contract. Tenderers shall not amend the Contract data as provided unless instruction is given to populate data i.e. “*Tenderer to complete*”.

SUB- CLAUSE	DATA TO BE GIVEN	DATA
1.1.19	Where the Contract allows for Cost Plus Profit, percentage profit to be added to the Cost:	5 %
1.1.27	Defects Notification Period (DNP)	365 days <i>(From the date of issuing the Taking-Over Certificate)</i>
1.1.31	Employer’s name and address	LESEDI LOCAL MUNICIPALITY P O Box 201 HEIDELBERG 1438
1.1.35	Engineer’s name and address	LYON AND PARTNERS (PTY) LTD. Gravitas Building 2, 1st Floor Sylviavale VANDERBIJLPARK 1911
1.1.85	Time for Completion <i>(Tenderer to Complete)</i>	<i>(period to correspond with the letter of tender and programme submitted with the tender)</i>
1.3(a)(ii)	Agreed methods of electronic transmission	e-mail
1.3(d)	Address of Employer for communications	Ms. Sibulelo Mokoena sibulelom@lesedi.gov.za Corner HF Verwoerd and Du Preez Street HEIDELBERG 1438
1.3(d)	Address of Engineer for communications	Mr. Max Swanepoel lyon@lyon.co.za Lyon and Partners (Pty) Ltd Gravitas Building 2, 1st Floor Sylviavale VANDERBIJLPARK 1911
1.3(d)	Address of Contractor for communications <i>(Tenderer to Complete)</i>	
1.4	Contract shall be governed by the law of:	The contract shall be governed, construed and interpreted in accordance with the Laws of the Republic of South Africa.
1.4	Ruling language	English

C1.3 - PART 2A: CONTRACT DATA

SUB- CLAUSE	DATA TO BE GIVEN	DATA
1.4	Language for communications	English
1.8	Number of document copies to the Contractor Number of <u>additional</u> paper copies of Contractor's Documents Documents to be kept on site by the Contractor	- One electronic copy to the Contractor - One paper original to the Employer. - One paper copy to the Employer. At least one copy of: (a) the Contract; (b) Contractor's records as per Sub-Clause 6.10 [Contractor's Records] and Sub-Clause 20.2.3 [Contemporary Records]; (c) publications named in the Specification / Scope of Works, such as Eskom's standards and D-DT drawings; (d) the Contractor's documents, such as ordering and delivering schedules; (e) the Drawings; (f) all Variations, Indices, Instructions, Minutes and other communication given under the Contract; (g) the Project Programme; (h) Wayleaves and Approvals; and (i) Safety, Health, Environmental and Quality documents.
2.1	After receiving the Letter of Acceptance, the Contractor shall be given right of access to all or part of the Site within	14 days, the Contractor shall receive a Site Handover Certificate.
2.4	Employer's financial arrangements	Department of Mineral Energy (DMRE) grant funding: Integrated National Electrification Programme 2026/2027: approx. R 53 000 000.00 2027/2028: approx. TBA <u>2028/2029: approx. TBA</u> TOTAL ∴ TBA Phased over multiple financial years.
2.5	Site data and items of reference	Included under "C4 – Site Information"
2.6	List of Employer-Supplied Material and / or Employer's Equipment	Not Applicable
4.1	Contractor's general obligations	Sub-Clause 4.1 (a) to (h) applies – The Contract requires the Contractor to provide detail designs, according to specifications, for all equipment, whether the detail design is executed by the Contractor or an OEM. The Contractor is responsible for any deficiencies in manufacturing designs or drawings.
4.2	Performance Security (as percentages of the Accepted Contract Amount in Currencies): - Percent - Currency	10 % - reduced to 5% following the issuing of the Taking-Over Certificate ZAR

C1.3 - PART 2A: CONTRACT DATA

SUB- CLAUSE	DATA TO BE GIVEN	DATA
4.3	Name of the Contractor's Representative during performance of the Contract <i>(Tenderer to Complete)</i>	_____
4.6	Co-operation	The Contractor shall provide training for the operation and maintenance of the Works to the Employer's personnel.
4.7.2	Period for notification by the Contractor of errors in the items of reference	28 days
4.8	Time for submission of the Health and Safety Manual	Within 21 days of the commencement date
4.9	Time for submission of the Quality Management System documents	Within 28 days of the commencement date
4.16	Transport of Goods notice	The Contractor shall give no less than 21 days' notice to the Engineer before the delivery date of any Goods to site
4.19	Period of payment by the Contractor for temporary utilities	Monthly <i>(the Contractor is to provide for all utilities required, i.e. water, electricity, toilets, wireless communication, etc.)</i>
4.20	Contractor shall submit progress reports to the Engineer	Monthly
5.1(a)	Maximum allowable accumulated value of work subcontracted (as a percentage of the Accepted Contract Amount)	20 %
5.1(b)	Parts of the Works for which subcontracting is not permitted	• Erection of primary plant equipment • Installation of control cabling into the control room • Stringing of overhead conductor
6.5	Normal working hours on the Site	- Monday to Friday from 07:00 to 17:00 - Saturday from 07h00 to 13h00 - No Sundays - No public holidays (Note: work outside normal working hours required for power outages)
6.6	Facilities to be provided for Staff and Labour	Contractor to provide for accommodation and welfare facilities for the Contractor's personnel.

C1.3 - PART 2A: CONTRACT DATA

SUB- CLAUSE	DATA TO BE GIVEN	DATA
6.12	List of the Contractor's key personnel	Project / Contracts Manager: _____ Health and Safety Officer: _____ ORHVS Qualified Site Supervisor: _____ Qualified Electrician: _____ SHEQ Representative: _____ Commissioning Engineer: _____ Company Accountant: _____
7.2	Period for the Contractor to submit samples to the Engineer	Within 28 days of the commencement date
7.3	Period for notification by the Contractor to the Engineer whenever any Plant, Materials or Work is ready for inspection	14 days
7.4	Period for notification by the Contractor to the Engineer whenever any Plant, Materials or Work is ready for testing	14 days
7.7	Payment shall be certified as a percentage of the material rate for material delivered to site.	Payment shall only be certified for equipment installed (80% to be considered subject to prior approval).
8.1	Commencement Date	Date of the Letter of Acceptance, as stated in the Letter of Acceptance, or 14 days from the date of the Letter of Acceptance. The Engineer shall give at least 14 days' notice to the Contractor stating the commencement date. The commencement date shall be no more than 42 days after the Contractor receives the Letter of Acceptance. The Contractor shall commence the execution of the Works on, or as soon as is reasonably practicable, after the commencement date and shall then proceed with the Works with due expedition and without delay.
8.3	Period for submission of the Programme by the Contractor to the Engineer	Within 28 days of the commencement date
8.8	Delay Damages payable for each day of delay	0.5% of the Contract amount per calendar day.

C1.3 - PART 2A: CONTRACT DATA

SUB- CLAUSE	DATA TO BE GIVEN	DATA
8.8	Maximum amount of Delay Damages	10% of final contract sum.
9.1	Completion test rectification Period by Contractor to Engineer	Test programme no less than 42 days before commencing with completion tests and 21 days' notice before starting completion tests
11.1	Defects Notification Period	For the Works, 365 days from the issuing of the Taking-Over Certificate for the Works, and for the Goods another 365 days after the issuing of the Performance Certificate.
11.11	Period for clearance of the site	Within 28 days of issuing the Performance Certificate
12.2	Method of measurement	Nett actual quantities measured by means of the Bill of Quantities according to progress.
12.3	Percentage profit	As stated under 1.1.19 above
13.4(b)(ii)	Percentage rate to be applied to Provisional Sums for overhead charges and profit	0 % if the Employer enters into a direct payment agreement with a subcontractor or nominated subcontractor, otherwise 5 %.
13.7	Adjustments for Changes in Cost: (<i>Tenderer to Complete</i>)	This clause is not applicable to fixed amount contracts. Contract Price Adjustment (CPA) will not be applicable to the whole of this contract as a whole, but will partially apply to items allowed in the CPA Items Table. The contract prices are fixed and firm or the duration of the contract. The Contractor must therefore allow for escalation in cost in his unit prices. Provision will however only be made for escalation on only the long lead items listed in the table below.

Table 1: CPA Items

EQUIPMENT	FOREIGN CURRENCY	COUNTRY OF ORIGIN
Power Transformer		
NECRT		
Cables		
132kV Isolators		
132k V CT's		
22 kV Switchgear		
Labour (after 12 months)		
Electrical material		

The above list of material and/or equipment will be subject to the formulae and conditions contained in the special provisions of the particular conditions of Contract.

C1.3 - PART 2A: CONTRACT DATA

SUB- CLAUSE	DATA TO BE GIVEN	DATA
14.2	Total amount of Advance Payment (as a percentage of Accepted Contract Amount)	Not applicable
14.2	Currency or currencies of Advance Payment	Not applicable
14.2.3	Percentage deductions for the repayment of the advance Payment	Not applicable
14.3	Period of payment	Monthly
14.3	Application for Interim Payment	The Contractor shall submit a Statement and Progress report to the Engineer on the 15 th of each month.
14.3(iii)	Percentage of retention	Retention shall be withheld for payments due by the Employer to the Contractor: - 10% of each Statement value certified for interim payment, until 5% of the Contract value is accumulated as retention, for the duration of the executions of the Works; - 50% of the 5% accumulated retention amount is released on issuing of the Taking-Over Certificate; - The remaining 50% of the 5% previously accumulated retention is released on issue of the Final Completion Certificate (Performance Certificate as per sub-clause 11.9); Or In lieu of the above the Contractor may submit a retention guarantee for the duration of the defects notification period if approved by the Employer.
14.3(iii)	Limit of Retention Money (as a percentage of Accepted Contract Amount)	5% of the Contract amount
14.5(b)(i)	Plant and Materials for payment when shipped	Not applicable
14.5(c)(i)	Plant and Materials for payment when delivered to the site	Not applicable
14.6.2	Minimum amount of Interim Payment Certificate (IPC)	R 200 000.00
14.6.1	Period within which the Engineer shall issue the Employer with an Interim Certificate (IPC) under sub-clause 14.6.1	As per the General Conditions: 28 days after the Engineer receives the statement and supporting documents.
14.7(a)	Period for payment of Advance Payment to the Contractor	Not applicable
14.7(b)(i)	Period for the Employer to make interim payments to the Contractor under Sub-Clause 14.13 (<i>Interim Payment</i>)	As per the General Conditions: 56 days after the Engineer receives the Contractor's statement
14.7(b)(ii)	Period for the Employer to make interim payments to the Contractor under Sub-Clause 14.13 (<i>Final Interim Payment</i>)	As per the General Conditions: 28 days after the Employer receives the FPC

C1.3 - PART 2A: CONTRACT DATA

SUB- CLAUSE	DATA TO BE GIVEN	DATA												
14.7(c)	Period for the Employer to make final payment to the Contractor (<i>Final Payment</i>)	As per the General Conditions: 56 days after the Employer receives the FPC												
14.8	Financing charges for delayed payment (<i>percentage points above the average bank short-term lending rate as referred to under sub-paragraph "a"</i>)	As per the General Conditions: ABSA Prime Rate plus 3%												
14.13	Period within which the Engineer shall issue the Employer with a Final Payment Certificate (FPC) under Sub-Clause 14.13 (<i>Final Payment</i>)	As per the General Conditions: 28 days after the Engineer receives the Final Statement.												
14.15	Currencies for payment of Contract Price	ZAR												
14.15(a)(i)	Proportions or amounts of Local and Foreign Currencies are: - Local (<i>Contractor to complete</i>) - Foreign (<i>Contractor to complete</i>)	 _____ _____												
14.15(c)	Currencies and proportions for payment of Delay Damages	ZAR												
14.15(f)	Rates of exchange (<i>Tenderer to complete and list applicable items</i>)	This clause is not applicable to fixed rate contracts The Rates of Exchange in Foreign Currency (at date of tender submission) for the purpose of this contract: i. 1 US Dollar: R_____ ii. 1 Euro: R_____ iii. 1 British Pound: R_____ iv. 1 Chinese RMB (Yuan): R_____ v. 1 Japanese Yen: R_____ The Tenderer must allow for changes in the Rate of Exchange in his unit prices. Provision will however be made for Rate of Exchange changes on only long lead items listed in the table below. Rate of exchange will apply to imported material to cater for upward and downward fluctuations in cost. <table border="1"> <caption>Table 2: RoE equipment table</caption> <thead> <tr> <th>EQUIPMENT</th><th>FOREIGN CURRENCY</th><th>COUNTRY OF ORIGIN</th></tr> </thead> <tbody> <tr> <td>132kV Circuit Breakers</td><td></td><td></td></tr> <tr> <td>Surge Arrestor</td><td></td><td></td></tr> <tr> <td>Protection IED's</td><td></td><td></td></tr> </tbody> </table> Note - The country of manufacturing origin's exchange rate shall be used i.e. a USD – ZAR exchange rate will not be accepted for equipment not manufactured in the USA.	EQUIPMENT	FOREIGN CURRENCY	COUNTRY OF ORIGIN	132kV Circuit Breakers			Surge Arrestor			Protection IED's		
EQUIPMENT	FOREIGN CURRENCY	COUNTRY OF ORIGIN												
132kV Circuit Breakers														
Surge Arrestor														
Protection IED's														

C1.3 - PART 2A: CONTRACT DATA

SUB- CLAUSE	DATA TO BE GIVEN	DATA
17.2(d)	Forces of nature, the risks of which are allocated to the Contractor	Abnormal weather. Refer to the Annexure to PCC - Rainfall
19.1	Permitted deductible limits:	
	- Insurance required for the Works and Goods	R 20 000.00
	- Insurance required for liability for breach of professional duty	R 20 000.00
	- Insurance required against liability for fitness for purpose (if any is required)	R 20 000.00
	- Insurance required for injury to persons and damage to property	R 20 000.00
	- Insurance required for injury to employees	R 20 000.00
	- Other insurances required by Laws and by Local Practice	_____

19.2(1)(b)	Additional amount to be insured in the joint name of the Contractor and the Employer	As per the General Conditions: 15%
19.2(1)(iv)	List of Exceptional Risks which shall not be excluded from the insurance cover for the Works	Force majeure, community unrest, riot, political
19.2.2	Extent of insurance required for Goods	Full replacement value plus delivery to site
19.2.3(a)	Amount of insurance required for liability for breach of professional duty	R 5 000 000.00
19.2.3(b)	Insurance required against liability for fitness for purpose	Yes
19.2.3	Period of insurance required for liability for breach of professional duty	From the commencement date to the date of the Performance Certificate
19.2.4	Amount of insurance required for injury to persons and damage to property	Minimum amount of R 5 000 000,00 insurance for third party liability
19.2.6	Other insurances required by Laws and by local practice (<i>Tenderer to complete</i>)	_____
21.1	Time for appointment of DAAB	28 Days after dispute is declared
21.1	The DAAB shall comprise	One (1) Member
21.1	List of proposed members of DAAB	
	- Proposed by Employer	Mr Dennis Lourens
	- Proposed by Contractor	1. _____
21.2	Appointing entity (official) for DAAB members	The President of FIDIC or a person appointed by the President

C1.3 - PART 2A: CONTRACT DATA

Definition of sections (if any):

Table 3: Designated section of the Works

Description of parts of the Works that shall be designated a Section for the purposes of the Contract <i>(FIDIC Sub-Clause 1.1.73)</i>	Value: Percentage* of Accepted Contract Amount <i>(FIDIC Sub-Clause 14.9)</i>	Time for Completion <i>(FIDIC Sub-Clause 1.1.84)</i>	Delay Damages <i>(FIDIC Sub-Clause 8.8)</i>
THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA, 132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)			
<i>(*These percentages shall also be applied to each half of the Retention Money under Sub-Clause 14.9)</i>			

I,, on behalf of the Company,

....., hereby

acknowledge and accept the Conditions of Contract as set out in the table above.

SIGNATURE:

SIGNED BY:

(for and on behalf of the Contractor)

DATE:

C1.4 - PART 2B: SPECIAL PROVISIONS

C1.4 - PART 2B: SPECIAL PROVISIONS

C1.4. GENERAL CONDITIONS OF CONTRACT (PART 2B)

PART 2B: PARTICULAR CONDITIONS – SPECIAL PROVISIONS

The Conditions of Contract further comprise of the following Special Provisions as part of the Particular Conditions of Contract, the General Conditions of Contract shall be amended by the Special Provisions as detailed herein.

These Special Provisions forms an integral part of the Particular Conditions of Contract and the Contract, and supersedes overrides any other provisions contained elsewhere in the documents.

The following clauses of the “Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer” Second Edition 2017, published by the Fédération Internationale des Ingénieurs-Conseils (FIDIC) (ISBN 978-2-88432-084-9) shall be amended as follows:

Clause Description	Clause No	Amendment
1. <u>GENERAL PROVISIONS</u>		
DEFINITIONS	1.1.31	“Employer” also means the Company, Subsidiary or Succession in Title or stated in the Contract Data.
	1.1.35	“Engineer” means an Engineer duly authorised by the Company, Subsidiary or Succession in Title stated in the Contract Data.
	1.1.7	Add to this sub-clause: The Commencement Date shall be notified in the Contract Data or the Letter of Acceptance. Access to the site shall be granted on the Commencement Date.
LIMITATION OF LIABILITY	1.15	Notwithstanding the provisions of this Clause, the Contractors Limit of Liability in terms of defects shall be 5 years.
2. <u>THE EMPLOYER</u>		
EMPLOYER’S FINANCIAL ARRANGEMENTS	2.4	The Employer shall only be obliged to provide reasonable evidence that financial arrangements have been made and are being made, if there is a dispute arising from non-payment of a certificate or of any amounts payable to the Contractor or if the Employer intends to make material changes notwithstanding the provisions of this sub-clause. In all other cases, the Employer shall not be bound to provide the requested information.
EMPLOYER-SUPPLIED MATERIALS AND EMPLOYER’S EQUIPMENT	2.6	Add to this sub-clause: After this visual inspection, the Employer-Supplied / free-issue materials shall come under the care, custody and control of the Contractor at which point, except where otherwise stated in the Contract, all risk in such free-issue materials shall also pass to the Contractor and shall remain with the Contractor unless and until the said free-issue materials are returned to the custody and control of the Employer.

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
3. <u>THE ENGINEER</u>		
ENGINEER'S DUTIES AND AUTHORITY	3.2	Add to this sub-clause: The Engineer shall require approval from the Employer on any matter which affects extension of time or variation to the Contract Price. Variations of the project scope that is covered by contingency amounts requires only the Engineer's approval. If the Contractor receives any instructions from the Engineer not complying with these conditions, he shall obtain written confirmation from the Employer before proceeding.
DELEGATION BY THE ENGINEER	3.4	Add to the end of this sub-clause: No oral representation shall be made by the Contractor to the Engineer through the Engineers Representative. The authority to delegate expressly excludes the delegation of powers to vary the Works in terms of Sub-Clause 13.1 [Right to Vary].
ENGINEERS INSTRUCTIONS	3.5	Add to this sub-clause: No oral instructions may be accepted from the Engineer unless these are recorded in writing by the Contractor who then obtains confirmation from the Engineer by means of a signature or confirmation in minutes within 7 days of the instruction being issued, or prior to commencing work on the item in question.
REPLACEMENT OF THE ENGINEER	3.6	Add to this sub-clause: In the unforeseen situation where the Engineer or Engineers representative is not available to complete the Works, the Employer will advise the Contractor immediately upon knowledge of such an event and will give notice to the Contractor within 7 days of the details of the proposed replacement.
4. <u>THE CONTRACTOR</u>		
PERFORMANCE SECURITY	4.2	Add to this sub-clause: With the Employers consent, the Engineer will hold the original Performance Security for safekeeping. The following stipulations shall be included in the performance security: (i) A statement that the performance security may be called on by means of written instruction by the Engineer; (ii) The person's name, contact details and address to which the Engineer's instruction to call on the performance security must be addressed; (iii) A statement confirming the period from the date of the Engineer's instruction to call on the performance security, until the security amount is paid to the Employer (period to be less than 56 days); (iv) Cancellation of the performance security shall be subject to approval by the Engineer; and (v) Specific inclusion of the 12 month defect notification period. The following is added at the end of this Sub-Clause: Should the Contractor fail to provide the said security within the specified time the Employer, in his sole discretion, may either: - (a) Withhold payment from the Contractor until the amount withheld is equal the Performance Security Amount

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
		stipulated in the Contract Data (as percentages of the Accepted Contract Amount) over and above the normal retention, or (b) Proceed to issue notice in terms of Clause 15 [Termination by Employer] and recover costs from the Contractor.
CONTRACTORS REPRESENTATIVE	4.3	Add to this sub-clause: Without derogating from the generality of the foregoing, the Contractor's Representative shall, at the Contractor's cost, implement forthwith any additional safety precautions which the Engineer may consider necessary for the proper protection of the Contractor's employees engaged in the Works. Work to which such additional precautions will apply shall be suspended pending the implementation of such precautions.
QUALITY ASSURANCE	4.9	Add to this sub-clause under 4.9.3 General provisions: Testing frequency of all materials shall be in accordance with the relevant clause of the Specifications or as specified on the construction drawings. The Engineer will have the right to visit the manufacturing location for the purpose of audit, surveillance or inspection during the manufacturing of the Materials/Plant to verify the Contractor's quality management. In the event of the Material/Plant being rejected due to non-compliance with the specification, workmanship and/or other valid reasons, then the cost of rectification as well as the Engineer's time based cost and re-inspection cost shall be for the account of the Contractor.
SUFFICIENCY OF THE ACCEPTED CONTRACT AMOUNT	4.11	The following is added at the end of this Sub-Clause: Without derogating from the generality of the foregoing, no claim by the Contractor for additional payment will be entertained which is consequent upon any misunderstanding or the allegation, or fact that it was supplied with incorrect information by any person, or its failure to obtain correct information as to any matter affecting its accepted tender or the execution of the Works to be provided, nor will any such misunderstanding, or the obtaining of incorrect information, or the failure to obtain correct information, relieve it from any risk or responsibility for the due fulfilment of its obligations in terms of the Contract.
PROGRESS REPORTS	4.20	Add to this sub-clause: Progress reports shall include updating of drawings issued by the Engineer to as-built drawings as the work progresses
WAIVER OF CONTRACTOR'S LIEN	4.24	The following additional Sub-Clause 4.24 is added to the end of Clause 4: The Contractor waives, in favour of the Employer, any lien or right of retention that is or may be held in respect of the Works to be executed on the Site. The Contractor shall ensure that it procures similar waivers from its subcontractors.

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
5. <u>SUBCONTRACTING</u>		
NOMINATED SUBCONTRACTORS	5.2	The following additional Sub-Clause 5.2.5 is added to the end of Clause 5.2: <u>5.2.5 Direct Payment with nominated sub-contractors</u> The Employer may enter into a direct payment agreement with a nominated sub-contractor. The Contractors profit shall not be paid to the Contractor if: i) The Contractor does not pay the subcontractor's invoice after receiving payment for work certified by the Engineer. ii) The Employer and nominated sub-contractor enters into a direct payment agreement and the Contractor performs no managerial function related to the Works by the nominated sub-contractor.
6. <u>STAFF AND LABOUR</u>		
WORKING HOURS	6.5	Add to this sub-clause: As stipulated in sub-clause 6.5 (c) execution of work on any day including holidays at any time will be required, without additional remuneration to the Contractor, for power outages and other unavoidable circumstances.
HEALTH AND SAFETY	6.7	Add to this sub-clause: A Health and Safety plan shall be furnished by the Contractor within 14 days after Letter of Acceptance
CONTRACTOR'S PERSONNEL	6.9	In addition to the items listed under headings (a) to (f), The Engineer may require the Contractor to remove any person who is in contravention of the provisions of the: • Environmental Management Plan • Client Safety Specification • The provisions of any statutory Act, i.e. OHS. Within seven (7) working days of signature of Letter Acceptance, the Contractor is required to furnish the Employer with a safety plan, risk assessment report and safe work procedures. Prior to commencement of site activities, the entire workforce to be located on site may be required to attend a Health and Safety Induction at the premises of the Employer. The Contractor shall ensure that all requirements set aside by the Occupational Health and Safety Act, and Construction Regulation are fulfilled.

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
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7. PLANT, MATERIALS AND WORKMANSHIP

MANNER OF EXECUTION	7.1	Add the following to Clause (d): All work shall be completed in accordance with the Specifications and drawings to be read in conjunction with all appropriate SANS or SABS, NRS, IEC, BC, IEEE and ANSI codes or guidelines prepared by authorities representing specialised industries.
OWNERSHIP OF PLANT AND MATERIALS	7.7	Add to this sub-clause: Before making any payment for Plant and Materials defined in this Clause, the Contractor is to provide the Employer with a Cession of ownership in a format to be agreed 14 days prior to the payment certificate. Payment thereof will be limited to materials stored where the following conditions are met: • Materials have not been prematurely delivered. • Materials are stored and protected adequately on site or an approved location. • Proof of payment for such materials is made available by the Contractor. After payment of the rate stipulated in the Contract Data, the ownership of material shall be ceded to the Employer.

8. COMMENCEMENT, DELAYS AND SUSPENSION

COMMENCEMENT OF THE WORKS	8.1	Further to the provisions of this Clause, notwithstanding the agreed date for the commencement of the Works, none of the activities related to project execution may begin until such time as the required proofs are received in respect of: • Insurances • Performance Securities • Approved SHEQ file The notice by the Engineer of the Commencement Date is recorded in the Contract Data. Access to the site shall be granted on the Commencement Date.
PROGRAMME	8.3	The first paragraph of this Clause is amended to read 14 days in place of 28 days. Add to this sub-clause: The programme shall provide for a minimum of two weeks “slack” in order to cater for unforeseen delays. The programme shall be submitted in the form of a Microsoft Projects Gantt Chart (version 2007 or newer)
EXTENSION OF TIME FOR COMPLETION	8.5	Add to this sub-clause: No extension of time for completion will be granted on account of normal inclement weather, but extension of time shall be determined for abnormal rainfall or wet conditions separately for

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
		each calendar month or part thereof in accordance with the Annexure to the Conditions of Contract applicable to Rainfall.
		The Contractor shall not be entitled to an extension of the Time for Completion to the extent that completion would, in the circumstances, in any event have been delayed by a cause not listed in sub-clause 8.5.
DELAY DAMAGES (PENALTIES)	8.8	Add to this sub-clause: Penalties shall be applied against Contractor according to Detailed Program submitted as per sub-clause 8.3

9. TESTS ON COMPLETION

CONTRACTOR'S OBLIGATIONS	9.1	Add to this sub-clause: The Contractor shall provide a complete set of As-Built drawings and documentation to the Engineer in an approved format together with all the test results as called for in the various sections of the Specifications, Schedules and Drawings.
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10. EMPLOYER'S TAKING OVER

TAKING OVER OF THE WORKS AND SECTIONS	10.1	Notwithstanding the various provisions of this Clause, if the Employer is not the end-user, it is the Contractors responsibility to ensure that all Works are completed, inspected and approved to the satisfaction of the end-user.
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11. DEFECTS AFTER TAKING OVER

12. MEASUREMENT AND VALUATION

EVALUATION	12.3	This Sub-Clause is amended as follows: • The percentage in sub-paragraph (b)(i) is amended to 20% • The percentage in sub-paragraph (b)(ii) is amended to 1.0% • The percentage in sub-paragraph (b)(iii) is amended to 5.0% Add to this sub-clause: The provisions for measurement are as per the Bill of Quantities and payment shall be made according to the progress on site and for material delivered to site before 7 days prior to the Contractor's Application for Interim Payment. The percentage payment of the material rate for material delivered to site is indicated in the Particular Conditions of Contract sub-clause 7.7.
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13. VARIATIONS AND ADJUSTMENTS

RIGHT TO VARY	13.1	Add to this sub-clause: The Employer reserves the right, in terms of the Clause, to request the Contractor to undertake Variations to the Contract outside the boundaries of the site but within the property boundary of land owned by the Employer.
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C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
VARIATIONS	13.3	Add to this sub-clause: All variations to the contract shall be priced in accordance with the rates agreed in the Contract Agreement for items where rates are available for work of similar nature
ADJUSTMENTS FOR CHANGES IN COST	13.7	This Clause is not applicable to Contracts where the Contract price is a Fixed Contract amount. If the Contract Data under the Particular Conditions of Contract makes allowance for Contact Price Adjustment for long lead items, these conditions shall apply: (a) No CPA claims will be accepted which are submitted later than 60 days from the date of the Payment Certification of the applicable equipment. (b) CPA claims submitted on the basis of one or more provisional indices, shall be treated as final claims. (c) CPA claims shall have a fixed portion of the Contract Unit Rate Price which shall not be subject to Price adjustment, if the fixed portion is not specifically detailed the fixed portion value shall default to 15% of the applicable rate. This percentage shall be applied to the cost adjustment of each item. (d) No CPA shall apply to early or advance payments certified. The following SEIFSA price adjustment will be applicable to these items for fluctuations in cost of labour and material (excluding cables).

(i) FLUCTUATIONS IN COST FOR POWER TRANSFORMER

Fluctuation in cost of all labour and material for the power transformer shall be calculated in accordance with the following formula:

$$F = (1 - x) \left[a \left(\frac{Lt}{Lo} \right) + b1 \left(\frac{Mt1}{Mo1} \right) + b2 \left(\frac{Mt2}{Mo2} \right) + b3 \left(\frac{Mt3}{Mo3} \right) + b4 \left(\frac{Mt4}{Mo4} \right) + b5 \left(\frac{Mt5}{Mo5} \right) - 1 \right]$$

Where,

- x = 10 % Fixed Portion.
- a = 15 % Table C3: Actual Labour Cost (All Hourly Paid Employees).
- Lo = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling at date of Tender.
- Lt = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling for month during which work was performed.
- b1 = 15 % Table E-A: Steel (Hot Rolled Plates).
- Mo1 = SEIFSA Index of Domestic Producers Price Steel (Hot Rolled Plates) as ruling at date of Tender.
- Mt1 = SEIFSA Index of Domestic Producers Price Steel (Hot Rolled Plates) ruling for month prior to month during which work was performed.
- b2 = 23 % Table F: Copper RCP (Metric ton).
- Mo2 = SEIFSA Index of Metal Prices (Copper RCP: Metric ton) as ruling at date of Tender.

C1.4 - PART 2B: SPECIAL PROVISIONS

- Mt2 = SEIFSA Index of Metal Prices (Copper RCP: Metric ton) ruling for month prior to month during which work was performed.
- b3 = 5 % Table G: Electrical Engineering Materials.
- Mo3 = SEIFSA Index of Production Price (Electrical Engineering Materials) as ruling at date of Tender.
- Mt3 = SEIFSA Index of Production Price (Electrical Engineering Materials) ruling for month prior to month during which work was performed.
- b4 = 6 % Table M: Transformer Oil.
- Mo4 = SEIFSA Index of PPI Selected Materials, Packing Materials (Transformer Oil) as ruling at date of Tender.
- Mt4 = SEIFSA Index of PPI Selected Materials, Packing Materials (Transformer Oil) ruling for month prior to month during which work was performed.
- b5 = 26 % Table J: Materials used in the manufacture of Power Transformers.
- Mo5 = SEIFSA Index of Materials used in the manufacture of Power Transformers as ruling at date of Tender.
- Mt5 = SEIFSA Index of Materials used in the manufacture of Power Transformers ruling for month prior to month during which work was performed.

(ii) FLUCTUATIONS IN COST FOR NECRT

Fluctuation in cost of all labour and material for the power transformer shall be calculated in accordance with the following formula:

$$F = (1 - x) \left[a \left(\frac{Lt}{Lo} \right) + b1 \left(\frac{Mt1}{Mo1} \right) + b2 \left(\frac{Mt2}{Mo2} \right) + b3 \left(\frac{Mt3}{Mo3} \right) + b4 \left(\frac{Mt4}{Mo4} \right) + b5 \left(\frac{Mt5}{Mo5} \right) - 1 \right]$$

Where,

- x = 10 % Fixed Portion.
- a = 15 % Table C3: Actual Labour Cost (All Hourly Paid Employees).
- Lo = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling at date of Tender.
- Lt = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling for month during which work was performed.
- b1 = 15 % Table E-A: Steel (Hot Rolled Plates).
- Mo1 = SEIFSA Index of Domestic Producers Price Steel (Hot Rolled Plates) as ruling at date of Tender.
- Mt1 = SEIFSA Index of Domestic Producers Price Steel (Hot Rolled Plates) ruling for month prior to month during which work was performed.
- b2 = 23 % Table F: Copper RCP (Metric ton).
- Mo2 = SEIFSA Index of Metal Prices (Copper RCP: Metric ton) as ruling at date of Tender.
- Mt2 = SEIFSA Index of Metal Prices (Copper RCP: Metric ton) ruling for month prior to month during which work was performed.
- b3 = 5 % Table G: Electrical Engineering Materials.
- Mo3 = SEIFSA Index of Production Price (Electrical Engineering Materials) as ruling at date of Tender.

C1.4 - PART 2B: SPECIAL PROVISIONS

- Mt3 = SEIFSA Index of Production Price (Electrical Engineering Materials) ruling for month prior to month during which work was performed.
- b4 = 6 % Table M: Transformer Oil.
- Mo4 = SEIFSA Index of PPI Selected Materials, Packing Materials (Transformer Oil) as ruling at date of Tender.
- Mt4 = SEIFSA Index of PPI Selected Materials, Packing Materials (Transformer Oil) ruling for month prior to month during which work was performed.
- b5 = 26 % Table J: Materials used in the manufacture of Power Transformers.
- Mo5 = SEIFSA Index of Materials used in the manufacture of Power Transformers as ruling at date of Tender.
- Mt5 = SEIFSA Index of Materials used in the manufacture of Power Transformers ruling for month prior to month during which work was performed.

(iii) FLUCTUATIONS IN COST FOR CABLES

Due to the volatility of material, labour and other costs, prices are based on those costs ruling as published by Price Waterhouse Coopers (auditors) and the Associations of Cable Manufacturers of South Africa for cables and steel core prices as published by SCAW South Africa materials, the Steel and Engineering Industries Federation of South Africa (SEIFSA) Table C4 – for labour. The adjustment formula applicable is as follows:

$$AP = T \pm (CxV + XxV + LxV + HxV + PxV + SxV + SCxV + DC)$$

Where,

- AP = Adjusted price per kilometre.
- T = Tender price per kilometre.
- C = Copper price (see note 1).
- X = Aluminium price (see note 1).
- L = Labour and other related services (see note 2)
- P = PVC price (see note 1).
- H = XLPE price (see note 1).
- S = Steel wire price (see note 1).
- SC = Steel core (see note 1) – (ACSR).
- V = Relevant variation factor per kilometre.
- D = Cable drum cost (see note 3).
- DC = DAP costs (see note 3).

Note 1 – Difference between base price on which quoted prices are based and the ruling price the time of adjustment

Note 2 – Difference between base index on which quoted prices are based and the ruling index (alternatively the last published index) at the time of adjustment.

Note 3 – Difference between base cost (Rand/km cable) on which tender prices are based and the cost at the time of adjustment.

*All prices and costs shall be in South African Rand (ZAR)

(iv) FLUCTUATIONS IN COST FOR 132 kV ISOLATORS

Fluctuation in cost of all labour and material for the 132 kV isolators shall be calculated in accordance with the following formula:

$$F = (1 - x) \left[a \left(\frac{Lt}{Lo} \right) + b1 \left(\frac{Mt1}{Mo1} \right) + b2 \left(\frac{Mt2}{Mo2} \right) + b3 \left(\frac{Mt3}{Mo3} \right) + b4 \left(\frac{Mt4}{Mo4} \right) + b5 \left(\frac{Mt5}{Mo5} \right) + b6 \left(\frac{Mt6}{Mo6} \right) - 1 \right]$$

where

- x = 10 % Fixed Portion.
- a = 48 % Table C3: Actual Labour Cost (All Hourly Paid Employees).
- Lo = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling at date of Tender.

C1.4 - PART 2B: SPECIAL PROVISIONS

- Lt = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling for month during which work was performed.
- b1 = 10 % Table E-A: Steel (Hot Rolled Plates).
- Mo1 = SEIFSA Index of Domestic Producers Price Steel (Hot Rolled Plates) as ruling at date of Tender.
- Mt1 = SEIFSA Index of Domestic Producers Price Steel (Hot Rolled Plates) ruling for month prior to month during which work was performed.
- b2 = 5 % Table F: Copper RCP (Metric ton).
- Mo2 = SEIFSA Index of Metal Prices (Copper RCP: Metric ton) as ruling at date of Tender.
- Mt2 = SEIFSA Index of Metal Prices (Copper RCP: Metric ton) ruling for month prior to month during which work was performed.
- b3 = 10 % Table G: Electrical Engineering Materials.
- Mo3 = SEIFSA Index of Production Price (Electrical Engineering Materials) as ruling at date of Tender.
- Mt3 = SEIFSA Index of Production Price (Electrical Engineering Materials) ruling for month prior to month during which work was performed.
- b4 = 15 % Table R: 99.70 Melting Ingot.
- Mo4 = SEIFSA Index of Price of Aluminium Products per Ton (99.70 Melting Ingot) as ruling at date of Tender.
- Mt4 = SEIFSA Index of Price of Aluminium Products per Ton (99.70 Melting Ingot) ruling for month prior to month during which work was performed.
- b5 = 1 % Table F: Zinc.
- Mo5 = SEIFSA Index of Metal Prices (Zinc) as ruling at date of Tender.
- Mt5 = SEIFSA Index of Metal Prices (Zinc) ruling for month prior to month during which work was performed.
- B6 = 1 % Table Q-2 (A): 304 Stainless Steel 2mm and 3mm.
- Mo6 = SEIFSA Index of Stainless Steel Flat Products, Cold Rolled Steel (2mm and 3mm 304) as ruling at date of Tender.
- Mt6 = SEIFSA Index of Stainless Steel Flat Products, Cold Rolled Steel (2mm and 3mm 304) ruling for month prior to month during which work was performed.

(v) FLUCTUATIONS IN COST FOR 132 kV CURRENT TRANSFORMER

Fluctuation in cost of all labour and material for the 132 kV Current Transformer shall be calculated in accordance with the following formula:

$$F = (1 - x) \left[a \left(\frac{Lt}{Lo} \right) + b1 \left(\frac{Mt1}{Mo1} \right) + b2 \left(\frac{Mt2}{Mo2} \right) + b3 \left(\frac{Mt3}{Mo3} \right) + b4 \left(\frac{Mt4}{Mo4} \right) + b5 \left(\frac{Mt5}{Mo5} \right) + b6 \left(\frac{Mt6}{Mo6} \right) + b7 \left(\frac{Mt7}{Mo7} \right) - 1 \right]$$

where

- x = 10 % Fixed Portion.
- a = 38 % Table C3(A): Actual Labour Cost (All Hourly Paid Employees).
- Lo = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling at date of Tender.
- Lt = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling for month during which work was performed.
- b1 = 5 % Table E-A: Steel (Hot Rolled Plates).
- Mo1 = SEIFSA Index of Domestic Producers Price Steel (Hot Rolled Plates) as ruling at date of Tender.

C1.4 - PART 2B: SPECIAL PROVISIONS

- Mt1 = SEIFSA Index of Domestic Producers Price Steel (Hot Rolled Plates) ruling for month prior to month during which work was performed.
- b2 = 20 % Table F: Copper RCP (Metric ton).
- Mo2 = SEIFSA Index of Metal Prices (Copper RCP: Metric ton) as ruling at date of Tender.
- Mt2 = SEIFSA Index of Metal Prices (Copper RCP: Metric ton) ruling for month prior to month during which work was performed.
- b3 = 6 % Table G: Electrical Engineering Materials.
- Mo3 = SEIFSA Index of Production Price (Electrical Engineering Materials) as ruling at date of Tender.
- Mt3 = SEIFSA Index of Production Price (Electrical Engineering Materials) ruling for month prior to month during which work was performed.
- b4 = 7.5 % Table M: Craft Paper.
- Mo4 = SEIFSA Index of PPI Selected Materials, Packing Materials (Craft Paper) as ruling at date of Tender.
- Mt4 = SEIFSA Index of PPI Selected Materials, Packing Materials (Craft Paper) ruling for month prior to month during which work was performed.
- b5 = 8 % Table M: Transformer Oil.
- Mo5 = SEIFSA Index of PPI Selected Materials, Packing Materials (Transformer Oil) as ruling at date of Tender.
- Mt5 = SEIFSA Index of PPI Selected Materials, Packing Materials (Transformer Oil) ruling for month prior to month during which work was performed.
- b6 = 4.5 % Table J: Materials used in the manufacture of Power Transformers.
- Mo6 = SEIFSA Index of Materials used in the manufacture of Power Transformers as ruling at date of Tender.
- Mt6 = SEIFSA Index of Materials used in the manufacture of Power Transformers ruling for month prior to month during which work was performed.
- b7 = 1 % Table F: Zinc.
- Mo7 = SEIFSA Index of Metal Prices (Zinc) as ruling at date of Tender.
- Mt7 = SEIFSA Index of Metal Prices (Zinc) ruling for month prior to month during which work was performed.

(vi) **FLUCTUATIONS IN COST FOR 11 kV METALCLAD SWITCHGEAR**

Fluctuation in cost of all labour and material for the 11 kV Metalclad Switchgear shall be calculated in accordance with the following formula:

$$F = (1 - x)[a1 \left(\frac{Lt1}{Lo1}\right) + a2 \left(\frac{Lt2}{Lo2}\right) + b \left(\frac{Mt}{Mo}\right) - 1]$$

where

- x = 10 % Fixed Portion.
- a1 = 30 % Table C3(A): Actual Labour Cost (All Hourly Paid Employees).
- Lo1 = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling at date of Tender.
- Lt1 = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling for month during which work was performed.
- a2 = 30 % Table U: PPI (Electricity and Water).
- Lo2 = SEIFSA Index of Production Price (Electricity and Water) as ruling at date of Tender.
- Lt2 = SEIFSA Index of Production Price (Electricity and Water) as ruling for month during which work was performed.

C1.4 - PART 2B: SPECIAL PROVISIONS

- b = 30 % Table G: Electrical Engineering Materials.
- Mo = SEIFSA Index of Production Price (Electrical Engineering Materials) as ruling at date of Tender.
- Mt = SEIFSA Index of Production Price (Electrical Engineering Materials) ruling for month prior to month during which work was performed.

If the Tenderer wishes to base his tender on values of x, a and b, different to those specified above, he shall state the relevant figures separately. The effect of the figures so tendered shall be calculated on the basis of the tender amount and shall be considered when appointing a Contractor.

(vii) FLUCTUATIONS IN COST FOR LABOUR

If the project is phased fluctuation in cost of all labour for subsequent phases shall be calculated in accordance with the following formula:

$$F = (1 - x) \left[a1 \left(\frac{Lt1}{Lo1} \right) + a2 \left(\frac{Lt2}{Lo2} \right) - 1 \right]$$

where

- x = 10 % Fixed Portion.
- a1 = 80 % Table C3(A): Actual Labour Cost (All Hourly Paid Employees).
- Lo1 = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling at date of Tender.
- Lt1 = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling for month during which work was performed.
- a2 = 10 % Table D: CPI (Consumer Price Index).
- Lo2 = Statistics SA Consumer Price Index as ruling at date of Tender.
- Lt2 = Statistics SA Consumer Price Index as ruling for month during which work was performed.

(viii) FLUCTUATIONS IN COST FOR ELECTRICAL MATERIAL

If the project is phased fluctuation in cost of all material for subsequent phases shall be calculated in accordance with the following formula:

$$F = (1 - x) \left[a1 \left(\frac{Lt1}{Lo1} \right) + a2 \left(\frac{Lt2}{Lo2} \right) + b \left(\frac{Mt}{Mo} \right) - 1 \right]$$

where

- x = 10 % Fixed Portion.
- a1 = 30 % Table C3 (A): Actual Labour Cost (All Hourly Paid Employees).
- Lo1 = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling at date of Tender.
- Lt1 = SEIFSA Index of Actual Labour Cost (All Hourly Paid Employees) as ruling for month during which work was performed.
- a2 = 15 % Table D: CPI (Consumer Price Index).
- Lo2 = Statistics SA Consumer Price Index as ruling at date of Tender.
- Lt2 = Statistics SA Consumer Price Index as ruling for month during which work was performed.
- b = 45 % Table G: Electrical Engineering Materials.
- Mo = SEIFSA Index of Production Price (Electrical Engineering Materials) as ruling at date of Tender.
- Mt = SEIFSA Index of Production Price (Electrical Engineering Materials) ruling for month prior to month during which work was performed.

