



**TENDER REFERENCE: EEBU 08-2025/26**

**TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS: AS AND WHEN REQUIRED: OVER A THREE (3) YEAR PERIOD**

**VOLUME 1**

**A Tender for Category 6EP or higher CIDB Registered Contractors**

ISSUED BY:	PREPARED BY:
The Chief Financial Officer Financial Services Department Supply Chain Management 320 Madiba Street, Pretoria PO Box 440 Pretoria 0001  Tel: (012) 358 8100	Energy and Electricity Business Unit 252 Thabo Sehume Street, Pretoria PO Box 440 Pretoria 0001  Contact: Mr Neo Mokalila Tel: (012) 358 2898 Email: <a href="mailto:Neomok@tshwane.gov.za">Neomok@tshwane.gov.za</a>

Registered Name of Tenderer:	
Trading Name of Tenderer:	
Registration No. of Entity:	
Contact Person:	CoT Vendor No:
Tel. No:	E-Mail Address:
Cell No:	Fax No:

TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS: AS AND WHEN REQUIRED: OVER A THREE (3) YEAR PERIOD

Contents of Volume 1

## CONTENTS

DESCRIPTION		COLOUR
<b>PORTION 1: TENDER</b>		
<b>PART T1</b>	<b>TENDERING PROCEDURES</b>	
	T1.1 TENDER NOTICE AND INVITATION TO TENDER	White
	T1.2 TENDER DATA	Pink
	T1.3 STANDARD CONDITIONS OF TENDER	Pink
<b>PART T2</b>	<b>RETURNABLE DOCUMENTS</b>	Yellow
<b>PORTION 2: CONTRACT</b>		
<b>PART C1</b>	<b>AGREEMENTS AND CONTRACT DATA</b>	
	C1.1 FORM OF OFFER AND ACCEPTANCE	Yellow
	C1.2 CONTRACT DATA	Yellow
	C1.3 FORM OF GUARANTEE	White
	C1.4 EXAMPLE OF GUARANTEE (CASH DEPOSIT)	White
	C1.5 HEALTH AND SAFETY AGREEMENT	White
<b>PART C2</b>	<b>PRICING DATA</b>	
	C2.1 PRICE INSTRUCTIONS	Yellow
	C2.2 PRICE SCHEDULE	Yellow
<b>PART C3</b>	<b>SCOPE OF WORK</b>	
	C3.1 DESCRIPTION OF THE WORKS	Blue
	C3.2 HEALTH & SAFETY SPECIFICATION	Blue
<b>PART C4</b>	<b>SITE INFORMATION</b>	
	C4.1 LOCALITY PLAN	Green
<b>VOLUME 2</b>	Tender Drawings (Bound Separately – Where Necessary)	

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**LIST OF ABBREVIATIONS**

(in alphabetical order)

Abbreviation	Description
B-BBEE	Broad-Based Black Economic Empowerment
CIDB	Construction Industry Development Board
CLO	Community Liaison Officer
CoT	City of Tshwane
CPA	Cost Price Adjustment
EEBU	Energy and Electricity Business Unit
EP	Electrical Engineering Works (CIDB grading system)
EPWP	Expanded Public Works Programme
FAT	Factory Acceptance Test
ISO	International Organization for Standardization
kV	Kilo Volts (1000 V)
MVA	Mega Volt Ampere (1 000 000 VA)
OHSA	Occupational Health and Safety Act
O&MM	Operations and Maintenance Manuals
SAT	Site Acceptance Test
SCADA	Supervisory Control and Data Acquisition
SEIFSA	Steel and Engineering Industries Federation of Southern Africa
SWG	Switchgear

# **PORTION 1: TENDER**

## **PART T1: TENDER PROCEDURES**

### **TABLE OF CONTENTS**

<b>T1.1</b>	<b>TENDER NOTICE AND INVITATION TO TENDER .....</b>	<b>2</b>
<b>T1.2</b>	<b>TENDER DATA.....</b>	<b>4</b>
<b>T1.3</b>	<b>STANDARD CONDITIONS OF TENDER.....</b>	<b>20</b>

## T1.1 TENDER NOTICE AND INVITATION TO TENDER

**EEBU 08 2025/2026**

**CITY OF TSHWANE  
ENERGY AND ELECTRICITY BUSINESS UNIT  
ELECTRICITY PLANNING AND DEVELOPMENT DIVISION**

**TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS AS AND WHEN REQUIRED: OVER A THREE (3) YEAR PERIOD**

Tenders are hereby invited for the above work.

**Tenderers should have a CIDB contractor grading designation of Category 6EP or Higher**

A **compulsory CLARIFICATION meeting** about the proposed services will be held on **22 January 2026 @ 10:00**. Prospective tenderers must already have the tender document and be familiarised with the contents. The meeting with a representative of the Employer will take place at **Centurion Council Chamber, cnr Basden Avenue and Rabie street, Lyttelton Manor, Pretoria**.

Tenders will be received until **10:00 on 19 February 2026**. Tenders will be received on the closing dates and times shown, must be enclosed in sealed envelopes, bearing the applicable tender heading and reference number, as well as the closing time and due date, and must be addressed to:-

The closing time for receipt of tenders is **10h00 on the 19 February 2026**. Tenders will be received on the closing date and time shown, must be enclosed in sealed envelopes bearing the applicable tender heading and reference number, as well as the closing time and due date, and must be addressed to the Divisional Head, SUPPLY CHAIN MANAGEMENT, PRETORIA, 0001 and must be submitted in the tender box situated at Tshwane House, 320 Madiba Street, Pretoria, 0002. Tenders will be opened at the latter address only on request.

A tender must remain open for a period of 90 days from the closing date of submission of tenders, during which period the tender may not be amended or withdrawn and may be accepted by the Municipality at any time during this period. The validity period for the tender after closure is 90 days.

The city shall have right and power to extend any tender validity period beyond any initial validity period set and subsequent extensions. SCM shall ensure that an extension of validity is requested in writing from all bidders before the validity expiry date. Extension of validity shall be finalised while the quotations/bids are still valid. The lowest or any tender will not necessarily be accepted, and the Municipality reserves the right to accept a tender as a whole or in part.

**ENQUIRIES:**

Employers Agent: **Neo Mokaila**

Tel (Office): **012 358 2898**

E-Mail: [NeoMok@tshwane.gov.za](mailto:NeoMok@tshwane.gov.za)

**SUPPLY CHAIN ENQUIRIES:**

Employer's Agent: Mulondi Rasekgala  
Tel (Office): 012-358 6636  
E-Mail: MulondiN@tshwane.gov.za

**Mr Johann Mettler**  
**City Manager**

**NOTICE No 09 of 2025/26**

## T1.2 TENDER DATA

The conditions of tender are the Standard Conditions of Tender as contained in **Annexure C of Standard for Uniformity in Engineering and Construction Works Contracts (Board Notice 423 Government Gazette No 42622 of 8 August 2019)**, bound into Section T1.3.

The Standard Conditions of Tender makes several references to the Tender Data. The Tender Data shall have precedence in interpreting any ambiguity or inconsistency between it and the Standard Conditions of Tender to which it mainly applies.

CLAUSE NUMBER	TENDER DATA
C.1.1 Actions	The Employer is the <b>City of Tshwane Metropolitan Municipality</b>
C.1.2 Tender Documents	<p><u>Volume 1: Tender Document</u></p> <p><b>THE TENDER</b></p> <p><b>Part T1: Tendering Procedures</b></p> <p>T1.1 – Tender Notice and Invitation to Tender</p> <p>T1.2 – Tender Data</p> <p>T1.3 – Standard Conditions of Tender</p> <p><b>Part T2: Returnable documents</b></p> <p>T2.1 – List of Returnable Documents</p> <p>T2.2 – Returnable Schedules</p> <p><b>THE CONTRACT</b></p> <p><b>Part C1: Agreements and contract data</b></p> <p>C1.1 – Form of Offer and Acceptance</p> <p>C1.2 – Contract Data</p> <p>C1.3 – Form of Guarantee</p> <p>C1.4 – Guarantee (Cash Deposit)</p> <p>C1.5 – Health and Safety Agreement</p> <p><b>Part C2: Pricing data</b></p> <p>C2.1 – Pricing Instruction</p> <p>C2.2 – Pricing Schedule</p> <p><b>Part C3: Scope of work</b></p> <p>C3.1 – Description of Works</p> <p>C3.2A – Health and Safety Specification</p> <p>C3.2B – Environmental Management Plan</p> <p><b>Part C4: Site Information</b></p> <p>C4.1 – Site Information</p>
C.1.3 Interpretation	<b>Add</b> the following new clause:
C.1.3.4	<i>The tender documents have been drafted in English. The contract arising from the invitation to tender shall be interpreted and construed in English</i>
C.1.4 Communication and Employer's Agent	<p>Agent: Neo Mokaila</p> <p>Tel: 012-358-2898</p> <p>E-Mail: <a href="mailto:Neomok@tshwane.gov.za">Neomok@tshwane.gov.za</a></p> <p>SCM Official: Mulondi Rasekgala</p> <p>Tel No: 012 358 6636</p> <p>E-mail: <a href="mailto:MulondiN@tshwane.gov.za">MulondiN@tshwane.gov.za</a></p>

CLAUSE NUMBER	TENDER DATA																				
C.2.1 Eligibility	<p>Only those tenderers who are registered with the CIDB, or are capable of being so prior to the evaluation of submissions, in a contract grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered or a value determined under regulation <b>25(1B)</b> or <b>25(7A)</b> of the Construction Industry Development Regulations for a <b>6EP OR HIGHER</b> class of construction work, are eligible to have their tenders evaluated.</p> <p>Joint Ventures are eligible to submit tenders provided that:</p> <ol style="list-style-type: none"> <li>1. The combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a contractor designation in accordance with the sum tendered for a <b>6 EP</b> class of construction work or a value determined in accordance with Regulation 25(1B) or 25(7A) of the Construction Industry Development Regulations.</li> </ol> <p><b><u>CIDB JOINT VENTURE GRADING TABLE</u></b></p> <table border="1"> <thead> <tr> <th>Designation</th><th>Deemed to satisfy joint venture arrangements</th></tr> </thead> <tbody> <tr> <td>6</td><td>Two contractors registered in contractor grading designation 5. One contractor registered in contractor grading designation 5 and two registered in contractor grading designation 4.</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Designation</th><th>Deemed to satisfy joint venture arrangements</th></tr> </thead> <tbody> <tr> <td>3</td><td>Three contractors registered in contractor grading designation 2</td></tr> <tr> <td>4</td><td>Three contractors registered in contractor grading designation 3</td></tr> <tr> <td>5</td><td>Two contractors registered in contractor grading designation 4 One contractor registered in contractor grading designation 4 and two registered in contractor grading designation 3</td></tr> <tr> <td>6</td><td>Two contractors registered in contractor grading designation 5 One contractor registered in contractor grading designation 5 and two registered in contractor grading designation 4</td></tr> <tr> <td>7</td><td>Two contractors registered in contractor grading designation 6 One contractor registered in contractor grading designation 6 and two registered in contractor grading designation 5</td></tr> <tr> <td>8</td><td>Three contractors registered in contractor grading designation 7</td></tr> <tr> <td>9</td><td>Three contractors registered in contractor grading designation 8</td></tr> </tbody> </table> <p>Only those tenderers who meet the minimum criteria as set out in this bid will be evaluated in four stages, namely:</p> <p>Stage 1: Administration Evaluation</p> <p>Stage 2: Mandatory Requirements</p>	Designation	Deemed to satisfy joint venture arrangements	6	Two contractors registered in contractor grading designation 5. One contractor registered in contractor grading designation 5 and two registered in contractor grading designation 4.	Designation	Deemed to satisfy joint venture arrangements	3	Three contractors registered in contractor grading designation 2	4	Three contractors registered in contractor grading designation 3	5	Two contractors registered in contractor grading designation 4 One contractor registered in contractor grading designation 4 and two registered in contractor grading designation 3	6	Two contractors registered in contractor grading designation 5 One contractor registered in contractor grading designation 5 and two registered in contractor grading designation 4	7	Two contractors registered in contractor grading designation 6 One contractor registered in contractor grading designation 6 and two registered in contractor grading designation 5	8	Three contractors registered in contractor grading designation 7	9	Three contractors registered in contractor grading designation 8
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CLAUSE NUMBER	TENDER DATA																	
	<p>Stage 3: Functionality Scorecard</p> <p>Stage 4: Preference Points System</p> <p><b>Stage 1: Administration Evaluation</b></p> <p>The bidder must submit the required returnable documents as required by the City of Tshwane's Supply Chain Management.</p> <p>All the bids will be evaluated against the administrative requirements as set out in the table below.</p> <table><tr><th>Compulsory Returnable Documentation (Submission of these are compulsory)</th><th>Submitted (YES or NO)</th><th>Checklist (Guide for Bidder and the Bid Evaluation Committee)</th></tr><tr><td>a) To enable The City to verify the bidder's tax compliance status, the bidder must provide;<ul style="list-style-type: none"><li>• Tax compliance status PIN.</li><li>or</li><li>• Central Supplier Database (CSD)</li></ul></td><td></td><td>Tax status must be compliant before the award.</td></tr><tr><td>b) A copy of their Central Supplier Database (CSD) registration; or indicate their Master Registration Number / CSD Number;</td><td></td><td>CSD must be valid.</td></tr><tr><td>c) Confirmation that the bidding company's rates and taxes are up to date: Original or copy of Municipal Account Statement of the Bidder (bidding company) not older than 3 months and account must not be in arrears for more than ninety (90) days; or ,signed lease agreement or In case of bidders located in informal settlement, rural areas or areas where they are not required to pay Rates and Taxes a letter from the local councillor confirming they are operating in that area</td><td></td><td>Was a Municipal Account Statement, signed lease agreement or letter from the local councillor provided for the bidding company? The name and / or addresses of the bidder's statement correspond with CIPC document, Address on CSD or Company profile? Are all payment(s) up to date (i.e. not in arrears for more than 90 days?</td></tr><tr><td>d) In addition to the above, confirmation that all the bidding company's owners / members / directors / major shareholders rates and taxes are up to date: • Original or copy of Municipal Account Statement of all the South African based owners / members / directors / major shareholders not older than 3 months and the account/s may not be in arrears for more than</td><td></td><td>Was a Municipal Account Statement, signed lease agreement or letter from the local councillor provided for the bidding company? The name and / or addresses of the bidder's statement correspond with CIPC document, Address on CSD or Company profile?</td></tr></table>			Compulsory Returnable Documentation (Submission of these are compulsory)	Submitted (YES or NO)	Checklist (Guide for Bidder and the Bid Evaluation Committee)	a) To enable The City to verify the bidder's tax compliance status, the bidder must provide; <ul style="list-style-type: none"><li>• Tax compliance status PIN.</li><li>or</li><li>• Central Supplier Database (CSD)</li></ul>		Tax status must be compliant before the award.	b) A copy of their Central Supplier Database (CSD) registration; or indicate their Master Registration Number / CSD Number;		CSD must be valid.	c) Confirmation that the bidding company's rates and taxes are up to date: Original or copy of Municipal Account Statement of the Bidder (bidding company) not older than 3 months and account must not be in arrears for more than ninety (90) days; or ,signed lease agreement or In case of bidders located in informal settlement, rural areas or areas where they are not required to pay Rates and Taxes a letter from the local councillor confirming they are operating in that area		Was a Municipal Account Statement, signed lease agreement or letter from the local councillor provided for the bidding company? The name and / or addresses of the bidder's statement correspond with CIPC document, Address on CSD or Company profile? Are all payment(s) up to date (i.e. not in arrears for more than 90 days?	d) In addition to the above, confirmation that all the bidding company's owners / members / directors / major shareholders rates and taxes are up to date: • Original or copy of Municipal Account Statement of all the South African based owners / members / directors / major shareholders not older than 3 months and the account/s may not be in arrears for more than		Was a Municipal Account Statement, signed lease agreement or letter from the local councillor provided for the bidding company? The name and / or addresses of the bidder's statement correspond with CIPC document, Address on CSD or Company profile?
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## Part T1: Tender Procedures

CLAUSE NUMBER	TENDER DATA		
	<p>ninety (90) days; or a signed lease agreement of owners / members / directors / major shareholders or In case of bidders located in informal settlement, rural areas or areas where they are not required to pay Rates and Taxes a letter from the local councillor confirming they are residing in that area</p>		<p>Are all payment(s) up to date (i.e. not in arrears for more than 90 days?</p>
	<p>e) Duly Signed and completed MBD forms (MBD 1, 4, 5, 8 and 9) The person signing the bid documentation must be authorized to sign on behalf of the bidder. Where the signatory is not a Director / Member / Owner / Shareholder of the company, an official letter of authorization or delegation of authority should be submitted with the bid document.</p> <p><b>NB: Bidders must ensure that the directors, trustees, managers, principal shareholders, or stakeholders of this company, declare any interest in any other related companies or business, whether or not they are bidding for this contract. <u>See Question 3.14 of MBD 4. Failure to declare interest will result in a disqualification</u></b></p>		<p>All documents fully completed (i.e. no blank spaces)? All documents fully signed by (any director / member / trustee as indicated on the CIPC document, alternatively a delegation of authority would be required? Documents completed in black ink (i.e. no "Tippex" corrections, no pencil, no other colour ink, or <b>non-submission of the MBD forms</b>, will be considered)?</p>
	<p>f) Audited Financial Statements for the most recent three (3) years or Audited Financial Statements from date of existence for companies less than three years old.</p> <p><b>NB: The bidder must submit signed audited annual financial statements for the most recent three years, or if established for a shorter period, submit audited annual financial statements from date of establishment.</b></p> <p>If the bidder is not required by law to prepare signed annual financial statements for auditing purposes, then the bidder must submit proof that the bidder is not required by law to prepare audited financial statements.</p>		<p>Applicable for tenders above R10m in conjunction with MBD 5)</p> <p>Are Audited financial statements provided (Audited financials must be signed by auditor) Or proof that the bidder is not required by law to prepare audited financial statements.</p>

## Part T1: Tender Procedures

CLAUSE NUMBER	TENDER DATA		
	<p>g) Joint Ventures (JV) – (Only applicable when the bidder tenders as a joint venture) Where the bidder bids as a joint venture (JV), the required or relevant documents as per (a) to (f) above must be provided for all JV parties. In addition to the above the bidder must submit a Joint Venture (JV) agreement signed by the relevant parties.</p> <p><b>NB:</b> It is a condition of this bid that the successful bidder will continue with the same Joint Venture (JV) for the duration of the contract unless prior approval is obtained from the City.</p>		<p>If applicable. JV agreement provided? JV agreement complete and relevant?</p> <p>Agreement signed by all parties? All required documents as per (i.e. a to f) must be provided for all partners of the JV.</p>
	<p>h) Bidder attended a compulsory briefing session where applicable</p>		<p>A compulsory briefing register must be signed by the bidder.</p> <p><b>Bidders will be disqualified should they fail to attend compulsory briefing session</b></p>
	<p>i) Pricing schedule (All items must be quoted for in pricing schedule and if not, all items are quoted the bidder will be disqualified). Unless the tender is awarded per item or per section where the bidder only quoted the items or sections, they are interested in.</p>		<p>Incomplete pricing schedule results in totals being incomparable. Bidder must be disqualified.</p> <p><b>Bidder will be disqualified should they make corrections on the price schedule without attaching a signature or initialising thereto.</b></p> <p><b>Bidder will be disqualified should they use tippex/ correction ink, on the price schedule.</b></p>
<b>Stage 2: Mandatory Requirements</b>			

Only tenders that fulfill all Mandatory Requirements will be considered for Stage 3: Functionality Criteria.

The Mandatory Requirement are as follows:

- a) The tenderer must have CIDB contractor grading 6 EP or higher.
- b) The tenderers must complete the Schedule of Particulars and Guarantee Part C2.1 Pricing Instruction - Section 5.
- c) The tenderer must submit type test certificates (SABS /IEC) for the following items:
  - Item 1: 11kV Metal Clad Indoor Switchgear.
  - Item 2: 11kV Metal Enclosed Indoor Switchgear.
- d) Form R.D.E.6P Verification of Schedule of Particulars and Guarantees must be fully completed and signed.
- e) The tenderers must offer and guarantee the specified requirements in the Schedule of Particulars and Guarantee.
- f) The tenderer must provide bank rating not older than three months indicating their Bank Rating before closing of tender. (Attach original copy of Bank Stamped Letter or original certified copy of Bank Stamped Letter)
  - Only tenders with bank ratings of A, B and C will be considered. Any bank rating below C shall be disqualified and will not be evaluated further
- g) Qualifications of key personnel. The personnel must have the following minimum requirements :minimum requirements :

	PROPOSED POSITION	Minimum Qualifications
1	Director/Senior Manager	BEng/BSc/BTech Degree in Electrical Engineering (NQF Level 7 Qualification)
2	Project Manager	BEng/BSc/BTech Degree in Electrical Engineering. ECSA Registration (NQF Level 7 qualification)
3	Site Supervisor	National Certificate, (NQF Level 6 Qualification)

### Stage 3: Functionality Criteria

The following criteria and weights will be applied when bids are assessed for functionality.

The maximum possible score that can be achieved for functionality is 100.

**Bids that do not achieve a minimum score of 60 (out of 100) for functionality will not be evaluated further.**

## Part T1: Tender Procedures

CLAUSE NUMBER	TENDER DATA					
	NO	CRITERIA	SUB-CRITERIA	SCALE	WEIGHT	HIGHEST POSSIBLE SCORE
	1	<p>TRACK RECORD AND TECHNICAL EXPERTISE</p> <p>Complete Form RD.C.1 and attach <u>signed</u> copies of contract appointment letters and project completion certificates for work successfully completed by the tenderer.</p> <p>Completed projects must entail the supply, delivery, installation, testing, and commissioning of electrical equipment in substations.</p>	<p>Appointment letters and completion certificates for two (2) completed substation projects</p> <p>Appointment letters and completion certificates for three (3) completed substation projects</p> <p>Appointment letters and completion certificates for four (4) completed substation projects</p> <p>Appointment letters and completion certificates for five (5) or more completed substation projects</p>	<p>1</p> <p>2</p> <p>3</p> <p>4</p>	10	40
	2	<p>EXPERIENCE OF KEY PERSONNEL</p> <p>The tenderer must have in his employ, personnel with the relevant experience in the supply, delivery, installation, testing, and commissioning of electrical equipment in substations.</p>	<p>Points will only be allocated for personnel with a minimum of five (5) years' experience in the installation, testing, and commissioning of electrical equipment in substations.</p> <p>&lt;5years, (0 points) &gt;5years, (1 point) (Note: Points will be allocated and added for all key personnel)</p>			

## Part T1: Tender Procedures

CLAUSE NUMBER	TENDER DATA					
		It is compulsory for the tenderer to complete Form RD.D.3 and indicate the experience record of each key personnel pertinent to the installation of equipment in substations.	Director/Senior Manager	2	10	40
			Project Engineer	1		
			Site Supervisor	1		
	3	QUALITY MANAGEMENT SYSTEM  The tenderer must describe the construction quality system incorporated by the tenderer in his organisation and which will be applicable to this Contract  (RD.D4) Evaluation schedule: Quality Management System form to be filled by the tender	Provide company's ISO 9001 quality compliance certificate	1	10	20
			Provide company's ISO 14001 compliance certificate	1		
	HIGHEST POSSIBLE SCORE					100
<p><b>1.1. Stage 4: Preference Point System</b></p> <p>The preferential point system used will be the 80/20 points system in terms of the Preferential Procurement Policy Framework Act, 2000 (Act 5 of 2000) Regulations 2022.</p> <ul style="list-style-type: none"><li>• 80 points for price</li><li>• 20 points for Specific goals</li></ul> <p>Specific Goals</p> <ul style="list-style-type: none"><li>• Bidders are required to submit supporting documents for their bids to claim the specific goal points.</li><li>• Non-compliance with specific goals will not lead to disqualification but bidders will not be allocated specific goal points. Bidders will score points out of 80 for price only and zero (0) points out of 20 for specific goals.</li></ul>						

## Part T1: Tender Procedures

CLAUSE NUMBER	TENDER DATA		
	<p>• Cot shall act against any bidder or person when it detects that the specific goals were claimed or obtained on a fraudulent basis.</p> <p>The specific goal for this bid is outlined below.</p>		
	Specific goals	80/20 preference point system	Proof of specific goals to be submitted
	BB-BEE score of companies <ul style="list-style-type: none"> <li>• Level 1</li> <li>• Level 2</li> <li>• Level 3</li> <li>• Level 4</li> <li>• Level 5</li> <li>• Level 6</li> <li>• Level 7</li> <li>• Level 8</li> <li>• Non-compliant</li> </ul>	<ul style="list-style-type: none"> <li>• 8 Points</li> <li>• 7 Points</li> <li>• 6 Points</li> <li>• 5 Points</li> <li>• 4 Points</li> <li>• 3 Points</li> <li>• 2 Points</li> <li>• 1 Point</li> <li>• 0 Points</li> </ul>	Valid Certified copy of BBBEE certificate. Sworn Affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises or CIPC BBBEE certificate.
	EME and/ or QSE	2 Points	Valid Sworn affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises or CIPC BBBEE certificate
	At least 51% of Women-owned companies	2 Points	Certified copy of Identity Document/s and proof of ownership (Sworn affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises, CIPC registration or any other proof of ownership)
	At least 51% owned companies by People with disability	2 Points	Medical Certificate with doctor's details (Practice Number, Physical Address, and contact numbers) and proof of ownership (Sworn affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises, CIPC registration or any other proof of ownership)
	At least 51% owned companies by Youth	2 Point	Certified copy of Identity Document/s and proof of ownership (Sworn affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises, CIPC registration or any other proof of ownership)

## Part T1: Tender Procedures

CLAUSE NUMBER		TENDER DATA	
		Local Economic Participation <ul style="list-style-type: none"><li>• City of Tshwane</li><li>• Gauteng</li><li>• National</li></ul>	<ul style="list-style-type: none"><li>• 4 Points</li><li>• 2 Points</li><li>• 1 Point</li></ul> Municipal Account statement/Lease agreement.
		For points to be allocated as per above the tenderers will be required to submit proof of documentation as evidence for claims made. Any tenderer that does not submit evidence as stated in the bid document to claim applicable points will be allocated zero points.	
		i. The service provider must comply with the Occupational Health and Safety Act 85 of 1993 and its regulation. OHS plan must be submitted with tender documents	
C.2.2	Cost of Tendering	The employer <b>will not</b> compensate the tenderer for any costs incurred in attending interviews or making any submissions in the office of the employer.	
C.2.7	Clarification meeting	The arrangements for a <b>compulsory</b> clarification meeting are as stated in the tender notice and invitation to tender.  Confirmation of attendance will be recorded in the attendance register to be signed by all tenderers. Addenda will be issued to and tenders received from those tendering entities appearing on the attendance register.  <b>Tender documents will not be made available at the clarification meeting.</b>	
C.2.8	Seek clarification	<b>Replace</b> the clause with the following:  <i>Request clarification of the tender documents, if necessary, by notifying the employer at least <b>5 (Five) working days before the closing time stated in the tender data.</b></i>	
C2.9	Insurance	The tenderer must take out their own insurance which will be verified by the Employer.	
C.2.12	Alternative offers	Alternative tender offers will <b>not</b> be considered.	
C2.13.	Submitting a tender offer	The tender offer <b>shall be completed in non-erasable black ink pen</b>  Any entry made by the tenderer in the document which the tenderer desires to change, <b>shall not be erased or painted out</b> . A line shall be drawn through the incorrect entry and the correct entry shall be written above in <b>non-erasable black ink pen</b> and the <b>full signature</b> of the tenderer shall be placed next to the correction.  Submit one tender offer only, either as a single tendering entity or as a member in a joint venture to provide the whole of the works, services or supply identified in the contract data described in the scope of work, unless stated otherwise in the tender data.	



## Part T1: Tender Procedures

CLAUSE NUMBER	TENDER DATA
C2.13.2	<p><b><u>Replace</u></b> the contents of the clause with the following:</p> <p><i>Submit the parts of the tender offer communicated on paper as an original plus the number of copies stated in the tender data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the employer.</i></p> <p><i>Return all volumes of the tender document to the Employer after completion of the relevant sections of each volume in their entirety, either electronically (if they were issued in electronic format) or by writing in black ink.</i></p> <p><i>All volumes are to be left intact in original format and no pages shall be removed or re-arranged</i></p>
C2.13.3	<p>Parts of each tender offer communicated on paper shall be submitted as <b>an original, plus a scanned copy in PDF format on a compact disc or memory stick.</b></p> <p><b>In addition to the hard copy submission, each tenderer is required to submit a scanned copy of the fully completed and signed tender submission document. This is to be on a Compact Disc (CD or DVD) or memory stick attached to the original tender submission documents, adequately identifiable as belonging to the tenderer, be in PDF format scanned at 400 DPI, and be in full colour.</b></p>
C2.13.4	<p><b><u>Add</u></b> the following to the clause</p> <p><i>Only authorised signatories may sign the original and all copies of the tender offer where required.</i></p> <p><i>In the case of a <b>ONE-PERSON CONCERN</b> submitting a tender, this shall be clearly stated.</i></p> <p><i>In the case of a <b>COMPANY</b> submitting a tender, include a copy of a <b><u>resolution by its board of directors</u></b> authorising a director or other official of the company to sign the documents on behalf of the company.</i></p> <p><i>In the case of a <b>CLOSE CORPORATION</b> submitting a tender, include a copy of a <b><u>resolution by its members</u></b> authorising a member or other official of the corporation to sign the documents on each member's behalf.</i></p> <p><i>In the case of a <b>PARTNERSHIP</b> submitting a tender, <b><u>all the partners</u></b> shall sign the documents, unless one partner or a group of partners has been authorised to sign on behalf of each partner, in which case <b><u>proof of such authorisation</u></b> shall be included in the Tender.</i></p> <p><i>In the case of a <b>JOINT VENTURE/CONSORTIUM</b> submitting a tender, include a <b><u>resolution of each company</u></b> of the joint venture together with a <b><u>resolution by its members</u></b> authorising a member of the joint venture to sign the documents on behalf of the joint venture.</i></p>

CLAUSE NUMBER	TENDER DATA
	<p><b><u>Accept that failure to submit proof of authorisation to sign the tender shall result in the tender offer being regarded as non-responsive.</u></b></p>
C2.13.5	<p>The identification details are:</p> <p>Tender Reference: EEBU 08-2025/26</p> <p>Tender Description: TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS: AS AND WHEN REQUIRED OVER A THREE (3) YEAR PERIOD</p> <p>Closing Time: 10H00am</p> <p>Closing Date: 19 February 2026</p> <p><i>Each tender shall be enclosed in a sealed envelope, bearing the correct identification details and shall be placed in the tender box located at:</i></p> <p><b>PROCUREMENT ADVICE CENTRE (TENDER BOX AT) Tshwane House 320 Madiba Street PRETORIA CBD 0002</b></p> <p>This address is 24 hours available for delivery of tender offers.</p> <p>Please ensure that all required compliance documents are included upon submission as no additional documents will be requested from bidders after closing.</p>
C2.13.9	Telephonic, telegraphic, telex, facsimile or e-mailed offers will <b><u>not</u></b> be accepted.
C.2.13.10	<p><b><u>Add</u></b> the following sub- clause C.2.13.10:</p> <p><i>Accept that all conditions, which are printed or written upon any stationery used by the Tenderer for the purpose of or in connection with the submission of a tender offer for this Contract, which are in conflict with the conditions laid down in this document shall be waived, renounced and abandoned.</i></p>
C.2.14	<p>Information and data to be completed in all respects</p> <p><b><u>Add</u></b> the following to the clause:</p> <p><i>The Tenderer is required to enter information in the following sections of the document:</i></p> <p>Section T2.2: Returnable Schedules</p> <p>Part C1: Agreements and Contract Data</p>

## Part T1: Tender Procedures

CLAUSE NUMBER	TENDER DATA
	<p><i>Part C2: Pricing Data</i></p> <p><i>The above sections shall be signed by the Tenderer (and witnesses where required). Individual pages should only be initialled by the successful Tenderer and by the witnesses after acceptance by the Employer of the Tender Offer.</i></p> <p><i>The Tenderer shall complete and sign the Form of Offer prior to the submission of a Tender Offer.</i></p> <p><i>The Schedule of Deviations (if applicable) shall be signed by the successful Tenderer after acceptance by the Employer of the Tender Offer.</i></p> <p><i>Accept that failure on the part of the Tenderer to submit any one of the Returnable Documents listed in Part T2 – Returnable Documents within the period stipulated, shall be just cause for the Employer to consider the tender offer as being regarded as non-responsive.</i></p> <p><i>Accept that the Employer shall in the evaluation of tender offers take due account of the Tenderer's past performance in the execution of similar engineering works of comparable magnitude, and the degree to which he possesses the necessary technical, financial and other resources to enable him to complete the Works successfully within the contract period. Satisfy the Employer and the Engineer as to his ability to perform and complete the Works timeously, safely and with satisfactory quality, and furnish details in Part T2 – Returnable Documents.</i></p>
C.2.15 Closing time	The closing time for submission of tender offers is stated in the tender notice and invitation to tender.
C.2.16 Tender offer validity	<p>The tender offer validity period is <b>90 days</b>.</p> <p>The validity period for the tender after closure is <b>90 days</b>. CoT shall have right and power to extend any tender validity period beyond any initial validity period set and subsequent extensions. SCM shall ensure that an extension of validity is requested in writing from all bidders before the validity expiry date. Extension of validity shall be finalised while the quotations/bids are still valid.</p>
C.2.16.5	<p><b>Add</b> the following new clause</p> <p><i>If the tender validity period expires on a Saturday, Sunday or public holiday, the tender offer shall remain valid and open for acceptance until closure of business on the following working day.</i></p>
C.2.18 Provide other material	The tenderer shall, when requested by the employer to do so, submit the names of all management and supervisory staff that will be employed to supervise the labour-intensive portion of the works together with satisfactory evidence that such staff members satisfy the eligibility requirements.
C.2.19 Inspections, tests and analysis	<p><b>Add</b> the following at the end of the clause:</p> <p><i>.... or upon written request.</i></p>

## Part T1: Tender Procedures

CLAUSE NUMBER		TENDER DATA
C2.20	Submit securities, bonds, policies, etc.	The tenderer is required to submit with his tender a letter of intent from an approved insurer undertaking to provide the performance bond to the format included in Section C1.3 of this procurement document.
C2.23	Certificates	Refer to part T2 of this procurement document for a list of the documents that are to be returned with the tender.
C2.24	<i>Canvassing and obtaining of additional information by tenderers</i>	<p><b>Add</b> the following new clause</p> <p><i>The Tenderer shall not make any attempt either directly or indirectly to canvass any of the Employer's officials or the Employer's agent in respect of his tender, after the opening of the tenders but prior to the Employer arriving at a decision thereon.</i></p> <p><i>The Tenderer shall not make any attempt to obtain particulars of any relevant information, other than that disclosed at the opening of tenders.</i></p>
C2.25	<i>Prohibitions on awards to persons in service of the state</i>	<p><b>Add</b> the following new clause</p> <p><i>The Employer is prohibited to award a tender to a person -</i></p> <ol style="list-style-type: none"> <li><i>who is in the service of the state; or</i></li> <li><i>if that person is not a natural person, of which any director, manager, principal shareholder or stakeholder is a person in the service of the state; or</i></li> <li><i>a person who is an advisor or consultant contracted with the municipality or municipal entity.</i></li> </ol> <p><b>In the service of the state means to be -</b></p> <ol style="list-style-type: none"> <li><i>a member of:-</i> <ul style="list-style-type: none"> <li><i>any municipal council;</i></li> <li><i>any provincial legislature; or</i></li> <li><i>the National Assembly or the National Council of Provinces;</i></li> </ul> </li> <li><i>a member of the board of directors of any municipal entity;</i></li> <li><i>an official of any municipality or municipal entity;</i></li> <li><i>an employee of any national or provincial department;</i></li> <li><i>provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999);</i></li> <li><i>a member of the accounting authority of any national or provincial public entity;</i></li> <li><i>or</i></li> <li><i>an employee of Parliament or a provincial legislature.</i></li> </ol> <p>In order to give effect to the above, the questionnaire for the declaration of interests in the tender of persons in service of state in part T2 of this procurement document must be completed.</p>
C2.26	<i>Awards to close family members of persons in the service of the state</i>	<p><b>Add</b> the following new clause</p> <p><i>Accept that the notes to the Employer's annual financial statements must disclose particulars of any award of more than R2000 to a person who is a spouse, child or parent of a person in the service of the state (defined in clause F2.25), or has been in the service of the state in the previous twelve months, including -</i></p> <ol style="list-style-type: none"> <li><i>the name of that person;</i></li> <li><i>the capacity in which that person is in the service of the state; and</i></li> <li><i>the amount of the award.</i></li> </ol>

## Part T1: Tender Procedures

CLAUSE NUMBER	TENDER DATA
	In order to give effect to the above, the questionnaire for the declaration of interests in the tender of persons in service of state in part T2 of this procurement document must be completed.
C2.27 Vendor registration	<p><b>Add</b> the following new clause</p> <p><i>The contractor will required registering as a supplier/ service provider on the City of Tshwane's vendor register before any payment can be done.</i></p> <p><i>If the tenderer is already registered as a vendor, it is required to record the vendor number in space provided on the cover page of this Tender document.</i></p> <p><i>Vendor registration documents and support is available from the Procurement Advice Centre or from <a href="http://www.tshwane.gov.za/procurement.cfm">http://www.tshwane.gov.za/procurement.cfm</a></i></p> <p><i>All parties of a joint venture or consortium submitting a tender shall comply with the requirements of this clause</i></p>
C2.29 Tax	<p><b>Add</b> the following new clause:</p> <p><b>National Treasury SCM Instruction no. 7 of 2017/18 clause 4 application during SCM Processes state that:</b></p> <p><i>The designated official(s) must verify the tenderer's tax compliance status prior to the finalisation of the award of the tender or price quotation.</i></p> <p><i>Where the recommended tenderer is not tax compliant, the tenderer should be notified of their non- compliant status and the tenderer must be requested to submit to the municipality or municipal entity, within 7 working days, written proof from South African Revenue Services of their tax compliance status or proof from SARS that they have made an arrangement to meet their outstanding tax obligations. The proof of tax compliance status submitted by the tenderer to the municipality or municipal entity must be verified via the Central Supplier Database or eFiling</i></p> <p><i>Accept that the tenderer will be rejected if such tenderer fails to provide proof of tax compliance status in terms of clause 4.2 of National Treasury SCM Instruction no. 7 of 2017/18.</i></p>
C.3.1 Respond to requests from the tenderer	
C.3.1.1	The employer will respond to requests for clarification up to 7 <b>(seven) working days</b> before the tender closing time.
C.3.4 Opening of tender submissions	Tenders will be opened immediately after the closing time for tenders
C3.11. Evaluation of tender offers	<p>Only those tenderers who meet the minimum criteria as set out in this bid will be evaluated in four stages, namely:</p> <ul style="list-style-type: none"> <li>• Stage 1: Administration Evaluation</li> <li>• Stage 2: Mandatory Requirements</li> <li>• Stage 3: Functionality Scorecard</li> <li>• Stage 4: Preference Points System</li> </ul>

## Part T1: Tender Procedures

CLAUSE NUMBER		TENDER DATA
C.3.13	Acceptance of Tender Offer	<p>Tender offers will only be accepted if:</p> <ul style="list-style-type: none"> <li>a.) the tenderer has complied in full with all eligibility criteria</li> <li>b.) the tenderer is able to provide proof of tax compliance status in terms of clause 4.2 of National Treasury SCM Instruction no. 7 of 2017/18;</li> <li>c.) the tenderer submits a letter of intent from an approved insurer undertaking to provide the Performance Bond to the format included in Section C1.3 of this procurement document;</li> <li>d.) the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation.</li> <li>e.) the tenderer is not in arrears for more than 3 months with municipal rates and taxes and municipal service charges;</li> <li>f.) the tenderer or any of its directors is not listed on the Register of Tender 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;</li> <li>g.) the tenderer has not: <ul style="list-style-type: none"> <li>i) abused the Employer's Supply Chain Management System; or</li> <li>ii) failed to perform on any previous contract and has been given a written notice to this effect.</li> </ul> </li> <li>h.) the tenderer has completed the Compulsory Enterprise Questionnaire and there are no conflicts 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 and persons in the employ of the state are permitted to submit tenders or participate in the contract;</li> <li>i.) the tenderer is registered and in good standing with the compensation fund or with a licensed compensation insurer;</li> <li>j.) the employer is reasonably satisfied that the tenderer has in terms of the Construction Regulations, 2003, issued in terms of the Occupational Health and Safety Act, 1993, the necessary competencies and resources to carry out the work safely.</li> </ul>
C.3.17	Copies of Contract	<b>One</b> signed copy of the contract shall be provided by the Employer to the successful Tenderer.

## T1.3 STANDARD CONDITIONS OF TENDER

### C.1 General

#### C.1.1 Actions

**C.1.1.1** The Employer and each tenderer submitting a tender offer shall comply with these conditions of tender. In their dealings with each other, they shall discharge their duties and obligations as set out in C.2 and C.3, timeously and with integrity, and behave equitably, honestly and transparently, comply with all legal obligations and not engage in anticompetitive practices.

**C.1.1.2** The Employer and the tenderer and all their agents and employees involved in the tender process shall avoid conflicts of interest and where a conflict of interest is perceived or known, declare any such conflict of interest, indicating the nature of such conflict. Tenderers shall declare any potential conflict of interest in their tender submissions. Employees, agents and advisors of the Employer shall declare any conflict of interest to whoever is responsible for overseeing the procurement process at the start of any deliberations relating to the procurement process or as soon as they become aware of such conflict, and abstain from any decisions where such conflict exists or recuse themselves from the procurement process, as appropriate.

**Note:** 1) *A conflict of interest may arise due to a conflict of roles which might provide an incentive for improper acts in some circumstances. A conflict of interest can create an appearance of impropriety that can undermine confidence in the ability of that person to act properly in his or her position even if no improper acts result.*

2) *Conflicts of interest in respect of those engaged in the procurement process include direct, indirect or family interests in the tender or outcome of the procurement process and any personal bias, inclination, obligation, allegiance or loyalty which would in any way affect any decisions taken.*

**C.1.1.3** The Employer shall not seek and a tenderer shall not submit a tender without having a firm intention and the capacity to proceed with the contract.

#### C.1.2 Tender Documents

The documents issued by the Employer for the purpose of a tender offer are listed in the tender data.

#### C.1.3 Interpretation

**C.1.3.1** The tender data and additional requirements contained in the tender schedules that are included in the returnable documents are deemed to be part of these conditions of tender.

**C.1.3.2** These conditions of tender, the tender data and tender schedules which are only required for tender evaluation purposes, shall not form part of any contract arising from the invitation to tender.

**C.1.3.3** For the purposes of these conditions of tender, the following definitions apply:

a) **conflict of interest** means any situation which:

- i) someone in a position of trust has competing professional or personal interests which make it difficult to fulfil his or her duties impartially;
- ii) an individual or organisation is in a position to exploit a professional or official capacity in some way for their personal or corporate benefit; or
- iii) incompatibility or contradictory interests exist between an employee and the organisation which employs that employee.

b) **comparative offer** means the price after the factors of a non-firm price and all unconditional discounts it can be utilised to have been taken into consideration;

- c) **corrupt practice** means the offering, giving, receiving or soliciting of anything of value to influence the action of the Employer or his staff or agents in the tender process;
- d) **fraudulent practice** means the misrepresentation of the facts in order to influence the tender process or the award of a contract arising from a tender offer to the detriment of the Employer, including collusive practices intended to establish prices at artificial levels;

#### **C.1.4 Communication and Employer's agent**

Each communication between the Employer and a tenderer shall be to or from the Employer's agent only, and in a form that can be readily read, copied and recorded. Communications shall be in the English language. The Employer shall not take any responsibility for non-receipt of communications from or by a tenderer. The name and contact details of the Employer's agent are stated in the tender data.

#### **C.1.5 Cancellation and re-invitation of tenders**

**C.1.5.1** An organ of state may, prior to the award of the tender, cancel the tender if-

- (a) due to changed circumstances, there is no longer a need for the services, works or goods requested; or
- (b) funds are no longer available to cover the total envisaged expenditure; or
- (c) no acceptable tenders are received.
- (d) there is a material irregularity in the tender process.

**F.1.5.2** The decision to cancel the tender must be published in the CIDB website and in the Tender Bulletin for the media in which the original tender invitation as advertised.

**C.1.5.3** An Employer may only with the prior approval of the relevant Treasury cancel a tender invitation for a second time.

#### **C.1.6 Procurement procedures**

##### **C.1.6.1 General**

Unless otherwise stated in the tender data, a contract will, subject to C.3.13, be concluded with the tenderer who in terms of C.3.11 is the highest ranked or the tenderer scoring the highest number of tender evaluation points, as relevant, based on the tender submissions that are received at the closing time for tenders.

##### **C.1.6.2 Competitive negotiation procedure**

**C.1.6.2.1** Where the tender data require that the competitive negotiation procedure is to be followed, tenderers shall submit tender offers in response to the proposed contract in the first round of submissions. Notwithstanding the requirements of C.3.4, the Employer shall announce only the names of the tenderers who make a submission. The requirements of C.3.8 relating to the material deviations or qualifications which affect the competitive position of tenderers shall not apply.

**C.1.6.2.2** All responsive tenderers, or not less than three responsive tenderers that are highest ranked in terms of the evaluation method and evaluation criteria stated in the tender data, shall be invited in each round to enter into competitive negotiations, based on the principle of equal treatment and keeping confidential the proposed solutions and associated information.



Notwithstanding the provisions of C.2.17, the Employer may request that tenders be clarified, specified and fine-tuned in order to improve a tenderer's competitive position provided that such clarification, specification, fine-tuning or additional information does not alter any fundamental aspects of the offers or impose substantial new requirements which restrict or distort competition or have a discriminatory effect.

**C.1.6.2.3** At the conclusion of each round of negotiations, tenderers shall be invited by the Employer to make a fresh tender offer, based on the same evaluation criteria, with or without adjusted weightings. Tenderers shall be advised when they are to submit their best and final offer.

**C.1.6.2.4** The contract shall be awarded in accordance with the provisions of C.3.11 and C.3.13 after tenderers have been requested to submit their best and final offer.

### **C.1.6.3 Proposal procedure using the two stage-system**

#### **C.1.6.3.1 Option 1**

Tenderers shall in the first stage submit technical proposals and, if required, cost parameters around which a contract may be negotiated. The Employer shall evaluate each responsive submission in terms of the method of evaluation stated in the tender data, and in the second stage negotiate a contract with the tenderer scoring the highest number of evaluation points and award the contract in terms of these conditions of tender.

#### **C.1.6.3.2 Option 2**

**C.1.6.3.2.1** Tenderers shall submit in the first stage only technical proposals. The Employer shall invite all responsive tenderers to submit tender offers in the second stage, following the issuing of procurement documents.

**C.1.6.3.2.2** The Employer shall evaluate tenders received during the second stage in terms of the method of evaluation stated in the tender data, and award the contract in terms of these conditions of tender.

### **C.2 Tenderer's obligations**

#### **C.2.1 Eligibility**

**C.2.1.1** Submit a tender offer only if the tenderer satisfies the criteria stated in the tender data and the tenderer, or any of his principals, is not under any restriction to do business with Employer.

**C.2.1.2** Notify the Employer of any proposed material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used by the Employer as the basis in a prior process to invite the tenderer to submit a tender offer and obtain the Employer's written approval to do so prior to the closing time for tenders.

#### **C.2.2 Cost of tendering**

**C.2.2.1** Accept that, unless otherwise stated in the tender data, the Employer will not compensate the tenderer for any costs incurred in the preparation and submission of a tender offer, including the costs of any testing necessary to demonstrate that aspects of the offer complies with requirements.

**C.2.2.2** The cost of the tender documents charged by the Employer shall be limited to the actual cost incurred by the Employer for printing the documents. Employers must attempt to make available the tender documents on its website so as not to incur any costs pertaining to the printing of the tender documents.

#### **C.2.3 Check documents**

Check the tender documents on receipt for completeness and notify the Employer of any discrepancy or omission.

#### **C.2.4 Confidentiality and copyright of documents**

Treat as confidential all matters arising in connection with the tender. Use and copy the documents issued by the Employer only for the purpose of preparing and submitting a tender offer in response to the invitation.