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
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14. CONTRACT PRICE AND PAYMENT

ADVANCE PAYMENT	14.2.1 – 14.2.3	This advance payment sub-clause shall not apply to this contract. However, should the Employer agree, an upfront payment can be negotiated, whereby the Contractor will be required to issue the Employer with a guarantee for the exact amount of the upfront payment. The costs involved to obtain this guarantee will be for the Contractor's account.
APPLICATION FOR INTERIM PAYMENT CERTIFICATES	14.3	A single copy of the Contractor Statement in an electronic format will be deemed adequate. An original, hard copy, invoice shall be raised by the Contractor upon Certification of the Contractors Claim by the Engineer. This Sub-Clause is amended as follows: - Delete the words "end of the period" in the first paragraph and replace with "7 days prior to the 25th day of each month." Add the following at the end of this Sub-Clause: - In the event that the Contractor fails to submit a Statement on time, any late submission will only be evaluated in the next month.
SCHEDULE OF PAYMENTS	14.4	The content of this Clause is not applicable. The Contractor shall submit together with the Programme an estimated Cash Flow based on tasks in the Programme.
CURRENCIES OF PAYMENT (Rate of Exchange)	14.15 (f)	If the Contract Data under the Particular Conditions of Contract makes allowance for Rate of Exchange Adjustment for long lead items, these conditions shall apply: - No CPA claims will be accepted which are submitted later than 60 days from the date of the Payment Certification of the applicable equipment. - CPA claims submitted on the basis of one or more provisional indices, shall be treated as final claims. - CPA claims shall have a fixed portion of the Contract Unit Rate Price which shall not be subject to Price adjustment, if the fixed portion is not specifically detailed the fixed portion value shall default to 15% of the applicable rate. This percentage shall be applied to the cost adjustment of each item. - No CPA shall apply to early or advance payments certified. - The country of manufacturing origin's exchange rate shall be used i.e. a USD – ZAR exchange rate will not be accepted for equipment not manufactured in the USA. - No Cost Adjustment will be applicable to this contract as <u>whole</u>. The Tenderer must therefore allow for changes in the Rate of Exchange in his unit prices. However, provision will be made for Rate of Exchange adjustments only on long lead items listed in the Contract Data. Rate of exchange will only apply to imported material, to cater for upward and downward fluctuations in cost.
ISSUE OF INTERIM PAYMENT CERTIFICATES	14.6	The content of sub-clause 14.6.1 is amended as follows: The Engineer will issue the Interim Payment Certificate within 7 - 28 days after the receipt of the Statement and supporting documentation

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
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15. TERMINATION BY EMPLOYER

16. SUSPENSION AND TERMINATION BY CONTRACTOR

17. CARE OF THE WORKS AND INDEMNITIES

18. EXCEPTIONAL EVENTS

EXCEPTIONAL EVENTS	18.1	Add this sub-clause: It is explicitly noted that no claims by the Contractor will be entertained for work stoppages due to riot, commotion, disorder, any blockade or embargo, strikes or lock outs by local labourers which are in the employ of the Contractor. If the Contractor has not reasonable provided against foreseeable community unrest stoppages by including a community desk, any claims by the Contractor shall not be entertained for stoppages caused by persons other than the Contractor's personnel. Note: for an event to be classified as an "exceptional event", the requirements of all four sub-paragraphs (i) to (iv) of clause 18.1 must be satisfied.
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19. INSURANCE

20. EMPLOYER'S AND CONTRACTOR'S CLAIMS

21. DISPUTES AND ARBITRATION

CONSTITUTION OF THE DAAB	21.1	The DAAB shall be adhoc in the event where dispute(s) arise between parties
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22. ADDITIONAL GENERAL PROVISIONS

These conditions are adopted from Clause 5 of the FIDIC Conditions of Contract for EPC/Turnkey Projects. (First Edition 1999)

PERIOD OF VALIDITY OF TENDER	22.1	Add this sub-clause: The period of the tender validity shall be 90 days, with extension by mutual agreement between the Engineer and the Contractor
TAX INVOICES	22.2	Add this sub-clause: The Contractor shall issue an invoice to the Employer for all amounts to be paid to the Contractor under the Contract. If VAT is payable on any amount certified by the Engineer for payment under the Contract, the Contractor shall ensure that the invoice complies with the requirements of a Tax Invoice under the Value Added Tax Act no. 89 of 1991 (as amended). No payment shall be made by the Employer on invoices not meeting this requirement and the Employer shall not be liable for interest for such non-payment.

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
EMPLOYER'S RIGHT TO STEP-IN	22.3	Add this sub-clause: If the Contractor fails to carry out any obligation under the Contract and fails to make good the failure and remedy it despite being required to do so by the Engineer by notice under Sub-Clause 15.1 [Notice to Correct] (within the specified reasonable time), the Employer, without prejudice to its other rights, powers and remedies under the Contract or in law, shall be entitled to make good the failure and remedy it either himself or via other persons, and the reasonable costs of doing so shall be for the account of the Contractor. The Contractor shall co-operate with the Employer and facilitate and permit the use of all required Goods, information, materials and other matter (including Contractor's Documents and all other drawings, CAD files, technical data, models, plans, designs, diagrams, evaluations, details, specifications, schedules, reports, calculation results, manuals or other documents or recorded information (electronic or otherwise) which have been or are at any time prepared by or on behalf of the Contractor under the Contract or otherwise for and/or in connection with the Works) and shall generally do all things required by the Engineer to achieve this end.
RECORD AND DATA KEEPING	22.5	Add this sub-clause: The Contractor shall maintain all data, records, electronic communications and documentation relating to this Contract and keep full and proper records and accounts in connection with the Works (whether contained in documents or in electronic format), during the execution of the Works and for a period of 5 (five) years after the latest of the expiry dates of the Defects Notification Periods (or the earlier termination of the Contract for any reason whatsoever, as the case may be) and shall ensure that all Subcontractors do likewise. The Employer's Personnel and the Employer's other authorised representatives and agents shall be entitled to examine, audit, copy and inspect all such books, records, systems, processes, procedures and documents at all reasonable times during the execution of the Works and during the said 5 (five) year period in order to verify compliance by the Contractor with its obligations, and/or to assess any entitlement or claimed entitlement of the Contractor under the Contract. The Contractor shall provide access to all such books, records, systems, data and documents of the Contractor and to any premises and personnel of the Contractor for this purpose and shall co-operate and render all assistance requested by the Employer's Personnel and the Employer's other authorised representatives and agents. All data, communications, records and accounts are to be kept in a lockable storeroom and adequately protects against loss which includes, but is not limited to, fire, theft, vermin, etc.

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
DAMAGES FOR THE LATE SUPPLY OF DOCUMENTATION	22.6	Add this sub-clause: If the Contractor fails to provide any of the documents listed by the dates specified in the Contract, the Contractor shall pay damages to the Employer for this default. These damages shall be the same amount stated in the Contract Data under sub-clause 8.8 for delay damages, which shall be paid for each day which shall elapse between the time the document in question was to have been delivered and when it was actually delivered. These damages shall not relieve the Contractor from his obligations to provide the said document, or to complete the Works, or from any other duties, obligations or responsibilities which he may have under the Contract.
RETESTING & RE-INSPECTION	22.7	If the Works or any Section fails to pass any Progress Tests, Completion Tests, Progress Inspections, Completion or Take Over Inspection, the Engineer may require such Tests and Inspections to be repeated on the same terms and conditions. All costs to which the Employer may be put due to repetition of the Tests under this sub-clause shall be deducted from the Contract price. The Contractor shall be liable to pay R 20 000.00 penalty to the Engineer for scheduled inspections or tests failed, per failure, for time wasted.

23. ADDITIONAL GENERAL PROVISIONS FOR DESIGN BY THE CONTRACTOR:

These conditions are adopted from Clause 5 of the FIDIC Conditions of Contract for EPC/Turnkey Projects. (First Edition 1999)

GENERAL DESIGN OBLIGATIONS	23.1	The Contractor shall be deemed to have scrutinised, prior to the Base Date (28 days before the Tender Closing Date), the Engineer's Requirements (including design criteria and calculations, if any). The Contractor shall be responsible for the design of parts of the Works and for the accuracy of such Engineer's Requirements (including design criteria and calculations), except as stated below The Engineer shall not be responsible for any error, inaccuracy, or omission of any kind in the Engineer's Requirements as originally included in the Contract and shall not be deemed to have given any representation of accuracy or completeness of any data or information, except as stated below. Any data or information received by the Contractor, from the Engineer, Engineer or otherwise shall not relieve the Contractor from his responsibility for the design and execution of the Works. However, the Engineer shall be responsible for the correctness of the following portions of the Engineer's Requirements and of the following data and information provided by (or on behalf of) the Engineer. - Portions, data, and information which are stated in the Contract as being immutable or the responsibility of the Engineer, - Definitions of intended purposes of the Works or any parts thereof, - Criteria for the testing and performance of the completed Works, and - Portions, data, and information which cannot be verified by the Contractor, except as otherwise stated in the Contract.
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C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
CONTRACTOR'S DOCUMENTS	23.2	The Contractor's Documents shall comprise the technical documents specified in the Engineer's Requirements, documents required to satisfy all regulatory approvals, and the as-built documents requirements, and operation and maintenance manual requirements. Unless otherwise stated in the Engineer's Requirement, the Contractor's Documents shall be written in the language for communications defined in Sub-Clause 1.4 (Law and Language). The Contractor shall prepare all Contractor's Documents and shall also prepare any other documents necessary to instruct the Contractor's Personnel. Each review period shall not exceed 21 days, calculated from the date on which the Engineer receives a Contractor's Document. The Contractor's Documents shall state the level of compliance with the Contract, or the extent to which it does not comply. The Engineer may, within the review period, give notice to the Contractor that a Contractor's Document fails (to the extent stated) to comply with the Contract. If a Contractor's Document so fails to comply, it shall be rectified, resubmitted, and reviewed in accordance with the Sub-Clause, at the Contractor's cost. For each part of the Works, and except to the extent that the Parties otherwise agree: a) Execution of such part of the Works shall not commence prior to the expiry of the review periods for all the Contractor's Documents which are relevant to its design and execution. b) Execution of such part of the Works shall be in accordance with these Contractor's Documents, as submitted for review; and c) If the Contractor wishes to modify any design or document which has previously been submitted for review, the Contractor shall immediately give notice to the Engineer. Thereafter, the Contractor shall submit revised documents to the Engineer in accordance with the above procedure. Any such agreement (under the preceding paragraph) or any review (under this Sub-Clause or otherwise) shall not relieve the Contractor from any obligation or responsibility.
CONTRACTOR'S UNDERTAKING	23.3	The Contractor undertakes that the design, the Contractor's Documents, the execution, and the completed Works will be in accordance with: a) The Laws in the Country, and b) The documents forming the Contract, as altered, or modified by Variations.

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
TECHNICAL STANDARDS AND REGULATIONS	23.4	The design, the Contractor's Documents, the execution, and the completed Works shall comply with the Country's technical standards, building, construction and environmental Laws, Laws applicable to the product being produced from the Works, and other standards specified in the Engineer 's Requirements, applicable to the Works, or defined by the applicable Laws. All these Laws shall, in respect of the Works and each Section, be those prevailing when the Works or Section are taken over by the Engineer under Clause 10 (Engineer's Taking Over). References in the Contract to published standards shall be understood to be references to the edition applicable on the Base Date, unless stated otherwise. If changed or new applicable standards come into force in the Country after the Base Date, the Contractor shall give notice to the Engineer and (if appropriate) submit proposals for compliance. In the event that: a) The Engineer determines that compliance is required, and b) The proposals for compliance constitute a variation, then the Engineer shall initiate a Variation in accordance with Clause 13 (Variations and Adjustments).
TRAINING	23.5	The Contractor shall carry out the training of Engineer's Personnel in the operation and maintenance of the Works. If the Contract specifies training which is to be carried out before taking-over, under Sub-Clause 10.1 (Taking Over of the Works and Sections) until this training has been completed.
AS-BUILT DOCUMENTS	23.6	The Contractor shall prepare, and keep up to date, a complete set of "as-built" records of the execution of the Works, showing the exact as-built locations, sizes and details of the work as executed. These records shall be kept on the Site and shall be used exclusively for the purposes of this Sub-Clause. Two copies shall be supplied to the Engineer prior to the commencement of the Tests on Completion. In addition, the Contractor shall supply to the Engineer as-built drawings of the Works, showing all Works as executed, and submit them to the Engineer for review under Sub-Clause 5.2 (Contractor's Documents). The Contractor shall obtain the consent of the Engineer as to their size, the referencing system, and other relevant details. Prior to the issue of any Taking-Over Certificate, the Contractor shall supply to the Engineer the specified numbers and types of copies of the relevant as-built drawings. In accordance with the Engineer's Requirements. The Works shall not be completed for the purposes of taking-over under Sub-Clause 10.1 (Taking Over of the Works and Sections) until the Engineer has received these documents.
OPERATION AND MAINTENANCE MANUALS	23.7	Prior to commencement of the Tests on Completion, the Contractor shall supply to the Engineer provisional operation and maintenance manuals in sufficient detail for the Engineer to operate, maintain, dismantle, reassemble, adjust, and repair the Plant. The Works shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 (Taking Over of the Works and Sections) until the Engineer has received final operation and maintenance manuals in such detail, and any other manuals specified in the Engineer's Requirements for these purposed.

C1.4 - PART 2B: SPECIAL PROVISIONS

Clause Description	Clause No	Amendment
DESIGN ERROR	23.8	If errors, omissions, ambiguities, inconsistencies, inadequacies, or other defects are found in the Contractor's Document, they and the Works shall be corrected at the Contractor's cost, notwithstanding any consent or approval under the Clause.

Note: The Contractor is advised to extend the liability for penalties to equipment manufacturers in order to cover the Contractor's liability if the project is delayed due to delayed manufacturing.

C1.4 - PART 2B: SPECIAL PROVISIONS

C1.4.1. ANNEXURE TO PCC – RAINFALL

No extension of the completion time will be granted in respect of normal rainfall. Extension will only be granted in respect of abnormal rainfall or abnormally wet conditions in accordance with the formula set out hereunder:

In the event of an extension being granted in accordance with the formula, no additional payment will be granted in respect of the "time related" items scheduled in Section 6: Preliminary and General of the Schedule of Quantities nor for any other costs incurred.

$$V = (N_w - N_n) \frac{R_w}{R_n}, \text{ if } N_w > N_n \text{ and where}$$

V = Extension of time in calendar days in respect of any particular month

N_w = Actual number of days during the corresponding month during which precipitation exceeds 10 mm

N_n = Average number of days during the corresponding month during which precipitation exceeded 10 mm

R_w = Actual rainfall during the corresponding calendar month

R_n = Average rainfall recorded during the corresponding calendar month

Calculations will be done for each month.

Calculations for part of a month are carried out using pro rata figures for N_n and R_n .

If R_w / R_n is greater than 2,5, its value shall be taken as 2,5.

If any month N_w is smaller than N_n , no extension of time will be granted for that month.

The following values of N_n and R_n shall be used for this Contract. They are based on figures supplied by the Weather Bureau, for the Impumelelo area.

Table 4: Average monthly rainfall

MONTH	AVERAGE NUMBER RAIN DAYS	N_n AVERAGE NUMBER OF DAYS EXCEEDING 10 MM	R_n AVERAGE RAINFALL IN MM
JANUARY	14,2	4	127,3
FEBRUARY	10,2	2	72,5
MARCH	9,8	3	74,6
APRIL	7,5	2	54,0
MAY	3	0	16,7
JUNE	1,7	0	9,1
JULY	1	0	8,6
AUGUST	1,9	0	8,2
SEPTEMBER	4,1	1	22,7
OCTOBER	9,1	3	66,5
NOVEMBER	12,9	3	100,3
DECEMBER	13,3	3	103,4

AVERAGE PER YEAR: 88,7 days and 663,9 mm

C1.4 - PART 2B: SPECIAL PROVISIONS

C1.4.2. ANNEXURE TO PCC – SCHEDULE OF SUB-CONTRACTORS

The Tenderer shall list below any Sub-Contractors he wishes to employ to carry out part(s) of the work.

The acceptance of this tender shall not be construed as being approval of all or any of the listed Sub-Contractors. Should any or all of the Sub-Contractors not be approved subsequent to the acceptance of the tender, it shall in no way invalidate this tender, and the tendered unit rates for the various items of work shall remain final and binding even in the event of a Sub-Contractor not listed below being approved by the Employer.

Table 5: Schedule of Sub-Contractors

PART OR TYPE OF WORK	PROPOSED SUB-CONTRACTOR	WORK RECENTLY EXECUTED BY SUB-CONTRACTOR

**This table must correspond with Table 2 in Section T2.2 Returnable Schedules*

SIGNED ON BEHALF OF TENDERER :

DATE :

C1.5: FORM OF SECURITIES

C1.5: FORM OF SECURITIES

C1.5. FORM OF SECURITIES

C1.5.1. EXAMPLE PERFORMANCE SECURITY – SURETY BOND

Name of Contract / Contract No.: _____

Name and address of Beneficiary (the “Employer”): _____

We have been informed that _____
[insert name of the Contractor] (hereinafter called the “Principal”), is your Contractor under such Contract, which requires him / her to obtain a Performance Security.

By this Bond, _____

[insert name and address of Contractor]
(who is your Contractor under such Contract) as Principal and: _____

[insert name and address of Guarantor]
as Guarantor are irrevocably held and firmly bound to the Beneficiary in the total amount of

_____ (10%) _____

[insert in figures and words the maximum amount payable and the currency in which it is payable] (the “Bond Amount”) for the due performance of all such Principal’s obligations and liabilities under the above named Contract.

[Such Bond Amount shall be reduced by 50 % upon the issue of the Taking-Over Certificate for the whole of the Works under Clause 10 of the Conditions of Contract.]

This Bond shall become effective on the Commencement Date defined in the Contract.

Upon Default by the Principal to perform any contractual obligation, or upon the occurrence of any of the events and circumstances listed in Sub-Clause 15.2.1 of the Conditions of Contract, the Guarantor shall satisfy and discharge the damages sustained by the Beneficiary due to such Default, event or circumstances [and shall not be entitled to perform the Principal’s obligations under the Contract.]. However, the total liability of the Guarantor shall not exceed the Bond Amount.

The obligations and liabilities of the Guarantor shall not be discharged by any allowance of time or other indulgence whatsoever by the Beneficiary to the Principal, or by any variation or suspension of the Works to be executed under the Contract, or by any amendments to the Contract or to the constitution of the Principal or the Beneficiary, or by any other matters, whether with or without the knowledge or consent of the Guarantor.

C1.5: FORM OF SECURITIES

Any claim under this Bond must be received by the Guarantor on or before _____

[insert the date six months after the expected expiry of the Defects Notification Period for the Works] (the “Expiry Date”), when this Bond shall expire and shall be returned to the Guarantor.

The benefit of this Bond may be assigned subject to the provisions for assignment of the Contract, and subject to the receipt by the Guarantor of evidence of full compliance with such provisions.

The Bond shall be governed by the law of _____
[insert the law governing the Bond] being the same country (or other jurisdiction) as that which governs the Contract. This Bond incorporates and shall be subject to the Uniform Rules for Contract Bonds, published as number 524 by the International Chamber of Commerce, and words used in this Bond shall bear the meanings set out in such Rules.

Whereas this Bond has been issued by the Principal and the Guarantor on _____
[date]

Signatures for and on behalf of the Principal:

(signature)

(signature)

(name)

(name)

Date: _____

Signatures for and on behalf of the Guarantor:

(signature)

(signature)

(name)

(name)

Date: _____

C1.5: FORM OF SECURITIES

NOTE: Payment shall be executed within 30 days of receiving instruction from the Engineer.

Instruction to be addressed to the following person's attention:

Name :

Telephone :

E-mail :

The address for submission of the Engineer's instruction to call upon the bond for payment:

Name :

Telephone :

E-mail :

Address :

C1.5: FORM OF SECURITIES

C1.5.2. EXAMPLE RETENTION GUARANTEE

Guarantee No.: _____ [*insert guarantee reference number*]

The Guarantor: _____
[*insert name and address of place of issue, unless indicated in the letterhead*]

Name of Contract / Contract No.: _____
[*insert reference number or other information identifying the contract between the Applicant and the Beneficiary on which the guarantee is based*]

The Beneficiary (the “Employer”): _____

[*insert name and address of the Beneficiary*]

We have been informed that _____
[*insert name and address of the Contractor*] (hereinafter called the “Applicant”)

is your Contractor under such Contract and wishes to receive an early payment of [part of] the retention money, for which the Contract requires him / her to obtain a guarantee.

At the request of the Applicant, we _____
[*insert name of Guarantor*] hereby irrevocably undertake to pay you, the Beneficiary/Employer, any sum or sums not exceeding in total the amount of

[*insert in figures and words the maximum amount payable and the currency in which it is payable*] (the “Guaranteed Amount”) upon receipt by us of your demand in writing and your written statement that the Applicant has failed to carry out his / her obligation(s) to rectify the following defect(s) for which he / she is responsible under the Contract [*state the nature of the defect(s)*].

At any time, our liability under this guarantee shall not exceed the total amount of retention money released to the Applicant by you, as evidenced by interim payment certificates issued under Sub-Clause 14.6 of the Conditions of Contract with a copy being submitted to us.

Any demand for payment must contain your signature(s) which must be authenticated by your bankers or by a notary public. The authenticated demand and statement must be received by us at the following office _____

[*insert address of office*]

on or before _____ [*insert the date 70 days after the expected expiry of the Defects Notification Period for the Works*], (the “Expiry Date”), when this guarantee shall expire.

C1.5: FORM OF SECURITIES

We have been informed that the Beneficiary may require the Applicant to extend this guarantee if the Performance Certificate under the Contract has not been issued by the date 28 days prior to such Expiry Date. We undertake to pay you the Guaranteed Amount upon receipt by us, within such period of 28 days, of your demand in writing and your written statement that the Performance Certificate has not been issued, for reasons attributable to the Applicant, and that this guarantee has not been extended.

The party liable for the payment of any charges:

_____ *[insert the name of the party]*.

This guarantee shall be governed by the laws of _____
[insert the law governing the guarantee] and shall be subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

SIGNED by:

(signature)

(name)

SIGNED by ⁽¹⁾:

(signature)

(name)

Date: _____

⁽¹⁾ *Whether one or more signatories for the bank are required will depend on the bank and / or applicable law.*

C1.5: FORM OF SECURITIES

C1.5.3. EXAMPLE SITE HANDOVER CERTIFICATE – BEGINNING OF THE WORKS

PROJECT : _____ [Insert Project Name]

CONTRACT NO : _____ [Insert Project Number]

SCOPE OF WORKS : _____ [Insert Project Description]

The site for the works, as stated above, is herewith handed over by the Employer/Local Authority namely: _____, to the appointed Contractor for the works, namely, _____.

The Contractor shall become “*the Mandatory*” when the Occupational Health and Safety Agreement is signed, with regards to Section 37(2) of the OHS Act 85 of 1993.

The Contractor shall take full responsibility for all aspects related to the above works and all portions thereof. The Employer/Local Authority shall remain responsible for related aspects and areas not affected by the Scope of Works. All infrastructure established as part of the works shall remain the responsibility of the Contractor until the site/works is handed over to the Employer / Local Authority.

Should the Contractor remove from site due to any contractual obligations not being met by the Employer/Local Authority, the Contractor shall notify the Employer/Local Authority that the Employer/Local Authority shall take over responsibility of the site until the relevant contractual obligations are met by the Employer/Local Authority.

SECTION OF WORK: [Insert Project Scope/Section Of Work]

CONTRACTOR'S REPRESENTATIVE : _____ (Full names)

CONTRACTOR'S FIRM : _____ (Company)

EMPLOYER / LOCAL AUTHORITY'S REPRESENTATIVE : _____ (Full Names)

EMPLOYER / LOCAL AUTHORITY'S : _____ (Company)

CONSULTING ENGINEER'S REPRESENTATIVE : _____ (Pr. xx.)

CONSULTING ENGINEER'S FIRM : **LYON AND PARTNERS (PTY) LTD**

DATE : _____ 20 _____

.....
SIGNATURE (LOCAL AUTHORITY/CLIENT)

.....
SIGNATURE (CONTRACTOR)

.....
SIGNATURE (CONSULTING ENGINEER)

.....
WITNESS



LESEDI LOCAL MUNICIPALITY
P O Box 201
HEIDELBERG
1438

**THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA,
132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)**

SECTION 4:
C2 – BILL OF QUANTITIES



LYON AND PARTNERS (Pty) Ltd
Electrical Consulting Engineers
P O Box 3925
VANDERBIJLPARK
1900

C2 – BILL OF QUANTITIES - CONTENTS

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C2.1 – PRICING INSTRUCTION

C2.1 PRICING INSTRUCTION

C2.BILL OF QUANTITIES

C2.1. PRICING INSTRUCTION

C2.1.1.PREAMBLE

1. This Schedule of Quantities forms part of the Contract Documents as listed in the Schedule of Documents and shall be read in conjunction with the General Conditions, the Specifications and the Drawings and must be submitted, duly completed, on the closing date of Tenders.
2. The short description of items in the Bill of Quantities are for identification purposes only, the work covered by the items being fully specified in the relevant clauses in the Specifications. The Tenderer must therefore allow in the unit price for ordering, obtaining, supplying, delivering to site, installation and commissioning of the relevant equipment with their accessories.
3. Except where Sum Amounts are required or where Provisional Amounts have been indicated, the Tenderer shall enter an applicable rate in the Rate Column of the Schedule of Quantities for each scheduled item. He shall also enter an applicable sum in the Amount Column for each scheduled item. Should the Schedule not be completed in the manner herein specified, the tender may either be rejected or the Contractor will not be paid for items against which rates or sum amounts, as applicable, have not been entered. In the event of the latter procedure items not paid for will be regarded as covered by other rates entered in the Schedule of Quantities.
4. Tenderers must complete the Schedule of Quantities and fill in the unit rates for material and labour as well as total amount for each item. The unit rate is for a single item only. Errors of the arithmetic calculation to calculate the total amount, as entered in the Schedule may be corrected by the Employer but rates will be binding.

An example of the calculations are as follows:

ITEM	DESCRIPTION	UNIT	QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
1	Supply and install a 9 m wood pole	No	100	R20,00	R100,00	R12 000,00
2	Excavate pole hole	m ³	100	R50,00	R0,00	R5 000,00
3	Supply and install 10 mm ² , 3-core cable	m	50	R5,00	R20,00	R1 250,00
4	Head office overhead cost	Sum	1	-	-	R15 000,00
TOTAL CARRIED FORWARD TO SUMMARY						R33 250,00

5. Tenderers are advised to check their items extensions and total additions as too many arithmetical errors occurring in the priced Schedule of Quantities will disqualify the Tenderer. Under no circumstances shall the Tenderer be permitted to change the specified quantities in the QTY column which will result in rejecting the tender or changing the quantity to the initial value and correcting the arithmetic's. If the Tenderer disagree with the quantity he must do so by means of an accompanied letter with full description and reference to the particular item.

C2.1 PRICING INSTRUCTION

6. The quantities reflected in the Schedule of Quantities are approximate only and do not necessarily represent the actual amount of work to be done. Allowance for off-cuts and scrap shall be allowed for in the unit rates. The Contract Price for the completed Contract shall be computed from the actual quantities of authorised work done to the satisfaction of the Engineer valued at the prices tendered against the respective items in the Bill of Quantities, and shall include such authorised provisional amounts and items of extra work as have become payable in terms of the Contract Documents. Extra material shall not be paid for and shall be removed from site.
7. The Contractor shall submit equipment technical data sheets and measured quantities for approval prior to placing any equipment orders. This information shall be submitted by the Contractor to the Engineering within 14 days of being appointed.
8. Unit prices quoted in the Schedule of Quantities must include for such small installation materials as are required for the complete installation in accordance with the Specifications.
9. Payment based on the rates tendered in the Schedule shall cover all the services and incidentals included in the works covered by the Contract and shall be made in accordance with the General Conditions, the Specifications and the Agreement pertaining to the Contract.
10. Where the Contractor is required to furnish detailed drawings and designs or other information in terms of the Contract Documents, all costs shall be deemed to have been provided for and included in the unit rates and sum amounts tendered for the items scheduled in the Schedule of Quantities and separate additional payment will not be made.
11. Writing in the Schedule must be done in black to facilitate clear photocopying.
12. The Contractor shall keep record of all material delivered to site, and shall submit such record to the Engineer at every site inspection. Material not installed shall be kept in the site yard or store and the material shall be kept readily available for inspection.
13. Application for payment, accompanied by supporting documentation, shall be submitted to the Engineer on a predetermined date which date shall be a suitable date in each month, agreed upon by all parties concerned with the payment. Claims for additional work in a particular month, for which no written instruction has not yet been issued, if applicable, must also accompany the monthly application for payment. Late claims will not be considered.
- 14. All unit rates and sum amounts shall exclude Value Added Tax, as applicable from 1 October 1991 and in accordance with the ruling rate as laid down by the Government, and all prices shall be quoted in South African currency.**
15. The Contractor's attention is drawn to the fact that the allowance for PROVISIONAL AMOUNTS/SUMS for escalation in costs and allowance for contingencies shall only be spent at the discretion of the Engineer and will fall away in part or in whole if not required. It is emphasized that prior to any variation, official approval must be granted.

C2.1 PRICING INSTRUCTION

16. Bidders must keep a copy of the completed excel spreadsheet BOQ which may be required during the evaluation processes. Failure to comply with the above-mentioned terms and conditions will deem your bid disqualified.

SIGNATURE OF TENDERER : _____

DATE : _____

C2.2 – BILL OF QUANTITIES

C2.2. BILL OF QUANTITIES

ITEM	DESCRIPTION	UNIT	QTY	UNIT RATE	TOTAL
1.	PRELIMINARIES				
	Amount allowed for all expenses, regarding the following:				
1.1	CONTRACTUAL REQUIREMENTS - FIXED AMOUNT				
1.1.1	Nett price for the fulfilment of the Tender Requirements, Conditions of Contract and Performance				
	Security/Security Bond. Performance Security to remain valid until date of issue of the Final Completion				
	Certificate or within 28 days after expiry Defects Notification Period	Sum	1		
1.1.2	Insurance of the Works in the <u>joint</u> names of the Employer and Contractor, Insurance of the Construction				
	Plant to its full replacement value and Third Party Insurance	Sum	1		
1.1.3	Site establishment, which includes site office, site store, laydown area, temporary housing, security fence,				
	sanitary, toilets, obtaining water, electrical connection, etc.	Sum	1		
1.1.4	Pegging and surveying of the route by a qualified surveyor: MV route including all pole positions,				
	anchors, stand boundaries for cable positions, etc.	Sum	1		
1.1.5	Surveying of the as-built route by a qualified surveyor: MV route including all pole positions,				
	anchors, stand boundaries for cable positions, etc.	Sum	1		
1.1.6	Pegging and surveying of the route by a qualified surveyor: LV route including all terminal poles and bends				
	points, etc.	Sum	1		
1.1.7	Pegging and surveying of the substation terrace by a qualified surveyor: Substation levels, fence position,				
	equipment positions and reference pegs	Sum	1		
1.1.8	Reinstating of missing S.G. pegs prior to construction of any works and obtaining Surveyors Certificate of				
	Compliance (Pr. Land Surveyor)	Sum	0		
1.1.9	Determining and locating of existing services as well as management of wayleaves throughout the delivery of				
	the works,	Sum	0		
1.1.10	Erecting of temporary obstructions and barricades	Sum	1		
1.1.11	CONSTRUCTION NOTICE BOARD (mm. 2600 X 1600)	Each	1		
1.1.12	Cleaning of the site, removal of all refuse, rubble, rock, etc. prior to handing over of every phase	Sum	1		
1.1.13	Obtaining permits, arranging for outages and switching with relevant Authorities	Sum	1		

CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION N

LIST A: PRELIMINARY GENERAL

ITEM	DESCRIPTION	UNIT	QTY	UNIT RATE	TOTAL
1.1.14	Obtaining access to the Eskom Website (<i>scot.eskom.co.za</i>) for access to the relevant Eskom Standards, and obtaining Eskom MOU authorisation before executing the Works	Sum	1		
1.1.15	Tools, material, safety clothing, and the appropriate PPE for the labourers (incl. local labourers) to conduct their work in accordance with safety requirements	Sum	1		
1.1.16	Medical evaluation and induction cost for all staff	Sum	1		
1.1.17	As built drawings and manuals (5 x sets). As built to include surveying of the works by a qualified surveyor, i.e. MV and LV conductors, equipment positions and any relevant site information (drawings to be issued in CAD format)	Sum	1		
1.1.18	Removal from site following completion of the Works	Sum	1		
1.1.19	Temporary removal from site for an undetermined period following completion of a section of the work and re-establishment to complete the remainder of the Works	Sum	1		
1.2	COMPLY WITH THE FOLLOWING SAFETY, HEALTH, ENVIRONMENTAL AND QUALITY (SHEQ) REQUIREMENTS - FIXED AMOUNT				
1.2.1	Adherence to Construction Regulations of the OHS Act	Sum	1		
1.2.2	Compile a Health and Safety Plan (H C S Plan)	Sum	1		
1.2.3	Compile a Risk Assessment for activities (RA)	Sum	1		
1.2.4	Comply with Environmental Management Plan (EMP)	Sum	1		
1.2.5	Submit proof of calibration of equipment, e.g. Crimper, HV test apparatus, breaking failure test of terminations and joints of ACSR OH Lines etc.	Sum	1		
1.2.6	Compile a SHEQ File to also include all the above distinct sections	Sum	1		
1.2.7	Construction work notification and permit application (assist the Employer to obtain a construction permit)	Sum	1		
1.3	TOTAL TIME RELATED COST BASED ON MONTHLY EXPENDITURE - ADJUSTABLE WITH CONTRACT PERIOD				
	The running cost of the project related to the contract period, which will also be used to adjust the cost if an event occurs that becomes the Employers Risk				
1.3.1	Head office overhead cost and contractual obligations	Sum	1		

CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION

LIST A: PRELIMINARY GENERAL

ITEM	DESCRIPTION	UNIT	QTY	UNIT RATE	TOTAL
1.3.2	Site overhead cost	Sum	1		
1.3.3	Material-store cost on site	Sum	1		
1.3.4	Material-store cost off site	Sum	1		
1.3.5	Maintenance of setting out of the works by a qualified surveyor	Sum	1		
1.3.6	Contracts Manager/ Contractor's Representative : Office and Site based	Sum	1		
1.3.7	Health, Safety and Environmental Officer	Sum	1		
1.3.8	Site Supervisor / Planner : Office and Site based	Sum	1		
1.3.9	Site Agent and SHE Representative: Site based	Sum	1		
1.3.10	Comply with SHEQ requirements by Safety Officer e.g. regular review and update of Health and Safety File	Sum	1		
1.3.11	Site offices cost , including ablution facilities, site administration, transport, accommodation etc.	Sum	1		
1.3.12	Coordination and working together with other Contractors / Sub-Contractors / Nominated Sub-Contractors	Sum	1		
1.3.13	Periodic medical, fitness and induction costs	Sum	1		
1.3.14	Security for site camp and work on site	Sum	1		
1.3.14	Local labour management cost for:	Sum	1		
1.3.14.1	Overhead cost to manage SMME's that will execute a portion of the contract	Sum	1		
1.3.14.2	Community Liaison Officer (R 5000.00 p/month)	Sum	1		
1.3.14.3	Community liaison and communication	Sum	1		
1.3.14.4	Community and Labour desk for community liaison, communication, to receive complaints and enquiries, and proactively manage relations	Sum	1		
1.3.14.5	Employment of local people for the duration of the project (R 260.00 p/day per worker)	Sum	1		
1.3.14.6	Training of semi-skilled labourers	Sum	1		

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CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION

LIST B: SITE WORK

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
2.	BULK EARTHWORKS	SANS 1200							
2.1	GENERAL								
2.1.1	Before starting the work the Contractor is to familiarise himself as to the accuracy of the Engineer's drawings.								
	All calculations will be based on this unless notified prior to site clearance and excavations commencing.	1200 A	Sum	1	0.8	0.2			
2.2	SPECIAL WATER CONTROL								
2.2.1	Allow for keeping excavations free of water for the duration of the contract.		Sum	1	0.8	0.2			
2.3	ADDITIONAL TESTS REQUESTED BY THE ENGINEER								
	The Contractor is to allow in his rates for all density tests required to comply with relevant specifications and drawings and in order to ensure that the required densities are obtained. The Contractor shall only be paid under the following items for test over and above the required tests as specified by the Engineer to be done by an independent laboratory.								
2.3.1	Nuclear density tests, including MOD.		Sum	1	0.8	0.2			
2.3.2	Road indicator tests with CBR values.		Sum	1	0.8	0.2			
2.3.3	Concrete - oxygen permeability		Sum	1	0.8	0.2			
2.3.4	Concrete - water sorptivity		Sum	1	0.8	0.2			
2.3.5	Concrete - slump test (all major slabs)		Sum	1	0.8	0.2			
2.4	HERBICIDES								
2.4.1	Application of Herbicides and Pesticides over the complete terrace (After terrace completion, during construction, before hand over and before lapse of 12 month maintenance period).		Each	1	0.8	0.2			
2.4.2	Application of Herbicides and Pesticides over all gravel roads		Each	1	0.8	0.2			
2.5	SITE SURVEY								
	Site survey / Setting out of works by a qualified land surveyor i.e. substation yard, access roads, buildings,								
	cable routes including multiple reinstating of pegs during construction and reinstating of pegs following completion		Sum	1	0.8	0.2			
	TOTAL CARRIED FORWARD TO SUMMARY OF BILL OF QUANTITIES								

CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION

LIST C: EARTH GRID

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
3.	INSTALLATION OF EARTH GRID								
	METHOD: Earth grid to be excavated and installed when the terrace / platform is 1000 below finished level (Excavation in completed terrace not allowed). Grid to be clearly marked with beacons following the installation. Tails to be excavated and installed following completion of the terrace as specified in Section 5, Clause 12.3.								
3.1	SUPPLY AND INSTALL COMPLETE EARTH GRID								
	Note: Copper quantified is for the earth grid only, and not for the earthing of the hold-down bolts. Copper for holding down bolts to be priced and allowed for with the foundations.								
3.1.1	150 mm ² Copper Equivalent CAMO CCS (Closing Span C Outside fence perimeter)		m	1667	1272	395			
3.1.2	78 mm ² Copper for earthing		m	3670	3144	526			
3.1.3	50 mm x 3 mm flat copper for earth tails connected to the earth grid and equipment foundation and all building and foundation re-enforcing.	D-DT-5240	m	962	769	193			
3.1.4	50 mm x 3 mm flat copper for earth tails to the fence and fence corner gate post (CGP).	D-DT-5240	m	278	189	90			
3.1.5	50 mm x 3 mm flat copper for earthing and earth-tails for building earthing of panels. This earthing should run in the cable trench / cable rack.	D-DT-5240	m	100	50	50			
3.1.6	50 mm x 3 mm flat copper for earthing and earth-tails for equal potential foot plates.	D-DT-5240	m	32	19	12			
3.1.7	Sacrificial earth anode	D-DT-5240	Each	5	3	2			
3.1.8	1 x 16 mm dia, 30 m deep earth spike		Each	35	30	5			
3.1.9	2 x 16 mm dia, 2 m deep earth spike in a 100 mm predrilled hole and backfilled with conductive concrete		Each	4	3	1			
3.1.10	2 x 16 mm dia, 30 m deep earth spike in a 100 mm predrilled hole and backfilled with conductive concrete		Each	3	2	1			
3.1.11	1 x 10 mm dia, 5 m deep earth rod in a 200 mm predrilled hole and backfilled with a Bentonite slurry mixture		Each	3	2	1			

LIST C: EARTH GRID

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ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
5.	CIVIL WORKS	SANS1200							
5.1	GENERAL								
5.1.1	Before starting the work the Contractor is to satisfy himself as to the accuracy of the Engineer's drawing.								
	All calculations will be based on this unless notified prior to site clearance and excavations commencing.	1200 A	Sum	1	0.8	0.2	R	-	
5.2	4,5M WIDE CONCRETE ROAD								
5.2.1	Excavation	1200D							
	Note: Contractors are to note that the prices for the bulk excavations are to include for the formation								
	of buttered banks required for lateral support and for ramps for the removal of excavated material and shall also include for all tests required.								
5.2.1.1	Excavation and stockpile for use as backfill or embankment or dispose within a free haul distance of 5km, in all materials (RWCLM Rates 19.32)	8.3.2.1	m³	540	540	0	R	-	
5.2.2	Backfill								
5.2.2.1	Rip and compaction of ground surface including scarifying for a depth of 150mm, breaking								
	down oversize material where necessary and compacting to 90% Mod AASHTO (RWCLM Rates 19.7)	8.3.4	m²	880	880	0	R	-	
5.2.3	Construct upper selected layer with materials from commercial sources								
5.2.3.1	Selected Grade G6 material compacted in layers 150mm thick to 93% Mod AASHTO to a moisture								
	content of +-2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval (RWCLM Rates 19.7)	8.3.4	m³	135	135	0	R	-	
5.2.3.2	Selected Grade G5 material compacted in layers 150mm thick to 96% Mod AASHTO to a moisture								
	content of +-2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval (RWCLM Rates 19.7)		m³	135	135	0	R	-	
5.2.4	Construct subbase with material from commercial sources:	1200ME							
5.2.4.1	Selected Grade G5 material compacted in layers 150mm thick to 98% Mod AASHTO to a moisture content of +-2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval (RWCLM Rates 19.7)	8.3.3	m³	135	135	0	R	-	
5.2.5	Construct base with material from commercial sources:	1200MF							
5.2.5.1	Selected Grade G5 material stabilized with and including 3% cement, compacted in layers 150mm thick to 98% Mod AASHTO to a moisture content of +-2% of optimum, including								
	MOD tests on the material to be used and submitted for the engineer's approval (RWCLM Rates 19.7)	8.3.3d	m³	135	135	0	R	-	
5.2.6	Concrete								
	Concrete - Rates for concrete to include for taking concrete samples and obtain test certificates for (7, 14 C 28 days):	1200G							
5.2.6.1	Rough formwork to edges	8.2.1	m	224	224	0	R	-	

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
5.2.6.2	Type 617 high tensile welded mesh	8.3.2	m ²	500	500	0	R -		
5.2.6.3	35MPa concrete in roads	8.4.3.3a	m ³	76	76	0	R -		
5.2.6.4	Wood float finish	8.4.4a	m ²	500	500	0	R -		
5.2.6.5	Construction joint to detail	8.5.5a	m	110	110	0	R -		
5.2.7									
5.2.7.1	900 x 450mm Concrete culvert underneath runway as per drawing	2-WT/1362	Each	2	2	0	R -		
5.3	7M WIDE CONCRETE GATE ENTRANCE								
5.3.1	Excavation	1200D							
	Note: Contractors are to note that the prices for the bulk excavations are to include for the formation								
	of buttered banks required for lateral support and for ramps for the removal of excavated material and								
	shall also include for all tests required.								
5.3.1.1	Excavation and stockpile for use as backfill or embankment or dispose within a free haul distance of 5km, in all materials	8.3.2.1	m ³	80	64	16	R -		
5.3.2	Backfill								
5.3.2.1	Rip and compaction of ground surface including scarifying for a depth of 150mm, breaking down oversize material where necessary and compacting to 90% Mod AASHTO	8.3.4	m ²	125	100	25	R -		
5.3.3	Construct upper selected layer with materials from commercial sources								
5.3.3.1	Selected Grade G6 material compacted in layers 150mm thick to 93% Mod AASHTO to a moisture content of +2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval	8.3.4	m ³	20	16	4	R -		
5.3.3.2	Selected Grade G5 material compacted in layers 150mm thick to 96% Mod AASHTO to a moisture content of +2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval		m ³	20	16	4	R -		
5.3.4	Construct subbase with material from commercial sources:	1200ME							
5.3.4.1	Selected Grade G5 material compacted in layers 150mm thick to 98% Mod AASHTO to a moisture content of +2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval	8.3.3	m ³	55	44	11	R -		
5.3.5	Construct base with material from commercial sources:	1200MF							
5.3.5.1	Selected Grade G5 material stabilized with and including 3% cement, compacted in layers 150mm thick to 98% Mod AASHTO to a moisture content of +2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval	8.3.3d	m ³	55	44	11	R -		

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
5.3.6	Concrete	1200G							
	Concrete - Rates for concrete to include for taking concrete samples and obtain test certificates for (7, 14 C 28 days):								
5.3.6.1	Rough formwork to edges	8.2.1	m	105	84	21	R	-	
5.3.6.2	Type 617 high tensile welded mesh	8.3.2	m²	125	100	25	R	-	
5.3.6.3	35MPa concrete in roads	8.4.3.3a	m³	20	16	4	R	-	
5.3.6.4	Wood float finish	8.4.4a	m²	225	125	100	R	-	
5.3.7	5M Wide brick paving road to gate entrance								
5.3.7.1	Site preparation, surface levelling, and construction of a 5 m wide paved access road from the existing roadway to the substation entrance gate, including all necessary sub-base preparation, compaction, edge restraints, and installation of paving blocks.		m	265	220	45	R	-	
5.4	CABLE TRENCH RAMPS	D-DT-5254							
5.4.1	to be done by an independent laboratory.	1200D							
	Note: Contractors are to note that the prices for the bulk excavations are to include for the formation of buttered banks required for lateral support and for ramps for the removal of excavated material and shall also include for all tests required.								
5.4.1.1	Excavation and stockpile for use as backfill or embankment or dispose within a free haul distance of 5km, in all materials (RWCLM Rates 19.32)	8.3.2.1d	m³	14	14	0			
5.4.2	Backfill from stockpile	8.3.4							
5.4.2.1	Rip and compaction of ground surface including scarifying for a depth of 150mm, breaking down oversize material where necessary and compacting to 90% Mod AASHTO (RWCLM Rates 19.7)		m²	55	55	0			
5.4.3	Concrete - Rates for concrete to include for taking concrete samples and obtain test certificates for: (7, 14 G 28 days)	1200G							
5.4.3.1	Rough formwork to edges	8.2.1	m	66	66	0			
5.4.3.2	Type 617 high tensile welded mesh	8.3.2	m²	83	83	0			
	25MPa concrete in ramps	8.4.3.3a	m³	20	20	0			
5.4.3.3	Wood float finish	8.4.4a	m²	56	56	0			
5.4.4	Miscellaneous items:	8.8							
5.4.4.1	30 x 30 x 5mm Galvanised mild steel angle section and lugs cast in	8.8.12a	kg	54	54	0			
5.4.4.2	16mm Galvanised mild steel plate, cut to 850mm lengths (Type 1)	8.8.12b	m²	5	5	0			
5.4.4.3	16mm Galvanised mild steel plate, cut to 1050mm lengths (Type 3)	8.8.12c	m²	7	7	0			