#### **C.2.5 Reference documents**

Obtain, as necessary for submitting a tender offer, copies of the latest versions of standards, specifications, conditions of contract and other publications, which are not attached but which are incorporated into the tender documents by reference.

#### **C.2.6 Acknowledge addenda**

Acknowledge receipt of addenda to the tender documents, which the Employer may issue, and if necessary apply for an extension to the closing time stated in the tender data, in order to take the addenda into account.

#### **C.2.7 Clarification meeting**

Attend, where required, a clarification meeting at which tenderers may familiarize themselves with aspects of the proposed work, services or supply and raise questions. Details of the meeting(s) are stated in the tender data.

#### **C.2.8 Seek clarification**

Request clarification of the tender documents, if necessary, by notifying the Employer at least five (5) working days before the closing time stated in the tender data.

#### **C.2.9 Insurance**

Be aware that the extent of insurance to be provided by the Employer (if any) might not be for the full cover required in terms of the conditions of contract identified in the contract data. The tenderer is advised to seek qualified advice regarding insurance.

#### **C.2.10 Pricing the tender offer**

**C.2.10.1** Include in the rates, prices, and the tendered total of the prices (if any) all duties, taxes except Value Added Tax (VAT), and other levies payable by the successful tenderer, such duties, taxes and levies being those applicable 14 days before the closing time stated in the tender data.

**C.2.10.2** Show VAT payable by the Employer separately as an addition to the tendered total of the prices.

**C.2.10.3** Provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data.

**C.2.10.4** State the rates and prices in Rand unless instructed otherwise in the tender data. The conditions of contract identified in the contract data may provide for part payment in other currencies.

#### **C.2.11 Alterations to documents**

Do not make any alterations or additions to the tender documents, except to comply with instructions issued by the Employer, or necessary to correct errors made by the tenderer. All signatories to the tender offer shall initial all such alterations.

## **C.2.12 Alternative tender offers**

**C.2.12.1** Unless otherwise stated in the tender data, submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted as well as a schedule that compares the requirements of the tender documents with the alternative requirements that are proposed.

**C.2.12.2** Accept that an alternative tender offer may be based only on the criteria stated in the tender data or criteria otherwise acceptable to the Employer.

**C.2.12.3** An alternative tender offer may only be considered in the event that the main tender is the winning tender.

## **C.2.13 Submitting a tender offer**

**C.2.13.1** Submit one tender offer only, either as a single tendering entity or as a member in a joint venture to provide the whole of the works, services or supply identified in the contract data and described in the scope of works, unless stated otherwise in the tender data.

**C.2.13.2** Return all returnable documents to the Employer after completing them in their entirety, either electronically (if they were issued in electronic format) or by writing legibly in non-erasable ink.

**C.2.13.3** Submit the parts of the tender offer communicated on paper as an original plus the number of copies stated in the tender data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the Employer.

**C.2.13.4** Sign the original and all copies of the tender offer where required in terms of the tender data. The Employer will hold all authorized signatories liable on behalf of the tenderer. Signatories for tenderers proposing to contract as joint ventures shall state which of the signatories is the lead partner whom the Employer shall hold liable for the purpose of the tender offer.

**C.2.13.5** Seal the original and each copy of the tender offer as separate packages marking the packages as "ORIGINAL" and "COPY". Each package shall state on the outside the Employer's address and identification details stated in the tender data, as well as the tenderer's name and contact address.

**C.2.13.6** Where a two-envelope system is required in terms of the tender data, place and seal the returnable documents listed in the tender data in an envelope marked "financial proposal" and place the remaining returnable documents in an envelope marked "technical proposal". Each envelope shall state on the outside the Employer's address and identification details stated in the tender data, as well as the tenderer's name and contact address.

**C.2.13.7** Seal the original tender offer and copy packages together in an outer package that states on the outside only the Employer's address and identification details as stated in the tender data.

**C.2.13.8** Accept that the Employer will not assume any responsibility for the misplacement or premature opening of the tender offer if the outer package is not sealed and marked as stated.

**C.2.13.9** Accept that tender offers submitted by facsimile or e-mail will be rejected by the Employer, unless stated otherwise in the tender data.

**C.2.14 Information and data to be completed in all respects**

Accept that tender offers, which do not provide all the data or information requested completely and in the form required, may be regarded by the Employer as non-responsive.

**C.2.15 Closing time**

**C.2.15.1** Ensure that the Employer receives the tender offer at the address specified in the tender data not later than the closing time stated in the tender data. Accept that proof of posting shall not be accepted as proof of delivery.

**C.2.15.2** Accept that, if the Employer extends the closing time stated in the tender data for any reason, the requirements of these conditions of tender apply equally to the extended deadline.

**C.2.16 Tender offer validity**

**C.2.16.1** Hold the tender offer(s) valid for acceptance by the Employer at any time during the validity period stated in the tender data after the closing time stated in the tender data.

**C.2.16.2** If requested by the Employer, consider extending the validity period stated in the tender data for an agreed additional period, but no longer than 12 weeks.

**C.2.16.3** Accept that a tender submission that has been submitted to the Employer may only be withdrawn or substituted by giving the Employer's agent written notice before the closing time for tenders that a tender is to be withdrawn or substituted. If the validity period stated in C.2.16 lapses before the employer evaluating tender, the contractor reserves the right to review the price based on Consumer Price Index (CPI).

**C.2.16.4** Where a tender submission is to be substituted, submit a substitute tender in accordance with the requirements of C.2.13 with the packages clearly marked as "SUBSTITUTE".

**C.2.17 Clarification of tender offer after submission**

Provide clarification of a tender offer in response to a request to do so from the Employer during the evaluation of tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the competitive position of tenderers or substance of the tender offer is sought, offered, or permitted.

**Note:** *Sub-clause C.2.17 does not preclude the negotiation of the final terms of the contract with a preferred tenderer following a competitive selection process, should the Employer elect to do so.*

**C.2.18 Provide other material**

**C.2.18.1** Provide, on request by the Employer, any other material that has a bearing on the tender offer, the tenderer's commercial position (including notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the Employer for the purpose of a full and fair risk assessment. Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the Employer's request, the Employer may regard the tender offer as non-responsive.

**C.2.18.2** Dispose of samples of materials provided for evaluation by the Employer, where required.

**C.2.19 Inspections, test and analysis**

Provide access during working hours to premises for inspections, tests and analysis as provided for in the tender data.

**C.2.20 Submit securities, bonds and policies**

If requested, submit for the Employer's acceptance before formation of the contract, all securities, bonds, guarantees, policies and certificates of insurance required in terms of the conditions of contract identified in the contract data.

**C.2.21 Check final draft**

Check the final draft of the contract provided by the Employer within the time available for the Employer to issue the contract.

**C.2.22 Return of other tender documents**

If so instructed by the Employer, return all retained tender documents within 28 days after the expiry of the validity period stated in the tender data.

**C.2.23 Certificates**

Include in the tender submission or provide the Employer with any certificates as stated in the tender data.

**C.3 The Employer's undertakings**

**C.3.1 Respond to requests from the tenderer**

**C.3.1.1** Unless otherwise stated in the tender data respond to a request for clarification received up to five (5) working days before the tender closing time stated in the Tender Data and notify all tenderers who drew procurement documents.

**C.3.1.2** Consider any request to make a material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used to prequalify a tenderer to submit a tender offer in terms of a previous procurement process and deny any such request if as a consequence:

- a) an individual firm, or a joint venture as a whole, or any individual member of the joint venture fails to meet any of the collective or individual qualifying requirements;
- b) the new partners to a joint venture were not prequalified in the first instance, either as individual firms or as another joint venture; or
- c) in the opinion of the Employer, acceptance of the material change would compromise the outcome of the prequalification process.

**C.3.2 Issue addenda**

If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until three days before the tender closing time stated in the Tender Data. If, as a result a tenderer applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, shall then notify all tenderers who drew documents.

**C.3.3 Return late tender offers**

Return tender offers received after the closing time stated in the Tender Data, unopened, (unless it is necessary to open a tender submission to obtain a forwarding address), to the tenderer concerned.

#### **C.3.4 Opening of tender submissions**

**C.3.4.1** Unless the two-envelope system is to be followed, open valid tender submissions in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data. Tender submissions for which acceptable reasons for withdrawal have been submitted will not be opened.

**C.3.4.2** Announce at the meeting held immediately after the opening of tender submissions, at a venue indicated in the tender data, the name of each tenderer whose tender offer is opened and, where applicable, the total of his prices, number of points claimed for its BBBEE status level and time for completion for the main tender offer only.

**C.3.4.3** Make available the record outlined in C.3.4.2 to all interested persons upon request.

#### **C.3.5 Two-envelope system**

**C.3.5.1** Where stated in the tender data that a two-envelope system is to be followed, open only the technical proposal of valid tenders in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data and announce the name of each tenderer whose technical proposal is opened.

**C.3.5.2** Evaluate functionality of the technical proposals offered by tenderers, then advise tenderers who remain in contention for the award of the contract of the time and place when the financial proposals will be opened. Open only the financial proposals of tenderers, who score in the functionality evaluation more than the minimum number of points for functionality stated in the tender data, and announce the score obtained for the technical proposals and the total price and any points claimed on BBBEE status level. Return unopened financial proposals to tenderers whose technical proposals failed to achieve the minimum number of points for functionality

#### **C.3.6 Non-disclosure**

Not disclose to tenderers, or to any other person not officially concerned with such processes, information relating to the evaluation and comparison of tender offers, the final evaluation price and recommendations for the award of a contract, until after the award of the contract to the successful tenderer.

#### **C.3.7 Grounds for rejection and disqualification**

Determine whether there has been any effort by a tenderer to influence the processing of tender offers and instantly disqualify a tenderer (and his tender offer) if it is established that he engaged in corrupt or fraudulent practices.

#### **C.3.8 Test for responsiveness**

**C.3.8.1** Determine, after opening and before detailed evaluation, whether each tender offer properly received:

- a) complies with the requirements of these Conditions of Tender,
- b) has been properly and fully completed and signed, and
- c) is responsive to the other requirements of the tender documents.

**C.3.8.2** A responsive tender is one that conforms to all the terms, conditions, and specifications of the tender documents without material deviation or qualification. A material deviation or qualification is one which, in the Employer's opinion, would:

- a) detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work,
- b) significantly change the Employer's or the tenderer's risks and responsibilities under the contract, or
- c) affect the competitive position of other tenderers presenting responsive tenders, if it were to be rectified.

Reject a non-responsive tender offer, and not allow it to be subsequently made responsive by correction or withdrawal of the non-conforming deviation or reservation.

### **C.3.9 Arithmetical errors, omissions and discrepancies**

**C.3.9.1** Check responsive tenders for discrepancies between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern.

**C.3.9.2** Check the highest-ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tender offers in accordance with C.3.11 for:

- a) the gross misplacement of the decimal point in any unit rate;
- b) omissions made in completing the pricing schedule or bills of quantities; or
- c) arithmetic errors in:
  - i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or
  - ii) the summation of the prices.

**C.3.9.3** Notify the tenderer of all errors or omissions that are identified in the tender offer and either confirm the tender offer as tendered or accept the corrected total of prices.

**C.3.9.4** Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows:

- a) If bills of quantities or pricing schedules apply and there is an error in the line item total resulting from the product of the unit rate and the quantity, the line item total shall govern and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line item total as quoted shall govern, and the unit rate shall be corrected.
- b) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern and the tenderer will be asked to revise selected item prices (and their rates if bills of quantities apply) to achieve the tendered total of the prices.

Consider the rejection of a tender offer if the tenderer does not correct or accept the correction of the arithmetical error in the manner described above.

### **C.3.10 Clarification of a tender offer**

Obtain clarification from a tenderer on any matter that could give rise to ambiguity in a contract arising from the tender offer.

### C.3.11 Evaluation of tender offers

The Standard Conditions of Tender standardize the procurement processes, methods and procedures from the time that tenders are invited to the time that a contract is awarded. They are generic in nature and are made project-specific through choices that are made in developing the Tender Data associated with a specific project.

Conditions of tender are by definition the document that establishes a tenderer's obligations in submitting a tender and the Employer's undertakings in soliciting and evaluating tender offers. Such conditions establish the rules from the time a tender is advertised to the time that a contract is awarded and require Employers to conduct the process of offer and acceptance in terms of a set of standard procedures.

The CIDB Standard Conditions of Tender are based on a procurement system that satisfies the following system requirements:	
Requirement	Qualitative interpretation of the goal
Fair	The process of offer and acceptance is conducted impartially without bias, providing simultaneous and timely access to participating parties to the same information.
Equitable	Terms and conditions for performing the work do not unfairly prejudice the interests of the parties.
Transparent	The only grounds for not awarding a contract to a tenderer who satisfies all requirements are restrictions from doing business with the employer, lack of capability or capacity, legal impediments and conflicts of interest.
Competitive	The system provides for appropriate levels of competition to ensure cost-effective and best-value outcomes.
Cost-effective	The processes, procedures and methods are standardized with sufficient flexibility to attain the best value outcomes with respect of quality, timing and price, and least resources to effectively manage and control procurement processes.

#### C.3.11.1 General

The employer must appoint an evaluation panel of not less than three persons conversant with the proposed scope of works to evaluate each responsive tender offer using the tender evaluation methods and associated evaluation criteria and weightings that are specified in the tender data.

#### C.3.12 Insurance provided by the Employer

If requested by the proposed successful tenderer, submit for the tenderer's information the policies and/or certificates of insurance which the conditions of contract identified in the contract data, require the Employer to provide.

#### C.3.13 Acceptance of tender offer

Accept the tender offer, if in the opinion of the Employer, it does not present any unacceptable commercial risk and only if the tenderer:



- a) is not under restrictions, or has principals who are under restrictions, preventing participating in the Employer's procurement,
- b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract,
- c) has the legal capacity to enter into the contract,
- d) 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,
- e) complies with the legal requirements, if any, stated in the tender data, and
- f) is able, in the opinion of the Employer, to perform the contract free of conflicts of interest.

#### **C.3.14 Prepare contract documents**

**C.3.14.1** If necessary, revise documents that shall form part of the contract and that were issued by the Employer as part of the tender documents to take account of:

- a) addenda issued during the tender period,
- b) inclusion of some of the returnable documents, and
- c) other revisions agreed between the Employer and the successful tenderer.

**C.3.14.2** Complete the schedule of deviations attached to the form of offer and acceptance, if any.

#### **C.3.15 Complete adjudicator's contract**

Unless alternative arrangements have been agreed or otherwise provided for in the contract, arrange for both parties to complete formalities for appointing the selected adjudicator at the same time as the main contract is signed.

#### **C.3.16 Registration of the award**

**C.3.16.1** An Employer must, within twenty-one (21) working days from the date on which a contractor's offer to perform a construction works contract is accepted in writing by the employer, register and publish the award on the CIDB Register of Projects.

**C.3.16.2** After the successful tenderer has been notified of the Employer's acceptance of the tender, notify other tenderers that their tender offers have not been accepted.

#### **C.3.17 Provide copies of the contracts**

Provide to the successful tenderer the number of copies stated in the tender data of the signed copy of the contract as soon as possible after completion and signing of the form of offer and acceptance.

#### **C.3.18 Provide written reasons for actions taken**

Part T1: Tender Procedures

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Provide upon request written reasons to tenderers for any action that is taken in applying these conditions of tender, but withhold information which is not in the public interest to be divulged, which is considered to prejudice the legitimate commercial interests of tenderers or might prejudice fair competition between tenderers.

## **PART T2:      RETURNABLE DOCUMENTS**

### **TABLE OF CONTENTS**

<b>T2.1</b>	<b>LIST OF RETURNABLE DOCUMENTS .....</b>	<b>29</b>
<b>T2.2</b>	<b>RETURNABLE SCHEDULES .....</b>	<b>32</b>

## T2.1 LIST OF RETURNABLE DOCUMENTS

### RD.A RETURNABLE DOCUMENTS FOR TENDER EVALUATION PURPOSES

**Note:** *Failure to fully complete and submit the applicable documents will result in the tender offer being disqualified from further consideration*

Document Name	Reference	Confirmation of Document Included (Tenders may use this column to confirm documents have been completed and included in the tender)
Form of offer and acceptance	Section C1.1	
MBD 4: Declaration of interest	Form RD.A.1	
MBD 8: Declaration of tenderer's past supply chain management practices	Form RD.A.2	
Copy/s of Municipal Account/s of the tenderer and each Director/Member of the company or where applicable a copy of the lease agreement	Must be submitted	

### RD.B RETURNABLE DOCUMENTS REQUIRED FOR PREFERENTIAL PROCUREMENT EVALUATION PURPOSES

**Note:** *Failure to submit the applicable documents will result in the tender offer being awarded 0 (zero) preference points*

Document Name	Reference	Confirmation of Document Included (Tenders may use this column to confirm documents have been completed and included in the tender)
Preference Points claim form in terms of the Preferential procurement regulations 2022	Form RD.B.1	
Valid B-BBEE Status Level of Contributor Certificate	Form RD.B.2	
B-BBEE Exempted Micro Enterprise – Sworn Affidavit	Form RD.B.3	
Promotion of local enterprises (Local Economic Participation)	Form RD.B.4	
Certified copy of Identity Document/s proof of ownership (Sworn affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises, CIPC registration or any other proof of ownership)	Form RD.B.5	
Medical Certificate with doctor's details (Practice Number, Physical Address and contact numbers) proof of ownership (Sworn affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises, CIPC registration or any other proof of ownership)	Form RD.B.6	

**RD.C ADDITIONAL RETURNABLE DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

<b>Document Name</b>	<b>Reference</b>	<b>Confirmation of Document Included</b> (Tenders may use this column to confirm documents have been completed and included in the tender)
Tax clearance certificate	Must be submitted	
Schedule of Tenderer's experience	RD.C.1	
Schedule of Proposed Subcontractors	RD.C.2	
Schedule of Plant and Equipment	RD.C.3	
Compliance with OHSA (Act 85 of 1993)	RD.C.4	
Record of services provided to organs of state	RD.C.5	
Company information for tenders greater than R 10 million	RD.C.6	
Classification of Business	RD.C.7	
Certificate of Authority of Signatory	RD.C.8	
Status of Concern Submitting Tender	RD.C.9	
Proof of Registration with the CIDB 6EP or higher	As required	
Certificate of independent bid determination	RD.C.10	
Bank Rating Report	Form RD.C.11	
Copy/ies of Municipal Account/s of the tenderer and each Director/Member of the company or where applicable a copy of the lease agreement	Must be submitted	

**RD.D ADDITIONAL RETURNABLE DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT**

Document Name	Reference	Confirmation of Document Included (Tenders may use this column to confirm documents have been completed and included in the tender)
Evaluation Schedule: Test Certificates for Electrical Equipment	RD.D.1	
Estimated Monthly Expenditure on Contract Works by Tenderer	RD.D.2	
Key-Personnel / Management and Supervisory Staff	RD.D.3	
Quality Management Systems	RD.D.4	

**RD.E OTHER DOCUMENTS THAT WILL INCORPORATED INTO THE CONTRACT**

Document Name	Reference	Confirmation of Document Included (Tenders may use this column to confirm documents have been completed and included in the tender)
Form of offer and acceptance	Section C1.1	
Data provided by the contractor	Section C1.2	
Activity Schedules / Bill of Quantities	Section C2	
Record of addenda to tender documents	RD.E.1	
Proposed amendments	RD.E.2	
Cost price adjustment (CPA) Local contents (SEIFSA)	RD.E.3	
Cost price adjustment (CPA) Imported content (FOREX)	RD.E.4	
SCADA operation verification	RD.E.5	
Verification of schedule of particulars & guarantees	RD.E.6P	

## T2.2 RETURNABLE SCHEDULES

FORM RD.A.1	MBD 4: DECLARATION OF INTEREST.....	33
FORM RD.B.1	PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022.....	38
	TAX CLEARANCE CERTIFICATE REQUIREMENTS .....	43
FORM RD.C.1:	SCHEDULE OF TENDERER'S EXPERIENCE.....	50
FORM RD.C.1	EVALUATION SCHEDULE: SCHEDULE OF TENDERER'S EXPERIENCE .....	51
FORM RD.C.2	SCHEDULE OF PROPOSED SUBCONTRACTORS .....	52
FORM RD.C.3	SCHEDULE OF PLANT AND EQUIPMENT .....	53
FORM RD.C.4	COMPLIANCE WITH OHSA (ACT 85 OF 1993) .....	54
FORM RD.C.5	RECORD OF SERVICES PROVIDED TO ORGANS OF STATE.....	55
FORM RD.C.6	COMPANY INFORMATION FOR TENDERS GREATER THAN R10 MILLION .....	56
FORM RD.C.7	CLASSIFICATION OF BUSINESS.....	57
FORM RD.C.8	CERTIFICATE OF AUTHORITY OF SIGNATORY .....	59
FORM RD.C.9	STATUS OF CONCERN SUBMITTING TENDER .....	61
RD.C.10	CERTIFICATE OF INDEPENDENT BID DETERMINATION .....	64
RD.C.11	BANK RATING REPORT.....	67
FORM RD.D.1	EVALUATION SCHEDULE: TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT .....	68
FORM RD.D.2	ESTIMATED MONTHLY EXPENDITURE ON CONTRACT WORKS BY TENDERER .....	69
FORM RD.D.3:	KEY PERSONNEL EXPERIENCE - MANAGEMENT AND SUPERVISORY STAFF.....	70
FORM RD.D.3:	CURRICULUM VITAE OF KEY PERSONNEL .....	71
FORM RD.D.4	QUALITY MANAGEMENT SYSTEM .....	76
FORM RD.E.1	RECORD OF ADDENDA TO TENDER DOCUMENTS .....	77
FORM RD.E. 2	PROPOSED AMENDMENTS.....	78
FORM RD.E.3	COST PRICE ADJUSTMENT (CPA) LOCAL CONTENT (SEIFSA).....	79
FORM RD.E. 4	COST PRICE ADJUSTMENT (CPA) IMPORTED CONTENT (FOREX).....	80
FORM RD.E. 5	SCADA OPERATIONAL VERIFICATION .....	81
FORM RD.E.6P	VERIFICATION ON SCHEDULE OF PARTICULARS & GUARANTEES.....	82

**FORM RD.A.1 MBD 4:****DECLARATION OF INTEREST**

1. No bid will be accepted from persons in the service of the state<sup>1</sup>.
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 favouritism, 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, shareholder<sup>2</sup>) .....

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. ....

<sup>1</sup> MSCM 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.

<sup>2</sup> 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.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: ....

.....

1. Full details of directors / trustees / members / shareholders.

## Part T2: Returnable Documents

[illegible]

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

Person authorized to sign the tender:

Full name (in BLOCK letters):

Signature:

Date:

**FORM RD.A.2 MBD 8: DECLARATION OF TENDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES**

1. This Municipal Bidding Document (MBD) must form part of all tenders invited.
2. 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.
3. The tender of any tenderer may be rejected if that tenderer, or any of it's directors have:
  - a. abused the municipality's/municipal entity's supply management system or committed any improper conduct in relation to such system.
  - b. been convicted for fraud or corruption during the past five years.
  - c. wilfully neglected, reneged on or failed to comply with any government, Municipal or other public sector contract during the past five years; or
  - d. been listed in the Register for Tender Defaulters in terms of Section 29 of the Prevention and Combating of Corrupt Activities Act, 2004 (Act 12 of 2004).
4. In order to give effect to the above, the following questionnaire must be completed and submitted with the tender:

Item	Question	Response	
4.1	Is the tenderer, any of it's directors listed on the National Treasurer's database as a company or persons prohibited from doing business with the public sector? <b>(Companies for persons who are listed on this database were informed in writing of this restriction by the National Treasury after the audi alteram partem rule was applied)</b>	YES	NO
	If so, furnish particulars:	<input type="checkbox"/> <input type="checkbox"/>	
4.2	Is the tenderer or any of it's directors listed on the Register for Tender Defaulters in terms of Section 29 of the Prevention and Combating of Corrupt Activities Act, 2004 (Act 12 of 2004)? <b>(To access this register enter the National Treasury's website, <a href="http://www.treasury.gov.za">www.treasury.gov.za</a>, click on the icon "Register for Tender Defaulters" or submit your written request for a hard copy of the Register to facsimile number 012-326-5445).</b>	YES	NO
	If so, furnish particulars:	<input type="checkbox"/> <input type="checkbox"/>	
4.3	Was the tenderer 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
		<input type="checkbox"/> <input type="checkbox"/>	

Item	Question	Response	
	If so, furnish particulars:		
4.4	Does the tenderer 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 <input type="checkbox"/>	NO <input type="checkbox"/>
	If so, furnish particulars:		
4.5	Was any contract between the tenderer 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 <input type="checkbox"/>	NO <input type="checkbox"/>
	If so, furnish particulars:		

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

Person authorized to sign the tender:

Full name (in BLOCK letters):

Signature:

Date:

MBD 6.1

FORM RD.B.1

## 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**

### 1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to invitations to tender:

- 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).

### 1.2 To be completed by the organ of state

*(delete whichever is not applicable for this tender).*

- a) The applicable preference point system for this tender is the **80/20** preference point system.

1.3 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.

### 1.4 To be completed by the organ of state:

The maximum points for this tender are allocated as follows:

	Points
<b>PRICE</b>	<b>80</b>
<b>SPECIFIC GOALS</b>	<b>20</b>
<b>TOTAL POINTS FOR PRICE AND SPECIFIC GOALS</b>	<b>100</b>

1.5 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.

- 1.6 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.

## 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).

## 3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

### 3.1. POINTS AWARDED FOR PRICE

#### 3.1.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

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

$$Ps = 80 \left( 1 - \frac{Pt - P_{min}}{P_{min}} \right) \quad \text{or} \quad Ps = 90 \left( 1 - \frac{Pt - P_{min}}{P_{min}} \right)$$

Where

- Ps = Points scored for price of tender under consideration  
 Pt = Price of tender under consideration  
 Pmin = Price of lowest acceptable tender

## 3.2. FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

### 3.2.1. POINTS AWARDED FOR PRICE

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

$$80/20 \quad \text{or} \quad 90/10$$

$$P_s = 80 \left( 1 + \frac{P_t - P_{max}}{P_{max}} \right) \text{ or } P_s = 90 \left( 1 + \frac{P_t - P_{max}}{P_{max}} \right)$$

Where

$P_s$  = Points scored for price of tender under consideration

$P_t$  = Price of tender under consideration

$P_{max}$  = Price of highest acceptable tender

#### 4. POINTS AWARDED FOR SPECIFIC GOALS

- 4.1. 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:
- 4.2. 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—
- 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
  - 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.)**

Specific goals	80/20 preference point system	Number of points claimed (80/20 system) (To be completed by the tenderer)
BB-BEE score of companies <ul style="list-style-type: none"> <li>Level 1</li> <li>Level 2</li> <li>Level 3</li> <li>Level 4</li> <li>Level 5</li> <li>Level 6</li> <li>Level 7</li> <li>Level 8</li> <li>Non-compliant</li> </ul>	<ul style="list-style-type: none"> <li>8 Points</li> <li>7 Points</li> <li>6 Points</li> <li>5 Points</li> <li>4 Points</li> <li>3 Points</li> <li>2 Points</li> <li>1 Point</li> <li>0 Points</li> </ul>	

Specific goals	80/20 preference point system	Number of points claimed (80/20 system) (To be completed by the tenderer)
EME and/ or QSE	2 Points	
At least 51% of Women-owned companies	2 Points	
At least 51% owned companies by People with disability	2 Points	
At least 51% owned companies by Youth	2 Point	
Local Economic Participation <ul style="list-style-type: none"> <li>• City of Tshwane</li> <li>• Gauteng</li> <li>• National</li> </ul>	<ul style="list-style-type: none"> <li>• 4 Points</li> <li>• 2 Points</li> </ul> 1 Point	

**N.B** For points to be allocated as per above the tenderers will be required to submit proof of documentation as evidence for claims made. Any tenderer that does not submit evidence as stated in the bid document to claim applicable points will be allocated zero points.

#### DECLARATION WITH REGARD TO COMPANY/FIRM

4.3. Name of company/firm.....

4.4. Company registration number: .....

4.5. 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]

4.6. 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 –

- (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;
- (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.

.....  
**SIGNATURE(S) OF TENDERER(S)**

**SURNAME AND NAME:** .....

**DATE:** .....

**ADDRESS:** .....  
.....  
.....  
.....

## **FORM RD.B.2 VALID B-BBEE STATUS LEVEL OF CONTRIBUTOR CERTIFICATE**

Submit B-BBEE Verification Certificate from a Verification Agency accredited by the South African Accreditation System (SANAS) or a Registered Auditor approved by the Independent Regulatory Board of Auditors (IRBA) or an Accounting Officer as contemplated in the Close Corporation Act (CCA).

### NOTE:

1. Attach original copy of B-BBEE Verification Certificate to this page.
2. In the case of a joint venture / consortium parties must each attach original copy of their B-BBEE Verification Certificates.

**FORM RD.B.3 B-BBEE EXEMPTED MICRO ENTERPRISE – SWORN AFFIDAVIT**

I, the undersigned

<b>Full Name &amp; Surname</b>														
<b>Identity Number</b>														

Hereby declare under oath as follow:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.
2. I am a member / director / owner of the following enterprise and am duly authorised to act on its behalf.

<b>Enterprise Name</b>	
<b>Trading Name</b>	
<b>Registration Number</b>	
<b>Enterprise Address</b>	

3. I hereby declare under oath that:

- The enterprise is \_\_\_\_\_ % black owned;
- The enterprise is \_\_\_\_\_ % woman owned;
- The enterprise is \_\_\_\_\_ % owned companies by People with disability;
- The enterprise is \_\_\_\_\_ % owned companies by Youth;
- Based on the audited management accounts and other information available on the \_\_\_\_\_ financial year, the income did not exceed R 10,000,000 (ten million rands);
- Please confirm on the below the B-BBEE level contributor, by ticking the applicable box.

100% Black owned      **Level One** (135% B-BBEE procurement recognition)More than 51% Black owned      **Level Two** (125% B-BBEE procurement recognition)Less than 51% Black owned      **Level Four** (100% B-BBEE procurement recognition)

4. The entity is an empowering supplier in terms of the dti Codes of Good Practice
5. I know and understand the contents of the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the owners of the enterprise which I represent in this matter.
6. The sworn affidavit will be valid for a period of 12 (twelve) month from the date signed by the commissioner.

Deponent Signature:

Date:

Commissioner of oaths  
(Signature and stamp)

1. Attach original or certified copy of CSD registration certificate to this page.

2. In the case of a joint venture / consortium (excluding consulting engineering partners) the joint venture / consortium must attach original or certified copy of their CSD registration certificate to this page.

**FORM RD.B.4 PROMOTION OF LOCAL ENTERPRISES**

The City of Tshwane has mandated the promotion of local enterprises. To comply with this the tenderer must provide proof of the type of business unit and whether the unit resides within the Tshwane and will be scored as follow:

If 80/20 preference point system applies:

	Promotion of local enterprises
<b>No Response (score 0)</b>	The tenderer did not respond or comply with this evaluation schedule. A score of 0 will also be awarded for any misrepresentation made in this regard,
<b>Satisfactory (score 1)</b>	The tenderer operates a head office or fully staffed office or his sole office outside the boundaries of Gauteng Province. (I.e. no business unit or office resides within the boundaries of Tshwane Metropolitan Municipality)
<b>Good (score 2)</b>	The tenderer's office resides within the boundaries of Gauteng Province. (I.e. no business unit or office resides within the boundaries of Tshwane Metropolitan Municipality)
<b>Very good (score 4)</b>	The tenderer's office resides within the boundaries of the Tshwane Metropolitan Municipality.

Municipal Rates & Taxes not older than three months from tender advertisement date or Valid Lease Agreement should be attached as evidence.

(If necessary the tenderer will be requested to present the office / business unit to officials of the City)

The undersigned, who warrants that he / she is duly authorized to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

Person authorized to sign the tender:

Full name (in BLOCK letters): \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

### FORM RD.B.5 At least 51% Women owned companies and At least 51% owned companies by Youth

The City of Tshwane has mandate for the promotion At least 51% Women owned companies and At least 51% owned companies by youth. To comply with this the tenderer must provide Certified copy of Identity Document/s that proof that company is 51% owned by Women or youth

	<b>promotion At least 51% Women owned companies and At least 51% owned companies by youth</b>
<b>No Response (score 0)</b>	The tenderer did not respond or comply with this evaluation schedule. A score of 0 will also be awarded for any misrepresentation made in this regard,
<b>Good (score 1)</b>	Certified copy of Identity Document/s that proof that company is 51% owned by Women and proof of ownership (Sworn affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises, CIPC registration or any other proof of ownership)
<b>Good (score 2)</b>	Certified copy of Identity Document/s that proof that company is 51% owned by youth and proof of ownership (Sworn affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises, CIPC registration or any other proof of ownership)

(If necessary the tenderer will be requested to present the office / business unit to officials of the City)

The undersigned, who warrants that he / she is duly authorized to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.	
<b><u>Person authorized to sign the tender:</u></b>	
Full name (in BLOCK letters):	_____
Signature:	_____
Date:	_____

**FORM RD.B.6 At least 51% owned companies by People with disability**

The City of Tshwane has mandate for the promotion of At least 51% owned companies by People with disability. To comply with this the tenderer must provide Medical Certificate with doctor's details (Practice Number, Physical Address and contact numbers that proof that company is 51% owned by People with disability.

	<b>Promotion of At least 51% owned companies by People with disability</b>
<b>No Response (score 0)</b>	The tenderer did not respond or comply with this evaluation schedule. A score of 0 will also be awarded for any misrepresentation made in this regard,
<b>Good (score 2)</b>	Medical Certificate with doctor's details (Practice Number, Physical Address and contact numbers and proof of ownership (Sworn affidavit for B-BBEE qualifying small enterprise or Exempt Micro Enterprises, CIPC registration or any other proof of ownership

(If necessary the tenderer will be requested to present the office / business unit to officials of the City)

The undersigned, who warrants that he / she is duly authorized to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters): \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## TAX CLEARANCE CERTIFICATE REQUIREMENTS

It is a condition of bid that the taxes of the successful bidder must be in order, or that satisfactory arrangements have been made with South African Revenue Service (SARS) to meet the bidder's tax obligations.

1. In order to meet this requirement bidders are required to complete in full the form TCC 001 "Application for a Tax Clearance Certificate" and submit it to any SARS branch office nationally. The Tax Clearance Certificate Requirements are also applicable to foreign bidders / individuals who wish to submit bids.
2. SARS will then furnish the bidder with a Tax Clearance Certificate that will be valid for a period of 1 (one) year from the date of approval.
3. The original Tax Clearance Certificate must be submitted together with the bid. Failure to submit the original and valid Tax Clearance Certificate will result in the invalidation of the bid. Certified copies of the Tax Clearance Certificate will not be acceptable.
4. In bids where Consortia / Joint Ventures / Sub-contractors are involved, each party must submit a separate Tax Clearance Certificate.
5. Copies of the TCC 001 "Application for a Tax Clearance Certificate" form are available from any SARS branch office nationally or on the website [www.sars.gov.za](http://www.sars.gov.za).
6. Applications for the Tax Clearance Certificates may also be made via eFiling. In order to use this provision, taxpayers will need to register with SARS as eFilers through the website [www.sars.gov.za](http://www.sars.gov.za)

Attach Tax Certificate/s to this page



**FORM RD.C.1: SCHEDULE OF TENDERER'S EXPERIENCE**

The following is a statement of similar work successfully executed by myself/ourselves.

Employer, contact person and telephone number	Description of contract	Value of work	*Date of appointment	**Date of completion

\* Attach signed copies of contract appointment letters

\*\* Attach signed copies of contract completion certificates

(Attach additional pages if more space is required)

**FORM RD.C.1 EVALUATION SCHEDULE: SCHEDULE OF TENDERER'S EXPERIENCE**

NO	CRITERIA	SUB-CRITERIA	SCALE	WEIGHT	HIGHEST POSSIBLE SCORE
1	<p><b>TRACK RECORD AND TECHNICAL EXPERTISE</b></p> <p>Complete Form RD.C.1 and attach <u>signed</u> copies of contract appointment letters and project completion certificates for work successfully completed by the tenderer.</p> <p>Completed projects must entail the supply, delivery, installation, testing, and commissioning of electrical equipment in substations.</p>	<p>Appointment letters and completion certificates for two (2) completed substation projects</p> <p>Appointment letters and completion certificates for three (3) completed substation projects</p> <p>Appointment letters and completion certificates for four (4) completed substation projects</p> <p>Appointment letters and completion certificates for five (5) or more completed substation projects</p>	<p>1</p> <p>2</p> <p>3</p> <p>4</p>	10	40

**FORM RD.C.2 SCHEDULE OF PROPOSED SUBCONTRACTORS**

You, the client, are hereby notified that it is our intention to employ the following Subcontractors for work on this contract.

If we are awarded a contract, we agree that this notification does not change the requirement for us to submit the names of proposed Subcontractors in accordance with requirements in the contract for such appointments. If there are no such requirements in the contract, then your written acceptance of this list shall be binding between us.

	NAME AND ADDRESS OF PROPOSED SUBCONTRACTOR	NATURE AND EXTENT OF WORK
1.		
2.		
3.		
4.		
5.		

**FORM RD.C.3 SCHEDULE OF PLANT AND EQUIPMENT**

The following are lists of major items of relevant equipment that I/we presently own or lease and will have available for this contract or will acquire or hire for this contract if my/our tender is accepted.

**1. Details of major equipment that is owned by and immediately available for this contract.**

QUANTITY	DESCRIPTION, SIZE, CAPACITY, ETC.

(Attach additional pages if more space is required)

**2. Details of major equipment that will be hired, or acquired for this contract if my/our tender is acceptable.**

QUANTITY	DESCRIPTION, SIZE, CAPACITY, ETC.

(Attach additional pages if more space is required)

**FORM RD.C.4 COMPLIANCE WITH OHSA (ACT 85 OF 1993)**

Tenderers are required to satisfy the Employer and the Engineer as to their ability and available resources to comply with the above by answering the following questions and providing the relevant information required below.

(Tick applicable box)

1. Is your company familiar with the OHSA (ACT 85 of 1993) and its Regulations? Do you have a copy available?	YES	NO
2. Who will prepare your company's Health and Safety Plan? Provide a copy of the person/s curriculum vitae/s or company profile.		
3. Does your company have a health and safety policy? If YES provide a copy.	YES	NO
4. How is this policy communicated to your employees? Provide supporting documentation.	YES	NO
5. Does your company keep record of safety aspects of each site where work is performed? If YES what records are kept?	YES	NO
6. Does your company conduct monthly safety meetings? If YES, provide copies of the Minutes of the last 2 meetings held.	YES	NO
7. Does your company have a safety officer in its employment, responsible for overall safety of your company? If YES, explain his duties and provide a copy of his CV ( <i>only if not the same person as in question 2 above</i> ). If NO, indicate who will be appointed as safety officer for this project and provide a copy of his/her CV.	YES	NO
8. Indicate the total number of employees in the Company.	_____	
9. Does your company have trained first aid employees? If YES, indicate who.	YES	NO
10. Does your company have a safety induction training programme in place? If YES, provide a summary of topics covered in such induction training programme.	YES	NO

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

Signature:

Date:

**FORM RD.C.5 RECORD OF SERVICES PROVIDED TO ORGANS OF STATE**

Tenderers are required to complete this record in terms of the Supply Chain Management Regulations issued in terms of the Municipal Finance Management Act of 2003.

Include only those contracts where the tenderer identified in the signature block below was directly contracted by the employer. Tenderers must not include services provided in terms of a sub-contract agreement.

Where contracts were awarded in the name of a joint venture and the tenderer formed part of that joint venture, indicate in the column entitled "Title of the contract for the service" that was in joint venture and provide the name of the joint venture that contracted with the employer. In the column for the value of the contract for the service, record the value of the portion of the contract performed (or to be performed) by the tender.

Complete the record or attach the required information in the prescribed tabulation

ALL SERVICES COMMENCED OR COMPLETED TO AN ORGAN OF STATE IN THE LAST FIVE YEARS				
	Organ of state, i.e. national or provincial department, public entity, municipality or municipal entity.	Title of contract for the service	Value of contract for service incl. VAT (Rand)	Date completed (State current if not yet completed)
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				

(Attach additional pages if more space is required.)

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

Signature:

Date:

**FORM RD.C.6 COMPANY INFORMATION FOR TENDERS GREATER THAN R10 MILLION**

1. The tenderer is required by law to prepare annual financial statements for auditing and is therefore requested to provide audited annual financial statements:

- for the past three years; or
- since their establishment if established during the past three years.

Indicate whether these have been included in the tender: **YES / NO**

2. Does the tenderer have any undisputed commitments for Municipal services towards a municipality or other service provider in respect of which payment is overdue for more than 30 days? **YES / NO**

If so, state particulars

.....

3. Have any contracts been awarded to the tenderer by an organ of state during the past five years? **YES / NO**

If so, state particulars

.....

4. Has there been any material non-compliance or dispute concerning the execution of such contract? **YES / NO**

If so, state particulars

.....

5. Is any portion of the goods or services expected to be sourced out from outside the Republic? **YES / NO**

If so, state what portion and whether any portion of payment from the Municipality is expected to be transferred out of the Republic.

.....

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

\_\_\_\_\_

Signature:

\_\_\_\_\_

Date:

\_\_\_\_\_

**FORM RD.C.7 CLASSIFICATION OF BUSINESS**

1. The Small Businesses are defined in the National Small Business Act, 1996 (Act 102 of 1996).
2. Information furnished with regard to the classification of Small businesses
- (a.) Indicate whether the company/entity is defined as a small, medium or micro enterprise by the National Small Business Act.

YES	NO
-----	----

(Tick appropriate box)

- (b.) If the response to 2.(a.) is **YES**, the following must be completed:

- i. Sector/sub-sector in accordance with the Standard Industrial classification:

---

- ii. Size or class:

- iii. Total full-time equivalent of paid employees:

- iv. Total annual turnover:

- v. Total gross asset value (fixed property excluded):

---

(A schedule indicating the different sectors is attached to this form.)

- (c.) The tenderer should substantiate the information provided by submitting the following documentation:
- i. A letter from the tenderer's auditor or an affidavit from the South African Police Services confirming the correctness of the abovementioned information,
  - ii. Company profile indicating the tenderer's staff compliment, and
  - iii. 3 year financial statement or since their establishment if established during the past 3 years.



**SCHEDULE OF SECTORS**

SIZE OF CLASS	THE TOTAL FULL-TIME EQUIVALENT OF PAID EMPLOYEES	TOTAL TURNOVER	TOTAL GROSS ASSET VALUE (FIXED PROPERTY EXCLUDED)
<b>AGRICULTURE</b>			
Medium	100	R 5 mil	R 5 mil
Small	50	R 3 mil	R 3 mil
Very Small	10	R 500 000	R 500 000
Micro	5	R 200 000	R 100 000
<b>MINING AND QUARRYING</b>			
Medium	200	R 39 mil	R 23 mil
Small	50	R 10 mil	R 6 mil
Very Small	20	R 4 mil	R 2 mil
Micro	5	R 200 000	R 100 000
<b>MANUFACTURING</b>			
Medium	200	R 51 mil	R 19 mil
Small	50	R 13 mil	R 5 mil
Very Small	20	R 5 mil	R 2 mil
Micro	5	R 200 000	R 100 000
<b>ELECTRICITY, GAS &amp; WATER</b>			
Medium	200	R 51 mil	R 19 mil
Small	50	R 13 mil	R 5 mil
Very Small	20	R 5.1 mil	R 1.9 mil
Micro	5	R 200 000	R 100 000
<b>CONSTRUCTION</b>			
Medium	200	R 26 mil	R 5 mil
Small	50	R 6 mil	R 1 mil
Very Small	20	R 3	R 500 000
Micro	5	R 200 000	R 100 000
<b>RETAIL AND MOTOR TRADE &amp; REPAIR SERVICES</b>			
Medium	200	R 39 mil	R 6 mil
Small	50	R 19 mil	R 3 mil
Very Small	20	R 4 mil	R 600 000
Micro	5	R 200 000	R 100 000
<b>WHOLESALE TRADE, COMMERCIAL AGENTS AND ALLIED SERVICES</b>			
Medium	200	R 64 mil	R 10 mil
Small	50	R 32 mil	R 5 mil
Very Small	20	R 6 mil	R 600 000
Micro	5	R 200 000	R 100 000
<b>CATERING, ACCOMMODATION AND OTHER TRADE</b>			
Medium	200	R 13 mil	R 3 mil
Small	50	R 6 mil	R 1 mil
Very Small	20	R 5.1 mil	R 1.9 mil
Micro	5	R 200 000	R 100 000
<b>TRANSPORT, STORAGE &amp; COMMUNICATIONS</b>			
Medium	200	R 26 mil	R 6 mil
Small	50	R 13 mil	R 3 mil
Very Small	20	R 3 mil	R 600 000
Micro	5	R 200 000	R 100 000
<b>FINANCE &amp; BUSINESS SERVICES</b>			
Medium	200	R 26 mil	R 5 mil
Small	50	R 13 mil	R 3 mil
Very Small	20	R 3 mil	R 500 000
Micro	5	R 200 000	R 100 000
<b>COMMUNITY, SOCIAL AND PERSONAL SERVICES</b>			
Medium	200	R 13 mil	R 6 mil
Small	50	R 6 mil	R 3 mil
Very Small	20	R 1mil	R 600 000
Micro	5	R 200 000	R 100 000

**FORM RD.C.8 CERTIFICATE OF AUTHORITY OF SIGNATORY****RESOLUTION** of the a meeting of the \*Board of Directors/Members/Partners of

(Legally correct full name and registration number, if applicable, of the enterprise)

Held at: (place)

On: (date)

**RESOLVED** that:

- The enterprise submits a tender to the Tshwane Metro Municipality in respect of the following project:

Tender Number:

**EEBU 08 2025/26**

Tender Description:

**TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS: AS AND WHEN REQUIRED OVER A THREE (3) YEAR PERIOD**

- \*Mr/Ms:

in \*his/her capacity as

and who will sign as follow:

Proof signature	Proof signature
-----------------	-----------------

be, and is hereby authorised to sign the tender, and any and all other documents and/or correspondence in connection with and relating to the tender for the enterprise mentioned above

NAME	CAPACITY	SIGNATURE

Note:

- \*Delete which is not applicable.
- IMPORTANT: This resolution must be signed by all the directors/members/ partners of the tendering enterprise.
- Should the number of directors/members/partners exceed the space available above, additional names and signatures must be supplied on a separate page.

Enterprise stamp

**CERTIFICATE OF AUTHORITY OF SIGNATORY FOR JOINT VENTURES AND CONSORTIA**

This Returnable Document is to be completed by joint ventures. *(Attach additional pages if more space is required.)*

We, the undersigned, are submitting this tender in a \*joint venture/consortium and hereby authorise \*Mr/Ms

authorised signatory of the enterprise

acting in the capacity of lead partner

to sign the tender, and any and all other documents and/or correspondence in connection with and relating to the tender for the \*joint venture/consortium mentioned above.

Registered name of enterprise	Registration number	% of contract value	Address	Duly authorised signatory	Mark with (x) for lead partner

**Note:**

1. \*Delete which is not applicable.
2. IMPORTANT: This resolution must be signed by all the parties of the joint venture/consortium and every duly authorised signatory for each party to the joint venture/consortium must complete a Form RD.C.15.
3. Should the number of directors/members/partners exceed the space available above, additional names and signatures must be supplied on a separate page.

**FORM RD.C.9 STATUS OF CONCERN SUBMITTING TENDER**

## 1. General

State whether the tenderer is a company, a closed corporation, a partnership, a sole practitioner, a joint venture/consortium or a co-operative

Public Company

Private Company

Closed Corporation

Partnership

Sole Proprietary

Joint Venture / Consortium

Co-operative

(Mark the appropriate option)


## 2. Information to be provided

If the Tendering Entity is a:		Documentation to be submitted with the tender
1	<u>Closed Corporation</u> , incorporated under the Close Corporation Act, 1984, Act 69 of 1984	CIPRO CK1 or CK2 (Certified copies of the founding statement) and list of members
2	<u>Private Company</u> incorporated with share capital, under the companies Act, 1973, Act 61 of 1973 (Including Companies incorporated under Art 53 (b))	Certified copies of: <ul style="list-style-type: none"> <li>a) CIPRO CM 1 - Certificate of Incorporation</li> <li>b) CIPRO CM 29 – Contents of Register of Directors, Auditors and Officers</li> <li>c) Shareholders Certificates of all Members of the Company, plus a signed statement of the Company's Auditor, certifying each Member's ownership/shareholding percentage relative to the total.</li> </ul>
3	<u>Private Company</u> incorporated with share capital, under the companies Act, 1973, Act 61 of 1973 in which any, or all, <u>shares are held by another</u> Closed Corporation or company with, or without, share capital.	Certified copies of documents referred to in 1 and/or 2 above in respect of all such Closed Corporations and/or Companies
4	<u>Public Company</u> incorporated with share capital, under the companies Act, 1973, Act 61 of 1973 (Including Companies incorporated under Art 21)	A signed statement of the Company's Secretary confirming that the Company is a public Company.
5	<u>Sole Proprietary</u> or a <u>Partnership</u>	Certified copy of the Identity Document of: <ul style="list-style-type: none"> <li>a) such Sole Proprietary, or</li> <li>b) Each of the Partners in the Partnership</li> </ul> Certified copy of the Partnership agreement.

Part T2: Returnable Documents

If the Tendering Entity is a:		Documentation to be submitted with the tender
6	<u>Co-operative</u>	CIPRO CR2 - Certified copies of Company registration document.
7	<u>Joint Venture / Consortium</u>	All the documents (as described above) as applicable to each partner in the joint venture / consortium as well as a certified copy of the joint venture / consortium agreement.

**Note:**

1. If the shares are held in trust provide a copy of the Deed of Trust (only the front page and pages listing the trustees and beneficiaries are required) as well as the Letter of Authority as issued by the Master of the Supreme Court wherein trustees have been duly appointed and authorised
2. Include a certified copy of the Certificate of Change of Name (CM9) if applicable.

## 3. Registered for VAT proposes in terms of the Value-Added Tax Act (89 of 1991)

Yes

<input type="checkbox"/>
<input type="checkbox"/>

No

(Make an X in the appropriate space)

REGISTRATION NO: \_\_\_\_\_

**PROOF OF REGISTRATION WITH THE CIDB**

3. Attach original or certified copy of CIDB registration certificate to this page.
4. In the case of a joint venture / consortium (excluding consulting engineering partners) parties must each attach original or certified copy of their CIDB registration certificate.

Firm	CRS Number	CIDB Grading	Lead Partner (Indicate with X)
<b>Combined CIDB Grading for Joint Venture / Consortium:</b>			

(Calculator is available at <https://registers.cidb.org.za/common/jvcalc.asp> )

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

Signature:

Date:

## RD.C.10 CERTIFICATE OF INDEPENDENT BID DETERMINATION

1. This Municipal Bidding Document (MBD) must form part of all bids<sup>1</sup> invited.
2. 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) <sup>2</sup>. Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.
3. 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:
  - a. Take all reasonable steps to prevent such abuse;
  - b. 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
  - c. 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.
4. 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.
5. In order to give effect to the above, the attached Certificate of Bid Determination (MBD 9) must be completed and submitted with the bid.

<sup>1</sup>Includes price quotations, advertised competitive bids, limited bids and proposals.

<sup>2</sup>Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices of 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.

**CERTIFICATE OF INDEPENDENT BID DETERMINATION**

I, the undersigned, in submitting the accompanying bid:

**EEBU 08 2025/26 -TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS: AS AND WHEN REQUIRED OVER A THREE (3) YEAR PERIOD**

(Bid Number and Description)

In response to the invitation for the bid made by:

**City of Tshwane Metropolitan Municipality**

(Name of Municipality/Municipal Entity)

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

I certify, on behalf of,

(Name of Bidder)

that:

1. I have read and 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 authorised 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 authorised 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, based on their qualifications, abilities or experience; and
  - b. Could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and 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 form, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium<sup>3</sup> 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 services will be rendered (market allocation);
  - c. Methods, factors or formulas used to calculate prices;
  - 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 arrangement 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 to the awarding of the contract.
10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practises 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 form conduction 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.

<sup>3</sup> Joint venture of Consortium means an associations of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

Signature:

Date:

**RD.C.11 BANK RATING REPORT****Banking Details:**

<b>Bank:</b>	
<b>Branch:</b>	
<b>Name of Account:</b>	
<b>Account No.:</b>	
<b>Type of Account:</b>	

*The Tenderer shall affix a Bank Rating Report, stamped and verified by the bank, to this page.*

**FORM RD.D.1 EVALUATION SCHEDULE: TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT**

Equipment	Submitted Type Test Certificate. State YES/NO	Test Laboratory / Institution	Date of Testing
11kV Metal Clad Indoor Switchgear			
11kV Metal Enclosed Indoor Switchgear			

**FORM RD.D.2 ESTIMATED MONTHLY EXPENDITURE ON CONTRACT WORKS BY TENDERER**

The tenderer shall, in the table below, state the estimated cash flow on the contract based on his preliminary programme, his tendered unit rates and his submission of payment certificates to the Employer. Amounts for Contract Price Adjustment shall not be included.

Payment Certificate No.	Amount (VAT Included)					
	a	b	a-b			Cumulative cash flow
	Payments Received	Expenditure		Net cash flow		
1	None		d		j=d	
2			e		k=j+e	
3			f		l=k+f	
4			g		m=l+g	
5			h		n=m+h	
6			etc		etc	
7						
8						
9						
10						
11						
12						
13						
14						
etc						
Maximum negative cash flow: take the largest negative number in the last column and write it here						

From what sources will you fund the above amount (e.g. funds internally available, bank overdraft, loan, partner (his source), etc.)

.....

.....

.....

.....

**FORM RD.D.3: KEY PERSONNEL EXPERIENCE - MANAGEMENT AND SUPERVISORY STAFF**

The tenderer shall list in the table below the key personnel to be engaged for this project.

**Note:** Form RD.D.3 must be complete for each person listed below.

	NAME	CATEGORY <sup>1</sup>	LOCAL / NON LOCAL
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

(Attach additional pages if more space is required)

<sup>1</sup> The Contractor shall fill in the various categories, e.g. Site, Agent, Foreman, Trainers, Plant Operators, Clerks, Technicians, Laboratory Assistants, etc. as required.

**FORM RD.D.3: CURRICULUM VITAE OF KEY PERSONNEL (DIRECTOR/SENIOR MANAGER)****Note:** This form should be completed for each key person listed in Form RD.D.3

<b>Name:</b>	<b>Date of birth:</b>
<b>Profession:</b>	<b>Nationality:</b>
<b>Qualifications:</b>	
<b>Professional membership:</b>	
<b>Name of employer (firm):</b>	
<b>Current position:</b>	<b>Years with firm:</b>
<b>Employment record:</b> (list in chronological order starting with earliest work experience)	
<b>Experience record pertinent to required service:</b>	
<b>Certification:</b>  I, the undersigned, certify that to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.	
_____ (Signature of person named in schedule)	_____ Date:

**FORM RD.D.3: CURRICULUM VITAE OF KEY PERSONNEL (PROJECT ENGINEER)****Note:** This form should be completed for each key person listed in Form RD.D.3

<b>Name:</b>	<b>Date of birth:</b>
<b>Profession:</b>	<b>Nationality:</b>
<b>Qualifications:</b>	
<b>Professional membership:</b>	
<b>Name of employer (firm):</b>	
<b>Current position:</b>	<b>Years with firm:</b>
<b>Employment record:</b> (list in chronological order starting with earliest work experience)	
<b>Experience record pertinent to required service:</b>	
<b>Certification:</b>  I, the undersigned, certify that to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.	
_____	_____
(Signature of person named in schedule)	Date:

**FORM RD.D.3: CURRICULUM VITAE OF KEY PERSONNEL (SITE SUPERVISOR)****Note:** This form should be completed for each key person listed in Form RD.D.3

<b>Name:</b>	<b>Date of birth:</b>
<b>Profession:</b>	<b>Nationality:</b>
<b>Qualifications:</b>	
<b>Professional membership:</b>	
<b>Name of employer (firm):</b>	
<b>Current position:</b>	<b>Years with firm:</b>
<b>Employment record:</b> (list in chronological order starting with earliest work experience)	
<b>Experience record pertinent to required service:</b>	
<b>Certification:</b>  I, the undersigned, certify that to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.	
_____ (Signature of person named in schedule)	_____ Date:



**EPWP STAFF FOR LABOUR INTENSIVE CONSTRUCTION WORKS**

The tenderer shall, submit the names of all management, design and supervisory staff that will be employed to design and supervise the labour intensive portion of the works together with satisfactory documentary evidence that such staff members satisfy the eligibility requirements.

CATEGORY OF EMPLOYEE	NAME OF EMPLOYEE	NQF LEVEL	LABOUR INTENSIVE SKILLS PROGRAM UNIT STANDARD TITLES	DATE COMPLETED	YEARS EXPERIENCE
Designer					

***NQF 7 Unit Standard Required: Develop and Promote Labour Intensive Construction Strategies***

Administrator/ Site supervisor					
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***NQF 5 Unit Standard Required: Manage Labour Intensive Construction Projects***

(Attach documentary proof to this page)

**RD.D. 3 Evaluation Schedule: Key personnel experience - Management and supervisory staff**

NO	CRITERIA	SUB-CRITERIA	SCALE	WEIGHT	HIGHEST POSSIBLE SCORE
2	<p><b>EXPERIENCE OF KEY PERSONNEL</b></p> <p>The tenderer must have in his employ, personnel with the relevant experience in the supply, delivery, installation, testing, and commissioning of electrical equipment in substations.</p> <p>It is compulsory for the tenderer to complete Form RD.D.3 and indicate the experience record of each key personnel pertinent to the installation of equipment in substations.</p>	Points will only be allocated for personnel with a minimum of five (5) years' experience in the installation, testing, and commissioning of electrical equipment in substations.			
		<5years, (0 points)			
		>5years, (1 point)			
		(Note: Points will be allocated and added for all key personnel)			
		Director/Senior Manager	1	10	30
		Project Engineer	1		
		Site Supervisor	1		

**FORM RD.D.4 QUALITY MANAGEMENT SYSTEM**

Briefly describe the construction quality system incorporated by the tenderer in his organisation and which will be applicable to this Contract.

	Internal	External	Name of responsible Company /or Person (In case of Person give years' experience and qualification)
Survey: Setting out of the works and control			
Testing Laboratory			
Additional quality systems			

**RD.D. 4 Evaluation Schedule: Quality Management System**

NO	CRITERIA	SUB-CRITERIA	SCALE	WEIGHT	HIGHEST POSSIBLE SCORE
3	<b>QUALITY MANAGEMENT SYSTEM</b>  The tenderer must describe the construction quality system incorporated by the tenderer in his organisation and which will be applicable to this Contract  (RD.D4) Evaluation schedule: Quality Management System form to be filled by the tender	Provide company's ISO 9001 quality compliance certificate	1	10	20
		Provide company's ISO 14001 compliance certificate	1		

**FORM RD.E.1 RECORD OF ADDENDA TO TENDER DOCUMENTS**

We confirm that the following communications received from the Employer before submission of this tender, amending or amplifying the tender documents, have been taken in account in this tender offer:

	DATE	REFERENCE	TITLE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

Signature:

Date:

**FORM RD.E. 2 PROPOSED AMENDMENTS**

The Tenderer should record any deviations or qualifications he may wish to make to the tender documents in this Returnable Schedule. Alternatively, a tenderer may state such deviations and qualifications in **a covering letter to his tender and reference such letter in this schedule.**

The Tenderer's attention is drawn to clause 3.8 of the Standard Conditions of Tender referenced in the Tender Data regarding the Employer's handling of material deviations and qualifications.

PAGE	CLAUSE OR ITEM	PROPOSAL

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

Signature:

Date:

**FORM RD.E.3 COST PRICE ADJUSTMENT (CPA) LOCAL CONTENT (SEIFSA)**Is/Are the tender price/s firm until the end of contract period? **(YES/NO)**

If not:	
---------	--

**LOCAL CONTENT:**

Submit the cost factors which will be taken into account in the event of price increase/decrease, as well as the compilation of the tender price/s, i.e. cost price, transport cost, margin of profit, etc.

		INDEX FIGURE AND BASE DATE ( E.G., SEIFSA TABLE E1)
Fixed	a= 0.1	
Material	b=	
Labour	c=	
Transport	d=	
Profit	e=	
Other		
Total	1	

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

Signature:

Date:

**FORM RD.E. 4 COST PRICE ADJUSTMENT (CPA) IMPORTED CONTENT (FOREX)**Is/Are the tender price/s firm until the end of contract period? **YES/NO):**

If not:	
---------	--

**IMPORTED CONTENT:**

When the price/s is/are subject to the rate of exchange, submit the price basis on which the exchange rate will be based (e.g. F.O.B. value, fixed value in respect of foreign exchange, etc.)

(ii) exchange rate upon which the bid price is based

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(ii) What portion of the bid price (percentage or amount) will be affected by variations in the exchange rate?

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**NB:** *Tenderers are also required to submit a bank statement or an auditor's report regarding the actual exchange rate in respect of the transaction value paid to the overseas supplier.*

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

Signature:

Date:

**FORM RD.E. 5 SCADA OPERATIONAL VERIFICATION****CITY OF TSHWANE**

This Certifies that the Supplier (Tenderer):.....

Product Description offered:.....

.....

Has performed the required compatibility verification tests on site of the customer, the customer being: The City of Tshwane, Electricity Department, Power Management, Operational Systems SCADA, Capital Park, Pretoria.

The criteria for SCADA compatibility being:

ITEM	REQUIREMENT	VERIFIED YES/NO
1.	Interfacing with the front-end processor utilizing DNP3.3 protocol.	
2.	Digital input status verification to mapped points, 1bit and 2bit.	
3.	Digital output control verification to mapped points.	
4.	Analogue input verification to mapped points.	
5.	Transformer tap position indication, verification.	
6.	Sequence of events (SOE) with time stamping verification.	

These tests were conducted on site on the:...../...../.....

Approved and Witnessed by the following role players:

- ☐ The Engineer, Tshwane, SCADA: ..... Date .....
- ☐ The Supplier, Tenderer: ..... Date .....
- ☐ Consulting Engineers: ..... Date .....

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters): .....

Signature: .....

Date: .....



**FORM RD.E.6P VERIFICATION ON SCHEDULE OF PARTICULARS & GUARANTEES**

**All bidders must complete the form in full. Failure to provide the required detailed information called for in the schedules will result in the bidders to be disqualified.**

**CONTENTS**

PART	DESCRIPTION	Verify if the requirements that are specified in the following schedules of particulars and guarantees		
		1	2	3
		1. Are the schedules completed in full? State YES or NO 2. Do all items comply fully to the specifications required? State YES or NO 3. Do you comply with IEC and SABS specifications? State YES or NO		
1	General Requirements			
8	11kV Cable, Connection, Termination and Accessories			
9	Earthing			
10	11 kV Switchgear Panels			
16	SCADA			

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

**Person authorized to sign the tender:**

Full name (in BLOCK letters):

Signature:

Date:

**PORTION 2: CONTRACT**

**PART C1: AGREEMENTS AND CONTRACT DATA**

**TABLE OF CONTENTS**

**C.1.1 FORM OF OFFER AND ACCEPTANCE ..... 2**

**C1.2 CONTRACT DATA ..... 7**

**C1.3 FORM OF GUARANTEE..... 26**

**C1.4 GUARANTEE ..... 29**

**C1.5 HEALTH AND SAFETY AGREEMENT ..... 30**

## C1.1 FORM OF OFFER AND ACCEPTANCE

STAMP

### OFFER

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract in respect of the following works:

### **TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS: AS AND WHEN REQUIRED OVER A THREE (3) YEAR PERIOD**

The tenderer, identified in the offer signature block, has examined the documents listed in the tender data and addenda thereto as listed in the returnable schedules, and by submitting this offer has accepted the conditions of tender.

By the representative of the tenderer, deemed to be duly authorized, signing this part of this form of offer and acceptance, the tenderer offers to perform all of the obligations and liabilities of the contractor under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the conditions of contract identified in the contract data.

THE OFFERED TOTAL OF THE PRICES INCLUSIVE OF VALUE ADDED TAX IS

.....Rand (in words);

R ..... (in figures) (or other suitable wording)

This offer may be accepted by the employer by signing the acceptance part of this form of offer and acceptance and returning one copy of this document to the tenderer before the end of the period of validity stated in the tender data, whereupon the tenderer becomes the party named as the contractor in the conditions of contract identified in the contract data.

Signature.....

Name .....

Capacity for the tenderer .....

.....  
(Name and address of organization)

Name and signature of:

Witness.....

Date.....

Witness.....

Date.....

## Acceptance

By signing this part of this form of offer and acceptance, the employer identified below accepts the tenderer's offer. In consideration thereof, the employer shall pay the contractor the amount due in accordance with the conditions of contract identified in the contract data. Acceptance of the tenderer's offer shall form an agreement between the employer and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract, are contained in:

Part T1	Tendering Procedures
Part T2	Returnable Documents
Part C1	Agreements and contract data, (which includes this agreement)
Part C2	Pricing data
Part C3	Scope of work.

and drawings and documents or parts thereof, which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the tender data and any addenda thereto as listed in the returnable schedules as well as any changes to the terms of the offer agreed by the tenderer and the employer during this process of offer and acceptance, are contained in the schedule of deviations attached to and forming part of this form of offer and acceptance. No amendments to or deviations from said documents are valid unless contained in this schedule.

The tenderer shall within two weeks after receiving a completed copy of this agreement, including the schedule of deviations (if any), contact the employer's agent (whose details are given in the contract data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the contract data. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy of this document, including the schedule of deviations (if any). Unless the tenderer (now contractor) within five working days of the date of such receipt notifies the employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the parties.

Signature.....

Name.....

Capacity for the Employer.....

.....  
(Name and address of organization)

Name and signature of:

Witness.....

Date.....

Witness.....

Date.....

Part C1: Agreements and Contract Data

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1 As an alternative, the following wording may be used:

Notwithstanding anything contained herein, this agreement comes into effect two working days after the submission by the employer of one fully completed original copy of this document including the schedule of deviations (if any), to a courier-to-counter delivery / counter-to-counter delivery / door-to-counter delivery /door-to-door delivery /courier service (delete that which is not applicable), provided that the employer notifies the tenderer of the tracking number within 24 hours of such submission. Unless the tenderer (now contractor) within seven working days of the date of such submission notifies the employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the parties.

NAME:

(in BLOCK letters)

---

CAPACITY:

(of authorized agent)

---

SIGNATURE:

(of authorized agent)

---

SIGNED at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_

WITNESSES:

(Full name in BLOCK letters and signature)

1. \_\_\_\_\_

2. \_\_\_\_\_

**SCHEDULE OF DEVIATIONS**

## Notes:

1. *The extent of deviations from the tender documents issued by the employer before the tender closing date is limited to those permitted in terms of the conditions of tender.*
2. *A tenderer's covering letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid, become the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here.*
3. *Any other matter arising from the process of offer and acceptance either as a confirmation, clarification or change to the tender documents and which it is agreed by the Parties becomes an obligation of the contract shall also be recorded here.*
4. *Any change or addition to the tender documents arising from the above agreements and recorded here, shall also be incorporated into the final draft of the Contract.*

1 Subject \_\_\_\_\_

Details \_\_\_\_\_

2 Subject \_\_\_\_\_

Details \_\_\_\_\_

3 Subject \_\_\_\_\_

Details \_\_\_\_\_

4 Subject \_\_\_\_\_

Details \_\_\_\_\_

By the duly authorised representatives signing this agreement, the employer and the tenderer agree to and accept the foregoing schedule of deviations as the only deviations from and amendments to the documents listed in the tender data and addenda thereto as listed in the returnable schedules, as well as any confirmation, clarification or changes to the terms of the offer agreed by the tenderer and the employer during this process of offer and acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this agreement.

For and on behalf of the **TENDERER:**

NAME:

(in BLOCK letters)

CAPACITY:

(of authorized agent)

SIGNATURE:

(of authorized agent)

SIGNED at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_

Part C1: Agreements and Contract Data

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WITNESSES:

(Full name in BLOCK letters and signature)

1. \_\_\_\_\_
2. \_\_\_\_\_

For and on behalf of the **EMPLOYER:**

NAME:

(in BLOCK letters)

\_\_\_\_\_

CAPACITY:

(of authorized agent)

\_\_\_\_\_

SIGNATURE:

(of authorized agent)

\_\_\_\_\_

SIGNED at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_

WITNESSES:

(Full name in BLOCK letters and signature)

1. \_\_\_\_\_
2. \_\_\_\_\_

**C1.2 CONTRACT DATA**

**TABLE OF CONTENTS**

**C.1.2.1 CONDITIONS OF CONTRACT ..... 8**

**C.1.2.2 VARIATIONS AND ADDITIONS TO THE CONDITIONS OF CONTRACT (PARTICULAR  
CONDITIONS)..... 9**

**C1.2.3 DATA PROVIDED BY THE EMPLOYER ..... 11**

**C1.2.3.1 The Data which will apply to all work under the Framework Contract..... 11**

**C1.2.3.2 The Data which will apply to all Package Orders..... 13**

**C1.2.4 DATA PROVIDED BY THE CONTRACTOR..... 25**



### **C1.2.1 CONDITIONS OF CONTRACT**

The Conditions of Contract comprise the “General Conditions”, which form part of the “Condition of Contract for Plant and Design-Build” First Edition 1999, published by the Fédération Internationale des Ingénieurs- Conseils (FIDIC), and the following “Particular Conditions”, which include amendments and additions to such General Conditions.

**C1.2.2 VARIATIONS AND ADDITIONS TO THE CONDITIONS OF CONTRACT (PARTICULAR CONDITIONS)**

The following “Particular Conditions” pertaining to the “**Condition of Contract for Plant and Design-Build**” First Edition 1999, published by the **Fédération Internationale des Ingénieurs -Conseils (FIDIC)**, shall apply to this Contract:

CLAUSE or SUB-CLAUSE	PARTICULAR CONDITION
1.1.1.9	<b>Replace</b> the contents of this clause with the following: “Appendix to Tender” means the completed pages entitled <b>C1.2.3 - Data provided by the Employer</b> and <b>C1.2.4 - Data provided by the Contractor</b> which form part of the contract data.
6.2 <i>Add the following:</i>	<b>Rates of Wages and Conditions of Labour</b> “The contractor shall submit proof that he/she pays labourers at least the minimum wage as prescribed by the government. The Contractor shall verify such proof and submit it monthly to the Engineer.”
14.9	<b>Payment of Retention Money</b>  No retention money will be released at taking-over but only at the end of the guarantee period.
18 <i>Add the following:</i> “18.5	<b>Insurance:</b>  1. <u>Contractor to Insure</u>  The Contractor/Sub-contractor must obtain for the duration of the contract until the issuing of the Defects Certificate or the end of the Maintenance Period, the following insurance policies at an insurance company within 14 (fourteen) days of the notification of acceptance of the tender and must pay all premiums and supply proof thereof to the relevant Project Manager, 30 (thirty) days before the inception of the contract, that the policies have been taken out and that all premiums have been paid:  a) All Risk Insurance cover with regard to all Plant and Materials and Equipment, owned, leased or hired by the Contractor that are used in the execution of the contract for the full replacement value thereof. b) Motor Vehicle and Liability Insurance cover indicating the registration numbers of the vehicles owned, leased or hired by the Contractor that are used in the execution of the contract to the amount of at least R10-million per claim with the number of claims unlimited. c) SASRIA cover for motor vehicles and Plant and Materials and Equipment owned, leased or hired by the Contractor that are used in the execution of the contract for the full replacement value thereof. d) In respect of Plant and Materials and Equipment and Motor Vehicles brought onto the Site by or on behalf of Subcontractors, the Contractor shall be deemed to have complied with the provisions of this Sub-Clause by ensuring that such Subcontractors have similarly insured such Plant and Materials and Equipment and Motor Vehicles. e) Proof must also be submitted that the Contractor complies with the conditions of the following legislation:  - Compensation for Occupational Injuries and diseases, 1993. - Unemployment Insurance Act, 1996. - The Contractor shall in respect of the Site of the contract works appoint in writing a competent person to meet the requirements of the Health and Safety Act, No 85 of 1993 as

## Part C1: Agreements and Contract Data

CLAUSE or SUB-CLAUSE	PARTICULAR CONDITION
	<p>amended.</p> <p>2.       <u>Reporting of crime related incidents</u></p> <p>All crime related incidents, losses or shortages irrespective of the value, must be reported within 24 (twenty-four) hours by the person who was involved or who has discovered the incident to the nearest South African Police Services (SAPS) station. The name of the Police Station, Investigation Officer and the Case number must be obtained and stated on the Contractor Claim Form. Should the incident not be reported to the SAPS, the claim will be repudiated.</p> <p>3.       <u>Contractor to pay deductibles</u></p> <p>Any claim in terms of the insurance affected by the Employer shall be subject to the Contractor being responsible for the payment of the amount stated in the Annexure to the Policies as being the deductible (first amount payable or Excess) as defined in the Certificate of Insurance issued by the Employer's insurer in terms of the Policy.</p>

**C1.2.3 DATA PROVIDED BY THE EMPLOYER****C1.2.3.1 The Data which will apply to all work under the Framework Contract**

Clause/Item		Entry
1.1.2.2 & 3	Employer's name and address	CITY OF TSHWANE PO Box 440 PRETORIA 0001
1.1.2.4 & 1.3	Engineer's Name and Address	PRIMARY AND SECONDARY ENGINEERING SERVICES City of Tshwane 312 Giovanetti Street Nieuw Muckleneuk Brooklyn, Pretoria
1.1.3.7	Defects Notification Period	365 days after Taking / Hand-Over
1.3	Electronic Transmissions systems	N/A
1.4	Governing Law	Law of the Republic of South Africa
1.4	Ruling Language	English
1.4	Language for communications	English
2.1	Time for access to the Site	28 Days after Commencement Date (Working Days)
4.2	Amount of Performance Security	10% of the Accepted Contract Amount, in the currencies and proportions in which the Contract Price is payable. The cost to obtain the surety is carried by the Contractor. (Excluding VAT and Contingencies)
5.1	Period for notifying unforeseeable errors, faults and defects in the Employer's Requirements	10 days
6.5	Normal working hours	7h00 to 17h00
8.7 & 14.15(b)	Delay damages for the Works	A penalty of a sum per week of one-half per cent of the Contract Price of the Works or such portion thereof as the case may be. No penalty will apply in respect of any part of the Works which has been completed and certified by the City.
8.7	Maximum amount of Delay damages	Penalty shall not in any case exceed 15% of the contract price.
<i>If there are Provisional Sums:</i>		
13.5(b)	Percentage for adjustment of provisional sums	<i>Refer to Part T2.2 Cost price adjustment: Form RD.E3 / RD.E4</i>
<i>If sub-clause 13.8 applies:</i>		
13.8	Adjustment for Change in Cost; Table(s) of adjustment data	<i>Refer to Part T2.2 Cost price adjustment: Form RD.E3 / RD.E4</i>
14.2	Total Advance Payment	0% of the Accepted Contract Amount
14.2	Number and timing of instalment	N/A
14.2	Currencies and proportions	N/A
14.2	Start repayment of advance payment	N/A
14.2(b)	Repayment amortisation of advance payment	N/A
14.3	Percentage of retention	5%
14.3	Limit of Retention Money	<i>Not applicable</i>
14.5(b)	Plant and Materials for payment when shipped en route to the Site	<i>Not applicable</i>
14.5(c)	Plant and Materials for payment when delivered to the Site	<i>Refer to Part C2.2 Activity Schedule / Bill of Quantities</i>
14.6	Minimum amount of Interim Payment Certificates	N/A

## Part C1: Agreements and Contract Data

Clause/Item		Entry
<i>If payment are only to be made in a currency / currencies and named on the first page of the Letter of Tender:</i>		
14.15	Currency / currencies of payment	<i>Refer to Part T2.2 Tender forms Form Bid</i>
18.1	Periods for submission of insurance: a. Evidence of insurance b. Relevant policies	Refer to particular conditions
18.2(d)	Maximum amount of deductibles for insurance of the Employer's risks	Refer to particular conditions
18.3	Minimum amount of third party insurance	Refer to particular conditions
20.2	DAB	Dispute(s) shall be referred and determined by Arbitration and/or a Court of competent jurisdiction
20.3	Appointment (if not agreed) to be made by	Not applicable

**C1.2.3.2 The Data which will apply to all Package Orders**

The Conditions of Contract for all Package Orders will **form part of the “Condition of Contract for Plant and Design-Build” First Edition 1999, published by the Fédération Internationale des Ingénieurs- Conseils (FIDIC).**

The following variations and additions to the Conditions of Contract for construction works, shall apply to all Package Orders:

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
1.3	Communications	<p><b>Add</b> the following to the clause:</p> <p><i>Sent by facsimile, electronic or any like communication irrespective of it being during office hours or otherwise.</i></p>
1.1.2	Parties and Persons	<p><b>Add</b> the following to the clause:</p> <p><i>1.1.2.11 The Employer has authorised the <b>Divisional Head: Electricity Planning and Development Division</b> to act on his behalf in respect of this Contract, save for such duties or functions:</i></p> <p><i>1.1.2.11.1 which other holders of office ex officio execute on behalf of the Employer; or</i></p> <p><i>1.1.2.11.2 for which the <b>Divisional Head: Electricity Planning and Development Division</b> has no authority and the Employer’s approval is required before execution thereof.</i></p>
1.1.2.4	Engineer	<p><b>Add</b> the following new sub-clause:</p> <p><i>1.1.2.4.1 The Employer may, in his sole discretion, provide technical support services to the Contractor. The technical team providing such support services will be appointed and remunerated by the Employer. In the case of EPWP Contractor Learnership Programmes, support services may be provided by the Department of Public Works. The technical team will consist of the Employer’s Agent and a person or persons acting as Training, Construction and Materials Managers or Construction Mentor, depending on the services to be provided and the scope of the functions to be executed</i></p> <p><i>1.1.2.4.2 In addition to his/her duties and functions, the Employer’s Agent will coordinate the work of the technical team providing the support services.</i></p> <p><i>1.1.2.4.3 The Construction Manager acts as mentor to the Contractor in respect of the following functions, which are described fully in the CESA document, Guideline Contract Specific Data C4- Construction Management Services of the Form of Agreement for Consulting Services for Labour Intensive Construction Projects:</i></p> <p><i>i. Programming the execution of the works</i></p> <p><i>ii. Interpretation of drawings, specifications and related contractual matters.</i></p>

## Part C1: Agreements and Contract Data

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<ul style="list-style-type: none"> <li>iii. Workforce structuring, employment and management.</li> <li>iv. Guidance to expedite work progress/ improve productivity.</li> <li>v. Setting out of works.</li> <li>vi. Safety measures and legislation requirements.</li> <li>vii. Materials handling.</li> <li>viii. Tools and equipment needs.</li> <li>ix. Financial matters.</li> <li>x. Training requirements.</li> <li>xi. Security aspects.</li> <li>xii. Quality control systems</li> </ul> <p>1.1.2.4.4 The Materials Manager is responsible for the following functions which are described fully in the CESA document, Guideline Contract Specific Data C5 -Materials Procurement Services of the Form of Agreement for Consulting Services for Labour-Intensive Construction Projects on the Contract:</p> <ul style="list-style-type: none"> <li>i. Establishment of stores.</li> <li>ii. Determination of store administration procedures.</li> <li>iii. Determination of requirements of store staff.</li> <li>iv. Employment of store staff.</li> <li>v. Staff guidance, supervision and training.</li> <li>vi. Acquisition of materials.</li> <li>vii. Issue of materials.</li> <li>viii. Upholding of an assets register.</li> <li>ix. Insurance of assets.</li> </ul> <p>1.1.2.4.5 The main role of the Mentor is to support the Learner Contractor and to impart knowledge that will enable the Contractor to compete independently as soon as possible. The Mentor provides a wide range of support and advice functions, including but not limited to advice with regard to:</p> <ul style="list-style-type: none"> <li>i. Finance and dealing with banks.</li> <li>ii. Business management.</li> <li>iii. Contract management.</li> <li>iv. Procurement of materials and other required services.</li> <li>v. Technical and engineering.</li> <li>vi. Construction planning and management.</li> <li>vii. Fulfilling of statutory and tax obligations.</li> <li>viii. Labour and human resource guidance.</li> </ul>
6.2	Rates of Wages and Conditions of Labour	<p><b>Add</b> the following new sub-clause:</p> <p>6.12 Wages and conditions of work:</p> <ul style="list-style-type: none"> <li>i. For conventional construction works the Basic Conditions of Employment Act of 1997 (Act No 75 of 1997) shall apply and the minimum employment conditions which will apply shall be guided by the latest Sectoral Determination: Civil Engineering Sector published from time to time.</li> </ul>

## Part C1: Agreements and Contract Data

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p>ii. <i>Basic Conditions of Employment Act of 1997 (Act No 75 of 1997) as per Government Notice R63 of 25 January 2002, shall apply to works described in the Scope of Work as being labour intensive and which are undertaken by unskilled or semi-skilled workers.</i></p>
		<p><b>Add</b> the following new sub-clause:</p> <p>6.12.1 <i>Notwithstanding any actions which the Employer may take, the Contractor accepts sole liability for due compliance with the relevant duties, obligations, prohibitions, arrangements and procedures imposed by the Occupational Health and Safety Act, 1993 (Act 85 of 1993), and all its regulations, including the Construction Regulations, 2003, for which he is liable as mandatory. By entering into this Contract it shall be deemed that the parties have agreed in writing to the above provisions in terms of Section 37(2) of the Act. The Contractor shall sign the Occupational Health and Safety Agreement for Contract Work in the City of Tshwane Metropolitan Municipality included in section C1.5.</i></p>
		<p><b>Add</b> the following new sub-clause:</p> <p>6.12.2 <i>The Employer retains an interest in all inquiries conducted under this Contract in terms of Section 31 and/or 32 of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and its Regulations following any incident involving the Contractor and/or Sub-Contractor and/or their employees. The Contractor shall notify the Employer in writing of all investigations, complaints or criminal charges which may arise pursuant to work performed under this Contract in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and Regulations.</i></p>
		<p><b>Add</b> the following new sub-clause:</p> <p>6.12.3 <i>Contractor's Designer</i></p> <p><i>The Contractor and his designer shall accept full responsibility and liability to comply with the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and the Construction Regulations, 2003 for the design of the Temporary Works and those part of the Permanent Works which the Contractor is responsible to design in terms of the Contract</i></p>
8.4	Extension of Time for Completion	<p><b>Add</b> the following new sub-clause</p> <p>8.4.1 <i>Critical path provision</i></p>



CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p><i>A delay in so far as extension of time is concerned, will be regarded as a delay only if, on a claim by the Contractor in accordance with the General Conditions of Contract, the Employer's Agent rules that all progress on an item or items of work on the critical path of the approved programme for the execution of the Works by the Contractor, has been brought to a halt. Delays on normal working days only, based on a working week, of five normal working days, will be taken in account for the extension of time.</i></p>
		<p><b>Add</b> the following new sub-clause</p> <p><b>8.4.2 Extension of time due to abnormal rainfall</b></p> <p><i>Extension of time due to abnormal rainfall shall be determined by means of Method 1, if rainfall records and/or values derived from rainfall records are supplied in the Scope of Work, otherwise Method 2 shall apply.</i></p> <p><b><u>Method 1: Rainfall formula method</u></b></p> <p><i>The rainfall records and/or values derived from rainfall records from a suitable rainfall station near the Site, which are supplied in the Project Specifications, shall be considered suitable for the determination of extension of time due to abnormal rainfall in accordance with this method.</i></p> <p><i>Extension of time arising from abnormal rainfall, shall be calculated separately for each calendar month or part thereof for the full period of completion of the Contract, including any extension thereof, in accordance with the rainfall formula given below:</i></p> $V = (N_w - N_n) + \frac{(R_w - R_n)}{X}$ <p><i>If <math>V</math> is negative and its absolute value exceeds <math>N_n</math>, then <math>V</math> shall be equal to minus <math>N_n</math>.</i></p> <p><i>If <math>V</math> is positive and greater than the number of calendar days in the calendar month under consideration, <math>V</math> shall be taken as equal to the number of calendar days in the relevant calendar month.</i></p> <p><i>The symbols shall have the following meaning:</i></p> <p><math>V</math> = Extension of time in calendar days in respect of the calendar month under consideration</p> <p><math>N_w</math> = Actual number of days during the calendar month on which a rainfall of <math>Y</math> mm or more has been recorded.</p> <p><math>R_w</math> = Actual rainfall in mm for the calendar month under</p>

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p>consideration.</p> <p><math>N_n</math> = Average number of days as derived from existing rainfall records, on which a rainfall of <math>Y</math> mm or more has been recorded for the calendar month. Rainfall records and/or the derived values of <math>N_n</math> will be provided in the Specifications.</p> <p><math>R_n</math> = Average rainfall in mm for the calendar month, as derived from existing rainfall records. Rainfall records and/or the derived values of <math>R_n</math> will be provided in the Project Specifications.</p> <p><math>X</math> = 20 unless otherwise provided in the Project Specifications</p> <p><math>Y</math> = 10 unless otherwise provided in the Project Specifications</p> <p>The total extension of time shall be the algebraic sum of the monthly totals for the period under consideration. However, if the grand total is negative the time for completion shall not be reduced on account of abnormal rainfall. Extension of time for parts of a month shall be calculated by pro rata values of <math>N_n</math> and <math>R_n</math> being used.</p> <p>The factor <math>(N_w - N_n)</math> shall be considered to represent a fair allowance for variations from the average number of days during which rainfall exceeds <math>Y</math> mm and wet conditions prevented or disrupted work.</p> <p>The factor <math>\frac{(R_w - R_n)}{X}</math> shall be considered to represent a fair allowance for variations from the allowance for variations from the average number of days when wet conditions further to that allowed for the factor <math>(N_w - N_n)</math>, prevented or disrupted work during the calendar month.</p> <p>Accurate rain gauging shall be taken at a suitable point on Site and the Contractor shall, at his own expense, take all necessary precautions to ensure that the rain gauges cannot be interfered with.</p> <p>This formula does not take into account further on concurrent delays which could be caused by other abnormal climatic conditions such as floods, which have to be determined separately in accordance with Sub-Clause (42.5 Critical Path Provision) hereof.</p> <p><u>Method 2: Expected delay method</u></p> <p>The Contractor shall make provision in his programme for the execution of the Works, for an expected delay of "n" normal working days (based on a working week of five normal working</p>

## Part C1: Agreements and Contract Data

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p><i>days) due to normal rainfall, for which he will not receive any extension of time.</i></p> <p><i>Unless otherwise provided in the Project Specifications, the value of "n" shall be taken as equal to the tendered time for completion of the Works in months, rounded off to an integer.</i></p> <p><i>Extension of time during normal working days will be granted to the degree to which actual delays as determined in accordance with Sub-Clause (42.5 Critical Path Provision) hereof, exceed the number of "n" normal working days.</i></p> <p><i>The value of "n" does not take into account further or concurrent delays which are caused by other abnormal climatic conditions such as floods, which have to be determined separately in accordance with Sub-Clause (42.5 Critical Path Provision) hereof.</i></p>
14.7	Payment	<p><b>Add</b> the following new sub-clause:</p> <p><b>14.7.1</b> <i>Payment for works identified in the Scope of Work as being labour-intensive shall only be made in accordance with the provisions of the Contract if the works are constructed strictly in accordance with the provisions of the Scope of Work. Any non-payment for such works shall not relieve the Contractor in any way of his obligations either in contract or in delict.</i></p>
		<p><b>Add</b> the following new sub-clause</p> <p><b>14.7.2</b> <i>The Contractor shall be paid at Pretoria in the currency of the Republic of South Africa only at the Office of the Chief Financial Officer of the CITY OF TSHWANE, unless otherwise stated in the Data provided by Employer.</i></p>
4.2	Performance Security	<p><b>Add</b> the following new sub-clause:</p> <p><b>4.2.1</b> <i>As an alternative to a performance guarantee, the Contractor may deposit with the Employer a cash amount in a sum equal to the amount stated in the Data provided by Employer. All the provisions in respect of the guarantee apply mutatis mutandis to the cash deposit accept that the amount deposited will be repaid to the Contractor within 30 (thirty) days after the issue of the Certificate or Certificates of Completion in respect of the whole of the permanent works.</i></p>
18.1	General Requirements for Insurances	<p><b>Add</b> clause 18.1.1 with the following:</p> <p><b>18.1.1</b> <i>Without limiting the Contractor's/Sub-contractor's obligation in terms of the Contract, the Employer will effect and maintain for the duration of the Contract until the issuing of the Defects Certificate or the end of the Maintenance Period, the following insurances in the name of the Contractor (including all Subcontractors whether nominated or otherwise):</i></p>

## Part C1: Agreements and Contract Data

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p>18.1.2 The Employer's insurer will indemnify the Contractor/Sub-contractor against physical loss of or damage to any part of the Property Insured not exceeding the maximum contract value or the final contract value estimated at inception including free issue materials were applicable as stated in the Contract Data:</p> <ul style="list-style-type: none"> <li>a. Whilst in transit including loading and unloading whilst temporarily stored at any premises en route to or from the Contract Site within the Territorial Limits;</li> <li>b. From the time of unloading, dismantling or preparation at the Contract Site and thereafter until the Property Insured has been officially accepted by the Employer and becomes his responsibility by means of a notice of completion certificate or similar evidence of legal transfer of risk;</li> <li>c. During the contractual defects liability or Maintenance Period which shall not exceed the period reflected in the Schedule but only so far as the Contractors and/or Sub-Contractors may be liable for such loss or damage under the defects liability or maintenance condition/s of the Insured Contract;</li> <li>d. Removal of debris;</li> <li>e. Surrounding property</li> <li>f. Work away;</li> <li>g. Offsite storage</li> <li>h. Temporary repairs;</li> <li>i. Contribution clause – marine;</li> <li>j. Escalation during Contract Period;</li> <li>k. Post loss escalation;</li> <li>l. Automatic reinstatement;</li> <li>m. Principals maintenance;</li> <li>n. Property taken over;</li> <li>o. Beneficial occupation;</li> <li>p. Escalation due to currency fluctuation;</li> <li>q. Manufacturers guarantees</li> </ul> <p>18.1.3 The Employer's insurer will indemnify the Contractor/Sub-contractor against all sums for which the Contractor/Sub-contractor shall become legally liable towards third party claimants to pay for and in consequence of:</p> <ul style="list-style-type: none"> <li>a. Accidental death of or bodily injury to or illness or disease contracted by any person (excluding employees of the Contractor/Subcontractor);</li> <li>b. Accidental physical loss or damage to tangible property occurring during the Period of Insurance and arising out of or in connection with the performance of the Insured Contract at the Contract Site as defined in the Schedule. The minimum limit of indemnity for any one event is R10-million in respect of contracts with a contract value</li> </ul>

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p><i>of up to R50-million (excluding VAT).</i></p> <p><b>18.1.4 Insurance premium payable</b></p> <p><i>The Employer will pay the insurance premium for the works damage and public liability insurance cover. The insurance premium will be calculated based on the approved Capital Budget per financial year and the insurance premium will be charged out to the relevant departments by the Section: Insurance and Risk Management.</i></p> <p><b>18.1.5 Additional insurance by the Employer</b></p> <p><i>The Employer shall be free to effect at his own cost any additional insurance, which he deems necessary in own interest to cover loss or damage not insured in terms of the insurance policies of Sub-Clause 35.1.1 of this Clause.</i></p> <p><b>18.1.6 Additional insurance by the Contractor / Subcontractor</b></p> <p><i>The Contractor and Sub-contractor shall be free to effect and maintain at their own cost any additional insurance which the Contractor/Subcontractor deem necessary to cover damage, loss or injury not insured in terms of the insurance effected by the Employer's insurer. The cost of the additional insurance will be for the account of the Contractor/Subcontractor.</i></p> <p><b>18.1.7 Contractor satisfied with insurance</b></p> <p><i>The submission of a tender shall be construed as acknowledgement by the Contractor that he is satisfied with the insurance cover effected by the Employer.</i></p> <p><b>18.1.8 Contractor to observe conditions</b></p> <p><i>The Contractor shall give all notices and observe all conditions and requirements imposed by the relevant insurance policies, which shall be binding on the Contractor.</i></p> <p><b>18.1.9 Contractor to insure</b></p> <p><i>The Contractor/Sub-contractor must obtain for the duration of the contract until the issuing of the Defects Certificate or the end of the Maintenance Period, the following insurance policies at an insurance company within 14 (fourteen) days of the notification of acceptance of the tender and must pay all premiums and supply proof thereof to the relevant Project Manager, 30 (thirty) days before the inception of the contract, that the policies have been taken out and that all premiums have been paid:</i></p> <p><b>a. All Risk Insurance cover with regard to all Plant and Materials and Equipment, owned, leased or hired by the Contractor that are used in the execution of the contract</b></p>

## Part C1: Agreements and Contract Data

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p><i>for the full replacement value thereof.</i></p> <p>b. <i>Motor Vehicle and Liability Insurance cover indicating the registration numbers of the vehicles owned, leased or hired by the Contractor that are used in the execution of the contract to the amount of at least R10-million per claim with the number of claims unlimited.</i></p> <p>c. <i>SASRIA cover for motor vehicles and Plant and Materials and Equipment owned, leased or hired by the Contractor that are used in the execution of the contract for the full replacement value thereof.</i></p> <p>d. <i>In respect of Plant and Materials and Equipment and Motor Vehicles brought onto the Site by or on behalf of Subcontractors, the Contractor shall be deemed to have complied with the provisions of this Sub-Clause by ensuring that such Subcontractors have similarly insured such Plant and Materials and Equipment and Motor Vehicles.</i></p> <p>e. <i>Proof must also be submitted that the Contractor complies with the conditions of the following legislation:</i></p> <ul style="list-style-type: none"> <li>- <i>Compensation for Occupational Injuries and disease, 1993</i></li> <li>- <i>Unemployment Insurance Act, 1996</i></li> <li>- <i>The Contractor shall in respect of the Site of the contract works appoint in writing a Section 16 appointee to meet the requirements of the Health and Safety Act, No 85 of 1993 as amended.</i></li> </ul> <p>18.1.10 <i>The Project Manager involved must furnish the required insurance documentation 30 (thirty) days before the inception of the contract to the Section: Insurance and Risk Management.</i></p> <p>18.1.11 <i>Reporting of incidents</i></p> <p><i>In the event of an occurrence, which is likely to give rise to a claim under the insurance policy affected by the Employer, the Contractor / Subcontractors and Project Manager will adhere to the following procedures:</i></p> <p>a. <i>In addition to any statutory obligations and/or requirements contained in the General Conditions of Contract, the Contractor shall notify the Employer and the Project Manager of every occurrence within 48 (forty-eight) hours giving the circumstances, nature and an estimate of the loss or damage.</i></p> <p>b. <i>The Project Manager will be responsible to complete and submit the relevant claim documentation for each incident within 30 (thirty) days after the incident occurred to the Section: Insurance and Risk Management. Should the incident be reported by the Project Manager more than 30 (thirty) days after the incident occurred to the Section: Insurance and Risk Management, the claim will only be considered if the</i></p>

## Part C1: Agreements and Contract Data

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p><i>claim documentation is accompanied by a letter from the relevant Strategic Executive Director motivating the reason(s) for the late reporting of the incident, but the Project Manager must take note the Insurer might repudiate the loss if it is found that the insurers rights have been compromised as a result of the late reporting.</i></p> <p><i>c. The following documentation must be included with the claim documentation:</i></p> <ul style="list-style-type: none"> <li><i>- Photos of damages caused or suffered as proof or substantiation of the claims.</i></li> </ul> <p><i>d. In the event of Insured Property being damaged during the Contract Works beyond economical repair, the property must be safeguarded and be handed over to the Employer's insurer for salvage.</i></p> <p><i>e. The Section: Insurance and Risk Management will inform the Employer's insurer of the incident. The Contractor/Subcontractor shall afford all reasonable access to the Site to the Employer, the Project Manager, the Employer's insurers and/or representatives for the purpose of assessment of any loss or damage.</i></p> <p><b>18.1.12 Reporting of catastrophic incidents</b></p> <p><i>In the event of an occurrence, which is likely to give rise to a claim, under the insurance policy effected by the Employer, with an estimated loss or damage of more than R250 000,00, the Contractor and the Project Manager will adhere to the following procedures:</i></p> <ul style="list-style-type: none"> <li><i>a. In addition to any statutory obligations and/or requirements contained in the General Conditions of Contract, the Contractor shall notify the Employer and the Project Manager of every occurrence within 24 (twenty-four) hours giving the circumstances, nature and an estimate of the loss or damage.</i></li> <li><i>b. The Project Manager must notify the Section: Insurance and Risk Management on the same day that the Contractor/Sub-contractor has notified the Project Manager of the incident.</i></li> <li><i>c. The Section: Insurance and Risk Management will notify the Employer's insurer of the incident. The Contractor/Sub-contractor shall afford all reasonable access to the Site to the Employer, the Project Manager, the Employer's insurers and/or representatives for the purpose of assessment of any loss or damage.</i></li> <li><i>d. The Project Manager will be responsible to complete and submit the relevant claim documentation for each incident within 30 (thirty) days after the incident occurred to the Section: Insurance and Risk Management. Should the incident be reported by the</i></li> </ul>

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p><i>Project Manager more than 30 (thirty) days after the incident occurred to the Section: Insurance and Risk Management, the claim will only be considered if the claim documentation is accompanied by a letter from the relevant Strategic Executive Officer motivating the reason(s) for the late reporting of the incident. Should the relevant claim documentation not be submitted within 30 (thirty) days, the claim will be repudiated.</i></p> <p><b>18.1.13 Reporting of crime related incidents</b></p> <p><i>All crime related incidents, losses or shortages irrespective of the value, must be reported within 24 (twenty-four) hours by the person who was involved or who has discovered the incident to the nearest South African Police Services (SAPS) station. The name of the Police Station, Investigation Officer and the Case number must be obtained and stated on the Contractor Claim Form. Should the incident not be reported to the SAPS, the claim will be repudiated.</i></p> <p><b>18.1.14 Claim documentation</b></p> <p><i>The Project Manager must obtain all relevant information from the Contractor/Sub-contractor and complete the Contractor Claim Form, included in this report as Annexure B that is available on the Intranet. The project number must be stated on the Contractor Claim Form.</i></p> <p><i>The Project Manager must submit with the Contractor Claim Form a detailed cost sheet indicating the estimate of the loss or damage.</i></p> <p><i>Any misrepresentation, misdescription or non-disclosure of material facts, at the option of the insurers, can result in claims submitted being declared null and void.</i></p> <p><b>18.1.15 Authorization of claim forms</b></p> <p><i>It is imperative that a formally delegated official or his nominee of the Employer should authorize the Contractor Claim forms as proof of the appropriate authorization, verification and approval of claims submitted. The Strategic Executive Director must provide an authorization letter to the Section: Insurance and Risk Management stating the names and the specimen signatures of the delegated official or his nominee within 30 (thirty) days from approval of this report by Council. Should the delegated official or his nominee not sign the relevant claim form, the claim will be repudiated as this may lead to inappropriate independent verification of the validity of claims, thereby increasing the risk of insurance fraud and consequent reputation damage to the Employer.</i></p> <p><b>18.1.16 Contractor to pay deductibles</b></p>



## Part C1: Agreements and Contract Data

CLAUSE / SUB-CLAUSE	DESCRIPTION	VARIATION / ADDITION
		<p><i>Any claim in terms of the insurance affected by the Employer shall be subject to the Contractor being responsible for the payment of the amount stated in the Annexure to the Policies as being the deductible (first amount payable or Excess) as defined in the Certificate of Insurance issued by the Employer's insurer in terms of the Policy.</i></p> <p><b>18.1.17 Settlement of claims</b></p> <p><i>All incidents reported to the Section: Insurance and Risk Management in respect of an occurrence, which is likely to give rise to a claim will be forwarded to the Employer's insurer who will take the necessary actions for the settlement of any such claims.</i></p> <p><i>The Contractor <u>shall negotiate</u> for the settlement of claims with the Employer or the Employer's insurer through the Section: Insurance and Risk Management. The Employer's Chief Financial Officer will authorize all settlements of claims.</i></p> <p><i>Should action for the settlement of any such claim to the satisfaction of the Project Manager not be taken by the Contractor/sub-contractor within 30 (thirty) days after receipt of such claim by the Contractor/sub-contractor, the Employer or the Employer's insurer may settle any such claim, after giving the Contractor notice of its intention to do so; provided that no such claim shall be settled by the Employer or the Employer's insurer without first consulting the Contractor/sub-contractor.</i></p> <p><i>The foregoing provisions of this Sub-Clause shall apply mutatis mutandis to any such claim received by the Contractor directly.</i></p>

**C1.2.4 DATA PROVIDED BY THE CONTRACTOR**

CLAUSE / ITEM		ENTRY
1.1.2.3 & 1.3	Contractor's Legal name and address	.....  .....  .....  .....
1.1.3.3	Time for completion of the works	..... days

---

## C1.3 FORM OF GUARANTEE

WHEREAS

**THE CITY OF TSHWANE**

(hereinafter referred to as the "Council"),

enters into a Contract (No. \_\_\_\_\_) with \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(hereinafter referred to as the "Contractor")

for \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**AND WHEREAS** in terms of the General Conditions of the Contract the Contractor is required to furnish an acceptable independent guarantee for the due and proper fulfilment by him of all his duties and obligations in terms of the said contract.