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ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
5.5.19	21m Lightning/lighting mast foundation	D-DT-5217s1C	Each	11	9	2			
5.5.20	AC yard board	D-DT-5276s1A	Each	3	2	1			
5.5.21	Fence foundations, 400 x 400 x 600mm deep	D-DT-5237	Each	126	95	31			
5.5.22	Sump Controller	D-DT-5233s1E	Each	1	1	0			
5.5.23	Steel templates for the above holding down bolts - to be approved prior to foundation construction		Sum	1	1	0			
5.6	CABLE DUCTS AND COVERS	1200LC							
	Excavate, dispose of burden within free haul distance of 5km, backfill, compaction, supply and cast/erect								
	complete concrete walls c/w covers detailed in the drawings (NOTE: Brick built trench walls will not be								
	considered or accepted, 1.2m.K/W bedding to be used for power cables								
5.6.1	Complete 750 mm wide cable trenches as per drawing	DX-5000	m	292	256	36			
5.6.2	Complete 900 mm wide cable trenches as per drawing	DX-5000	m	55	45	10			
5.6.3	Bedding to fill 750 mm wide cable trenching as per Eskom Spec	DX-5000	m	292	256	36			
5.6.4	Bedding to fill 900 mm wide cable trenching as per Eskom Spec	DX-5000	m	55	45	10			
5.6.5	Bedding test certificate		Sum	2	1	1			
5.6.6	Extra over 750mm wide cable trench for								
5.6.6.1	90 Degree bend		Each	3	2	1			
5.6.6.2	T-Intersection		Each	9	8	1			
5.6.6.3	Closed end		Each	8	7	1			
5.6.7	Extra over 900mm wide cable trench for								
5.6.7.1	90 Degree bend		Each	3	2	1			
5.6.7.2	T-Intersection		Each	3	2	1			
5.7	OIL DRAINAGE SYSTEM								
5.7.1	Sundry								
5.7.1.1	Supply and install a 200l/min 3m head submersible pump, including 10m pipe, in oil holding dam and control panel.		Each	1	1	0			
5.8	OIL DRAINAGE SYSTEM								
5.8.1	Earthworks - Small works	1200DA							
	Excavate, dispose of burden within free haul distance of 5km, backfill, compaction, supply and cast/erect								
	complete concrete oil holding dam.								
5.8.1.1	Excavate for "Oil Holding Dam"	8.3.1b	m³	61	61	0			
5.8.1.2	Excavate for "Oil Trap"	8.3.1b	m³	0	0	0			
5.8.2	Extra over excavations for:								
5.8.2.1	Intermediate excavation	8.3.1c1	m³	10	10	0			

LIST E: CIVIL WORK

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
5.8.2.2	Hard rock excavation	8.3.1c2	m³	10	10	0			
5.8.2	Oil drainage piping	1200DB							
	Excavate, dispose of burden within free haul distance of 5km, backfill, compaction for pipes over 125 mm								
	dia and up to 400 mm dia for depths:								
5.8.2.1	Up to 1,0 m	8.3.2.4a	m	30	30	0			
5.8.2.2	Over 1,0 m up to 2,0 m	8.3.2.4b	m	30	30	0			
5.8.3	Sundry building work								
5.8.3.1	Construct "Oil Holding Dam" as per drawings c/w oil trap, sump and sump control	D-DT-5234-1AC1B	Each	1	1	0			
5.8.3.2	Construct "Oil Trap" in series with the dam.	5241	Each	1	1	0			
5.8.4	Pipes	1200DB							
	Supply, lay and bed as per Engineer's details, complete Concrete Pipe Culverts on class A bedding:								
	Type SC 100 -D-load pipes with ogee joints:								
5.8.4.1	300 mm Diameter	8.2.1.1	m	60	60	0			
5.8.5	Manholes	1200LD							
	Construct manholes complete with concrete cover and frame for pipes up to 600 mm dia:								
5.8.5.1	Depth 0,5 m up to 1,0 m	8.2.3.1	each	2	2	0			
5.8.5.2	Depth 1,0 m up to 1,5 m	8.2.3.1	each	2	2	0			
5.8.6	Sundry								
5.8.6.1	Supply and install filter for oil trap	D-DT-5234	Each	1	1	0			
5.8.6.2	Excavate, supply and install a Bat wall.		Each	1	1	0			
5.8.6.3	Excavate, trench, supply and construct 75 mm concrete pipe from each Bag Filter to Bat wall		m	1	1	0			
5.8.6.4	Supply and install a 200l/min 3m head submersible pump in oil holding dam and control panel.		Each	1	1	0			
5.G	Storm water Drainage								
5.G.1	Earthworks - Pipe trenches	1200DB							
	Excavate, dispose of burden within free haul distance of 5km, backfill, compaction for pipes over 125 mm								
	dia up to 200 mm dia for depths:								
5.9.1.1	Up to 1,0 m		m	480	400	80			
5.9.1.2	Over 1,0 m up to 2,0 m		m	182	152	30			
5.G.2	Extra over excavations for:								
5.9.2.1	Intermediate excavation		m³	25	20	5			
5.2.2	Hard rock excavation		m³	25	20	5			
5.G.3	Pipes in subsurface drains:								
	Supply, lay, and bed as per Engineer's details, complete perforated Pipes including geofabric								
	normal duty uPVC pipes complete with couplings:								

LIST E: CIVIL WORK

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
5.9.3.1	160mm Diameter perforated including stone bedding and bidim wrapping		m	662	552	110			
5.G.4	Supply and Install Manholes, Catch pits, etc.								
5.9.4.1	Storm water outlet and wingwall		each	2	2	0			
5.10	Gravel Roads								
5.10.1	Excavation	1200D							
	Note: Contractors are to note that the prices for the bulk excavations are to include for the formation of buttered banks required for lateral support and for ramps for the removal of excavated material and shall also include for all tests required.								
5.10.1.1	Excavation and stockpile for use as backfill or embankment or dispose within a free haul distance of 5km, in all materials	8.3.2.1	m³	4128	3440	688			
5.10.2	Backfill from stockpile	8.3.4							
5.10.2.1	Rip and compaction of ground surface including scarifying for a depth of 150mm, breaking down oversize material where necessary and compacting to 90% Mod AASHTO		m²	4440	3700	740			
5.10.3	Importing of Materials from commercial sources	8.3.4							
5.10.3.1	Selected Grade G5 material compacted in layers 150mm thick to 96% Mod AASHTO to a moisture content of +2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval		m³	666	555	111			
5.10.4	Construct subbase with material from commercial sources:	1200ME							
5.10.4.1	Selected Grade G5 material compacted in layers 150mm thick to 96% Mod AASHTO to a moisture content of +2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval	8.3.3	m³	666	555	111			
5.10.5	Construct base with material from commercial sources or designated borrow areas	1200MF							
5.10.5.1	Gravel material Grade G3 material, compacted in layers 150mm thick to 98% Mod AASHTO, including MOD tests on the material to be used and submitted for the engineer's approval	8.3.3	m³	666	555	111			
5.11	Asphalt Roads								
5.11.1	Excavation	1200D							
	Note: Contractors are to note that the prices for the bulk excavations are to include for the formation of buttered banks required for lateral support and for ramps for the removal of excavated material and shall also include for all tests required.								
5.11.1.1	Excavation and stockpile for use as backfill or embankment or dispose within a free haul distance of 5km, in all materials	8.3.2.1	m³	506	422	84			
5.11.2	Backfill from stockpile								
5.11.2.1	Rip and compaction of ground surface including scarifying for a depth of 150mm, breaking down oversize material where necessary and compacting to 90% Mod AASHTO	8.3.4	m²	845	704	141			
5.11.3	Importing of Materials from commercial sources								
5.11.3.1	Selected Grade G5 material compacted in layers 150mm thick to 96% Mod AASHTO to a moisture content of +2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval	8.3.4	m³	127	106	21			
5.11.4	Construct subbase with material from commercial sources:	1200ME							

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
5.11.4.1	Selected Grade G5 material stabilized with and including 3% cement, compacted in layers 150mm thick to 98% Mod AASHTO to a moisture content of +/-2% of optimum, including MOD tests on the material to be used and submitted for the engineer's approval	8.3.3	m³	127	106	21			
5.11.5	Construct base with material from commercial sources or designated borrow areas	1200MF							
5.11.5.1	Graded crushed stone Grade G1 material, compacted in layers 150mm thick to 88% Relative Density, including MOD tests on the material to be used and submitted for the engineer's approval	8.3.3	m³	110	92	18			
5.11.6	Continuously TPA graded medium asphalt, including approved prime and tack coat preparation	1200MH							
5.11.6.1	30mm Thick on roads	8.5.4.1	m²	739	616	123			
5.11.7	Precast concrete kerbing	1200MK							
	Excavate, supply, transport to site and install complete concrete kerbing								
5.11.7.1	SABS 927 fig 8c kerb	8.2.1	m	48	40	8			
5.11.7.2	SABS 927 fig 8c kerb curved to radius exceeding 4m and not exceeding 20m	8.2.1	m	96	80	16			
5.12	YARD STONING								
5.12.1	Supply and spread 150 mm thick layer of new 26-37 mm crushed dolomite stone.		m³	1178	1017	161			
TOTAL CARRIED FORWARD TO SUMMARY OF BILL OF QUANTITIES									

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ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
6.1.13	Amount allowed to complete the Integrated Security System pipe work in the building. (Note: All conduit work and draw boxes to be flush mounted).	D-DT-5239&2	Sum	0	0	0			
6.1.14	MILD STEEL DOWEL BARS								
6.1.14.1	10 mm Diameter bars 1 025 mm long	D-DT-5239&2	Ton	0.6	0.4	0.2			
6.1.15	MILD STEEL REINFORCEMENT TO STRUCTURAL CONCRETE WORK								
6.1.15.1	8 mm Diameter bars	D-DT-5239&2	Ton	2	1	1			
6.1.15.2	10 mm Diameter bars	D-DT-5239&2	Ton	1	0.6	0.4			
6.1.16	HIGH TENSILE STEEL REINFORCEMENT TO STRUCTURAL CONCRETE WORK								
6.1.16.1	12 mm Diameter bars	D-DT-5239&2	Ton	3	1.8	1.2			
6.1.16.2	16 mm Diameter bars	D-DT-5239&2	Ton	3	1.8	1.2			
6.1.16.3	20 mm Diameter bars	D-DT-5239&2	Ton	0.32	0.2	0.12			
6.2	CABLE ENTRY SEALS								
	Supply and install "Roxtec" knock-out-sleeves and seals, all in accordance with manufacturer's and specifications. Contractor to verify amount of seals required.								
6.2.1	Formwork for cable entries with Roxtex seals for Type 2 cable entry	D-DT-5239&2	Sum	4	2	2			
6.2.2	Wedge 120 Galv	D-DT-5239&2	Sum	16	8	8			
6.2.3	Stayplate 120 Galv	D-DT-5239&2	Each	112	56	56			
6.2.4	RM 30 Module	D-DT-5239&2	Sum	256	128	128			
6.2.5	RM 40 Module	D-DT-5239&2	Sum	144	72	72			
6.3	ROOF VENTILATORS								
	Z275 Spelter Galvanised steel slope mounted turbine type ventilator (Model: CP250) with Chromadek finish (Colour: Dove Grey), including isolation trimmers, fixed through roof sheeting to timber purlins watertight joints, sealing strips, fixing accessories etc., installed in accordance to the manufacturer's instructions		Each	2	1	1			
6.4	SUNDRIES								
6.4.1	9kg DCP (fe) dry powder portable fire extinguisher on and including wrought Meranti backboard size 520 x 100 x 22mm thick plugged and screwed to wall and finished with two coats of polyurethane varnish, including 120 x 20 x 2mm mild steel strip bent to form hook including all signage.		No	4	2	2	R	-	R -
6.4.2	465 x 310 x 150mm Steel wall mounted first aid box with Government compliant First Aid refill kit		Each	2	1	1	R	-	R -
6.5	FURNITURE								
	Supply, transport and install the following building furniture:								
6.5.1	1500 x 800 mm Desk equal similar to Item G (543327) of Waltons Catalogue, Scholastic.		Each	2	1	1	R	-	R -

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ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
7.	ERECTION OF STEELWORK								
7.1	Equipment Support - Manufacture, supply and install equipment support for the following:								
	Manufacture, supply and install equipment support for the following:								
7.1.1	132kV Steelwork 132/C Column C anti climbing	D-DT-5252s2ACF	Each	2	2	0			
7.1.2	132kV Steelwork 132/40/1 Beam	D-DT-5252s2D	Each	1	1	0			
7.1.3	132kV Steelwork Earth wire support with earth spike	D-DT-5252s2E	Each	2	2	0			
7.1.4	132 kV Isolator support (surge arrestors)	D-DT-5202s2A	Each	1	1	0			
7.1.5	132 kV Isolator Support Surge Arrestor Extension Arm	D-DT-5219s4	Each	1	1	0			
7.1.6	132 kV Isolator support	D-DT-5202s2A	Each	4	4	0			
7.1.7	132 kV CT - 2.5m Medium Equipment Lattice Support	D-DT-5206s2C	Each	6	6	0			
7.1.8	132 kV CT - Medium Equipment Lattice Support Cap "M1"	D-DT-5206s2H	Each	6	6	0			
7.1.9	132 kV Circuit Breaker Support	D-DT-5200s2A	Each	2	2	0			
7.1.10	132 kV VT C Power VT - 2.5m Medium Equipment Lattice Support	D-DT-5206s2C	Each	3	3	0			
7.1.11	132 kV VT C POWER VT - Medium Equipment Lattice Support Cap "M1"	D-DT-5206s2H	Each	3	3	0			
7.1.12	132 kV PI Medium Equipment Lattice Support	D-DT-5206s2C	Each	3	3	0			
7.1.13	132 kV PI Medium Equipment Lattice Support Cap "M1"	D-DT-5206s2H	Each	3	3	0			
7.1.14	Busbar - 132/66kV Tubular BB Twin Supports	D-DT-5225s2A	Each	2	2	0			
7.1.15	Road Crossing - 6.6-44kV 1200 Phase centres, high-level lipped channel Supports	D-DT-5221s2	Each	2	2	0			
7.1.16	22 kV NECRT Support	D-DT-5207s2A	Each	1	1	0			
7.1.17	22kV Circuit breaker kiosk lattice support	D-DT-5216s2B	Each	3	1	2			
7.1.18	22kV Isolator lattice support	D-DT-5205s2A	Each	16	7	9			
7.1.19	22 kV Isolator support surge arrestor extension arm	D-DT-5219s1	Each	1	1	0			

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ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
8.	INSTALLATION OF EQUIPMENT								
8.1	SUPPLY, INSTALLATION AND COMMISSIONING OF THE FOLLOWING EQUIPMENT (Tenderer to allow for cost of commissioning by the OEM or accredited agency):								
8.1.1	132 kV Isolator with S.A. to be installed and commissioned by OEM (2500A, 40kA Hand Operated)	D-DT-6302s1	Each	1	1	0			
8.1.2	132 kV Current Transformer (132kV 2500A 40kA 2P2M2BZ 1600/1 31mm)	D-DT-6190s1	Each	6	6	0			
8.1.3	132 kV Circuit breaker (3150A 40kA 3P 110VDC 31mm) to be installed and commissioned by OEM.	D-DT-6250s1	Each	2	2	0			
8.1.4	132 kV Isolator to be installed and commissioned by OEM (2500A, 40kA Hand Operated)	D-DT-6302s1	Each	4	4	0			
8.1.5	132 kV / 110V Voltage Transformer 100VA.	D-DT-6170s1	Each	3	3	0			
8.1.6	132 kV / 400V 2500VA Power Voltage Transformer.	D-DT-6315s1	Each	0	0	0			
8.1.7	132 kV / 400V 16kVA Power Voltage Transformer.	D-DT-6315s1	Each	0	0	0			
8.1.8	20 MVA 132 / 22 kV YNd1 OLTC transformer to be installed and commissioned by OEM (ONAN Rating)	D-DT-6122s1	Each	1	1	0			
8.1.9	132 kV Surge Arrestor S/CL MCOV 84kV 31mm/kV (Isolator mounted)	D-DT-6210s1	Each	3	3	0			
8.1.10	132 kV Surge Arrestor S/CL MCOV 84kV 31mm/kV (Trfr mounted).	D-DT-6210s1	Each	3	3	0			
8.1.11	66 kV Surge Arrestor S/CL MCOV 48kV 31mm/kV (Trfr mounted) Neutral Bushing.	D-DT-6212s1	Each	1	1	0			
8.1.12	22 kV Surge Arrestor S/CL MCOV 24kV 31mm/kV (Trfr mounted).	D-DT-6215s1	Each	3	3	0			
8.1.13	22 kV Surge Arrestor S/CL MCOV 24kV 31mm/kV (Isol mounted).	D-DT-6215s1	Each	3	0	3			
8.1.14	11 kV NEC / NER / AUX Transformer 360A-10sec 31mm/kV.	D-DT-6141s1	Each	1	1	0			
8.1.15	22 kV Isolator 2500A 25kA CRDB H/O 31mm/kV	D-DT-6154s2	Each	16	7	9			
8.1.16	22 kV / 110V Voltage Transformer 100VA.	D-DT-6173s1	Each	3	2	1			
8.1.17	22kV Kiosk Circuit breaker (1250A 25kA 3P 110VDC 31mm) to be installed and commissioned by OEM.	D-DT-6252s1	Each	4	2	2			
8.1.18	22kV Outdoor vacuum Circuit breaker (1250A 25kA 3P 110VDC 31mm) to be installed and commissione	OEM	Each	3	2	1			
8.1.19	22 kV Current Transformer (22kV 1600A 25kA 2P2M2BZ 1600/1 31mm) to be installed onto vacuum circuit breaker and commissioned by OEM	OEM	Each	9	6	3			
8.1.20	22 kV / 110V Voltage Transformer 100VA to be installed onto vacuum circuit breaker and commissioned	OEM	Each	9	6	3			
8.1.21	132 kV Post Insulators.	D-DT-6230s1	Each	9	9	0			
8.1.22	66 kV Post Insulators.	D-DT-6232s1	Each	12	6	6			

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
8.1.23	22 kV Post Insulators S/CL 31mm/kV.	D-DT-6235s1	Each	0	0	0			
8.1.24	Insul Long Rod 132 kV 120kN B/S 31C	D-DT-7014s2	Each	3	3	0			
8.1.25	Insul Long Rod 33 kV 120kN 570C/L 31C	D-DT-3190s4	Each	33	15	18			
8.1.26	Line post insulator 33 kV 10kN Composite 31C	D-DT-3189s3	Each	21	12	9			
8.1.27	Sump Control box 1800x120mm steel pole C fixtures		Each	1	1	0			
8.1.28	Surge Counter similar or equal to ABB Excount-I type.		Each	0	0	0			
8.2	TESTING AND COMMISSIONING BY OEM ON SITE								
8.2.1	Surveyor, i.e. MV and LV conductors, equipment positions and any relevant site information.		Sum	1	0.5	0.5			
8.2.2	132 kV Current Transformer		Sum	1	0.5	0.5			
8.2.3	132 kV Circuit Breaker		Sum	1	0.5	0.5			
8.2.4	132 kV Power / Voltage Transformer		Sum	1	0.5	0.5			
8.2.5	132/11 kV Power Transformer		Sum	1	1	0			
8.2.6	22 kV Kiosk Circuit Breaker		Sum	1	0.5	0.5			
8.2.7	22 kV Vacuum Circuit Breaker including extended 22kV CT and 22kV VT		Sum	1	0.5	0.5			
8.2.8	Sump Control box		Sum	1	1	0			
8.2.9	Yard AC Distribution board and interface box		Sum	1	0.5	0.5			
8.3	FACTORY ACCEPTANCE TEST (FAT)								
	Provision for three (3) Engineer and three (3) Employer Representatives and one (1) contractor representatives to witness FAT at manufacturer as specified in Clause C3.26.3 for the following equipment:								
8.3.1	20 MVA 132/22 kV Transformers		Sum	1	1	0			
8.3.2	22kV NEC / NER / AUX Transformer		Sum	1	1	0			
8.3.3	22 kV Kiosk Circuit Breaker		Sum	1	0.5	0.5			
8.3.4	22 kV Vacuum Circuit Breaker including extended 22kV CT and 22kV VT		Sum	1	0.5	0.5			
8.4	CLAMP ASSEMBLIES, STRINGING, STRANDED CONDUCTOR G TUBULAR CONDUCTOR								
	Supply and install the following which must be capable of carrying 2 300 A.								
8.4.1	CLAMP COMP D/END ASSY KING BIRD 23.88mm	7000s4	Each	9	9	0			

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
8.4.2	CLAMP B/COMP 38.3mm - PALM 0DG EPC-P (McWade : SPC14)	6018s9	Each	9	9	0			
8.4.3	CLAMP B/COMP 38.3mm - PALM 45DG EPC-E (McWade : SPC5)	6018s3	Each	57	45	12			
8.4.4	CLAMP CROSS 26mm - 26.5mm EX-B (McWade : K-2)	6002s2	Each	32	27	5			
8.4.5	CLAMP CROSS 38mm - 26.5mm EX-D (McWade : K-4)	6002s2	Each	37	27	10			
8.4.6	CLAMP B/COMP 38.3mm - 38mm EXC-C 0 DEG (McWade : KC3)	6006s2	Each	39	30	9			
8.4.7	CLAMP B/COMP 38.3mm - PALM 0DG EPC-D (McWade : SPC4)	6018s3	Each	56	46	10			
8.4.8	CLAMP B/COMP 38.3mm - PALM 90DG EPC-F (McWade : SPC6)	6018s3	Each	27	23	4			
8.4.9	CLAMP TUB TAP-OFF ETP-IL1-J (McWade : TBTC120/C1-38)	6119s2	Each	21	15	6			
8.4.10	CLAMP TUB TAP-OFF ETP-TE-IL1-R (McWade : TBCT120/C1-38)	6090s3	Each	24	18	6			
8.4.11	CLAMP, FIXED TUBE ECC-PI-F-F (McWade : TBFC120-127)	6086s2	Each	21	15	6			
8.4.12	CLAMP, SLIDE TUBE ECC-PI-S-F (McWade : TBSC120-127)	6086s4	Each	21	15	6			
8.4.13	END CAP ETEC-DC-C;120/4 WITH F/CLAMP (McWade : TBEC/C-120)	6040s5	Each	21	15	6			
8.4.14	END CAP ETEC-PL-C;120/4 NO F/CLAMP (McWade : TBEC/P-120)	6040s2	Each	24	15	9			
8.4.15	CLAMP, PIMOUNT EXCP-D (McWade : KCP-38/127)	3014s4	Each	24	24	0			
8.4.16	CLAMP B/COMP 26.5mm - PALM 0DG EPC-A (McWade : SPC1)	6018s2	Each	6	0	6			
8.4.17	CLAMP B/COMP 26.5mm - 38mm EXC-B 0 DEG (McWade : KC2)	6006s2	Each	6	0	6			
8.4.18	CLAMP, B/COMP 2 x 38.3mm - 38mm EYC-B 0DEG (McWade : YC2)	6013s1	Each	3	0	3			
8.4.19	CLAMP B/COMP 2 x 38.3mm - PALM 45DG EYC-S (McWade : YC-17)	6109s2	Each	6	0	6			
8.4.20	CLAMP TUBE TAP-OFF ETP-TE-IL2-R (McWade : TBCT120/C2-38 0 DEG)	6090s6	Each	3	0	3			
8.4.21	CLAMP STUD PALM BOLT 38.3mm STP38 (McWade : STP-38)	6027s1	Each	3	0	3			
8.4.22	CLAMP CABLE 50mm - 75mm DIA POLYPROP BLK (McWade : KC1)	8019s3	Each	1	0	1			
8.4.23	CLAMP TUB BUS/PALM T/OFF TBPT120	6117s1	Each	12	0	12			
8.4.24	CLAMP CABLE DBL 50-75 DIA POLYPROP	8019s4	Each	12	0	12			

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
8.4.25	CLAMP CROSS 16.3mm - 38mm EX-C (McWade : K-3)	6002s2	Each	3	0	3			
8.4.26	LUG AL HORNET 1B M12 45 DEG	3074s2	Each	6	0	6			
8.4.27	CLAMP TUB TAP-OFF ETP-IL1-H (McWade : TBTC120/C1-26)	6119s2	Each	3	0	3			
8.4.28	CLAMP B/COMP 26.5mm - PALM 45DG EPC-B (McWade : SPC2)	6018s2	Each	3	0	3			
8.4.29	SPACER COND 2x38.3mm 150mm CRS (McWade : S2)	6087	Each	9	0	9			
8.4.30	CLAMP, PEG AL BULL 38.3mm EEPC-B	6115s1	Each	102	84	18			
8.5	MISCELLANEOUS ASSEMBLIES								
8.5.1	BOLT U GALV M16 x 89 x 102mm	6098s1	Each	9	9	0			
8.5.2	STRAIGHT SHACKLE BOLT TYPE - 120kN M16	7017s1	Each	9	9	0			
8.5.3	BOLT ASSEMBLY - M12, LG 65mm FASTENER	6097s2	Each	564	456	108			
8.5.4	BOLT HX GALV M16 x 40mm W/Hx NUT	6097s1	Each	27	20	7			
8.5.5	BOLT HX GALV M16 x 75mm W/Hx NUT	6097s1	Each	232	185	47			
8.5.6	BOLT ASSEMBLY - M16, LG 30mm FASTENER	6369s1	Each	188	144	44			
8.5.7	BOLT ASSEMBLY - M16, LG 40mm FASTENER	6369s2	Each	159	135	24			
8.5.8	CLEVIS BALL 16mm IEC 120kN	6059s1	Each	9	9	0			
8.5.9	SOCK TONGUE 16mm IEC 120kN	6061s1	Each	9	9	0			
8.5.10	BALL JOINT FOR PORTABLE EARTH 20kA	6081s1	Each	114	84	30			
8.5.11	BRACKET PHASE COLOUR DISK	6114s2	Each	52	42	10			
8.5.12	BRACKET, CONTROL CABLE	6065s1	Each	168	132	36			
8.5.13	SLEEVE TYPE - ECES-A CONDUCTOR END	6001s1	Each	18	15	3			
8.5.14	WASHER, TAPER M16 38SQ 18.00D HL	3014s8	Each	192	156	36			
8.5.15	WASHER, RD FLAT M16 29.6D 18.25D HL	3014s4	Each	464	380	84			
8.5.16	ELECTRICAL EQUIPMENT LABEL	5047s1	Each	43	33	10			
8.6	STRINGING, STRANDED CONDUCTOR G TUBULAR CONDUCTOR								
	Supply and install the following tube and conductor:								

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
8.6.1	132 kV Busbar - Aluminium Tubes, 120 x 4 mm thick x 12 m lengths inclusive of vibration damping	D-DT-6000s1	Each	19	15	4			
8.6.2	Stringers and droppers - Centipede	D-DT-3136s7	m	77	46	31			
8.6.3	Stringers and droppers - Bull	D-DT-3136s7	m	645	510	135			
8.6.4	Stringers and droppers - Centipede insulated	D-DT-3136s8	m	40	20	20			
8.6.5	Stringers and droppers - Bull insulated	D-DT-3136s8	m	80	40	40			
8.6.6	Stringers and droppers - Hornet insulated	D-DT-3136s8	m	30	15	15			
8.7	PORTABLE EARTH								
8.7.1	Supply portable earths suitable for earth balls.		Set	5	3	2			
8.7.2	Supply link stick		Set	2	1	1			
8.8	EQUIPMENT LABELLING								
8.8.1	Supply and install outdoor equipment labels (chromadek c/w bolts, brackets etc).	D-DT-5047	Each	43	13	30			
8.8.2	Supply and install phase identification disks (Blue/Red/White).	D-DT-6114	Each	21	14	7			
8.9	PIPES								
8.9.1	Supply and install µPVC pipes, 50 mm diameter for lighting circuits		m	374	255	119			
8.9.2	Supply and install nextube pipes, 110 mm diameter for transformer bays		m	15	0	15			
8.10	LIGHTING / LIGHTNING MASTS								
	Supply and install the following:								
8.10.1	90 W LED light units complete with all accessories.		Each	42	26	16			
8.10.2	Supply, make off and install 4c x 10 mm² cable for lighting		m	689	465	224			
8.11	LABELS								
	Supply and install the following signs to security fence:								
8.11.1	Prohibitive (Figure 3)	D-DT-6074	Each	24	12	12			
8.11.2	Unauthorised Entry and Interfering (Figure 13)	D-DT-6072	Each	7	5	2			
8.11.3	Hard hat area (Figure 4)	D-DT-6075	Each	8	4	4			
8.11.4	Battery room (Figure 5)	D-DT-6087	Each	1	1	0			
8.11.5	Battery cabinet (Figure 6)	D-DT-6112	Each	4	2	2			
8.11.6	Battery PPE (Figure 7)		Each	2	1	1			

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ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
10.	CONTROL CABLE WORK								
	Supply, installation and commissioning of the following control cables:	Section 5							
10.1	CABLE LAYING	Clause 26							
10.1.1	Cable 1 kV 19c 2,5 mm² Armoured (No 3)		m	682	502	180			
10.1.2	Cable 1 kV 12c 2,5 mm² Armoured (No 3)		m	668	320	348			
10.1.3	Cable 1 kV 7c 2,5 mm² Armoured (No 3)		m	200	0	200			
10.1.4	Cable 1 kV 4c 2.5 mm² Armoured (No 1)		m	200	100	100			
10.1.5	Cable 1 kV 4c 4 mm² Armoured (No 1)		m	6339	5258	1081			
10.1.6	Cable 1 kV 4c 16 mm² Armoured (No 2)		m	247	247	0			
10.1.7	Cable 1 kV 4c 25 mm² Armoured (No 3)		m	0	0	0			
10.1.8	Cable 10 Pair 0,6 mm² Armoured (No 1)		m	150	100	50			
10.1.9	Cable 25 Pair 0,6 mm² Armoured (No 3)		m	50	50	0			
10.1.10	Cable 50 Pair 0,6 mm² Armoured (No 2)		m	50	50	0			
10.1.11	All HV external and internal SCADA cabling, wiring, termination, glanding etc. requirements (MV SCADA cabling and wiring measured with MV switchgear)		Sum	2	1	1			
10.2	CABLE MAKE OFF	PSE 08							
	Supply, making off and commissioning of cable ends.								
10.2.1	Cable 1 kV 19c 2,5 mm² Armoured (No 3)		Each	18	12	6			
10.2.2	Cable 1 kV 12c 2,5 mm² Armoured (No 3)		Each	40	30	10			
10.2.3	Cable 1 kV 7c 2,5 mm² Armoured (No 3)		Each	6	0	6			
10.2.4	Cable 1 kV 4c 2.5 mm² Armoured (No 1)		Each	12	6	6			
10.2.5	Cable 1 kV 4c 4 mm² Armoured (No 1)		Each	170	132	38			
10.2.6	Cable 1 kV 4c 16 mm² Armoured (No 2)		Each	6	6	0			

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
10.2.7	Cable 1 kV 4c 25 mm ² Armoured (No 3)		Each	0	0	0			
10.2.8	Cable 10 Pair 0,6 mm ² Armoured (No 1)		Each	16	10	6			
10.2.9	Cable 25 Pair 0,6 mm ² Armoured (No 3)		Each	10	10	0			
10.2.10	Cable 50 Pair 0,6 mm ² Armoured (No 2)		Each	10	10	0			
10.3	TESTING AND COMMISSIONING								
10.3.1	Megger testing of all LV cables before energising and confirming their destination		Sum	2	1	1			
10.4	CONTROL PANELS (INDOOR SWING FRAME)	Section 5							
	Design, supply, install and commission panels as follows. (Protection panels to include 1 painted mimics c/w 19" rack-mounted frame, semaphores for all equipment and lamp test)								
10.4.1	Transformer Protection Panel and Tap Change Panel	D-DT-5413	Each	1	1	0			
10.4.2	Feeder Protection Panel Scheme 5FZD3920	D-DT-5413	Each	1	1	0			
10.4.3	Rural Feeder Protection Panel Scheme 5RF1100	D-DT-5413	Each	5	2	3			
10.4.4	Bus Zone Protection Panel scheme 5BZ3600	Clause 26.3	Each	0	0	0			
10.4.5	132 kV 10U Mimics for above panels c/w all auxiliary equipment		Each	2	2	0			
10.5	METERING PANEL (TARIFF AND STATISTICAL)	Section 5							
	Tariff and Statistical metering panel including all accessories as specified as follows:								
10.5.1	Statistical Metering HV C MV QoS Panel	Clause 26.7	Each	1	1	0			
10.5.2	Tariff Metering HV C QoS Panel	Clause 26.7	Each	4	2	2			
10.5.3	QoS meters - Vecto III	Clause 26.7	Each	2	1	1			
10.5.4	QoS Auxiliary equipment (GPS module to be fitted to mast)	Clause 26.7	Sum	2	1	1			
10.6	OTHER EQUIPMENT								
10.6.1	AC Yard Board according drawing D-DT-11200 including 1 x chop over systems with distribution equipment	PSE 52	Each	1	1	0			
10.6.2	Junction box VRW20 with CT insert	D-DT-5406	Each	6	6	0			
10.6.3	Junction Box VRW20 with VT insert	D-DT-5406	Each	4	3	1			
10.6.4	AC / DC Panel	D-DT-5600	Each	2	1	1			
10.7	BATTERY CHARGER	PSE 52							
10.7.1	Cordex chargers 110V _{DC} . Cordex charges C battery banks sized for 12h standby - low (non-urgent) DC voltage and low-low (urgent) outputs to be provided (22 kV equipment). (Note: chargers to be suitable for								

**BILL OF QUANTITIES (BID: 19/2026
CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO
SUBSTATION N LIST J: CONTROL PLANT**

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
11.	MV CABLE WORK								
11.1	MV CABLE	PSE 50							
11.1	Supply, installation and commissioning of the following MV cable.								
11.1.1	1 000 mm ² x 1 core, 6.35 / 22 kV, XLPE W/B AWA FR PVC laid in Trefoil		m	0	0	0			
11.1.2	185 mm ² x 3 core, 6.35 / 22 kV, XLPE W/B SWA FR PVC		m	0	0	0			
11.2	MV CABLE ENDS								
	Supply, making off and commissioning of cable ends.								
11.2.1	1 000 mm ² x 1 core XLPE (indoor)		Each	0	0	0			
11.2.2	1 000 mm ² x 1 core XLPE (outdoor)		Each	0	0	0			
11.2.3	185 mm ² x 3 core XLPE (outdoor)		Each	0	0	0			
11.3	MV CABLE JOINTS								
	Supply, making off and commissioning of cable joints equal or similar to Raytech joints.								
11.3.1	1 000 mm ² x 1 core XLPE		Each	0	0	0			
11.3.2	185 mm ² x 3 core XLPE		Each	0	0	0			
11.4	CABLE TRENCH	PSE 09							
	Excavation, backfilling and consolidation of cable trenches.								
11.4.1	Soft rock and soil - excavation and backfill		m	0	0	0			
11.5	BEDDING	PSE 09							
11.5.1	Supply and installation of a 1.2 m.K/W bedding layer per running meter of soft sieved soil in trenches as well as backfilling and consolidation as specified.		m	0	0	0			
11.6	DANGER TAPE	PSE 09							
11.6.1	Supply and installation of danger tape to a depth of 300 mm.		m	0	0	0			
11.7	END CAPS								
11.7.1	Seal off cable ends with heat shrinkable endcaps and mark position with an earth peg.		Sum	0	0	0			
11.8	SLEEVES	PSE 09							
	Supply and installation of 1000mm ² sleeves per cable.		m	0	0	0			
	TOTAL CARRIED FORWARD TO SUMMARY OF BILL OF QUANTITIES								

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ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
13.	SECURITY								
	Note: Security systems panel measured under control plant	PSE 51							
13.1	ACCESS CONTROL SYSTEM								
13.1.1	System Interface Controller – 12 VDC @ 700mA, (5 year lithium battery or 3 months MB standard cardholder flash memory, 50,000 of Event memory, maximum of 32 On-board Ethernet, on-board two door control, eight inputs, four outputs, cabinet power fault input monitors. RoHS, CE, C-Tick and UL 294	LNL-2220	Each	2	1	1			
13.1.2	Door Reader Controller (Supports OSDP Readers) – 12 VDC, 2 Reader interface, W/M, 8 6(5A) form C relays.	LNL-1320	Each	8	4	4			
13.1.3	Power Supply C Enclosure – 12VDC output, 220/230 VAC (17.6 amps) input, current with enclosure (24” x 18” x 4.5”), lock and open frame transformer, tamper power distribution module, UPS capable CE Approved, houses 6 controller boards	LNL-600X6	Each	2	1	1			
13.1.4	HID iCLASS SE R10, Mini-Mullion, Wiegand Interface, Pigtail, Black (32-bit 14443A CSN, standard iCLASS + SIO (EV1, MIFARE, iCLASS, SEOS), LED RED, FLSH GRN, BZR ON)		Each	0	0	0			
13.1.5	Emergency green break glass unit	DMN700G	Each	0	0	0			
13.1.6	5A Power Supply with battery backup for maglocks (6 Maglocks per PSU)		Each	0	0	0			
13.1.7	Electromagnetic Lock, 300Kg Holding Force, Surface Mount 12/24Vdc Selectable with and accessories, including door monitor	FE130MS	Each	0	0	0			
13.1.8	L Mount Bracket for 300Kg magnets for Electromagnetic Lock	FE130ZL	Each	0	0	0			
13.1.9	Request to Exit Button Surface Mounted	ACA001	Each	0	0	0			
13.1.10	Regular door-closer for top jamb applications door weight up to 60Kg.		Each	0	0	0			
13.1.11	System designs, drawings, documentation and commissioning (NFPA Approval)		Sum	2	1	1			
13.1.12	Sundries		Sum	2	1	1			
13.2	CCTV								
13.2.1	Perimeter Camera - Including Housing	P1365-E MkII	Each	10	8	2			
13.2.2	Perimeter Lens - Standard: Varifocal, 2.8–8 mm, F17.3, IR corrected, Megapixel		Each	8	8	0			
13.2.3	Perimeter Lens - Telephoto: 12.5-50 mm Telephoto Lens, P-Iris, F17.4 for perimeter		Each	0	0	0			
13.2.4	Crossline / Tripwire Analytics		Each	0	0	0			

CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION

LIST M: SECURITY

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
13.2.5	Infrared Illuminator (up to 300m)	RM300-AI-10	Each	0	0	0			
13.2.6	General Overview	P3024-LVE	each	0	0	0			
13.2.7	Vehicle License Camera	P3225-LVE	Each	0	0	0			
	Surveyor, i.e. MV and LV conductors, equipment positions and any relevant site								
13.2.8	Dome	M3105-L	Each	2	1	1			
13.2.9	Dome Camera (long range)	P3225-V MkII	Each	2	1	1			
13.2.10	PTZ Camera	Q6114-E	Each	2	1	1			
13.2.11	3U Extended Chassis (i.e. DVC-EX) with 8TB (4x2 TB) data drives, NVR software (i.e. latest Windows 64bit operating system C all licencing		Each	2	1	1			
13.2.12	Video Viewing Station (installed in the 48U security cabinet) to allow for viewing of real footage as well as stored video data		Each	2	1	1			
13.2.13	Video Management System (installed in the 48U security cabinet)		Each	2	1	1			
13.2.14	Network video recorder (installed in the 48U security cabinet)		Each	2	1	1			
13.2.15	Sundries		Sum	2	1	1			
13.3	FIRE DETECTION PANEL								
13.3.1	FP2 Analogue Addressable 2 Loop Fire Control Panel Incl batteries (output to SCADA	ZP2-F2-S-99	each	0	0	0			
13.3.2	Addressable Optical Smoke Sensor	ZP730-3P	each	0	0	0			
13.3.3	Detector Base, surface mounting - Addressable	ZP7-SB1-P	each	0	0	0			
13.3.4	Detector Base Isolator – Addressable	ZP7-IB-P	each	0	0	0			
13.3.5	Addressable Manual Call Point - Red	ZP785-3	each	0	0	0			
13.3.6	Fire Detection Beams		each	0	0	0			
13.3.7	Addressable Interface Unit	99102	each	0	0	0			
13.3.8	Addressable Fire Sounder with strobe light (combined unit)		each	0	0	0			
13.3.9	Addressable Fire Sounder, hazardous area, multi tone horn C separate strobe light		each	0	0	0			

CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION

LIST M: SECURITY

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
13.3.10	24 VDC-3Amp Power Supply	PM863	each	0	0	0			
13.3.11	Line Relay Module - High Voltage - DIN Rail Mounting	201301	each	0	0	0			
13.3.12	System designs, drawings, documentation and commissioning (NFPA Approval)	-	each	0	0	0			
13.3.13	NFPA Approval	-	sum	0	0	0			
13.3.14	Third Party Inspection (FSIB)	-	sum	0	0	0			
13.3.15	Removal of existing Fire Detection System	-	sum	0	0	0			
13.3.16	Interfacing to existing Fire Detection Panels	-	sum	0	0	0			
13.3.17	Sundries	-	sum	0	0	0			
13.4	INTRUSION SYSTEM								
13.4.1	Input Control Module (Series two) –12/24 VDC, 16 zone input monitor module, (32) 1K (with 2 programmable output relays) , RoHS, CE, C-Tick and UL294 certified	LNL-1100	each	2	1	1			
13.4.2	Command Display terminal Keypad - 32-character back-lit LCD display with a 16-supports both direct RS-485 communication with the ISC and Wiegand TTL output, external Wiegand input, 12VDC±15% @175mA (keypad only). C-Tick Certified	LNL-CK	each	2	1	1			
13.4.3	Surface Mount Gate Magnetic Contact - N/C with armoured cable (outdoor)	DC108	each	4	2	2			
13.4.4	Magnetic door contacts (indoor)	DC123	each	4	2	2			
13.4.5	PIR Infrared motion sensor, 360 degrees, ceiling mounted	6530CM	each	16	12	4			
13.4.6	PIR Infrared motion sensor, wall mounted	T8331	each	0	0	0			
13.4.7	IR Beams - External 60m		each	10	8	2			
13.4.8	Intrusion Siren		each	2	1	1			
13.4.9	Sundries		Sum	2	1	1			
13.5	CABLES C TRENCHING								
13.5.1	Supply and install Mylar Cable, 2-Pair		Sum	2	1	1			
13.5.2	Supply and install Mylar Cable, 4-Pair		Sum	2	1	1			
13.5.3	PH30 Fire Resistant 2-core-1mm²		Sum	2	1	1			

CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION

LIST M: SECURITY

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
13.5.4	3 core 4mm² PVC-SWA-PVC electrical cable		m	600	300	300			
13.5.5	Bosal conduit, 20mm plus spacer saddles at 1,5m distances including fixings for fire PIR cable		Sum	2	1	1			
13.5.6	Bosal conduit, 25mm plus spacer saddles at 1,5m distances including fixings for CAT 6 cable		Sum	2	1	1			
13.5.7	Trenching in soil (450mm x 600mm deep)		m	600	300	300			
13.5.8	Supply and install 50mm sleeves with draw wire		Sum	2	1	1			
13.5.9	Supply and install IP65 external Camera/Electrical Kiosk at external camera poles		each	6	4	2			
13.5.10	Supply and install 6m camera poles		each	6	4	2			
13.5.11	Earthing of poles (3 Point Star/connection to main earth grid)		each	6	4	2			
13.5.12	Sundries		Sum	2	1	1			
13.6	NETWORKING AND DATA CABLES								
13.6.1	CAT 6 Data Point Complete (Includes CAT6 cable, RJ45 outlet, installation, testing C		Sum	2	1	1			
13.6.2	CAT 6 Patch lead (3m)		Sum	2	1	1			
13.6.3	CAT 6 Fly leads (1m)		Sum	2	1	1			
13.6.4	CAT 6 24 port Patch Panel		Sum	2	1	1			
13.6.5	Splice Fibre Cable into Fibre Patch Panel (Including LC/PC Pigtails and OTDR)		Sum	2	1	1			
13.6.6	Splice Fibre Cable in field termination boxes (including, LC/PC Pigtails)		Sum	2	1	1			
13.6.7	Supply and Install 24 port LC/PC Fibre Patch Panel		each	2	1	1			
13.6.8	Fibre Fly leads - 1m - Camera (Duplex - LC/PC - Match optical equipment supplied)		Sum	2	1	1			
13.6.9	Cable Management Panel		each	2	1	1			
13.6.10	4 Core Single-mode OS1 Fibre (UG)		m	600	300	300			
13.6.11	12 Core Single-mode OS1 Fibre (UG)		m	0	0	0			

CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION

LIST M: SECURITY

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
13.6.12	Compact Fibre Splice Box		each	8	4	4			
13.6.13	12 port POE Switch (Rugged)		each	2	1	1			
13.6.14	4 x 1 GBE Fibre Module		each	2	1	1			
13.6.15	Stacking Kit		each	2	1	1			
13.6.16	Fibre to Copper Converters (Single-mode - 1 GB/s)		each	16	8	8			
13.6.17	1000BASE-LX SFP (1310 nm, for distances up to 10km)		each	2	1	1			
13.6.18	1000BASE-EX SFP (1310 nm, for distances up to 40km)		each	0	0	0			
13.6.19	1000BASE-ZX SFP (1550 nm, for distances up to 70km)		each	0	0	0			
13.6.20	4 Port PoE+ Ruggedized Network Switch for Kiosk		each	8	4	4			
13.6.21	19" Data Cabinet 48u x 600 x 1000mm deep complete with 4way, 10way power, bottom doors gland plate and perforated		each	2	1	1			
13.6.22	19" Data Cabinet 12u x 600 x 450mm deep complete with 10way power, bottom gland and perforated doors		each	0	0	0			
13.6.23	UPS Rack mounted 4kVA - 12 / 72 hour battery capacity complete with circuit breakers (Security Inst. as specified)		each	2	1	1			
13.6.24	UPS additional 3U rack mounted battery packs,		each	6	3	3			
13.6.25	Class II Surge Arrestor for LV Aux Feed		each	2	1	1			
13.6.26	UPS DB - housed in 48U security cabinet		each	2	1	1			
13.7	SERVICES								
13.7.1	Installation C Commissioning		Sum	2	1	1			
13.7.2	Drawings/Designs C Documentation		Sum	2	1	1			
13.7.3	Software Engineering (programming and configuration)		Sum	2	1	1			
13.8	MISCELLANEOUS								
13.8.1	Initial inspection of buildings for defects.		Sum	2	1	1			
13.8.2	Additional cost for items not allowed for elsewhere:		Sum	2	1	1			

CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION

LIST N: TELEMETRY

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
14.	TELEMETRY EQUIPMENT								
	Design, manufacture, supply to site, install, test and commission a radio link system from Dan Tloome Substation to the Rand West's Electrical Department.	VE0409-32-9-SUB-TELE							
14.1	MAST / COMMUNICATION TOWER								
	Tower to include all bolt and nuts, lightning spikes, cat 8 cable ladder, paint, work platform for every rest platform for every tower. Proposed nominated sub-contractor: "Mast Projects"								
14.1.1	30m Lattice Tower Self supporting 3 - legged Mast (12m ² antenna loading, 40m/s designed wind speed, terrain category: 2B)		Each	0	0	0			
14.1.2	30m Lattice Tower earth conductor		Each	0	0	0			
14.1.3	30m Lattice Tower aircraft warning light system (AC double light with cable)		Each	0	0	0			
14.1.4	GSM Antenna Bracket Ø76 x 4500mm		Each	0	0	0			
14.1.5	M/W Antenna Bracket Ø114 x 600mm		Each	0	0	0			
14.1.6	Corner Reflector UHF Antenna Bracket		Each	0	0	0			
14.2	MAST / TOWER CIVIL AND FOUNDATIONS								
14.2.1	Foundation and template including holding down bolts suitable for 30m mast as specified.		Each	0	0	0			
14.2.2	Excavation in pickable material for tower foundation		m ³	0	0	0			
14.2.3	Supply and installation of rebar work of tower foundation		kg	0	0	0			
14.2.4	Supply and installation of 25 MPA concrete for tower foundation(including blinding)		m ³	0	0	0			
14.2.5	Backfill and compaction of tower foundation (Incl 300mm under base and around Apron)		m ³	0	0	0			
14.2.6	Foundation Cube tests, 7 days and 28 days		Each	0	0	0			
14.2.7	Form Work and HDB Set Up		Sum	0	0	0			
14.3	MAST / TOWER SUPPLY AND INSTALLATION OF SITE AND FOUNDATION EARTHING SYSTEM								
14.3.1	Bonding C earthing of the tower including all auxiliaries, spike, downlead, earth bar etc.		Sum	0	0	0			

CONSTRUCTION OF A NEW 20MVA, 132/22 kV IMPUMELELO SUBSTATION

LIST N: TELEMETRY

ITEM	DESCRIPTION	REF	UNIT	TOTAL QTY	ESKOM QTY	MUNIC QTY	UNIT LABOUR RATE	UNIT MATERIAL RATE	TOTAL
14.4	MAST / TOWER ERECTION								
14.4.1	Tower Erection, 30m Lattice		Sum	0	0	0			
14.4.2	Tower Painting 30m Lattice, Self Etching paint, as per ATC Spec.		Sum	0	0	0			
14.4.3	Tower Delivery		Sum	0	0	0			
14.5	MAST / TOWER SITE WORKS								
14.5.1	Site Access Ramp (4.2m x 2m x 0.15m)		m³	0	0	0			
14.5.2	Manhole (695mm x 530mm x 650mm) Made on Site		Sum	0	0	0			
14.5.3	Supply and install 110mm Nextube sleeves		m	0	0	0			
14.5.4	Painting to block base with bitumen		Sum	0	0	0			
14.5.5	Security light cable (Greenfield Site)		m	0	0	0			
14.5.6	Security light (Fixed to Tower - Greenfield Site or Shelter - Rooftop site)		Each	0	0	0			
14.5.7	Security light switch		Each	0	0	0			
14.5.8	Supply and install precast concrete kerbing Figure 6 type, this will include trenching, foundation and		m	0	0	0			
14.5.9	Retainer Wall (Face Brick)		m²	0	0	0			
14.5.10	25Mpa Concrete plinth (3m x 3m plinths for Mini D)		m³	0	0.0	0.0			
14.5.11	Red Line Drawing		Sum	0	0	0			
14.5.12	Supply and install bosal and trunking including all accessories		m	0	0	0			
14.6	MAST / TOWER FENCE AND SECURITY								
14.6.1	ClearVu, barbed wire and electric fencing to be installed around the tower. 33m Perimeter for each.		m	0	0	0			
14.6.2	Anti-climbing device		Each	0	0	0			
14.6.3	Electric fence energizer		Each	0	0	0			
14.6.4	Battery back up for electric fence energizer (long life, deep cycle type)		Each	0	0	0			

[illegible]

**BILL OF QUANTITIES (BID: 19/2026
CONSTRUCTION OF A NEW 20MVA, 132/22 kV
IMPUMELELO SUBSTATION
SUMMARY**

ITEM NO	DESCRIPTION OF THE ITEM	LIST	TOTAL PRICE
1	Preliminary and General	List A	
2	Site Works	List B	
3	Earth Grid	List C	
4	Fencing	List D	
5	Civil Work	List E	
6	Buildings	List F	
7	Steel Work	List G	
8	Equipment	List H	
9	Mv Switchgear Protection	List I	
10	Control Plant	List J	
11	MV Cable Work	List K	
12	Training	List L	
13	Security333	List M	
14	Telemetry	List N	
15	SUBTOTAL A - LIST A to N		
16	Plus: 20 % Contingencies		
17	Plus: 10% Escalation		
18	SUBTOTAL B		
1G	Plus: 15 % VAT		
20	TOTAL TENDER PRICES - SUBTOTAL B G VAT (Carried forward to Section 3, Part C1.1, Page 1 of tender document)		

TENDERER'S SIGNATURE:

COMPANY NAME:

ADDRESS:



**LESEDI LOCAL
MUNICIPALITY P O
Box 201 HEIDELBERG
1438**

**THE CONSTRUCTION OF THE IMPUMELELO 1 X
20MVA, 132/22 kV SUBSTATION (ESKOM SELF BUILD
PROJECT)**

**SECTION 5:
C3 & C4 – SCOPE OF WORKS AND SITE
INFORMATION**



LYON AND PARTNERS (Pty) Ltd
Electrical Consulting Engineers
PO Box 3925
VANDERBIJLPARK
1900

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C3. SCOPE OF WORKS

C3.1. DESCRIPTION OF THE WORKS

The Contractor shall be responsible for the procurement, supply, manufacture where applicable, delivery to site, offloading, installation, construction, erection, testing, commissioning and handing over of the Works, complete with all associated auxiliary equipment. Equipment shall be as specified, or of an approved equivalent standard, subject to acceptance by the Employer, the Engineer and, where applicable, Eskom.