**NOW THEREFORE** we the undersigned [full names of authorized agent(s)]

and acting in my/our capacity as \_\_\_\_\_

and \_\_\_\_\_

and as such duly authorized thereto, do hereby bind the said \_\_\_\_\_

(hereinafter referred to as the "Guarantor") as surety and co-principal Debtor in *solidum* for the sum of:-

R ( \_\_\_\_\_ )

\_\_\_\_\_

for the due and proper fulfilment by the Contractor of all or any of his duties and obligations in terms of the said Contract. This guarantee shall not be interpreted as accessory to the contract between Council and the Contractor.

The Guarantor further undertakes, in the event of the Contractor failing duly and properly to fulfil any of his duties and obligations in terms of the said Contract or if the Contractor is placed under provisional liquidation or in the event of termination of the Contract by the Council in terms of the General Conditions of Contract, to pay to the Council, the said sum of R ( \_\_\_\_\_ ) or

\_\_\_\_\_

\_\_\_\_\_

Part C1.3: Agreements and Contract Data

such portion thereof as may be required by the Council, immediately upon receiving written demand from the Council which written demand shall be addressed to the Guarantor at

(*domicilium* address).

The Guarantor further hereby renounces the benefits of the legal exceptions:

***Exceptio non numerate pecuniae***

***Exceptio non causa debiti***

***Beneficium duobus vel pluribus reis debendi***

***Beneficium ordinis deu excussionis***

***Beneficium Divisionis***

and all other defence which could be pleaded against the validity of this guarantee, with the meaning and effect of which it declares itself to be fully acquainted.

This undertaking shall remain in full force and effect up to and including the date of issue of the Certificate of Completion, as provided for in the General Conditions of Contract, unless the Guarantor is advised in writing by the Council of his intention to institute claims, and the particulars thereof, in which event this guarantee shall remain in full force and effect until all such claims have been paid or liquidated. Notwithstanding the aforesaid, the Council may at its' sole discretion elect to have the amount provided for under this guarantee, paid out directly to it in the case of breach of contract by the Contractor by giving the Guarantor written notice to that effect, notwithstanding the fact that the Council may decide not to institute any further legal action against the contractor.

This document is not negotiable or transferable.

NAME:

(in BLOCK letters)

CAPACITY:

(of authorized agent)

SIGNATURE:

(of authorized agent)

SIGNED at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_

WITNESSES:

(Full name in BLOCK letters and signature)

1. \_\_\_\_\_

2. \_\_\_\_\_

---

**ANNEXURE A**

**LIST OF INSTITUTIONS FROM WHO CONTRACT/DEPOSIT GUARANTEES CAN BE ACCEPTED.**

1. ABSA Bank
2. Credit Agricole Indosuez (South Africa Branch)
3. Development Bank of South Africa
4. FirstRand Bank
5. ING Bank N.V. (South Africa Branch)
6. Investec Bank
7. Landbank
8. National Housing Finance Co.
9. Nedcor Bank
10. South African Reserve Bank
11. Standard Bank
12. AIG South Africa
13. Credit Guarantee Insurance Co
14. Emerald Insurance Company
15. Federated Employers Mutual Assurance Co
16. Global Insurance Company
17. Guardrisk Insurance Company
18. Hannover Re:
19. Home Loan Guarantee Company
20. Lion of Africa Insurance Company
21. Metropolitan Life
22. Metropolitan Odyssey Ltd
23. MUA Insurance
24. Mutual & Federal Insurance Company
25. Rand Mutual Assurance Company
26. Regent Insurance Company
27. SA Eagle Insurance Company
28. Lombard Insurance.

## C1.4 GUARANTEE (CASH DEPOSIT)

CONTRACT NO.: \_\_\_\_\_

Employer: **CITY OF TSHWANE**

Contractor: \_\_\_\_\_

Description of Contract: \_\_\_\_\_

I/We, the undersigned, \_\_\_\_\_  
(Contractor)

deposit herewith cash \*a bank certified cheque", in the amount of \_\_\_\_\_

as surety for the due performance of the Contract by the abovementioned Contractor, and for all losses, damages and expenses that may be suffered or incurred by the Employer as a result of non-performance of the Contract by the Contractor, renouncing all benefits from the legal exceptions *ordinis seu excussions et divisions* no value received and all other exceptions which might or could be pleaded against the surrender of this deposit.

The deposit shall be returned to the Contractor on the issue of the Completion Certificate in terms of the Contract, unless the Contractor is advised in writing by the Employer before issue of the said Certificate of his intention to institute claims and the particulars thereof, in which event this deposit shall remain in force until all such claims are paid or settled.

For and on behalf of **TENDERER:**NAME:  
(in BLOCK letters) \_\_\_\_\_CAPACITY:  
(of authorized agent) \_\_\_\_\_SIGNATURE:  
(of authorized agent) \_\_\_\_\_

SIGNED at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_

WITNESSES:

(Full name in BLOCK letters and signature)

1. \_\_\_\_\_

2. \_\_\_\_\_

## C1.5 HEALTH AND SAFETY AGREEMENT

**Article of Agreement in terms of Section 37(2) of the Occupational Safety Act, 1993 between**

**CITY OF TSHWANE**

(Hereinafter referred to as the "EMPLOYER")

AND

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Herein represented by \_\_\_\_\_ in his/her capacity as

\_\_\_\_\_ duly authorised by virtue of a resolution dated

\_\_\_\_\_, attached hereto Annexure A, of the said

\_\_\_\_\_ (herein after referred to as the CONTRACTOR")

WHEREAS the CONTRACTOR is the mandatory of the EMPLOYER as contemplated in an agreement in respect of

**CONTRACT NO:** \_\_\_\_\_

**TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS: AS AND WHEN REQUIRED OVER A THREE (3) YEAR PERIOD**

AND WHEREAS section 37 of the Occupational Health and Safety act, 1993 (Act 85 of 1993), hereinafter referred to as the "ACT"), imposes certain powers and duties upon the EMPLOYER.

AND WHEREAS the parties have agreed to enter into an agreement in terms of section 37(2) of the ACT.

NOW THEREFORE the parties agree as follows:

- (a) The CONTRACTOR undertakes to acquaint the appropriate officials and employees of the CONTRACTOR with all relevant provisions of the ACT and the regulations promulgated in terms thereof.
- (b) The CONTRACTOR undertakes that all relevant duties, obligations and prohibitions imposed in terms of the ACT and Regulations will be fully complied with. Provided that should the EMPLOYER prescribe certain arrangements and procedures, that same shall be observed and adhered to by the CONTRACTOR, his officials and employees. The CONTRACTOR shall bear the onus of acquainting himself/herself/itself with such arrangements and procedures.
- (c) The CONTRACTOR hereby accepts sole liability for such due compliance with the relevant duties, obligations, prohibitions, arrangements and procedure, if any, imposed by the ACT and Regulations and the EMPLOYER expressly absolves the EMPLOYER from itself being obliged to comply with any of the aforesaid duties, obligations, prohibitions, arrangements and procedure as the case may be.

Part C1.5: Agreements and Contract Data

- (d) The CONTRACTOR agrees that any duly authorised officials of the EMPLOYER shall be entitled, although not obliged, to take such steps as may be necessary to ensure that the CONTRACTOR has complied with the undertakings as more fully set out in paragraphs 1 and 2 above, which steps may include, but shall not be limited to, the right to inspect any appropriate site or premises occupied by the CONTRACTOR, or to inspect any appropriate records held by the CONTRACTOR or to take such steps it may deem necessary to remedy the default of the CONTRACTOR at the cost of the CONTRACTOR.
- (e) The CONTRACTOR shall be obliged to report forthwith to the EMPLOYER any investigations, complaint or criminal charge which may arise as a consequence of the provisions of the ACT and Regulations, pursuant to work performed in terms of this agreement, and shall, on written demand, provide full details in writing of such an investigation, complaint or criminal charge as the case may be

**FOR AND ON BEHALF OF THE CONTRACTOR:**

NAME:

(in BLOCK letters)

\_\_\_\_\_

CAPACITY:

(of authorized agent)

\_\_\_\_\_

SIGNATURE:

(of authorized agent)

\_\_\_\_\_

SIGNED at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_

WITNESSES:

(Full name in BLOCK letters and signature)

1. \_\_\_\_\_

2. \_\_\_\_\_

**FOR AND ON BEHALF OF THE EMPLOYER:**

NAME:

(in BLOCK letters)

\_\_\_\_\_

CAPACITY:

(of authorized agent)

\_\_\_\_\_

SIGNATURE:

(of authorized agent)

\_\_\_\_\_

SIGNED at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_

WITNESSES:

(Full name in BLOCK letters and signature)

1. \_\_\_\_\_

2. \_\_\_\_\_



**PART C2****PRICING DATA**

(To be filled in by Tenderer/Contractor)

**CONTENTS**

<b>PART</b>	<b>DESCRIPTION</b>
<b>C2.1</b>	<b><u>Pricing Instruction</u></b> Section 4: Specifications Section 5: Schedule of Particulars and Guarantee
<b>C2.2</b>	<b><u>Activity Schedules / Bill of Quantities</u></b> Bill of Quantities A: Metal Clad Switchgear Bill of Quantities B: Metal Enclosed Switchgear

# **SECTION 4**

## **SPECIFICATION**

### **CONTENTS**

<b>PART</b>	<b>DESCRIPTION</b>	<b>APPLICABLE</b>
1	<u>General:</u>	
1.1	General Requirements	Yes
1.2	Security, Storage and Supervision Requirements	Yes
1.3	Quality Assurance Requirements	Yes
1.4	Technical Requirements	Yes
1.5	Yard Labelling	No
1.6	Substation Testing & Re-commissioning	Yes
1.7	Implementation Plan	Yes
1.8	Day works	Yes
1.9	Health & Safety	No
1.10	Environmental Management plan	No
2	<u>11kV Cable, Connection, Termination and Accessories:</u>	
2.1.A	Between 20 MVA Transformer and 11kV Switchgear	Yes
2.1.B	Between 35 MVA Transformer and 11kV Switchgear	Yes
2.1.C	Between 40 MVA Transformer and 11kV Switchgear	Yes
2.2	Underground PVC-Insulated Multi-Core Control Cable	Yes
2.3	Termination and Connecting up of Cables and Cable Accessories	Yes
2.4	Trenching, Layout and the Installation of Multicore Cables	Yes
2.5	Medium Voltage Cable Sealing Ends, Terminations and Cables	Yes
3	<u>Earthing:</u>	
3.1	Earthing Grid	Yes
3.2	Earthing	Yes
4	<u>11kV Switchgear</u>	
4.1	11 kV Metal-Clad Switchgear	Yes
4.2	11 kV Metal Enclosed Switchgear	Yes
5	<u>SCADA:</u>	
5.1	SCADA Interface	Yes

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CoT – Signatures - Contractor

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## SECTION 4: TECHNICAL SPECIFICATION

### PART 1.1: GENERAL REQUIREMENTS

#### CONTENTS

1.	STANDARDS AND COMPLIANCE WITH SPECIFICATION .....	2
2.	ENVIRONMENT .....	2
3.	SYSTEM PARTICULARS.....	3
3.1	132 kV System.....	3
3.2	88kV System.....	3
3.3	33 kV System.....	3
3.4	11 kV System.....	4
4.	SOCIO ECONOMIC DEVELOPMENT .....	4
5.	SITE SECURITY.....	4
6.	SITE OFFICE.....	5
7.	FOOD, ACCOMMODATION AND TRANSPORT .....	5
8.	CONTRACT MANAGEMENT .....	5
8.1	Project Team .....	5
8.2	Subcontractors.....	5
8.3	Work Scheduling.....	5
8.4	Site Office .....	5
8.5	Progress Meetings.....	5
8.6	Progress Reports.....	6
9.	SITE INSTRUCTION BOOK.....	6
10.	DELIVERY AND STORAGE.....	6
11.	SAFETY OF PERSONNEL .....	6
12.	COMMENCEMENT AND COMPLETION DATES, PROJECT SCHEDULING .....	7
13.	INFORMATION TO BE SUBMITTED WITH TENDER.....	7
14.	INFORMATION TO BE SUBMITTED BY SUCCESSFUL TENDERER .....	7
14.1	As-Built Drawings .....	7
15.	STATEMENT OF COMPLIANCE .....	7
16.	STANDARD REGULATIONS .....	8
17.	PERMIT-TO-WORK.....	8
18.	PROTECTION OF EQUIPMENT AGAINST DAMAGE .....	9
19.	LV DISTRIBUTION VOLTAGE.....	9
20.	TEST BY SUPPLY AUTHORITY.....	9
21.	ARTICLES OF VALUE .....	9
22.	WITNESSING OF TESTS .....	9
23.	EXISTING SERVICES.....	9
24.	HANDOVER .....	9

## SCOPE

Part 1 is the general specifications and must be read with the specific specifications of the various equipment.

### 1. STANDARDS AND COMPLIANCE WITH SPECIFICATION

All work shall be in accordance with this Specification and Standard Specifications herein, and the General Conditions of Contract Governing Tenders and Special Conditions of Contract Governing tenders: Energy and Electricity Department.

Where no particular specification clause is referred to with respect to any item of equipment to be supplied, the latest issue/amendment of the relevant SANS specification or NRS, or IEC Specification shall be adhered to (in the same order).

In order to help control costs, the Tenderer shall where possible offer his available standard commercial equipment.

Tenderers shall highlight any deviations from the specification on a clause-by-clause basis explaining the reasons for any deviations in detail. Reference to attached pamphlets, brochures etc., which may contain details of such deviations, are not acceptable. Tenderers main offer must comply fully with this specification. Any alternative offer shall supply the same functionality as called for in this specification. Tenders not complying with these functional requirements will be summarily rejected.

All civil work shall be in accordance with the Standard Specifications for Municipal Civil Engineering Works.

### 2. ENVIRONMENT

Altitude above sea-level	1 530 m
Maximum ambient temperature	40°C
Average daily maximum ambient temperature	30°C
Minimum ambient temperature	-5°C
Average daily minimum ambient temperature	2°C
Maximum ground temperature	25°C
Minimum ground temperature	10°C
Relative humidity	94%
Lightning conditions	Severe
Degree of pollution	Medium
Earth resistivity	Varying between 50 and 1000 ohm per metre at a depth of 1,5m
Maximum wind speeds:	
a) Steady conditions;	25 m/s
b) Gusty conditions.	45 m/s

### 3. SYSTEM PARTICULARS

#### 3.1 132 kV System

Nominal system voltage (r.m.s. line to line)	132 kV
Highest system voltage (r.m.s. line to line)	145 kV
System frequency	50 Hz
Maximum symmetrical fault current capacity (3 second rating)	31.5 kA
System BIL at sea-level	650 kV
System insulation level at Pretoria altitude	550 kV
Number of phases	3
Phase rotation	R-W-B anti-clockwise
System earthing	Neutral points on 132kV transformer windings solidly earthed

#### 3.2 88kV System

Nominal system voltage (r.m.s. line to line)	88 kV
Highest system voltage (r.m.s. line to line)	100 kV
System frequency	50 Hz
Maximum symmetrical fault current capacity (3 second rating)	31.5 kA
System BIL at sea-level	450 kV
System insulation level at Pretoria altitude	520 kV
Number of phases	3
Phase rotation	R-W-B anti-clockwise
System earthing	Neutral points on 88kV transformer windings solidly earthed

#### 3.3 33 kV System

Nominal system voltage (r.m.s. line to line)	33 kV
Highest system voltage (r.m.s. line to line)	36 kV
System frequency	50 Hz
Maximum symmetrical fault current capacity (3 second rating)	13.10 kA
System BIL at sea-level	170 kV
Number of phases	3
Earthing	Through NEC and NER

**3.4 11 kV System**

Nominal system voltage (r.m.s. line to line)	11 kV
Highest system voltage (r.m.s. line to line)	12 kV
System frequency	50 Hz
Maximum symmetrical fault current capacity (3 second rating)	20 kA
System BIL at sea-level	95 kV
Number of phases	3
Earthing	NER on star/star transformer NEC on star/delta transformer

**4. SOCIO ECONOMIC DEVELOPMENT**

The contractor shall approach this contract and execute the Works with due consideration of the need to empower and subcontract a portion of the works to the local communities in which the project is executed. It is expected that a Project Steering Committee consisting of members of the local communities or forums still to be established, will monitor the extent to which government policy in this regard is supported.

It may be expected that these forums or committees or a committee established specifically for this contract, will also be involved in the requirements of labour, assessment of training needs and development requirements of entrepreneurs as contractors/sub-contractors as well as utilisation of sub-contractors from the relevant local communities.

The contractor shall give his full co-operation to these forums and committees.

All labour and sub-contractors utilised on this contract shall be drawn from the communities of the CITY OF TSHWANE METROPOLITAN MUNICIPALITY where large unemployment prevails and the need for a better quality of life exists, all in accordance with the EPWP guidelines.

If the contractor intends to utilise certain categories of employees (generally considered as being key personnel of the contractor), or certain sub-contractors (generally specialist sub-contractors) in the Works, full details in this regard must be provided with the Tender. This clause shall apply mutatis mutandis to such a sub-contractor if accepted in terms of the General Conditions of Contract.

Should the contractor fail to comply with the conditions of this clause, the Engineer may suspend the progress of the Works in terms of clause 48 of the Special Conditions of Contract and the contractor shall not be entitled to make a claim for a delay or additional Cost.

Compliance with this clause does not relieve the contractor of any of his contractual obligations or liabilities.

**5. SITE SECURITY**

The Contractor will be responsible for all security until hand over to the Council. This shall include all temporary security site lighting.

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**6. SITE OFFICE**

The Engineer will allocate to the Contractor an area for the purpose of stacking or storing materials and the erection of site offices. On completion of the Contract Work, the Contractor will remove all buildings, equipment, rubble and materials at the construction site and leave it in a tidy condition.

**7. FOOD, ACCOMMODATION AND TRANSPORT**

Suitable provision shall be made for the supply of drinking water and food under sanitary conditions acceptable to the health inspectors of the Council.

The safe transport of plant, tools, materials and labour to and from the working sites is the responsibility of the Contractor.

**8. CONTRACT MANAGEMENT****8.1 Project Team**

The Tenderer shall submit a list of his proposed project team, with a brief CV of each candidate. The Engineer shall have the right to instruct the Contractor to change the team after negotiation with the Contractor.

**8.2 Subcontractors**

The Contractor shall submit a list of proposed subcontractors for approval to the Engineer. Any changes to the list of subcontractors shall be approved by the Engineer. Subcontractors may not subcontract work further without permission of the Engineer. The Engineer may at any time ask for a subcontractor to be changed.

**8.3 Work Scheduling**

Within 3 weeks of order date the Contractor shall submit a detailed plan covering all important activities. The Engineer, together with the Contractor, shall agree the final schedule. This schedule will be saved as the base case and may not be changed. The milestones so generated will become the contractual dates for payments.

**8.4 Site Office**

The Contractor shall establish a permanent on-site organisation for the proper control, management and execution of the works.

**8.5 Progress Meetings**

Weekly meetings shall be held at which reports shall be submitted to the Engineer indicating progress and adherence to the work program.

Minutes of meetings shall be kept by the contractor and shall be made available to all participants, and others to be decided by the Engineer, within 3 working days.

Agenda to be circulated to all participants by email 1 week before each meeting.

## 8.6 Progress Reports

Monthly progress reports reflecting the status at the end of each calendar month shall be made available to the Engineer before the 5<sup>th</sup> working day of the following month and shall include, but not be limited to, updated versions of the following:

- a) Cover sheet for monthly report;
- b) Minutes of the previous meeting;
- c) Cash flow statements showing actual expended amounts and forecast amounts to the end of the project on a monthly basis;
- d) Gantt charts generated on the approved project management software showing sequence and duration of work, as well as actual progress achieved and expected completion time. The base information as quoted for shall be shown and shall remain unchanged for the duration of the project;
- e) Attendance list;
- f) List of site instructions to date;
- g) List of variation orders to date;  
List of drawings on the project;
- h) List of rainfall days;
- i) Schedule of plant and personnel on site; and
- j) List of subcontractors on site.

Furthermore, all variations to the contract, extras, omissions, etc., shall be processed and presented in the form to be directed by the Engineer.

## 9. SITE INSTRUCTION BOOK

The Contractor shall supply and keep in safe custody on site, a site instruction book of standard A4 size, with numbered pages and provision for two carbon copies per page.

The first page of every instruction will be removed and retained by the Engineer for record purposes.

## 10. DELIVERY AND STORAGE

The Contractor shall make his own arrangements regarding transport and off-loading of labour and materials and shall provide his own plant. The Contractor will be responsible for the safe storage of all equipment, materials and plant after delivery and will be held responsible for loss by theft or damage in any way, whether installed on the contract or not, until take-over of the works by the Council.

The Contractor will assume full responsibility for all materials which are supplied to him on site. He must provide adequate security measures to minimise the risk of theft. Materials on site shall be insured by the Contractor against all risks to their full value. Proof of such insurance and pre-payment of premiums to cover the duration of the Contract must be provided before the issue of any payment certificates will be considered.

## 11. SAFETY OF PERSONNEL

The Contract may involve work within close proximity of and work upon possible live high voltage equipment. Correct safety procedures must be adhered to at all times and work must be carried out under control and supervision of an experienced responsible person as detailed in the Occupational Health and Safety Act 85 of 1993 as amended.



**12. COMMENCEMENT AND COMPLETION DATES, PROJECT SCHEDULING**

Within 1 week of written notification of acceptance of his tender, the Contractor shall arrange a kick-off meeting with the Engineer at which open points will be discussed and design freeze dates established.

The Contractor shall put the work in hand and shall submit a detailed programme to the Engineer for approval within two weeks after award of the contract, detailing the commencement date; duration and completion date and detail cash flow of each activity concerning the works. A suitable number of milestones shall be defined in order to ensure that the project is kept on schedule and that sufficient resources are employed.

The Contractor shall use a project planning programme approved by the Engineer.

Manufacture of equipment off-site is to run concurrently with the execution of the civil and building works. The various phases shall be properly co-ordinated to ensure that accommodation for equipment is ready when the equipment is ready for delivery.

A detailed manufacturing schedule for all equipment shall be supplied to the Engineer for his approval within 1 month of award of the contract. The Engineer will then insert hold points and inspection points at his discretion. The Engineer reserves the right to visit any works of the Contractor or any Sub-contractor at any reasonable time without prior announcement.

**13. INFORMATION TO BE SUBMITTED WITH TENDER**

Tenders shall be submitted complete with comprehensive literature, drawings, etc., describing the equipment offered. This information shall include the following as a minimum requirement:

- a) Dimensioned drawings, to metric scale of each item of equipment;
- b) Typical circuit diagrams of control and protection system;
- c) Description of units and its operation, including vital design parameters (max. system voltage, fault capacity, current rating, impulse withstand level etc.).

All tenders must be fully priced. Items not specifically called for, but required for the successful completion of the works, shall be added by the tenderer.

Tenderers are further required to indicate in their tender their past experience in the execution of works of similar nature and scope.

Detail cash flow for each activity concerning the works.

**14. INFORMATION TO BE SUBMITTED BY SUCCESSFUL TENDERER****14.1 As-Built Drawings**

The successful Tenderer shall during the course of this service update all drawings to reflect the as-built status of the works. Full sets of "AS-BUILT" drawings shall be supplied by the Contractor before final take over. These drawings must be to the satisfaction of the Engineer. One set of drawings shall be left on site, and the other used by the Contractor to correct the originals.

**15. STATEMENT OF COMPLIANCE**

Tenders are to be accompanied by the Statement of Compliance, stating whether the tender complies with the Conditions of Contract and the Specification.

**16. STANDARD REGULATIONS**

Wherever applicable the equipment, work and installation shall conform with the:

- a) The Standard Regulations for the Wiring of Premises issued by the South African Bureau of Standards.
- b) Any special requirements of the Supply Authorities of the area or district concerned.

Please note the requirements of Electrical Machinery Regulation R4 and R5. These state that no person employed by the Contractor or any Sub-contractor may enter any existing substation or switch-house without the uninterrupted presence of a "competent person" as defined in the Occupational Health and Safety Act acting on behalf of the client, unless a "permit to work" as referred to hereinafter has been obtained. When the electrical apparatus in any new substation or switch-house is made alive for the first time and at all times thereafter, such substation shall be treated as an existing substation and the requirements of the above paragraph shall apply for high voltage work.

**17. PERMIT-TO-WORK**

As the work may be done in stages, sections of the area can be energised. We draw your attention to the Electrical Machinery Regulation R4 and R5. The Contractor shall not work on any part(s) of the high voltage distribution system until such part(s) of the system have been isolated and earthed and the appropriate measures have been taken to prevent accidental re-energising of the part(s) and a "permit to work" authorisation in writing has been obtained from the Engineer or his duly authorised representative.

Before the responsible person of the Contractor signs for and accepts the permit, he must satisfy himself that the part of the system on which he requires to work has been effectively isolated and earthed, that all circuits have been clearly identified, and that the Engineer has made it safe to work at the point of working.

The "permit-to-work" shall be made in duplicate and shall contain the following:

- a) Written description of location of points of isolation and of earthing.
- b) Name and signature of person to whom the permit is issued.
- c) Time and date of issue of permit.
- d) Statement handing-over section(s) of system clearly defining the part(s) handed-over as being safe to work upon.
- e) Signature of the Supply Authority or his duly authorised representative.

The responsible person of the Contractor shall retain the original "permit-to-work" shall be handed to the Contractor and shall retain it while his work is being completed on that part of the system covered by the permit.

After ensuring that no person employed by the Contractor or any Sub-contractor is still working on the system, that work is completed and that the installation has been made safe, the Contractor shall sign the "permit-to-work" and return it to the Engineer. Then the electrical installation may be re-energised. The same person that took out and signed the permit must return it.

Notwithstanding the foregoing, the Contractor shall at all times take all necessary precautions and make all necessary tests to ensure the safety of all persons employed by him or by any Sub-contractor.

No extras to the contract or extension of time will be allowed due to any of the above factors.

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**18. PROTECTION OF EQUIPMENT AGAINST DAMAGE**

Equipment shall be adequately protected against possible damage during transportation, off-loading and handling on site. Relays, instruments and other delicate equipment shall be adequately protected against transport and other damage to the satisfaction of the Engineer.

**19. LV DISTRIBUTION VOLTAGE**

The low voltage distribution will be at a nominal voltage of 400/230 volt 50 Hz 3 phase AC.

The voltage on miniature substations or transformers shall be set at a No-Load voltage of 400/230 volts.

Distribution will be by 4 wire, 3 phases and a neutral. The neutral shall be solidly earthed at the substation.

**20. TEST BY SUPPLY AUTHORITY**

On completion of the work, the whole of the installation will be inspected and tested by the Engineer.

The Contractor will be required to attend on the Supply Authority's inspector(s) requests and give all assistance required and provide such tools, materials, implements and instruments as are necessary for the tests.

**21. ARTICLES OF VALUE**

Any article of value, archaeological finding, etc., found on the site during the execution of the Contract shall be handed to the Engineer who shall be the sole referee as to what constitutes articles of value and to report to who ever may be concerned.

**22. WITNESSING OF TESTS**

The Council reserves the right to have the Engineer inspect and witness factory and onsite commissioning tests of all equipment to the satisfaction of the Engineer.

The Contractor shall make due allowance for these inspection points in his manufacturing programme and to avoid delays occurring, shall notify the date for inspection or witnessed tests at least 14 days in advance of the actual date.

The Council does not accept responsibility for the late delivery on the basis of inspection delays.

All tests shall be documented to the satisfaction of the Engineer.

**23. EXISTING SERVICES**

The Contractor shall be responsible for obtaining drawings from other Municipal Departments and authorities showing the positions of underground services.

**24. HANDOVER**

The last payment on takeover (i.e. prior to retention payments) will only be done on completion of a Handover Certificate and receipt of all manuals and test certificates.

SECTION 4:

TECHNICAL SPECIFICATION

PART 1.2:

SITE SAFETY, SECURITY, STORAGE AND  
SUPERVISION REQUIREMENTS

SPECIFICATION No:

SR.01/0-2003 (Previous No: SR.01/0-97)

CONTENTS

1.	WORKING IN LIVE YARDS .....	2
2.	SECURITY MEASURES .....	2
3.	STORAGE OF MATERIALS.....	3
4.	WORKING HOURS .....	3
5.	CLEARING SITE .....	3

## 1. WORKING IN LIVE YARDS

In order that the Council may make the necessary arrangements, each application for a Work Permit shall be submitted to the Engineer, together with all the required particulars, **at least three full working days** before access to the site yard is required.

With regard to the switching out of equipment to facilitate the carrying out of Contract Work, it shall be distinctly understood that switch-out dates, times and periods are subject to load and operational requirements. Operational and/or load requirements may dictate that Contract Work on the existing network be carried out over weekends or outside normal working hours.

The Contractor shall obtain, complete and return the following documentation one week before access to the site is required:

- a) Issuing of substation keys to Contractors (where applicable)
- b) Temporary Permit to enter a security area
- c) Appointment of a competent person to supervise workers near electrical equipment
- d) Duties and responsibilities for the competent person supervising construction work near live electrical work.

## 2. SECURITY MEASURES

Work inside electrical yards is subject to the Council's security measures and the contractor shall contact the responsible Project Engineer prior to the commencement of any work under the Contract, in order to make the required security arrangements. The costs of security measures shall be included in the rates for site work.

If so required by the Council, all Employees of the Contractor and his Subcontractors employed with regard to the execution of the Contract shall be security cleared on such conditions as laid down by the Council.

Should any Employee of the Contractor or his Subcontractor be declared unfit for whatever security reasons, the Contractor or the Subcontractor shall have the right to appoint any person in lieu of the disqualified Employee, subject to the Council's security clearance.

The Contractor undertakes -

- a) to treat all information regarding the Contract and the execution thereof as strictly confidential;
- b) that he himself, his Subcontractors and all Employees concerned will sign the Council's Declaration of Secrecy;
- c) in the execution of the Contract, to report to the Council's responsible Project Engineer, without delay and confidentially, any information regarding:
- d) Any suspected espionage in respect of the lay-out of the site where the work is being executed, or in respect of sites where protective measures are applied.
- e) Actions which may be interpreted as sabotage, or any planning in this regard.
- f) Any suspected subversive activities among his Employees.
- g) The loss of any classified documents which came into his possession as a result of the Contract.
- h) The contravening of any security measure by an Employee.
- i) Housebreaking, theft, arson, vandalism, loss of identity documents, security keys or lock combinations.
- j) Corruption, blackmail, intimidation, striking or inciting or unauthorized access to an office or premises.

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- k) Any Employee who is involved with the Contract and who is suspected of bringing drugs, intoxicating liquor, a weapon, ammunition or explosives on the site of the Council.

The Council shall have the right to inspect, at all reasonable times, and through its Security Department, the Contractor's and Subcontractor's premises and offices where work in connection with the Contract is executed or where documents in that connection are kept, in order to prescribe suitably security measures, and to determine whether the prescribed security measures are being implemented satisfactorily.

### **3. STORAGE OF MATERIALS**

The Contractor shall be solely responsible for all security arrangements for the safe storage of materials on site. The Council will not be liable for any loss or damage of any materials or equipment whatsoever.

Prices for supply and delivery of materials shall allow for all transport, handling, loading and off-loading on site.

The receiving and handling thereafter on site of all materials is the responsibility of the Contractor.

### **4. WORKING HOURS**

Site work carried out for the execution of this Contract shall be confined, as far as possible, to normal working hours on normal working days (i.e. 07h00 - 17h00 on Mondays to Fridays) excluding Public Holidays.

Work to be done outside normal working hours shall be approved by the Engineer who shall be notified of the reasons in writing at least three working days in advance of any work to be done outside normal working hours.

### **5. CLEARING SITE**

On completion of the Contract the contractor shall clear the Site of all temporary offices, sheds, temporary structures and waste material and rubbish. Nothing shall be buried on site.

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**SECTION 4: TECHNICAL SPECIFICATION**  
**PART 1.3: QUALITY ASSURANCE REQUIREMENTS**

**SPECIFICATION No: QR.01/0-2003 – Rev 4 (Previous No: QR.01/0-97)**

**CONTENTS**

1.	QUALITY SYSTEM.....	2
2.	INFORMATION REQUIRED IN THE TENDER.....	2
3.	QUALITY SYSTEM DOCUMENTATION .....	2
3.1	Contractor's Quality Control Plan (QCP).....	2
3.2	Witnessing by Engineer .....	2
4.	INSPECTION AND TESTING .....	3
4.1	Scope.....	3
4.2	Statutory Testing.....	3
4.3	Testing .....	3
4.4	Procedures Subject to Approval .....	5
5.	WELDER QUALIFICATION.....	5
6.	CONTRACTOR'S RECORDS AND REPORTS .....	5
7.	AUDITS BY THE ENGINEER.....	5
8.	QUALITY ASSURANCE REQUIREMENTS.....	5
9.	PROVISION OF STANDARD SPECIFICATIONS.....	6

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CoT – Signatures - Contractor

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## 1. QUALITY SYSTEM

The Contractor shall provide and operate throughout the Contract, to the satisfaction of the Engineer, a Quality System in accordance with the requirements specified hereinafter.

The Contractor's quality assurance activities shall include, but not be limited to, those functions defined in the Schedule and such additional activities as the Engineer may direct to prove conformity to the Specification. They shall provide for the detection and removal of all non-conforming material either prior to or at the latest state of process or manufacture where the required characteristics can be measured or observed.

A valid ISO 9000 listing will be acceptable to the Engineer.

## 2. INFORMATION REQUIRED IN THE TENDER

The Contractor shall complete and submit in his Tender the Quality System Questionnaire.

In support of this information and when called upon to do so, the Contractor shall submit a description of his Quality System or a Quality Manual.

## 3. QUALITY SYSTEM DOCUMENTATION

### 3.1 Contractor's Quality Control Plan (QCP)

Within one month of instructions to proceed, the Contractor shall submit for approval of the Engineer two copies of a draft Quality Plan for the contract Works, defining the inspections, tests and other quality activities, which he proposes to carry out at each stage of his work under the Contract. The Engineer shall add his witness and hold points to the quality plan. Quality activities, which are to be performed at sub-contractor's premises, shall be clearly defined.

**The Quality Plan shall be in two parts, covering:**

- a) Quality activities during design (if applicable), and manufacture.
- b) Quality activities at Site.

Following approval of the Quality Plan and within 1 month of approval by the Engineer, the Contractor shall submit to the Engineer four copies of the approved documents.

### 3.2 Witnessing by Engineer

Following his approval of the Contractor's Quality Plan the Engineer will notify to the Contractor the inspections, tests and other quality activities, which he intends to witness. He may at any time call for the witness of such additional inspection and tests as he may require proving conformity with the Specification. When the Engineer has confirmed his intentions to witness any inspections or tests the Contractor shall be given due notice of his readiness. Work or dispatch may not proceed if the Engineer has not witnessed or attended tests required by the Quality Control plan.

The Engineer shall indicate on the QCP whether he wishes to attend factory witness tests, and site commissioning tests. The documentation of these tests shall be incorporated into the Contract Documentation system.

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## **4. INSPECTION AND TESTING**

### **4.1 Scope**

Inspection and testing shall include all items in Schedule A and all relevant tests listed in the appropriate Standards. The quality plan shall be to the approval of the Engineer.

### **4.2 Statutory Testing**

The Contractor shall be responsible for ensuring that all tests and approvals required by Statutory Authorities are duly performed and the relevant approval documents issued, free of charge, to the Employer.

Where classification of equipment is required, an approved Classification Society shall carry it out at the Contractor's expense. On completion, the Contractor shall issue the relevant documents to the Engineer.

### **4.3 Testing**

Cognisance should be taken of the specific requirements detailed in other parts of Section 3 regarding testing. Tenderers are to ensure that all uncertainties regarding separate requirements are clarified with the Engineer in advance.

All test reports shall be incorporated into the Instruction, Operating and Maintenance Manuals.

#### **4.3.1 Type tests**

The electrical equipment, relays and control equipment shall be certified by means of test certificates to have been tested successfully and in accordance with the specified requirements and Standards. It shall also be certified that they have passed the following tests successfully:

- a) Temperature rise test;
- b) ability to withstand overload test;
- c) durability test;
- d) contact test;
- e) insulation test;
- f) high-frequency disturbance test; and
- g) any other type tests normally carried out by the manufacturer and those laid down by the appropriate Standard Specifications.

If type testing is to be done specifically for the purpose of this contract, testing shall be carried out in accordance with the specified requirements by an independent recognised testing institute approved by the City of Tshwane.

Existing type test certificates will be considered on their merits and Tenderers are requested to submit copies of existing type test certificates with their tenders. Should reasonable doubt arise as to the validity of the test certificates submitted and accepted by the City of Tshwane, in respect of the relays to be supplied, the City of Tshwane may direct that further certificate(s) be obtained on a sample unit/sample units, provided by the successful Tenderer at his expense. An independent recognised testing institute shall carry out such further testing.

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#### 4.3.2 Routine tests

These are part of the manufacturing process and the test results shall be included in the operation and maintenance manuals.

A high-voltage test of insulation shall be carried out.

Any other factory routine tests normally carried out by the manufacturer and those laid down by the appropriate Standard Specification.

The general philosophy shall be to deliver a system to site only once it has been thoroughly tested and its specified performance has been verified, in so far as site conditions can be simulated in a test laboratory.

#### 4.3.3 Instruments

All measurements shall be calibrated in accordance with SABS-ISO 9000.

#### 4.3.4 Detailed testing requirements

The Contractor shall give the City of Tshwane or its appointed representative not less than fourteen (14) days notice of such equipment being ready for inspection or witnessing of tests, as necessary (90 days in respect of overseas tests).

In order to assist the City of Tshwane in making provision for inspection and witnessing of tests, the name of the manufacturer, the place of manufacture, the place where equipment can be inspected and where equipment will be tested, shall be provided. Should the Contractor wish to change to another manufacturer, he shall in due time advise the City of Tshwane in writing of the details called for above.

The Contractor shall at the time of placing orders or sub-orders advise all Sub-contractors that all equipment may be subject to inspection and witnessing of tests by the City of Tshwane or its appointed representatives.

Factory tests shall be regarded as an integral part of the manufacturing of the various items and shall therefore be allowed for in the unit prices quoted for supplying.

Site and commissioning tests shall be regarded as an integral part of the installation of the various items and shall be allowed for in the unit prices quoted for installation.

The Engineer shall be furnished with two copies of the Contractor's records of all factory tests immediately after such tests and before any material is shipped. No material shall be installed before the Engineer has officially approved these tests.

The Engineer shall be furnished with two copies of the Contractor's records of all site and commissioning tests immediately after completion of such tests.

#### 4.3.5 Site tests

Site tests shall be carried out in detail to confirm the integrated operation of the control and protection scheme.

Testing shall at the least include the following:

- a) Secondary injection tests, to prove panel circuits and the operation, speed and operating curves of relays;
- b) functional testing of all elements, to prove the operation of the different circuits. This includes the interfacing with yard equipment and the various other substation functions, like busbar protection, breaker fail/busbar strip protection, inter-tripping, aided tripping, interlocking, indications, alarms, control functions, communication networks, operator stations and master station control operations;

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- c) tests to prove the key features of instrument transformers;
- d) primary injection, carried out from the yard equipment, to prove instrument transformer circuits; and

On-load testing, as a final proof of instrument transformer circuits and the phase relation of current and voltage inputs to the protection relays.

#### **4.4 Procedures Subject to Approval**

The Contractor shall submit his proposal to the Engineer when it is a condition of this Specification that a manufacturing, inspection or testing process be subject to the approval of the Engineer or when any matters require to be agreed between the contracting parties, as when specified Standards leave acceptance criteria to be so agreed.

Wherever practicable the Contractor's proposals shall be submitted early enough to allow ample time for agreement to be reached.

The approval of equipment, etc (issue for Manufacture/Construction) shall not relieve the Contractor of his responsibility regarding the correctness thereof or any subsequent failures as a result of faults or omissions by the Contractor.

#### **5. WELDER QUALIFICATION**

Welders who hold valid certificates of competence in accordance with the relevant National or International Standard shall carry out all welding.

#### **6. CONTRACTOR'S RECORDS AND REPORTS**

The Contractor shall maintain adequate records for inspection by the Engineer and shall submit for the Engineer's approval all test data, results and certificates as required. Following final tests on completion, test sheets recording the results of the tests shall be submitted in triplicate.

The Contractor shall obtain and submit to the Engineer copies of the relevant data and certificates when others carry out inspections and tests.

#### **7. AUDITS BY THE ENGINEER**

The Contractor's procedures and implementation thereof shall be subject to audit by the Engineer after Contract award. The frequency of audits shall be dependent upon the complexity and duration of the work. The Engineer shall give Two weeks notice to the Contractor of an intended audit.

#### **8. QUALITY ASSURANCE REQUIREMENTS**

Tenders shall present a Quality Plan to the satisfaction of the Engineer in the format suggested by ISO 9000.

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**9. PROVISION OF STANDARD SPECIFICATIONS**

The Tenderer shall supply the latest issues and amendments of the list of specifications to be issued on the tender designation to the successful tenderer. The standard specifications are:

- a) SABS Catalogue;
- b) IEC Catalogue;
- c) BSI Catalogue;
- d) IEC 129 - Disconnectors;
- e) IEC 51 - Switchgear;
- f) IEC 255 - Protection relays;
- g) IEC 694 - Common clauses;
- h) IEC 298 - Metal encapsulated, type tested, works manufactured switchgear assemblies for voltages up to 72.5kV;
- i) IEC 298 - Testing the response of Type tested, works manufactured, metal encapsulated switchgear, for voltages up to 72.5kV, to an internal arc fault;
- j) NRS 001 - Technical specifications guidelines for drafting;
- k) SABS 0200 - Earthing;
- l) IEC 185 - Current transformers;
- m) IEC 186 - Voltage transformers;
- n) IEC 529 - Degrees of protection afforded by enclosures (IP code);
- o) SABS-1195 - Busbars and busbar connections; and
- p) SABS-1222 - Enclosures for electrical equipment.

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CoT – Signatures - Contractor

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**SECTION 4: TECHNICAL SPECIFICATION****PART 1.4: TECHNICAL REQUIREMENTS****SPECIFICATION No: TR.01/0-97 – Rev 3 (previous No: TR.01/0-97)****CONTENTS**

1.	STANDARDS.....	2
1.1	South African Sources.....	2
1.2	IEC Sources.....	2
1.3	British Sources.....	4
2.	REQUIREMENTS FOR DESIGN AND LAYOUTS OF EQUIPMENT .....	4
3.	GALVANISING .....	5
4.	PAINTING.....	5
4.1	General .....	5
4.2	Painting of Non-Galvanised Steelwork.....	5
5.	BOLTS AND NUTS.....	5
6.	ALUMINIUM AND ALUMINIUM ALLOYS .....	6
7.	LABELS .....	6
8.	OIL .....	6
9.	SF6 GAS.....	6
10.	DENSITY METERS .....	6
11.	SPARES .....	7
12.	SPECIAL TOOLS .....	7
13.	STRUCTURES .....	7
14.	LOADING CALCULATIONS AND FACTORS OF SAFETY.....	8
15.	MANUFACTURE AND ERECTION OF STRUCTURES .....	8
16.	DRAWINGS, DOCUMENTATION and detailed design.....	9
16.1	General Requirements for Drawings .....	9
16.2	Documentation to be submitted with the Tender.....	10
16.3	Documents and Drawings to be submitted after Award of Tender.....	11
17.	OPERATING AND MAINTENANCE MANUALS (O&mM's).....	13
18.	WIRING .....	14
18.1	Small Wiring.....	14
18.2	Interpretation of and additions to NRS003-1 .....	15
18.3	MCCB's, Isolators, Fuses and Links.....	15
18.4	Multi-Core Cable and Wire Terminals and Trunking .....	16

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CoT – Signatures - Contractor

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## 1. STANDARDS

The design, manufacturing and testing of the equipment offered shall be strictly in accordance with this specification and the current editions of the following Standard Specifications and Codes of Practice, except where amended herein.