At a high level, the Works comprise the construction of a new 132/22 kV substation, namely Impumelelo Substation, to be owned and operated by Eskom, together with a new 22 kV switching station (SWS) to be operated by Lesedi Local Municipality (LLM). The 22 kV SWS feeder bays will supply the new and future Impumelelo Ext. 1 to Ext. 6 developments within the Lesedi Local Municipality area. These switching stations will ultimately be used to electrify approximately 12 445 households within the area.

The Impumelelo Substation portion of the Works will be executed as a self-build project for Eskom. Accordingly, all equipment, materials, designs, construction methods, installation procedures, testing, commissioning and handover requirements shall comply with the applicable Eskom specifications, standards and requirements.

The substation and SWS terrace shall be erected, including preparation of the platform, installation of the earth grid, and construction of a new perimeter fence to enclose the complete substation and SWS area.

The 132/22 kV substation shall comprise a fully equipped and strung 132 kV incomer bay, a 132 kV busbar including 2 x 132 kV bus section isolators, 1 x 20 MVA 132/22 kV transformer bay, a 22 kV four-bay box structure, and 2 x 22 kV feeder bays feeding the 22 kV SWS. Provision shall also be made for future expansion, comprising the construction of foundation plinths only for a second 132 kV incomer, busbar, transformer bay, five-bay 22 kV box structure and 5 x 22 kV feeder bays.

The 22 kV SWS shall comprise 2 x fully equipped 22 kV incomer bays, a four-bay MV box structure, and 4 x 22 kV rural feeder bays. Only 3 x rural feeders circuit breaker shall be installed under the current scope, with the remaining rural feeder foundation plinths to be constructed for future installation. All substation and SWS switchgear shall be of outdoor type.

A control building shall be constructed for the Eskom substation to house the protection, metering, control and security panels, including the associated battery room and bathroom facilities. A separate control building shall also be constructed for LLM to house the relevant protection, metering, control and security panels.

C3.1 – SCOPE OF WORKS: GENERAL

All materials and equipment shall be supplied by the Contractor. This shall include manufacture in accordance with the relevant Eskom specifications, transportation to site, offloading, installation, testing, commissioning and handover of the complete Works.

Prior to energisation, commissioning certificates shall be submitted by the relevant original equipment manufacturers (OEMs) for, as a minimum, the 132 kV circuit breakers, 132 kV current transformers, 20 MVA power transformer, 22 kV NECRT and 22 kV circuit breakers. Prior to energisation of the 20 MVA transformer and the 22 kV NECRT, oil samples shall be taken and tested. The oil test certificates shall not be older than 30 days at the date of energisation.

C3.1.1. HIGH LEVEL SCOPE OF WORKS

The high-level scope of works is outlined below. The new equipment shall, to the fullest extent practicable and subject to the applicable Eskom standards, conform to the specified equipment and Eskom requirements.

The Contractor appointed by LLM shall undertake the full scope of work which, at a high level, comprises the supply, delivery, installation, testing, commissioning and handing over, complete with all auxiliary equipment, of the following:

a) New substation platform, earth grid and perimeter fence to accommodate the following:

- 1 x 132 kV 2500A 40kA sectional Isolator CRDB H/O 31mm/kV
- 1 x 132kV 3150A 40kA 3P Circuit Breaker 31mm/kV
- 3 x 132kV 2500A 25kA 2P2M2B (1600) Current Transformer 31mm/kV
- 1 x 20MVA 132 / 22kV Transformer
- Transformer Plinths size = 20 – 40 MVA (D-DT-5232s3A)
- 3 x 22 kV Bus bar Tube 120mm x 4mm onto Road Crossing.
- 1 x NEC/NER/AUX Transformer 22kV 360A
- 3 x 22kV 110V 100VA CLASS 3P/0.2 Voltage Transformers
- 1 x 22kV 1250A 20kA Transformer Breaker 31mm/kV
- 1 x 22kV 2500A 25kA Isolator CRDB H/O 31mm/kV
- Eskom Control Building
- Lesedi Control Building
- Cable ducts and associated cable routing infrastructure

C3.2. GENERAL REQUIREMENTS FOR THE SCOPE OF WORKS

C3.2.1. CONSTRAINTS WITH EXECUTION OF THE WORKS

- a) Grant funding is provided by the National Treasury through DEE's Integrated National Electrification Plan. For the respective financial years, the funding allocation to execute the works is:

- 2026/2027: approx. R 53 000 000.00
- 2027/2028: approx. TBA
- 2028/2029: approx. TBA
- ***TOTAL : TBA***
- Phased over multiple financial years.

The Contractor shall plan his works according to the above. Although not ideal, withdrawal and re-establishment to site must be catered for.

- b) **All the material shall be provided by the Contractor.** The Contractor shall take full responsibility for material orders and shall administer material with a store bookkeeping system (computer-aided). **A stocktaking report must be submitted to the Project Manager on a two-weekly basis.**
- c) **No work shall be permitted to proceed without the work being surveyed & pegged by the Contractor (subject to the Engineer's approval).**
- d) The Engineer, Project Manager and his Clerk of Works will have full access to the site, the Clerk of Works is expected to visit the site once a week. A site meeting or inspection will be conducted every second week on a rotational basis and **it is expected from the Contractor to forward a weekly (summary) progress report, and a monthly (detail) report to the Project Manager by email.**
- e) Any variation or modification with a cost implication must be approved by the Engineer before work can commence. No variation claim without prior approval will be entertained.
- f) Payment application will be assessed once a month and the progress claim must be approved and certified by the Engineer. Progress claim statements applying for interim payments shall be submitted by the Contractor to the Engineer on or before the 17th of each month. **Progress claims will not be considered without the Contractor's progress report in a format acceptable to the Engineer.**
- g) **No equipment shall be delivered to the site prior to the Contractor submitting routine OEM test reports to the Engineer and approval thereof by the Engineer.**

Handing over will not be signed until all as-built information is received. This may result in penalties.

- h) The Contractor must adhere to statutory requirements and the Employer's Health and Safety requirements stipulated.
- i) The Contractor shall be responsible for arranging Factory Acceptance Tests (FAT) at the OEM and the Site Acceptance Testing (SAT) on site, which will be attended by the Engineer and the Employer's personnel. The OEM shall issue a list of all proposed tests to be conducted during the FAT to the Engineer for approval.
The following equipment shall be subjected to Factory Acceptance Testing:
- 132 kV Outdoor breakers.
 - 132 kV Current transformers.
 - 132kV/22kV Power transformer.
 - 132kV Voltage power transformers
 - 22kV NECRT.
 - 22 kV Outdoor breakers.
 - Metering/Protection/Control Panels.
- j) If any of the above-listed equipment is manufactured and/or assembled outside the Gauteng Province or South Africa, the Contractor shall make all the necessary arrangements for two (2) Engineer representatives and two (2) Employer representatives and one (1) Contractor representative to witness the FAT at the manufacturer. The cost thereof shall be for the account of the Contractor.
- k) The Contractor shall also be responsible for arranging training for all equipment by the OEM at their offices and on site, which will be attended by the Maintenance Personnel of the Employer and the Engineer's Representative. The training shall include a practical "hands-on" session. Training shall be provided in a classroom environment, and the OEM shall provide relays or equipment for each delegate attending the training session, enabling practical interaction with various control, monitoring, and measuring equipment.
Training shall be provided for the following equipment:
- All IED's in the substation
 - All measuring equipment used in the substation
 - All switchgear and operation sequences
 - The Contractor shall also arrange training and testing in the relevant ORHVS modules required to operate and maintain HV Voltage equipment. The ORHVS training shall be done at an accredited institution, and an ORHVS Authorisation Certificate shall be issued to the successful delegates (min. five delegates).
Training shall be in accordance with all parts of the latest version of NRS 040.

C3.2.2. PROJECT SPECIFICATIONS

The project specifications address the technical installation aspects of this project. Any discrepancy between the Particular Specification, Bill of Quantities and Drawings must be reported to the Engineer, who will clarify such contradiction before the closing of the tender.

If any discrepancies exist between parts of this document, the following order of preference will take place:

- a) The Contract Agreement (if any)
- b) The Letter of Acceptance
- c) The Letter of Tender
- d) The Particular Conditions of Contract
- e) The General Conditions of Contract
- f) The Specifications and Scope of Works
- g) The Drawings, and
- h) The BoQ, Schedules and any other documents forming part of the Contract

As part of achieving a standard specification countrywide, with Eskom playing a leading role in its compilation, Eskom's specification has been used throughout this document. It is therefore an explicit requirement and condition of contract that all Contractors must have access to the Eskom specifications via the Eskom Web. Application can be made to:

Mrs Brenda Morrison Assistant
Officer

Tel : (011) 629 5266

Fax : (086) 662 6387

E-mail: Brenda.morrison@eskom.co.za

Please note that a fee is payable to Eskom for this service.

Eskom specifications and equipment standards are adopted for the delivery of the works.

C3.2.3. GENERAL SPECIFICATIONS

Note:

Failure to duly complete Technical Schedules, in full, at tender stage will result in the disqualification of the tenderer's offer.

No change in supplier is permitted without a written application by the contractor and written consent by the Engineer. Should any change in supplier be noted at any stage during implementation of the project the Engineer will instruct the Contractor to revert back to suppliers as per the tender offer with any time and cost implications for the Contractors account.

It shall be noted that specifications are for the general use of project construction, certain sections or paragraphs may not be relevant to this particular contract in which case such irrelevant items are to be considered as not applicable. Any uncertainties shall be communicated to the Engineer. Where equivalent South African standards (SANS / NRS) exist, such standards are to be used in preference to foreign standards quoted.

The documents referenced contain provisions that constitutes requirements of this specification. 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.

I / We, the undersigned _____ hereby acknowledge that I / We have obtained copies of the mentioned documents and confirm that I / We fully understand them and the consequences of non-compliance.

SIGNED AT _____ ON BEHALF OF THE FIRM _____

ON THIS _____ DAY OF _____

NAME _____

SIGNATURE _____

CAPACITY _____

Specifications as listed below shall apply to this project:

C3.2.4. LAW - NATIONAL AND INTERNATIONAL STANDARDS

All IEC, NRS, SANS, ASCE, ISO codes and National Law applicable to the disciplines listed below shall apply to this project:

1. Electrical Cable Works
2. Civil reinforced concrete works
3. Building Works
4. High Voltage Works

ACT 31 Fencing Act.

ACT 73 1989 Environmental Conservation act.

ACT 85 1993 Machinery and Occupational Safety Act 85 of 1993 with special reference to Section 1 (Act & Regulations), Section 2 (Administrative Regulations), Section 6 (Electrical Installation Regulations) and Section 16 (General Safety Regulations)

ACT OHS 1993 Occupational Health and Safety Act 1993

Standards are obtainable on the SABS Web store www.store.sabs.co.za.

C3.2.5. ESKOM SPECIFICATIONS / STANDARDS

To achieve a countrywide standard, the Eskom Specifications for outdoor substations will apply to this project. These listed specifications are included on the Tender CD issued together with the Tender. It is the Contractor's responsibility to ensure that he/she obtains the tender CD. In addition, these specifications are also available on the Eskom website (www.scot.eskom.co.za).

Table 1: Eskom Specifications/Standards

NO.	REV / YEAR	DESCRIPTION
240-53113923	2	Specification for substation clamps for tube aluminium conductors
240-56062765	2	Eskom standard for inductive voltage transformers up to 132kV
240-66581487	3	Standard for outdoor air insulated MV circuit breakers with combined current transformers & control gear for 11kV, 22kV and 33kV
240-69125210	2	Standard for 11kV, 22kV and 33kV outdoor kiosk circuit breakers
240-57648848	1	Specification for combined three-phase neutral electromagnetic couplers with neutral earthing resisters and auxiliary power transformers (NECRT's)
240-75660336	2	Substation and network equipment label specification
240-83382076	2	Standard for operational floodlighting in substations
240-83382122	2	Emergency lighting in substations
240-86100853	3	Standard for Barricading prohibited area and live chamber
240-87605434	1	Quality control process for the checking of distribution substation construction before handing over for commercial operation
240-56063756	8	Specifications for outdoor circuit breakers for systems with nominal voltages from 11 kV up to and including 765 kV.
240-76628689	1	Distribution group's specific requirements for the use of furniture in substations buildings
240-71062174	4	Generic sub design
240-134369472	2	Substation Earthing
240-170000153	1	Copper Conductors Used for Earthing in Substations
240-75880946	2	Earthing Standard
240-120804300	2	Standard for the Labelling of Electrical Equipment Within Eskom Wires Networks
240-100183119	2	Standard for Fences in Eskom Transmission Substations

NO.	REV / YEAR	DESCRIPTION
240-76368574	2	High Risk Security Mesh Fencing
240-56063710	2	Standard for MV Cabling in Substations
240-56030635	3	General Information and Requirements for MV Cable Systems
240-66917056	2	Standard for Passive Fire Protection in Distribution Substation Yards
240-62629353	0	Specification for panel labelling standards.
240-64636794	0	Standard for wiring and cable marking in substations
240-56062864	3	Eskom standard for current transformers up to 132kV
240-109589380	3	Direct Lightning Stroke Protection of Substations
240-130615754	1	Distribution Standard – Part 2, Earthing Section 1. MV and LV reticulation earthing
34-213	Latest	KIPTS Natural ageing test procedure for outdoor insulator products section 1 – particular requirements for post, long rod and stand-off insulators
34-224	Latest	KIPTS natural ageing and pollution performance test procedure for outdoor insulator products Section 0 - General Requirements
34-2057	2010-2015	Sweep frequency response analysis test procedure
Act 85 of 1993		Occupational Health and Safety Act
34-396	1	Specification for a VRW20 Junction Box.
240-54651430	0	Standard specification for outdoor metal oxide surge arresters without spark gaps for the 533kV HVDC System
34-464	1	Distribution Specification for a Swing frame Panel (19 inch rack) and blanking plates.
240-53113927	2	Specification for substation clamps for stranded aluminium conductors
240-53113923	2	Specification for substation clamps for tube aluminium conductors
240-66917056	2	Standard for passive fire protection in distribution substation yards
ESKPBAAA9	Latest	Environmental impact assessment procedure
ESKPBAAD6	Latest	Environmental management policy
ESKPVAAL7	Latest	Environmental impact assessment procedure
ESKPVAAZ1	Latest	Environmental Management Programme (EMP) Procedure
SCSSCAAZ2	0	Distribution group's specific requirements for A.C./D.C. distribution units.

C3.2.6. SUBSTATION SPECIFICATIONS

The following National and International standards shall be adhered to and can be obtained through the SABS webstore.

C3.2.6.1.CABLES

IEC 61089	-	Round wire concentric lay standard conductor IEC
60332	-	Test on electrical cables under fire conditions
IEC 60502	-	Power cables with extruded insulation and their accessories for rated voltages from 1 kV ($U_m = 1.2$ kV) up to 30 kV ($U_m = 36$ kV)
SANS 10142	-	The wiring of premises
IEC 60228	-	Conductor of insulated cables
SANS 1507	-	Electrical cables with extruded solid dielectric insulation for fixed installation (300/500 V to 1900/3300 V)
SANS 97	-	Electric cables – Impregnated paper – insulated metal-sheathed cables for rated voltages 3.3/3.3 kV to 19/33 kV (excluding pressure assisted cables)
SANS 1339	-	Electric cables — Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3,8/6,6 kV to 19/33 kV
SANS 10198	-	The selection, handling and installation of electric power cables of rating not exceeding 33 kV (all parts)
NRS 013:2007	-	Medium-Voltage cables
NRS 053	-	Accessories for medium-voltage power cables (3,8/6,6 kV to 19/33kV)
NRS 074-1	-	Low-voltage (600/1 000 V) cable systems for underground electrical distribution (all parts)
SANS 529	-	Heat-resisting wiring cables.
SANS 1507	-	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) (all parts)
SANS 6138	-	Resistance of cables and cords to flame propagation - Single vertical (IEC 60332) insulated cable or cord.

Relevant Eskom specifications as listed.

C3.2.6.2.POWER TRANSFORMERS

IEC 60076	-	Power Transformers (all applicable parts)
IEC 60137	-	Bushings for AC voltages above 1000V NRS
054	-	Design of large Power transformers Relevant Eskom specifications.

C3.2.6.3.EARTHING AND LIGHTNING PROTECTION SYSTEM

SANS 725/IEEE 80 -	-	Guide for safety in AC Substation Grounding
IEEE 81	-	Guide for measuring earth resistivity, ground impedance and earth surface potentials of a ground system
SANS 10199	-	The design and installation of an earth electrode IEC
62305	-	Protection against lightning

SANS 10292	-	Earthing of low-voltage (LV) distribution systems
SANSA 10313	-	Protection against lightning — Physical damage to structures and life hazards
NRS 060	-	Code of Practice for clearances for electrical systems with rated voltages up to and including 145 kV, for the safety of persons
IEC 61024	-	Protection of structures against lightning

Relevant Eskom specifications.

C3.2.6.4.HIGH VOLTAGE DISCONNECTORS AND EARTHING SWITCHES

IEC 62271-102	-	High Voltage Switchgear and Control Gear — Alternating current Disconnectors and earthing switches
NRS 031	-	Alternating Current Disconnectors and Earthing Switches (Up to 145 kV)

Relevant Eskom specifications.

C3.2.6.5.SURGE ARRESTERS

IEC 60099	-	Surge Arrestors. Metal-Oxide. Surge Arresters without gaps for AC Systems.
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Relevant Eskom specifications.

C3.2.6.6.HIGH VOLTAGE CIRCUIT BREAKERS

IEC 62271-100	-	High Voltage Switchgear and Control Gear — Alternating current Circuit-breakers IEC
60376	-	New Sulphur Hexafluoride
IEC 60694	-	Common specification for high-voltage switchgear and control gear standards
IEC 62271-301	-	High-voltage switchgear and control gear Part 301: Dimensional standardisation of terminals
IEC 62271-310	-	High-voltage switchgear and control gear Part 310: Electrical endurance testing for circuit breakers of rated voltage 72,5 kV and above

Relevant Eskom specifications.

C3.2.6.7.INSULATION

SANS 1019	-	Standard voltages, currents and insulation levels for electricity supply
IEC 60273	-	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000 V
IEC 60168	-	Tests on indoor and outdoor post insulators of ceramic material or glass for systems greater than 1000 V
IEC 60383	-	Insulators for overhead lines with a nominal voltage above 1000 V
IEC 60815	-	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions

- IEC 60168 - Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 000 V
 - IEC 60455 - Resin based reactive compounds used for electrical insulation
 - IEC 60071-1 - Insulation co-ordination
- Relevant Eskom specifications.

C3.2.6.8.VOLTAGE AND CURRENT TRANSFORMERS

- IEC 61869-1 - Instrument Transformers — Part 1: General Requirements. IEC
- 61869-2 - Instrument Transformers — Part 2: Additional Requirements for Current Transformers.
- IEC 61869-5 - Instrument Transformers — Part 5: Additional Requirements for Capacitor Voltage Transformers
- IEC 60186 - Voltage transformers IEC
- 66044-1 - Current Transformers IEC
- 66044-2 - Voltage Transformers NRS
- 029:2012 - Current Transformers Relevant Eskom specifications.

C3.2.6.9.ELECTROMAGNETIC COMPATIBILITY

- IEC 61000-6-2 - Electromagnetic compatibility (EMC) — Part 6-2: Generic standards – Immunity for industrial environments IEC
- 61000-6-4 - Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments IEC
- 61000-6-5 - Electromagnetic compatibility (EMC) – Part 6-5: Generic standards — Immunity for power station and substation

Relevant Eskom specifications.

C3.2.6.10. HIGH VOLTAGE TECHNIQUES

- IEC 60060 - High Voltage Test Techniques
- IEC 60071 - Insulation Coordination
- IEC 62271-1 - High Voltage Switchgear and Control Gear Standards. Common Specifications
- IEC 60270 - High-voltage test techniques - Partial discharge measurements

Relevant Eskom specifications.

C3.2.6.11. BATTERY TRIP UNITS

Battery Chargers:

- SANS 1652 - Battery chargers – Industrial type
- IEEE1115-1 - Recommended Practice for Sizing Nickel-Cadmium Batteries for Stationary Applications

Nickel Cadmium Batteries:

SANS 1632-1	-	Batteries: General information – Definitions, abbreviations and symbols
SANS 1632-2 and	-	Batteries - Part 2: Vented-type stationary lead-acid cells and batteries.
SANS 1632-3	-	Batteries: Vented-type prismatic nickel-cadmium cells and batteries
SANS 60623	-	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Vented nickel-cadmium prismatic rechargeable single cells
IEC 60993	-	Electrolyte for vented nickel-cadmium cells
IEEE1115-1	-	Recommended Practice for Sizing Nickel-Cadmium Batteries for Stationary Applications

C3.2.6.12. PROTECTION RELAYS AND CONTROL RELAYS

IEC 60255	-	Electrical relays
IEC 60447	-	Basic and safety principles for man-machine interface, marking and identification. Actuating principles
IEC 60073	-	Basic and safety principles for man-machine interface, marking and identification. Coding principles for indicators and actuations
IEC 60870	-	Telecontrol equipment and systems
IEEE 829	-	Software test documentations Relevant
Eskom specifications.		

C3.2.6.13. METERING EQUIPMENT

IEC 62052 /		
IEC 62053	-	Electricity metering equipment (a.c.) [relevant parts]
IEC 62056-21	-	(EMC) - Part 4-30: Testing and measurement techniques IEC
61000-4-30	-	Power quality measurement methods
NRS 048	-	Electricity Supply – Quality of supply (all relevant parts)
Relevant Eskom specifications.		

C3.2.6.14. SCADA AND TELECONTROL

IEEE1815-2012	-	Standard for Electric Power Systems Communications-Distributed Network Protocol (DNP3)
NRS037	-	Telecontrol Protocol (all parts applicable)
IEC 60870	-	Telecontrol equipment and systems (all parts applicable) IEC
61850	-	Communication networks and systems in substations IEEE
C37.1-2007	-	Standard for SCADA and automation systems
IEC 1588-2002	-	Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems
NERC CIP-005	-	Security
IEC 60870-5	-	Transmission Protocols - Companion standard for the informative interface of protection equipment NRS-
040-2	-	Voltage Colour Coding for Diagrammatic Displays

Relevant Eskom specifications.

C3.2.6.15. AUXILIARY SERVICE SYSTEM, CONTROL AND OTHER

IEC 61439	-	Low-voltage switchgear and control gear assemblies IEC
60947	-	Low-voltage switchgear and control gear
IEC 60529	-	Degrees of protection provided by enclosures (IP Code) IEC
60158	-	Low voltage control gear
SANS 10139	-	Fire detection and alarm systems for buildings — System design, installation and servicing
SANS 10142-1	-	Wiring of Premises Part 1 : Low Voltage Installations
SANS 1091	-	National colour standards of Paint

Relevant Eskom specifications.

C3.2.7. SITE ESTABLISHMENT

The Contractor shall supply, transport, and off-load his own facilities, such as sheds, water, electricity, lighting, etc., on the site. The Contractor shall be responsible for removing all facilities established on site upon completion of his work.

It shall be expected of the Electrical Contractor to establish a site office with a surrounding security fence. The surrounding fence is to be at least 1,8 m high, with a Y-shaped frame on top and equipped with barbed wire. Lockable gates must form part of the surrounding fence. The site yard shall provide adequate security to all material stored. The site office must be equipped with furniture for meeting purposes, and the Contractor must make arrangements to have a full-time security guard, keeping watch over all material stored in this yard. The Contractor must also provide toilets, an electricity connection, a water supply, a rain gauge, etc.

The Contractor shall make provision for lay-down areas for equipment (such as poles) inside a fenced perimeter.

The Contractor shall install a name board with a minimum size of 2 600 mm x 1 600 mm at a suitable position to be approved by the Engineer.

The preferred site office location will be indicated by the Engineer, and the Contractor shall submit a Site Establishment application to the Municipality's Building and Land Use Department on the prescribed application form.

Pin boards shall be provided in site facilities to accommodate all project and construction drawings.

C3.2.8. SITE INSTRUCTION BOOK & DAILY DIARY

The Contractor shall provide a site instruction book (triplicate pages) which shall be always kept in the site office. All instructions and variations shall be written in this site instruction book by the Engineer while attending the site. The responsibility will be on the Contractor to confirm such instructions and variations in writing, if the Engineer neglects to do so within 14 days after the issuing of this instruction, especially if it has a cost implication.

All instructions given to the Contractor while the Engineer is not on site, shall be populated into the Site Instruction Book by the Contractor. The Contractor shall

present the populated pages to the Engineer for signature upon the Engineer's next site visit.

The Contractor provide a Daily Diary which shall be kept in the site office at all times. The Contractor shall record the following information in the Daily Diary:

- Site activities.
- Work executed.
- Safety issues & incidents.
- Environmental issues & incidents.
- Quality issues.
- Community-related matters
- Weather conditions and record rainfall.
- Material received and used.

C3.2.9. SECURITY

The Contractor must arrange 24-hour security with a reputable security company to protect the construction works. The Contractor must take cognisance that he will be responsible for any material theft and the replacement thereof until 28 calendar days after the date of signing of the Handing Over Certificate.

C3.2.10. REQUIREMENTS FOR THE PROGRAMME

This tender document must be accompanied by a preliminary programme, based on prior experience and accounting for site conditions.

The tender shall be accompanied by a cash flow projection. The projection is required for adjudication of the tender and to determine the escalation on the project, if applicable.

It is essential that the Contractor refers to the General Conditions of Contract for specific requirements for the programme.

The detailed programme for the execution of the works shall be submitted by the Contractor to the Engineer within 28 days of issuing of the Letter of Acceptance.

The programme must make provision for delivery dates of material as quoted by their suppliers. The Contractor shall be responsible for late delivery of material. The Engineer may alter the programme to meet the priorities of the Client. Such amendments must allow the Contractor to complete the works within the tendered construction time.

When compiling the project programme the Contractor shall consider the Health and Safety file, which may require a permit application before the construction can initiate. Adequate allowance for this process shall be included in the programme, if needed. Due to the Employers' limited capacity, the Contractor shall assist the Employer to obtain a construction permit.

The Contractor must take cognisance to allow for normal rainfall during this period in his programme.

The expected delivery dates of long lead material must be recorded in the section of this document containing forms to be completed.

The programme shall be compiled using Microsoft Projects showing actual and scheduled progress in percentages. A Gantt chart shall be provided with carefully planned task linkage, the critical path, float allowance and the baseline programme.

C3.2.11. TIME FOR COMPLETION

- The Contractor must allow sufficient time in the delivery period for delays due to climate and weather according to the average rainfall for this area, as indicated in the special conditions of contract. Extensions of time will only be granted if evidence can be provided that the delays were caused by **abnormal** weather conditions.
- Claims for rework will not be considered and is an issue for insurance.
- The Contractor shall allow slack in the construction programme to cater for any unforeseen circumstances.
- The penalty for late completion of the works is indicated in the contract conditions, and it is emphasized that time is of the essence. Commencement of the contract will be as indicated in the acceptance letter.
- **The Contactor shall note that strikes/protest action from the community is anticipated. Therefore, strikes/protest actions do not constitute Force Majeure conditions, which are defined as unforeseeable events. No claim for extension of time and/or cost shall be approved.**

C3.2.12. SUBSTATION SURVEY

The Contractor must appoint a qualified Land Surveyor to peg the substation equipment centre lines according to the issued Construction Drawings. The Land Surveyor shall also peg the corners of the cadastral boundaries of the substation property, and the fence position.

Prior to commencement of any phase of the project, as indicated on the drawings, the Contractor must do a thorough survey to ensure that all pegs applicable to this project are installed. Missing pegs must be reported in writing to the Engineer. The Contractor will be responsible for re-installing all missing pegs at his/her own expense on the day of handover of a particular phase.

Any cadastral pegs, where applicable, which are removed accidentally or intentionally by the Contractor during the execution of the works shall immediately be reported to the Engineer.

If the Employer's Land Surveyor re-installs missing pegs, it shall be at the expense of the Contractor. The Contractor must issue a certificate obtained from a professional Land Surveyor to verify that all pegs are installed correctly to set out the works. A CAD drawing indicating all pegs set out shall be submitted to the Engineer to overlay on the construction drawings to confirm the correctness of the pegs set out.

The Contractor shall, after completion of the contract, employ a Land Surveyor acceptable to the Engineer and Employer to certify the correctness of the constructed infrastructure. This certificate must be submitted to the Engineer together with the survey in a CAD format.

ALL CADASTRAL BOUNDARIES, R.O.W.S.'s AND SERVITUDES ALONG ROUTES, SHALL BE PEGGED BY A PROFESSIONAL LAND SURVEYOR.

Any cadastral pegs, where applicable, which are removed accidentally or intentionally by the Contractor during his/her activities, shall immediately be reported to the Engineer. The Employer's Land Surveyor shall re-install such pegs at the expense of the Contractor, or the Contractor shall appoint a Professional Land Surveyor to reinstate these pegs. The Contractor must issue a certificate obtained from a Professional Land Surveyor to verify that all pegs are installed to correctly set out the works. A CAD drawing indicating all pegs set out shall be submitted to the Engineer to overlay on the construction drawings to confirm the correctness of the pegs set out.

The Contractor shall employ a Land Surveyor acceptable to the Engineer and Employer to certify the correctness of the constructed infrastructure. This certificate must be submitted to the Engineer together with the survey in a CAD format.

C3.2.13. MEASUREMENTS

Before ordering equipment, the measurements must be confirmed on site by the Contractor who shall confirm the measurements with the Engineer. The accuracy or inaccuracy of the Bill of Quantities will not influence the validity of the tender. The quantities in the Bill are measured from a drawing and serve only as an indication to obtain base unit rates during the tender. At the end of the Contract period, a final re-measurement, based on actual quantities, will be performed, according to which the Contractor's payment upon completion will be confirmed.

C3.2.14. FINAL INSPECTION

After completion of each section of the project, the Contractor must perform an internal, thorough inspection on all the work done, to satisfy himself that the work complies with the specifications, and then apply in writing to the Engineer for a final inspection. The Contractor will be liable to pay the Engineer in time, according to the newest gazetted ECSA rates or as indicated in the conditions of contract, for re-inspections.

The application for the final inspection must be accompanied by the as-built drawings. The installation will not be approved before submission of the as-built drawings.

C3.2.15. QUALIFIED PERSONNEL

During the tender stage the Contractor must submit a list of the staff allocated to this project with proof of their qualifications and experience in the construction and erection of similar works. The Contractor shall provide the Employer and Engineer with the

names of the supervisory personnel on site before commencement of the contract works. Deviation from the lists during construction of the works shall not be permitted without the written consent of the Engineer.

The Contractor shall submit a certificate issued by the Chief Inspector of the Department of Labour, indicating that he is fully competent to perform electrical construction work. No work will be allowed before submission of these documents.

If the Contractor, during any stage of the contract and for whatever reason, desires to change the supervisory personnel on site, he will do so in writing to the Engineer. Failure to do this will result in the Engineer halting the contract works until such time the necessary documentation is provided and the changes approved. Any such delays will not be considered by the Engineer for late completion of the contract.

C3.2.16. CONTRACTOR'S RESPONSIBILITY

All the material shall be supplied by the Contractor and shall include manufacturing, according to the relevant standards and specification, transporting to site, installation, testing and commissioning.

The Contractor shall be responsible for any damage caused by excavation work, whether caused directly or indirectly and whether written permission has been granted for machine excavation or blasting, or not.

The Contractor shall be responsible for all Health, Safety, Environmental, Quality and Community matters on the construction site.

C3.2.17. MATERIAL MANAGEMENT

The Contractor shall be responsible for the transporting of all materials and equipment to the site or off-site storage facility, and the Contractor shall provide for the off-loading, rigging, lifting, handling and placement thereof into the permanent position as planned. The Employer shall not provide any assistance or plant for the placing of equipment into position.

All materials shall be provided by the Contractor unless otherwise specified. The Contractor shall take full responsibility for this material received and shall administer this material according to store bookkeeping system by means of computer aid.

The contractor shall compile a material ordering list stating the supplied, order date and delivery date within 28 days of issuing the Letter of Acceptance.

A stock taking report shall be submitted to the Project Manager on a two-weekly basis.

All material must comply with the requirements of the latest SANS Standards. If the offered material does not comply or fails the specified tests, the Contractor shall at his cost replace the material or equipment that does not comply or has failed the specified tests. All replacement equipment or material shall comply with the relevant specifications.

C3.2.18. WORKSHOP ASSEMBLY

To avoid problems with the erection and installation activities on site, components, equipment and sub-assemblies must be pre-assembled in the place of manufacture to ensure proper fitting and operation on site.

Such pre-assemblies which are to be tested in the place of manufacture, shall be set up in a simulated mode, using the specified peripheral equipment as far as possible in a temporary connected condition to simulate site conditions as accurately as possible. This requirement is applicable to field equipment for electrical and electronic installations.

The purpose of such preliminary testing, shall further be done to check whether the equipment complies with predetermined set values and shall produce certain predetermined set results, as set out in the various parts of the document.

Measurements of equipment shall be taken into consideration to ensure that such equipment and materials can be handled on site and can be placed into the specified positions.

Additional costs or delays resulting from failure on the part of the Contractor to check access conditions, positions, openings, etc., will be for the Contractors account.

Individual units of equipment shall be clearly marked by employing an identification code in such a manner that actual re-assembly, erection and installation on site can be done in the minimum of time with a minimum of fitting and adjusting on site.

Equipment should be delivered to site in the largest sub-assemblies that are practical.

Equipment of the same type shall all be obtained from one manufacturer and sub-components shall be changeable. Prior to manufacture, the Contractor shall ascertain all critical dimensions and points of entry.

The Engineer may, upon request by the Contractor, inspect existing installations of prototype assemblies in the factory to determine whether the extent and workmanship of such units are of the required standard for the particular Contract. This may be done to obviate the possibility of having to replace unacceptable equipment already installed.

Prior to the delivery of any equipment, the Contractor shall submit OEM routine tests to the Engineer for approval.

C3.2.19. DELIVERY OF EQUIPMENT

The Contractor shall make the necessary arrangements to get all equipment delivered to site in accordance with the Programme of the works and in an undamaged condition.

The Contractor shall pack equipment and material for transport and delivery in soundly constructed crates or other packages fitted with removable lids or openings for inspection.

All parts of the equipment prior to packaging, shall have been thoroughly protected to preclude damage during transport and storage.

Any damage that may occur in transit or storage must be repaired, corrected or replaced by the Contractor before such materials or equipment is installed. Any parts of items found to be defective after installation on site, shall be replaced or repaired at the Contractor's expense and the Engineer's approval.

The Contractor shall be responsible for the acquisition of any insurance cover that may be required for equipment in transit and temporary storage on and off site.

All the lifting and erection equipment required by the Contractor to off-load, install or erect equipment on site is deemed to have been allowed for by the Contractor in the Contract price, as no assistance in this regard will be provided by the Employer or other Contractors.

If no item has been measured in the Pricing Schedules, Schedule of Quantities or Bills of Quantities for such handling equipment, the rate of the item to be handled shall include such handling costs.

Materials stored off-site must be repacked or protected, after inspection, to provide the necessary protection thereof for transport to site.

C3.2.20. OFF-SITE HANDLING OF MATERIALS AND SAFETY

Equipment and materials stored off-site shall be stored in a safe, dry and clean environment and shall be protected against damage, from the elements and theft. Electrical and electronic equipment shall not be assembled, stored or tested in areas where grinding, welding or painting work takes place. Damaged equipment and materials, stored in factories or stores of the Contractor, will be rejected upon inspection.

Areas in stores or places of manufacturing for testing or inspections of equipment and materials by the Engineer shall be clean and safe for the purpose of testing or inspections. Floors must be free of loose materials, dirt and debris.

Equipment and materials will not be inspected in noisy or dirty environments and also not in areas where welding, grinding, and painting or any other manufacturing processes are underway. Testing or inspections will not be undertaken in hazardous or explosive atmospheres.

All material and equipment for the contract shall be separated within the storage facility and clearly marked with the contract number and project name.

Materials stored in the stores of the Contractor or in alternate storage space, and which is acceptable to the Engineer for off-site certification for payment, shall only be certified for payment under the conditions as laid down in this document.

C3.2.21. ON-SITE HANDLING OF MATERIALS AND SAFETY

Equipment and materials stored on site shall be stored in a safe, dry and clean environment and shall be protected against damage, from the elements and theft.

Heavy materials shall be stored in a manner as not to create a danger to the Contractor, other Contractors, the Employer or the Engineer.

Small materials shall not be left lying around on site. Expensive, small items such as instrumentation or electronic components shall be kept under lock and key until the installation thereof.

Storerooms used by the Contractor shall be kept locked to prevent unnecessary loss of materials.

Redundant material, which is the property of the Employer, shall be removed from site and either be reused elsewhere or returned to the Employer through the relevant processes. If clear directions are not available in this regard, the Contractor shall obtain instructions for the removal of the equipment from the Engineer. No redundant material shall become the property of the Contractor or any other party and shall remain the property of the Employer unless decided otherwise by the Engineer.

C3.2.22. RE-LABELLING

The Contractor shall be responsible to attend to all labelling requirements that arise with any system installation. All labelling requirements shall be allowed for in the unit rates of the Contractors priced bill of quantities. A schedule of labels shall be compiled by the Contractor and submitted to the Engineer for approval. Labelling shall include relabelling of existing works where the new installations affect the original labelling.

C3.2.23. CONSTRUCTION METHODS

Before initiating any construction, the Contractor shall compile a list of all defects per sectional area and verify such defects alongside a duly authorized representative. The repair of any damage not listed shall be the full responsibility of the Contractor, the Employer shall under no circumstances be held responsible for payment of damages done by the Contractor or damages not listed prior to initiating construction.

Where the Contractor will perform trench work, it shall be the Contractor's responsibility to request that the employer scans the trench for any existing services, especially cables at substations. The Contractor shall mark the trench positions clearly by means of chalking.

The Contractor shall ensure that all wayleaves are approved prior to commencement of any work and shall be responsible for maintaining any pre-approved wayleaves.

C3.2.24. SITE SAFETY

Safety requirements are as follows:

- Only harnesses and no safety belts must be used in alleviated positions.
- No labourers will be allowed to stay on site. A night watch shall be appointed to guard the site at night.
- Sufficient barricading and visible warnings shall be applied if work is executed near energised plant or equipment.
- All excavations shall be visible barricaded
- No short pants will be allowed on site.
- Safety clothes (PPE) suitable for the specific task must be worn at all times.
- Toilet facilities shall be available on site.
- Day visitors will be able to enter via the visitor's log.
- Hard hats and safety boots are compulsory on the construction site.
- All operators must be trained and competent.
- All equipment must be in a good working order.
- The Contractor must have a first-aid kit on site and all injuries must be reported.
- The Contractor must keep complete record of all man hours.
- No work shall proceed without all statutory Health & Safety appointments by the Contractor.

The requirements of the Occupational Health and Safety Act, Act 85 of 1993 and the Construction Regulations shall be complied with as far as site safety is concerned.

Excavations shall be barricaded, backfilled and compacted as soon as possible after excavating to allow safe passage for persons and traffic on site.

Contractors shall not allow any workers to work in excavations deeper than 1m, unless the sides of the excavations are properly shored and supported, especially in sandy or wet soil conditions.

Open manholes shall be barricaded.

Deep waterlogged excavations shall be pumped empty as soon as possible after flooding or shall be solidly barricaded until pumped dry.

Open, live or unsafe power connections shall not be left unguarded or unprotected. The construction site shall be kept clean and tidy daily.

Off-cuts and rubbish shall be removed from the site and deposited in the designated dumping place daily.

The Contractor shall adhere to all safety rules and regulations as may be in existence on a site or as may be required by the Employer or the Engineer. The Contractor shall also ensure that their workforce on site adhere to safety rules.

Contractor shall not drive or allow a vehicle or machine to be driven close to excavations.

Contractor shall keep all power connections and/or live equipment with voltages above 30V, temporary or permanent, in a good and safe condition and shall keep all doors, shutters and covers closed on such equipment, during construction, testing and commissioning and shall take all steps to prevent accidental contact of live equipment by any person.

The Contractor shall take control over any power cable or power circuit connected from equipment installed by him, or under his control and which operates at a voltage higher than 30V. The Contractor shall not energise such a cable or circuit and shall not grant permission to any other person on the site to energise such a cable or circuit without first having made sure that such action does not create a dangerous situation.

The Contractor shall not connect any portion of an installation to the point of supply of a Supply Authority without first having complied with the requirements and regulations of such an Authority as far as tests, certification or clearance from the Authority is concerned and not until permission is obtained from the Engineer in this regard.

Any damage to equipment of other contractors or the Employer due to equipment being supplied by such an unauthorized power connection shall be for the account of the Contractor for this Contract.

The Contractor shall not energise any portion of an installation until the earth points of power equipment in such installation have been properly bonded and earthed to a known good earth point with a value of 5 ohm or less, referred to zero, as tested with a null balance megger.

C3.2.25. EXISTING SERVICES

The Contractor shall consider all possible existing cables and other services. The services may be buried and cannot be accurately pinpointed. Therefore, all excavations must be done with care.

The Contractor shall acquaint himself with the position of all the existing services such as storm water pipes, water mains, sewer mains, gas pipes, telephone cables, etc. before any excavations are commenced. For this purpose, he shall approach the Engineer's representative, the local municipal authority and any other authority, which may be involved, in writing.

The Electrical Contractor shall accept full responsibility for any damage caused by excavation work, whether caused directly or indirectly and whether written permission has been granted for machine excavation or blasting, or not.

Repair of damaged services undertaken by the Electrical Contractor shall be to the satisfaction of the owner of the service. The cost of repair work undertaken by the owners of the service, as well as consequential losses arising from damage to the service, will be recovered from payments due to the Electrical Contractor without notice, unless proof of direct payment to the owners can be produced.

The Contractor shall report any damage to existing services immediately to the Engineer as well as the owner of the service, irrespective of whether the damage is

considered minor or not. Apart from reporting damage, an entry shall be made in the site diary, indicating the time of occurrence, the extent of the damage, the time reported, and the names of the persons reported to at the Consulting Engineers as well as the Owners of the service.

Penalties shall be levied for damage caused to existing services under the following circumstances:

- a) Damage due to machine excavation or blasting without the written permission of the Engineer.
- b) Damage which the Contractor failed to report to the Engineer as well as the owners of the service, or which the Contractor failed to enter comprehensively in the site diary.

The penalties referred to above, shall be 100 % of the cost of repair work carried out by the owner of the service as well as 100 % of the value of consequential losses as calculated by the owners of the service. Any such penalties shall be recovered from any payments due to the Contractor.

C3.2.26. DESIGN RESPONSIBILITY

Preparation of all detail designs, manufacturing drawings and documentations for approval specified throughout the enquiry document shall initiate once the successful Contractor has received a Letter of Acceptance.

The Contractor shall be responsible for furnishing all equipment detailed designs. The Contractor shall submit the initial design drawings to the Engineer for a design review and the allowed duration for the design review by the Engineer shall be 10 working days. The design freeze will be only granted after approval by the Engineer. The Contractor shall submit all outline drawings and design details including supporting documents requested within a reasonable time frame and prior to the commencement of the equipment manufacturing.

It is envisaged that the detailed design of the following shall be required.

- 132 kV Outdoor breakers.
- 132 kV Current transformers.
- 132 kV Voltage transformers
- 132 kV Isolators
- 132 kV Surge Arrestors
- 20 MVA 132 kV/22 kV Power transformer.
- 66 kV Surge Arrestors
- 22 kV Surge Arrestors
- 22 kV NECRT.
- 22 kV Outdoor breakers.
- 22 kV Outdoor Isolators.
- 22 kV Outdoor Voltage Transformers
- 22 kV Outdoor Current Transformers
- Control/protection schemes and panels.

Note: all drawings shall be submitted in hard and soft copy — soft copies shall be in editable DXF / DGN format.

C3.2.27. AS-BUILT INFORMATION

The Contractor shall ensure that accurate as-built records are kept of all infrastructure installed or relocated during the contract. A marked-up set of drawings shall also be kept and updated by the Contractor. This information shall be supplied to the Engineer's Representative on a regular basis (monthly). All information in possession of the Contractor required by the Engineer and/or the Engineer's Representative to complete the as-built/record drawings, shall be submitted to the Engineer's Representative before a Certificate of Completion will be issued. Three sets of the following information are required on completion of the works:

- OEM Manuals of all equipment
- Operation and Maintenance manuals.
- Commissioning Reports.
- Design Drawings.
- Factory Acceptance Testing Reports.
- Commissioning Reports.
- As-built drawings.
- Soft copy of all documentation

C3.2.28. PAYMENTS

Payment application shall be assessed once a month and the claim must be agreed to and approved by the Engineer. The progress claim, together with a progress report, must reach the Engineer's office by the 17th of each month.

The Engineer will not issue any certificate for interim payment of any equipment and material that is stored on or off site in such a way as to hinder inspection thereof.

The Employer reserves the right to be under no obligation to pay for material delivered to or off site and shall take preference for payment to the Contractor after commissioning of the works. The Contractor shall price the preliminary and general section of the bill of quantities adequately, allowing for all overhead costs during the construction period.

Materials or equipment stored on or off site and packed in crates or boxes must be opened for inspection and the serial numbers, types or quantities must be easily identifiable by the Engineer before payment for such materials will be processed.

Payment will not be certified for small materials such as short pieces of cable, conduit, wire, conduit boxes, saddles, screws, etc., that are stored on or off site. Payment for such materials will only be certified once the materials have been built in, installed or commissioned. In special cases, 80% payment for material on site may be considered subject to approval.

Interim payment will only be considered subject to the following conditions:

- a) The equipment must be complete and in a ready state for installation or commissioning. Loose components which are not yet built into, or which will form part of, the large materials mentioned in the previous paragraph, will not be considered for payment.
- b) The materials which are to be type tested, performance tested, or safety tested should have already passed inspections and/ or tests by the Contractor and/or the supplier of the equipment.
- c) The Contractor shall, prior to submitting interim payment claims, procure financial assurance by means of the guarantee from a registered bank, on the format and to the amount stated in the Conditions of Contract.

The material must be stored in a cordoned off area in the stores of the Contractor and a notice must be affixed to this area stating that the materials stored in that area are the property of the Employer. The area must be safe and not near flammable liquids or explosive equipment and must be kept clean and dry.

C3.2.29. USE OF OWN MANPOWER

- The Contractor shall only use skeleton staff and skilled staff for implementation of the project. The contractor shall appoint local labourers for all unskilled tasks. Should it prove to be impossible to identify people from the community to perform the expected tasks identified by the Contractor, written approval shall be obtained from the Engineer, or the community, prior to utilising his own manpower to complete the project.
- The Contractor's own personnel will be responsible for all specialised work. The Contractor shall therefore use only skilled labour of his own workforce. All other unskilled labour required shall be local labour.
- The Contractor shall take full responsibility to manage local labour The

different tasks and responsibilities are as follows:

- a) CLO - Community Liaison Officer
- b) Security Guards (an additional security guards must be ready on standby):
 - Manage access to and from the construction site;
 - Manage access to and from the site camp;
 - Move around perimeters;
 (The above guards shall rotate to prevent "sleeping on the job")
- c) Unskilled labourers

The contractor shall provide for the necessary facilities for the workforce i.e. water, toilets, guard houses, stationary, PPE, identification etc.

C3.2.29.1. DUTIES, TASKS AND RESPONSIBILITIES

C3.2.29.1.1. CLO

- d) Act as Liaison Officer between Community, Contractor and Employer.
- e) Identify and recruit manpower.
- f) Ensure labourers obey Contractor's instructions.

- g) Terminate, retrench, expel and discipline workers
 - Not obeying Contractor's instructions
 - Refuse to work
 - Not reporting for work without excuse
 - Misbehave, steal, drink, intimidating etc. during working hours etc.
- h) Settlement of disputes.
- i) Obtain wayleaves.
- j) Man, and manage a community desk for enquiries, complaints, and recommendations to assist in preventing work stoppages by the community.
- k) Any other reasonable instructions required by the Contractor, Project Manager or Employer.

C3.2.29.1.2. SECURITY OFFICER

- a) Keep close watch over all material, site yard and equipment of Contractor.
- b) Protect material and equipment. Report all incidents to the Contractor.
- c) Work 8 hours shifts as follows:
 - Shift 1: 06:00 to 14:00
 - Shift 2: 14:00 to 22:00
 - Shift 3: 22:00 to 06:00
- d) Any other reasonable instructions required by the Contractor, Project Manager or Employer.

C3.2.29.1.3. LOCAL LABOUR

- a) Perform and execute tasks such as:
 - Digging holes
 - Digging trenches
 - General unskilled labour
- b) Any other reasonable instructions required by the Contractor, Project Manager or Employer.

C3.2.29.1.4. CONTRACTOR

- a) Employ the CLO, security officers and local labour.
- b) Provide and supply all clothing, tools and materials to perform the tasks required.
- c) Manage the workforce with the assistance of the CLO to ensure that the programme to carry out the work is met.
- d) Manage all material. The Contractor will be responsible for the management, issuing and verification of all material.
- e) Conduct and convene meetings on a daily base, to delegate work and tasks and to record progress.
- f) To ensure all safety requirements are met.
- g) Pay and remunerate the workforce once a month by means of a cash cheque and record all payments with relevant signatures.
- h) The Contractor will register all local labourers for unemployment insurance.
- i) Enter into written agreement with CLO and workforce and appoint workforce in writing.

C3.2.29.1.5. CONDITIONS OF EMPLOYMENT

- a) Obey the Contractor's instructions.
- b) Sign time sheets and report for work from Monday to Friday.
- c) Work overtime if required by the Contractor.
- d) Working hours are 45 hours per week from 07:00 to 16:30 with a 30-minute lunch break from 12:00 to 12:30.
- e) Payment will be effected according to the attendance register, with a no-work-no-pay policy.
- f) Payment will be made once a month, on the last Friday of the month at 14:00.
- g) Unemployment insurance funds will be deducted.
- h) Tax will be deducted if applicable, and when deducted, IRP5 certificates will be issued.
- i) Payment categories:
 - CLO - Estimated R 10 000,00 per month or pro rata for days working
 - Security Guards - Estimated R 16 000 per month or pro rata for days working
 - Labourers - Estimated R 285,07 per day (45-hour weekday)

The above are estimated minimum amounts and shall be negotiated between the Contractor, Municipality and relevant manpower. To prevent disputes arising any manpower shall not be paid more or paid less than the rates being used within the Municipal area.

- j) Overtime will be paid according to time plus a third.
- k) If the required progress is not met after actions taken by the CLO, the Contractor will have the right to strengthen his own workforce with the approval of the Project Manager.

C3.3. EQUIPMENT SPECIFICATION

The following equipment forms part of the Impumelelo Substation:

Table 2: Equipment Schedule (Substation Extension)

DESCRIPTION	DRAWING NUMBER	QTY
ISOL 132kV 2500A 40kA CRDB H/O 31mm	D-DT-6302s1	5
BREAKER 132kV 3150A 40kA 3P	D-DT-6250s1	2
CT 132kV 2500A 40kA 2P2M2B (1600)	D-DT-6190s1	6
VT 132 kV / 110V 100VA.	D-DT-6170s1	3
TRANSFORMER 20MVA 132/22kV OLTC Ynd1	D-DT-6122s1	1
NEC/NER/AUX TRANSFORMER 22kV 360A 100kVA 22kV/420/240V 31mm/kV	D-DT-6141s1	1
KIOSK BREAKER 22kV 1250A 25kA 110VDC 31mm	D-DT-6252s1	4
ACTOM CTB36 22kV, 1250A, 25kA OUTDOOR VACUUM COMBO VCB 31mm/kV	OEM	3
ACTOM COMPOSITE CT – 1200/800/200/1A CLASS 0.2	OEM	9
ACTOM COMPOSITE VT – 22kV/110V 100/50VA	OEM	9
ISOLATOR 22kV 2500A, 25kA, CRDB H/O 31mm/kV	D-DT-6154s2	16
INSUL LONG ROD 132 KV 120KN B/S 31C	D-DT-7014s2	3
INSUL LONG ROD 33 KV 120KN 570C/L 31C	D-DT- 3190S4	33
LINE POST INSULATOR 33 KV 10KN COMPOSITE 31C	D-DT-3189s3	21
VT 1 PH 22kV/110V 100/50VA	D-DT-6173s1	3
INSUL POST STN 132kV	D-DT-6230s1	9
INSUL POST STN 66kV	D-DT-6232s1	12
S/ARR S/CL 132kV MCOV 84kV	D-DT-6210s1	3
S/ARR S/CL 22kV MCOV 24kV	D-DT-6215s1	6
S/ARR S/CL 66kV MCOV 48kV	D-DT-6212s1	1
FLOODLIGHT LED 60W, 10 000 LM, 120LM/W, RND	D-DT-6009	42

C3.3.1. SUBSTATION EQUIPMENT

- a) Feeder Isolator with Surge Arrestors (D-DT-4622s5):
1 x set 132 kV, 2500 A, 40 kA, Bull, 31 mm/kV isolator with 3m phase spacing.
- b) Bus-section Isolator (D-DT-4630s1):
2 x sets 132 kV, 2500 A, 40 kA, Bull, 31 mm/kV isolator with 3m phase spacing.
- c) Feeder onto Busbar Isolator (D-DT-4623s2):
2 x sets 132 kV, 2500 A, 40 kA, Bull, 31 mm/kV isolator with 3m phase spacing.
- d) Circuit Breaker (D-DT-4618s1):
2 x 132 kV, 2500 A, 40 kA, 3P, 31mm/kV, Bull
- e) Current Transformer (D-DT-4631s1):
6 x 132 kV, 2500 A, 40 kA, 2P2M2B1600, 31mm/kV

- f) Busbar Tube 132kV onto Bus section (D-DT-4655s1):
3 x Aluminium Tube, 120 OD x 4mm Thick x 12m Length
- g) 20MVA 132/22kV Power transformer (D-DT-4600s1): 1 x
20MVA, 132/22kV OLTC
- h) Voltage transformer (D-DT-4636s1):
 $3 \times \frac{132\,000/\sqrt{3}}{110/\sqrt{3}} \text{ V}, 100 \text{ VA}, 31 \text{ mm/kV}, \text{ Centipede (D-DT 6170s1)}$
- i) NEC/NER/AUX Transformer (D-DT-6141s1):
1 x 22kV 360A, 100kVA, 22kV/420/240V, 31mm/kV
- j) Post Insulator (132kV) (D-DT-6230): 9
x 132 kV Post Insulator, 31 mm/kV
- k) Post Insulator (66kV) (D-DT-6232): 9
x 66 kV Post Insulator, 31 mm/kV
- l) Isolator (22kV) (D-DT-4626s1):
16 x 22 kV, 2500 A, 25 kA, CRDB, H/O, 31 mm/kV
- m) Outdoor Circuit Breaker Kiosk (22kV) (D-DT-4619s1) 4
x 22 kV, 1250 A, 25kA
- n) Outdoor Circuit Breaker Vacuum (22kV) (OEM) 3
x 22 kV, 1250 A, 25kA with fitted CT and VT
- o) Voltage transformer (D-DT-4642):
 $3 \times \frac{22\,000/\sqrt{3}}{110/\sqrt{3}} \text{ V}, 100 \text{ VA}, 31 \text{ mm/kV}, \text{ Centipede (D-DT 6173)}$

C3.4. GENERAL

C3.4.1.1. ESKOM SELF-BUILD PROJECT

The Contractor or Subcontractor responsible for the Eskom's Impumelelo Substation shall be conversant with Eskom standards, procedures and requirements, shall have a valid Eskom vendor number, and be able to get authorised to perform work in FSOU.

All work shall be in accordance with Eskom's self-build procedure. Only equipment approved through Eskom's National Contracts shall be permitted to be installation.

The Contractor shall be responsible for all primary plan and control plant aspects associated with the Impumelelo Substation extension, including detail OEM drawings.

Eskom will recommission and energise the substation extension. However, the Contractor shall pre-commission and test all equipment installed in accordance with Eskom's requirements.

C3.4.1.2. SITE WORKS

The Contractor shall remove all vegetation and neutralise the site before construction can begin.

The bulk earth works portion of the contract to establish the substation platform is included under the Eskom contract in full. The Contractor will be responsible to hand over and certify the setting out and levels of the bulk earth works.

The external access road to the substation is sufficient as is and the Contractor is not required to create any new access roads. The existing access road shall be graded for ease of access.

C3.4.1.3. BULK EARTH WORKS AND ROAD WORKS

The bulk earth works comprises of:

- Site Clearance and Preparation
- Bulk Excavations
- Bulk Backfilling
- Platform preparation
- Gabions and Pitching
- Top-soiling and grassing
- Testing
- Site Survey
- Herbicides and Pesticides application

The internal road works comprises of:

- Concrete gate entrances ramps
- Substation road curbing

C3.4.1.4. WORK SPECIFICATION

C3.4.1.4.1. DISPOSAL OF EXCAVATED MATERIAL SHALL INCLUDE:

- a) Removal of excavated Black Turf or any other soil unsuitable for backfilling and transporting it to borrow pits.
- b) The excavated material shall be disposed of in borrow pits or a suitable place, indicated by the Engineer or his site representative or the Employer's environmental representative.
- c) The Contractor shall make his own arrangements for the provision to dispose of the excavated material on such a disposal place.
- d) Free haul shall be the distance within a radius of 1,5 km from the substation position.
- e) Limited haul shall be the first 1 km beyond the end of the free haul distance via the shortest practicable route.
- f) Long haul shall be the remainder of the distance beyond the limited haul by the shortest practicable route.

C3.4.1.4.2. IMPORTING SOIL SHALL INCLUDE:

- a) Transporting imported soil from borrow pits to substation position.
- b) In areas where the excavated soil is Black Turf, imported soil shall be used for the soil / cement mixture.
- c) The Contractor shall make his own arrangements for the provision of a suitable borrow pit for the importing soil.
- d) Free haul shall be the distance within a radius of 1,5 km from the substation position.
- e) Limited haul shall be the first 1 km beyond the end of the free haul distance by the shortest practical route.
- f) Long haul shall be the remainder of the distance beyond the limited haul by the shortest practical route.

C3.4.1.4.3. TRANSPORTATION SHALL INCLUDE:

- a) Transporting all material and equipment from the construction camp to the substation position.
- b) Free haul shall be the distance within a radius of 1,5 km from the substation position.
- c) Limited haul shall be the first 1 km beyond the end of the free haul distance by the shortest practicable route.
- d) Long haul shall be the remainder of the distance beyond the limited haul by the shortest practicable route.
- e) If the Contractor is planning to use a batching plant not located in the construction camp, the cost due to transporting the concrete from the batching plant to the construction camp shall be at the expense of the Contractor.

C3.4.1.5. MATERIAL SPECIFICATION

C3.4.1.5.1. DISPOSAL OF EXCAVATED MATERIAL:

- a) The Contractor shall be responsible for disposing of excavated soil not used for backfilling.
- b) The Contractor shall transport all the excavated soil not used for backfilling to the suitable borrow pit.

C3.4.1.5.2. IMPORTING SOIL:

- a) The Contractor shall be responsible for supplying imported soil. If not otherwise specified, the imported soil shall be in accordance to SANS 1200.
- b) The imported soil shall not contain notable quantities of organic matter or stones of average dimension exceeding 150 mm.
- c) The Contractor shall transport all the imported soil from the borrow pit to the substation position.

C3.4.1.5.3. TRANSPORTATION:

- a) The Contractor shall transport the concrete from the batching plant to the substation position.

C3.4.2. INSTALLATION OF EARTH GRID

C3.4.2.1. WORK SPECIFICATION

NOTES:

- a) The earth grid shall be installed in accordance to Eskom Earthing Standard D-DT5240 and to the Earth Grid Layout drawing.
- b) All labour and transport cost must be included in the quoted rate.

C3.4.2.1.1. EXCAVATE EARTH GRID TRENCHES SHALL INCLUDE:

- a) Excavating in all material 450 mm wide trenches.
- b) The main earth grid shall be laid in 1000 mm deep trenches.
- c) Risk of collapse and keeping excavations free of water shall be included in the quoted rate.

C3.4.2.1.2. INSTALLING THE EARTH GRID SHALL INCLUDE:

Horizontal earth electrode

- a) Round annealed copper rod with a 10 mm diameter, is to be used for the earth electrode.
- b) A 200 mm layer of imported soil with a resistivity less than 100 Ω .m shall be compacted at the bottom of the trench before placing the copper conductor in the trench.
- c) The copper conductor shall be placed on this bed of compacted soil.
- d) The main earth grid trenches shall be back filled and compacted with imported soil with a resistivity less than 100 Ω .m, in layers not exceeding 150 mm.
- e) Copper rods shall be installed under the switch house foundation and welded to the main substation earth grid.

Vertical earth electrode:

- a) Round annealed copper rod with a 10 mm diameter, is to be used for the earth electrode.
- b) Holes with an inside minimum diameter of 100 mm must be drilled to the required depth. The vertical copper electrodes (two rods per hole) will be positioned in the hole, which will then be filled with conductive concrete. It must be poured as a slurry into the holes.

Welding of joints, crossings and earth tails shall include:

- a) All copper rod crossings and joints shall be welded according to Earthing Standard D-DT-5240. This includes the vertical electrodes welded to the horizontal electrodes.
- b) At positions indicated on Earth grid drawing, earth tails shall be welded to the earth grid.
- c) These earth tails shall protrude above the substation floor level, long enough for bonding to the substation fence and steel support footings.
- d) No joint in earth tails shall be made above the ground level.
- e) Bonding of the earth tails to the steelwork, equipment and substation fence is covered in the documents handling the installation of the relevant parts.

- f) Earth tails for bonding to the terminal towers shall be installed as shown on the Earth grid Layout drawing. The line Contractor shall do the bonding to the terminal tower.

Connection to the existing earth:

- a) The Contractor shall perform cross-cuts to determine the position of the existing earth grid. The newly installed earth grid shall be welded according to Earthing Standard D-DT-5240 to the existing earth grid.

Testing of earth grid shall include:

- a) The preferred method for testing the earth grid resistance is the 'Wiener Bridge' method.
- b) The test shall be done from one of the corners of the main substation earth grid.
- c) The measurements shall be carried out and logged by the Project Engineer.

Additional earthing shall include:

- a) The total earth resistance of the earth grid before the overhead line is connected should be less than [the resistance calculated in CDEGS].
- b) If the values for the earth resistance for any are above the mentioned values, additional vertical earthing should be installed, after the project Engineer has been notified.
- c) The additional vertical electrodes shall be welded to the existing horizontal grid according to Earthing Standard D-DT-5240.
- d) The earth resistance shall again be measured as described.
- e) If the value for the earth resistance is still above the mentioned values, the Project Engineer shall be notified once again.

C3.4.2.2. MATERIAL SPECIFICATION

Unless otherwise specified, The Contractor shall supply the copper and all the material necessary for installing the earth grid. The Contractor shall further be responsible for the safekeeping of the copper.

All earthing outside the substation perimeter fence shall be the Copper Cladded Steel (CAMO type) equivalent to the copper earthing specified.

Installing the earth grid:

- a) 10 mm Diameter annealed copper rods shall be used for the main earth grid conductors as well as for the counter poise conductors.
- b) The resistivity of the imported soil shall be less than 100 Ω .m for the soil to be back filled in the earth grid trenches.

Welding of joints:

- a) Unless otherwise specified the earth tails shall be 50 mm x 3 mm flat copper strips.

Testing earthing resistance:

- a) The Contractor / Project Engineer shall carry out the tests.

Additional earthing:

- a) 10mm Diameter annealed copper rods shall be used for the additional counter poise conductors.
- b) All material for the additional earthing shall be supplied by the Contractor.

Conductive concrete for vertical electrodes:

The conductive concrete must have a resistivity of less than $0.01 \Omega \cdot \text{m}$. It must be made from high quality (99% Carbon) petroleum coke with a closely graded particle size. The mixture of the conductive concrete should be 7 parts carbon, one-part cement.

C3.4.3. CIVIL WORKS

C3.4.3.1. WORK SPECIFICATION

NOTES:

- a) All foundations shall be erected according to Eskom's standard foundation drawings.
- b) All work shall be in accordance the relevant SANS 1200 documents and the latest revision of drawing D-DT 5240.
- c) All labour and transport costs shall be included in quoted rate.
- d) Risk of collapse and keeping excavations free of water shall be included in the quoted rate.

Foundations:

- a) Supply and erect complete foundations to standard Eskom drawings including formation, reinforcing, holding down bolts, back filling and compaction around the foundations.
- b) A steel template shall be used for setting all holding down bolts.
- c) Formation shall be extended to at least 100 mm below the natural ground level.

Transformer plinths:

- a) Supply and erect a complete transformer plinth and runway according to the foundation drawing including formation and reinforcing. A sump, leading to the oil holding dam shall be established inside all bund walls.

Cable trenching and kerbing:

- a) Supply and install complete cable trench as shown on the Foundation Drawing including back filling and compaction around the trenches.
- b) The substation kerb shall enclose the substation as shown on the Foundation Drawing.
- c) All ramps shall be a concrete slab reinforced with mesh as shown on Foundation Drawing.

Yard stoning:

- a) The 25 mm - 38 mm yard stone shall be spread over the entire substation yard to a thickness of at least 150 mm.
- b) The yard stone shall be lightly compacted to set levels.

Herbicides, insecticides, etc. shall include:

- a) Treating of yard surface with Eskom approved herbicides, insecticides, etc.
- b) Forming of V-grooves along foundation walls and treating with additional insecticides approved by Eskom.
- c) Herbicides shall be applied after completion of the substation terrace, during commissioning of the substation and before the 12-month maintenance and guarantee period lapses.

C3.4.3.2. MATERIAL SPECIFICATIONS

The Contractor shall supply, transport and offload all material and equipment necessary for completing all the civil works.

Foundations:

- a) All material used for the foundations shall be in accordance to the relevant foundation drawings and SANS documents mentioned on these drawings.
- b) All holding down bolts complete with nuts. The Contractor shall supply washers.
- c) All holding down bolts shall be galvanised to SANS 1461 or ISO 1461 for all foundations.
- d) All holding down bolts shall be in accordance to SANS 135 with a strength grade of 4.6.

Cable trenching and kerbing:

- a) The concrete used for the cable trench walls shall be in accordance to the Foundation Drawings.
- b) The concrete covers shall be reinforced with mesh reinforcing in accordance to Foundation Drawings.
- c) The sand on the inside of the cable trench shall be river sand.

Yard stoning:

- a) The stone shall be clean, hard, sound crushed stone having a nominal size not less than 25 mm as approved by Eskom.

Herbicides, insecticides, etc.:

- a) All herbicides, insecticides, etc. and the application thereof shall be in accordance to Eskom's latest corporate Environmental Policy.
- b) A guideline for selecting herbicides used in substations shall be acquired from the Eskom's Environmental Department.
- c) Prior to the use of any herbicides, insecticides, etc. approval from Eskom's environmental representative shall be obtained.
- d) Consultation on herbicides and the effectiveness thereof, as well as advice on any other aspect of herbicides, can be obtained from Eskom's Environmental Department.

C3.4.4. STEELWORK

C3.4.4.1. WORK SPECIFICATION

NOTES:

- a) Unless otherwise specified, all steelwork shall be standard equipment supports according to Eskom's standard equipment support drawings.
- b) All labour and transport cost must be included in quoted rate.

Erecting steelwork shall include:

- a) Supply and erect all steelwork shown on Steelwork Schedule and according to standard Eskom drawings.

C3.4.4.2. MATERIAL SPECIFICATION

Unless otherwise specified, the Contractor shall supply all material necessary for installing the steelwork.

Erecting steelwork:

- a) The steel for the supporting structures shall be in accordance to the specific support structure drawings.
- b) The steel shall be hot dipped galvanised to SANS 1461 or ISO 1461.

C3.4.5. INSTALLATION OF EQUIPMENT

C3.4.5.1. WORK SPECIFICATION

NOTES:

- a) All work shall be in accordance to Eskom's standards and specifications.
- b) Unless otherwise specified, all installed equipment shall be labelled.
- c) All equipment shall be positioned and all necessary stringing and earth bonding shall be done according to the following drawings:
 - Station electrical diagram.
 - General Arrangement diagram.
 - Sections diagram
- d) All labour and transport costs must be included in quoted rate.

New Equipment:

- a) Extension of the Substation as indicated.

Clamp Assemblies:

- a) All clamps shall be installed as indicated on the Sections and Clamp Layout drawing.
- b) The clamp assemblies shall be in accordance to the manufacturers' specifications.
- c) All conductors shall be cleaned to a shiny finish at the point where the conductor clamps are to be applied.
- d) A non-oxidation compound, approved by Eskom, shall be applied on all conductor and earthing connections.
- e) After the application of the compound, the conductor shall be brushed with a steel brush.
- f) The clamp assemblies will be done and torqued to the manufacturers' specifications.

Stringing and Conductors:

- a) All stringing shall be done in accordance with General Arrangement and the Sections and Clamps Layout Drawings.
- b) The HV switchgear between the Busbar and TRFR shall be strung with Centipede conductor
- c) The stringing on the MV side of the transformer to the MV busbar shall be Bull Conductor.
- d) The stringing from the MV feeder breakers to the ACSR shall be Centipede.

Earth Ball Joint Portable Earth

- a) Install portable earth balls on the isolators' steelwork.

Equipment labelling:

- a) Equipment labels shall be attached according to the Eskom specification to the relevant equipment support steelwork.
- b) The label shall be attached to the supporting steelwork with a minimum of two M10 galvanised bolts with nuts and washers.
- c) All labelling shall be in accordance with Eskom's latest labelling standards.
- d) The outdoor breaker and isolator labels shall be fitted so that it is visible from the operating points.

Equipment bonding:

- a) Bonding of all steelwork to 50 mm x 3 mm earth tails in accordance with the Earthing Standard D-DT 5240.
- b) The steel support bolts shall be used to bond the earth tail to the equipment support footings.
- c) Where connections are made painted steelwork, the paint shall be removed over a minimum area to allow good contact between surfaces.
- d) The earth tails shall be fixed to the steelwork according to the Earthing Standard D-DT 5240.
- e) Where connections are made onto painted steelwork the paint shall be removed over a minimum area to allow good contact between surfaces.
- f) A 50 mm x 50 mm area around the hole on the earth tail used for bonding shall be cleaned before the earth tail is bonded to the steel support.
- g) A non-oxidising paste, approved by Eskom, shall be put between the cleaned earth tail surface and the steel support before it is bonded.
- h) After bolting any scraped area not covered by the copper connection shall be painted using original types and colours of paints.
- i) No joints shall be made above the ground level.
- j) All visible copper earth tails protruding above the ground shall be painted using the same type and colour paints as the equipment or the equipment support to which it is bonded.

Lightning/lighting masts:

- a) Lighting/lightning masts (with spikes) shall be installed according to D- DT 5217 and the lamps attached at 6 m with a support platform at

4 m. Refer to substation layout drawing for the orientation of the lamps on masts.

C3.4.5.2. MATERIAL SPECIFICATION

The Contractor shall supply all the equipment necessary to install the material.

If material is supplied by the Contractor, then those products will be in accordance with Eskom standards and specifications and the Eskom buyers' guide. All materials shall be approved by Eskom and be marked with the manufacturers' logo/trademark and specific part number.

An ordering schedule with SAP numbers shall be provided by the Contractor for approval prior to placing any material orders.

New Equipment

- a) The holding down bolts for the equipment shall be supplied by the Contractor.
- b) All holding down bolts with nuts and washers shall be hot dipped galvanised to SANS 1461 or ISO 1461.
- c) All holding down bolts shall be in accordance to SANS 135 with a strength grade of 4.8

Clamp assemblies:

- a) Clamps shall be as in the Substation Bill of Materials.

Stringing and conductors

- a) Conductors shall be as specified in the Substation Bill of Materials.
- b) The conductors shall be in accordance to SANS 182-2:2020 & SANS 182-3:2003.

Earth Ball Joint Portable Earth

- a) Portable Earth Ball Joints shall be in accordance to SANS 61230 and Eskom specification SCSSCAAN3.

Equipment labelling:

- a) The Contractor shall supply all fixing bolts with nuts and washers for the labels.
- b) All bolts nuts and washers shall be hot dipped galvanised to SANS 1461 or ISO 1461.
- c) All bolts shall be in accordance to SANS 135 with a strength grade of 4.8.
- d) Eskom shall supply all labels.
- e) The supports for the labels shall be supplied by the Contractor according to 0.54/400 and 0.54/402 (Including concrete foundations if required), unless otherwise indicated on the design drawings and Bill of activities.
- f) All labels shall be in accordance with Eskom's latest labelling standards.

Equipment Bonding:

- a) All bolts with nuts and washers used for bonding shall be hot dipped galvanised to SANS 1461 or ISO 1461 and shall be supplied by the Contractor.
- b) All bolts shall be in accordance to SANS 135 with a strength grade of 4.6.

Lighting/lightning masts:

- a) All bolts shall be in accordance to SANS 135 with a strength grade of 4.6.

C3.4.6. SUBSTATION FENCING

C3.4.6.1. WORKS

SPECIFICATION

NOTES:

- a) All work shall be in accordance to Eskom's standards and specifications.
- b) All labour and transport cost must be included in quoted rate.

Fencing shall include:

- a) Installing the complete security fence of welded mesh (high security) on the perimeter of the substation extension as shown on the Foundation and Steelwork drawings including excavations, foundations and erection of the fence.
- b) Earth tails shall be bonded to the security fence at all strain, corner posts in accordance to Eskom Earthing Standard D-DT 5240.
- c) Where indicated a 1.8 m diamond mesh separation fence shall be installed.

Installing complete gates shall include:

- a) 5 m gates shall be provided where indicated.
- b) All gates shall be bonded to the gate post with hot dipped galvanised bolts.

Installing signs shall include:

- a) Warning sign shall be installed on the security fence next to the gate.
- b) All signs and notices shall be in accordance to SANS 1186.
- c) The following signs shall be attached to the fence next to the gate:
 - Unauthorised Entry & interfering prohibited.
 - Procedure in case of fire.
 - Warning of electrical shock.
 - "No copper" where CCS is installed
- d) On the fence a warning of electrical shock sign must be attached.
- e) The signs on the fence shall not be more than 15 m apart.

C3.4.6.2. MATERIAL SPECIFICATION

The Contractor shall supply the fence, the gates and the signs as well as the necessary material for erecting the substation fence and attaching the signs.

C3.4.7. SUBSTATION LABELS

- All substation and feeder names shall be written out in full without abbreviation.
- All equipment names shall be abbreviated.

- The labelling shall provide positive identification of individual plant, which it controls; and the labelling of plant shall not conflict with any other labelling. Refer to Standard for Labelling of substation and networks.

C3.4.8. LV SUPPLY TOWARDS THE SUBSTATION

For construction, testing and commissioning activities, a temporary low voltage supply can be made available.

All costs relating to the temporary low voltage auxiliary supply shall be for the contractor's cost.

C3.4.9. ELECTRICAL INSTALLATION IN THE SUBSTATION

The electrical installation to conform to the requirements of SANS 10142-1:2017. The layout of the installation is shown on the attached project drawings forming part of this specification. All conduit work is to be surface mounted in an acceptable manner, with bosal conduit. **No Sprague tubing shall be accepted.**

The building electrical installation involves:

LIGHTING

- A.C. supplies to new equipment
- Earthing of new equipment
- Etc.

C3.4.10. POWER TRANSFORMERS (PSE 18)

This section of the specification provides for the manufacture, supply, testing before shipment, delivery, off-loading and positioning on a concrete base, installation, site testing, handing over in a working condition of one (1), 20 MVA, 132 000/22 000 V step down transformers with on-load tap changing equipment at Impumelelo Substation.

The Contract also includes the supply and delivery of all auxiliary materials and equipment necessary for a complete installation and all drawings, plans and instructions.

The power transformers to be supplied shall comply with the latest Eskom Specification (240-68973110) "SPECIFICATION FOR POWER TRANSFORMERS RATED FOR 1.25MVA AND ABOVE AND WITH HIGHEST VOLTAGE OF 2.2kV OR ABOVE".

Transformers offered shall comply with the following specific requirements:

- | | |
|--|--------------|
| 1. Application: | Outdoor |
| 2. Number required | One (1) |
| 3. Dry type or oil immersed: | Oil immersed |
| 4. Rated Frequency: | 50 Hz |
| 5. Continuous maximum rating at rated voltage: | 20 MVA |
| 6. Vector Group: | Ynd1 |
| 7. On load voltages | |
| a. Primary | 132 kV |
| b. Secondary | 22 kV |

- | | |
|--|----------------------------|
| <ul style="list-style-type: none"> c. Tertiary | |
| 8. Earthing | |
| <ul style="list-style-type: none"> a. Primary | Solid or via 66 kV surge |
| <ul style="list-style-type: none"> arrestor | |
| <ul style="list-style-type: none"> b. Secondary | NECRT |
| <ul style="list-style-type: none"> c. Tertiary | Not Applicable. |
| 9. Anti-vibration | 20 mm malthoid (Three ply) |

If there is any uncertainty to any of the transformer parameters, it shall be clarified in writing with the Engineer prior to closing of the tender. Transformers within the substation shall be capable of short time parallel operation for load transfer.

The cooling system of the transformer shall be an Oil-Neutral and Air-Neutral (ONAN) system for the maximum transformer rating.

The transformers are required to be supplied with open air insulated tank top mounted bushings for both the 132kV as well as the 22kV side. The HV bushings on all transformers are to be of the Resin Impregnated Paper (RIP) condenser core type, with composite external insulation with silicone or porcelain weather sheds. The 22 kV side bushings of the transformers shall have a minimum insulation level for 33 kV with a creepage distance of 31mm/kV.

It is a requirement of this contract that the power transformers are equipped with radiator banks fitted to the transformer in the space allocated on the project drawings. The power transformer, radiator banks and auxiliary transformers shall be effectively earthed to the substation earth system.

C3.4.10.1.PHYSICAL ARRANGEMENT

The power transformer's maximum dimensions, including the bushings, cooler banks and conservator shall be:

Height:	< 3.1 m (plinth to tank cover) < 5 m (top of bushing stem) < 5.5 m (conservator tank top)
Length:	< 4.4 m (tank footprint) < 6.5 m (overall)
Width:	< 1.5m (tank footprint) < 5 m (overall)

NOTE: The conservator spatial orientation, with reference to the transformer main tank, must be adjustable to ensure the minimum safe working clearances are satisfied.

The power transformer's physical arrangement shall conform to the layout as per the sketch below.

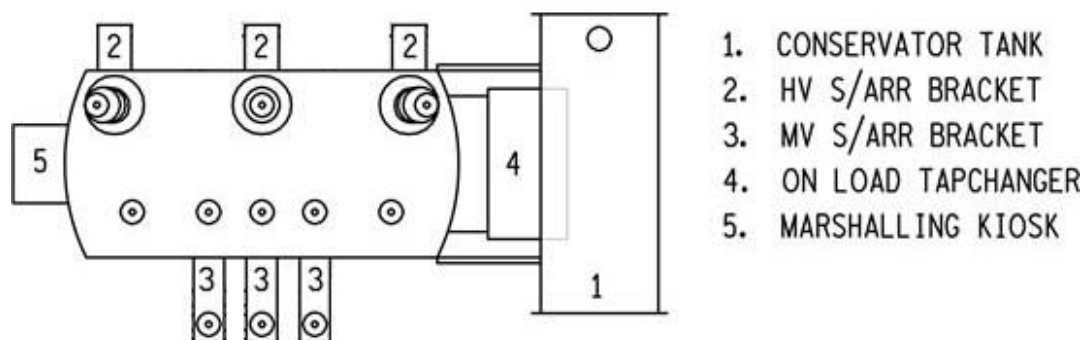


Figure 1: Transformer arrangement

Tenderers shall note that the transformer radiators / cooling fins shall be attached to the transformer main tank only and shall not destabilise the transformer to such an extent that radiator supports are required.

C3.4.10.2.BUSHINGS

The following shall apply to the transformer bushings:

1. The HV Bushing shall be symmetrically arranged about the overall transverse Centre line of the transformer.
2. All neutral bushings shall be fitted in line with the MV bushings.
3. Despite the actual operating voltage, the transformer bushings shall have an insulation level corresponding to a nominal system voltage of 33 kV. These bushings shall be equipped with a terminal stem of **38 mm diameter** for secondary side, **26 mm diameter** for primary side and **125 mm length**, have a minimum centre-to-centre spacing of not less than **400 mm for MV side**.
4. The MV bushings shall be of the capacitance graded type.
5. The minimum distance from the transformer base (plinth) to the bushing flange base shall be 2.5 m.
6. The bushing creepage distance shall be 31mm/kV (MV: at 33 kV).

C3.4.10.3.CLEARANCES

The electrical clearance shall be:

HV (132kV)

Phase – Earth	1000mm
Working Clearance	3300mm (Vertical) 1900mm (Horizontal)

MV (22kV)

Phase – Earth	320mm
Working Clearance	2800mm (Vertical) 1400mm (Horizontal)

C3.4.10.4.TAP CHANGER

The tap changer shall be of the vacuum type. The on-load tap changer shall operate in the range of +5% to -15% of the HV voltage in 16 equal steps of 1.25% each.

The tap changer shall be subject to the following testing:

1. 8 Complete Cycles – not energized
2. 1 Complete operation cycle – 85% of rated voltage applied
3. 1 Complete Cycle energized at rated voltage and frequency (no-load)
4. 10 Tap changes within +/- 2 steps of the principle tap

Care shall be taken to match the tap voltages to the voltage range of other transformers.

C3.4.10.5.CORE

There shall be no sparking that may upset Dissolved Gas Analysis (DGA) monitoring of the transformer, between bolted mechanical members during inrush or other transient conditions. This requirement shall apply even if DGA is not included at this stage.

The core shall be earthed to the core clamping structure at one point only, through a removable external link suitably situated and protected, to allow testing after installation of the transformer. The core earthing connection shall be larger than 80mm².

Lifting lugs shall be provided for lifting the core and windings.

C3.4.10.6. WINDINGS

The paper used in the winding insulation shall be thermally upgraded paper. The bracing of the windings and connections shall be such that these parts shall safely withstand the cumulative effects of stresses that may occur during handling, transportation, installation and service, including line-to-line and line-to-ground faults.

C3.4.10.7.AUXILIARIES

All contacts providing an alarm output shall be rated to carry 30 A for 200ms at 250 V_{D.C.} and continuously carry 2 A at 250V_{D.C.} All secondary wiring shall be 2.5mm² with 30 strands (660/100 V as per SANS 1507-2). The auxiliary wiring shall be neatly fitted into a cable tray or compartment onto the transformer.

A 400/230V_{A.C.}, 3ph, 4 wire, 50Hz auxiliary power supply shall be provided.

The marshalling box shall have a certified rating of min. IP55. The marshalling box shall preferably be free standing. All gauges such as oil and winding temperature indications shall be equipped within the marshalling box.

C3.4.10.8.TANK

- a) The transformer tank cover shall be bolted.
- b) The interior surfaces of the tank, the cover and the cooling equipment shall be cleaned and dried immediately prior to filling the transformer with oil. Interior surfaces (other than those of cooling tubes and headers) above a line that lies at least 50 mm below the oil level that corresponds to an oil temperature of 20 °C, shall be corrosion-protected by varnishing, priming or painting, using materials that are not affected by, or will not adversely affect, the electrical or chemical properties of the insulating oil.

- c) The tank and cover shall be designed so that local heating due to stray flux in any structural part shall not exceed the top oil temperature limit specified for the transformer, by more than 10 °C.
Heating, due to stray flux, shall also not cause local temperature elevations of more than 15 °C relative to the oil temperature at that level.
Thermometer pockets shall be located so as to avoid errors in temperature indication due to the heating effects resulting from stray flux.
- d) The under base shall be suitable for the movement of the transformer in any direction, by sliding on greased rails, and shall be provided with four hauling eyes not less than 50 mm in diameter, as near as possible to the extremities of the length and width of the tank with not less than 100 mm working clearance above them.
- e) Four suitably and symmetrically placed jacking pads shall be provided in positions that shall be accessible when the transformer is loaded on to the transport vehicle, except where jacking pads are used as transport pads on vehicles with built-in jacking.
The position of the jacking pads shall be such that they do not restrict the direction in which the transformer could be moved (forward, backward and sideways) once offloaded on site.
- f) Four symmetrically placed lifting lugs shall be provided so that it will be possible to lift the complete transformer when filled with oil without structural damage to any part of the transformer. The factor of safety at any one point shall not be less than 2.
- g) The lifting lugs shall be arranged and located as to be accessible for use when the transformer is loaded on the transport vehicle, and so as not to cause fouling of any of the transformer fittings and accessories.
- h) Centre of gravity shall be clearly visible and indicated on all sides of the transformer tank.
- i) The transformer primary will be solidly earthed without any Neutral Earthing Resistor. The OEM shall therefore take circulating currents into consideration when the tank wall thickness is calculated to prevent any interior or exterior corrosion.

Provision shall be made for earthing the transformer and associated apparatus as follows:

1. Transformer tank earthing
2. Transformer neutral(s) earthing (direct)
3. Transformer surge arrester earthing (line and neutral surge arresters)
4. All tank attached apparatus, including cable marshalling boxes, tap-changer operating gear and mechanism boxes, and fan and pump motors shall be bonded to their supporting structures.