The hierarchy of the specifications shall be as follows:

- a) This specification;
- b) SABS;
- c) NRS;
- d) IEC; and then
- e) BS

The following documents shall be read in conjunction with this specification:

### 1.1 South African Sources

<i>Occupational Health and Safety Act No 85 of 1993.</i>	
Bolts and Nuts	SABS 135
Busbars	SABS 1195
Galvanising	SABS 763
Insulating Oil	SABS 555, IEC 296
Insulators	SABS 177
Marking of small wiring	NRS 003-1:1994
Mineral Lubricating Oil	SABS 053
Moulded case circuit breakers.	SABS 156: 1977 Amendment No 1: March 1987
National colour standards for paint.	SABS 109: 1975 Amendment No 2: 1989.
PVC Insulated Electric Cables	SABS 150, SABS 1507

### 1.2 IEC Sources

Alternating current and disconnectors and earthing switches.	IEC 129 (1984)
Auxiliary switches	IEC 129
Bushings for alternating voltages above 1000 V.	IEC 137 (1984)
Common clauses for high-voltage switchgear and control-gear standards.	IEC 694 (1980) Amendment No 1 (1985) Amendment No 2 (1993)
Contactors	IEC 158-1
Current transformers	IEC 185
Degrees of protection afforded by enclosures (IP code).	IEC 529 (1989)

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CoT – Signatures - Contractor

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Dimensional standardisation of terminals for high-voltage switchgear and control-gear .	IEC 518 (1975)
Dimensions of low-voltage switchgear and control-gear. Standardised mounting on rails for mechanical support of electrical devices in switchgear and control-gear installations.	IEC 715 (1981)
Disconnectors	IEC 129
Electric Power Switchgear and Accessories	IEC 51
Electrical and magnetic devices.	IEC 50-151 (1978)
Electrical Protection Relays	IEC 255
General definitions and test requirements.	IEC 60-1 (1989)
Graphical symbols for use on equipment.	IEC 417 (1973)
Guide for the checking of SF <sub>6</sub> taken from electrical equipment	IEC 480 (1974).
Guide to the testing of circuit breakers with respect to out-of phase switching	IEC 267 (1968)
High voltage alternating current circuit breakers - guide for maintenance.	IEC 1208 (1992)
High voltage metal-enclosed switchgear for rated voltages of 72,5 kV and above	IEC 517.
High voltage test techniques.	IEC 60 (1989)
High-voltage alternating current circuit breakers	IEC 56 (1987) Amendment 1 (1992)
IEC Standard voltages	IEC 38 (1993)
Insulation Co-ordination	IEC 71
International Electrotechnical Vocabulary	IEC 50
Low voltage control gear. Part 1 : Connectors	IEC 158-1 (1970)
Low voltage motor starters	IEC 292-1
Oil immersed Power Transformer	IEC 354
On-load tap changer	IEC 214
Partial discharge measurement	IEC 529, IEC 270 (1981)
Post Insulators	IEC 273
Power Transformers	IEC 76
Radio interference measurement	IEC 270
Rotating electrical machines	IEC 34 (1994), BS 2613 and BS 3979
Specification and acceptance of new sulphur hexafluoride.	IEC 376 (1971)
Sulphur Hexafluoride (SF <sub>6</sub> ) Gas	IEC 376
Surge Diverters	IEC 99.1

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CoT – Signatures - Contractor

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Switchgear, control gear and fuses.	IEC 50-441 (1984)
Synthetic testing of high voltage alternating current circuit breakers.	IEC 427 (1989) Amendment No 1 (1986)
Tests on hollow insulators for use in electrical equipment.	IEC 233 (1990)
Voltage transformers	IEC 186

**1.3****British Sources**

Cartridges fuse for voltages up to and including 1 000V ac and 1500 V dc.	BS 88 (1988)
Direct Acting Indicating Analogue Indicating Instruments	BS 3693
Electrical Measuring Instruments and Associated Apparatus.	BS 162
Electrical power switch-gear and associated apparatus	BS-162
Electrical protection relays.	BS 142 (1982) Appendix G.
Electroplated coatings of tin	BS-1872
Lead Based Primary Paints	BS 2523
Phosphate Treatment of Iron and Steel	BS 3189
Specification for current transformers	BS 3838: 1973 (1982)
Structural Steel	BS 5950, BS 449
Weldable Structural Steel	BS 4360

The equipment shall be designed to include all possible provisions for the safety of those concerned in operation and maintenance.

All outdoor equipment shall be designed to prevent accumulation of moisture. The terminal boxes shall be to IP55 as a minimum requirement.

Where it is not possible to protect metal parts by painting or galvanising, these parts shall be constructed of stainless steel or brass.

Control panels and kiosks shall be designed to be rodent proof and outdoor 'live' structures shall be designed and positioned to eliminate possible short circuits, which could be caused, by birds or animals.

**2.****REQUIREMENTS FOR DESIGN AND LAYOUTS OF EQUIPMENT**

The contractor shall ensure that the design and layout of the equipment to be supplied on this contract is such that in the operating condition it shall comply fully with the regulations promulgated in terms of the Occupational Health and Safety Act of 1993 and the latest amendments.

Where equipment supplied on this Contract is to be positioned in the proximity of existing equipment, structures or plant, the Contractor shall establish beyond any doubt that the said Regulations shall not be contravened by virtue of this proximity during the

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CoT – Signatures - Contractor

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erection and testing periods and in the final operating conditions. Any queries in this regard must be submitted in writing to the Engineer.

Where special inspection and testing are required the cost shall be included in the contract price for the equipment and the contractor shall be responsible for the arrangement of such inspections and testing.

### 3. GALVANISING

The pre-galvanising treatment, the hot process galvanising and the testing shall be carried out in accordance with SABS 763.

A minimum thickness of 0.063mm of zinc is to be achieved during the galvanising process.

The preparation and the galvanising shall not adversely affect the function or the properties of the galvanised equipment.

The material shall be completely shaped, cut, drilled, countersunk, welded, etc., before galvanising.

Surfaces, which are in contact with oil while in service, shall not be galvanised.

Alternative processes shall not be used unless approved in writing by the Engineer.

The galvanising of bolts shall be carried out after all mechanical operations have been completed, but the associated nuts may be threaded after galvanising. The galvanised threads of bolts shall be cleaned of spatter by spinning or brushing.

### 4. PAINTING

#### 4.1 General

The material shall be completely shaped, cut, drilled, countersunk, welded, etc. before any paintwork commences.

#### 4.2 Painting of Non-Galvanised Steelwork

Cubicles, which contain wiring and other apparatus and are assembled in the works, shall receive the external finishing coat of paint in the works.

Before painting the parts shall be thoroughly cleaned by sand or shot-blasting or metal brushes and acid bathed to remove all traces of rust, scale or grease.

Immediately after cleaning all rough surfaces shall be filled.

Paint finish for indoor conditions shall be powder coating in excess of 80 microns. White chassis plates shall be supplied.

Unless otherwise specified, all indoor Panels should be painted Cloud Grey F48 to SABS 1091 of 1975.

### 5. BOLTS AND NUTS

Bolts and nuts shall comply in all respects with the current edition of SABS 135. The bolts, nuts and washers used on outdoor galvanised steel work shall be hot dip galvanised in accordance with Clause 1.4.

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CoT – Signatures - Contractor

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For electrical connections, no brass bolt or stud shall be less than M6 size.

## 6. ALUMINIUM AND ALUMINIUM ALLOYS

Aluminium shall be of the highest purity commercially obtainable, and be suitable for the electrical and mechanical applications for which it is intended.

Aluminium and aluminium alloy castings shall be free from porosity.

## 7. LABELS

All equipment to be supplied on this contract shall be provided with clear and concise descriptive labelling describing the function and the circuit number of the apparatus concerned. These shall be to the approval of the Engineer. All labels shall be in English.

In the case of open busbar, phase identification discs shall be fitted where practical, i.e. for strung busbar on the gantry beam below every string insulator set and for solid busbar on post insulator support pedestals. These shall be 150mm diameter discs and shall be coloured red, yellow or blue according to phase and shall be fitted to be visible from ground level. They shall be properly affixed by each fuse holder, link, protection relay, switch, control handle, control relays and indicator lamps shall be labelled to indicate its function and current rating for fuses.

Complete particulars of instrument transformers and surge diverters must be engraved or stamped on permanent weatherproof labels.

The manufacturer's details of switchgear such as rating, type, serial number etc. shall be engraved or stamped on a permanent weatherproof label.

## 8. OIL

New oil shall be supplied on this contract for all equipment required to be oil filled. Re-refined oil will not be accepted.

Insulating oil shall comply with the current editions of SABS 555 and shall be passed through a filter before use.

Lubricating oil shall comply with the current edition of SABS 053.

## 9. SF6 GAS

New sulphur hexafluoride (SF6) gas shall be supplied on this contract for all equipment required to be gas filled.

SF6 gas shall comply with the recommendations of IEC Publication No. 376.

## 10. DENSITY METERS

Unless specified elsewhere each gas compartment of equipment supplied with SF6 gas shall be supplied with density gauges equipped with at least one change-over contact for low gas density alarm condition and density alarm condition trip and one for lockout if applicable.

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CoT – Signatures - Contractor

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These gauges shall be easily visible from ground level by the operator. Arrangement of the gauges shall be to the approval of the Engineer.

## 11. SPARES

All spare parts or materials containing electrical insulation shall be delivered in approved cases suitable for storing such parts over a considerable period of time without deterioration due to climatic conditions or other causes.

Cases of spares shall be clearly marked with the contract number and as to what their contents are and a packing list shall be easily accessible from outside.

Individual spares shall be packed in plastic sheet or plastic bags, and tags listing the part number and description tied to the parts.

## 12. SPECIAL TOOLS

Where special tools are required for effecting adjustments, for dismantling purposes or for maintenance, a full kit of such tools shall be provided.

The cost of the special tools shall be deemed to have been included in the price of the device for which they are required, unless specially listed.

These tools are not to be used during erection.

A special lockable cupboard shall be supplied at each substation to house the special tools.

## 13. STRUCTURES

Structures with foundations shall be provided and erected to support the busbars, isolating switches, earthing switches, instrument transformers, surge diverters, etc.

A drawing (or drawings) shall be issued with this specification detailing the envisaged layout of the substation equipment. The design and layout of the equipment to be supplied on this contract shall be based on this envisaged layout.

The structures complete with busbars and droppers shall be designed such that under all conditions of loading, temperature variations and maximum swing under fault conditions the electrical clearances shall be equal to or greater than those specified. The temperature variation of busbars shall be considered to be 75° C to -5° C.

Safety clearances to enable operation, inspection, cleaning, repairs, painting and normal maintenance work shall be strictly in accordance with BS 162.

This contract covers the supply and fitting of droppers and connecting clamps to all items of equipment shown on the drawings of an envisaged layout of yard equipment whether these are to be supplied on this contract. The name/s of the supplier/s of associated yard equipment will be available from the Engineer. Where these connections are to be made onto existing commissioned equipment this work shall be carried out only after staff of the Engineer have certified that the existing equipment has been made safe and the necessary dead orders have been obtained.

Where the supply to the substation is by overhead line, the yard structures covered by this contract shall be provided with all the fittings or anchor bolts necessary for the anchorage of the tension insulators to be provided and fitted by the overhead line contractor. The structures shall be designed to allow for the loading of these incoming conductors (and earth wires) with the factors of safety specified in Clause 14 below.

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CoT – Signatures - Contractor

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The final connection from the yard equipment to the terminal landing span conductors shall be the responsibility of the supplier of the yard structures specified herein.

Provision shall be made on each leg of all structures to accommodate an M16 bolt for the earth strap.

#### 14. LOADING CALCULATIONS AND FACTORS OF SAFETY

The assumed maximum working loads shall be the combined simultaneous loading of "dead weight", windage and tension loadings.

The "dead weight" shall be the vertical loading of the conductors, insulators and equipment supported by the structures and the structures themselves.

The windage loading shall be the product of an assumed wind pressure of 700 Pa and the "effective projected area" of the structures, equipment, insulators and conductors supported. The "effective projected area" is as follows: -

- a) The true projected surface area of flat objects x 1.
- b) The true projected surface area of round, elliptical or hexagonal objects x 0.6.
- c) The true projected area of all the members of the side of lattice supporting structures X1.5.

For equipment and structures of less than 10 metres total height the wind pressure shall be assumed to be 900 Pa. For structures of total height above 10 metres the assumed wind pressure shall be that determined from the curve of pressure against height as shown in Table 3 (section 4.5) of SABS 0160 - 1980 "Code of Practice for the general procedures and loadings to be adopted for the design of buildings", adjusted by multiplying the figure by a gushing factor of 1,37 (i.e. for a 140km/hour wind).

The tension loading shall be the combination of the tensions applied to the supported yard conductors and the tension due to the incoming lines and earth wires.

For calculation purposes working tension of each line conductor (or earth wire) shall be considered to be 4500 Newtons (i.e. 9000 Newtons per phase for twin conductors per phase) and allowance must be made for variation in landing direction (from that shown on the drawings issued with this specification) of up to 30° laterally and 20° vertically. The yard conductors shall be assumed to be at -5 C for the calculation of the assumed maximum working load.

The ratio of unsupported length of compression members to their least radius of gyration shall not exceed 120 for main members or 200 for bracing members.

The calculated tension/compression stress of any member of the completed structure resulting from the assumed maximum working load shall not exceed 40% of the elastic limit/crippling strength of that member (i.e. a safety factor of 2.5).

The tension of each single conductor shall not exceed 4500 Newtons at -5 C and a maximum safety factor of 2.5, based on the elastic limit or the 0.1% proof stress, shall apply.

The strength of the insulator strings shall be such that a factor of safety of 3 exists at maximum assumed working load condition.

The clamps and connectors shall be such that no slipping shall occur at any load less than 3 times the maximum nominal working tension of 4500 Newtons.

The design of the structures shall be such that under the assumed maximum working loads the deflection in the structures will not exceed the limits as specified by BS 5950 and SABS 0160, nor shall this deflection disturb the alignment of the apparatus supported.

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CoT – Signatures - Contractor

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## 15. MANUFACTURE AND ERECTION OF STRUCTURES

The design of the structures should preferably allow for the use of readily available standard steel sections. All structural steel shall be of mild steel to the requirements of BS 4360.

All members of the structure shall be manufactured with the utmost care. Jigs shall be used for cutting and drilling of the material such that when erected on site all members shall fit neatly together and all holes shall be truly aligned. No cutting, drilling, punching etc. of steel already galvanised will be permitted.

Bolthole clearances shall not exceed 2mm for bolts of up to M15 and shall not exceed 3mm for larger bolts unless otherwise approved. Holes shall not be elongated unless otherwise approved.

Each fabricated member shall be stamped (before galvanising) with an erection mark corresponding to the markings shown on the final approved structural arrangement drawings.

All structural steelwork shall be hot-dip galvanised.

Care shall be taken that the galvanised surfaces are not damaged during storage, transport or erection.

The design of the structure and the procedure for erection shall ensure that no members are strained or damaged during erection of the structures or the erection and tensioning of conductors.

Bolts shall be galvanised, and shall project at least 1 thread past the fastening nut, but not more than 3 threads or 3 mm, whichever is the lesser.

A hole to accommodate an M16 bolt for the earth strap shall be provided on each leg.

Foundation bolts shall be cast into the foundation on site using templates made of steel angle or U-section.

## 16. DRAWINGS, DOCUMENTATION AND DETAILED DESIGN

### 16.1 General Requirements for Drawings

Cognisance should be taken of the specific requirements detailed in other parts of Section III regarding the drawings and documentation. Tenderers are to ensure that all uncertainties regarding separate requirements are clarified with the Engineer in advance.

All manufacturing, layout, construction and detail drawings shall be to scale and fully detailed.

Schematic and other electrical drawings shall preferably be A3 in size and suitable for reduction to A4 for inclusion in instruction books, etc. All drawings and graphical symbols shall be to IEC specifications. Graphical symbols shall be in accordance with NRS-002.

Drawings for approval shall bear approved contract references and shall be submitted in duplicate as prints. After having been approved, the contractor shall supply CAD drawings on CD (Compact Disk) in DXF format suitable for use with Autocad version 2009 and with Microstation version 5.0.

All drawings to be supplied shall be approved and signed before manufacturing of the equipment is started.

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CoT – Signatures - Contractor

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All drawings, diagrams, sketches and plans shall be clear, well laid out, of a high standard and in all respects subject to the approval of the Engineer. Legends, notes and descriptions shall be incorporated in each drawing, diagram or plan. Separate loose legend sheets or descriptions or other leaflets will not be acceptable.

The wording of drawing titles shall be to approval. The name of the Manufacturer, Supplier and/or Contractor as well as the Contract Number shall appear prominently on all drawings, plans and diagrams. All final drawings shall display a drawing number issued by the City of Tshwane.

Drawing sheet sizes shall comply with the ISO A series, sizes A4 to A0, and preferably be in size A3.

All drawings, diagrams or plans shall use S.I. metric units and be in English.

The cost of all drawings, diagrams and plans to be supplied on this Contract shall be included in the Tender Price of the equipment to be supplied. The equipment will not be considered to be "delivered complete" if the drawings and manuals called for have not been supplied, which will result in payment being withheld.

## 16.2 Documentation to be submitted with the Tender

This list is a minimum requirement only. The Engineer reserves the right to request additional drawings and information during adjudication. Such additional drawings shall be submitted within 7 days of request.

Tenderer's Drawing Number	Description
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CoT – Signatures - Contractor

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	<ul style="list-style-type: none"> <li>a) General arrangement of equipment. This drawing shall give the principal dimensions and approximate position of all equipment.</li> <li>b) General arrangement and Block diagram of all control and protection schemes.</li> <li>c) Configuration of the offered substation automation system;</li> <li>d) technical specification and description of systems;</li> <li>e) outline and general arrangement drawing(s) of all panels, showing the proposed lay-out of equipment on the panels, relay dimensions and method of mounting of relays and other equipment;</li> <li>f) catalogues, brochures, technical specification sheets, schematic diagrams and logic block diagrams of the control gear , relays and other equipment offered;</li> <li>g) scope of supply;</li> <li>h) reference list;</li> <li>i) such other drawings, illustrations, brochures, schedules, diagrams, sketches and descriptions of information as the City of Tshwane may require to determine whether the equipment offered complies with the Specification; and</li> <li>j) estimates of cable types and quantities.</li> </ul>
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Where main and alternative offers are being submitted, a set of drawings for each alternative shall be submitted. In such cases the drawing title shall clearly indicate to which offer the drawing is applicable.

In amplification of his tender, a Tenderer may submit with his tender such descriptive literature, leaflets, brochures or illustrations, as he deems necessary. No information contained in such literature will exonerate the Contractor from his obligations with respect to the particulars and guarantees stated in the Schedule of Particulars and Guarantees or the requirements of the contract.

### 16.3 Documents and Drawings to be submitted after Award of Tender

A project schedule, which indicates the general approval procedure required for the detailed design stage of this project, has been included with this document.

#### 16.3.1 Electrical Manufacture/Construction Design (M/CD)

The Contractor shall, on or before the date indicated on the provided project schedule, submit a complete detailed Manufacture/Construction Design (for input from the CoT) to the CoT. The first submission of the design shall include at least the following information (in duplicate):

- a) Complete index and summary of all documentation submitted for detail design;

			CoT – Signatures - Contractor			
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- b) overall single line diagram of substation;
- c) substation yard equipment layout and sectional drawings;
- d) substation building equipment layout;
- e) 132 kV circuit-breaker mechanism manual & schematic diagrams;
- f) 132 kV isolator and earth switch mechanism manual and schematic diagrams;
- g) 33 kV switchgear manuals and schematic diagrams;
- h) 11 kV switchgear manuals and schematic diagrams;
- i) 132/33 & 132/11 kV transformer auxiliary equipment schematic diagrams;
- j) battery charger manual and schematic diagrams;
- k) DC distribution board schematic diagrams;
- l) AC distribution board schematic diagrams;
- m) LVAC board layout and schematic diagrams;
- n) sample multi-core cable schedules;
- o) communication equipment user's guides;
- p) communication panel layout diagram;
- q) communication panel schematic diagrams;
- r) pilot board layout;
- s) control system software user's guides;
- t) control system programmer's manuals;
- u) SMMI operating system manual;
- v) operator's training manuals;
- w) control system detailed physical implementation;
- x) control system detailed screen layouts and implementation-specific information;
- y) control panel(s) detailed physical layout and construction;
- z) GPS manual;
- aa) inverter manual;
- bb) detailed battery and battery charger capacity calculations;
- cc) type tests for all equipment;
- dd) user's guides for all protection relays and auxiliary devices;
- ee) protection implementation block diagrams;
- ff) relay and controller configuration diagrams;
- gg) complete schematic diagrams for all protection & control schemes and panels with proper integration of switchgear and other equipment schematic diagrams; and
- hh) any other equipment details considered necessary to constitute a complete design.

The second revision of the Design shall include all the revised items from the first revision, as well as:

- a) Detailed cable schedules;
- b) detailed factory and site inspection and testing program; and
- c) label schedules drawn to scale.

Three iterations have been allowed for the satisfactory completion of the Design. The properly integrated Design submission is considered to be an extremely important part

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CoT – Signatures - Contractor

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of the Contract, and Tenderers' attention is drawn to the special payment conditions applicable to this Design.

The approval of drawings (issue for Manufacture/Construction) shall not relieve the Contractor of his responsibility regarding the correctness thereof or any subsequent failures as a result of faults or omissions by the Contractor.

### 16.3.2 Civil and general Manufacture/Construction Design (M/CD)

The following is a list of the documents and drawings to be submitted by the Contractor for approval within the time indicated on the provided project schedule or stated in the specification:

- a) Contracts Work Progress Chart in the form of a detailed Gantt chart, which is also to be submitted monthly;
- b) detailed sub-order chart;
- c) list of drawings to be submitted;
- d) arrangement drawings and details of circuit-breakers, disconnectors, earth switches, lighting arrestors, kiosks and auxiliary plant;
- e) foundation plans of equipment showing the static and dynamic loading at each support point, together with dimensioned plans of foundations required for all parts of the apparatus including particulars of holding-down bolts, chases for cables, etc. to enable the Civil Contractor to design the various foundations in detail for subsequent approval by the main Contractor;
- f) detail drawings of all foundations and associated civil works requirements;
- g) detail drawings of structures, showing dimensions of principal members and fixing for equipment and foundations;
- h) sectional elevation drawings of each type of switch unit or bay, showing the positions of apparatus forming an integral part of each unit or bay;
- i) operating and maintenance instructions. See clause 17 below; and
- j) a quality control plan for and with witness and hold part points during the manufacture of the various items in the contract.

## 17. OPERATING AND MAINTENANCE MANUALS (O&MM'S)

NO WORKS TESTING WILL BE PERMITTED UNLESS THESE MANUALS HAVE BEEN IN THE ENGINEER'S POSSESSION FOR AT LEAST 20 WORKING DAYS.

The O&MM's shall include the following, where applicable:

- a) Table of contents;
- b) Descriptions. General and detailed descriptions, including pamphlets, mode of operation;
- c) maintenance instructions and handbooks of all component equipment for the overall system;
- d) drawings, including layouts, mechanical drawings, single line diagrams, schematics, cable block diagrams and schedules;
- e) parts lists, drawings and schedules for spares ordering purposes;
- f) commissioning reports, including all settings;
- g) test reports;
- h) program listings; and

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CoT – Signatures - Contractor

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- i) equipment settings.

One month after final take-over the Contractor shall submit two (2) further IOMM's in a form approved by the Engineer.

**Note:**

Both approval copies shall be marked up by the Contractor's commissioning engineer before leaving site. One copy shall be left at the CoT site, and the other copy shall be used by the Contractor to compile the final O&MM's, including as-built drawings and commissioning reports.

Approval copies are considered an integral and essential component of the system to be supplied. Payment on delivery will only be made if the O&MM's for approval have been delivered to the Engineer and the required operator training has been completed (if required by Protection, Power system Control and/or Scada). Similarly, retention's will only be released when the final O&MM's have been received by the Engineer.

The Contractor shall also provide O&MM's for any spare apparatus and materials which he may be called on to supply.

## 18. WIRING

Wiring shall be carried out strictly in accordance with the requirements of the appropriate NRS, SABS, IEC or BS Standards and the following supplementary rules.

### 18.1 Small Wiring

The marking and colouring of small wiring shall be carried out strictly in accordance with NRS003-1: 1994 and the following set of supplementary rules:

All cables and wiring shall be of approved types and sizes. Unless otherwise approved. The minimum size of wire to be used internally in the control cubicles shall be multi-strand, 2,5 mm<sup>2</sup> copper wire. The size of the wiring for current transformer secondary circuits shall be 2,5 mm<sup>2</sup>. Should the total circuit burden become excessive the size of the wiring for current transformer secondary circuits shall be increased to 4.0 mm<sup>2</sup>.

All multi-core cable cores shall be of at least seven strands of copper. All panel wires shall have at least 40 strands of copper.

Small wiring shall be properly insulated and of CMA grade manufactured in accordance with the appropriate SABS Standard Specification. PVC insulated wire shall be of the fire retardant type, insulated to withstand 2kV to earth for one minute.

All wires shall be terminated with suitable crimped lugs, fitted with a compression tool designed for this purpose.

If stud type terminals are employed, stranded conductors shall be terminated with tinned (not soldered) approved claw washer or lock nuts, or with approved crimping lug. Separate washers or lugs shall be used for each conductor.

All wiring shall be taken to terminals and wires shall not be jointed or teed between terminal points.

All wiring, external as well as internal, shall be ferrule marked to approval with suitable ferrules. Both ends of the same wire shall be identically marked and shall be consistent with the associated drawings. Spare cores shall be marked with their respective cable number in addition to the requirements of NRS003-1, Annexure A.

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CoT – Signatures - Contractor

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Ferrule markers shall be of a durable insulating material having a reasonable glossy finish to prevent adhesion of dirt. Ferrule markers shall be marked clearly and permanently and shall not be affected by moisture or oil. Unless otherwise approved, ferrules shall be white with black marking. The type of ferrule marker to be used shall be to approval.

All communication cables like optic fibre, twisted pair, ribbon and coaxial cables shall be uniquely marked and labelled to the approval of the Engineer.

All optic fibre cables, twisted pair, ribbon type and coaxial type communication cables shall be routed separately or individually. They shall be mechanically protected and supported, and shall not rely on control wiring looms for support. Requirements in terms of minimum bending radii shall be observed.

## 18.2 Interpretation of and additions to NRS003-1

Numbering shall always be in ascending order from the defined starting point.

Where a starting point is defined as an odd or even number, the ascending numbers shall be odd or even only.

Connections made directly to the secondary terminals of current transformers and to star points in current transformer circuits shall take the lowest number in the group allocated for the purpose. The lowest even number shall be used for S1 terminal connections and the lowest odd number for S2 and/or S3 terminal connections. Preference shall be given to commencing the ascending numbering from the S1 terminal side. Where phase and neutral current transformers are in circuit together, phase current transformers shall take precedence.

The polarity of current transformers shall be determined as follows:

- a) Terminal P1 shall always be nearest the circuit breaker.
- b) Terminal P2 shall always be nearest the star point of a transformer.

Numbers shall be skipped where necessary for the possible future addition of items of equipment in series.

The addition of 500 to numbers, where associated equipment on the same panel would otherwise have caused a duplication of numbers, shall be extended to provide for more than two associated sets of equipment by adding 600, 700, 800 or 900 to the numbering of the third, fourth, fifth and sixth similar set of associated equipment respectively.

Numbering of a circuit shall continue in ascending order from the branch point but shall have 100, 200, 300 or 400 added to prevent duplication of numbers already appearing in the main succession numbering. For example, a branch connection from H13 through a coil shall be numbered H114 beyond the coil and shall progress to H116 etc.

## 18.3 MCCB's, Isolators, Fuses and Links

MCCB's, isolators, fuses and links shall be provided as required for the protection and isolating of circuits. The arrangement, type and kA rating of MCCB's and fuses shall be to approval.

The MCCB's, isolators, fuses and links shall be mounted vertically in horizontal rows in such a way as to allow easy access and replacement from the front. MCCB's shall be mounted at or near the top of control panels to prevent inadvertent operation by substation maintenance and cleaning staff.

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All MCCB's, isolators, fuses and links of the same circuit shall be mounted adjacent to each other.

MCCB's and isolators shall be of the DIN rail mounting type to allow for easy replacement.

Fuses and links shall be mounted on insulated draw-out carriers that hold the fuses or links positively after withdrawal. In all cases the top terminal of the fuse or link shall be the live terminal.

Fuse link holders shall be black and solid link holders shall be white.

All MCCB's, isolators, fuses and links shall be suitably and permanently labelled, displaying the designation and identification number and using the prefix "MCB" for circuit breakers, "ISOL" for isolators, "FS" for fuses and "LK" for links. Current ratings shall also be displayed.

The labels shall not be fixed to removable parts of MCCB's, isolators, fuses or links.

#### 18.4 Multi-Core Cable and Wire Terminals and Trunking

Terminal blocks shall be provided inside the control cubicles in an easily accessible position(s) for terminating multi-core cable tails and for connecting up with the internal wiring in the cubicles. Unless otherwise approved, terminal blocks shall be mounted horizontally in vertical rows in order that ferrule numbers may be read without difficulty.

All terminals and connections for secondary wiring shall be sufficiently large to accommodate at least two 2,5 mm<sup>2</sup> PVC insulated wires.

Terminal blocks shall either be of the double-ended insertion type with suitable provision made for mounting the terminal blocks on terminal boards or rails in rows.

Terminal blocks of the insertion type shall incorporate serrated clamping yokes of plated steel which clamp the wire ends onto a silver or nickel plated serrated current bar by means of plated steel clamping screws. The complete assembly shall be encased in a non-hygroscopic moulding of insulating material with high electrical and mechanical strength. Entrelec M10/10.RS or Klippon type RSF 1 spring loaded terminals are preferred. Klippon type SAKR terminals are required for pilot cable termination board application. Terminals of the type where clamping screws are in direct contact with the wire are not acceptable. The Engineer shall approve the precise type of terminal used.

Terminal blocks shall be mounted such as to allow sufficient space for cable tails and working on cable glands without impeding access to any other equipment.

Terminal blocks shall be wired such that all internal or incoming wiring enters from one side and all outgoing or external connections (multi-core cable tails) enter from the other side.

Terminal blocks shall not be covered by compound.

No more than two wires shall be connected to any one terminal

At least 10% spare terminals shall be provided on all sets of terminal blocks, with a minimum of two (2) terminals.

Covers of transparent insulating material shall be fitted where necessary on terminal rows to prevent accidental contact with live equipment.

Each terminal shall be marked clearly, permanently and conspicuously and all sets or groups of terminal blocks shall be suitably identified with durable labels fixed in an approved manner.

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Suitable slotted trunking with clip on covers shall be installed to channel interior wiring in a neat and orderly way. The space between the rows of terminal blocks and slotted trunking shall preferably not be less than 75 mm.

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SECTION 4 : TECHNICAL SPECIFICATION

PART 1.6 : SUBSTATION TESTING & RE-COMMISSIONING

SPECIFICATION No: Rev Z/9

CONTENTS

1.	SCOPE	1
2.	STATION TESTING AND RE-COMMISSIONING OF ALL EQUIPMENT	1
2.1	First stage:	1
2.2	Second stage:	2

1. SCOPE

This specification covers the complete testing and commissioning of all new control and protection (ICAP) equipment and all new non-ICAP equipment as well as the testing and re-commissioning of all existing primary and secondary equipment in order to re-commission the total substation.

2. STATION TESTING AND RE-COMMISSIONING OF ALL EQUIPMENT

The new control and protection (ICAP) equipment shall be tested and commissioned by the contractor, but he will also be responsible to test and re-commission “other” or non-ICAP equipment in order to re-commission the total substation. All existing and new secondary (non-ICAP) equipment such as battery chargers and auxiliary supply equipment, as well as primary equipment such as circuit breakers, isolators, current transformers, voltage transformers, current carrying connectors, surge divertors and power transformers shall be tested and re-commissioned as specified. Earthing and bonding of equipment must also be confirmed. The work shall encompass the following aspects with respect to the substation as an entity as well as to each individual bay.

2.1 First stage:

Available drawings, substation and equipment are available at the clients drawing office.

All marshalling kiosks and other panels and cubicles that are to remain after the refurbishment shall be dusted out and cleaned (apart from any cubicle refurbishment work described elsewhere).

The schematic diagrams shall be correlated with the physical bay wiring and cabling by means of visual inspection, ringing out and tracing of the circuits. Any alterations that may be found shall then be marked up on the schematic diagrams to represent 'as found' drawings. Again, this can primarily be restricted to the equipment and circuits, or parts of circuits, which will be retained after the station refurbishment.

Proposals as to the improvement of equipment characteristics or sub-standard parameters, correction of errors and replacement of defective parts or functions must be submitted as part of the first stage of the testing.

Generation of a new set of drawings, as if for a new substation, combining the new control and protection schemes with the existing drawings and the existing equipment, for each bay of the substation, the substation itself and scheme common drawings (i.e. bus zone scheme). It has to be ensured that all details of non-ICAP equipment are included in the drawings listed in Part 1.3: Drawings and Documentation. Schematic diagrams of motor drives, mechanisms and interface equipment of transformers, circuit breakers, isolators, earth switches and transformer cooling equipment must be included.

These proposals and drawings shall be handed to the Engineer and where applicable, approval will be given by the Engineer to incorporate the proposed changes. All the information gathered shall be incorporated in the ICAP-designs and be included in the DDS in a suitable format.

## 2.2 Second stage:

All approved modifications shall be carried out and commissioned as part of the control and protection installation and commissioning process.

Apart from the tests prescribed for the ICAP system the following tests shall be conducted on each bay for a given substation:

- a) All the circuit breakers associated with the panels shall have their opening and closing motion measured depicting the position of the breaker related to time as the breaker opens or closes. The total opening and closing times shall also be indicated. These results shall be graphically represented and the breakers shall then be certified if it complies with the manufacturers specifications.
- b) In conjunction with the Control Centre, functional test of inter-trip circuits:
  - i. For pilot wire inter-trip receive relay: - determine the operating range and operating time over the relay's range of operating voltage at 10 V intervals.
  - ii. For pilot wire inter-trip system: - From the furthestmost point on the line, send an inter-trip signal and measure the receiving voltage at the substation being tested with the relay in service.
  - iii. For all inter-trip systems: - In conjunction with the Engineer or his representative, determine the time elapsed for a substation on a particular line to send an inter-trip and for the system voltage at the substation to fall below 30% of the nominal system voltage.
- c) Measure and record the earthing bonding resistance as well visually inspect the earthing from a centrally defined point within the substation that has been proved to have a low earthing resistance:
  - i. Control panels
  - ii. Protection panels
  - iii. Tap change control panel (TCCP)
  - iv. Transformer/line marshalling kiosk (TMK), (LMK)
  - v. Transformer
  - vi. Cooling fins (where applicable)
  - vii. Closing rectifier
  - viii. Battery chargers
  - ix. HV apparatus (neutral CT's etc)
  - x. Neutral isolators
  - xi. Switchgear
  - xii. Fences

Where there are two bonding straps to a piece of equipment, the resistance of each bond shall be determined separately.

- d) Do core and sheath insulation tests on all multi-core cables for the complete bay/scheme

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- e) Current transformers, determine:
  - i. Polarity from the furthestmost possible point.
  - ii. Magnetising curves. One ratio per core. Specify the ratio. The magnetising curves shall be represented graphically in the format as described in the requirements for documents.
  - iii. Star point connections
- f) Functional tests, as part of the commissioning of the ICAP system, of:
  - i. Main tripping circuits
  - ii. Back-up circuits
  - iii. Control circuits
  - iv. Tap change control circuits (where applicable)
  - v. Alarms circuits
  - vi. No volt relay (secondary injection)
  - vii. Back-up Auxiliary supply failure circuits
  - viii. Battery charger chop over relay
  - ix. Stability of the bus zone tripping circuits
  - x. Coupler interlocking
- g) Functional testing of all VT circuits and testing of VT's (phasing).
- h) Check all fuse ratings and MCB ratings (mainly restricted to remaining battery charger, transformer marshalling kiosks and 275 kV yard marshalling kiosks).
- i) Check lugs for correct application and type (crimping).
- j) Do primary injections on all CT's and VT's and record readings on the secondary side at the furthestmost accessible points.
- k) All redundant wiring inside the remaining panels shall be removed and all redundant cores shall be strapped into the harness inside the panel (mainly restricted to remaining battery charger, transformer marshalling kiosks and 275 kV yard marshalling kiosks).
- l) Commission with primary voltage and current. Prove phasing with phasing gear where possible. Do synchronising checks. Voltage and current measurement on all accessible points and record results. Prove stability of the bus-zone.

Any changes made during the testing and commissioning shall be included in the "as commissioned" documentation.

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**SECTION 4 : TECHNICAL SPECIFICATION****PART 1.7 : IMPLEMENTATION PLAN****SPECIFICATION No: - Rev Z/8****1. IMPLEMENTATION PLAN**

The purpose of this section is to highlight the aspects involved and points for consideration in preparation of the detail implementation planning that is required of the Contractor in order that due allowance is made in terms of budget and manpower to perform this element of the project work at a sufficient level of refinement. Preparing the Detail Implementation Program will be the second major project activity running concurrently with and following the Functional Design Specification activity as an important step towards preparation for site work.

Here a distinction is drawn between the Detail Project Schedule in the sense of the overall scheduling of all the project elements and activities including detailed equipment specification and procurement scheduling, schemes design, laying down the sequence and duration of activities in the factory and on site including testing and commissioning to ensure optimal (cost/time/quality) project scheduling on the one hand and;

A Detail Implementation Plan in terms of which the project work on site is interfaced with physical and operational system constraints to ensure that the intervention at the Kwagga Infeed Station in order to refurbish the control and protection equipment is done at the absolute minimum risk to the safety of workmen, system stability and disruptions of supply on the other hand.

In the 132 kV yard of the Station the majority of existing current transformers will be replaced departmentally as part of the larger refurbishment initiative. Isolators and earth switch mechanisms in this yard will also be refurbished and upgraded. This departmental work will be co-ordinated with the Refurbishment of Control and Protection Equipment contract work to be performed during the same period when the bay or equipment is out of operational service. The Contractor shall make allowance in costing and scheduling the site work for allowing the Employers departmental teams or own contractors reasonable access to the primary plant of this refurbishment work.

The Detail Implementation Plan shall be drawn up taking into account the following considerations plus any further factors that come to the fore in the process. The Contractor shall submit the Plan to the Engineer for approval and endorsement by all parties that could be affected by it.

1. Seasonal loading of the Infeed Station;
2. Operational constraints in terms of Kwagga/Rooiwal/Pta West/Njala interconnect;
3. Minimum / maximum loading on given Kwagga elements or sections;

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4. Energy unit (opportunity) cost for different system switching configurations and the duration of these conditions;
5. System stability and outage risk associated with specific temporary switching configurations;
6. Minimising loss of protection functionality in terms of bus zone or back-up protection schemes including the justification of specific interim protection schemes;
7. Considerations such as sequence of work dictated by the re-use requirement on certain of the existing protection equipment in the same or similar equipment bays and;
8. Basic constraints such as the accessibility of existing multi-core cables in cable ducts for purposes of re-routing.

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**SECTION 4 : TECHNICAL SPECIFICATION****PART 1.8 : DAYWORKS****SPECIFICATIO No: Rev Z/8****SCOPE**

Extra work which is not covered in any Contract Item and which is ordered by the Engineer in writing as such shall be undertaken by the Contractor on a day work basis.

Day labour as may be required for such day works shall be provided by the Contractor at the rates of wages of the particular category as inserted in the schedules provided for this purpose.

When the Contractor is required to supply materials in connection with such day works as may be ordered, the percentage over actual cost price at the Works on which the Contractor agrees to supply such material as may be required shall be as inserted in the schedules provided for this purpose.

The Contractor shall, when required by the Engineer, produce all time sheets, correspondence, invoices and receipts and any other particulars necessary to enable the Engineer to certify the correctness of claims for payment in terms of this provision.

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**SECTION 4 : TECHNICAL SPECIFICATION****PART 8.1 : 11KV CABLE CONNECTIONS BETWEEN 20/35MVA TRANSFORMER & 11KV SWITCHGEAR****CONTENTS**

1.	CABLE TYPE AND SIZE .....	2
1.1	20MVA Transformers .....	2
1.2	35MVA Transformers .....	2
2.	INSULATED CABLE GLANDS .....	2
3.	BONDING AND EARTHING.....	2
4.	CABLE LAID DIRECT IN THE GROUND .....	2
4.1	Laying, Bedding, Slabbing and Back-Filling .....	2
4.1.1	Depth .....	2
4.1.2	Bedding.....	2
4.1.3	Covering (Blinding) .....	3
4.1.4	Slabbing.....	3
4.1.5	Back-filling .....	3
4.2	Selected Bedding Soil .....	3
4.3	Cable Formation .....	3
4.4	Cables in Pipe Ducts .....	3
5.	CABLES IN AIR IN CABLE TUNNELS.....	4
5.1	Cable Formation .....	4
5.2	Trefoil Group Spacing.....	4
5.3	Vertical Clearance .....	4
6.	FIRE PROTECTION ADJACENT TO TRANSFORMERS AND SWITCH-GEAR.....	4
6.1	Compound Fibrous Serving.....	4
6.2	PVC Serving .....	4

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15\_C2.1.4.02.1 - Power Cable 11 kV from 20 or 35MVA

The following procedures shall apply unless specific instructions to the contrary are issued.

## 1. CABLE TYPE AND SIZE

### 1.1 20MVA Transformers

11kV, 630 mm<sup>2</sup> copper conductor, single core, non drain PILC and served cable.

Six cables connected two in parallel per phase, per transformer circuit.

### 1.2 35MVA Transformers

11kV, 630 mm<sup>2</sup> copper conductor, single core, non drain PILC and served cable.

Nine cables connected three in parallel per phase, per transformer circuit.

## 2. INSULATED CABLE GLANDS

The transformer and switch-gear cable terminating boxes are provided with insulated cable glands. Care must be taken to check that the lead sheath passing through the gland plate is at least 5 mm clear of the gland plate.

If clearance is insufficient steps must be taken to increase the clearance or the lead sheath shall be insulated with three half-lapped layers of empire tape.

## 3. BONDING AND EARTHING

Single point bonding shall be employed on each trefoil group (red, yellow, blue) of cables. (Maximum cable runs do not exceed 150 m).

Near the 11kV switch-gear at the most convenient point, which may or may not be in the ground, split each trefoil group and make a trefoil bond by wrapping with lead sheath having a minimum cross-sectional area equal to the cross section of one cable sheath.

(Use redundant cable sheath), and plumbing to the cable sheaths.

Bond all trefoil earths together and earth to the local substation earth using 70 mm<sup>2</sup> minimum size bare copper conductor.

Where such bonds are made in the ground they shall be sealed with bituminous Hessian wrap basted on and protected with adhesive PVC tape.

- a) N.B. Do not bond directly onto the cable glands!
- b) The sheaths must be insulated from each other except at the single bond point.

## 4. CABLE LAID DIRECT IN THE GROUND

### 4.1 Laying, Bedding, Slabbing and Back-Filling

#### 4.1.1 Depth

The depth of laying over the top of the cables shall exceed 0.8 m unless otherwise specified.

#### 4.1.2 Bedding

An 80 mm deep layer of selected bedding soil, screened, if necessary, shall be placed in the clean cable trench before cable is laid.

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15\_C2.1.4.02.1 - Power Cable 11 kV from 20 or 35MVA

**4.1.3 Covering (Blinding)**

Immediately after laying the cable trench shall be filled with the same selected screened soil to a depth of 80 mm above the cable.

**4.1.4 Slabbing**

Approved concrete cable slabs shall then be placed to overlap the outside edges of cable groups by at least 75 mm.

**4.1.5 Back-filling**

Final back-filling shall be reasonably free of stones and foreign matter and shall be consolidated in layers.

**4.2 Selected Bedding Soil**

A soil thermal resistivity of  $g = 1,2 \text{ C m/W}$  has been assumed for the required cable rating.

If the local soil is not judged to be good thermal conducting material suitable for bedding and blinding an approved quality of imported soil shall be used.

Sandy or granular soils are generally poor thermal conductors whilst soils exhibiting a degree of "fattiness" are generally satisfactory.

**4.3 Cable Formation**

Trefoil touching (A red, yellow and blue phase in each trefoil group).

Trefoil Group Spacing Centres for each and Adjacent Transformer Circuits 450 mm.

Spacing Between Each Transformer Circuit and Adjacent Transformer Circuits:

a) Transformers of the same substation stage

As far as possible circuits shall be separated by at least 1 250 mm clearance between the nearest cables of each circuit.

Where absolutely necessary this clearance can be reduced to 500 mm.

b) Transformers of Different Substation stages different routes and maximum separation shall be used as far as possible.

Where absolutely necessary, except where circuits cross each other, 1 750 mm clearance between the nearest cables of adjacent circuits must be maintained.

Crossings of transformer circuits :

a) Crossings involving a transformer circuit and any other cables shall be as near to  $90^\circ$  as possible and shall provide a vertical separation of at least 350 mm.

**4.4 Cables in Pipe Ducts**

Pipe ducts shall be avoided unless absolutely necessary when a maximum length of 2.0 m in pipe may be permitted.

Eg.: Through a concrete foundation.

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15\_C2.1.4.02.1 - Power Cable 11 kV from 20 or 35MVA

## **5. CABLES IN AIR IN CABLE TUNNELS**

### **5.1 Cable Formation**

Trefoil touching (A red, yellow and blue phase in each trefoil group).

### **5.2 Trefoil Group Spacing**

Centres: 200 mm.

### **5.3 Vertical Clearance**

A vertical clearance of at least 200 mm shall be maintained to all other cables and to the floor and ceiling, except for short distances at crossing points.

## **6. FIRE PROTECTION ADJACENT TO TRANSFORMERS AND SWITCH-GEAR**

The single core transformer cables may have either a compounded fibrous serving which may be highly inflammable or a PVC serving.

### **6.1 Compound Fibrous Serving**

If the serving is of flammable material such as bituminised Hessian or jute it shall be stripped from the single core cable tails inside the switch chamber and adjacent to the transformer, except where it is underground, and the lead sheath shall be cleared of compound and re-served with fire-proof material such as asbestos tape.

### **6.2 PVC Serving**

Do not strip PVC servings except where necessary for jointing or bonding.

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15\_C2.1.4.02.1 - Power Cable 11 kV from 20 or 35MVA

**SECTION 4 : TECHNICAL SPECIFICATION**

**PART 8.2 : UNDERGROUND PVC-INSULATED MULTI-CORE CONTROL CABLE**

**CONTENTS**

1.	SCOPE .....	2
2.	STANDARDS.....	2
3.	OPERATING CONDITIONS.....	2
4.	VOLTAGE AND FREQUENCY .....	2
5.	CONDUCTORS .....	2
6.	INSULATION OF CONDUCTORS .....	2
7.	CORE IDENTIFICATION.....	3
8.	LAYING UP OF CORES.....	3
9.	BINDER .....	3
10.	PVC SHEATH.....	3
11.	STEEL WIRE ARMOURING .....	3
12.	OUTER SHEATH.....	3
13.	MANUFACTURER'S IDENTIFICATION.....	4
14.	REQUIREMENTS FOR FINISHED PRODUCT .....	4
15.	TESTS .....	4
16.	SEALING OF CABLE .....	4
17.	PACKING AND MARKING .....	5
18.	ADDITIONAL INFORMATION REQUIRED .....	5
19.	GUARANTEE .....	5



## 1. SCOPE

This specification covers multi-core, general purpose control cable having PVC-insulated stranded copper conductors, impermeable PVC-sheath, single wire armouring and an impermeable and fully insulating PVC-over sheath.

## 2. STANDARDS

The cable shall be manufactured to comply strictly with the appropriate requirements laid down in the latest version of **SANS1507:2007, Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)**.

## 3. OPERATING CONDITIONS

The cable is intended for use in switchgear and transformer control circuits as well as for protection and indication circuitry.

The cable will normally be laid directly in the ground or in open cable ducts along with power cables. In certain instances, it can be expected that the cable will be continuously submerged under seepage water.

The cable shall be suitable for operation at a continuous maximum temperature of 65°C down to a continuous minimum temperature of minus 5°C.

## 4. VOLTAGE AND FREQUENCY

The cable will be used for protection, remote control, indication and signalling circuits and the cable cores may be subjected to a maximum working voltage of 230V direct current or 400/230V, 50Hz, alternating current between cores.

The control cable shall have an assigned voltage rating of 600/1 000V in accordance with **SANS1507:2007**.

## 5. CONDUCTORS

The stranded conductor of each core shall have a rated conductor cross-sectional area of 2.5 or 4 mm<sup>2</sup> as specified, and shall consist of at least seven un-tinned plain annealed copper wires, and shall comply with the requirements of **SANS1507:2007**.

## 6. INSULATION OF CONDUCTORS

The core dielectric shall consist of homogeneous, impermeable PVC in full compliance with all the relevant requirements of **SANS1507:2007**.

The thickness of insulation, when measured in accordance with **SANS1507:2007**, Clause 9.1, shall not be less than the appropriate value laid down in Table L.

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16\_C2.1.4.02.2 - Multi-core Control cable - Rev 1

## 7. CORE IDENTIFICATION

Core identification shall be such that each core in the cable can be identified no matter where the cable is cut. Core identification shall be permanent, clear, distinctive and shall not have any deleterious effect on the core insulation. Preference is given to core identification by means of contrasting printed numbers at frequent intervals not exceeding 75 mm.

Tenderers may wish to offer alternative methods of core identification, such as colouring or colour coding, in which case full particulars of their proposals for core identification shall be submitted with their tenders for approval.

## 8. LAYING UP OF CORES

The insulated cable cores shall be laid-up together in accordance with **SANS1507:2007**, Clause 5.6 to form a compact and circular cable.

## 9. BINDER

A suitable binder tape or tapes of suitable non-hygroscopic material shall be applied over the laid-up cores. The core covering shall serve as a heat barrier to prevent softening of the core insulation during sheath extrusion. There shall be no adhesion between the core insulation and the binder or between the core sheath and the binder.

## 10. PVC SHEATH

The wrapped up cores shall be sheathed with a continuous, impermeable, close fitting extruded sheath of homogeneous black PVC in accordance with the requirements of **SANS1507:2007**.

The PVC sheath shall be of uniform radial thickness and shall be free from pinholes, splits, joints, repairs, blisters and other defects.

The minimum radial thickness and the minimum average thickness of the PVC sheath, when determined in accordance with Clause 9.1 of **SANS1507:2007** shall not be less than the values laid down in Table T of **SANS1507:2007**.

## 11. STEEL WIRE ARMOURING

The cable shall be armoured with one layer of galvanised steel wires applied with a left-hand lay. The proper-ties of the galvanised armouring shall comply with that laid down in **SANS1507:2007**.

The galvanised steel wires shall all be continuous throughout the length of the completed cable.

When it is necessary to join wires to achieve this continuity, the joints shall be made in a workmanlike manner by brazing or electric welding and shall be finished smooth.

Armouring wires shall be free from kinks, bends, sharp edges, protruding points, zinc flaking and other defects which may damage or penetrate into the bedding or serving.

## 12. OUTER SHEATH

The anti-corrosion protective covering over the armouring shall consist of a layer of homogeneous black PVC applied in the form of an extruded close fitting over sheath.

The over sheath shall be free from pinholes, joints, repairs and other defects and shall be impervious to moisture.

The outer sheath shall be of uniform radial thickness and the minimum radial thickness, measured in accordance with SABS Method 495, shall not be less than 2.8 mm.

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16\_C2.1.4.02.2 - Multi-core Control cable - Rev 1

### 13. MANUFACTURER'S IDENTIFICATION

The following information shall be clearly and indelibly embossed on the serving of the cable at intervals not exceeding 0.5 m:

- a) manufacturer's name and/or trademark;
- b) year of manufacture; and
- c) the cable length shall be clearly and indelibly marked on the outer PVC sheath at intervals of 2 m over the full length of the cable starting from the drum spindle end in order to determine the length of cable remaining on the drum after cutting of cable.

### 14. REQUIREMENTS FOR FINISHED PRODUCT

The electrical and physical requirements shall comply with the appropriate requirements laid down in Section 6 of **SANS1507:2007**.

### 15. TESTS

The following routine tests shall be carried out on each cable length in the factory and the cost of testing shall be included in the price of the cable.

#### Conductor resistance test.

The conductor DC resistance of each core in each cable shall be measured at ambient temperature and corrected to a temperature of 20°C. The value so obtained shall not exceed the figure laid down in Table C of **SANS1507:2007**.

#### Insulation resistance test.

The insulation resistance shall be measured for each core with all other conductors bunched and earthed. Insulation resistance shall be measured at a voltage not less than 500 V DC at ambient temperature allowing one minute charging time.

The measured value shall be corrected to 20°C and the value so obtained shall not be less than the appropriate value laid down in Table L of **SANS1507:2007**.

#### High-voltage withstand test.

Each core of each cable shall withstand for 10 minutes, without break-down of the dielectric, an applied test voltage of 2 000 V, 50Hz to all other conductors.

The voltage withstand test shall be carried out with alternating current of approximately sine wave form. The voltage shall be increased gradually to the required level and shall be maintained at the level continuously for the stipulated period.

A sufficient number of sample tests shall be carried out at regular intervals to effectively control the uniformity of manufacture and to check compliance with this specification.

#### Test Certificates.

Duplicate test certificates of all routine tests and of sample tests shall be submitted direct after completion of such tests, to the Engineer.

### 16. SEALING OF CABLE

After completion of the works tests, each end of each cable length shall be effectively sealed to prevent the ingress of moisture.

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16\_C2.1.4.02.2 - Multi-core Control cable - Rev 1

**17. PACKING AND MARKING**

The cable shall be supplied in continuous lengths of 300m on new wooden drums of solid and substantial construction which are resistant to biological attack.

All drums shall be suitable for loading on a 100 mm diameter spindle.

Packing and marking of the cable to be supplied to this specification shall comply with the requirements of Section 7 of **SANS1507:2007**.

In addition to the information called for in Clause 7.2.2(b) of **SANS1507:2007**, each drum shall be clearly marked as indicated below:

CoT ENQUIRY (NUMBER)

The maximum overall dimensions of drums shall not exceed the following dimensions:

- a) Overall diameter      2 800 mm; and
- b) overall width            1 520 mm.

**18. ADDITIONAL INFORMATION REQUIRED**

The Schedule of Particulars, shall be completed in detail and any additional information relating to the cable offered shall be submitted with the tender.

**19. GUARANTEE**

The cable to be supplied against this specification shall be guaranteed by the successful tenderer against failure due to faulty design, inferior materials or bad workmanship for a period of two years from the date the cable is to be delivered.

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CoT – Signatures - Contractor

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16\_C2.1.4.02.2 - Multi-core Control cable - Rev 1

SECTION 4 : TECHNICAL SPECIFICATION

PART 2.3 : TERMINATION & CONNECTING UP OF CABLE  
AND CABLE ACCESSORIES

SPECIFICATION No: CG.01/1-97 – Rev 1/A

CONTENTS

1.	SCOPE OF WORK INCLUDED IN THE QUOTED PRICE RATES .....	2
2.	CABLE GLANDS .....	2
3.	CORE LUGS.....	2
4.	CABLE AND CORE IDENTIFICATION .....	2
4.1	Cable Identification .....	2
4.2	Core Identification.....	3
5.	CABLE CLEATS .....	3
6.	GLANDING-OFF OF CABLES .....	4
7.	TERMINATIONS.....	4
8.	TRUNKING AND WIRING CHANNELS .....	4

## 1. SCOPE OF WORK INCLUDED IN THE QUOTED PRICE RATES

The supply and installation of:

- a) Cable glands and core lugs;
- b) Cable and core identification labels and marking material; and
- c) Cable cleats, strapping and fixing material.

The removal, drilling and re-filling of equipment gland plates, and touching-up of gland plate paint work where necessary.

The testing of glanded-off cables and the recording of test results.

The removal of surplus material.

The connecting-up of cables.

## 2. CABLE GLANDS

PVC SWA PVC cables shall be terminated using patent adjustable cable glands.

Unless otherwise stated all cable glands shall be of the captive cone type such that the wire armouring is held firmly by the gland, and at the same time electrically bonded via the body of the gland to the metallic gland plate.

Glands shall be supplied complete with lock nuts made of the same material as the gland.

The gland material shall be compatible with the cable armouring material.

Where cable glands are installed out doors they shall be provided with a suitable shroud or boot to prevent the ingress of moisture between the wire armouring and outer sheath of the cable where it enters the gland.

The fitting of cable glands shall be carried out in accordance with the manufacturer's instructions, copies of which shall be furnished to the Engineer.

The cost of supplying and installation of cable glands shall be included in the rates for the glanding-off of cables.

## 3. CORE LUGS

The individual cable cores shall be fitted with insulated crimped lugs of the size designed for the relevant cross sectional cable core size.

Fitting of the core lugs shall be carried out with an appropriate crimping tool in accordance with the manufacturer's instructions, copies of which shall be furnished to the Engineer.

The cost of supplying and installation core lugs shall be included in the rates for the connecting-up of cables.

## 4. CABLE AND CORE IDENTIFICATION

### 4.1 Cable Identification

All cables shall be marked at each end with a unique number in accordance with the Council's standard cable numbering system implemented for distribution substations.

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The number shall be displayed in 4 mm high lettering.

Outdoor labels	stamped on a brass, copper or aluminium strip fixed to the cable by means of galvanised steel wire
Indoor labels	printed or embossed on a PVC identification label (in black on a white back-ground) fixed to the cable by means of self-locking PVC straps.

Cable identification labels shall be fixed around and at 90° to the axis of the cable.

The supply and erection of cable identification labels shall be included in the rates for the glanding-off of the cables.

Cables terminating in equipment shall also be marked with *Indoor Labels* as described above.

In floor mounted panels, such labels shall be located at the point where the inner sheath of the cable emerges from the gland.

## 4.2 Core Identification

Cable core identification shall be strictly in accordance with the general requirements in Part 1 of the Technical Specification.

## 5. CABLE CLEATS

Cleats may be defined as single way or multi-way clamping type units for the purpose of securing cables at a series of points on a vertical surface, typically structural steelwork or masonry.

For the purposes of securing cables to structural steel-work, the use of patent adjustable metal cleats which do not require special holes to be drilled in the steel work and which allow a vertical cable to be secured to a diagonal steel work member, are preferred. However, the use of suitable alternatives will be considered by the Engineer.

The use of steel or plastic banding or strapping as a means of fixing cables to structural steel work will only be considered where the use of a cleat is precluded.

Steel components of cleats shall be galvanised.

Where cables are to be fixed to concrete or masonry surfaces (either vertical or horizontal) the use of galvanised trays or stainless steel saddles are preferred. Saddles shall be secured to the concrete or masonry by means of expanding bolts.

The intervals at which cables are secured to vertical and horizontal surfaces shall not exceed 500mm.

The cost of supplying and erecting cable or cable cores, cleats and accessories shall be included in the rates for the installation of cables in the appropriate price schedules.

Cables run as trefoil groups shall additionally be clamped in trefoil arrangement every two metres over the entire length (including where buried in the ground).

Clamping of trefoil groups on cable supports shall be by means of wooden blocks and clamping in made trenches or in the ground shall be done by means of a stainless steel bonding strap bonded over scrap PVC serving wrapped around the trefoil groups.

Where mechanism box cables cannot be fixed to a structure, a separate galvanised support structure shall be provided to prevent the cables from hanging on the cable glands.

Where cables are to be terminated onto a 132/11kV power transformer a cable support structure of steel and hard wood shall be provided as referred to on drawing C-53.

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**6. GLANDING-OFF OF CABLES**

Blank cable gland plates shall be supplied with the various items of plant and equipment.

The Contractor shall, unless otherwise stated:

- a) Supply all cable glands.
- b) Drill all gland plates (removing them from the equipment for this purpose and replacing after drilling).
- c) Gland-off all multi-core control and power cables in accordance with the gland manufacturer's directions for use in a position which shall be appropriate to the points where the cable tails are to be terminated.

**7. TERMINATIONS**

The rates for terminations to be inserted in the Price Schedule shall allow the following lengths for preparation of tails at each end of the cable.

High voltage cables to suit equipment terminations.

PVC insulated power cables            1,5 m.

PVC insulated control cables            2,2 m.

The Contractor shall strip away all bedding or sheathing collectively surrounding the cable cores and shall leave the skins of cores neatly rolled-up inside the panel, terminal box, etc., as the case may be. The Contractor shall also replace or close any terminal box or kiosk covers or door on outdoor equipment which he might have removed or opened in order to gain access for glanding-off the cables.

The Contractor shall, in the process of glanding of the cables:

- a) Fit the cable identification labels described below after having verified by means of an end-to-end check on at least 2 separate cores in the cable that both ends belong to the same cable;
- b) perform the insulation and continuity checks described in the Specification and record the results in an approved manner;
- c) touch-up the paint work on gland plate surfaces where this might have been scratched or damaged; and
- d) remove all surplus PVC bedding, sheathing and armouring material to a scrap bin which shall be provided for this purpose on the site.

Each terminated core shall have sufficient slack to be re-terminated if required. (For example: In the event of a badly crimped lug having to be replaced).

**8. TRUNKING AND WIRING CHANNELS**

The connecting-up of cables shall include the whipping, strapping, lacing and harnessing of cable tails, the identification of the tails by means of ferrules or markers, the termination of each core by means of crimped lugs and the connection of cores to equipment terminals or terminal blocks (maximum of two lugs per terminal).

All wiring shall be taken to terminals and wires shall not be jointed or teed between terminal points.

After glanding the cable cores of each individual cable shall be unwound, straightened and strapped together to form a neatly bound group.

Grouped cable routes between the glands and the trunking shall be parallel to the front, back and sides of the cubicle. All bends along the grouped routes shall be at right angles. Direct routes between the glands and the trunking will not be accepted.

In cubicles the control wiring between devices and terminals shall be run in plastic, non-flammable trunking with snap-on covers. To enable additional wires to be added in future, the channels shall not be more than 60% full at time of delivery.

Control and instrumentation / signal wires shall be run in trunking as far separated from each other and from power supply leads as possible to eliminate influence on each other.

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**SECTION 4 : TECHNICAL SPECIFICATION****PART 8.4 : TRENCHING, LAYOUT AND THE INSTALLATION OF MULTICORE CABLES****CONTENTS**

1.	SCOPE OF WORK INCLUDED IN THE QUOTED PRICE RATES .....	2
2.	CABLE TRENCHES IN GROUND .....	2
3.	MADE CABLE TRENCHES.....	3
4.	DUCTS AND PIPES.....	4
5.	LAYING AND INSTALLATION OF CABLES.....	4
5.1	Laying of Cables in Ground .....	4
5.2	Laying of Cables in Made Trenches.....	5
5.3	Cables Installed in Ducts and Pipes .....	6
5.4	Cables Installed Against Walls. ....	6
6.	PROTECTIVE SLABS AND MARKERS.....	6
7.	CABLE JOINTS .....	7
8.	TERMINATION OF MULTICORE CABLES .....	8
9.	TESTS ON SITE.....	9
10.	LENGTHS AND QUANTITIES .....	9
10.1	Estimated Lengths and Quantities.....	9
10.2	Measurement of "as Installed" Quantities.....	9
10.3	Method of Measurement.....	11
10.3.1	<i>Supply and delivery of cables .....</i>	<i>11</i>
10.3.2	<i>Laying of cables in trenches. ....</i>	<i>11</i>

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## 1. SCOPE OF WORK INCLUDED IN THE QUOTED PRICE RATES

The laying and installation of cable shall include:

- a) The excavation and back-filling of all trenches in the ground;
- b) the supply and installation of:
  - i. Riddled earth for bedding of cables;
  - ii. protective slabs;
  - iii. cable markers; and
  - iv. cable marker tapes.
- c) the removal of excavated surplus, rocks, debris and spoil from the site;
- d) the laying and pulling-in of cables in trenches, ducts, pipes etc. of the various descriptions contained in the Specification;
- e) the supply of all cable cleats, saddles, cantilevers and trays required to fix cables to the various surfaces and in the various planes required together with the installation of the cleats and saddles, cantilevers and trays and the fixings associated therewith;
- f) the proper recording of the number and actual length of each cable installed on the regular basis prescribed by the Specification and in a format approved by the Engineer;
- g) the removal and replacement of cable trench covers;
- h) the sealing of cut ends which will not be glanded-off within 24 hours of being cut;
- i) all and any steps to ensure that outdoor equipment is not left exposed to the elements by virtue of doors opened or covers removed during cable installation;
- j) the sealing of apertures in made-trench walls;
- k) testing on site, after installation; and
- l) the measurement of the actual "as installed" quantities for payment.

## 2. CABLE TRENCHES IN GROUND

Cable trenches in the ground shall not be wider than 450 mm for one HV power cable or for one trefoil group of HV power cables or 1 250 mm for three trefoil groups of HV power cables or 300 mm for one LV power cable or group of control cables and shall be excavated to the following depths:

- a) For control cables : 500 mm;
- b) for low voltage power cables : 800 mm; and

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- c) for high voltage power cables : 1 100 mm.

The excavation of cable trenches shall form part of the contract works. Prices for trenching shall be based on the following classifications of the ground:

- a) **Very Hard Rock:** Shall mean rock that can be excavated only by means of explosives.
- b) **Hard Rock :** Shall mean granite, quartzitic sandstone, slate and rock of similar or greater hardness, solid slabs and boulders over 0.03 m<sup>3</sup> in volume.
- c) **Soft Rock :** Shall mean rock that can be loosened by hand pick and include hard shale, compact decomposed shale and boulders from 75 mm in diameter up to 0.03 m<sup>3</sup> in volume.
- d) **Earth :** Shall mean ground that can be removed by pick and hand shovel and includes loose gravel, clay, made-up ground, loose or soft shale, loose decomposed shale and boulders less than 75 mm in diameter.

The prices for the laying and installation of cables in ground shall, unless otherwise stated, be based on excavation and back-filling in earth as defined above.

No allowance shall be made for the breaking away of the trench sides, other earth movements or for trenches excavated in excess of the stipulated dimensions, other than as agreed with the Engineer.

No guarantee is given or implied that blasting shall not be required, but should this method of removal be necessary and permitted, then the contractor shall take all responsibility and observe all conditions set forth in Government and Local Authority Regulations.

Power driven mechanical excavators may be used for trenching operations provided that they are not used in close proximity to other plant liable to be damaged by the use of such machinery. They may not be used within the boundaries of live switch yards. Their use along sections of the route must in each case be approved by the Engineer.

The bottom of the trench shall be level and clear and the bottom and sides free from rocks or stones liable to cause damage to the cable. Payment for cable trenching having greater volume than that specified for the purpose will not be considered except where extra excavations are necessary to bypass obstacles such as water pipes, drains, large boulders etc. In all such instances the amount of the extra excavations shall be agreed upon on site between the Engineer and the Contractor.

The Contractor must take all necessary precautions to safeguard all pipe work, structures, roads, sewerage works, earthing conductors, electrical cables or other property on the site from any risk of subsidence and damage.

### 3. MADE CABLE TRENCHES

Made cable trenches inside equipment buildings shall form part of the building and will be provided on other parts of the contract. The steel covers shall be removed during cable installations.

Made cable trenches between various items of outdoor equipment will be provided on other contracts and will consist of a concrete floor and walls of either masonry or re-enforced concrete in which apertures are provided at regular intervals to permit cables to enter the surrounding earth. The trenches will be fitted with removable reinforced concrete covers.

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Two types of made, outdoor cable trenches will be provided, both of which will have an internal depth of approximately 450 mm, and the following widths, measured internally:

- a) Type A trench 600 mm wide;
- b) type B trench 400 mm wide.

**4. DUCTS AND PIPES**

Where the amount of ducts in which cable is to be laid is significant, full particulars of the type, material and dimensions of such ducts and pipes will be given in the Schedule forming part of this Specification and/or on the tender drawings.

The Contractor shall satisfy the Engineer as to the effect of the duct on the thermal rating of the cable.

**5. LAYING AND INSTALLATION OF CABLES**

The general installation of cables shall conform with the guidelines contained in the relevant SANS Specification regarding the handling of drums on site and minimum installation bending radii.

**5.1 Laying of Cables in Ground**

When laying cables in trenches excavated in soft or hard rock or containing sharp stones, rocks or other items likely to injure cables, the following precautions shall be taken:

Before laying the cables all injurious items and sharp objects shall be removed from the bottom of the trench. The floor of the trench shall be evenly covered with a layer of sifted backfill, or sandy loam to a level which is 100 mm above the highest unevenness of the trench.

The backfill used for this purpose shall have passed through a screen having a 6 mm square mesh.

The laying of cables shall not be commenced until the trenches have been inspected and approved. The cable shall be removed from the drum in such a way that no twisting, tension or mechanical damage is caused, and must be adequately supported at short intervals during the whole operation.

The cables shall then be covered with a 150 mm layer of sifted backfill, or sandy loam. The backfill shall be well consolidated.

Backfilling shall then be continued with proper grading of material to ensure settling without voids, and the material is to be stamped down after the addition of every 150 mm layer. The surface is to be made good to approval, and in the case of roadway crossings the excavations must be consolidated to original stability. Where cables pass under road-ways they shall be laid in concrete trenches provided or in pipes at a depth not less than 1 100 mm below the surface.

Should the specified backfill not be available at any particular section of the trench, the contractor shall transport the backfill from elsewhere. The cost for this shall be included in the unit rates for excavation.

Where cables are cut and are not intended to be made off within 24 hours the ends are to be sealed without delay.

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Where more than one horizontal layer of cable is laid, the level of the upper layers of cable shall be gauged from the level of the finished bottom of the trench and marked on the side on the trench at frequent intervals before the installation of the lower layers, to ensure that the correct vertical spacing is maintained.

The Contractor shall take all reasonable steps to ascertain where the cables and associated metallic pipes or corrodable materials may be subjected to chemical or electrolytic action and shall submit his recommendations for special precautions to the Engineer for approval.

The Contractor shall, before commencing with any excavation work, satisfy himself as to the location of any buried cables, water pipes, earthing conductors or other underground service which might be damaged during excavation.

Any damage inflicted on other services by the Contractor shall be immediately reported to the Engineer and shall be made good by the Contractor or by others at the Contractor's expense.

Unless otherwise approved control cables shall be laid in the same trench as the power cables where the latter are laid direct in the ground. Where power cables are laid otherwise than direct in the ground the control cables shall be laid separately in an approved manner.

Where control cables are laid in the same trench as power cables, there shall be at least 200 mm of riddled earth between the two types of cables and to form a definite division, approved concrete slabs shall be installed on edge between the power and multi-core cables

All surplus ground, rocks and spoil shall be removed from the site or shall be spread and the cost of same shall be included in the prices for laying and installing the cables.

**5.2 Laying of Cables in Made Trenches**

Before the commencement of laying cables in made trenching the Contractor shall remove any loose material and shall ensure that the exit apertures in the walls of the trench allow clear and free access to surrounding earth for the cable route involved.

Cable covers which have been removed to gain access to the trench shall be stowed alongside the trench in the sequence in which they were removed.

All cables (except large power cables) shall be laid directly on the floor of the cable trench and shall touch one another. A second layer of cables shall not be started until the first layer is complete.

Cable crossover points within the trench shall be kept to a minimum and cables shall be laid such that they are conveniently located to enter and leave the trench when this is necessary.

Cable ladders shall be installed in the main 11kV cable trench in the switch room to provide crossover points for control cables.

Ends not yet glanded-off shall be sealed and shall not be left laying in the open trench where they might become submerged in accumulated rainwater.

On completion of the cable installation the Contractor shall be responsible for:

Clearing trenches of all rubble and foreign matter and removing it to a refuse dump.

Sealing-up all used and unused apertures in the trench walls with a weak cement mix to prevent ingress of soil and water from the surrounding earth.

Ensuring that all weep-holes and trench drainage points are clear and unobstructed.

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Before handing over a weak plaster mix 30 mm thick shall be poured and floated over the cables in the trenches.

Replacing the cable trench covers.

**5.3 Cables Installed in Ducts and Pipes**

Unless otherwise specified, ducts and pipes will be provided under a separate contract. The Contractor is however to remove any loose material from the ducts, and prove them by drawing through a mandrel of slightly less diameter than the duct, immediately before pulling in the cables. Any lubricant used shall have no deleterious effect on the cables.

Metal or impregnated fibre pipes or earthenware ducts may be used for three-core cables.

Impregnated fibre pipes or earthenware ducts may be used for single-core cables. The Contractor shall ensure that all pipes are clear of obstructions before cables are drawn in. Where specified by the Engineer split pipes shall be fitted round the cable after its installation.

All ducts or pipes not used shall be sealed by wooden plugs before backfilling, or at the end of the Contract.

Where required by the Engineer, the ducts, floor bushings, etc., shall be sealed after drawing in the cables by caulking with an approved fire resistant compound, followed by not less than 35 mm of soft vermiculite cement, or other material as the Engineer may direct.

Rates for plugs and sealing ducts and holes shall be entered into the Schedules, where called for.

Particular care must be exercised where it is necessary to draw cable through pipes and ducts to avoid abrasion, elongation, or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after drawing in of the cables.

Where holes and slots have been provided through floors for the installation of cables the Contractor shall arrange to seal these holes and slots when the total number of cables to pass through any slot or hole has been installed. Rates for sealing such holes and slots shall be given in the Schedules.

The seal shall prevent the spread of fire, access by vermin, and shall not permit the passage of dust through the hole when sealed. The material used for sealing shall not be detrimental to either cable sheaths or copper conductors and it shall be possible to remove the seal without damaging either cables or copper conductors.

**5.4 Cables Installed Against Walls.**

Cable racks shall be installed against walls or the sides of cable trenches where control cables are to be routed against walls or the sides of cable trenches.

**6. PROTECTIVE SLABS AND MARKERS**

Where cables are laid in the ground, they shall be protected by means of slabs and the cable route, shall, where directed by the Engineer, be suitably marked.

Protective slabs shall consist of reinforced concrete or other approved material and shall have the following dimensions:

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- a) Length : 900 mm;
- b) width : 225 mm; and
- c) thickness : 50 mm.

The top of the slab shall be installed at the following minimum depths:

- a) For control cables only : 275 mm;
- b) for low voltage power cables  
and control cables : 500 mm; and
- c) for high voltage (greater than  
1kV) power cables : 800 mm.

The underside of the slab shall not be less than 150 mm above the cable which it protects.

For high voltage (voltages exceeding 1 kV) power cables a colour plastic marking tape shall be installed 400 mm above the buried cable. The tape shall be yellow with a skull and crossbones motif and the words ELECTRIC CABLE / ELEKTRIESE KABEL embossed in red at regular intervals of not more than 1 metre apart along the whole length of the tape.

Cable markers shall consist of concrete blocks in the shape of truncated pyramids with the following dimensions:

- a) Height (approximately) : 300 mm
- b) Base dimension : 250 x 250 mm .
- c) Top dimension : 150 x 150 mm .

Brass plates shall be cast into the tops of the blocks in such a manner that they cannot be prised loose. The wording "ELECTRIC CABLE/ELEKTRIESE KABEL" shall be stamped on the brass plates as well as direction arrows and the cable voltage rating.

Cable markers shall be installed on the surface along all underground routes and shall project 35mm above normal ground level unless the projected markers could be a hazard to pedestrian or other traffic in which case they shall be installed flush with the surface.

Cable markers shall be installed at the beginning and end of a cable run (e.g. where a cable enters a substation or building) at all changes or direction, above all joints, above cable pipe entries and exits and at intervals not exceeding 50 m along the cable route.

The position of cable markers shall be as indicated on the "as built" drawings.

## 7. CABLE JOINTS

No joints shall be permitted in multi-core cables or cable cores used for control purposes.

Joints in power cables shall be restricted to an absolute minimum. The type of joint employed shall be to the approval of the Engineer and the permission of the Engineer shall be obtained for every proposed joint.

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**8. TERMINATION OF MULTICORE CABLES**

Cores, including spares, shall be long enough to reach the terminal.

The spare cores shall not cut off but folded and tied back.

All cores shall be ferrules marked according to the schematic drawing.

All spare cores shall be ferrule marked with their associated cable number.

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## 9. TESTS ON SITE

The following tests shall be carried out on site:

- a) All PVC sheathed cables shall, after laying and backfilling, but prior to being glanded-off be subjected to a 2000V Megger test to prove the soundness of the outer PVC sheath;
- b) control cables and low voltage power cables shall, after glanding off, be subjected to the following Megger tests:
  - i. 1000 volts applied between cores; and
  - ii. 1000 volts applied between each core and earth.
- c) all site test results shall be recorded in a form approved by and acceptable to the Engineer and test results shall be submitted on a daily basis to the Engineer's site representative who shall then call for tests to be repeated at random if he so wishes in order to check the values recorded.
- d) Low voltage power cables, shall, after glanding-off be subjected to the test voltages appearing in Appendix D of **SANS1507:2007** for a period of 15 minutes.
- e) High voltage cables shall be pressure tested in the presence of the Engineer in accordance with the applicable standards.

## 10. LENGTHS AND QUANTITIES

### 10.1 Estimated Lengths and Quantities

Unless otherwise indicated the lengths and quantities set out in the Schedule of Quantities are estimated for tendering purposes only. The Council does not undertake that the whole of these estimated lengths and quantities will in fact be required. Surplus or waste material will not be taken over or paid for by the Council except where, at the time when it was reasonable for the material to be provided or manufacture to be put in hand it was not possible to accurately determine the quantity of material required.

The Contractor shall be responsible for providing detailed cable schedules on which the estimated length of each run of cable shall be set out. The contractor shall also be responsible for ascertaining the exact lengths, by measurement on the Site or otherwise, before putting in hand the manufacture of the cables. Any surplus cable after completion will not be taken over or paid for by the Council unless the Council so decides.

The Contractor will be paid for actual "as installed" quantities, as measured on Site.

### 10.2 Measurement of "as Installed" Quantities

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All measurement for the purpose of payment shall be made by the Contractor in the presence of the Engineer. The Contractor shall be responsible for obtaining the Engineer's signature approving such measurement not later than one week after the measurements have been made.

All measurements shall be to the nearest standard unit for which rates are given in the appropriate schedule. The sum payable in respect of each such part of the Contract Works shall be ascertained according to the price or rate shall be a fair or reasonable price or rating into account any price or rates that may be specified in the Contract for similar work. Such reasonable price or rate shall be settled by agreement between the Engineer and the Contractor.

A copy of the proposed cable plans shall be marked-up with as installed cable lengths and sizes. Final payment will not be made unless this drawing is handed to the engineer.

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**10.3 Method of Measurement**

The supply and erection of material shall be measured as follows:

**10.3.1 Supply and delivery of cables**

The length of each cable shall be deemed to be the length between the end of the longest conductor at one end of the cable to the end of the longest conductor at the other end of the cable. The length shall be measured to the nearest metre, i.e. lengths up to and including 500 mm downwards to the last complete metre, and in excess of 500 mm upwards to the next complete metre.

Where, by written agreement with the Engineer excess lengths of cable are supplied (for example in cases where the position of the associated plant is not determined) the total length of such cable will be paid for. In such circumstances any surplus after completion shall, if required by the Council, be taken over by the Contractor at prices to be agreed.

Off-cuts of whole pieces of cable too short to be of any practical use shall be strenuously avoided. Where such off-cuts are unavoidable they shall be paid for at the supply rate only. Off-cuts shall be deposited in a special bin for this purpose and shall remain the property of the Council.

**10.3.2 Laying of cables in trenches.**

Measurement of cables laid in trenches shall be of the actual length of that part of a cable laid in the trench when the cable is finally installed.

Drawing cables into ducts, pipes and conduits (excluding supply and installation of ducts, pipes and conduits).

Measurement of cables drawn into ducts, pipes and conduits shall be of the actual length of that part of a cable laid in ducts, pipes or conduits when the cable is finally installed.

Supply, delivery and erection of all supports, racks, trays, cleats and clips and installation of cables.

Measurement of supports, racks, trays, cleats, clips and installation of cables shall be determined by measurement from the underside of the cable gland at one end of the cable to the underside of the cable gland at the other end of the cable after due allowance has been made for the sections of the cable that may be installed by methods other than the above, i.e. drawn into ducts, in concrete trenches or in open trenches.

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**SECTION 4 : TECHNICAL SPECIFICATION****PART 8.5 : MEDIUM VOLTAGE CABLE SEALING ENDS,  
TERMINATIONS AND CABLES****SPECIFICATION No:TC.40/0-97 – Rev 1/A****CONTENTS**

1. SCOPE.....	2
2. DEFINITIONS .....	2
3. STANDARDS.....	2
4. CABLE SEALING ENDS .....	2
4.1 INDOOR CABLE SEALING ENDS.....	2
4.1.1 Pluggable sealing ends for 33 kV cable .....	3
4.1.2 Fixed sealing ends for 11 kV switchgear and transformers .....	3
4.2 OUTDOOR CABLE SEALING ENDS .....	3
4.2.1 33 kV SEALING ENDS .....	3
5. 33 KV CABLE .....	3
5.1 11 kV paper cable.....	3
5.2 33 kV single-core cross-linked polyethylene cable .....	4

## 1. SCOPE

This specification covers the requirements for indoor and outdoor MV (11 kV and 33 kV) cable sealing ends, as well as the 33 kV and 11 kV cables connecting transformers to the switchgear.

## 2. DEFINITIONS

*Pluggable cable sealing ends* shall mean MV cable sealing ends which can be made off outside the switchgear, and which shall be capable of being connected to the switchgear without using special tools and without opening a cable connection compartment of the switchgear to do the connection.

## 3. STANDARDS

All equipment shall be made in accordance with the relevant SABS, IEC or British Standards and with the applicable Parts 8 of this specification. Tenderers shall state to which standards their products conform.

## 4. CABLE SEALING ENDS

The cable sealing ends shall be of the dry, air insulated type for use on single core medium voltage cables.

The sealing ends may be of the cold cast, heat shrink or lead-wiped type. The sealing ends shall be made of material which is free from voids and shall be partial discharge free at the working voltages.

The sealing ends shall be type tested to approved standards. The Tenderer shall state to which standards his products conform, and be able to produce type test certificates if requested by the Engineer to do so.

The sealing ends shall be correctly dimensioned with respect to current carrying capacity, short circuit thermal withstand and dynamic forces.

The Tenderer shall include a description of his product, cross sectional drawings, including details of making off the earthing point of the sealing end, as well as installation instructions.

Terminal lugs shall be to the approval of the Engineer and may be crimped or sweated

The clearances, flash over and creepage distances shall be approved by the Engineer and shall be to IEC standards.

### 4.1 INDOOR CABLE SEALING ENDS

Indoors, the sealing ends shall be of the pluggable type for 33 kV switchgear and of the fixed type for the 11 kV terminations in the switchgear.

Tenderers shall include a reference list of installations of their products in South Africa.

#### **4.1.1 Pluggable sealing ends for 33 kV cable**

For single core XLPE cables connected to indoor 33 kV switchgear described in Part 11, pluggable sealing ends shall be supplied. As many ends as are necessary shall be supplied to give the needed current carrying capacity.

The Tenderer shall give details of the construction of the sealing ends, as well as a description of how they are made off. They shall further indicate the minimum space and bending radius needed to make off and install the sealing ends.

Ease of installation and of connection to the switchgear will be an important factor. Tenderers shall indicate how they intend to achieve these aims. They shall also supply drawings showing details of they products offered, and the maximum cable size which can be accommodated.

The Tenderer shall indicate how the ends have been dimensioned.

He shall further show how these ends are to be installed in the 33 kV switchgear specified in Part 11.

The Tenderer shall include a list of references preferably in South Africa.

#### **4.1.2 Fixed sealing ends for 11 kV switchgear and transformers**

The sealing ends are to be installed onto single core PILC non draining cables, with air insulation. At the switchgear end and at the transformer end they will be in bolted enclosures. They may be of the heat shrink or other approved system. The Tenderer shall indicate what system he intends using.

All the materials necessary for the making off and termination of the cables onto the equipment shall be supplied by the tenderer and be to the approval of the Engineer. The tenderer shall indicate how he intends to compensate for the expansion and contraction at the cable-ends during operating conditions

### **4.2 OUTDOOR CABLE SEALING ENDS**

#### **4.2.1 33 kV SEALING ENDS**

The outdoor sealing ends shall be installed at the transformer end of the cable. These may be of the composite type, and shall preferably have silicone rubber sheds.

The Tenderer shall give the same dimensioning, constructional and reference data as indicated above for the indoor 33 kV sealing ends.

### **5. 33KV CABLE**

The 33 kV cable shall have insulation of the cross-linked polyethylene type. It shall be dimensioned to carry the -full load current of the transformer continuously, as well as withstand the thermal and dynamic load effects of short circuits. The voltage requirements are shown in Section III Part 1.

#### **5.1 11 kV paper cable**

The 11 kV cable is specified in Section 4 Part 8.1.

**5.2 33 kV single-core cross-linked polyethylene cable**

The 33 kV cable shall be single-core cross-linked polyethylene cable with the cable sheath earthed at one end.

It shall conform to the parameters stated in Section III Part 1.

The Tenderer shall include a description of the construction of the cable, as well as how he intends supporting the cable and the sealing ends at both ends.

He shall also, if requested by the Engineer, be able to show how the cable size was dimensioned.

SECTION 4 : TECHNICAL SPECIFICATION

PART 3.1 : Earthing Grid

SPECIFICATION NUMBER : EG.01/0-04

CONTENTS

1.	SCOPE .....	2
2.	QUALITY OF WORK AND STANDARDS .....	2
3.	DESIGN AND APPROVAL .....	2
4.	EARTH RESISTANCE SURVEY.....	2
5.	STOLEN AND NEW EARTHING FOR OUTDOOR EQUIPMENT .....	3
6.	INDOOR EQUIPMENT EARTHING AND CABLE TRENCHES.....	4
7.	EARTHING ELECTRODES.....	4
8.	LIGHTNING CONDUCTORS .....	4
9.	TESTING OF EARTH RODS .....	4
10.	DRAWINGS REQUIRED .....	4
11.	ANNEXURES .....	4

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## 1. SCOPE

This specification shall include the design, supply, installation, connection and testing of the substation earthing system and ancillary works described below.

This specification includes the supply of copper conductor, lightning masts, earth spikes, earth mats etc. and the necessary excavation and civil works to install the earthing system and the replacement of stolen earth trails in substations.

The required general layout of the substation yard is shown on the drawings attached to this specification.

This specification describes all major components, but the Contractor shall supply and install all minor items and labour as may be necessary to complete the installation.

## 2. QUALITY OF WORK AND STANDARDS

All work shall be carried out strictly in accordance with the Code of Practice for earthing. (CP 1013)

The following SABS standards must be adhered to:

1. Earth rods, couplers and clamps shall be supplied and installed in accordance with SABS 1063-1985 and SABS 0199.
2. The two pack zinc-rich epoxy primer must be in accordance with SABS 926: 1968
3. The zinc and aluminium coatings for the protection of iron and steel against atmospheric corrosion must be in accordance with SABS 1391: 1983.
4. The replacement or new earth tail shall be two copper-plated steel earth rods according to SABS 1063: 1985.
5. Each earth rod shall have a diameter not less than 14.5mm, equivalent M16, according SABS 1063: 1985. The thickness of the copper plating on the earth rod shall not be less than 250µm.

## 3. DESIGN AND APPROVAL

The Contractor shall allow for soil resistivity tests to be performed on site. A detailed report on the resistivity tests shall be submitted to the Engineer together with a preliminary earthing scheme showing how the Contractor envisages installing the earth mat before commencing installation of the earth mat. The Contractor shall employ a specialist to investigate, plan and install the earthing installation.

The earth mat installation shall incorporate earthing electrodes at the extreme corners of the station, in the vicinity of earthing switches and transformer neutrals. The fences shall also be earthed at regular intervals. The installed maximum earth resistance shall be 1 Ω, or as agreed by the Engineer. Copper rod, 10mm<sup>2</sup> shall be used for the earth grid. The earth conductors shall generally be laid at a depth of more than 500 mm below the finished surface.

The complete earth mat design shall be submitted for written approval. The Engineer may then add or delete equipment and change the design of the earth system if he so requires. The installation of the earth mat shall be so arranged as not to cause delays in civil works.

## 4. EARTH RESISTANCE SURVEY

The Contractor will be responsible to have an earth resistance survey carried out on site by a specialist in this field, to be approved by the Engineer. The test shall be done on the undisturbed site, i.e. before earth works, trenching, building etc. commence.

The Engineer shall attend the survey. The Contractor shall inform the Engineer in good time when the test is scheduled to take place. If it is done without his or his representative being present, the test shall be repeated in the Engineer's presence at no additional cost to the Council.

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The results of this survey will be used to adjust the earthing system as specified herein, if necessary, on the basis of the quoted rates.

Payment for the services of the specialist shall be by the Contractor who may recover such costs out of the provisional amount allowed for this purpose. The recoverable amount will be the nett invoice amount charged by the specialist, plus a 5% mark-up to cover the Contractor's administrative overhead and profit.

## 5. STOLEN AND NEW EARTHING FOR OUTDOOR EQUIPMENT

To discourage theft of copper bar or conductor, no bare earthing copper shall be visible above ground. For all visible outdoor connections to equipment or structures, copper plated solid steel rods having an equivalent resistance as the copper it replaces, shall be used. Sizes and cross sections shall be according table 1 (see appendix A) and be approved by the Engineer

Connections shall either be bolted directly to the earthing conductor, or bolted to a copper flag silver soldered or exothermically welded to the earth conductor to the approval of the Engineer. Alternatively, each joint shall be made with adequate bolts to the approval of the Engineer

The copper plated earth rod must be exothermic welded onto the structure as well as the copper earth mat. The reason is to enable a temperature rise up to 800°C for the copper plated earth rod. This provides for higher current capability for 3 seconds. The galvanising of the structure must be removed with a grinder and the surface cleaned where the exothermic weld is to be preformed. Failing to remove the galvanising will cause holes in the exothermic weld, which will result in poor contact and poor current carrying capability. After completion of the exothermic weld, the area on the structure, where the galvanizing was removed, must be covered with cold galvanizing. All exothermic weld joints are to be hammered tested to ensure that the mechanical strength of the joints are adequate. It is very important to use the correct weld metal power for the correct joint.

After connection the Engineer shall inspect all joints before the joints are sealed or trenches closed.

The following equipment needs to be earthed and the standard practices for earthing this equipment are as follows:

a) Transformer earthing:

Transformers need to be earthed on the top cover on two different places and by using double earth rods.

b) Surge arresters:

Insulated surge arrestors will be earthed on the surge arrestors base where non-insulated surge arrestors will be earthed on the structure exothermically.

c) Voltage and current transformers:

Voltage and current transformers will be earthed on the structure exothermically.

d) Earth switches and isolator earthing:

Earth switches and isolator earthing will be earthed on the structure exothermically on two different ends. The handle of the earth switches shall be earthed through a flexible earth.

e) Fences:

All steel fencing must be earthed with in every 20M

f) Mechanism boxes and kiosks:

Mechanism boxes and kiosks shall be earthed independently of the associated device or steel structure on which they are supported.

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## 6. INDOOR EQUIPMENT EARTHING AND CABLE TRENCHES

Control panels, battery chargers, cable racking and other indoor auxiliary equipment shall be bonded by earth rod.

An earth rod shall be laid in the cable trench together with the multicore cables. This earth strap shall be run into the building and serve as the building earth to which all equipment in the building is connected. The building earth shall be connected to ground rods or bonding bar at diametrically opposite ends of the building.

## 7. EARTHING ELECTRODES

The number and lengths of earthing electrodes shall be determined from the resistivity tests above. Earthing electrodes shall be of the extendible rod type. The rods shall be of copper clad steel and the copper to steel weld shall be a true molecular bond according SABS 1063.

## 8. LIGHTNING CONDUCTORS

Lightning conductor aerial masts shall be designed according to SABS 0160 with a safety factor of 2.5. They shall be hot-dip galvanised to SABS 763.

Masts shall be joined and hinged at ground level and shall be supplied complete with foundations.

## 9. TESTING OF EARTH RODS

SANS 1885: 2004

## 10. DRAWINGS REQUIRED

After completion of the Works, the Contractor shall supply the necessary drawings as agreed upon with the Engineer

## 11. ANNEXURES

### Annexure A:

Copper earthing conductor sizes.

Fault current	Copper area required mm <sup>2</sup>		Main earth grid (Rod)		Connections to equipment support (50 × 3 strap)		Connections to equipment support (2 × 10mm rod)	
	Grid	Earth lead	No. of directions	Actual area mm <sup>2</sup>	No. of connections	Actual area mm <sup>2</sup>	No. of connections	Actual area mm <sup>2</sup>
12.5	125	150	2	160	1	150	1	160
16	160	190	4	320	2	300	2	320
20	200	240	4	320	2	300	2	320
25	250	300	4	320	2	300	2	320
31.5	315	375	4	320	3	450	3	480
40	400	480	6	480	4	600	3	480
50	500	600	8	640	4	600	4	640

**Table 1:** The table above illustrates the conductor arrangements required to meet standard fault levels.

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**SECTION 4 : TECHNICAL SPECIFICATION****PART 3.2 : EARTHING****SPECIFICATION No:****1. EXTENT OF WORK**

An earthmat (copper band/conductor) needs to be installed in the new trenches and the new Control Building to match the existing earthmat configuration. The new earthmat needs to be connected to the existing earthmat by an isothermic welding process (Cad-welding). Where existing earthmat sections are damaged or removed, they should be replaced.

The substation earth resistance and bonding of equipment must be tested and proved. Where abnormalities occur, it must be rectified and tested to the approval of the Engineer.

Tenderers are referred to the applicable requirements of Section 4 Part 12.1 "Earthing Grid", Section 4 Part 18 "Project Specification: Substation Testing and Re-Commissioning", as well as the price items in the Schedule of Prices (Section 7 Part 2).

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**SECTION 4: TECHNICAL SPECIFICATION****PART 4.1: 11 kV Metal-Clad Switchgear****SPECIFICATION No: SG.23/0-97 SUPPLEMENTARY SPECIFICATION****CONTENTS**

1. SCOPE	2
2. DEFINITIONS	2
3. STANDARDS	2
4. REFERENCING	2
5. STATEMENT OF COMPLIANCE	2
6. GENERAL REQUIREMENTS	3
6.1 Complete supply	3
6.2 Multi-function IED (Intelligent electronic device)	3
6.3 Local/remote operation selector switches	3
6.4 Automatic change-over	3
6.5 Busbar voltage imaging	3
6.6 Busbar blocking/breaker fail scheme	4
6.7 Internal arc proofing	4
7. CHANGES TO NRS REQUIREMENTS	4
7.1 Access to busbars	4
7.2 Instrument chamber	4
7.3 Padlocking	4
7.4 Control voltage range	4
7.5 Auxiliary contact in closing circuit	4
7.6 Mechanical tripping and closing	4
7.7 Anti-pumping and auto spring charging	5
7.8 Metal trunking	5
7.9 Open/close control switches	5
7.10 Position indication	5
7.11 Optic fibres and communication cables	5
7.12 Protection relays	6
7.13 Terminals	6
7.14 Voltage transformer secondary circuits	6
7.15 Colour	6
7.16 Routine test certificates	6
7.17 Labels	6
7.18 Details of cable termination enclosures	6
7.19 Powered racking device	6
7.20 Marking of communication cables	6
7.21 Standardised panels	6
7.22 Bus-section panel types	6
7.23 Busbar designations	6
7.24 Current transformers for transformer incomers	7
7.25 Current transformers for feeders	7
7.26 Ammeters and voltmeters	7
7.27 Additional relays, etc.	7

## 1. SCOPE

This supplementary specification and the NRS specifications indicated in clause 3 cover the supply, delivery, installation and testing of type tested and works manufactured, fully equipped 11 kV metal-clad switchgear intended for indoor operation.

The panels will in general each include equipment that comprises a mechanical switching device (e.g. a circuit breaker or switch) and its combination with associated control, measuring, indicating, alarm, protective and regulating equipment, including interconnections, accessories and supporting structures.

This specification part forms one element of an overall specification for a turn-key substation contract. Switchgear suppliers are cautioned to ensure that the requirements in other parts of the specification which may have an impact on the 11 kV switchgear are met. In particular, some requirements common to different substation components are described in Part 1 of the specification and the numerical control and protection devices that have to be installed and utilised on the switchgear, are specified in Part 12 of the specification.

A single line layout of the switchgear installation and single line block schematic diagrams for each type of panel are shown in Section IV, Drawings.