5. Earthing pads shall also be provided on each end of the supporting structures for all separately mounted cooler banks and oil conservators and on all free-standing cubicles.
6. No copper shall be used as connections for the purpose of earthing.

C3.4.10.9. NEUTRAL BUSHING

The neutral bushing shall be solidly earthed by means of a 50 x 3 mm Cu strap painted silver. The neutral bushing must be equipped with two CT cores in turret arrangement as an integral or built in part of the transformer:

- Core 1 – Class X for LV REF Protection
- Core 2 – SEF Protection
- CT wiring to be brought out into a CT JB and wired to the transformer marshalling box or kiosk.

C3.4.10.10. INSULATION

The transformer bushing insulation level shall be 10% above the values given in the table below:

Table 3: Insulation level

Table 5: Insulation level														
U _m (kV _{rms})	U _n (kV _{rms})	Fault level (kA)	Lightning - BIL (kV peak)		Power Frequency 60s 50Hz		Bushings					Tap changer		
							Line		Neutral		Creepage (3 lmm/kV)			
			Line Terminal	Neutral Terminal	Separate source	Induced	BIL	60s 50Hz (kV)	BIL (kV peak)	60s 50Hz (kV _{rms})			U _n (kV _{rms})	BIL (kV peak)
24	22	25	15 0	150	50	48	20 0	70	200	70	375	22	150	50
100	88	25	38 0	250	95	15 0	55 0	23 0	350	140	3100	44	250	95

C3.4.10.11. TRANSFORMER OIL

The transformer main tank oil insulation level shall be 70kV per 2.5mm for virgin oil prior to filling and 60kV per 2.5mm at time of taking over.

C3.4.10.12. TESTS

The transformer shall be tested in accordance with Eskom specification 240-68973110. The transformer shall be subject to the following test at the cost of the OEM to be witnessed by the Authority and Engineering representative:

1. Voltage Ratio and Phase displacement
2. Winding D.C. Resistance
3. Insulation Resistance to Earth
4. Insulation Characteristics and bushing dielectric loss
5. Separate source voltage withstand

6. Induced Over-voltage withstand
 7. Partial Discharge Measurement
 8. Lightning impulse Withstand
 9. Switching Impulse Withstand
 10. Insulation resistance to earth
 11. Short circuit AC tests (Partial Discharge)
 12. No load loss, magnetizing current and impedance voltage
 13. Short Circuit Impedance and load loss
 14. Zero Sequence Impedance
 15. On load tap changing
 16. Temperature rise & overload
 17. Overpressure – Leakage Test
 18. Oil DGA
 19. Determining of Sound Levels / acoustic noise
 20. Frequency Response analysis (Factory & Site)
 21. Paint thickness & quality
 22. Auxiliary wiring functionality & pressure test (Factory)
 23. Impact Recorders during transport, loading and offloading
- Short circuit withstand calculations for the transformer shall be provided.

The transformer test methodology and connection diagrams for testing shall be submitted together with the bid offer.

C3.4.10.13. TRANSFORMER OFFLOADING

Loading and offloading of the transformers shall be done by means of rigging on skids. The transformer mounted on the low bed vehicle will be brought into position adjacent to the transformer bay. The transformer must be lifted with jacks to install railway rails underneath the transformer. By means of a system of packers and jacks, the tank is then lowered onto a pair of greased railway rails along which it can be slid to its position over the plinth. The required position of the tank on the plinth must be accurately marked. When the tank is correctly positioned on the plinth, it must then be carefully examined for any signs of damage or any other indication that it might have been abused during transport.

The impact recorder that has been fitted for transport shall now be read or downloaded and then switched off and removed. Any additional clamping that has been applied to the core and windings for transport must now be removed according to the instruction manual. The coolers, pipework, bushing, turrets, etc. which were removed for transport, will now be fitted and connected, requiring the removal of blanking plates giving access to the tank.

Such opening of the tank must be kept to a minimum time to reduce the possibility of moisture entering the tank. If the transformer has been transported with the tank full of nitrogen, it is necessary to perch this fully with dry air.

When all bushings have been fitted, access covers replaced, conservator and Buchholtz pipe work erected as well as associated pipe work installed and connected to the radiators, preparation can begin with the filling of the transformer with oil.

C3.4.11. NECRT

This section of the specification provides for the manufacture, supply, testing before shipment, delivery, off-loading and positioning on a concrete base, installation, site testing, handing over in a working condition of combined oil-immersed 22 kV three phased neutral electro-magnetic couplers with neutral earthing resistors and auxiliary transformers (NECRT's)

The Contract also includes the supply and delivery of all auxiliary materials and equipment necessary for a complete installation as well as drawings, plans and instructions as further specified herein.

The NECRT's to be supplied shall comply with the latest Eskom Specification (240-57648848) "SPECIFICATION FOR COMBINED THREE-PHASE NEUTRAL ELECTRO-MAGNETIC COUPLERS WITH NEUTRAL EARTHING RESISTORS AND AUXILIARY TRANSFORMERS (NECRT's)".

1.	Application:	Outdoor
2.	Number required:	One (1)
3.	Continuous maximum rating at rated voltage of auxiliary transformer:	100 kVA
4.	Indoor or outdoor:	Outdoor
5.	Dry type or oil immersed:	Oil immersed
6.	Rated Frequency:	50 Hz
7.	Normal "on-load" voltages:	
	a. Primary for NECRT	22 kV
	b. LV for Aux. Trfr.	420 V
8.	Method of system earthing	
	a. MV System	via NEC / NEC
	b. LV	Solid
9.	Vector group of NEC	Zig-Zag
10.	Vector group of auxiliary transformer	Dyn 11

The NECRT's will be installed on concrete plinths as indicated on the project drawings.

All low voltage circuit breakers to be supplied for this project shall be complete with flash barriers and inter phase barriers with rear insulating screens, Cable and Power connectors, chassis side plates as well as IP40 Escutcheons.

The connection of the AAC conductor and clamps, as well as the LV supply connections between the transformer and the auxiliary transformers form an integral part of this part of the contract.

The auxiliary transformer will be fitted with the following integrated mechanical protection devices, complete with the necessary wiring to the abovementioned control cable boxes:

- Oil/winding over temperature alarm and trip contacts.
- Gas (Buchholz) over pressure alarm and trip functions, complete with sufficient alarm and trip contacts to comply with the protection scheme, shall be provided.

- A common set of alarm/trip contacts for alarm and indication functions in the transformer protection panel.
- A common set of alarm and trip contacts to provide alarm and trip indication for the SCADA system.
- The contractor shall make allowance for the witnessing of the FAT by the Employer / End-User and the Engineer, in the priced unit rate.

C3.4.12. SUBSTATION FOUNDATIONS AND STRUCTURAL WORK

C3.4.12.1.FOUNDATIONS

All foundation shall be constructed according to the Eskom standard foundations as specified in the Project Specifications, Bill of Quantities and project drawings.

The oil containment wall shall be brick built according to D-DT-5232s2B and the dimension shall be as indicated on the project drawings.

The transformer plinth shall be constructed according to D-DT-5231s1 & VE9335-6-FDN and the dimension shall be adjusted as indicated on the project drawings.

Transformer fire walls shall be a steel fire barrier as per D-DT-5218s2A

Concrete ramps shall be provided at all gates and over cable trenches as indicated. The level of the gate's sliding beams shall be coordinated in detail to prevent the yard stone level from being higher than any foundation top level.

Anti-tunnelling systems / kerbs shall be provided underneath the perimeter fence. The mesh must be anchored into/onto the centre of the anti-tunnelling and the bottom rail of the panels must be flush with the anti-tunnelling. The anti-tunnelling shall be 100mm (wide) x 600mm (deep) concrete (15MPa) between posts. The mesh must be anchored into/onto the centre of the anti-tunnelling.

Table 4: Foundation Schedule

DESCRIPTION	DRAWING NUMBER	QTY
132kV ISOLATOR SUPPORT FOUNDATION (TYPE 3) (2.4m Phase Spacing)	5202s1e	3
TUBE BUSBAR SUPT. FDN. 132kV	5208s1	6
132kV CIRCUIT BREAKER FOUNDATION (TYPE 2)	5200s1C	1
MED. EQUIP. SUPT. FOUNDATION FOR CURRENT TRANSFORMER	5206s1	3
STANDARD TRANSFORMER PLINTH 5-20MVA	5231s1	1
STANDARD TRANSFORMER SLIPWAY	5231s1 & VE9335-6-FDN	1
STANDARD SELF-CONTAINED OIL CONTAINMENT AREA	5232s2B	1
NEC/NER/AUX TRF 33/22/11kV FOUNDATION	5207s1b	1
6.6kV-44kV POST INSULATOR SUPPORT FDN	5221s1	2
BKR. 22kV FOUNDATION DETAILS	5216s1	3
ISOLATOR 22kV SUPT FOUNDATION	5205s1	7
COLUMN SUPT. FOUNDATION	5223s2	6
MED. EQUIP. SUPT. FOUNDATION (132kV CT)	5206s1	3
MED. EQUIP. SUPT. FOUNDATION (22kV VT's)	5206s1	2

DESCRIPTION	DRAWING NUMBER	QTY
LIGHTING-LIGHTNING MAST 21 m TUBULAR SUPPORT FOUNDATION (1 x PROVISIONAL)	5217s6	3
FENCE FOUNDATIONS - WELDED MESH	D-DT-5237s5A	12
GATE FOUNDATION DETAILS	D-DT-5237s3	3
600mm CABLE TRENCH	D-FS-887	47m
1200mm WIDE CABLE TRENCH FOR T-TYPE SECTION	VE9335-6-FDN	2
LV CABLE ROAD DUCT 8-PIPE	D-DT-5254s-3d	1

C3.4.12.2. STEELWORK

All steelwork shall be according to the Eskom standard steelwork as specified in the Project Specifications, Bill of Quantities and project drawings.

Table 5: Steelwork Schedule

DESCRIPTION	DRAWING (D-DT)	QTY
ISOLATOR 132kV 2500A 25kA BULL - BUSSECTION	5202s2K	2
NON-EXTENDABLE BUSBAR 132kV ONTO BUSSECTION	5208s2	6
ISOLATOR 132kV 2500A 25kA CENT - TRFR BAY	5202s2K	1
CURRENT TRANSFORMER 132kV 2500A 25kA 2P2M2B	5206s5&5206s3	3
TRANSFORMER 132/22kV 20 MVA OLTC CENT TO BULL	5231s1&5231C	1
NEC/NER/AUX TRANSFORMER 22kV 360A BULL	5207s2A	1
22kV ROAD CROSSING	5221s2	2
TRFR BREAKER 22kV 1250A 20kA BULL (COMBO-UNITS)	6254	3
ISOLATOR 22kV 2500A 25kA	5205s2A	7
MV BUSBAR 22kV BULL BASIC BAY (without busbar/bay isolator channels)	5223s6	1
MV BUSBAR 22kV BULL EXT BAY (without busbar/bay isolator channels)	5223s6	1
VOLTAGE TRANSFORMER 22kV/110V	5206s3&5206s6	1
SUBSTATION LIGHTING MAST 21m (1 x Provisional)	5217s2C	3
STEEL FIRE BARRIER (MODULE A&B)	5218s2A	2
STEEL FIRE BARRIER (LATTICE SUPPORT)	5218s2A	3

C3.4.13. OUTDOOR HV SWITCHGEAR

C3.4.13.1.1. CIRCUIT BREAKERS

The substation extension shall use one (1) new 132 kV type outdoor circuit breakers & three (3) new 22kV outdoor kiosk type circuit breakers, each of which shall fully comply with Eskom standard 240-56063756.

The circuit breakers shall be mounted on suitable mounting structures as indicated on the project drawings.

The following high voltage circuit breaker is required as part of this contract:

- 132 kV SF₆ three pole circuit breaker: 2500 A, 40 kA, 31 mm/kV, 110V_{D.C.} control voltage; [D-DT-6250]
- 22kV three pole, 1250A, 25kA, 31mm/kV, 110V_{D.C.} kiosk type outdoor vacuum breaker (CTB 36) [D-DT-6252].

Detailed type test certificates for the circuit breaker as offered, proving compliance with specifications shall be submitted with all tenders. Failure to provide the required test certificates may result in the respective tenders to be disqualified.

The operating mechanisms for these circuit breakers shall be of the motor wound spring operated type and shall be in a fully accessible positions from ground level. The mechanism box shall also be easily accessible under all circumstances.

All circuit breaker mechanisms shall be equipped with a sufficient number of auxiliary contacts for remote control and indication from the local substation control room as well as from the supervisory control and indication system. A sufficient number of spare contacts shall also be provided and shall not be less than 20%.

The operating mechanism motor, tripping, closing and control circuits shall be operated from the 110V_{D.C.} supply, obtained from the dual battery system to be installed in the battery room of the substation building.

The circuit breakers shall be provided with completely separated duplicate trip coil systems, operating totally independent electrically as well as mechanically. One trip coil shall be used for protection purposes and the other for control facilities.

The circuit breaker, mechanism boxes and mounting structures shall be earthed to the main substation earthing system.

The circuit breaker mechanism boxes shall also be equipped with approved padlock ready selector switches, selecting between “local” and “remote” operation, completely preventing remote control of the circuit breaker when selected in the “local” position for local control or maintenance purposes.

Control of the circuit breakers shall be possible either from the “local” control position on the circuit breaker itself, from the protection and control cubicles in the substation control room or from the supervisory or SCADA control system.

All mechanism boxes of the circuit breakers shall be equipped with a suitable anti condensation heater to prevent any condensation taking place in the early hours of the morning.

Full type test certificates, indicating compliance of all breakers with SANS 62271 and Eskom specifications shall be submitted with tender submissions. Failure by the Contractor to submit these required type test certificates with their respective tender submissions may result in their tenders being disqualified.

C3.4.13.1.2. ISOLATORS

The substation shall be equipped with five (5) new 132 kV type outdoor double break centre rotate isolators, each of which shall fully comply with Eskom standard 240-56063815.

The substation designs are based on 132 kV 2500 A centre rotating double side breaking outdoor type isolators: 40 kA short time current, 31 mm/kV creepage, hand

operated, 1 x F contact, 5 x M contacts, 8 x g contacts, 2 x N contacts and any additional contact required for interlocking.

The following isolators shall be supplied and installed at the relevant substation locations:

- 1 x 132kV feeder isolators with surge arresters;
- 2 x 132 kV busbar isolators;
- 2 x 132 kV bus-section isolators;

These isolators are intended for visible isolation and earthing.

All outdoor type centre rotating isolators to be used on this project shall be equipped with the required earth switches for earthing purposes.

All the isolator units and all earth switches shall be manual, hand-operated type units.

Special care shall be taken to ensure that all isolator mounting frames, as well as operating mechanisms and associated supporting drive assemblies are fully earthed to the substation main earthing system. Bonded and earthed isolator foot plates shall be provided with all isolators.

The earth switch mechanisms on the isolators shall be fitted with an electrical and integral mechanical interlocking system in order to prevent closing thereof under certain prescribed conditions detailed later on in this specification.

The operating mechanism boxes for the isolators shall be mounted in an approved and fully accessible position. These operating mechanisms shall all be equipped with a sufficient number of auxiliary contacts for the remote indication of the isolator and earth switch status as well as for the necessary electrical interlocking schemes. In addition, at least 20% spare contacts shall be allowed for possible future use. Approved facilities shall furthermore be provided on all isolator mechanism boxes to accommodate the necessary interlocking schemes.

All isolators shall be of the free-entry/free-exit (FE/FE) type with spring loaded multiple finger type contacts, with a knuckle action on opening and closing. Isolators with a single tubular main contact with a single pair of spring-loaded recipient contacts will not be acceptable.

All isolators shall be equipped with the necessary arcing contacts to prevent the unnecessary erosion of the main contacts during opening or closing operations.

All isolator mechanism boxes shall be equipped with suitable condensation heaters to prevent any condensation taking place during moist conditions.

These mechanism and kiosk heaters shall be operated from a 220V_{A.C.} supply to be initiated by a photocell and/or timer circuit in the control building.

Full type test certificates, indicating compliance of all isolators with IEC 62271-102, NRS 031 and Eskom specifications shall be submitted with tender submissions. Failure by the Contractor to submit these required type test certificates with their respective tender submissions may result in their tenders being disqualified.

C3.4.14. VTS

New high voltage transformers to be supplied and installed consist of the following:

- 3 x electromagnetic, single phase $\frac{132 \text{ kV}}{\sqrt{3}}$ voltage transformers with $\frac{110 \text{ V}}{\sqrt{3}}$ outputs on the secondary windings, 150kV BIL, 31 mm/kV creepage and 100 VA Class 0.2 burden.
- 3 x electromagnetic, single phase $\frac{22 \text{ kV}}{\sqrt{3}}$ voltage transformers with $\frac{110 \text{ V}}{\sqrt{3}}$ outputs on the secondary windings, 150kV BIL, 31 mm/kV creepage and 100 VA Class 0.2 burden.

All voltage transformers shall be mounted on suitable outdoor type mounting structures, fully complying with the steelwork requirements.

The supporting structures and voltage transformers shall each be separately earthed to the local substation earthing system.

Voltage transformers shall comply with the relevant specifications and standards listed in the general specification section of this enquiry.

C3.4.15. CONTROL PLANT SPECIFICATIONS

The contractor will be responsible for all aspects of the control plant installation.

C3.4.15.1. PROTECTION PHILOSOPHY

In order to achieve the necessary performance requirements at all voltage levels, protection of the network shall follow the philosophy whereby no single failure of protection and its associated systems shall permit a fault to remain connected to the primary system.

To implement this philosophy, it is necessary to ensure that all faults are detected by independent high speed protection systems, including Main and Back-Up protections, the outputs of which are selectively allocated to independent tripping systems with separate D.C. supplies.

Circuit-breaker fail protection shall be provided to cater for failure of circuit-breakers and associated tripping circuits. The function shall be duplicated and integrated within both main protection systems.

Redundancy of critical functions (e.g. tripping) shall be achieved via hardwired signals in parallel with the specified communication protocol.

The successful Contractor shall be responsible for the detail design, detail schematic drawings, installation, testing, commissioning and handing over of the secondary plant according to the information and equipment offered. All drawings must be submitted to the Engineer for approval prior to manufacturing. The design shall be based on Eskom Distribution Standards.

The technology design shall be done according to the following schemes:

- 1 x Feeder protection scheme – Eskom scheme 5FZD3920 Rev 0.
- 1 x Transformer protection scheme – Eskom scheme 5TM7101 Rev 0.

- 1 x Tap change protection scheme – Eskom scheme 5TC5200 Rev 2.
- 2 x Rural feeder protection schemes – Eskom scheme 5RF1100 Rev 2.

The protection design philosophies for the above-mentioned schemes are outlined in the paragraphs to follow. Philosophies given are high level requirements, all details shall be submitted by the Contractor for approval, including a Functional Design Specification for approval detailing all proposed schemes.

C3.4.15.2.PROTECTION PANELS

The following protection panels shall be installed:

- i. 1 x Transformer protection panel to house the transformer protection scheme (5TM7101) & tap change protection scheme (5TC5200).
- ii. 1 x Feeder protection panel to house 1 x 132kV feeder protection schemes (5FZD3920).
- iii. 1 x Feeder protection panel to house 2 x Rural feeder protection schemes (5RF1100).

C3.4.15.3.TRIPPING D.C CIRCUIT

Double-pole miniature circuit-breakers (DP MCBs) shall be provided for the protection and isolation of the D.C. supplies to each scheme.

C3.4.15.4.CLOSING D.C. CIRCUIT

Anti-pumping - In the event that a breaker is closed into a fault, while the operator is applying a closed signal via a closed control switch, the circuit breaker should trip and prevent closing again until the closing circuit has been de-energised by the operator's releasing the control switch.

C3.4.15.5.PROTECTION CT CIRCUITS

For each circuit the protection CT core shall feed onto standard terminals and then to the CT test block and IED measuring elements.

A MMLG test block shall be used in all the wired CT circuits. Each test block shall include integral shorting of the incoming terminals when the cover is removed.

For this application, the CT circuits shall be used for the Differential, REF, Breaker-fail, and Over-Current, Earth Fault, and Instantaneous Over-current protection functions and for the Measurements functions.

The neutral of each CT circuit shall be earthed at one place only: on the incoming neutral terminal inside the protection panel. A sliding link terminal shall be provided on the earth connection for isolation proposes in order to facilitate insulation resistance testing.

C3.4.15.6.132 / 22 KV TRANSFORMER PROTECTION PHILOSOPHY

The 5TM7101 protection scheme shall be utilised. The scheme is shown below.

Cabling requirements shall be as indicated on the project drawings. The contractor shall submit detail control cabling schedules indicating the cable types, sizes, glands, lengths, connector types etc. for approval.

C3.4.15.7. VOLTAGE TRANSFORMER REQUIREMENT

Voltage transformer (VT) input to the transducers will be obtained from the transformer's 132kV, 22 kV, VT JB. The VT inputs to the Tap Change Schemes are to be looped from the transformer protection schemes.

C3.4.15.8. CURRENT TRANSFORMER RATIOS TO BE EMPLOYED

The new (2P2M2B) 132 kV CTs will have two multi-ratio (MR) 1600/1 protection cores, two MR 1600/1 bus zone cores, and two MR 1600/1 metering cores. The new (1P2M), 22 kV CT's include one protection and two metering (metering and indication) multi-ratio 1200/1 cores.

- c) The high voltage (HV) restricted-earth-fault (REF) function is to operate via direction comparison of the currents from the Differential CT inputs and the transformer's HV **neutral CT**. The transformer's HV neutral CT has a fixed ratio of 300/1.
- d) The HV differential protection (diff), HV REF and HV overcurrent functions are to receive CT inputs from the same sets of **post type CT** cores. A CT ratio of 200/1 will be used.
- e) CT inputs to the high impedance LV REF will be provided via the 22 kV CT's and a neutral CT on the NEC/R.
- f) CT inputs to the Transformer Differential protection will be provided via the 22 kV CT's and the post top HV CT's.

C3.4.15.9. 132 / 22 KV TRANSFORMER TAP CHANGER PROTECTION PHILOSOPHY

On-Load Tap Change Protection and Control shall be achieved using the Eskom scheme (4TC5200). The scheme shall be mounted below the transformer protection scheme in the transformer protection panel.

C3.4.15.10. INSTRUMENT TRANSFORMER REQUIREMENTS

The VT inputs to the Tap Change Schemes are to be looped from the transformer protection schemes (transformer protection panel).

Current transformer inputs to the tap change scheme are to be obtained from the transformer's MV bushing CT's.

C3.4.15.11. 22KV OUTDOOR KIOSK BREAKER

The 22kV outdoor feeder combo-breakers (i.e. CTB36 VCB) shall use the 4RF1100 Eskom rural feeder protection scheme. Two rural feeder protection schemes are required.

The feeder breaker protection scheme is shown below.

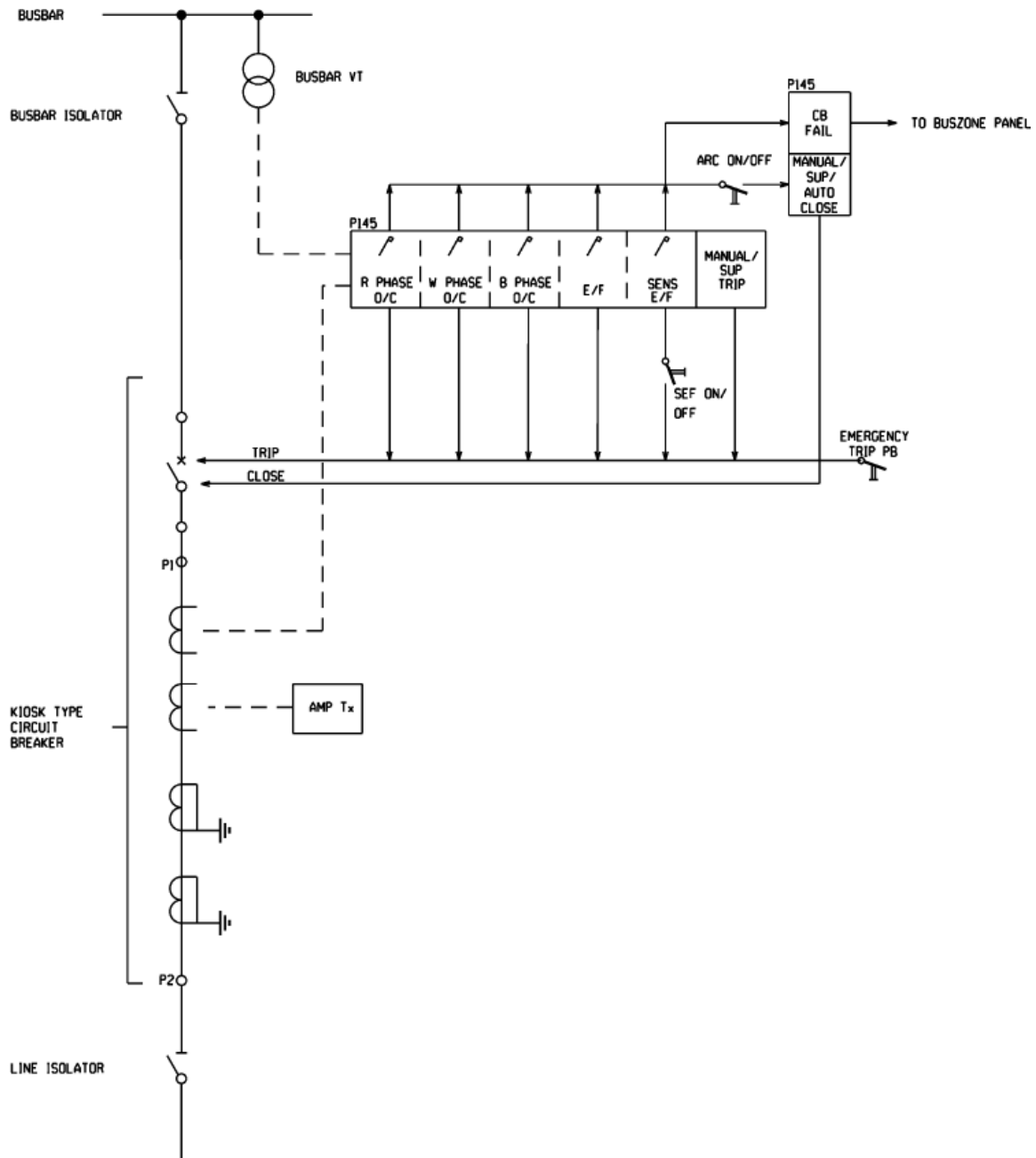


Figure 3: Feeder breaker protection scheme

C3.4.15.11.1. WORKS SPECIFICATION

Installation of control cable shall include:

- All control cables shall be laid, glanded, numbered and terminated according to the protection drawings, specifications and bill of material.
- Cable lengths shall be made to reach the furthestmost terminal block in the panels, JB, etc. No joints shall be made.
- Spare cores shall be earthed at one end only and not at both ends.
- Ferrule numbering shall be done according to protection drawings.
- Correct sizes of ferrule numbers shall be used per cable size and to Eskom standard - black lettering on yellow a background only (D-DT-6069).
- All cable or wire numbering shall be so that it is readable from one position. Numbering shall not be inverted.

- g) Where insulated lugs are used the correct crimping tool shall be used.
- h) The correct size glands shall be used per cable size.
- i) The correct type of lugs shall be used per cable size.
- j) The screen of the control cable shall be earthed according to D-DT-5240.

C3.4.15.11.2. MATERIAL SPECIFICATION

Unless otherwise specified, the Contractor shall supply, transport and offload all the material and equipment necessary for installing all the cables in the substation.

Install control cable:

- a) The cable strand numbering shall be black lettering on yellow a background only (D-DT-6069).

C3.4.15.12. METERING PANEL

Only 1 x metering panel will be required to house the following:

- i. 2 x Main & 2 x Check tariff meters for the two 22kV feeder bays.
- ii. 1 x Statistical meter for the 10MVA transformer.

C3.4.15.13. TARIFF METERING

The two 22kV feeders shall each be fitted with the following:

- 2 x Class 0.5s (Main & Check) tariff meters per feeder.

The Eskom specified Elster A1700 meter shall be installed. The relevant Eskom SAP material number for the Elster meter is 0242600. The Contractor must supply the calibration certificates for the meters.

The meters shall interface with the existing RTU in the control room. The Contractor can assume that the existing RTU has enough communication ports available.

C3.4.15.14. STATISTICAL METERING

Statistical metering shall be installed for the 10MVA transformer. A class 0.5s meter shall be used.

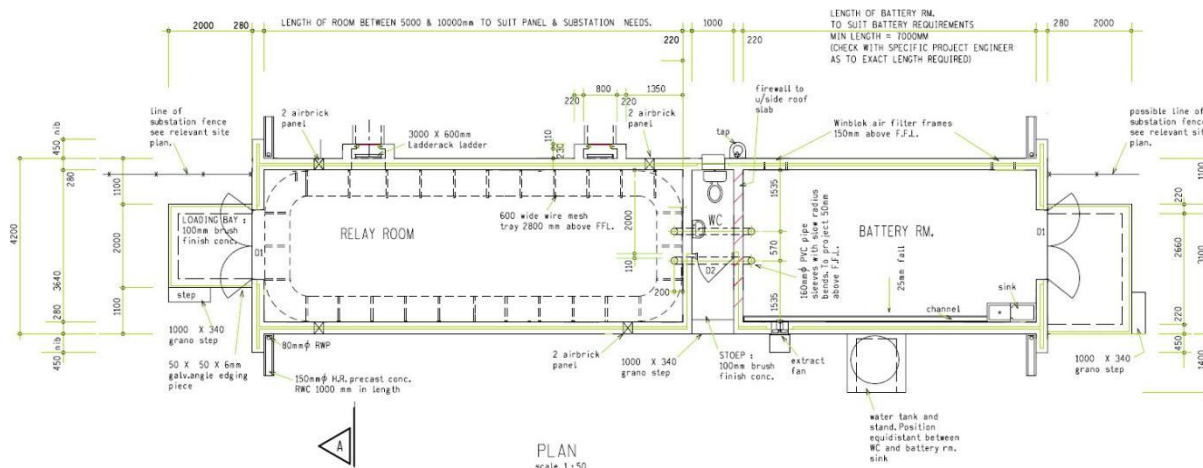
The Eskom specified Elster A1700 meter with SAP number 0242600 shall be used. The

statistical meter shall interface with the existing RTU in the control room.

C3.4.16. CONTROL ROOM BUILDING (PSE 16)

Due to space constraints in the building, the existing DB shall be moved so that the transformer protection panel can be placed against the wall where the DB is currently located. The proposed control room layout is shown in the project drawings.

The proposed control room layout is shown below.



The Contractor shall perform minor refurbishments to the building. This entails refurbishing the ceiling panel and installing a new light fixture with 2 x fluorescent tubes.

C3.4.16.1.1. CONDUITING AND WIRING

Conduits shall be 20mm surface mounted galvanised steel conduits. The Contractor shall make provision for all saddles, bends, loop boxes and draw boxes required for the installation in the rate for the small power installation.

Wire to be used shall be 600/1000V PVC insulated, single core multi stranded copper conductors and green insulated copper conductors for earth continuity to SANS 175.

- Light circuits = 2,5mm² power & 2,5mm² Earth
- Power circuits = 4mm² power & 2,5mm² Earth
- No joints in conduits will be accepted.

C3.4.16.1.2. POWER SUPPLY

The distribution board for the building electrical installation is currently fed from the existing AC yard boards for the two existing transformers. A supply from the new AC yard board for the building electrical installation is not required.

C3.4.16.1.3. DISTRIBUTION BOARD

The existing distribution board shall be moved due to space constraints inside the control room building.

C3.4.16.2.LIGHT FITTINGS

The existing light fitting inside the control room is faulty. The Contractor shall supply and install a new fluorescent light fixture and tubes (2 x 5ft tubes, 58W per tube).

C3.4.17. SUBSTATION SYSTEM TESTING AND COMMISSIONING

All site acceptance tests shall be performed in accordance with IEEE Std 1861:2014 “IEEE Guide for On-site Acceptance Tests of Electrical Equipment and System Commissioning of 1000 kV AC and Above”. All standards and specifications are subject to revision, and parties to agreements based on this specification are

encouraged to investigate the requirements of the above guide. The tests shall apply to:

C3.4.17.1.POWER TRANSFORMERS

- Leak testing with pressure (tightness test)
- Winding resistance measurement
- Ratio tests
- Polarity check
- Insulation resistance test on each winding to ground and between windings including bushings
- Dissipation factor ($\tan\delta$) and capacitance measurement on each winding to ground and between windings
- Core and frame insulation check
- Tests on bushings
- Insulating oil tests
- Dissolved gas analysis (DGA) test
- Excitation current measurements at reduced voltage
- Frequency response analysis (FRA)
- Short-circuit impedance measurement at reduced current
- Applied voltage tests
- Induced voltage test with partial discharge measurement (IVPD)

C3.4.17.2.CAPACITIVE VOLTAGE TRANSFORMERS

- Insulation resistance measurement of capacitor voltage dividers' low-voltage terminal to earth terminal
- Capacitance and dissipation factor ($\tan\delta$) measurement of capacitor voltage dividers
- Tightness of the liquid-filled capacitor voltage dividers
- Winding resistance measurement of electromagnetic units
- Insulation resistance measurement of each component of electromagnetic units
- Connection check between components of electromagnetic units
- Tightness of electromagnetic units
- Accuracy checks (determination of error)
- Damper check

C3.4.17.3.BUSHING TYPE CURRENT TRANSFORMERS

- Insulation resistance tests
- Resistance measurements
- An applied voltage test on secondary windings
- Determination of error and polarity check
- An excitation test

C3.4.17.4.GAS INSULATED SWITCHGEAR

- Mechanical tests: leakage
- Mechanical tests: gas quality (moisture, purity, and density)
- Electrical tests: continuity, conductivity, and resistivity
- Electrical tests: low-frequency ac voltage withstand
- Electrical tests: low-frequency ac voltage withstand requirements and conditions

- Electrical tests: low frequency ac voltage withstand configurations and applications
- Electrical tests: assessment of the ac voltage withstand test
- Electrical tests: tests on auxiliary circuits
- Mechanical and electrical functional tests: checks and verifications
- Mechanical and electrical tests: documentation

C3.4.17.5.AIR INSULATED DISCONNECTORS SWITCHES / ISOLATORS

- Appearance check
- Dielectric tests on control and auxiliary circuits
- Mechanical test
- Measurement of the resistance of the main circuit
- Design and visual inspection

C3.4.17.6.BUSHINGS

- Visual inspection
- $\tan\delta$ and capacitance measurement
- Tap withstand voltage

C3.4.17.7.SURGE ARRESTORS

- Insulation resistance test of MOSAs
- Insulation resistance test of the bottom of the MOSAs
- Leakage current test
- Check of appearance
- Check of monitoring devices

C3.4.17.8.INSULATORS

- The insulation resistance should be tested at 5000 V. The tested value of insulation resistance of each piece of suspension insulator should not be lower than 5000 M Ω before installation.
- For the ac voltage withstand test, the test voltage for the suspension insulator is 60 kV. For the test method, refer to 14.1 of IEC 60383-1:1993.
- Post Insulators: The insulation resistance measurement should be performed on a transportation unit with 5000 V before installation. The value of the measured insulation resistance should not be lower than 5000 M Ω .

C3.4.17.9.INSULATOR OIL

No.	Items	Requirements
1	Visual examination	Transparent, inclusion-free, no suspended matter
2	Granularity in oil	Granularity (5 μm ~ 100 μm) $\leq 1000/100 \text{ mL}$ Granularity (> 100 μm) None
3	Dielectric strength, kV	≥ 70 (2.5 mm gap, spherical electrode)
4	Dissipation factor, 90 $^{\circ}\text{C}$, %	Before filling into equipment ≤ 0.5 After filling into equipment ≤ 0.7
5	Water content, 50 $^{\circ}\text{C}$, mg/kg	≤ 10
6	Total dissolved gas, %	≤ 0.5
7	DGA	Refer to relevant subclauses of this guide

C3.4.17.10. SYSTEM COMMISSIONING

No.	System commissioning items	Note
1	Measurement of UHV transmission line parameters at rated power frequency	
2	Test of UHV power transformer with current increasing from zero	*
3	Test of UHV ac transmission line with current increasing from zero	*
4	Test of UHV power transformer with voltage rising from zero	*
5	Test of UHV ac transmission line with voltage rising from zero	*
6	Switching on/off test of no-load UHV power transformer	**
7	Switching on/off test of UHV ac no-load transmission line	**
8	Ring closing (interconnection)/ Ring opening (splitting) test of UHV system	**
9	Induced current and induced voltage test of the double circuit/ multi-circuit UHV ac transmission lines on the same tower	**
10	Switching on/off test of tertiary connected reactor	**
11	Switching on/off test of tertiary connected capacitor	**
12	Artificial single phase to ground fault test	**
13	System dynamic disturbance test	**
14	Normal operation test	**

* The test system should be composed of the selected generator, substations, and transmission lines, which are completely isolated from the operating system electrically.

** The test should be performed in the operating system.

C3.4.18. SUBSTATION FENCE (PSE 54)

The substation fence shall be:

- High security diamond mesh type perimeter fence with provision for:
 - i. Razor wire flat wrap (500mm), “Class A” heavy galvanised.
- All required sliding gates and personnel gates as per project drawings.

A mock-up of the mesh security fence shall be made available for evaluation and approval. The correct wire sizes shall be used with the correct specified finishing, coatings and all auxiliary material.

C3.4.18.1.DIAMOND MESH FENCE

This specification covers material requirements and installation of security fencing and gates. The work included for the contractor is to furnish and install fences and gates, and accessories as required and shown.

The diamond mesh fence shall comply with the relevant specifications as indicated in D-DT-5237s5A.

The following information shall be submitted to the Engineer for approval prior to placing any manufacturing orders:

- Certificate of compliance for materials and coatings
- Shop drawing for gates
- Quality control program shall be submitted to the Engineer for review prior to
- commencement of any work.

The mesh must be anchored into/onto the centre of the anti-tunnelling, and the bottom rail of the panels must be flush with the anti-tunnelling. The anti-tunnelling shall be 100mm (wide) x 600mm (deep) concrete (15MPa) between posts.

C3.4.18.2.PRODUCTS

All steel materials shall be of good commercial quality, galvanized steel. All pipes / columns shall be galvanized, one piece without joints. Provide moisture proof caps for all posts. Zinc coating shall be smooth and essentially free from lumps, globs, or points. Miscellaneous material shall be galvanized.

All gates shall be provided with a concrete ramp for the gate to be at least 100mm above the finished substation yard stone level.

C3.4.18.3.EXECUTION

Install all fencing and gates in accordance with the drawings, specifications, instructions, and as specified, lines and grades indicated. **Line posts shall be spaced at equal length intervals.** Terminal posts shall be set at abrupt changes in vertical and horizontal alignment.

C3.4.18.4.POSTS

The posts shall comply with the specifications and details as set out in D-DT-5237s5A.

Post holes shall be cleared of loose material. Waste material shall be spread where directed by Engineer. The ground surface irregularities along the fence line shall be eliminated to the extent necessary.

Posts shall be set plumb, and follow the indicated alignment. All posts shall be set to the depth indicated on the design documents. Concrete shall be thoroughly consolidated around each post, free of voids, and finished with a domed shaped surface, with the base of dome at grade elevation. Concrete shall be allowed to cure prior to installing any additional components to the posts.

Concrete footings shall be carried down to at least the depth indicated on the design documents and shall not be smaller than the dimensions shown. Where a rock layer is encountered within the required depth to which the post is to be erected, a hole of a diameter slightly larger than the largest dimension of the post may be drilled into the rock and the post grouted in. Then the regular concrete footing shall be placed between the top of the rock and the top of the footing elevation as shown on the design

documents. Posts shall be approximately centred in their footings. All concrete shall be placed promptly and consolidated by tamping or other approved methods.

Where the ground is firm enough to permit excavation of the post hole to neat lines, the concrete may be placed without forms by completely filling the hole. Curing may be achieved by covering the concrete with not less than four inches of loose moist material immediately after placing concrete, or by using a curing compound. All excess material from footings, including loose material used for curing, shall be disposed of as directed by the Engineer.

Where the ground cannot be satisfactorily excavated to neat lines, forms shall be used to place concrete for footings. Under these conditions the earth and forms coming in contact with the concrete shall be moistened and all ponded water shall be removed from the hole prior to placing concrete. When forms are removed, the footing shall be backfilled with moistened material, and thoroughly tamped. The top of the concrete shall then be covered with not less than 100 mm (4 in) of loose moistened material or use curing compound if the 7-days cure is not completed. All excess material from footings, including loose material used for curing, shall be disposed of as directed.

C3.4.18.5. ADJUSTING

Gate: Adjust gate to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range.

Confirm that latches and locks engage accurately and securely without forcing or binding.

Lubricate hardware and other moving parts.

C3.4.19. SURGE ARRESTORS

The surge arresters to be supplied and installed shall primarily consist of the following:

- Supply and install 3 x 132kV heavy duty station class surge arresters on the 132 kV Feeder Isolator.
- Supply and install 3 x 132kV heavy duty station class surge arresters close to the 132kV bushings of the new power transformer.
- Supply and install 3 x 22kV heavy duty station class surge arresters close to the 22kV bushings of the new power transformer.
- Supply and install 6 x 22kV heavy duty station class surge arresters onto the 2 x feeder Isolators.
- Supply and install 1 x 66 kV neutral surge arresters on the neutral star points of the primary winding on the power transformer.

All the transformer primary and secondary surge arresters shall be mounted on tailor made supports to be fixed and fitted directly on the transformer.

The following surge arrestors are required as part of this contract:

- 1) 22 kV Surge arrestor: station class, gapless, metal oxide, polymer housed, minimum MCOV of 24 kV, maximum residual voltage of 85 kV, 10 kA discharge current, Class 2 - line discharge (IEC), 31 mm/kV creepage; [D-DT-6215]
- 2) 66 kV Surge arrestor: station class, gapless, metal oxide, polymer housed, minimum MCOV of 48 kV, maximum residual voltage of 165 kV, 10 kA discharge current, Class 2 - line discharge (IEC), 31 mm/kV creepage (used for the protection of unearthed transformer primary neutrals); [D-DT-6212]

- 3) 132 kV Surge arrester: station class, gapless, metal oxide, polymer housed, minimum MCOV of 84 kV, maximum residual voltage of 210 kV, 10 kA discharge current, Class 2 - line discharge (IEC), 31 mm/kV creepage; [D-DT-6210]

Surge arresters shall all preferably be fitted with grading rings. Grading rings shall be rigid and shall be securely fitted to the surge arrester.

Surge counters are required to be provided and installed on all of surge arresters, an insulated base on all PCD attachments shall therefore be included on surge arrester footings. The earthed ends of all surge arresters shall each be independently connected to the substation earthing system, by means of a copper earth conductor with a minimum cross-sectional area of 250mm². In the installation of the surge arrester earth conductors, 90° bends in the earth conductors shall be avoided.

Type Test Certificates indicating full compliance with IEC 60099, IEC 60815 and the relevant Eskom Specification, shall be submitted with all Tenders.

C3.4.20. HIGH VOLTAGE CTS

Conventional high-voltage outdoor post type current transformers shall be supplied and installed in the following positions:

- 6 x 132 kV transformer feeder CTs.
- 3 x 132 kV Transformer bushing CTs

The following post type high voltage current transformers are required as part of this contract:

- 1) Six cores - 2 x Protection (PX-multi ratio), 2 x Metering (0.2-multi ratio), 2 x Bus zone (PX-multi ratio), 132 kV, 2500 A, 40 kA/3sec, 650 kV BIL, 31 mm/kV creepage

Further detail CT requirements are outlined under the protection philosophies.

Type test certificates indicating full compliance with Eskom DSP 34-1689, NRS 029 and the relevant IEC standards shall be submitted with all tenders. As in the case with all other equipment called for in this specification, failure by Contractors to supply the required applicable and approved type test certificates, may result in tenders being disqualified.

All conventional outdoor post type current transformers shall be mounted on suitable outdoor type medium support mounting structures.

All current transformers shall be equipped with the number of current transformer cores required for the respective circuits generally as shown on the project drawings.

All supporting structures as well as the current transformer tanks shall furthermore be separately earthed to the local substation earthing system.

C3.4.21. 22 KV CLOSING SPAN

C3.4.21.1.CONDUCTORS

The phase conductors that shall be used for the closing span to the existing Impumelelo line shall be ACSR CHICKADEE.

Table 6: Conductors

Description	MV Phase Conductor
Type	ACSR CHICADEE
Stranding and wire diameter (mm)	18/1
Cross section area (mm ²)	212
Overall diameter (mm)	18.85
Unit Weight (kg/Km)	643
UTS (kN)	44.90
Final modulus of elasticity (kN/mm ²)	66.2
Coefficient of linear expansion	21.44 /°C x10 ⁻⁶

C3.4.21.2.LINE HARDWARE

All line hardware shall be rated for 120 kN minimum.

Compression type dead-ends shall be used.

C3.4.22. LV PVC INSULATED LV CABLES**C3.4.22.1.GENERAL**

The cables and accessories shall comply with the general requirement as specified in GSE 08.

C3.4.22.2.TYPE OF CABLE

All low voltage cables to be supplied and installed as part of this Contract, shall be of the PVC/PVC/SWA/PVC type in accordance with NRS 074 and SANS 1507.

All such cables shall be of the new material and shall bear the SANS mark.

C3.4.22.3.EARTHING OF ARMOURING

The armouring of the cable shall be earthed.

The galvanised steel armouring shall not be used as an earth conductor.

C3.4.22.4.GLANDS

All cables shall be properly glanded off within the substation and within each of the appropriate kiosk / DB's / Boxes. Pratley glands shall be provided with the associated rubber boots properly applied to prevent the ingress of water into the armouring.