Types of switchgear panels and the quantities of each type required are stated in the Schedule of Particulars and Guarantees in section IV.

## 2. DEFINITIONS

For the purpose of this part of the specification the definitions in clause 3 of NRS 003-1 and NRS 003-2 apply.

## 3. STANDARDS

The 11 kV switchgear and ancillary equipment shall comply with the requirements of this Supplementary Specification, the relevant requirements of all other sections and parts of the overall specification, the particulars and guarantees stated in the Schedule of Particulars and Guarantees, the requirements of the Rationalised User Specifications for medium voltage metal-clad switchgear, **NRS 003-1:1994, Second edition : General requirements and method of test** and **NRS 003-2:1993, Amendment 1 : Standardised panels**, and the relevant requirements of the **Standards** referred to in these NRS specifications. The requirements of these NRS specifications shall be amended, augmented or qualified by the requirements of this Supplementary specification, which reflects requirements particular to Pretoria's standards, and which shall take precedence over the NRS specifications. Tenderers must ensure that they obtain the correct revisions of these NRS specifications and prepare their submissions accordingly.

The BS 3938 standard specification for current transformers has been superseded by BS 7626, which is technically identical to IEC 185 (or, as it has been renumbered, IEC 60185). However, since manufacturing of current transformers in accordance with BS 3938 is still allowed until 1 June 1998, and since the NRS 003 still indicates BS 3938, some current transformers will still be specified accordingly.

## 4. REFERENCING

Reference to NRS 003-1 will be denoted by a "[1]", and clause number references from NRS 003-1 will be preceded by a "[1]" e.g. [1]4.1.7. In a similar fashion, a "[2]" will be used for references to NRS 003-2, and a "[s]" for references to this supplementary specification.

References to "Schedule A" and "Schedule B" in NRS 003 and in this supplementary specification imply the Schedule of Particulars and Guarantees included in Section IV of the specification.

## 5. STATEMENT OF COMPLIANCE

Tenderers are to compile a separate statement of compliance, stating compliance or details of deviations for every clause and sub-clause of these specifications.

## 6. GENERAL REQUIREMENTS

### 6.1 Complete supply

The specified requirements shall be considered basic in that the necessary refinements to provide equipment that will function reliably shall be included in the tender ( e.g. auxiliary relays, cut-off contacts, position stops, timers, dampers, etc.).

The cost of the supply of the multi-function IED (Intelligent electronic device) on every panel, the auxiliary trip relays on the transformer incomer panel, the differential current protection relay on the main feeder panels and the cost of bay controllers or remote terminal units associated with the control of the 11 kV switchgear must be separately indicated and priced in the price schedule under part 12 and not under part 11.1. The cost of installation and integrated testing of these IEDs, differential current relays and, if necessary bay controllers, as well as the cost of supply, installation and testing of all other relays, switches, test terminals, etc. must be included in the unit price for each type of panel.

### 6.2 Multi-function IED (Intelligent Electronic Device)

A multi function IED, different types of which are described in part 12 of the specification, is to be installed on every panel in order to integrate as many as possible of the traditionally separate functions like protection, (remote) control, automatic control, interlocking, measurements, indication, event recording and disturbance recording into one device. Inter-panel hard-wiring and cabling to external control panels are minimised, since the IEDs are interconnected, and connected to the substation control system, by means of digital communication networks. On some types of bus-coupler and bus-section panels which are not equipped with current transformers, the function of the IED may be limited to control and status indication.

### 6.3 Local/remote operation selector switches

Each panel shall have a Local/Remote selector switch which shall :

- a) Inhibit local control when selected onto remote;
- b) inhibit remote control when selected onto local; and
- c) have a sufficient number of contacts for the control wiring and for its own status indication input to the IED.

Selector switches integral to the IED would be considered in lieu of the panel mounted selector switch.

“Local” operation shall include the operation of the circuit breaker by means of the “Cord control pendant” described in clause [1]4.10.14 (modified). “Local” selection shall not inhibit tripping of the CB, should the protection relays operate.

### 6.4 Automatic change-over

Automatic change-over facilities, to transfer the load from any one of the A, B or C transformers to the R transformer via the applicable bus coupler, are required, and are detailed in part 12 of the specification (Control and Protection). The logic diagram details the change-over conditions. See Section IV, Drawings.

A three-position “Automatic/Manual” spring-loaded, centre-return switch shall be provided on each bus-coupler panel to allow the local selection of the automatic change-over sequence for that particular section of busbar.

Automatic/Manual status indication lamps (Multiple LED-type) shall be provided on each of the bus couplers.

### 6.5 Busbar voltage imaging

Busbar voltage imaging is required for the IED’s on all panels not fitted with voltage transformers. Voltage buswires must connect the voltage transformers to the IEDs via circuit breaker auxiliary contacts and busbar selection auxiliary contacts in such a way as to reflect the secondary voltage of the busbar to which the closed circuit breaker is selected, onto the voltage inputs of the IED.

Only main CB auxiliary contacts may be used (no auxiliary relays). Auxiliary relays may be used to replicate busbar shutter position contacts. However, these relays shall only operate when the CB is racked into and locked into the service position. The imaged (derived) supply shall not back-energise the voltage transformers in any way.

## **6.6 Busbar blocking/breaker fail scheme**

A rudimentary busbar protection and breaker fail scheme, which is described in Part 12, is used. Cognisance must be taken of the wiring and bus-wiring requirements of this scheme.

## **6.7 Internal arc proofing**

Preference will be given to suppliers who have proved their switchgear to be safe in the case of internal arcs in all compartments. The requirements for testing are stipulated in SABS IEC 298 (Amendment no.1, 1994). The arc duration for the tests shall be at least 200 ms. Complete type test reports in accordance with Annex AA of SABS IEC 298 (As amended) must be submitted by tenderers claiming compliance with these requirements.

# **7. CHANGES TO NRS REQUIREMENTS**

## **7.1 Access to busbars**

Add in after [1]4.1.12. "Provision shall be made for easy access to busbars and busbar joints for locating possible corona during testing, and for remaking joints if required, or replacing primary plug-in bushings. Work of this nature shall be possible with the switchboard in service on the other set of busbars, and shall not involve breaking cable end boxes, removal of current transformers or current transformer chambers or removing relay panels from the switchboard.

The use of cabled sections in the busbar runs - e.g. to provide connections to the bus-couplers is not acceptable".

## **7.2 Instrument chamber**

Add in after [1]4.1.18. "Every switchgear panel shall have an instrument and relay chamber mounted directly on the switchgear panel, with a left hinged front opening door to give access to the wiring, and which shall accommodate the instruments, relays etc, as specified.

Relays and instruments located on the chamber door shall be flush mounted".

## **7.3 Padlocking**

Add under [1]4.2.8.7. "e) the mechanical close initiation device."

## **7.4 Control voltage range**

Change the first sentence of [1]4.2.9.4 to read as follows : "Where electrically operated mechanisms and closing and tripping coils are supplied, these shall be suitable for operation at any voltage between 110 % and 85 % of the rated voltage, in the case of a.c., or between 120 % and 70 % in the case of d.c., as measured at the terminals of the device."

Change the upper tolerance value in [1]4.12.11 : "...between 70 % and 120 % of...".

## **7.5 Auxiliary contact in closing circuit**

Add as part of [1]4.2.9.5. "An adequately rated '52b' contact shall be connected in series with the closing coil."

## **7.6 Mechanical tripping and closing**

Replace [1] 4.2.9.12 with : "Mechanical trip and close initiation facilities, which are suitably protected against accidental operation, shall be provided. The operating mechanism for closing shall be of the 'trip-free' pattern for manual and electrical closing."



**7.7 Anti-pumping and auto spring charging**

Add in after [1]4.2.9.13 : “The circuit breaker shall be equipped with an anti-pumping circuit, or alternatively, it shall be proven that no special anti-pumping arrangements are required.

Automatic recharging of the mechanism spring shall also take place after a closing operation has been carried out, to facilitate immediate trip and reclosure if needed”.

**7.8 Metal trunking**

Add to [1]4.10.8 : “..., which shall be mechanically continuous, with no side openings or ‘T’ connection points.”

**7.9 Open/close control switches**

Replace [1]4.10.14 with the following paragraph : “Each of the panel instrument cubicles shall be equipped with a suitable, approved circuit breaker control socket, to allow insertion of a plug for a ‘Cord control pendant’. The control pendant shall be attached to the plug by means of an 8 m length of suitably insulated flexible cord. The pendant shall consist of a dust-proof, insulated box, fitted with clearly labelled ‘Close’ and ‘Open’ push-buttons. This cord control pendant will allow the operator to stand at a safe distance, or behind the wall or door, whilst doing “safe local” operation of the circuit breaker in the service position.

Another version of the control pendant, a ‘Plug control box’ without a cord, shall also be provided. This assembly shall have the plug and the box with control switches combined into one unit, to allow it to be plugged directly and securely into the cubicle socket. In this application, the control box will serve as a temporary local control position to allow electrical testing and direct observation of the circuit breaker operation whilst it is in the test position.

Local electrical CB control will work in both CB test and CB service position. If possible, a shutter with padlocking facilities shall be provided, to lock off the socket in order to prevent the insertion of a control pendant or control box.

General arrangement drawings, schematic diagrams and full particulars of the sockets, control pendants, control boxes, push-buttons and other components must be submitted for approval.

**7.10 Position indication**

Replace [1]4.10.27 with :

“Separate, individual, position indication switches with sufficient numbers of contacts must be installed and wired to the instrument cubicle, to allow positive indication of each of the positions of the circuit breaker, namely:

- a) Racked into the top busbars (by implication, this indication must only be given when the circuit breaker is in the service position);
- b) racked into the bottom busbars (by implication, this indication must only be given when the circuit breaker is in the service position);
- c) racked into and selected into service position (carriage interlocking bar or device locked in position);
- d) racked into and selected into the test position; and
- e) racked into and selected into the earth position.

False or irrelevant indications (mostly of a transient nature), which may occur as the circuit breaker trolley is racked in or out, re-selected or configured for integral earthing, must not occur.”

**7.11 Optic fibres and communication cables**

All optic fibre cables, twisted pair, ribbon type and coaxial type communication cables shall be routed separately or individually. They shall be mechanically protected and supported, and shall not rely on control wiring looms for support. Requirements in terms of minimum bending radii shall be observed.

**7.12 Protection relays**

Add to [1]4.12.2 : “....or in Part 12 of the specification : ‘Control and Protection’ ”.

**7.13 Terminals**

In [1]4.13.1 delete the words : “current transformers”.

**7.14 Voltage transformer secondary circuits**

Replace [1]4.13.3 with : “Four-wire secondary circuits shall be used for three phase voltage transformers. The neutral conductor shall be bonded to earth via a solid removable link, which shall be accessible whilst the panel is in service.”

**7.15 Colour**

Change the first sentence of [1]4.14.4 to : “The external and interior surfaces shall be finished to the colour Cloud Grey F48 of SABS 1091”.

Change the Note under [1]4.14.4 to read : “Annex D contains....”

**7.16 Routine test certificates**

Change the last part of [1]5.2.5 to read : “....shall be supplied as specified in Part 1 of the overall specification”.

**7.17 Labels**

All labels shall be fixed mechanically. Engraved white-black-white sandwich board type labels shall be used where possible. Dymotape or similar types of glued labels shall not be used.

**7.18 Details of cable termination enclosures**

Change the last part of [1]6.6.4 : “....shall be provided with the general documentation and arrangement drawings as specified in Part 1 of the overall specification.”

**7.19 Powered racking device**

Add to the list in [1]8.3.1 : “h) One portable power operated circuit breaker racking device, if required in schedule A”.

**7.20 Marking of communication cables**

Add to [1]A.14 of [1]Annex A : “A.15 All communication cables like optic fibre, twisted pair, ribbon and coaxial cables shall be uniquely marked and labelled to the approval of the Engineer.”

**7.21 Standardised panels**

The standardised panels defined in NRS 003 - 2 are used as a basis for defining the type of panel, but the requirements for control and protection are those stated in Part 12 of the overall specification : “Control and Protection”. Attention must also be paid to the busbar designations defined in Schedule A [1]4.2.1, which are different from the original NRS designations given in [2]4.1.3.2.

**7.22 Bus-section panel types**

Add the underlined words into [2]4.1.3.1 : “Type B11 : without protection relays or current transformers; ....”

**7.23 Busbar designations**

Change the last part of the last sentence of [2]4.1.3.2 to read : “....F denotes the bottom busbars and R denotes the top busbars”.

**7.24 Current transformers for transformer incomers**

Change [2]4.4.1.2 to read : “Current transformers for overcurrent, earth fault protection and indication, shall be rated as specified in schedule A, in accordance ....”

Add to [2]4.4.1.2 : “Current transformers for metering and tap-change blocking shall be rated as specified in schedule A.”

**7.25 Current transformers for feeders**

Change the second sentence of [2]4.4.2 to read : “Current transformers for overcurrent, earth fault protection and indication, shall be rated as specified in schedule A, in accordance with BS3938.”

**7.26 Ammeters and voltmeters**

Change [2]4.8 to read : “No ammeters and voltmeters are required”.

**7.27 Additional relays, etc.**

Add to both [2]4.10.1 and [2]4.10.2 : “....and in Part 12 of the specification (Control and Protection).”

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## **SECTION 4: SPECIFICATION**

### **PART 4.2: 11KV METAL ENCLOSED SWITCHGEAR**

**SPECIFICATION No:**

#### **CONTENTS PAGE**

<b>1</b>	<b>SCOPE .....</b>	<b>3</b>
<b>2</b>	<b>STANDARDS AND REFERENCE DOCUMENTATION ... ERROR! BOOKMARK NOT DEFINED.</b>	<b>2</b>
<b>3</b>	<b>DESIGN CRITERIA .....</b>	<b>3</b>
3.1	RATED NORMAL CURRENTS .....	3
3.2	TEMPERATURE LIMITS AND ENVIRONMENT .....	3
3.3	INTERNAL ARC FAULT TEST.....	4
<b>4</b>	<b>TECHNICAL DATA.....</b>	<b>4</b>
<b>5</b>	<b>PANEL HOUSING DESCRIPTION.....</b>	<b>5</b>
5.1	GENERAL .....	5
5.2	CUBICLE DESIGN AND COMPARTMENTS.....	6
5.3	MAIN BUSBAR COMPARTMENT.....	6
5.4	POWER CABLE COMPARTMENT .....	7
5.5	CIRCUIT BREAKER/CONTACTOR COMPARTMENT .....	7
5.6	BUSBAR VOLTAGE TRANSFORMER COMPARTMENT .....	7
5.7	CABLE VOLTAGE TRANSFORMERS.....	8
5.8	LOW VOLTAGE COMPARTMENT .....	8
<b>6</b>	<b>INSTALLATION FACILITY .....</b>	<b>8</b>
<b>7</b>	<b>DOORS AND EXTERNAL COVERS COATING OR PAINTING ON THE SWITCHBOARD CUBICLES .....</b>	<b>8</b>
<b>8</b>	<b>DEGREE OF PROTECTION .....</b>	<b>8</b>
<b>9</b>	<b>SWITCHING DEVICES.....</b>	<b>8</b>
9.1	CIRCUIT BREAKERS .....	8
9.2	CONTACTORS.....	9
<b>10</b>	<b>OTHER EQUIPMENT .....</b>	<b>10</b>
10.1	EARTH SWITCHES .....	10
10.2	PROTECTION AND CONTROL .....	10
10.3	VOLTAGE AND CURRENT SENSORS AND / OR CONVENTIONAL INSTRUMENT TRANSFORMERS .....	10
<b>11</b>	<b>INTERLOCKING FEATURES .....</b>	<b>11</b>
<b>12</b>	<b>TESTS.....</b>	<b>12</b>
12.1	TYPE TESTS .....	12
12.2	ROUTINE TESTS.....	12
<b>13</b>	<b>QUALITY SYSTEM .....</b>	<b>12</b>



## 1 Scope

This specification describes the metal enclosed air insulated medium voltage switchgear for indoor application to be required for this project in configuration and amount of panels as set out in the separate detailed information, drawings and single line diagram(s).

## 2 Standards and Reference Documentation

The latest revision of the following standards shall apply:

IEC 62271	Specification for AC metal enclosed switchgear and control gear, for voltages above 1kV up to and including 52kV
Part:	
-1	Common specifications for HV switchgear and control gear standards (IEC 60694)
-100	Alternating current Circuit breakers (IEC60056)
-102	Alternating current disconnectors and earthing switches (IEC 60129)
-103	Switches for rated voltages above 1kV and less than 52kV (IEC60265-1)
-106	Alternating current contactors and contactor-based motor-starters (IEC60470)
-200	AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV
IEC 60282-1	Protection fuses
IEC 60529	Degree of protection (IP rating)
IEC 60044-1	Current transformer
IEC 60044-2	Voltage transformer
IEC 60044-8	Current sensors
IEC 60044-7	Voltage sensors
IEC 61343-5	Voltage detection system VDS
IEC 60071-1	Insulation coordination
IEC 60125	Protection relays
IEC 60376	SF6 gas

## 3 Design Criteria

### 3.1 Rated Normal Currents

The rated normal currents of components as stated in the Technical data and shall be valid for a maximum temperature of 40° C.

### 3.2 Temperature limits and environment

For switchboards and equipment located indoors and in normal unpolluted and non corrosive atmosphere. The ratings guaranteed under the following ambient conditions::

## Environmental conditions:

Maximum temperature	40 °C
Maximum 24 h average temperature	30 °C
Minimum (correspondents to "minus 5 °C indoor class")	-5 °C
Maximum relative humidity	
for one month	90 %
for 24 hours	95 %

The switchboard shall be suitable for installation and service up to an elevation of 1000 m above the sea level. For higher altitudes the switchgear shall be de-rated to the applicable altitude, in accordance with IEC 60071-1

**3.3 Internal arc fault test**

The arc proof units shall be tested in compliance with the IEC 62271-200 Standards (IAC AFLR) ensuring operator safety.

A pressure relief duct, to release the gases resulting from a possible internal arc, must be provided to improve the level of safety for the operators. To safely vent gases out of the working area a pressure relief duct is compulsory for a one (1) second rating where short circuit levels are equal to or higher than 25 kA and the ceiling height of the switchboard room is below 3.5 meters.

**4 Technical data****The following design parameters are required:**

Rated voltage	kV	12	17.5	24
Maximum operating voltage	kV	12	17,5	24
Rated power frequency withstand voltage	kV	28	38	50
Rated lightning impulse withstand voltage	kV	75	95	125
Rated frequency	Hz	50	50	50
Rated short –time current, 3 sec.	kA	31.5	31.5	25
Rated peak withstand current	kA	78.75	78.75	62.5
Rated short-circuit breaking current of circuit breaker	kA	31.5	31.5	25
Rated short-circuit making current of circuit breaker	kA	78.75	78.75	62.5
Rated operating sequence O-0,3s-CO-3min-CO		X	X	X
Degree of protection :				
HV-live parts		IP4X	IP4X	IP4X
Low voltage compartment		IP2X	IP2X	IP2X
Ambient temperature max.	°C	40	40	40

Colour		Cloud grey	Cloud grey	Cloud grey
Dimensions: max. width				
Tee-off current up to 1250A	mm	600	600	-
Tee-off current up to 1600-2500A		800	800	800
Tee-off current from 2500 up to 4000A		1000	1000	-
Safety features :				
Arc- fault IAC rating, to the switchboard rating for 1 second, according to IEC 62271-200,		AFLR	AFLR	AFLR
		Yes	Yes	Yes
Integrated pressure relief ducts				

## 5 Panel housing description

### 5.1 General

The switchboard shall be an indoor air insulated, metal enclosed with a double busbar system as per the scope. The double busbar system shall allow for an independent connection of the line circuit breaker between any one of the busbars, or to be connected to both busbars, so that transfer between the two busbar systems can occur without any interruption or loss of power to the circuit.

The design of the switchgear shall be suitable for local and remote control, of the circuit breakers and the transfer system.

The switchboard shall be designed in accordance with the relevant IEC specifications to ensure:

- loss of service continuity type LSC2B
- partitioning class, type PM
- racking operation of circuit breaker behind closed doors
- racking operation from remote location (if available)
- mounting of all voltage transformers within the arc proof enclosure
- easy installation and reduced construction costs
- arrangement for future extensions on both sides of the switchboard

The switchgear shall be so designed and manufactured to prevent the occurrence of an internal arc. The switchboard shall ensure maximum personnel safety even in case of an internal arc. The switchboard shall be built to withstand the overpressure ensuing from the internal arc for 1 second. The switchboard shall be designed to fit gas ducts to convey the exhausted gases away from and prevent damage to operators and apparatus.

For further operator safety the switchboard must be equipped with a specific arc flash or high speed busbar protection system to protect against internal faults in each partitioned compartment. This arc protection system shall be based on sensors (preferably fibre) suitably located in the switchboard and connected to the



trip circuits of the circuit breakers. The sensors shall detect the presence of an internal arc fault at the instance of the arc and promptly open the circuit breakers. The fault shall be cleared within 100 ms (including the circuit breaker operating time).

The inclusion of the arc flash protection equipment shall not be used as a basis for reducing the internal arc capability of the switchboard, and the minimum internal arc capability of the switchboard shall remain at 1 second.

## **5.2 Cubicle design and compartments**

Enclosure and internal partitioning of the cubicles shall be of high-quality aluminium-zinc coated steel sheets, with a minimum thickness of 2 mm. The front shall be closed off by pressure resistant doors which shall open to an angle of not less than 150°.

Every cubicle of the switchboard shall be divided in separate compartments for power components as follows:

- bus-bar compartment for Main busbar
- busbar compartment for Reserve busbar
- power cable and cable instrument transformer (CT/VT) compartment
- circuit breaker compartment
- busbar voltage transformer compartment
- an instrument compartment

All compartments shall be segregated by metal partitions, and allow for safe venting of gases to comply with the arc proof rating of the switchgear. All compartments within the switchboard shall vent externally to the top of the switchboard. No venting between compartments will be acceptable.

The correct performance of operation shall be ensured by proper interlocks with mechanical position indicators and inspection windows, to facilitate the correct and safe operation of the switchgear.

For the purpose of ventilation if applicable in cases of higher current ratings, where openings in the outer enclosure is necessary, the following provisions shall apply:

- the degree of protection shall be IP4X
- the openings shall close in the event of an internal fault, and prevent any gasses from being emitted.

## **5.3 Main and reserve busbar compartments**

These compartments located within the switchgear enclosure shall contain the bus-bar system. Each busbar system shall be fully enclosed in its own compartment, and connected to the circuit breaker insulating contacts by means of line isolating switches. The Isolators shall provide for on load transfer of the line circuit between the two busbar systems.

The main busbars and tee-off conductors shall be insulated by means of shrink-on sleeves. It shall be possible to provide partitions with bushings between adjacent cubicles, as follows.

- no partitioning for fault levels of 25kA and below

- partitioning on every third cubicle, for fault levels above 25kA and up to 31.5kA
- partitioning on every cubicle shall be possible. T

#### **5.4 Power Cable compartment**

The power cable compartment, shall be accessible from the front or rear of the switchboard. The cable compartment shall comprise the following:

- a branch system for connecting the power cables to the circuit breaker insulating contacts
- a fault make cable earth switch with operation from the front of the cubicle.
- an integral interlocking device between circuit breaker and earth switch.
- current transformers or current and/or voltage sensors
- removable voltage transformers, where cable voltage transformers are required

#### **5.5 Circuit Breaker/Contactor compartment**

This compartment shall be so designed as to accommodate the withdrawable circuit breaker or contactor complete with its truck for the racking operations (in and out) with the compartment door closed and all accessories required for its operation.

The following components shall be mounted in this compartment:

- the primary connections, namely the bushings containing the power connections to the circuit breaker compartment the busbar and cable compartments
- metal shutters automatically operated by the movement of the circuit breaker truck. The shutters shall be equipped with a fail-safe device (on request) to prevent their manual opening when the circuit breaker is removed from the compartment and the door is open. The shutters shall make provision for two independent padlocks and lock each of the cable and busbar shutters
- connection for the circuit breaker control wiring

The position of the withdrawable truck (Circuit breaker / contactor) shall be observed at any time through a security glass type window on the compartment door.

#### **5.6 Busbar Voltage Transformer compartment**

This compartment shall be so designed as to accommodate the withdrawable busbar voltage transformer complete with its truck for the racking in and out with the compartment door closed and all accessories required for its operation.

The following components shall be mounted in this compartment:

- the primary connections, namely the bushings containing the power connections between the voltage transformer on the busbar compartment
- Three single phase voltage transformers, with suitable rated HRC primary fuses, and secondary windings in accordance with the requirements
- metal shutters automatically operated by the movement of the voltage transformer. The shutters shall make provision for padlocks.
- connection for the voltage transformer secondary wiring

The position of the voltage transformer shall be observed at any time through a security glass type window on the compartment door.

### **5.7 Cable Voltage Transformers**

If cable voltage transformers are required, this switchgear shall be so designed as to accommodate the removable cable voltage transformer complete with its truck without compromising the internal arc rating of the switchboard. Access to the cable voltage transformer shall only be allowed once the compartment has been de-energised, and a safety earth applied. The following components shall be mounted in this compartment:

- the primary connections, namely the bushings containing the power connections between the voltage transformer and the busbar compartment
- Three single phase voltage transformers, with suitable rated HRC primary fuses, and secondary windings in accordance with the requirements
- interlocks to ensure safe access after earthing of the switchgear.
- connection for the voltage transformer secondary wiring

### **5.8 Low voltage compartment**

The low voltage compartment shall be encased separately from the high voltage compartments. The low voltage compartment is closed with a door and is placed above the circuit breaker compartment. Sufficient space shall be available for all the required secondary equipment such as:

- connection terminals and wiring (in proper wiring ducts)
- interconnections between cubicles and for connection of auxiliary cables
- auxiliary equipment (fuses, low voltage MCBs, the measuring instruments, protection relays, control and signalling devices, etc.).

## **6 Installation facility**

The panels are to be delivered to site as factory assembled, and tested units. A base frame laid in or on the floor is requested for speedier and easier alignment. After the cubicles (or cubicle assemblies) have been positioned side by side in a single row and bolted together and the power and control cables are connected, the system must be ready for operation.

## **7 Doors and external covers coating or painting on the switchboard cubicles**

The doors and the external cover plates shall be painted. The finishing coat shall be colour cloud grey (SABS 1091 colour no. F48).

## **8 Degree of Protection**

The protection degrees in compliance with IEC 60299 Standards shall be the following:

- IP4X for the external housing
- IP2X inside between the compartments

## **9 Switching devices**

### **9.1 Circuit breakers**

The switchboard can be equipped with either SF6 or vacuum withdrawable circuit breakers that comply with IEC Publication 62271-100.

They must be triple pole. The stationary mounted circuit breakers shall be fully type-tested. Test certificates, as evidence of successful completion of type tests shall be submitted with the tender.

All circuit breakers shall be routine tested in accordance with IEC 62271-100

The circuit breaker shall be equipped as follows:

- with stored energy spring mechanism for motor charging and emergency manual operation or by means of a magnetic actuated mechanism
- with mechanical push buttons for closing and opening
- with mechanical indicators for switch position and mechanism position
- with mechanical counter
- with 2 shunts release OFF
- with shunt release ON
- with auxiliary signalling contacts

Circuit breakers shall be suitable for the following switching duty, in accordance with the latest IEC 62271-100

- for mechanical endurance, class M2
- for electrical endurance, class E2
- Capacitor switching class C2

## **9.2 Contactors**

The switchboard shall be equipped with withdrawable vacuum contactors that comply with IEC Publication 60470. They must be triple pole and are protected by primary H.R.C. fuses that comply with the IEC 60282-1 Standards.

The contactors shall be fully type-tested. Test certificates, as evidence of successful completion of type tests shall be submitted with the tender.

All contactors shall be routine tested in accordance with IEC 62271-1 (60694).

The contactor shall be equipped as follows:

- with solenoid type operating mechanism with electrical latching (on request mechanical latching with shunt release OFF)
- with mechanical indicators for switch position and mechanism position
- with auxiliary signalling contacts

Magnetic actuated contactors are acceptable. Where magnetic actuated contactors are used, the contactor shall be equipped as follows:

- with solenoid type operating mechanism with magnetic latching (on request electrical latching function shall be provided via an opening coil)
- with mechanical indicators for switch position
- with electrical indicators signalling contactor ready for operation
- with auxiliary signalling outputs

## **9.3 Isolators**

The line isolators that connect the circuit breaker to the main and reserve busbars shall be operated manually and by a motor. When manually operated the motor circuit shall be disconnected when the crank handle is inserted.

The Isolators shall be provided with the necessary interlocks between Isolators and the circuit breaker by means of blocking magnets. The interlocks shall prevent inappropriate operation of the Isolators.

The isolator shall always be visible by means of a camera or see through window.

#### **9.4 Cable live voltage detection system.**

Each incoming and feeder cubicle shall be fitted with a cable live voltage detection system. The system shall detect the voltage on the power cables connected to the cubicle, and indicate the presence of voltage via lamps. It must also have an earthswitch interlocking circuit to prevent applying an earth onto the Live cable.

The cable live indicating system shall be according to IEC61243-5, voltage detection system (VDS).

It shall be possible to connect phase balance or phase comparators to the VDS system.

### **10 Other equipment**

#### **10.1 Earth switches**

Each incoming and/or feeder unit shall be equipped with a cable earth switch to earth the power cables.

Where applicable the busbar earth switch shall be installed in its separate cubicle or the bus section unit.

The earth switch shall comply with IEC62271-102 and have a class of E2. The device shall have a fault make capacity that can withstand the switchboard short circuit current rating. The earth switch shall be properly interlocked and manually operated from the front of the switchboard.

The earth switch opening and/or closing operations shall make provision for key and independent padlocks.

On request, the earth switch shall be supplied with auxiliary contacts signalling the switching position.

The earth switch shall always be visible by means of a camera or see through window.

#### **10.2 Protection and control**

The protection and control devices must be mounted in the front of the panel and comply to protection and control specification as detailed in part 12.

#### **10.3 Voltage and current sensors and / or conventional instrument transformers**

Combined modern voltage/current sensors to IEC 60044-8 and IEC 60044-7 (with high linearity over the entire working range) may be used.

Conventional inductive resin insulated voltage and current transformers according to IEC 60044-2 and IEC 60044-1 shall be applied and designed according to metering and protection requirements.

Conventional voltage transformers shall be provided with a residual open delta winding for protection purposes. This winding shall be quipped with a suitable

loading resistor, or protective device to protect the voltage transformer from Ferro-resonance phenomenon

## 11 Interlocking features

To ensure proper operation and to prevent mal operation that might jeopardise the personnel safety and put at risk the installation functionality, a series of interlocks shall be provided to protect the operators and the switchgear itself.

In particular the following interlocks are required (but not limited to):

- the withdrawable part can only be moved from the test/disconnected position (and back) when the circuit breaker and earth switch are off (i.e. the switch must be off beforehand). In the traverse position, the switch shall be mechanically interlocked.
- the circuit breaker can only be switched on when the withdrawable part is in the test or service position. In the traverse position, the switch shall be mechanically interlocked.
- the withdrawable part can only be racked in if the control voltage is present and the circuit breaker auxiliary contacts are connected. (electromechanical interlock)
- connecting and disconnecting of the control wiring is only possible in the test/disconnected position of the withdrawable part

If the cubicle is equipped with an earthing switch, the following interlocks shall also be provided:

- the earthing switch can only be switched on if the withdrawable part is in test/disconnected position or outside of the cubicle ( mechanical interlock) and the VDS cable Live monitor allows switching i.e. cable is not Live.
- if the earthing switch is on, the withdrawable part cannot be moved from the test/ disconnected position (mechanical interlock)

Interlocks for Line Isolators, for on load transfer:

- The line isolator shall not be able to be operated when the line circuit breaker is closed and the second busbar line isolator is open.
- The line isolator shall be able to be operated, when the line circuit breaker is closed, and the second busbar isolator is closed and associated the bus-coupler circuit is closed.
- Either line isolator shall be able to be operated when line circuit breaker is open but should not be possible to close one isolator whilst the other is closed, unless interlocked with a bus coupler circuit.
- The Bus Coupler circuit should not be able to OPEN if 2 busbar isolators are closed and their associated circuit breaker is OPEN.

Interlocks between cubicles:

- the busbar earthing switch can only be applied when all withdrawable parts in the busbar section, which must be earthed, are in the test/disconnected position (electromechanical key interlock)
- when the busbar earth switch is on, the withdrawable part in the earthed busbar section cannot be moved from the test/disconnected position to the service position (electromechanical key interlock)

Other interlocks:

- the shutters shall be secured independently of each other with padlocks when the withdrawable circuit breaker part has been removed

- access to the drive-shaft of the earthing switch shall be restricted with a padlock.
- access to the circuit breaker compartment and the cable compartment as well as to the withdrawable part controls shall be restricted with a padlock.
- racking in of a circuit breaker truck having a different size shall be prevented, i.e. through the codification of the control wiring plug or the circuit breaker.

## **12 Tests**

All tests shall be carried out according to relevant IEC standards.

### **12.1 Type tests**

The metal enclosed switchgear is to be type tested at a recognised and well-reputed test laboratory. Type test certificates shall be available for verification as evidence of successful completion of type tests.

### **12.2 Routine tests**

All tests shall be carried out according to relevant IEC standards.

## **13 Quality system**

The quality system as certified according to ISO 9001 code shall be applicable. A dedicated quality control plan shall be provided on request.

## **14 Documentation**

### **14.1 Data and documentation to be submitted with the offer:**

- information about the type of the switchboards and the equipment offered
- single line diagram with a front view of the switchboards complete with overall dimensions (preliminary)
- spare parts suggested for startup and 2 years of service
- type test certificates

### **14.2 Data and documentation to be submitted in case of an order**

- single line diagram with front view of the switchboards complete with overall dimensions (as built)
- circuit diagrams per typical units
- panel sections per typical units
- foundation drawings complete with fixing system and floor openings (as built)
- installation and maintenance manual of the switchboards and main equipment
- test certificates of the switchboard

SECTION 4:

SPECIFICATION

PART 5.1:

SCADA INTERFACE

SPECIFICATION No: SC.03/0-97 - Rev 3

CONTENTS

1.	Introduction .....	2
2.	STANDARDS .....	2
3.	Overview .....	2
4.	Communication medium .....	2
5.	Substation SCADA interface .....	2
6.	Busbar Colouring .....	3
7.	Symbols list .....	3
7.1	Breaker .....	3
7.2	Isolator .....	3
7.3	Earth .....	3
8.	Data Point Numbering .....	3
9.	Official DNP Subsets .....	4
10.	Class Data .....	4
11.	Modes of operations .....	5
12.	GPS Clock .....	5
13.	FUNCTIONALITY OF THE SCADA .....	5
14.	Testing .....	5
15.	Documentation .....	6

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## 1. INTRODUCTION

This specification specifies the Supervisory Control and Data Acquisition (SCADA) interface for a substation.

The City of Tshwane Metropolitan Municipality control centre are situated at Capital Park, from where fifty substations are monitored and controlled via SCADA links

The Scada Protocol at the Control Centre of the City of Tshwane is DNP 3 level 3. The Tenderer shall submit the following documents

- i) A document stating that the tenderer complies to IEC 60870-5-103
- ii) A document explaining the protocol that the tenderer will be using in the substation.
- iii) A document stating that the protocol being used by the tenderer can be converted to DNP3 level 3.

The conversion of the substation protocol to DNP 3 level 3 can be done by the tenderer, by doing the conversion in the substation MMI or by doing the conversion in a Harris D20++ Processor board. The tenderer must be able to prove both conditions. The implementation of the protocol conversion at the substation will be the responsibility of the tenderer. The tenderer will supply the City of Tshwane with an IO list indicating Digital Inputs, Digital Outputs, Analogs and DNP mapping.

The Tenderer will give training to personnel of the City of Tshwane on fault finding, populating of the database in the MMI and the substation protocol

## 2. STANDARDS

The following documents are referred to in this specification:

- a) The DNP Basic 4 Document set which includes the complete description of all the facilities available in DNP together with their usage; and
- b) the DNP V3.00 Subset Definitions which explains the minimum functionality that is expected in the three officially recognised subsets of DNP.

Both of these documents are available from the DNP users group and from Tshwane Electricity.

## 3. OVERVIEW

Harris Distributed Network Protocol (DNP) has been developed by Harris Canada Inc. for application in both SCADA and distributed automation systems. The DNP protocol are being used by CCP to interface the front end processor at Capital Park with different substations.

## 4. COMMUNICATION MEDIUM

The communication medium consists of optical fibre with multi-plexers, twisted copper pilot wire with modems and micro wave radio links. The baud rates vary between 300 baud and 19 200 kilo baud.

## 5. SUBSTATION SCADA INTERFACE

The preferred option will be for the Tenderer to make use of a standard D20 ++ processor card from Harris to convert the protocol inside the substation to interface to the Control Centre at Capital Park talking DNP protocol on the SCADA link.

Harris support protocols such as ABB SPA-BUS, GEC Courier K-bus, Modbus, etc.

The configuration for the substation will be programmed on NV Ram situated on the D20 ++ card.

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The Council will provide a suitable cubicle to house the 19 inch rack.

An option for the Tenderer to make use of an intelligent device (Gateway) to convert the protocol inside the substation to interface to the Control Centre at Capital Park talking DNP protocol on the SCADA link would also be considered by the Council.

The Tenderer should quote on both the above options.

## 6. BUSBAR COLOURING

- a) Powered : 275 kV Busbar : Blue
- b) 132 kV Busbar : Orange
- c) 33 kV Busbar : Magenta
- d) 11 kV Busbar : Cyan
- e) Without power : All busbars white
- f) Earthed : All busbars green
- g) Invalid : All busbars yellow
- h) Background : Black

## 7. SYMBOLS LIST

For further details see Part 12.

### 7.1 Breaker

Use a square symbol with the following conditions:

- a) Breaker closed : a square solid red;
- b) breaker open : a square solid green; and
- c) breaker disturbed : a square yellow with a line running from top left to bottom right.

### 7.2 Isolator

Use a circle with the following conditions:

- a) Isolator closed : a circle solid red
- b) isolator open : a circle solid green
- c) isolator disturbed : a hollow circle in yellow with a 45 degree line running from top left to bottom right.

### 7.3 Earth

The conventional 3 horizontal lines arranged within the outline of a triangle.

When earthed the green symbol should show, when not earthed no symbol should show.

## 8. DATA POINT NUMBERING

For the purposes of maximum efficiency of the communications system and data entry into the SCADA system the following are recommended for any equipment to be connected to the control centre via DNP.

- a) All point numbers for all types of data should start from zero (0);
- b) all point numbers should be contiguous, with no gaps or spares within the point mapping. This is recommended because on start-up and at pre-set intervals the FEP will ask for all data (integrity poll) and gaps in data will make the response inefficient as the real data and the spare points are all transmitted together;

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- c) the two points associated with status of a device (e.g. open-closed status of a circuit breaker) shall be adjacent to each other in the point map and located at an even boundary. The Open and Close indications should be in the same order as for the RTUs that have already been installed (Closed Indication first, Open indication second). If this procedure is followed the SCADA system data entry and FEP mapping will be easier; and
- d) control output bits should follow the same procedure in that the associated output should be next to each other and at an even boundary. The sequence should be Trip first and then Close.

Digital Inputs (time tagged or not) should be allocated to Class 1, Analogue Inputs should be allocated to Class 2 and Counter values to Class 3

## 9. OFFICIAL DNP SUBSETS

Three official subsets of DNP have been defined by the DNP Users group. These are as follows:

- a) Level 1 Implementation (DNP-L1)
- b) level 2 Implementation (DNP-L2)
- c) level 3 Implementation (DNP-L3)

Level 1 is the minimum subset that should be implemented and is typically used between a master station and an IED. The requests for the following data objects from the slave must be accepted

- a) Reads of Class Data Objects;
- b) Reads of Binary Outputs and Analogue Output Objects only if these objects exist in the slave;
- c) Control Operations;
- d) Writes to the RESTART Internal Indication;
- e) Cold Restarts; and
- f) Time Synchronisation.

The Level 2 implementation consists of all the Level 1 features plus additional data objects as defined in the subsets document.

The Level 3 implementation consists of all Level 2 plus additional data objects as defined in the subsets document. This is the level which is required and specified by the Council.

## 10. CLASS DATA

DNP has the facility to send changed (event), data to the master station. The master station thus polls for changed data rather than for data of a specific type e.g. the poll is for all Class 1 data rather than all Analogue.

DNP has 4 different classes of data, each of which can contain different types of data, but which have different event queues and priorities :

- a) Class 0 Data is the exception in that data is static data rather than changed data. Class 0 consists of all data and is called an integrity poll because it returns the status of all the I/O points in the RTU; and
- b) Class 1, 2 and 3 data there are different priorities of data and the master station can be set up to poll more frequently for Class 1 data than for Class 2 data and Class 3 data.

Class Data requests are the basis for the communications in the Tshwane Electricity SCADA network. This is due to the necessity to most efficiently use the bandwidth available for communications, as DNP is a relatively high overhead protocol.

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## 11. MODES OF OPERATIONS

DNP provides several different means of operation:

a) **Quiescent Operation;**

where the master never polls the slave. All communications are unsolicited report by exception. This mechanism is generally used for systems using radio communications and pole top RTUs to keep communications to a minimum. The integrity of the data is never verified and is thus not recommended for Tshwane Electricity;

b) **Unsolicited Report by Exception;**

in which most communications is unsolicited, but the master occasionally send integrity polls for Class 0 Data (all data) to verify its database. This option is not acceptable to the Council.

c) **Polled Report by Exception Operation; and**

in which the master polls frequently for event data and occasionally for Class 0 Data. Polling is generally quick because only significantly changed data objects are reported to the master station. This is the mechanism that is used by the Tshwane Electricity system at this moment, due to the combination of high efficiency, good integrity, and control by the master. The slave never sends data unless polled by the master and the master is thus controlling the system. This is the recommended implementation needed by the Council.

d) **Polled Static Operation.**

where the master always polls for all data. This is very inefficient and not acceptable to the Council.

## 12. GPS CLOCK

The Tenderer shall supply and install a GPS clock for the time tagging of events at the substation and also for time synchronisation with the front end processor at Capital Park with an accuracy of 1 ms or better.

## 13. FUNCTIONALITY OF THE SCADA

The SCADA shall be able to control the substation in the same way and with the same detail as the MMI or substation control system. All controls, status indication, analogue indications, event recording and alarms shall be provided.

When any of the elements of the substation is in local mode it shall not be possible to control that element by the SCADA.

It is not necessary for the SCADA to be able to communicate with the relays

In addition intruder detection and alarms shall be supplied, as well as battery status alarms and charger control (e.g. battery boost charge).

## 14. TESTING

The Contractor shall be responsible to test all the Substation SCADA alarms, analogues, tap positions and indications to the front end processor at Capital Park

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## 15. DOCUMENTATION

The following drawings shall be supplied by the Tenderer :

- a) Single line diagrams showing the basic layout of the busbars, breakers, isolators, bus couplers, bus sections etc.
- b) a document showing the numbering of addresses for all the different 1 bits, 2 bits, analogues, tap positions, controls and alarms
- c) a drawing of the element types (circuit breakers, transformers, isolators etc.
- d) transducer outputs (0-5 mA or 4-20 mA etc.) and voltage- and current transformers ratios.

The following documentation will be supplied by CCP to the Contractor:

- a) DNP documents mentioned above
- b) protocols supported by Harris
- c) a hardware manual on the Harris D20 ++ processor card
- d) a name and telephone list of contact persons at CCP.

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# PART C2.1 – PRICING INSTRUCTION

## SECTION 5

### SCHEDULE OF PARTICULARS & GUARANTEES

All Tenderers must complete the following schedules in full. Failure to provide the required detailed information called for in the schedules will result in the tender to be disqualified.

#### CONTENTS

PART	DESCRIPTION	APPLICABLE
1	<u>General Requirements:</u>	
1.3	Quality Control / assurance Questionnaire	Yes
2	<u>Insulated Cables:</u>	
2.1	Between 40 MVA Transformer and 11kV Switchgear	Yes
2.2	Underground PVC-Insulated Multi-Core Control Cable	Yes
2.3	Medium Voltage Cable Sealing Ends, Terminations and Cables	Yes
3	<u>Earthing:</u>	
3.1	Earthing Grid	Yes
4	<u>11 kV Switchgear:</u>	
4.1	11kV Metal-Clad Switchgear	Yes
4.2	11kV Metal Enclosed Outdoor Switchgear	Yes
5	<u>SCADA:</u>	
5.1	SCADA Interface	Yes

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## SECTION 5: SCHEDULE OF PARTICULARS AND

### PART 1.3: QUALITY CONTROL / ASSURANCE

**SPECIFICATION No: PT.61/0-2003 - Rev 2 (Previous No: PT.61/0-98)**

- 1 All Tenderers shall complete the following schedules in full. Failure to provide the required detailed information called for in the schedules will cause a tender to be disqualified.
- 2 All information provided by the Tenderer, or specified by the Council and not qualified by the Tenderer will be regarded as offered and guaranteed by the Tender.

ITEM NO	DESCRIPTION	YES	PARTLY	NO
<b>1</b>	<b>PROCEDURE:</b>			
1,1	Have you a formal procedure for approval and implementation of design changes?			
<b>2</b>	<b>PRODUCTION PLANNING:</b>			
2,1	Do you provide written work instructions?			
2,2	Do they list the inspections required?			
2,3	Do you provide written quality and inspection			
<b>3</b>	<b>PURCHASING:</b>			
3,1	Have you a procedure for approving and checking the performance of sub-contractors?			
3,2	Do you specify minimum requirements for quality control by your sub-contractor?			
3,3	Do you check the quality control activities of your sub-contractors?			
3,4	Does your purchase documentation include drawings, specifications, quality standards and other requirements?			
<b>4</b>	<b>MANUFACTURING CONTROL:</b>			
4,1	Do you have written procedures for checking the accuracy of special manufacturing equipment?			
<b>5</b>	<b>INSPECTION STATUS:</b>			
5,1	Do you have a system for identifying the inspection status of work in progress?			
<b>6</b>	<b>FINAL INSPECTION AND TEST:</b>			
6,1	Are all items subject to final inspection and test to ensure compliance with contract requirements?			
6,2	Are the final inspection and test witnessed and approved by the Quality control Department?			

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<b>7</b>	<b>CORRECTIVE ACTION:</b>			
7,1	Do you have written procedure for correcting deficiencies in quality?			
<b>8</b>	<b>CONTROL OF NON-CONFORMANCE MATERIAL:</b>			
8,1	Do you have formal procedures for the identification of defective items and for re-work, repair or disposal?			
8,2	Do you have a system for segregating defective items?			
<b>9</b>	<b>DOCUMENT AND CHANGE CONTROL:</b>			
9,1	Do you maintain a complete list of all documents, drawings and forms in current use?			
9,2	Have you a formal system for the issue and revision of drawings, documents, manuals, instructions and the like?			
<b>10</b>	<b>INSPECTION EQUIPMENT:</b>			
10,1	Have you an organization and facilities for the control, storage and calibration of all inspection and testing of equipment?			
<b>11</b>	<b>HANDLING, STORAGE AND DELIVERY:</b>			
11,1	Do you have separate storage areas for incoming material, work in progress and finished products?			
11,2	Is access to all stores restricted to authorized personnel?			
11,3	Are all items in the store identified and issued in rotation?			
11,4	Are items in store periodically inspected?			
11,5	Can the stored goods be traced back to material certificates, test reports and purchasing orders when required?			
11,6	Are packing instructions detailed?			
<b>12</b>	<b>RECORDS:</b>			
12,1	Do you record the satisfactory completion of inspection and quality checks?			
<b>13</b>	<b>REVIEW AND ASSESSMENT:</b>			
13,1	Do you regularly monitor all production planning and quality control functions?			