C3.4.22.5.JOINTS

Only resin filled joints shall be used jointing of all LV cables.

The Contractor shall notify the Engineer timeously of the day on which jointing is to be carried out in order that an inspection may be arranged if so required. Any cable joint not inspected by the Engineer because of insufficient notice being given, shall be opened for inspection and redone at the discretion of the Engineer at the cost of the contractor.

The crossing of cores in joints will not be permitted under any circumstances.

C3.4.22.6. TESTING

All commissioning tests in accordance with SANS 10198-13 shall be performed following installation of the cables.

The Contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The cost of testing shall have been included in the tender price.

The Contractor shall notify the Engineer timeously so that a representative of the Engineer may witness the tests.

On completion of the tests on any cable, the Contractor shall without delay, submit three copies of the certified Test Reports to the Engineer.

C3.4.23. INSTALLATION OF CABLES

C3.4.23.1. GENERAL

The cable must be installed as per the general requirement specified in GSE 09 and as shown on the project drawings.

Cable installation shall comply with SANS 10198-8.

C3.4.23.2. CABLE ROUTE DESCRIPTION

The Contractor shall, before trenching commences, familiarise himself with the routes and site conditions and the procedure and order of doing the work shall be planned in conjunction with the general construction programme for other services and building requirements.

Trenches shall connect the points shown on the drawings in a straight line. Any deviations due to obstructions or existing services shall be approved by the Engineer beforehand and shall be clearly marked by the Contractor on the as-built information.

The Engineer reserves the right to alter any cable route or portion thereof in advance of cable laying. Payment in respect of any additional or wasted work involved shall be at the documented rates. The removal of obstructions along the cable routes shall be subject to the approval of the Engineer.

C3.4.23.3. TRENCH DIMENSIONS

Where cables are installed directly in ground the trench dimensions for cable trenches will be as follows:

- | | | |
|--------------------|---|-----------------|
| a) Width | : | min. 300 mm |
| b) LV depth | : | 700 mm |
| c) Length | : | Length of cable |
| d) Crossings depth | : | 1 500 mm |

The width shall be increased where more cables are installed to allow for the spacings.

The bottom of the trenches must be even and shall follow the contour of the natural ground level.

C3.4.23.4.BEDDING LAYER

The Electrical Contractor must clean the “trench”; remove all rocks before the installation of the bedding layer.

Bedding shall be of a suitable soil sifted through a 6 mm mesh and levelled off. Only sandy clay or loam soil with a satisfactory thermal resistivity (not exceeding 1,2 K.m/W) may be used for this purpose. Local excavated material may be used upon approval by the Engineer and laboratory testing confirming the above specified soil thermal resistivity. A bedding layer of 100 mm shall be installed prior to cable laying and a blanket layer of 150 mm following laying of cables. The bedding under joints shall be fully consolidated to prevent subsequent settling.

Where no suitable soil is available on site, the Contractor shall import fill from elsewhere and make all the necessary arrangements to do so. The cost of importing soil for bedding purposes shall be included in the unit rates for bedding. Where local excavated soil is used for bedding and adequate thermal resistivity is proven, the saving shall be given through to the Employer.

Sea or river sand, ash, chalk, peat, clinker or clayey soil shall not be used.

Table 7: Soil Types (SANS 10198-5)

SOIL TYPE	DESCRIPTION	THERMAL RESISTIVITY	SUITABLE FOR BEDDING & BLANKET	SUITABLE FOR BACKFILL
Chalk	Soft white / grey porous	Low (wet) High (dry)	No (if drying out is likely)	Yes
Clay	Dense, compact, greasy to touch when wet, shrinks while drying	Low (good)	No	Yes
Loam	Reddish to dark brown (may contain organic matter), crumbles well – can be well compacted	Satisfactory (good)	Yes	Yes
Mine Sand	Highly corrosive	Low (good)	Used with caution	Used with caution
Ouklip	Decomposed granite, varying in particle size	Low (undisturbed) High (disturbed)	No	If mixed with loam/ clay
Peat (humus)	Mainly organic material, black /dark brown	High (when dry)	No	Used with caution
Sand (sea / river)	Crumbly, spherical particles and gritty to touch even when wet, cannot be easily compacted	High (when dry)	No (unless mixed with loam/ clay)	If mixed with loam/ clay

C3.4.23.5.BACKFILLING

After installation of the cables, the Contractor shall be responsible for backfilling and compaction of all these trenches to original compaction with suitable soil to ensure settling without voids. The maximum allowable diameter of stones present in the backfill material is 20 mm. This must be done to the satisfaction of the Engineer and Employer.

Where the soil excavated is not suitable for backfilling, the Contractor shall import backfilling from elsewhere and make all the necessary arrangements to do so. The cost of importing soil for backfilling purposes shall be included in the unit rates for excavation and backfilling. All excavations in hard rock shall imply that excavate material is not suitable for backfilling and these excavations shall be priced accordingly.

The backfill shall be compacted in layers of 150 mm and sufficient allowance shall be made for final settlement. A water cart shall be used during backfilling to moisten backfill material. The Contractor shall maintain the refilled trench at his expense for the duration of the contract. Surplus material shall be removed from site and suitably disposed of at the cost of the Contractor.

On completion, the surface shall be made good to match the surrounding area. DCP test certificates shall be provided to prove compaction is equal or harder than undisturbed natural ground. Positions for tests shall be indicated by the Engineer, the Contractor shall allow for a DCP test every 100 m. The contractor shall care not to damage the cables during compaction testing.

In case of roadways or paved areas the excavations shall be consolidated to the original density of the surrounding material and the surface finish reinstated.

After the cable trench has been refilled and compacted, the Contractor must level the area and remove all excess soil and refuse.

C3.4.23.6.INSPECTION OF CABLES AND CABLE TRENCHES

The Contractor shall not commence with the backfilling of trenches without prior notification to the Engineer so that the cable installation may be inspected. Should the Contractor fail to give a timeous notification, the trenches shall be re-opened at the Contractor's cost. Such an inspection will not be unreasonably delayed.

A logbook, in triplicate, shall be kept by the Contractor on the site, in which each part of the installation that has been inspected can be recorded after inspection and approval.

C3.4.23.7.SECURITY

The Contractor must arrange 24-hour security with a reputable security company to protect the cable for the duration of exposed cable. The Contractor must take cognisance that he will be responsible for any cable theft and replacement of stolen cable.

C3.4.23.8.TESTING

The cables installed shall be tested as specified.

On completion of the tests on any cable, the Contractor shall without delay, submit three copies of the certified Test Reports to the Engineer.

SIGNATURE OF TENDERER :

DATE :



LESEDI LOCAL MUNICIPALITY
P O Box 201
HEIDELBERG
1438

**THE CONSTRUCTION OF THE IMPUMELELO 1 X 20MVA,
132/22 kV SUBSTATION (ESKOM SELF BUILD PROJECT)**

SECTION 6:
ANNEXURES & DRAWINGS



LYON AND PARTNERS (Pty) Ltd
Electrical Consulting Engineers
P O Box 3925
VANDERBIJLPARK
1900

LIST OF ANNEXURES

ANNEXURE 1: Employer Health & Safety Specification

ANNEXURE 2: Employer Environmental Management Plan

ANNEXURE 3: Drawings

HEALTH AND SAFETY SPECIFICATION
REQUIREMENTS RELATED TO CONSTRUCTION WORK

**APPOINTMENT OF SERVICE PROVIDER FOR THE CONSTRUCTION OF
THE IMPUMELELO 1 X 20MVA, 132/22kV SUBSTATION
(ESKOM SELF BUILD PROJECT)**

VE 9724-27-5



LYON AND PARTNERS (PTY) LTD
Electrical Consulting Engineers
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HEALTH & SAFETY

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1. HEALTH AND SAFETY SPECIFICATION

COMPILED BY	Dave Redfearn for Lyon and Partners
APPROVAL DATE	2017-08-22
NEXT REVIEW DATE	T.B.C.

1. SPECIFICATION

This specification refers to the specific health and safety requirements related to construction work.

2. SAFETY AND HEALTH REQUIREMENTS

2.1. DURING TENDER STAGE

The contractor shall submit the following safety documentation during the tender stage:

- Proof that the contractor has implemented a safety management system in compliance with OHS Act 85 of 1993 (Construction Regulations 2014).

2.2. PRE-CONTRACT QUALIFICATION AUDITS

The Engineer may require a safety audit to be conducted on the contractor to ascertain whether the contractor has implemented a safety management system based on the relevant codes of practice.

Should the contractor not comply with the Engineer safety specifications the contractor may be omitted from the supplier's data base until such time that he obtains the relevant compliance.

3. DURING THE PROJECT STAGE

3.1. AGREEMENT

In accordance with the provision of Section 37(2) of the Occupational Health and Safety Act 85 of 1993, every contractor shall enter into a written agreement with the principle contractor.

3.2. SAFETY AND HEALTH FILE

Prior to any work on site the contractor shall compile a safety and health file based on the requirements of the Occupational Health and Safety Act 85 of 1993 – Construction Regulations 2014 for approval by the Engineer.

The safety file shall include but will not be limited to the following:

- Safety Policy
- SHE Plan
- Appointment letters as per OHS Act 85 of 1993

- Notification of construction work
- Hazard identification risk assessments
- Base line risk assessments
- Safe work procedures
- Daily task risk assessments
- Emergency evacuation plan
- Internal safety Audits
- Proof of induction training
- Contractor agreements (As per the OHS 85 of 1993 Act 37 (2))
- First aid box contents, training certificates
- Incidents and accidents reporting Annexure A
- Health and safety meetings
- Letter of good standing “Compensation fund number”
- COID
- Personnel protective equipment issue (PPE)
- Hand tool inspection list
- Electrical equipment checklist
- Vehicle inspection
- Fire extinguisher checklist
- Toolbox Talks
- PTO’s Task job observations

3.3. RISK ASSESSMENT

Contractor shall before the commencement of any construction work and during construction work, cause a risk assessment to be performed by a competent person appointed in writing and the risk assessment shall form part of the health and safety plan to be applied on the site and shall include at least-

- The identification of the risks and hazards to which persons may be exposed to
- The analysis and evaluation of the risks and hazards identified
- Documented plan of safe work procedures to mitigate, reduce or control the risks and hazards that have been identified
- Monitoring plan
- Review plan.

Contractor shall ensure that a copy of the risk assessment is available on site for inspection by an inspector or employee of the principle contractor.

Typically, the following identified risks could endanger the work done by the *Contractor*. The *Contractor* should identify mitigating actions for these risks, as well as identify any additional risks and submit at tender stage:

Table 1: Risks

Typical Risk	Yes/No
Live underground cables	Yes
Work in live chambers/restricted areas	Yes
Live overhead conductors/crossings	Yes

Typical Risk	Yes/No
Close proximity work to live equipment	Yes
Work in elevated positions/on ladders/from crane buckets	Yes
Operating of cranes/vehicle mounted	Yes
Static electricity/induction , step potential etc.	Yes
Work with chainsaws/mechanical cutters	Yes
Materials handling/ heavy equipment handling	Yes
Conductor stringing and tensioning	Yes
Vehicle risks	Yes
Work in open trenches/excavations	Yes
Biological/Health risks (camps)	Yes
Weather related risks (UV, heat, cold)	Yes
Environmental risks	Yes
Ergonomic risks (body position, fatigue)	Yes
Work on/dismantling of rusted & rotten poles and structures	Yes
Fire risks	Yes
Public safety risks	Yes

3.4. EMPLOYEES COMPETENCE

Prior to work the contractor shall provide the Engineer with the relevant training certificates (in-house and external) to ensure that all employees are competent to conduct the scope of work.

This training may include but is not limited to the following

- First aiders
- Induction
- Fire fighters
- Installation electricians (Proof of COC competence)
- Health and Safety representative

3.4.1 NUMBER OF HEALTH AND SAFETY PRACTITIONERS

When on site for more than two weeks the following shall apply:

- one trained Health and Safety Representative for every 10 employees or part thereof;
- one Health and Safety Officer for every 50 persons on site or part thereof. Part time Health and Safety Officers shall be allowed based on the risk profile and the type of work to be done – this shall be negotiated;
- one first aider trained to Level 2 per team of workers. The size of the team of workers shall be determined by the risk exposure and the nature of the work.

3.4.2 COMPETENCY REQUIREMENTS OF KEY PERSONNEL

- Curriculum Vitae, training certificates and proof of experience of key Health and Safety Personnel shall be submitted with the Health and Safety Plan.

- Health and Safety Competency assessments may be conducted by The Employer on Health and Safety practitioners before site establishment.
- The training requirements of key health and safety personnel shall include, but will not be limited to, the following:

3.4.3 CONSTRUCTION MANAGER (C.R 8.1 APPOINTEE)

- a) Three years applicable experience in construction management
- b) Risk Assessment training
- c) Incident investigation and root cause analysis
- d) Occupational Health and Safety Act orientation course
- e) Training in the Construction Regulations

3.4.3 HEALTH AND SAFETY OFFICER (C.R 8.6 APPOINTEE)

- a) Three years applicable experience in managing construction health and safety.
- b) Health & Safety Risk Management
- c) Risk Assessment training
- d) Incident investigation and root cause analysis
- e) OHS Act orientation course
- f) Training in the Construction Regulations
- g) Emergency Preparedness coordination training and experience

3.4.4 CONSTRUCTION SUPERVISOR (C.R 8.7 APPOINTEE)

- a) Attended an accredited supervisors health and safety course
- b) Risk Assessment training
- c) Incident investigation training
- d) Root cause analysis training
- e) Introduction to the OHS Act

3.4.5 HEALTH AND SAFETY REPRESENTATIVES

- a) Accredited Health and Safety Representative Training
- b) Hazard identification and Risk assessment
- c) General health and safety training

3.5. EQUIPMENT

Control of equipment:

All equipment shall be strictly controlled throughout the project if any equipment is lost or stolen it shall be reported immediately to the site supervisor

Checklists:

All equipment and facilities that will be used on site by the contractor shall be listed on a register. Inspections shall be conducted at least once a month as a minimum requirement.

3.6. SAFETY AND HEALTH COMMUNICATION

All contractual safety and health communication shall be in writing between the contractor and the Engineer.

Safety and Health meetings will be held on a monthly basis. It is compulsory for all contractors' safety representatives to attend these meetings.

Regular in-house safety communication must be conducted by means of:

- Daily Toolbox talks
- Meetings

3.7. PPE

Where required personnel protective equipment is compulsory, any employee that does not wear his / her PPE will be escorted from site and will not be allowed to enter the premises before a disciplinary hearing has been conducted. A copy of this disciplinary hearing and sanctions must be forwarded to the Engineer for information / comments.

3.8. WEATHER CONDITIONS

During any adverse change in weather conditions such as heavy rain, hail storms, thunderstorms and strong winds work may be stopped by the site supervisor. He shall inform all employees of the eminent dangers.

Once the weather changes back to normal, a risk assessment must be conducted before any work may commence again.

3.9. NOTICE BOARDS AND SIGNAGE

Each contractor shall display the necessary notices and signs.

The following information needs to be clearly displayed:

- No unauthorized persons
- No access
- Emergency contact details

3.10. SITE SAFETY AND HEALTH AUDITS

The appointed safety manager of the Engineer will conduct monthly site audits to ascertain that the safety and health file complies with legislation and safety specifications. Any deviations found are required to be rectified within 2 days after discovery.

The contractor must forward the corrective actions to the Engineer for approval or comments.

It remains the right of the Engineer to stop any contractor work when any safety transgressions occur or the safety and health file does not comply with the OHS Act 85 of 1993 – Construction Regulation requirements.

Should a contractor's work be stopped or delayed due to the non-conformance, costs incurred will be for the contractor's account.

Records of these audits shall be forwarded to the contractor and shall be filed on site in the contractor's safety file for reference purposes.

3.11. SECURITY CLEARANCE

It is the contractor's responsibility to ensure that their employees are subjected to security clearance before they are allowed to enter the premises to work.

3.12. TASK OBSERVATIONS

The contractor's site supervisor shall conduct regular task observations on employees.

It is compulsory that task job observations are conducted on a regular basis on employees during all stages of a project.

3.13. DISABLING INJURY FREQUENCY RATE (DIFR'S)

The Contractor shall ensure that injury and incident records versus man hours are filed in the safety file and submitted to the Engineer monthly on a specified date. These include all near hits, first aid, medical treatment and disabling lost time cases.

All documents shall be made available on site for inspection by the Department of Labour Inspectors as well as client as required by the Occupational Health and Safety Act, 85 of 1993.

3.14. ACCIDENT AND INCIDENT REPORTING AND INVESTIGATION

Should an accident investigation be required the contractor shall appoint a competent person in writing to conduct the said investigation.

The contractor shall ensure that the results of all investigations are communicated to the employees by means of incident recall discussions at prescribed communication sessions and/or meetings.

The contractor shall ensure that the investigations are kept for record purposes in accordance with the prescribed requirements set out in the OHSA.

If an incident/accident does occur, the contractor shall notify the Engineer within 24-hours of the occurrence.

The Engineer reserves the right to participate in all investigations into accidents or incidents.

3.15. TRANSPORTATION

Safe vehicular transport shall be provided by the contractor for his personnel working on the project to the workplace. This shall include adequate seating, side restraints and covers.

Road safety principles shall be adhered to on and off site.

No employees shall be permitted to be transported at the back of a loaded open pick-up (bakkie).

3.16. CONSTRUCTION VEHICLES

No vehicle shall be allowed to enter the premises without the relevant roadworthy certificate

Service and maintenance of the vehicles shall be of a high standard at all times, no oil leaks, faulty exhausts or unsafe loads shall be allowed on site.

Pre-start up inspections on all motorized equipment shall be conducted on a daily basis via a checklist. Deviations found shall be rectified and recorded.

3.17. FIRE FIGHTING EQUIPMENT

The Contractor shall ensure that adequate fighting equipment is available on site complies with the following:

- Extinguishers shall be placed in positions to ensure fast and easy access is maintained at all times.
- Placement of all extinguishers shall be depicted with the required pictograms.
- Extinguishers shall be serviced once annually, and after discharge or visible signs of depressurizations.
- The contractor shall ensure all employees are adequately trained in the safe use of the extinguishers.
- The contractor shall ensure a person is appointed to inspect the extinguishers on a monthly basis and the results of which are to be entered into a register designed for that purpose

3.18. SCAFFOLDING / WORKING AT HEIGHTS / FALL PROTECTION

Work involving scaffolding and work at heights shall comply with the requirements set out in the Construction regulations 2003 pertaining to these activities with reference to the SABS 085 code of practice. Fall protection planning shall be done in conjunction with the risk assessment process.

All scaffolds shall be erected under the control of a person trained and appointed to conduct such scaffold erection.

3.19. LIFTING MACHINERY AND TACKLE

The contractor shall ensure that the use of Lifting Machinery and Tackle is done in accordance with the requirements of the Regulations, which include but is not limited to the following:

- Lifting machinery and tackle to be used on site shall be marked with the Maximum Mass Load (MML), which is the safe limit in which the equipment may be used.
- Inspections on Lifting Machines and Lifting Tackle shall be inspected once per month on the register provided and the findings recorded.
- Daily pre-start checks shall also be conducted on all Lifting Machinery and Tackle.

- Records shall be kept of all lifting machinery and tackle inspections and Load Tests.
- Load tests shall be conducted a minimum of once per annum, and a certificate of compliance shall be kept on record.
- A valid logbook shall be maintained for all lifting machinery, which will comply with a minimum six-monthly service and maintenance.
- Lifting machinery shall be operated under supervision at all times with a trained bank's man who shall inspect all tackle before each lift.
- All lifting equipment operators shall be trained once every two years and a copy of such training shall be attached to the appointment, which is to be made on site.
- The Operators shall be tested for medical fitness.

3.20. LADDERS AND LADDER WORK

The following requirements shall be complied with regarding Ladders and Ladder work:

- Ladders shall be clearly numbered, and inspected on the register provided.
- A competent person shall be identified and appointed as the ladder inspector.
- Wooden ladders shall be straight grained, unpainted to allow for proper inspection of the grain for cracking.
- Ladders shall be secured at the top and chocked at the base to prevent slipping.
- Where chocking of the base is not possible, then the user shall ensure that the ladder is held in position by another employee when ascending the ladder.
- Ladders shall be inspected a minimum once per month by the person appointed as the ladder inspector.
- Proper storage shall be provided for all ladders when not in use.

3.21. LIGHTING AND POWER (SITE CONTAINERS AND OFFICES)

The contractor shall ensure lighting circuits and power circuits are fitted with suitable earth leakage in accordance with the legislation, which will include the following activities:

- Earth leakage system will be tested monthly.
- Malfunctions shall be repaired immediately or replaced.
- Lighting shall be so positioned as not to interfere with construction activities.

3.22. VESSELS UNDER PRESSURE (VuP) OR GAS BOTTLES

The contractor shall ensure they comply at all times with the requirements of Vessels under Pressure Regulations, with specific reference to the following but not limited to:

- Ensuring all Equipment owned and hired-in Vessels under pressure, comply with the 36-month pressure vessel inspection, and a certificate of testing is available on site.
- Ensuring that all personnel who shall use this equipment are competent and trained.
- Ensuring the users of this equipment is issued with the required PPE.
- Gas bottles must be chained and standing in an upright position.

3.23. PORTABLE ELECTRICAL TOOLS / EXPLOSIVE POWER TOOLS

The contractor shall ensure the following procedure is adhered to regarding Portable Electrical Tools and Explosive Powered tools but not limited to:

- Minimum compliance with legislation.
- Only competent persons shall be permitted to conduct routine and monthly inspections on the equipment.
- Persons competent to inspect the equipment shall be appointed in writing.
- Persons who are trained to operate such equipment shall be appointed and shall be the only authorised person to operate the equipment.
- The Site supervisor shall ensure operation of the equipment is in accordance with the approved Risk Assessment and Safe Working Procedure set out.
- All users shall undergo regular awareness training to ensure compliance.

3.24. EXCAVATIONS

Excavation work exceeding the specified depth as stipulated in the OHSA regulations, shall comply with the following requirements:

- The excavations are inspected before the shift starts, after heavy rain (inclement weather) and after any major condition which may affect the excavations stability and the findings are to be recorded and kept;
- All excavations regardless of the depth shall be adequately barricaded to prevent persons falling into the excavation;
- The safe working procedure shall be communicated to all employees who may be effected by the work; and
- The safe working procedures shall be enforced and maintained by the appointed excavation supervisor at all times.
- For high-risk activities, all personnel working in the excavation shall be attached by means of a lifeline.
- Material excavated shall be removed from the point of excavation.
- Ensure stability of adjoining structures.

3.25. FACILITIES FOR SAFE KEEPING / EATING AREAS

The contractor shall ensure that adequate safe keeping and eating facilities are provided for the personnel on site.

Waste bins shall be strategically placed and cleared regularly.

3.26. FIRST AID BOX AND CONTENTS

All Contractors with more than 5 employees shall supply their own first aid box. Contractors with more than 10 employees shall have a trained, certified first aider on site at all times.

The First Aid attendant shall be trained in accordance with the requirements set out in the OHSA.

Proof of training attended (certificate) shall be attached to the written acceptance of appointment.

The contents of the first aid boxes must be monitored. Inspections must be recorded on the register to ascertain that the contents is valid and has not reached the expiry date.

3.27. SAFETY AND HEALTH NON-CONFORMANCES

Non-compliance with the safety specifications can result in work stoppage and possible expulsion from site until the problem has been remedied including costs.

4. ENVIRONMENTAL REQUIREMENTS - SYSTEMS

4.1. MATERIAL SAFETY DATA SHEETS (MSDS)

Any hazardous chemicals that are used on site shall have an updated 16 point material safety data sheet.

The contractor shall ensure that the required training and information regarding the use and storage of HCS is provided, and that the use and storage of HCS is carried out as prescribed by the HCS Regulations.

The first aider shall be made aware of the MSDS and how to treat HCS incidents appropriately.

4.2. MATERIAL SAFETY DATA SHEETS (MSDS)

The storage facility must comply but is not limited to the following:

- Adequate ventilation must be available
- Spill control
- Adequately identifiable

Weekly inspections need to be conducted to ensure that the facility complies with legislation.

4.3. MATERIAL SAFETY DATA SHEETS (MSDS)

The contractor shall clearly indicate his procedure for the removal of waste.

Removal of any hazardous waste shall be carried out as set out in the relevant legislation.

4.4. EMP

This is not an Environmental Management Plan – refer to separate documentation (Environmental Management Plan) for detail Environmental Requirements.

5. BASELINE RISK ASSESMENT

5.1. SAFETY RISK ANALYSIS-SPECIFICATIONS

Eskom's specifications and their Occupational Health and Safety requirements shall be met by Contractors and Sub-Contractors although not directly employed by Eskom.

Contractors shall comply with the Construction and shall draw up a Health and Safety Plan. Specific risks to note are set out under the Risk Analysis Specification following below.

5.2. RISK ANALYSIS SPECIFICATION

The requirements to address shall form the basis of the evaluation of the Contractor's Health and Safety Plan.

The risks identified should be considered as the first approach to compile the site specific health and safety document. The risks identified herein should be considered but will be underlying to the risks identified by the Contractor.

The table below presents a list of risks that will most likely be experienced during construction:

Table 2: Baseline Risk Assessment

No.	TASK/ ACTIVITY/ WORKP	HAZARD / DANGER IDENTIFIED	PREVENTATIVE MEASURES TO BE IMPLEMENTED (INCLUDING PPE TO BE USED)
1	Housekeeping	Possible injury to staff due to poor housekeeping. Rubbish and materials lying around may increase the fire hazard.	The following requirements to be complied with: • Excess material, scrap, waste or debris must be removed and be disposed of regularly. • Equipment and material to be stacked correctly and securely in designated areas. • Keep the site camp clean from materials that can cause fire.
2	Health and safety in housing complex (Camp).	Health effects suffered by staff due to poor health and safety standards maintained in housing complex.	The following requirements to be complied with: In accordance with the Act the following facilities must be provided: ○ One (1) toilet for every 30 staff members; ○ One (1) shower for every 15 employees; ○ Sheltered dining room facilities; and • Ample quantities of drinking water to be available in the housing complex; and • Sufficient quantities and types of firefighting equipment to be available in the housing complex.
3	Use and maintenance of PPE	Injuries to staff due to improper or lack of use of Personal Protective Equipment	The following requirements to be complied with: • Risk assessment to be conducted • Copy of risk assessment to be kept on site • Staff to be issued with and trained on appropriate use of PPE • PPE to be maintained in good working conditions and stored appropriately • Disciplinary action to be maintained against transgressors.
4	Poor ergonomics	Possible injuries to personnel: Working in an awkward / uncomfortable position; and / or Move or carry heavy objects.	The following requirements to be complied with as to minimize agronomical risks: • Where possible manual handling will be limited and lifting machines be used; and • Staff will be encouraged to use the correct method when lifting and / or carrying items.
5	Security	Material stored to be protected from theft and fire	• Site office must be fenced and a security guard must be available on site. • Keep the site camp clean from materials that can cause fire.
6	Unauthorised Entry	Possible theft or injury	No unauthorised person may enter onto construction site without permission.
7	Storage of flammable liquids	The storage of flammable liquids could increase the risk of fires.	The following requirements to be complied with: • Not more than 40 litres to be stored as per SANS 10400. Quantities in excess of 40 litres are to be stored in a flammable liquid store or cabinet specially constructed for this purpose; • Sufficient amounts of firefighting equipment to be kept available on the premises; • All staff to be trained in the use of the firefighting equipment;

No.	TASK/ ACTIVITY/ WORKP	HAZARD / IDENTIFIED DANGER	PREVENTATIVE MEASURES TO BE IMPLEMENTED (INCLUDING PPE TO BE USED)
			- All firefighting equipment to be inspected by a Competent Person appointed for this purpose. - All flammable liquids to be labelled properly
8	Fire prevention.	High risk of fires and property damage.	The following requirements to be complied with: - Sufficient amounts of firefighting equipment to be kept available on the premises; - All staff to be trained in the use of the firefighting equipment; - Cooking fires in designated areas only and under controlled conditions - All firefighting equipment to be inspected by a Competent Person appointed for this purpose; - The presence of all fires to be reported to the client immediately; - Staff to be trained in the correct firefighting procedure; and - Staff only to be allowed to smoke in designated areas.
9	Stacking of articles	Possible injury to persons due to items falling, moving or rolling.	The following requirements to be complied with: - All stacking to be done under the supervision of a person appointed in writing and assigned the duty of ensuring safe stacking on site; - Storage areas are to be kept clean and orderly at all times (Housekeeping) - Stacked items are to be secured as to prevent items from falling or rolling
10	Use of compressors	Possible injuries due to pressure vessels exploding. The equipment also generates noise that may result in hearing loss.	The following requirements to be complied with: - All pressure vessels to be performance tested at intervals not exceeding every 3 years. All pressure tests are to be performed by a person / company approved for this purpose by the Department of Labour; - A record to be kept of all inspections and tests conducted on the pressure vessels; - Only competent persons to be allowed to operate pressure vessels; - Pressure vessels to be fitted with the required safety appurtenances; and - Employees performing work in close proximity to compressor to be issued with and be required to wear hearing protectors.
11	Cranes and lifting machines (Vehicle mounted, chain blocks, electrical hoists, buckets and forklifts)	Possible injury to persons or property due to the incorrect use or failure of the lifting machine or gear.	The following requirements to be complied with: - All lifting machines and other gear shall be tested and inspected at the required intervals in accordance with the relevant machinery regulations. - All lifting gear and cranes shall be inspected on a daily basis before use. - All load tests shall be performed by a person / company approved by the Department of Labour; - Records shall be kept of all inspections and tests conducted on the lifting machines. - Cranes shall only to be operated by operators who are in possession of a valid training certificate issued by an approved training authority;

No.	TASK/ ACTIVITY/ WORKP	HAZARD IDENTIFIED / DANGER	PREVENTATIVE MEASURES TO BE IMPLEMENTED (INCLUDING PPE TO BE USED)
			- Personnel may under no circumstances be lifted by means of a crane, unless it is specifically built for such purpose. - All hooks to be fitted with catches to prevent the accidental un-hooking of slings. - The crane or vehicle shall be stabilized by setting the hydraulic pods prior to use. - The load to be properly secured before being lifted or moved. - Earthing of the machine to be done when used near live equipment.
12	Working at elevated positions	Possible injuries due to staff falling from heights.	The following requirements to be complied with as to prevent injuries: Cardinal Rule: Any person who performs work higher than two meters above ground level must wear a fall arrest system, and be attached to an anchor point at all times. - All work conducted at a height to be performed in accordance with the Construction Regulations, the OHS Act and must be performed under the direct supervision of a Competent Person who has been appointed in writing. - The requirements as per this Health and Safety as well as the Fall Protection Plan to be complied with at all times.
13	Use of ladders	Possible injury to personnel when falling from ladders.	- The safety precautionary measures as per the Safe Operating Procedure and Standard. - Prescribed inspections to be performed
14	Working near “Live” equipment	Possible contact with high voltage equipment	Work shall only be performed under direct supervision of an Authorized person in terms of ORHVS (Reg 5.03.63) when working in close proximity of live apparatus. Barricading of “live” parts of the structure / yard, prohibiting personnel entering barricaded areas. The following requirements to be complied with: - The presence of overhead HV equipment to be indicated to personnel prior to construction on a daily basis. - All safety clearances as per NRS060 to be complied with. - Prohibition of the lifting of tools and other objects above the shoulder.
15	Use of portable electrical tools and equipment and temporary electrical installations.	Possible injury due to electric shock or the use of unsafe or unguarded machines.	The following requirements to be complied with: - All temporary electrical installations to be inspected weekly by accredited person. - All portable electrical equipment to be inspected daily or before use by accredited person; - The findings of inspections must be recorded in a register. The register must be kept on site. - All portable electrical equipment used must be: - Linked to a functional earth leakage system; or - Be double insulated;

No.	TASK/ ACTIVITY/ WORKP	HAZARD / IDENTIFIED DANGER	PREVENTATIVE MEASURES TO BE IMPLEMENTED (INCLUDING PPE TO BE USED)
			- Only portable electrical tools which are fitted with an on / off switch on the tool may be used. - All electrical cables and plugs must be in a good condition and free from any defects or damage, and - All breakers on temporary electrical supplies must be marked.
16	Hand tools	Possible injury due to the use of unsafe hand tools, or due to tools falling from a height.	- All hand tools used in elevated positions must be properly secured to prevent falling. - Persons using electrical tools shall have secure footing on a clean sound surface
17	Jack hammers and paving breakers.	Possible injuries to the operator or other persons standing close by. Damage to health due to noise and vibration.	The following requirements to be complied with: - Wear the correct protective gear including ear protection. - Other personnel to stay clear of machines. - Operator to have secure footing on solid ground. - Regular removal of rubble around the place of work.
18	Power and Hydraulic tools such as power packs and crimpers	Possible hand injuries. Injuries due to items being ejected from the machine.	The following requirements to be complied with: - Only skilled and competent operators to be allowed to operate the equipment. - The operator is required to inspect the equipment before use as to ensure that the equipment is safe for use. - Ensure that safety guards are always in place. - Wear the correct safety gear: - Overall; - Safety boots; - Eye protection; and - Leather gloves and ear protection where necessary.
19	Stringing of conductors (dead)	Personnel may fall from a height. Tools may fall from a height and cause injury to personnel below. Possible injury due to static electricity.	The following requirements to be complied with: - Only competent persons to be allowed to perform this task. - All requirements pertaining to working at heights as per this Health and Safety Plan to be complied with. - All requirements as per the ORHVS standard to be conformed to, specifically with regard to earthing. - Proper and correct use of equipment such as slings, clamps, dynamometers etc.
20	Opening of cable ducts	Snake or Spider bites and Scorpion or Bee Stings	The following measures shall apply: - Be vigilant and on the lookout for these critters. - Use protective gear. - First aid to be available.

No.	TASK/ ACTIVITY/ WORKP	HAZARD / IDENTIFIED DANGER	PREVENTATIVE MEASURES TO BE IMPLEMENTED (INCLUDING PPE TO BE USED)
21	Excavation work	Possible injury to staff due to the collapse of the excavation. Possible contact with electrical cables.	The following requirements to be complied with as to prevent injuries: • All excavation work to be conducted under the supervision of a Competent Person who has been appointed in writing for this purpose; • No excavation to be conducted unless the required permits, wayleaves of drawings have been obtained; • The presence of all cables, water pipes or other services to be determined prior to any excavation being conducted; • All excavation to be inspected: ○ Daily before the shift; ○ After blasting; ○ After fall of ground; ○ After damage to the supports; and/or ○ After rain. Details of the inspections conducted to be entered into a register, which will be kept on site and be signed by the competent person appointed for excavation work. • To ensure the safety of staff excavations to be: ○ Braced or shored; ○ Excavated to the normal angle of repose; or ○ Inspected and be declared safe by the Competent Person appointed for excavation work. The decision to declare the excavation site; • All possible precautionary measures to be taken as to: ○ Ensure a safe distance is maintained between staff should excavations be dug manually by means of picks and shovels; ○ Limit the amount of material, ground or plant placed or moved on or near the edge of any excavations.
22	Work performed in hot environments and in direct sunlight.	Possible ill health effects such as heat stroke or skin cancer due to prolonged exposure to direct sunlight.	The following measures shall apply: • All staff members to be informed in the dangers of exposure to excessive heat and the illnesses associated with heat exposure; • First aid equipment and qualified first aiders to be available at all times; • Employees to be acclimatized prior to being required to perform working in hot environments; • Ample quantities of drinking water to be available on site; and • Employees to be provided with and be required to wear the required personal protective equipment and sun creams.
23	Construction of gantries	Overhead crane, falling items	Wear protective clothing. Keep away from under the lifted equipment.

No.	TASK/ ACTIVITY/ WORKP	HAZARD / DANGER IDENTIFIED	PREVENTATIVE MEASURES TO BE IMPLEMENTED (INCLUDING PPE TO BE USED)
24	Construction vehicles and Transportation of personnel	Possible injury to persons due to the use of construction vehicles.	The following requirements to be complied with: • All construction vehicles are to be inspected on a daily basis by a competent person appointed for this purpose in writing; • The findings of all inspections to be recorded in a register kept for this purpose; • Only trained, competent and properly licensed persons to be allowed to operate construction vehicles; • The driver of vehicles to be in possession of a valid Public Drivers Permit(PDP) if: ○ More than 12 are transported on a vehicle; ○ A vehicle with a gross vehicle mass of more than 3500kg is being used • All staff to be informed of the danger of public violence and / or hijackings and the measures to be taken should they be exposed to such occurrences; • Staff members are not to be transported on the back of vehicles unless the material and equipment transported are properly secured as to prevent movement. • Proper seating facilities to be provided to all staff transported on vehicles. (Constr Reg.21.2(i)) • All construction vehicles are to be ○ Maintained in a safe working condition; ○ Fitted with signalling equipment; ○ Fitted with structures that will prevent items from falling onto the operator; ○ Fitted with an acoustic signalling device and a reversing alarm; ○ Fitted with a seat which is securely affixed into position; • All operators of construction vehicles must be in possession of a medical certificate of fitness which was issued by an Occupational Health Practitioner after evaluating employees physical and psychological fitness; • All tools and equipment transported on vehicles are to be secured as to prevent items from moving; • The operator of the vehicle must take care as to ensure that vehicles are not overloaded; • No employees, including contractor employees may be transported in the back of open vehicles or vehicle fitted with a canopy, unless approved seating and safety belts have been provided. • Only under special circumstances, where vehicles are driven for very short distances and at low speed (less than 40 km per hour), and proper seating and handrails have been provided, carrying of passengers in the back of such open vehicles may be allowed, provided that: ○ An assessment has been carried out indicating a very low risk.

No.	TASK/ ACTIVITY/ WORKP	HAZARD / IDENTIFIED DANGER	PREVENTATIVE MEASURES TO BE IMPLEMENTED (INCLUDING PPE TO BE USED)
			○ Mitigating factors have been identified to control the risk. ○ Discussed and agreed upon at the Health and safety committee meeting. ○ Defined and in a formal written divisions or BU's own policy, including the appropriate mitigating factors. ○ Such a policy has been communicated to all employees and contractors. • Such risk assessment findings/outcomes must be available at all times for audit purposes. • All safety signs, speed limits and rules of the road or rules as specified for the premises are to be complied with at all times.
25	Use of slings (Material, chain and cable slings)	Possible injury to persons or property due to incorrect use or failure of the lifting tackle.	The following requirements to be complied with: • Lifting gear shall be inspected for damage on a daily basis before use. • All lifting tackle, slings and chains must be inspected by a competent person at intervals not exceeding three (3) months; • A record to be kept of all inspections and tests conducted on the lifting tackle; • All lifting equipment shall be marked with an identity mark which will indicate the maximum design load.
26	Making and breaking of jumpers	Electrocution as result of potential differences	Work only to be executed within equi-potential earthing zone
27	Cable Terminations	During energizing – failure of HV plant	Only persons trained and declared competent by Raychem or TANK may perform MV Cable jointing and terminations.
28	Static Induction	Electrocution as result of potential differences	Work only to be executed within equi-potential earthing zone
29	Exposure to noise	Noise induced hearing loss suffered by staff due to insufficient precautionary measures implemented.	The following requirements to be complied with as to prevent employees from contracting noise induced hearing loss when exposed to noise in excess of the prescribed noise rating limit of 85dB(A): • All staff exposed to noise in excess of the prescribed noise rating limit to be trained on the dangers of noise and the need for hearing conservation; • All staff to be provided with and be required to use hearing protectors when performing tasks which may result in them being exposed to excessive noise; and • All staff exposed to high noise rating levels to be subjected to audiometric tests as to determine and prevent possible hearing loss.
30	Staff performing work while intoxicated.	Possible injuries to staff due to the operation of equipment while under the influence of alcohol or drugs. Intoxicated employees could also pose a danger to others.	Staff members who are or who appear to be under the influence of alcohol or drugs are not to be allowed on site.

No.	TASK/ ACTIVITY/ WORKP	HAZARD / IDENTIFIED DANGER	PREVENTATIVE MEASURES TO BE IMPLEMENTED (INCLUDING PPE TO BE USED)
31	Environmental pollution	Oil or chemical substances being spilled.	The requirements as set out in the EMP must be applied.
32	Review and general compliance	Health and Safety Plan not being revised regularly	All health and safety documents to be evaluated and amended as and when required. Where necessary and possible the provisions of the Client's HSE regulations and instructions to be complied with.
33	Handover of contract	Possible civil action against the client or principal contractor due to poor workmanship.	The following requirements to be complied with: • All installations to be inspected and tested by a competent person after completion; • A completion certificate to be issued by the designer after construction • All construction work to be done as per the designer's specifications. • Implementation of Eskom Handover specification
34	Emergency Preparedness		• Staff to be trained on evacuation routes • Staff to be trained on handling of all types of emergencies. • Equipment to be provided as to enable staff to effectively deal with emergencies • Emergency numbers to be available on site. • Transport to be made readily available
35	Helicopter risks for construction purposes	Possible injuries to persons due to: Entering and exiting of helicopter Moving rotor blades. Risk of falling due to heights. Risk of falling objects being lifted by helicopter.	• No unauthorised persons in close proximity or inside helicopter • All persons to keep clear from helicopter when lift-off or landing is in progress • All persons to keep clear of rotating parts of helicopter • All persons to keep clear when overhead construction take place and movement of objects are in progress • Authorised persons making use of helicopter are to be aware of potential tripping hazard when boarding and disembarking helicopter • Any persons in helicopter are to secure themselves and/or doors to prevent falling from heights • Staff to be aware of all the possible risks with regard to a helicopter on site and construction by helicopter
36	Environmental work risks	Possible injuries to persons due to: Slipping on slopes. Sliding rocks Slipping on wet surfaces Slipping in streams Fast running streams after rains Falling from cliffs Animals – bees snakes etc. Weather conditions	• Workers should be fit and physical capable to work under the changing site conditions. • Workers should be issued with PPE required for the site conditions. • An emergency plan to address medical situations must be in place and workers must be trained accordingly. • Means of transport must be available. • Medical aid must be available on site. • Northam Platinum Induction documentation must be reviewed as specified. • Changing weather conditions must be considered.

No.	TASK/ ACTIVITY/ WORKP	HAZARD / DANGER IDENTIFIED	PREVENTATIVE MEASURES TO BE IMPLEMENTED (INCLUDING PPE TO BE USED)

6. WORK PERMIT APPLICATION

In accordance with the Department of Labour's notice dated 07 July 2015 regarding construction work permit applications for construction work in terms of the Construction Regulations 2014 this project fall within the second phase of implementation / exemption of the Construction Regulation 3 in terms of Section 40 of the Occupational Health and Safety Act, 1993 (Construction Regulation 2014) viz.

Work permit applications are required for:

- Contract values exceeding a threshold of R 40,000,000.00
- CIDB grading 8 or more
- No duration is applicable
- No person days are applicable

The contractor shall allow a specific item in the project implementation programme to obtain the mentioned permit (60 days) and allow for all costs related to supply the Client with the information needed from the Contractor to obtain the mentioned construction work permit.

7. ESKOM REQUIREMENTS

It is emphasized that although the project is funded by DEE (Client) the end user is Eskom for the overhead power line and 132/22 kV Substation and Lesedi Local Municipality for the 22 kV Switching Station. Therefore, any reference to Eskom or Lesedi Local Municipality as the Client shall mean Eskom or Lesedi Local Municipality as the End-Users. All requirements by both entities shall be met by the Contractor to ensure successful handing over of the infrastructure upon completion.

The Contractor shall adhere to the following Eskom requirements that forms part of this enquiry / contract:

32-136	Contractor Health and Safety Requirements
32-421	Eskom Cardinal Rules
32-727	Eskom's Safety, Health, Environment and Quality (SHEQ) Policy
34-369	Monitoring of Occupations Hygiene Factors
240-62196227	Life-saving rules
DST 34-1710	Provision and use of personal protective equipment
EPC 34-846	Operating Regulations for High Voltage Systems
EPC 32-36	Smoking
EPC 32-93	Vehicle and Driver Safety Management
EPL 32-94	Eskom Safety, Health, and Environmental Policy
ESP 32-345	Eskom Vehicle Safety
DISPVABF3	OHS Act requirements to be met by principal contractors employed by Eskom Distribution



Environmental Management Plan

Impumelelo Substation 2026



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Revision log	Comment
Version 1	Original EMPr
Version 2 12 October 2018	Revised to reflect the generic Environmental Management Programme (EMPr) applicable to an application for overhead electricity transmission and distribution infrastructure.
Version 3 07 September 2020	Reviewed to ensure compliance with the latest standards and legislation.
Version 4 08 March 2021	Reviewed to ensure compliance with the latest standards and legislation.

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Abbreviations

ACM	Asbestos-Containing Materials
CA	Competent Authority
CE	Consulting Engineer(s)
CEO	Contractors Environmental Officer
DEO	Developer Environmental Officer
DPM	Developer Project Manager
DSS	Developer Site Supervisor
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EAR	Environmental Assessment & Remediations
ECO	Environmental Control Officer
EMPr	Environmental Management Programme
EO	Environmental Officer
ERAP	Emergency Response Action Plan
FPA	Fire Protection Agency
GNR	Government Notice Regulation
HCS	Hazardous Chemical Substance
I&AP	Interested & Affected Parties
MSDS	Material Safety Data Sheet
NEM: AQA	National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PM	Project Manager
SAHRA	South African Heritage Resource Agency

Definitions

Aspect	Element of an organisation's activities, products or services that can interact with the environment.
Clearing	The clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified.
Construction camp	The area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation,

	cooking and ablution facilities, waste and wastewater management.
Construction Waste	Construction waste means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.
Contractor	The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.
Environment	Our surroundings, including living and non-living elements, e.g. land, soil, plants, animals, air, water and humans. The environment also refers to our social and economic surroundings, and our effect on our surroundings.
Environmental Impact	A change to the environment, whether negative or positive, resulting from an organisation's activities, products or services.
General Waste	General waste means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreational purposes.
Hazardous Substances	A substance governed by the Hazardous Substances Act. 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995.
Hazardous Waste	Hazardous waste means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste have a detrimental impact on health and the environment.
Impact	A description of the potential effect or consequence of an aspect of the project on the environment or people surrounding the project area.
Method statement	A written submission by the Contractor to the Project Manager in response to this EMP or a request by the Project Manager and ECO. The Method Statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification: The Method Statement shall cover applicable details with regard to: (i) Construction procedures; (ii) Plant, materials and equipment to be used; (iii) Transporting the equipment to and from site; (iv) How the plant/ material/ equipment will be moved while on site; (v) How and where the plant/ material/ equipment will be stored; (vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur; (vii) Timing and location of activities; (viii) Compliance / non-compliance; and (ix) Any other information deemed necessary by the Project Manager.
Mitigation	Measures or actions designed to avoid or reduce the negative impacts on the environment.
Slope	The inclination of a surface expressed as one unit of rise or fall for so many horizontal units.
Solid Waste	All solid waste, including construction debris, hazardous waste, excess

	cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
Spoil	Excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works.
Topsoil	A varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil.
Works	The works to be executed in terms of the Contract.

1. Introduction

1.1 Background

Ecosphere has compiled this EMPr for Consulting Engineers to manage the way their activities may impact the environment. They are committed towards environmental conscientiousness and this EMPr will also serve as a guideline to all subcontractors with regards to environmental management.

The National Environmental Management Act 107 of 1998 (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the EIA Regulations, 2014, or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including but not limited to the applicant and the competent authority (CA).

1.2 Purpose

This Environmental Management Programme is relevant to new electricity distribution or transmission projects as well as the expansion of overhead electricity transmission and distribution infrastructure, and all listed and specified activities necessary for the realisation of such infrastructure.

1.3 Objectives

The objective of this EMPr is to prescribe and pre-approve generally accepted impact management outcomes and actions which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion for overhead electricity transmission and distribution infrastructure.

This EMP is compiled using the following principles to strive towards a more sustainable and effective development:

1. **Continuous improvement:** The EMP must be continually reviewed and improved upon to enhance the environmental management.

2. **Wide level of commitment:** For the EMP to be successful and effective, commitment from all management levels as well as the workforce are required.
3. **Responsive and flexible:** The EMP is a “living” document, which has to respond to problems and incidents during the project lifespan. Therefore, regular review and revision of the EMP is required.
4. **Integration across operations:** The integration of the different operations (safety, health and environmental departments) within the EMP should be done to ensure that the environmental management are seen as a single domain.
5. **Legislation:** It is important that management personnel be aware that certain activities during the construction phase will require further licensing or environmental approval. The ECO must therefore be consulted on a regular basis during this phase.

The objectives of an EMP are to:

- Ensure compliance with regulatory authority stipulations and guidelines;
- Ensure compliance with relevant legislation;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels; and
- Identify measures that could optimize beneficial impacts.

The EMP focuses on the following:

- Avoiding potential negative impacts;
- Mitigation of negative impacts to a minimal or insignificant level;
- Minimising the negative impacts on the environment; and
- Monitoring and management of the impacts on the environment as a result of the development.

1.4 Scope

The scope of this EMP applies to the development or expansion of overhead electricity transmission and distribution infrastructure.

The EMP will address issues related to the following activities:

- The construction of overhead lines (11 -132kV);
- Underground cable works;
- Refurbishments of old substations;
- Construction and/or expansion of new substation;
- Electrical maintenance work;
- Building electrical installations;
- Industrial electrical installations;
- Electrical installations;
- Engineer Procure and Construction project.

Applicable Voltages (SANS 1019-2001):

- Low Voltage (Less than 1000V)
- Medium Voltage (2.2kV, 3.3kV, 6.6kV, 11kV; 22kV; 33kV)
- Sub-transmission (44kV; 66kV; 88kV; 132kV)

1.5. Project specific details

Metsimaholo Local Municipality would like to further their goal of Electrification Universal Access. Approximately 2600 dwellings in Refengkgotso need to be electrified in the municipality's area of supply. This will add approximately 5MVA of load to Vaaldam substation – which cannot be provided by the two existing 10MVA transformers. Therefore, the requirement is to install an additional 10MVA transformer at Vaaldam substation.

The proposal is to install a third 88/22kV 10MVA transformer bay and 2 x 22kV feeder bays at Vaaldam substation. The new 2 x 22kV feeder bays will be for the double-circuit, Chickadee feeder line to Themba Khubeka, which has already been constructed. The 22 kV overhead power lines are the asset of Metsimaholo Local Municipality and they are responsible for the maintenance of the lines.

The scope of work for the substation extension is:

- Extend the existing substation yard by extending the substation platform and constructing a new substation fence – the existing fence will be kept where possible or rerouted until construction is completed to ensure that the substation will be fenced off at all times.
- Construct an 88kV bus-section with two 132kV isolators to connect to the existing 88kV busbars.
- Install a complete 88/22kV transformer bay.
- Install a 22kV road crossing structure.
- Install a 22kV transformer breaker.
- Install a 22kV transformer/busbar isolator.
- Extend the existing double 22kV busbar -section.
- Install a 22kV isolator to interconnect to the existing 22kV busbars.
- Relocate existing 22kV VT.
- Install 22kV busbar VT's.
- Install 2 x 22kV feeder bays.
- Install a 22kV NEC/NER.
- Construct a fire barrier between the existing and new transformer.
- Connect the existing feeder lines to the feeder bays by constructing the closing spans.

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3. Applicable legislation

The following legislation was taken into consideration during the preparation of the EMP:

- Conservation of Agricultural Resources Act (Act No. 43 of 1983). Government Notice No. 2687. Government Gazette: Pretoria.
- Department of Environmental Affairs and Tourism (DEAT) (2004): Integrated Environmental Management Information Series. Department of Environmental Affairs and Tourism (DEAT): Pretoria.
- Environmental Impact Assessment Regulations (Government Notice No. R. 982 of 2014).
- List of Activities and Competent Authorities (Government Notice No. R. 983 of 2014).
- List of Activities and Competent Authorities (Government Notice No. R. 984 of 2014).
- National Environment Conservation Act (Act No. 73 of 1989). Government Gazette: Pretoria.
- National Environment Management: Waste Act (Act No. 59 of 2008). Government Notice No. 32000. Government Gazette: Pretoria.
- National Environmental Management Act (Act No. 107 of 1998). Government Notice No. 19519. Government Gazette: Pretoria.
- National Environmental Management Laws Act (Act No. 14 of 2013). Government Notice No. 36703. Government Gazette: Pretoria.
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004). Government Notice No. 26436. Government Gazette: Pretoria.
- National Environmental Management: Protected Areas Act (Act No. 57 of 2003). Government Notice No. 26025. Government Gazette: Pretoria.
- National Heritage Resources Act (Act No. 25 of 1999). Government Notice No. 19974. Government Gazette: Pretoria.
- National Water Act (Act No. 36 of 1998). Government Notice No. 19182. Government Gazette: Pretoria.
- Spatial Planning and Land Use Management Act (Act No. 16 of 2013). Government Notice No. 559 of 2013.
- The Constitution of the Republic of South Africa (Act No. 108 of 1996).

4. Roles and responsibilities

The effective implementation of this EMP is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. The table below provides guidance to the various environmental roles and reporting lines.

Function	Role and Responsibilities
Developer's Project Manager (DPM)	The Project Developer is accountable for ensuring compliance with the EMP and any conditions of approval from the competent authority (CA). An independent environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMP according to relevant environmental legislation, and the conditions of environmental authorization (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must

	ensure that the ECO is integrated as part of the project team while remaining independent. Responsibilities: – Be fully conversant with the conditions of the EA; – Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); – Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and – Ensure that periodic environmental performance audits are undertaken on the project implementation.
Developer Site Supervisor (DSS)	The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities: – Ensure that all contractors identify a contractor's Environmental Officer (CEO); – Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; – Must ensure that all landowners have the relevant contact details of the site staff, ECO and CEO; – Will issue all non-compliances to contractors; and – Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO) (In cases where EA was not required, the contractor should have a representative with environmental experience to fulfil these responsibilities)	The ECO should be employed by the developer for the duration of the project. The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advice on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the CEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, CEO and DEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Implementing Agent and potential and Registered Interested & Affected Parties (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. Responsibilities: – Be aware of the findings and conclusions of all EA related to the development; – Be familiar with the recommendations and mitigation measures of this EMPr; – Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them;

	– Undertake regular and comprehensive site inspections/ audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; – Educate the construction team about the management measures contained in the EMPr and environmental licenses; – Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; – Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; – In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; – Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; – Issuing of site instructions to the Contractor for corrective actions required; – Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; – Validating the regular site inspection reports, which are to be prepared by the Contractor Environmental Officer (CEO); – Checking the CEO's record of environmental incidents [spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; – Checking the CEO's public complaints register in which all complaints are recorded, as well as action taken; – Assisting in the resolution of conflicts; – Facilitate training for all personnel on the site - this may range from carrying out the training, to reviewing the training programmes of the Contractor and/or sub-contractors; – In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; – Maintenance, update and review of the EMPr; – Communication of all modifications to the EMPr to the relevant stakeholders.
Developer Environmental Officer (DEO)	The DEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. Responsibilities: – Be fully conversant with the EMPr ; – Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; – Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) and its sub-contractor(s); – Confine the development site to the demarcated area; – Conduct environmental internal audits with regards to EMPr and authorisation compliance (on CEO); – Assist the contractors in addressing environmental challenges on site; – Assist in incident management; – Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; – Assist the contractor in investigating environmental incidents and compile

	investigation reports; – Follow-up on pre-warnings, defects, non-conformance reports; – Measure and communicate environmental performance to the Contractor; – Conduct environmental awareness training on site together with ECO and CEO; – Ensure that the necessary legal permits and / or licenses are in place and up to date; – Acting as Developer's Environmental Representative on site and work together with the ECO and contractor; – Audit carried out by an independent auditor/consultant.
Contractor	The Contractor appoints the CEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the management actions contained in the EMPr will be implemented during the development or expansion for overhead electricity transmission and distribution infrastructure activities. Responsibilities – Project delivery and quality control for the development services as per appointment; – Employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; – Ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; – Attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; – Ensure that contractors' staff (or sub-contractors) repairs, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
Contractor Environmental Officer (CEO)	Each Contractor affected by the EMPr should appoint a CEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the CEO shall meet the following criteria: The CEO ensures that all Sub-contractors working under the Contractor abide by the requirements of the generic EMPr. The Contractor is answerable to the Project Manager for all environmental issues associated with the project. Responsibilities: – Be on site throughout the duration of the project and be dedicated to the project; – Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; – Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; – Attend the Environmental Site Meeting; – Undertaking corrective actions where non-compliances are registered within the

	stipulated timeframes; - Report back formally on the completion of corrective actions; Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a CEO representing that company.
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5. Impact Management outcomes and actions

5.1. Environmental Awareness Training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- All staff must receive environmental awareness training prior to commencement of the activities; - The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; - Refresher environmental awareness training is available as and when required; - All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; - The Contractor must erect and maintain information posters at key locations on site; - Environmental awareness training should include as a minimum the following: - Description of significant environmental impacts, actual or potential, related to their work activities; - Mitigation measures to be implemented when carrying out specific activities; - Emergency preparedness and response procedures; - Emergency procedures; - Procedures to be followed when working near or within sensitive areas; - Wastewater management procedures; - Water usage and conservation; - Solid waste management procedures; - Sanitation procedures; and - Disease prevention. - A record of all environmental awareness training courses undertaken as part of the EMPr must be available; - Educate workers on the dangers of open and/or unattended fires; - A staff attendance register of all staff to have received environmental awareness training must be available.	Client	The training will be done through a qualified environmental person via a visual and audible presentation.	Prior to the commencement of the activity. On a monthly basis during construction.	Client	Monthly	Attendance registers and training records.

- Course material must be available and presented in appropriate languages.						
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5.2. Site Establishment development

Impact management outcome: Impacts on the environment are minimized when developing new infrastructure and the development footprint are kept to demarcated development area.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; - Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; - Sites should be located where possible on previously disturbed areas; - The camp must be fenced in accordance with Section 5.5: - Fencing and gate installation; and - The use of existing accommodation for contractor staff, where possible, is encouraged.	Client	Approved method statements.	Prior to the commencement of construction and maintenance works.	Client	Prior to the commencement of the construction or maintenance works. As and when required.	Record keeping of signed method statements.

5.3. No-Go areas

Impact management outcome: Access to No go areas prevented.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Identification of No-Go areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; - Erect, demarcate and maintain a temporary fence around the perimeter of any No-Go area;	Contractor	Erecting fences and banners. The no-go areas will be included in the	Prior to the commencement of construction, during site preparation to prevent access.	Contractor	Weekly	Training records.

- Fencing of No-Go areas is to be undertaken in accordance with Section 5.5: Fencing and gate installation; and - Unauthorized access and development related activity inside No-Go areas is prohibited.		environmental awareness training.	Prior to the commencement of maintenance works.			
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5.4. Access roads

Impact management outcome: Minimize impact to the environment through the planned and restricted movement of vehicles on site.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Access to the servitude and tower positions must be negotiated with the relevant landowner and must fall within the assessed and authorized area; - An access agreement must be formalized and signed by the DPM, Contractor and landowner before commencing with the activities; - The access roads to tower positions must be signposted after access has been negotiated and before the commencement of the activities; - Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; - Maximum use of both existing servitudes and existing roads must be made; - In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with section 6.9: photographic record; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; - All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition. As far as possible, access roads must follow the contours in hilly areas, as opposed to winding down steep slopes; - Access is to be established by vehicles passing over the same track on natural ground, multiple tracks are not permitted. - Access roads must only be developed where necessary at watercourses, on steep slopes or where boulders prohibit vehicular traffic; and - Upon completion of development, only roads as indicated by the DPM must be closed.	Contractor	Determine prior to the commencement of construction the roads and servitudes to be used. Identify which roads or access will be used as the project proceeds to make arrangements.	Prior to the commencement of construction.	Contractor	Weekly	Photographic record prior to use.

5.5. Fencing and Gate installation

Impact management outcome: To minimize Impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the defined Working Area, where possible; – Existing and new gates to be recorded and documented in accordance with section 6.9: photographic record; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of overhead transmission and distribution electricity infrastructure development activities; – Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated no-go areas, where applicable; – All fencing must be developed of high-quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. – Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.	Contractor	The overall project areas and other areas requiring demarcation and fencing must be discussed prior to the commencement of construction.	Prior to the commencement of construction.	Contractor	Monthly As and when required.	Record keeping of the integrity of all fences and gates.

5.6. Water Supply Management

Impact management outcome: Undertake responsible water usage.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; - Should water abstraction be required and the necessary authorisation from DWS and permission from the landowner has been received, the Contractor must ensure the following: - The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river; - No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and - All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. - Ensure water conservation is being practiced by: - Minimizing water use during cleaning of equipment; - Undertaking regular audits of water systems; and - Including a discussion on water usage and conservation during environmental awareness training.	Contractor	Prior to the commencement of construction determine the source of water supply. Ensure all licenses are in order for abstraction from water sources.	Prior to the commencement of construction.	Contractor	Daily	Record keeping of the amounts of water abstracted. Water abstraction log, if required.

5.7. Storm and waste water management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Appropriate pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into watercourses or water bodies must be designed and implemented; - Run off from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location	Contractor	Stormwater Management Plan needs to be implemented. Spillage kits need to be readily available on site.	Prior to the commencement of construction.	Contractor	Weekly	Record keeping of any spills or pollution on site.

approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.		All required licenses from DWS for the discharge into a watercourse or waterbody need to be in place.				
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5.8. Solid waste management

Impact management outcome: Wastes are appropriately stored, handled and safely disposed of at a recognized waste facility.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type; – Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at recognized waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site; – Certificates of safe disposal for general, hazardous and recycled waste must be maintained.	Contractor	Waste collection bins need to be strategically placed and readily available on site. Clearly marked bins must be placed to recycle the waste. Waste must be collected and removed from site on an, as and when required basis.	Prior to commencement of construction, the bins will need to be strategically placed.	Contractor	Weekly	Certificates of safe disposal. Record keeping of when waste is removed from site.

5.9. Protection of watercourses

Impact management outcome: Pollution and contamination of the watercourse environment and erosion are prevented.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland; – Development of permanent watercourse crossing must only be undertaken where no alternative access to tower position is available; – When working in or near any watercourse or wetland, the following environmental controls and consideration must be taken: a) River levels during the period of construction; b) During the execution of the Works, appropriate measures to prevent pollution and contamination of the riverine environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilized using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the river banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilized as soon as development allows.	Contractor	All required licenses from DWS for the development of water crossings need to be in place before development of such crossings. Demarcation of a buffer zone around all watercourses to prevent access, where possible.	Prior to the commencement of construction.	Contractor	Daily As and when required.	Record keeping of any spills or pollution into the watercourses.

5.10. Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorized development footprint of the proposed infrastructure.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
General: - Indigenous vegetation which does not interfere with the development must be left undisturbed; - Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; - Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; - Permits for removal must be obtained from the relevant CA prior to the cutting or clearing of the affected species, and they must be filed; - The Environmental Report must confirm that all identified species have been rescued and replanted; - Trees felled due to construction must be monitored and listed in the Audit Environmental Report; - Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris; - Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; - A daily register must be kept of all relevant details of herbicide usage; - All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off if required in accordance with No-Go procedure in Section 5.3: No-Go areas. When working in or near any watercourse or wetland, the following environmental controls and consideration shall be taken. Servitude: - Vegetation that does not grow high enough to cause interference with overhead transmission and distribution infrastructures, or cause a fire hazard to any plantation, should not be cut or trimmed unless it is growing in the road access	Contractor	All required permits must be obtained from the CA before clearing or cutting of vegetation. All sensitive vegetation needs to be marked and demarcated prior to construction. Maintenance Plan must be implemented.	Prior to the commencement of construction.	Contractor	Weekly As and when required.	Filing of permits from the CA. Report to indicate rescued and replanted species. Record keeping of when herbicide has been sprayed.

area, and then only at the discretion of the Project Manager; - Where clearing for access purposes is essential, the maximum width to be cleared within the servitude must be in accordance to the specifications. - Alien invasive vegetation should be removed according to a plan (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a recognized waste disposal facility; - Vegetation should be trimmed where it is likely to intrude on the minimum vegetation clearance distance (MVCD) or will intrude on this distance before the next scheduled clearance. MVCD is determined from SANS 10280; - Debris resulting from clearing and pruning must be disposed of at a recognized waste disposal facility, unless the landowners wish to retain the cut vegetation; - In the case of the development of new overhead transmission and distribution infrastructures, a one metre "trace-line" must be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along the "trace-line". Alternative methods of stringing which limit impact to the environment must always be considered.						
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5.11. Protection of fauna

Impact management outcome: minimize disturbance to fauna.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present; - The breeding sites of raptors and other wild bird species must be taken into consideration during the planning of the development programme; - Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; - Nesting sites on existing parallel lines must be documented; - Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; - Bird guards and diverters must be installed on the new line as per the recommendations of the specialist;	Contractor	During the design phase consideration must be given to the breeding sites. Livestock and other animals need to be observed during construction phase to not interfere with the animals. Minimize the fragmentation of habitat for flora, fauna and avifauna.	Prior to the commencement of construction	Contractor	Daily	Incident report must be kept.

- No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as No-Go areas.						
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5.12. Protection of heritage resources

Impact management outcome: impact to heritage resources is minimised.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No- Go procedure in Section 5.3: No-Go areas; - Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; - All work must cease immediately, if any human remains and/or at her archaeological, paleontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ paleontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to remove/ collect such material before development recommences.	Contractor	Inspections during the excavations will provide evidence of heritage resources when encountered. All operations must cease if any material of heritage importance are uncovered.	During the construction phase.	Contractor	Daily	Record keeping of inspections done.

5.13. Safety of the public

Impact management outcome: all precautions are taken where possible to minimize the risk of injury, harm or complaints.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; - All unattended open excavations must be adequately fenced or demarcated; - Adequate protective measures must be implemented to prevent unauthorized access to and climbing of partly constructed towers and protective scaffolding; - Ensure structures vulnerable to high winds are secured; - Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	Contractor	Adequate demarcation of high risk areas need to be demarcated to prevent access.	Prior to the commencement of construction. During the construction phase, if the conditions on site change.	Contractor	Daily	Record keeping of any incidents.

5.14. Sanitation

Impact management outcome: clean and well maintained toilet facilities are available to all staff in an effort to minimize the risk of disease and impact to the environment.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Mobile chemical toilets are installed onsite if no other ablution facilities are available; - The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; - Where mobile chemical toilets are required, the following must be ensured: - Toilets are located no closer than 100 m to any watercourse or water body; - Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; - No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; - Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; - Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; - Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; - A copy of the waste disposal certificates must be maintained.	Contractor	Ensure the adequate amount of ablution facilities is available for the workforce. Ensure the ablution facilities are within reasonable distance from the operations.	Prior to the commencement of construction or on the day the construction commences, the ablution facilities must be available.	Contractor	Daily	Record keeping of the servicing of the toilets.

5.15. Prevention of disease

Impact management outcome: All necessary precautions linked to the spread of disease are taken.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Undertake environmentally-friendly pest control in the camp area; - Ensure that the workforce is sensitized to the effects of sexually transmitted diseases, especially HIV AIDS; - The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area;	Contractor	Informative brochures will be provided to all personnel. Informative posters	Prior to the commencement of construction, the posters will be erected inside the contractor camp.	Contractor	Monthly	Register will be kept and signed when brochure have been received.

- Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; - Free condoms will be made available to all staff on site at central points; - Medical support must be made available; - Provide access to Voluntary HIV Testing and Counselling Services.		will be visual within the contractor camp.				
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5.16. Emergency procedures

Impact management outcome: emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; - The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; - All staff must be made aware of emergency procedures as part of environmental awareness training; - The relevant local authority must be made aware of a fire as soon as it starts; - In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see Hazardous Substances section 5.17).	Contractor	Emergency Response Action Plan need to be implemented. Emergency procedures need to be discussed in the awareness training.	Prior to the commencement of construction.	Contractor	Monthly	Record keeping of emergency incidents. Attendance registers from awareness training.

5.17. Hazardous substances

Impact management outcome: safe storage, handling, use and disposal of hazardous substances.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- The use and storage of hazardous substances to be minimized and non-hazardous and non-toxic alternatives substituted where possible; - All hazardous substances will be stored in suitable containers as defined in the Method Statement; - Containers will be clearly marked to indicate contents, quantities and safety requirements; - All storage areas will be bunded. The bunded area will be of	Contractor	The storage area for hazardous materials needs to be demarcated. All Material Safety Data Sheets (MSDS) need to be	Prior to the commencement of construction.	Contractor	Daily	Record keeping of any incidents.

sufficient capacity to contain a spill / leak from the stored containers; - An Alphabetical Hazardous Chemical Substance (HCS) control sheet will be drawn up and kept up to date on a continuous basis; - All hazardous chemicals that will be used on site will have Material Safety Data Sheets (MSDS); - All employees working with HCS will be trained in the safe use of the substance and according to the safety data sheet; - Employees handling hazardous substances/materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available; - The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsters; - The tanks/bowsters must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowsters (110% statutory requirement plus an allowance for rainfall); - The floor of the bund must be sloped, draining to an oil separator; - Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; - All empty externally dirty drums must be stored on a drip tray or within a bunded area; - No unauthorized access into the hazardous substances storage areas shall be permitted; - No smoking must be allowed within the vicinity of the hazardous storage areas; - Adequate firefighting equipment must be made available at all hazardous storage areas; - Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used; - An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; - The responsible operator must have the required training to make use of the spill kit in emergency situations; - In the event of a spill, contaminated soil must be collected in		in place for hazardous chemicals to be used on site. Firefighting equipment and emergency spills kits need to be readily available. All personnel working with HCS will require training in specific handling of such substances.				
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containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to Section 5.7 for procedures concerning waste water management and 5.8 for solid waste management.						
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5.18. Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimized.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; - During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; - Leaking equipment must be repaired immediately or be removed from site to facilitate repair; - Workshop areas must be monitored for oil and fuel spills; - Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; - The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil/water separator where maintenance work on vehicles and equipment can be performed; - Water drainage from the workshop must be contained and managed in accordance Section 5.7: Waste water management.	Contractor	Maintenance of vehicles and equipment need to be scheduled on a routinely basis. Maintenance to take place in the workshop only, unless it is an emergency.	During the construction phase.	Contractor	Daily	Record keeping of all incidents and spills.

5.19. Batching plants

Impact management outcome: Minimize spillages and contamination of soil, surface water and groundwater.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Concrete mixing must be carried out on an impermeable surface (such as on boards and/or within a bunded area with an impermeable surface) or make a hard surface and remove	Contractor	Sites for batching plants need to be identified prior to the	Prior commencement to of construction.	Contractor	Daily	Record keeping of all incidents.

when done; – Concrete mixing areas must be fitted with a containment facility for the collection of cement laden water. This facility must be impervious to prevent soil and groundwater contamination; – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licensed disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to Section 5.20: Dust emissions) – Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility; – Temporary fencing must be erected around batching plants in accordance with Section 5.5: Fencing and gate installation.		commencement of construction and lined with impervious material. Batching plants need to be demarcated to prevent access from unauthorized personnel.				
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5.20. Dust Emissions

Impact management outcome: dust prevention measures are applied to minimize the generation of dust.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimize the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or stabilized as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO will evaluate the situation and make recommendations as to whether dust damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; – Where possible, soil stockpiles must be located in sheltered	Contractor	Adequate dust suppression measures need to be implemented during times of high dust pollution. Prior to the commencement of construction, high risk areas for dust pollution need to be identified and closely monitored.	During the construction phase, as and when required.	Contractor	Daily	Record keeping of when dust suppression measures have been implemented.

areas where they are not exposed to the erosive effects of the wind; - Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; - Vehicle speeds must not exceed 40km/h along dust roads or 20km/h when traversing unconsolidated and non-vegetated areas; - Appropriate dust suppression measures must be used when dust generation is unavoidable e.g. Dampening with water; particularly during prolonged periods of dry weather in summer. Such measures must also include the use of temporary stabilizing measures (e.g. chemical soil binders, straw, brush packs, chipping); - Straw stabilization must be applied at a rate of one bale/ 10 m" and harrowed into the top 100 mm of top material, for all completed earthworks; - For significant areas of excavation or exposed ground, spray water or wet areas using trucks to minimize the spread of dust.						
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5.21. Blasting

Impact management outcome: impact to the environment is minimized through a safe blasting practice.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Any blasting activity must be conducted by a suitably licensed blasting contractor; and - Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.	Contractor	Determine and draft a blasting schedule. Notify the surrounding landowners, emergency services and relevant personnel prior to such activity taking place.	During the construction phase.	Contractor	After blasting took place.	Record keeping of blasting and cleaning fly rock from the surrounding areas such as roads, etc. outside the works areas.

5.22. Noise

Impact management outcome: To prevent unnecessary noise to the environment by ensuring that noise from development activity is mitigated.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, development must be limited to daylight hours.	Contractor	Implement a working schedule to adhere to and be limited to normal work hours or daylight hours. .	During the construction phase.	Contractor	Daily	Record keeping of working hours.

5.23. Fire prevention

Impact management outcome: Prevention of uncontrollable fires.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- Designate smoking areas where the fire hazard could be regarded as insignificant; - Firefighting equipment must be available on all vehicles located on site; - The local Fire Protection Agency (FPA) must be informed of construction activities; - Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; - Two way swap of contact details between ECO and FPA.	Contractor	Fire prevention training during the awareness training. Firefighting equipment need to be readily available.	During the construction phase.	Contractor	Daily	Record keeping of all incidents.

5.24. Stockpiling and stockpile areas

Impact management outcome: To reduce erosion and sedimentation as a result of stockpiling						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
- All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimize impacts to watercourses, wetlands and water bodies;	Contractor	Demarcate the stockpile areas to prevent unnecessary access.	During the construction phase.	Contractor	Daily	Record keeping of disturbance to the stockpiles or incorrect stockpiling.

– All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles should be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) should be placed at the bases of the stockpiled material in order to prevent erosion of the material.		Stockpiling must take place in such a manner to prevent erosion.				
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5.25. Finalizing tower positions

Impact management outcome: No environmental degradation occurs as a result of the survey and pegging operations.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– No vegetation clearing must occur during survey and pegging operations; – No new access roads must be developed to facilitate access for survey and pegging purposes; – Project manager, botanical specialist and contractor to agree on final tower positions based on survey within assessed and approved areas; – The surveyor is to demarcate (peg) access roads/tracks in consultation with ECO. No deviations will be allowed without the prior written consent from the ECO.	Contractor	No impacts on the environment are allowed during the finalizing of tower positions. Botanical specialist need to be consulted.	Prior to the commencement of construction.	Contractor	None.	None.

5.26. Installation of foundations

Impact management outcome: No environmental degradation occurs as a result of the survey and pegging operations.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– Batching of cement to be undertaken in accordance with Section 5.19: Batching; – Residual cement must be disposed of in accordance with Section 5.8: Solid Waste Management.	Contractor	Implementation methods are as per Section 5.8: Solid Waste Management and Section 5.19: Batching.	As per Section 5.8: Solid Waste Management and Section 5.19: Batching.	Contractor	As per Section 5.8: Solid Waste Management and Section 5.19: Batching.	As per Section 5.8: Solid Waste Management and Section 5.19: Batching.

5.27. Assembly and erecting towers

Impact management outcome: No environmental degradation occurs as a result of assembly and erecting of towers.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– Prior to erection, assembled towers and tower sections must be stored on elevated surface (suggest wooden blocks) to minimize damage to the underlying vegetation; – In sensitive areas, tower assembly must take place off-site or away from sensitive positions; – The crane used for tower assembly must be operated in a manner which minimizes impact to the environment; – The number of crane trips to each site must be minimized; – Wheeled cranes must be utilized in preference to tracked cranes; – Consideration must be given to erecting towers by helicopter or by hand where it is warranted to limit the extent of environmental impact; – Access to tower positions to be undertaken in accordance with access requirements specified in Section 8.4: Access Roads; – Vegetation clearance to be undertaken in accordance with general vegetation clearance requirements specified in Section 8.10: Vegetation clearing; – No levelling at tower sites must be permitted unless approved by the Development Project Manager or Developer Site Supervisor; – Topsoil must be removed separately and stored for later use during rehabilitation of such tower sites; – Topsoil must be stored in heaps not higher than 2m to prevent destruction of the seed bank within the top soil; – Excavated slopes must be no greater than 1:3, but where this is unavoidable, appropriate measures must be undertaken to stabilize the slopes; – Fly rock from blasting activity must be minimized and any pieces greater than 150 mm falling beyond the Working Area, must be collected and removed; – Only existing disturbed areas are utilized as spoil areas; – Drainage is provided to control groundwater exit gradient with the spill areas such that migration of fines is kept to a minimum; – Surface water runoff is appropriately channeled through or around spoil areas; – During backfilling operations, care must be taken not to dump	Contractor	Identify access to tower positions with the least impact on the environment. Consider equipment which will have minimal impact on the environment. Topsoil to be stockpiled separately and backfilled at the top. Disturbed areas to be used, where possible, for stockpiling, spoil areas and storing of material. Stormwater management plan need to be implemented.	Prior to the assembly and erecting of each tower.	Contractor	Daily	Record keeping of vegetation cleared.

the topsoil at the bottom of the foundation and then put spoil on top of that; – The surface of the spoil is appropriately rehabilitated in accordance with the requirements specified in Section 5.29: Landscaping and rehabilitation; – The retained topsoil must be spread evenly over areas to be rehabilitated and suitably compacted to effect re-vegetation of such areas to prevent erosion as soon as construction activities on the site is complete. Spreading of topsoil must not be undertaken at the beginning of the dry season.						
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5.28. Stringing

Impact management outcome: No environmental degradation occurs as a result of stringing						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– Where possible, previously disturbed areas must be used for the siting of winch and tensioner stations. In all other instances, the siting of the winch and tensioner must avoid No-Go areas and other sensitive areas; – The winch and tensioner station must be equipped with drip trays in order to contain any fuel , hydraulic fuel or oil spills and leaks; – Refueling of the winch and tensioner stations must be undertaken in accordance with Section 5.17: Hazardous substances; – In the case of the development of overhead transmission and distribution infrastructure, a one metre "trace-line" may be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along "trace-lines". Vegetation clearing must be undertaken by hand, using chainsaws and hand held implements, with vegetation being cut off at ground level. No tracked or wheeled mechanized equipment must be used; – Alternative methods of stringing which limit impact to the environment must always be considered e.g. by hand or by using a helicopter; – Where the stringing operation crosses a public or private road or railway line, the necessary scaffolding/protection measures must be installed to facilitate access. If, for any reason, such access has to be closed for any period's) during development, the persons affected must be given reasonable notice, in	Contractor	Notice to landowners must be provided a minimum of 10 days prior to stringing commences. Drip trays are required for the equipment used. Consider alternative stringing methods which will have minimal impact on the environment.	During the construction phase.	Contractor	During the planning phase for stringing.	Record keeping of vegetation cleared, when and where.

writing; – No services (electrical distribution lines, telephone lines, roads, railways, lines, pipelines, fences, etc.) must be damaged because of stringing operations. Where disruption to services is unavoidable, persons affected must be given reasonable notice, in writing; – Where stringing operations cross cultivated land, damage to crops is restricted to the minimum required to conduct stringing operations, and reasonable notice (10 work days minimum), in writing, must be provided to the landowner; – Necessary scaffolding protection measures must be installed to prevent damage to the structures supporting certain high value agricultural areas such as Vineyards, orchards, nurseries.						
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5.29. Temporary closure of site

Impact management outcome: Minimize the risk of environmental impact during periods of site closure greater than five days.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable); – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; – Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.	Contractor	Implement a temporary closure plan to ensure all aspects be addressed and accounted for.	Prior to the temporary closure.	Contractor	During closures.	Record keeping of all maintenance and services.

5.30. Landscaping and rehabilitation

Impact management outcome: No environmental degradation occurs as a result of the survey and pegging operations.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for Implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; – All spoil and waste will be disposed to a registered waste site and certificates of disposal provided; – All slopes in excess of 2% (1:50) must be contoured in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – All slopes in excess of 12% (1:8.3) must be terraced in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created should have a slope of 1:4 and be replanted with indigenous species and grasses; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping to a minimum depth of 600 mm; – Rehabilitation of tower sites and access roads outside of farmland; – Indigenous species will be used for replanting; – Stockpiled topsoil must be used for rehabilitation (refer to Section 5.23: Stockpiling and stockpiled areas); – Stockpiled topsoil will be evenly spread so as to facilitate seeding and minimize loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The project must be timed so that rehabilitation can take place at the optimal time for vegetation establishment; – Where impacted through construction related activity, all sloped areas must be stabilized to ensure proper rehabilitation is effected and erosion is controlled as per the instruction from the ECO; – Sloped areas stabilized using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Where required, re-vegetation can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to	Contractor	Rehabilitation plan need to be implemented to ensure the exposed areas due to construction activities are rehabilitated and returned to previous state or better.	After construction has taken place and materials and equipment have been moved. As and when required.	Contractor	Weekly	Photographic evidence of the rehabilitation. Record keeping of when rehabilitation has taken place.

ensure the following: a) Annual mid perennial plants are chosen; b) Pioneer species are included; c) Species chosen must grow in the area feasible to grow; d) Root systems must have a binding effect on the soil; e) The final product should not cause an ecological imbalance in the area.						
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6. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms must be in place for all overhead electricity transmission and distribution infrastructure projects as a minimum requirement.

6.1. Document control/ Filing system

The holder of the EA/client is solely responsible for the upkeep and management of the EMPr file. At a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be tiled, while an electronic copy may be kept where relevant. A duplicate file will be maintained in the office of the DSS (where applicable). This duplicate file will be the responsibility of the ECO's and must remain current and up-to-date. The filing system must be updated and relevant documents added as required. The EMPr file must be made available at all times on request by the CA on terms of NEMA EIA regulation, or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations.

6.2. Documentation to be available

At the outset of the project the following documents shall be placed in the filing system and be accessible at all times:

- Full copy of the signed EA from the CA in terms of NEMA, granting approval for the development or expansion;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All method statements;
- Completed environmental checklists;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;
- A copy of all instructions or directives issued;
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record;
- Complaints register.

6.3. Weekly Environmental Checklist

The ECO's are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.

The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA regulations, 2014.

6.4. Environmental site meetings

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the Monthly Report that is distributed to attendees. Each set of minutes must clearly record "Matters for Attention" that will be reviewed at the next meeting.

6.5. Required Method Statements

The method statement will be done in such detail that the ECO's are enabled to assess, whether the contractor's proposal is in accordance with the EMPr.

The method statement shall cover applicable details with regard to:

- Development procedures;
- Materials and equipment to be used;
- Getting the equipment to and from site;
- How the equipment/ material will be moved while on site;
- How and where material will be stored;
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- Timing and location of activities;
- Compliance / non-compliance with the EMPr; and
- Any other information deemed necessary by the ECOs.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager no less than 14 days prior to the commencement date of the activity:

- Site establishment - Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Handling, transport and Storage of Hazardous Chemical Substances;
- Vegetation management - Protected, clearing, aliens, felling;
- Access management - Roads, gates, crossings etc.;
- Fire plan;
- Waste management (all waste streams);
- Transport, storage, segregation, classification, disposal
- Social interaction complaints management, compensation claims, access to properties etc.;
- Water use (source, abstraction and disposal) , access and all related information, crossings and mitigation;
- Emergency preparedness - Spills, training, other environmental emergencies;

- Dust and noise management methodologies;
- Fauna interaction and risk management - only if the risk was identified - wildlife interaction especially on game farms; and
- Heritage and paleontology management.

The ECO shall ensure that the contractors perform in accordance with these method statements.

6.6. Environmental Incident Log (Diary)

The ECO is required to maintain an up-to-date and current Environmental Incident Log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents and/or all non-compliance notice would not be issued. An environmental incident is defined as:

- Any deviation from the listed impact management actions (listed in this EMPr) that may be addressed immediately by the ECOs. (For example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the environmental stipulations and guidelines listed in the EMPr Which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect (for example no toilet paper available in the ablutions for an afternoon); and
- General environmental information such as road kills or injured wildlife.

The ECO are to record all environmental incidents in the Environmental Incident Log. All incidents regardless of severity must be reported to the Developer. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the Contractor responsible;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Incident Log will be captured in the EAR.

6.7. Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECO's via the DSS or Project Manager. The non-compliance notice will be issued in writing; a copy filed in the EMPr file and will at a minimum include the following:

- Time and date of the non-compliance;

- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended/ required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the development site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia, There is a deviation from the environmental conditions, management outcomes and actions activities, as approved in generic and site specific EMPr as relevant as set out in the EMPr, which deviation has, or may cause, an environmental impact.

6.8. Corrective action records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the Developer's Site Supervisor, the contractor's CEO will ensure that the corrective actions required take place within the stipulated timeframe. On completion of the corrective action the CEO is to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECOs are to sign-off on the Corrective Action Report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report signed off by the ECOs.

6.9. Photographic record

A digital photographic record will be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project as well used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

1. Allow the ECOs access to take photo graphs of all areas, activities and actions.

The ECO's shall keep an electronic database of photographic records which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Condition of all farm fences;
5. Topsoil storage areas;
6. All areas to be cordoned off during construction;
7. Waste management sites;
8. Ablution facilities (inside and out);
9. Any non-conformances deemed to be "significant";
10. All completed corrective actions for non-compliances;
11. All required signage;
12. All areas before, during and post rehabilitation; and
13. Include relevant photographs in the Final Environmental Audit Report.

6.10. Complaints register

The ECOs shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant;
2. Record the time and date of the complaint;
3. Contain a detailed description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECOs to take relevant photographs); and
5. Contain a copy of the ECOs written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contract or, ECO and affected party. Where a damage claim is issued by the complainant, the ECOs shall respond as described in (Section 6.11) below.

6.11. Claims for damages

In the event that a Claim for Damages is submitted by a community, landowner or individual, the ECOs shall:

1. Record the full detail of the complaint as described in (section 4.10) above;
2. The ECOs will evaluate the claim and associated damage and submit the evaluation to the Senior Site Representative for approval;

3. Following consideration by the DPM, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the Developer's negotiator and legal department; and
4. A formal record of the response by the ECOs to the claimant as well as the rectification of the method of making payments not amount will be recorded in the EMPr file.

6.12. Interactions with affected parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The ECOs shall:

1. Ensure that all queries, complaints and claims are dealt within an agreed timeframe;
2. Ensure that any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
3. Ensure that a complaints telephone numbers are made available to all landowners and affected parties; and
4. Ensure that contact with affected parties is courteous at all times;

6.13. Environmental audits

Internal Environmental Audits of the activity and implementation of the EMPr will be undertaken by the ECO. The findings and outcomes of these audits will be recorded in the EMPr file. The environmental audits and associated reports must be conducted and submitted to the CA at intervals as indicated in the EA.

The ECOs must prepare a monthly EAR. The report will be tabled as the key point on the agenda of the Environmental Site Meeting. The Report is submitted for acceptance at the meeting and the final report will be circulated to the Project Manager and filed in the EMPr file. At a frequency determined by the Environmental Authorisation, the ECOs shall submit the monthly reports to the Competent Authority in terms of NEMA. At a minimum the Monthly report is to cover the following:

- Weekly Environmental Checklists;
- Deviations and non-compliances with the checklists;
- Non-compliances issued;
- Completed and reported corrective actions;
- Environmental Monitoring;
- General environmental findings and actions; and
- Minutes of the Bi-monthly Environmental Site Meetings.

6.14. Final environmental audits

On final completion of the entire activity, the ECOs are required to prepare a final EAR. The report is to be submitted to the CA for acceptance and approval. The environmental report must comply with Appendix 7 of the EIA Regulations, 2014.

- Details of the independent person who prepared the report;
- Details of the expertise of independent person that compiled the report;
- A declaration that the independent auditor is independent in a form as may be specified by the CA;
- An indication of the scope of, and the purpose for which, the environmental audit report was prepared;
- A description of the methodology adopted in preparing the environmental audit report;
- An indication of the ability of the EMPr, and where applicable, the closure plan to.

Sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an on-going basis;

Sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and

Ensure compliance with the provisions of EA, EMPr and where applicable, the closure plan;

- A description of any assumptions made, and any uncertainties or gaps in knowledge;
- A description of any consultation process that was undertaken during the course of carrying out the EAR;
- A summary and copies of any comments that were received during any consultation process;
- Any other information requested by the CA.

Submission of the final EAR to the CA will indicate the end of the entire activity.

7. Appendix 1 – Handling of waste

	Waste Type	Disposal method
1.	Asbestos	The management, handling and disposal of asbestos and ACM must be done in accordance with the Asbestos regulation, 2001. (a) All asbestos waste needs to be placed in containers that will prevent the likelihood of exposure during handling. (b) All vehicles, re-usable containers or any other similar articles which have been in contact with asbestos waste are cleaned and decontaminated after use, in such a way that they do not cause a hazard inside or outside the workplace; (c) All asbestos waste which can cause exposure, is disposed of only on sites specifically designated for this and in such a manner that it does not cause a hazard inside or outside the site; (d) All persons involved in the collection, transport and disposal of asbestos waste, who may be exposed to that waste, are provided with personal protective equipment; and (e) Where the services of a contractor for the disposal of asbestos waste are used, a provision is incorporated into the contract stating that the contractor shall also comply with the provisions of the Asbestos Regulations.
2.	Neon lights	The following will be required for disposal of this material: • Neon light tubes need to be broken under controlled condition to render it physically safe and release or recover the mercury containing substances. • Storage of the neon lights in an appropriate container which would need to be removed if and when required. • The lights will need to be crushed and stored within a drum. If the drum reaches full capacity, the drum must be sealed and transported to a hazardous landfill site for safe disposal.
3.	Lead	The management, handling and disposal of lead must be done in accordance with the Lead regulation, 2001. (a) Recycle all lead waste, but not into non-lead production processes; (b) Ensure that all collected lead waste is placed into containers that will prevent the likelihood of exposure during handling; (c) Ensure that all vehicles, re-usable containers and covers which

		have been in contact with lead waste are cleaned and decontaminated after use, in such a way that such vehicles, containers or covers do not cause a hazard inside or outside the premises concerned; (d) Ensure that all lead waste that can cause exposure to lead, is disposed of only on sites specifically designated for this purpose in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989) and the National Environmental Management Act, 1998 (Act No. 107 of 1998), and in such a manner that it does not cause a hazard inside or outside the site concerned; (e) Ensure that all persons involved in the collection, transport and disposal of lead waste and who may be exposed to that waste, are provided with suitable personal protective equipment; and (f) Ensure that, in cases where the services of a waste disposal contractor are used, a provision is incorporated into the contract stating that the contractor too shall comply with the provisions of these Regulations.
4.	Oil	• Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. • Collect and reclaim or dispose of material in sealed containers at licensed waste disposal site. • Dispose in accordance with all applicable regulations
5.	Ceramics	• If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations. • This product should be disposed of in suitable landfill sites in accordance with local governmental / municipal regulations.
6.	Steel	• Metal should first be reused or recycled before disposal to landfill is considered. • Waste must be disposed of in accordance with applicable regulations.
7.	Copper	• Metal should first be reused or recycled before disposal to landfill is considered. • If the material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.
8.	Rubber	• Dispose of waste and residues in accordance with applicable requirements.

		No specific disposal method is required.
9.	Creosote	- Dispose in accordance with all applicable regulations. - Treated wood should not be burned in open fires or in stoves, fireplaces or residential boilers, because toxic chemicals may be produced as part of the smoke and ashes. - Treated wood from commercial or industrial use (e.g., construction sites) may be burned only in commercial or industrial incinerators or boilers in accordance with regulations.
10.	PVC	Disposal on registered landfill site in accordance to applicable regulations.

APPROVED BY	SIGNATURE	DATE
NAME: Christelle Greyling		12/10/2018
COMMENTS:		