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**SECTION 5: PARTICULARS & GUARRANTEES****PART 2.1: CABLE 11KV FROM TRF****SPEC NO:**

ITEM	DESCRIPTION	UNIT	REQUIREMENT	OFFERED
<b>2.1</b>	<b>11 kV Cable Connections from 40MVA Transformers to 11kV Switchgear</b>			
1	Total length of cable required	m	1200	
2	Type of cable required (SABS 97-1970, Appendix B Clause B-1(b))		Single-core PILC PVC	
2.1	Number of cables in parallel			
3	Voltage rating (r.m.s.line to line)	kV		
4	Configuration		Earthed through NEC	
5	Rated conductor size	sq mm	630	
6	Number and diameter of wires in core			
7	Minimum radial thickness of dielectric	mm		
8	Thickness of each paper insulating tape	mm		
9	Number of layers of paper on core			
10	State type of impregnation			
11	State type of impregnation			
12	State whether draining or non-draining type cable is offered		non-draining	
13	Minimum radial thickness of lead sheath	mm		
14	Nominal diameter over lead insulated core	mm		
15	Nominal diameter over insulated core	mm		
16	Nominal diameter over lead sheath	mm		
17	Nominal diameter over PVC over sheath	mm		
18	Minimum radial thickness of PVC over	mm		
19	Mass of copper per 1000 m of cable	kg		
20	Mass of lead per 1000 m of cable	kg		
21	mass of completed cable per 1000 m	kg		
22	Cable will be supplied in drum lengths of	m		
23	Gross weight of drum and cable	kg		
24	Overall dimentions of cable drum :			
24.1	a) Overall width	mm		
24.2	b) Overall diameter	mm		
25	Conductor DC resistance at 20°C per 1000	ohms		
26	Capacitance core to sheath per 1000 m	micro-farad		
27	Positive - negative sequence shunt capacitive reactance at 50 Hz per 1000 m	ohms		

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ITEM	DESCRIPTION	UNIT	REQUIREMENT	OFFERED
28	Zero sequence series reactance at 50Hz per 1000 m *	ohms		
29	Zero sequence series resistance per 1000 m *	ohms		
30	Zero sequence shunt capacitive reactance at 40Hz per 1000 m	ohms		
31	Manufacturer			
31.1	Type and model			
31.2	County of origin			
	* In the case of item 28 and 29, the reactance and resistance shall be based on all return current in the sheath and none in the ground. Assume trefoil formation.			

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## SECTION 5: PARTICULARS & GUARRANTEES

### PART 2.2: MULTI-CORE CABLES

SPEC NO:

ITEM	DESCRIPTION	UNIT	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
	<b>600 V PVC-SWA PVC, Multi-Core Control Cable</b>							
1	Total length of cable	m						
2	Number of cores							
3	Cross-sectional area/core	sq mm						
4	Number of strands per core							
5	Diameter of each strand	mm						
6	Conductor material							
7	Type of insulation							
8	Radial thickness of conductor insulation							
9	Minimum average	mm						
10	Minimum	mm						
11	Maximum conductor resistance at 20°C	ohm/km						
12	Guaranteed minimum insulation resistance at 20°C in Megohm/km							
13	Diameter over laid-up cores	mm						
14	Radial thickness of sheath:							
14	Minimum average	mm						
14	Minimum	mm						
15	Nominal diameter over sheath	mm						
16	Sheath material							
17	Number of armour wires							
18	Diameter of size of armour wires							
19	Nominal diameter over armour	mm						
20	Serving material							

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ITEM	DESCRIPTION	UNIT	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
21	Radial thickness of serving:							
21	Minimum average	mm						
21	Minimum	mm						
22	Nominal outside diameter	mm						
23	Mass of completed cable per 100 m							
24	Mass of copper per 100 m							
25	Gross weight of cable and drum							
26	Cable length on drum							
27	Place of manufacture							
28	Make or trade-mark							
29	Full details of core identification							

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**SECTION 5: PARTICULARS & GUARRANTEES****PART 2.3: MV CABLES & TERMINATIONS****SPEC NO:**

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
	<b>Medium Voltage Cable Sealing Ends and 11 and 33kV Cables</b>			
<b>1</b>	<b>INDOOR CABLE SEALING ENDS</b>			
<b>1,1</b>	<b>Pluggable sealing ends for 33 kV</b>			
1.1.01	Manufacturer			
1.1.02	Country of manufacture			
1.1.03	Type and model			
1.1.04	Nominal current carrying capacity	amps		
1.1.05	Nominal operating voltage	kV	33	
1.1.06	BIL	kV		
1.1.07	Short circuit withstand current	kA for 1s		
1.1.08	Peak short circuit withstand current	kA		
1.1.09	Maximum cable size	sq mm		
1.1.10	Overall dimensions of sealing end	mm		
1.1.11	Material and construction of sealing			
1.1.12	Descriptive literature detailing method of making off sealing ends			
1.1.13	Drawing number			
1.1.14	Can fixed part of sealing end (circuit breaker side) be energised without cable sealing end being inserted into switchgear?			
<b>1,2</b>	<b>Indoor 11 kV cable sealing ends</b>			
1.2.01	Manufacturer			
1.2.02	Country of manufacture			
1.2.03	Type and model			
1.2.04	Nominal current carrying capacity	amps		
1.2.05	Nominal operating voltage	kV	11	
1.2.06	BIL	kV		
1.2.07	Short circuit withstand current	kA for 1s		
1.2.08	Peak short circuit withstand current	kA		
1.2.09	Maximum cable size	sq mm		
1.2.10	Overall dimensions of sealing end	mm		
1.2.11	Material and construction of sealing			
1.2.12	Descriptive literature detailing method of making off sealing ends			

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
1.2.13	Drawing number			
<b>2</b>	<b>CABLES</b>			
<b>2,1</b>	<b>33kV CABLE</b>			
2.1.01	Manufacturer			
2.1.02	Country of manufacture			
2.1.03	Type			
2.1.04	Nominal current carrying capacity	amps		
2.1.05	Nominal operating voltage	kV	33	
2.1.06	BIL	kV		
2.1.07	Short circuit withstand current	kA for 1s		
2.1.08	Peak short circuit withstand current	kA		
2.1.09	Cable cross sectional area	sq mm		
2.1.1	Number of strands			
2.1.11	Overall dimensions	mm		
2.1.12	Material and construction of cable			
2.1.12.01	Material of conductor		Copper	
2.1.12.02	Insulation		XLPE	
2.1.12.03	Shield - Copper		Tape / stranded	
2.1.12.04	Outer sheath		PE	
2.1.12.05	Drawing number			
2.1.13	Descriptive literature of cable			
<b>2,2</b>	<b>11kV CABLE</b>			
2.2.01	Manufacturer			
2.2.02	Country of manufacture			
2.2.03	Type			
2.2.04	Nominal current carrying capacity	amps		
2.2.05	Nominal operating voltage	kV	11	
2.2.06	BIL	kV		
2.2.07	Short circuit withstand current	kA for 1s		
2.2.08	Peak short circuit withstand current	kA		
2.2.09	Cable cross sectional area	sq mm		
2.2.1	Number of strands			
2.2.11	Overall dimensions	mm		
2.2.12	Material and construction of cable			
2.2.12.01	Material of conductor		Copper	
2.2.12.02	Insulation		XLPE	
2.2.12.03	Shield - Copper		Tape / stranded	
2.2.12.04	Outer sheath		PE	
2.2.12.05	Drawing number			
2.2.13	Descriptive literature of cable			

## SECTION 5: PARTUCULARS & GUARRANTEES

### PART 3.1: EARTHING GRID

SPEC NO:

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
	<b>EARTHING GRID</b>			
<b>1</b>	<b>Earth resistance survey</b>			
1,1	Name of subcontractor for earth resistance survey			
1,2	Method proposed for measurement (Tenderer to			
1,3	Target resistance	ohm	1	
<b>2</b>	<b>Earth mat</b>			
2,1	Cross section of earth mat	sq	2 x Steel rods	
2,2	Material of earth mat		Steel rod Cu plated SABS1063&0199	
2,3	Drawing number of proposed earth mat			
<b>3</b>	<b>Earthing electrodes</b>			
3,1	Dimensions :			
3.1.1	diameter	mm	16mm dia	
3.1.2	area	sq. mm		
3.1.3	length	m		
3,2	Construction			
<b>4</b>	<b>Connections to equipment</b>			
4,1	Outdoor		exothermic welds	
4,2	Stainless steel type and cross		exothermic welds	
4,3	Stainless steel type and cross section - Complex runs, bends,		exothermic welds	
4.3.1	Indoor		exothermic welds	
4.3.2	Copper	sq	150	
<b>5</b>	<b>Method of connection and</b>			
5,1	Earth mat to earth electrode		exothermic welds	

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ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
5,2	Earth mat to copper earthing strap for indoor earthing		exothermic welds	
5,3	Earth mat to stainless steel strap for outdoor earthing		exothermic welds	
5,4	How electrolytic corrosion will be prevented		exothermic welds	
5,5	Stainless steel strap to outdoor equipment		exothermic welds	

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## SECTION 5: SCHEDULE OF PARTICULARS AND GUARANTEES

### PART 4.1: METAL-CLAD SWITCHGEAR

**SPECIFICATION No: PT.NRS 003-2: 1996 / SANS 1885: 2004 (Previous No: SG 20/01/98) / IEC 62271-100**

- 1 All Tenderers shall complete the following schedules in full. Failure to provide the required detailed information called for in the schedules may cause a tender to be disqualified.
- 2 All information provided by the Tenderer, or specified by the Council and not qualified by the Tenderer will be regarded as offered and guaranteed by the Tender.

#### A GENERAL REQUIREMENTS

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
<b>1</b>		<b>GENERAL</b>			
<b>1.1</b>	<b>4.2.1.3 a</b>	<b>Manufacturer of switchboard</b>		State	
1.1.1		Type		State	
1.1.2	<b>4.2.1.3 b</b>	Country of origin		State	
1.1.3	<b>4.2.1.3 c</b>	Catalogue/type designation		State	
1.1.4	<b>4.2.4.1</b>	Is installation and on site testing to be carried out by supplier		Yes	
1.1.5		Year of Manufacture			
<b>1.2</b>	<b>4.3.2.1.7</b>	<b>Busbar pattern</b>		Top and bottom preferred	
1.2.1		Type		Double Single	
1.2.2	<b>4.2.8.1</b>	What is the 11kV earth fault current:			
		Secondary substations feeding from NEC	A	350	
		Secondary substations feeding from NER	A	2000	
		Primary substations with NEC	A	350	
		Primary substations with NER	A	2000	
1.2.3		D.C Circuit protection		D.C.MCB's	
1.2.4	<b>4.17.2.1</b>	State requirements for main circuit designation labels		White traffolite with black letters	
1.2.5	<b>4.17.1.1</b>	State method used to attach labels		Mechanical (screws)	
1.2.6	<b>4.17.2.2</b>	Where are main circuit labels to be placed?		On the front and back of each switchgear panel	
<b>1.3</b>		<b>Dimensions Double bus:</b>			
1.3.1		Height (Top/Bottom double busbar)	mm	2 502	
1.3.2		Depth(Top/Bottom double busbar)	mm	2 433	
1.3.3		Width (400 A, 630 A & 800 A panel)	mm	600	
1.3.4		Width (2 500 A, 2 000 A & 1250 A panel)	mm	800	
<b>1.3</b>		<b>Dimensions Single bus:</b>			
1.3.1		Height	mm		
1.3.2		Depth	mm		
1.3.3		Width (400 A, 630 A & 800 A panel)	mm	600	
1.3.4		Width (2 500 A, 2 000 A & 1250 A panel)	mm	800	
<b>2</b>		<b>RATINGS</b>			
<b>2.1</b>	<b>4.16.2</b>	<b>Switchboard rating plate</b>		In compliance with SABS 1885 clause 4.16.2	
<b>2.2</b>		<b>Number of phases</b>	-	3	
<b>2.3</b>	<b>4.1.1.2</b>	<b>Frequency</b>	Hz	50	
2.3.1	<b>4.1.1.1.b</b>	Rated (Design) Voltage	kV	12	
2.3.2		Highest equipment voltage	kV	17,5	
2.3.3	<b>4.1.1.3</b>	Nominal Voltage	kV	11	
<b>2.4</b>		<b>Fault capacity:</b>			
2.4.1	<b>4.1.1.7</b>	Breaking capacity (350 MVA)	kA	31.5	
2.4.2	<b>4.1.1.8</b>	Making capacity	kA	50	
2.4.3	<b>4.1.1.5.2</b>	Through-fault rating for 3 seconds	kA	31.5	
2.4.4	<b>4.1.1.4.2</b>	Standard 1/50 micro second impulse rating at sea level	kV	95	
2.4.5		Corona extinction voltage:			
2.4.5.1		To earth	kV	8	
2.4.5.2		Between phases	kV	14	
<b>2.5</b>		<b>Internal Arc:</b>			
2.5.1		Internal arc protection system	Y/N	Yes	
2.5.2		Internal arc test IEC 62271-200			

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
		Classification	IAC	AFLR	
		Fault current	kA	31.5	
		Duration	s	1	
2.5.3		Ducting between switchgear and exterior of S/S	Y/N	Yes	
2.5.4		Number of external outlets required	each	6	
2.5.5		Total length of external ducting required (Distance between switchgear and exterior x outlets required)	Y/N each (m)		
2.6		Internal arc protection system	Y/N	Yes	
2.7		Arcing	State		
3		<b>BUSBARS</b>			
3.1		<b>Current rating:</b>			
3.1.1		132/11kV Substations with 20 MVA TRF and Secondary Subs	A	1200	
3.1.2		132/11kV Substations with 35 MVA TRF	A	2000	
3.1.3		132/11kV Substations with 40 MVA TRF	A	2500	
3.2	4.2.9.1	<b>Insulating medium</b>	-	Air / Epoxy	
3.3		<b>Dimensions of each busbar chamber:</b>			
3.3.1		Height	mm	533	
3.3.2		Depth	mm	466	
3.4		<b>Clear access to busbars by removal of cover plate only</b>	-	Yes	
3.5		<b>Dimensions of access opening</b>			
3.5.1		Width	mm	466	
3.5.2		Depth	mm	600	
4		<b>CIRCUIT-BREAKERS</b>			
4.1		<b>Relevant standard</b>	-		
4.1.1	4.16.3	Circuit-breaker rating plate		In compliance with SABS 1885 clause 4.16.3 / IEC 62271-100	
4.2	4.3.1.9.6	<b>Type</b>		XEM	
4.2.1	4.3.1.1.3	Interrupting medium vacuum or SF6	-	Vacuum preferred	
4.2.2	4.2.9.4	Is a device for monitoring the SF6 pressure required?		yes	
4.2.3	4.3.1.4.1	Are earthing facilities required for all main circuits?		Yes	
4.2.4	4.3.2.4.1	Details of earthing facilities offered		State	
4.2.4.1	4.4.1.4	Is an integral 3 pole earth switch on switch disconnector required		Yes	
4.2.4.2	4.5.1.4	Is an integral earthing facility on the circuit side of the switch disconnector required?		Yes	
4.2.4.3	4.4.1.5	Type of switch disconnector offered			
4.2.5	4.3.1.6.1	Are open/close switches for local electrical operation required?		Yes	
4.2.7	4.3.1.9.4	Supply voltage of spring charge motor	DC	110V	
4.2.7.1	4.3.1.9.6	Type of circuit breaker closing mechanism offered		State	
4.2.7.2		Peak power	kW	State	
4.2.7.3		Steady power	KW	State	
4.2.7.4	4.3.1.9.7	Current	A	State	
4.2.7.5		Voltage	V	State	
4.2.8	4.3.1.11.3	Number of contacts:			
4.2.8.1		a)SF6 Alarm		2b	
4.2.8.2		b)Lock- out SF6		2b	
4.2.8.3		c)Circuit-breaker auxiliary 'a'		6	
4.2.8.4		d)Circuit-breaker auxiliary 'b'		6	
4.2.8.5		e)Spring limit		2	
4.2.8.6		f)Circuit breaker earthed		2a and 2b	
4.2.8.7	4.3.1.11.5	Should the circuit breaker auxiliary contacts be wired to the multicore cable compartment behind the switchgear		Yes	
4.2.8.8	4.3.11.4	Number of spare contacts			
		-"a" contacts		2	
		-"b" contacts		2	
4.2.8.8	4.3.2.1.5	Circuit breaker details			
		a) manufacturer		State	
		b) country of origin		State	
		c) model/type designation		State	
		d) total mass		State	
		e) rating nameplate position		State	
4.2.8.9		Isolation displacement of circuit-breaker		Horizontal/ Vertical	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
4.2.9	4.3.2.4.1	Is three pole integral earthing on the circuit side required ?		Yes	
4.2.10		Maximum current from battery	A		
4.3		<b>Current rating</b>			
4.3.1		For TRF, bus coupler, bus section and interconnector panels for 40 MVA TRF in 132/11kV Substations	A	2500	
4.3.2	4.1.1.3	For TRF, bus coupler, bus section and interconnector panels for 35 MVA TRF in 132/11kV Substations	A	2000	
4.3.3		For TRF, bus coupler, bus section and interconnector panels for 20 MVA TRF in 132/11kV Substations	A	1250	
4.3.4		For bus coupler, bus section and interconnector panels for Secondary subs	A	1250	
4.3.5		Incomer Panels in Secondary subs	A	800	
4.3.6	4.1.1.3	Feeder Panels in Secondary subs	A	400	
4.3.7	4.1.1.3	Feeder Panels in Primary subs	A	800	
4.4		<b>Closing mechanism</b>	-		
4.4.1		Type		Motor wound spring preferred	
4.4.2	4.17.4	ON, OFF,EARTH and SERVICE position labels		Yes	
4.5		<b>Hand closing mechanism:</b>			
4.5.1		To be provided	-	Yes/No	
4.5.2		Is hand closing in 'service position' safe?	-	State	
4.5.3		Pattern	-	Trip free	
4.6	4.3.1.10	<b>Trip and closing coil voltage</b>	V	110 DC	
4.6.1		Trip operating voltage limit	V	60% of 110V DC	
4.6.2		Close operating limits	V	80% and 120% of 110V DC	
4.7		<b>Mass of Switchgear panels:</b>			
4.7.1	4.2.1.3.d	Total mass of each DBB incomer TRF, Bus coupler, and Bus section panel	kg	To be advised by tenderer	
4.7.2	4.2.1.3.e	Mass of each DBB incomer TRF, Bus coupler, and Bus section circuit breaker.	kg	To be advised by tenderer	
4.7.3	4.2.1.3.e	Total mass of each SBB incomer TRF, Bus section or RMU panel	kg	To be advised by tenderer	
4.7.4	4.2.1.3.e	Mass of each SBB incomer TRF, and Bus section or RMU circuit breaker.	kg	To be advised by tenderer	
4.7.5	4.2.1.3.e	Mass of switch disconnecting panel type SW11/SW12	kg	To be advised by tenderer	
4.8		<b>Maintenance:</b>			
4.8.1		Number of operations under normal load conditions between maintenance services on mechanism	-	>10 000	
4.8.2		Number of operations under rated fault conditions between maintenance services on mechanism	-	>100	
4.8.3		Number of operations under normal load conditions between maintenance services on circuit-breaker	-	1000/630A	
4.8.4		Number of operations under rated fault conditions between maintenance services on circuit-breaker	-	100/2 000A	
4.8.5		Is a circuit-breaker maintenance trolley required?		State	
5		<b>CABLE END BOXES</b>			
5.1	NRS 12	Clearance: Phase to phase	mm	120mm minimum	NRS 12
	NRS 12	Clearance: Phase to earth	mm	120mm minimum	NRS 008-1991
5.2		Type of cable end box		Air with heat shrink termination	
5.3		Number of glands :			
		a)transformer: For 1250A TRFP (20MVA)		6 per transf.	
		For 2000A TRFP (35MVA)		9 per transf.	
		For 2500A TRFP (40MVA)		12 per transf.	
		b)Feeders		1 per panel	
5.4		Types of glands		Swivel	
5.5		Type of cable termination required (NRS 0012)		Air, Heat shrink Bottom entry	
6		<b>SPRING WINDING MOTOR</b>			
6.1	4.3.1.9.4	Rated voltage	V	110V DC	
6.2	4.3.1.9.2	kW	kW	1.5	
6.3	4.3.1.9.4	Starting current	A	-T.B.A	
6.4	4.3.1.9.4	Running/Current	A	-T.B.A	
7		<b>PAINT FINISH</b>			
7.1		<b>Switchgear:</b>			
7.1.1		Exterior		Cloud grey (SABS 1091 Colour No F48)	
7.1.2		Interior		Cloud grey (SABS 1091 Colour No F48)	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
7.2		<b>Control Panels:</b>			
7.2.1		Exterior:		Cloud grey (SABS 1091 Colour No F48)	
7.2.2		Interior		Cloud grey (SABS 1091 Colour No F48)	
7.2.3		State special coating requirements		Powder coating	

## B SPECIFIC REQUIREMENTS

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
1		<b>11kV METAL-CLAD (MC) SWITCHGEAR (SG)</b>			
1.1		<b>11kV METAL-CLAD (MC) SWITCHGEAR (SG) IN 132/11kV SUBSTATIONS (PRIMARY SUBSTATIONS)</b>			
1.1.1		<b>Frame leakage scheme with wall mounted limited and free standing control panels</b>			
1.1.1.1		<b>Transformer (Incomer) Panel (TRFP)</b>			
1		Transformer Panels (TRFP)			
(a)		1250A Current rating		See: A General requirements	
(b)		2000A Current rating		See: A General requirements	
(c)		2500A Current rating		See: A General requirements	
1.1		<b>Protection for the TRFP:</b>			
1.1.1		Busbar protection Relay			
(a)		Integrated/stand-alone arc protection		unit protection	
		Arc sensors (fibre links must be monitored)		per compartment	
(b)		Over-current and earth fault relay (Only applicable for busbar blocking)		Yes	
(c)		Neutral relay (Only applicable for frame leakage)		state	
1.1.2		Power Quality Metering		Standard	
1.1.3		Current transformers:			
		Relevant standard:		IEC 61869-1:2023	
4.16.4		Current transformer rating plates			
4.16.1.1		State method used to attach rating plates			
4.8.1		Current transformers for restricted earth fault protection TRF panel:			
4.8.2		Number of cores		1 per phase	
4.8.3		Class	-	PX	
4.8.3		Ratios:			
		For 20MVA TRF		1200/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2500/1	
4.8.3		Knee-point voltage	V	> 350	
4.8.3		Excitation current at knee-point voltage	mA	Less than 15	
4.8.3		Resistance of secondary winding at 75 Ohm	Ohm	<9	
4.8.1		Current transformers for biased differential protection TRF panel:			
4.8.2		Number of cores		1 per phase	
4.8.3		Class	-	5P20	
4.8.3		Ratios:			
		For 20MVA TRF		1200/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2500/1	
4.8.3		Burden	VA	15	
4.8.3		Resistance of secondary winding at 75 Ohm	Ohm	8,4	
4.8.1		Current transformers for O/C and earth fault protection and indication TRF panels:			
4.8.2		Number of cores		1 per phase	
4.8.3		Class	-	5P20	
4.8.3		Ratios:			
		For 20MVA TRF		1200/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2500/1	
4.8.3		Burden	VA	15	
4.8.1		Current transformers for metering TRF panels:			
4.8.2		Number of cores		1 per phase	
4.8.11		Relevant standard		NRS 057-2	
4.8.11		Class: 10VA - 100VA	-	0,2	
4.8.11		Ratio:	-		
		For 20MVA TRF		1200/1	
		For 35MVA TRF		2000/1	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
		For 40MVA TRF		2500/1	
	4.8.11	Burden	VA	10	
		Saturation factor:			
		1200/1		state	
		2000/1		state	
		Current transformers for tapchanger blocking TRF panel. Yellow phase:			
	4.8.2	Number of cores		1 per phase	
	4.8.3	Class	-	10P10	
	4.8.3	Ratio:	-		
		For 20MVA TRF		1200/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2500/1	
	4.8.3	Burden	VA	5 - 10 VA	
1.1.4		Voltage Monitoring Relay			
(a)		Make		state	
(b)		DC undervoltage and overvoltage detection		Yes	
1.2		Control & Indication & Test:			
1.2.1		Voltage transformers:			
	4.9.2	Relevant standard	-	IEC 61869-1:2023	
	4.9.3 a	One or three phase		Three phase	
	4.9.3 b	Ratio	V	11000/110	
		<b>Winding 1 (Metering)</b>			
	4.9.3 c	Accuracy class 10VA – 200VA	-	0,2	
	4.9.3 d	Rated burden per phase	VA	200	
	4.9.3 e	Voltage factor		1,2	
		<b>Winding 2 (Protection)</b>			
	4.9.3 c	Accuracy class 10VA – 200VA	-	3P	
	4.9.3 d	Rated burden per phase	VA	200	
	4.9.3 e	Voltage factor		1,9	
	4.9.3 g	3 or 5 limb		5 Limb or 3 x single phase	
	4.9.3 h	Primary connection at primary or circuit side?		Circuit side	
	4.9.5	Insulating medium	-	Epoxy resin	
	4.9.10	Required location of fuses		On VT	
	4.9.7	Is removal of VT possible without affecting associated circuit required?		State	
	4.9.8	Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
	4.9.11	Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
	4.9.14	Must the White phase on 3 limb VT be brought out and earthed through a solid link?		Yes	
	4.9.13	Internal VT connection?		Star/Star	
	4.14.4.6	Detail of voltmeter selector switches offered		State	
	4.12.2.3	Voltage dividers:			
	4.12.2.3	Make		State	
	4.12.2.3	type		State	
	4.12.2.3	dielectric		State	
1.2.2		Supervisory and Indication equipment:			
	4.13	Alarm circuits		As detailed on drawings	
	4.14.1	Auxiliary protection and alarm circuits		As detailed on drawings	
		Type supervisory Relay:	-		
	4.14.5.1	Voltage rating (contacts)	V	110 DC	
	4.14.5.1	Voltage rating (coil)	V	24 DC	
	4.14.5.1	Contact current rating	A	10	
	4.14.5.1	Contacts	-	2 NO; 2 NC	
		Quantity required:			
	4.14.5.1	Per Type TRF Panel	-	2	
	4.11	Transducers:			
	4.11.1.1	Voltage transducer rating	-	0-110V/ 0-5mA	
		Quantity required	-	1 per TRF panel	
	4.11.1.1	Current transducer rating	-	0-1A / 0- 5mA	
		Quantity required		1 per TRF panel	
	4.11.1.1	Active Power (P) output	mA	+5 mA	
		Reactive Power (Q) output	mA	-5mA - 0 + 5 mA	
	4.11.1.1	Interposing CT:			
		Quantity required: Yellow phase		1 per TRF panel	
	4.11.1.1	Class		10VA Class 1	
	4.11.1.1	Ratio		1/1	
1.2.3		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required (metering)		C & H preferred 13 way test block	
		Type of test block required (protection)		PK2 4 way test block	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
	4.11.2	Ammeter full scale length	mm	125 if not integral part of relay or 90° deflection to approval of engineer	
		Ammeters to indicate phase colours, red, white and blue	3	Yes	
	4.11.2.4 4.11.2.5 and 4.11.2.6	Are ammeters with thermal maximum demand indicators required?	3	Yes if 90° deflection ammeters are offered.	
	4.11.2.8 and 4.11.2.9	Are additional ammeter scales required ?	3	Yes if scales are not reversible then one scale per phase for each ratio.	
		Whether ammeters comply fully with the provisions of Clause 19.3 of the tender document	-	State/NA	
	4.11.3	Voltmeter scale length	mm	125	
	4.11.3.2	Voltmeter scale range	%	Zero to 120%	
	4.11.3.3	Nominal voltage marked in red on scale		Yes	
1.2.4		Switch lead (Chicken lead) required?	yes	state	
2		<u>Limited control panels:</u>			
2,1		<u>Overall dimensions of control panel per 3 (three) circuits</u>		250 x 600mm or 670 x 960mm preferred	
2,2		<u>Items required per control panel:</u>			
		a) Trip, close and neutral switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Ammeters		3	
		e) Local/Supv.switch		1	
	4.12.2	f) Cable alive lamps:			
	4.12.2.1	What type of live circuit indication of the circuit side is required?		IEC 61243-5	
	4.12.2.1	Make		State	
	4.12.2.2	Are suitable shunt resistors required?		Yes	
	4.12.3.1	Are circuit breaker open/close indication lamps required?		Yes	
	4.12.3.3	What colour signal indications are required?		Closed/red and open/green	
3		<u>Free standing control panels:</u>			
3,1		<u>Overall dimensions of control panel per 3 (three) circuits</u>			
3,2		<u>Items required per control panel:</u>			
		a) Trip, close and neutral switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Ammeters		3	
		e) Voltmeter		1	
		f) Local/Supv.switch		1	
	4.12.2	g) Cable alive lamps:			
	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
	4.12.2.1	On which panels are live circuit indication required?		Switchgear panels	
	4.12.2.1	Make		State	
	4.12.2.2	Are suitable shunt resistors required?		Yes	
	4.12.3.1	Are circuit breaker open/close indication lamps required?		Yes	
	4.12.3.3	What colour signal indications are required?		Closed/red and open/green	
4		<u>Operating &amp; Maintenance Manuals (O&amp;M M)</u>			
1.1.1.2		<b>Main Feeder Panel (MFP)</b>			
1		<b>Main Feeder Panels (MFP)</b>			
(a)		800A Current rating: 1250A BB rating		<b>See: A General requirements</b>	
(b)		800A Current rating: 2000A BB rating		<b>See: A General requirements</b>	
(c)		800A Current rating: 2500A BB rating		<b>See: A General requirements</b>	
1,1		<b>Protection for the MFP:</b>			
1.1.1		<b>Relay:</b>			
(a)		Differential current protection:			
1		Differential current protection:	state		

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
2		Solcor relay	state		
3		Differential current protection (RS 485)			
(b)		Over-current & earth fault relay:			
1		Static	state		
2		Numeric	state		
1.1.2		Current Transformers:			
		Relevant standard:		IEC 61869-1:2023	
4.16.4		Current transformer rating plates			
4.16.1.1		State method used to attach rating plates			
4.8.1		Current transformers for Translay/Differential protection on MF panels:			
4.8.2		Number of cores per phase		1	
4.8.3		Class		PX	
4.8.3		Ratios:		800/400/1	
4.8.3		Knee-point voltage	V	>300	
4.8.3		Maximum excitation current at 10/i + i * (Rct + 2Rw) volt	mA	16	
4.8.3		Excitation current at knee-point voltage	mA	<30	
4.8.3		Resistance of secondary winding at 75 C	Ohm	<2	
4.8.1		Current transformers Protection and Indication for MF panels			
4.8.2		Number of cores		1 per phase	
4.8.3		O/C, E/F, IDMT and INST O/C:			
4.8.3		Class	-	5P20	
4.8.3		Ratios:	-	800/400/1	
4.8.3		Burden	VA	15	
		Current transformers Metering and Indication for MF panels			
		Number of cores		1 per phase	
		Class	-	0,5	
		Ratios:	-	800/400/1	
		Burden	VA	10	
1.2		Control & Indication & Test:			
1.2.1		Supervisory and Indication equipment:			
4.13		Alarm circuits		As detailed on drawings	
4.14.1		Auxiliary protection and alarm circuits		As detailed on drawings	
		Type supervisory Relay:	-		
4.14.5.1		Voltage rating (contacts)	V	110 DC	
4.14.5.1		Voltage rating (coil)	V	24 DC	
4.14.5.1		Contact current rating	A	10	
4.14.5.1		Contacts	-	2 NO; 2 NC	
		Quantity required:			
4.14.5.1		Per Type MF Panel	-	2	
4.11		Transducers:			
4.11.1.1		Current transducer rating	-	0-1A / 0- 5mA 0-5A / 0- 5mA	
		Quantity required		1 per MF panel	
4.11.1.1		Active Power (P) output	mA	+5 mA	
		Reactive Power (Q) output	mA	-5mA - 0 + 5 mA	
4.11.1.1		Interposing CT:			
		Quantity required: Yellow phase		1 per MF panel	
4.11.1.1		Class		10VA Class 1	
4.11.1.1		Ratio		1/1	
				5/5	
1.2.2		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required			
		Protection		PK2 test block preferred	
		Metering		C & H 13 way preferred	
4.11.2		Ammeter full scale length	mm	125 if not integral part of relay or 90° deflection to approval of engineer	
		Ammeters to indicate phase colours, red, white and blue	3	Yes	
4.11.2.4 4.11.2.5 and 4.11.2.6		Are ammeters with thermal maximum demand indicators required?	3	Yes if 90° deflection ammeters are offered.	
4.11.2.8 and 4.11.2.9		Are additional ammeter scales required ?	3	Yes if scales are not reversible then one scale per phase for each ratio.	
		Whether ammeters comply fully with the provisions of Clause 19.3 of the tender document	-	State/NA	
1.2.3		Switch lead (Chicken lead) required?	yes	state	
2		Limited control panels:			

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
2,1		Overall dimensions of control panel per 3 (three) circuits		250 x 600mm or 670 x 960mm preferred	
2,2		Items required per control panel:			
		a) Trip, close and neutral switch	1		
		b) Mimic diagram and system of indication lights with test and select indication	1		
		c) Designation label	1		
		d) Ammeters	3		
		e) Local/Supv.switch	1		
4.12.2		f) Cable alive lamps:			
4.12.2.1		What type of live circuit indication of the circuit side is required?		Neon lamps	
4.12.2.1		Make		State	
4.12.2.2		Are suitable shunt resistors required?		Yes	
4.12.3.1		Are circuit breaker open/close indication lamps required?		Yes	
4.12.3.3		What colour signal indications are required?		Closed/red and open/green	
		Interlocked with cable earthswitch		Yes	
3		Free standing control panels:			
3,1		Overall dimensions of control panel per 3 (three) circuits			
3,2		Items required per control panel:			
		a) Trip, close and neutral switch	1		
		b) Mimic diagram and system of indication lights with test and select indication	1		
		c) Designation label	1		
		d) Ammeters	3		
		e) Local/Supv.switch	1		
4.12.2		f) Cable alive lamps:			
4.12.2.1		What type of live circuit indication of the circuit side is required?		Neon lamps	
4.12.2.1		On which panels are live circuit indication required?		Switchgear panels	
4.12.2.1		Make		State	
4.12.2.2		Are suitable shunt resistors required?		Yes	
4.12.3.1		Are circuit breaker open/close indication lamps required?		Yes	
4.12.3.3		What colour signal indications are required?		Closed/red and open/green	
4		Operating & Maintenance Manuals (O&M M)			
1.1.1.3		Bus Coupler Panel (BCP)			
1		Bus Coupler Panel (BCP)			
(a)		1250A Current rating		See: A General requirements	
(b)		2000A Current rating		See: A General requirements	
(c)		2500A Current rating		See: A General requirements	
1,1		Protection for the BCP:			
1.1.1		Relay			
(a)		Frame leakage relay	state		
(b)		Frame leakage repeat relay	state		
(c)		VT selection relay	state		
(d)		Over-current and earth fault relay (Only applicable for busbar blocking)	state		
1.1.2		Current transformer			
		Relevant standard:			
4.16.4		Current transformer rating plates			
4.16.1.1		State method used to attach rating plates			
4.8.1		Current transformers for frame leakage in BC panel			
4.8.2		Number of cores	1		
4.8.3		Class	-	5P10	
4.8.3		Ratios:	-	200/5	
4.8.3		Burden	VA	5	
		Current transformers for O/C and earth fault protection and indication BC panels:			
		Number of cores	1 per phase		
		Class	-	5P20	
		Ratios:	-		
		For 20MVA TRF		1200/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2500/1	



ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
		Burden	VA	15	
1,2		Control & Indication & Test:			
1.2.1		Instruments and Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required			
		Protection		PK2 test block preferred	
		Metering		C & H 13 way preferred	
		Supervisory and Indication equipment:			
4,13		Alarm circuits		As detailed on drawings	
4.14.1		Auxiliary protection and alarm circuits		As detailed on drawings	
		Type (latch and release) supervisory Relay:	-	Telemecanique	
4.14.5.1		Voltage rating (contacts)	V	110 DC	
4.14.5.1		Voltage rating (coil)	V	24 DC	
4.14.5.1		Contact current rating	A	10	
4.14.5.1		Contacts	-	6 NO; 2 NC	
		Quantity required:			
4.14.5.1		Per Type BC Panel	-	4	
		Auto changeover timer	state		
1.2.2		Switch lead (Chicken lead) required?	yes	state	
2		Limited control panels:			
2,1		Overall dimensions of control panel per 3 (three) circuits		250 x 600mm or 670 x 960mm preferred	
2,2		Items required per control panel:			
		a) Trip, close and neutral switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Local/Supv.switch		1	
3		Free standing control panels:			
3,1		Overall dimensions of control panel per 3 (three) circuits			
3,2		Items required per control panel:			
		a) Trip, close and neutral switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Local/Supv.switch		1	
4.12.2		e) Cable alive lamps:			
4.12.3.1		Are circuit breaker open/close indication lamps required?		Yes	
4.12.3.3		What colour signal indications are required?		Closed/red and open/green	
4		Operating & Maintenance Manuals (O&M M)			
1.1.1.4		Bus Section/Interconnector Panel (BSP)			
1		Bus Section Panel (BSP)			
(a)		1250A Current rating		See: A General requirements	
(b)		2000A Current rating		See: A General requirements	
(c)		2500A Current rating		See: A General requirements	
1,1		Protection for the BSP:			
1.1.1		Relay			
(a)		Over-current and earth fault (Only applicable for busbar blocking)	state		
(b)		Differential current protection (fibre optic 13nm single mode)	state		
1.1.2		Current Transformers:			
		Relevant standard:		IEC 61869-1:2023	
		Current transformer rating plates			
		State method used to attach rating plates			
		Current transformers for O/C and earth fault in BS panel			
		Number of cores		1 per phase	
		Class	-	5P20	
		Ratios:	-		
		For 20MVA TRF		1200/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2500/1	
		Burden	VA	15	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
		Current transformers for Differential protection in BS panels:			
		Number of cores		1 per phase	
		Class	-	PX	
		Ratios:	-		
		For 20MVA TRF		1200/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2500/1	
		Knee-point voltage	V	>300	
		Excitation current at knee-point voltage	mA	<30	
		Resistance of secondary winding at 75 C	Ohm	<2	
1.2		<b>Control &amp; Indication &amp; Test:</b>			
		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
1.2.1		Supervisory and Indication equipment:			
	4.13	Alarm circuits		As detailed on drawings	
	4.14.1	Auxiliary protection and alarm circuits		As detailed on drawings	
		Type supervisory Relay:	-		
	4.14.5.1	Voltage rating (contacts)	V	110 DC	
	4.14.5.1	Voltage rating (coil)	V	24 DC	
	4.14.5.1	Contact current rating	A	10	
	4.14.5.1	Contacts	-	2 NO; 2 NC	
		Quantity required:			
	4.14.5.1	Per Type BS Panel	-	4	
1.2.2		Switch lead (Chicken lead) required?	yes	state	
2		<b>Limited control panels:</b>			
	2.1	Overall dimensions of control panel per 3 (three) circuits		250 x 600mm or 670 x 960mm preferred	
	2.2	Items required per control panel:			
		a) Trip, close and neutral switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Local/Supv.switch		1	
3		<b>Free standing control panels:</b>			
	3.1	Overall dimensions of control panel per 3 (three) circuits			
	3.2	Items required per control panel:			
		a) Trip, close and neutral switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Local/Supv.switch		1	
	4.12.2	e) Cable alive lamps:			
	4.12.3.1	Are circuit breaker open/close indication lamps required?		Yes	
	4.12.3.3	What colour signal indications are required?		Closed/red and open/green	
4		<b>Operating &amp; Maintenance Manuals (O&amp;M M)</b>			
1.1.2		<b>Frame leakage scheme</b>			
1.1.2.1		<b>Transformer (Incommer) Panel (TRFP)</b>			
	1	Transformer Panels (TRFP)			
	(a)	1250A Current rating		See: A General requirements	
	(b)	2000A Current rating		See: A General requirements	
1.1		Protection for the TRFP:			
	1.1.1	Relay			
	(a)	Bus-zone relay type		state	
	(b)	Neutral relay type		state	
1.1.2		Current transformers:			
		Relevant standard:			
	4.16.4	Current transformer rating plates			
	4.16.1.1	State method used to attach rating plates			
	4.8.5	Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
	4.8.1	Current transformers for restricted earth fault protection TRF panel:			
	4.8.2	Number of cores		1 per phase	
	4.8.3	Class	-	X	
	4.8.3	Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
	4.8.3	Knee-point voltage	V	> 350	
	4.8.3	Excitation current at knee-point voltage	mA	Less than 15	
	4.8.3	Resistance of secondary winding at 75 Ohm	Ohm	8,4	
	4.8.1	Current transformers for biased differential protection TRF panel:			
	4.8.2	Number of cores		1 per phase	
	4.8.3	Class	-	X	
	4.8.3	Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
	4.8.3	Knee-point voltage	V	> 350	
	4.8.3	Excitation current at knee-point voltage	mA	Less than 15	
	4.8.3	Resistance of secondary winding at 75 Ohm	Ohm	8,4	
	4.8.1	Current transformers for O/C and earth fault protection and indication TRF panels:			
	4.8.2	Number of cores		1 per phase	
	4.8.3	Class	-	10P10	
	4.8.3	Ratios:	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
	4.8.3	Burden	VA	15	
	4.8.1	Current transformers for metering TRFpanels. Red and blue phase:			
	4.8.2	Number of cores		1 per phase	
	4.8.11	Relevant standard		NRS 057-2	
	4.8.11	Class <10VA	-	0,5	
	4.8.11	Class 10VA – 100VA		0,2	
	4.8.11	Ratio:	-		
		For 20MVA TRF		1250/5	
		For 35MVA TRF		2000/5	
	4.8.11	Burden	VA	10	
		Saturation factor:			
		1250/5		state	
		2000/5		state	
		Current transformers for tapchanger blocking TRF panel. Yellow phase:			
	4.8.2	Number of cores		1 per phase	
	4.8.3	Class	-	10P10	
	4.8.3	Ratio:	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
	4.8.3	Burden	VA	5 - 10 VA	
1.2		Control & Indication & Test:			
1.2.1		Voltage transformers:			
	4.9.2	Relevant standard	-	NRS 057-2	SABS
	4.9.3 a	One or three phase		Three phase	
	4.9.3 b	Ratio	V	11000/110	
	4.9.3 c	Accuracy class 10VA – 200VA	-	0,2	
	4.9.3 c	Accuracy class <10VA		0,5	
	4.9.3 d	Rated burden per phase	VA	200	
	4.9.3 e	Voltage factor		1,2	
	4.9.3 g	3 or 5 limb		5 Limb	
	4.9.3 h	Primary connection at primary or circuit side?		Circuit side	
	4.9.5	Insulating medium	-	Epoxy resin	
	4.9.10	Required location of fuses		On VT	
	4.9.7	Is removal of VT possible without affecting associated circuit required?		State	
	4.9.8	Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
	4.9.11	Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
	4.9.14	Must the White phase on 3 limb VT be brought out and earthed through a solid link?		Yes	
	4.9.13	Internal VT connection?		Star/Star	
	4.14.4.6	Detail of voltmeter selector switches offered		State	
	4.12.2.3	Voltage dividers:			
	4.12.2.3	Make		State	
	4.12.2.3	type		State	
	4.12.2.3	dielectric		State	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
1.2.2		Supervisory and Indication equipment:			
	4.13	Alarm circuits		As detailed on drawings	
	4.14.1	Auxiliary protection and alarm circuits		As detailed on drawings	
		Type supervisory Relay:	-		
	4.14.5.1	Voltage rating (contacts)	V	110 DC	
	4.14.5.1	Voltage rating (coil)	V	24 DC	
	4.14.5.1	Contact current rating	A	10	
	4.14.5.1	Contacts	-	2 NO; 2 NC	
		Quantity required:			
	4.14.5.1	Per Type TRF Panel	-	2	
	4.11	Transducers:			
	4.11.1.1	Voltage transducer rating	-	0-110V/ 0-5mA	
		Quantity required	-	1 per TRF panel	
	4.11.1.1	Current transducer rating	-	0-1A / 0- 5mA	
		Quantity required		1 per TRF panel	
	4.11.1.1	Active Power (P) output	mA	+5 mA	
		Reactive Power (Q) output	mA	-5mA - 0 + 5 mA	
	4.11.1.1	Interposing CT:			
		Quantity required: Yellow phase		1 per TRF panel	
	4.11.1.1	Class		10VA Class 1	
	4.11.1.1	Ratio		1/1	
1.2.3		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H preferred 13 way test block	
	4.11.2	Ammeter full scale length	mm	125 if not integral part of relay or 90° deflection to approval of engineer	
		Ammeters to indicate phase colours, red, white and blue	3	Yes	
	4.11.2.4 4.11.2.5 and 4.11.2.6	Are ammeters with thermal maximum demand indicators required?	3	Yes if 90° deflection ammeters are offered.	
	4.11.2.8 and 4.11.2.9	Are additional ammeter scales required ?	3	Yes if scales are not reversible then one scale per phase for each ratio.	
		Whether ammeters comply fully with the provisions of Clause 19.3 of the tender document	-	State/NA	
	4.11.3	Voltmeter scale length	mm	125	
	4.11.3.2	Voltmeter scale range	%	Zero to 120%	
	4.11.3.3	Nominal voltage marked in red on scale		Yes	
1.2.4		Control:			
		Switch lead (Chicken lead) required?	yes	state	
		Trip, close and neutral switch		1	
		Local/Supv.switch		1	
	4.12.2	Cable alive lamps:			
	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
	4.12.2.1	Make		State	
	4.12.2.2	Are suitable shunt resistors required?		Yes	
2		Operating & Maintenance Manuals (O&M M)			
1.1.2.2		Main Feeder Panel (MFP)			
1		Main Feeder Panels (MFP)			
(a)		800A Current rating: 1250A BB rating		See: A General requirements	
(b)		800A Current rating: 2000A BB rating		See: A General requirements	
1.1		Protection for the MFP:			
1.1.1		Relay:			
(a)		Differential current protection:			
1		Translay relay	state		
2		Solcor relay	state		
(b)		Over-current & earth fault relay:			
1		Static	state		
2		Numeric	state		
1.1.2		Current Transformers:			
		Relevant standard:			
	4.16.4	Current transformer rating plates			
	4.16.1.1	State method used to attach rating plates			
	4.8.5	Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
	4.8.1	Current transformers for Translay protection on MF panels:			
	4.8.2	Number of cores per phase		1	
	4.8.3	Class		X	
	4.8.3	Ratios:		400/300/1	
				400/300/5	
	4.8.3	Knee-point voltage	V	76	
	4.8.3	Maximum excitation current at $10/i + i * (R_{ct} + 2R_w)$ volt	mA	16	
	4.8.3	Excitation current at knee-point voltage	mA	50	
	4.8.3	Resistance of secondary winding at 75 C	Ohm	0,16	
	4.8.1	Current transformers Protection and Indication for MF panels			
	4.8.2	Number of cores		1 per phase	
	4.8.3	O/C, E/F, IDMT and INST O/C:			
	4.8.3	Class	-	10P10	
	4.8.3	Ratios:	-	400/300/1	
				400/300/5	
	4.8.3	Burden	VA	15	
1.2		Control & Indication & Test:			
1.2.1		Supervisory and Indication equipment:			
	4.13	Alarm circuits		As detailed on drawings	
	4.14.1	Auxiliary protection and alarm circuits		As detailed on drawings	
		Type supervisory Relay:	-		
	4.14.5.1	Voltage rating (contacts)	V	110 DC	
	4.14.5.1	Voltage rating (coil)	V	24 DC	
	4.14.5.1	Contact current rating	A	10	
	4.14.5.1	Contacts	-	2 NO; 2 NC	
		Quantity required:			
	4.14.5.1	Per Type MF Panel	-	2	
	4.11	Transducers:			
	4.11.1.1	Current transducer rating	-	0-1A / 0- 5mA	
				0-5A / 0- 5mA	
		Quantity required		1 per MF panel	
	4.11.1.1	Active Power (P) output	mA	+5 mA	
		Reactive Power (Q) output	mA	-5mA - 0 + 5 mA	
	4.11.1.1	Interposing CT:			
		Quantity required: Yellow phase		1 per MF panel	
	4.11.1.1	Class		10VA Class 1	
	4.11.1.1	Ratio		1/1	
				5/5	
1.2.2		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
	4.11.2	Ammeter full scale length	mm	125 if not integral part of relay or 90° deflection to approval of engineer	
		Ammeters to indicate phase colours, red, white and blue	3	Yes	
	4.11.2.4 4.11.2.5 and 4.11.2.6	Are ammeters with thermal maximum demand indicators required?	3	Yes if 90° deflection ammeters are offered.	
	4.11.2.8 and 4.11.2.9	Are additional ammeter scales required ?	3	Yes if scales are not reversible then one scale per phase for each ratio.	
		Whether ammeters comply fully with the provisions of Clause 19.3 of the tender document	-	State/NA	
1.2.3		Control:			
		Switch lead (Chicken lead) required?	yes	state	
		Trip, close and neutral switch		1	
		Local/Supv.switch		1	
	4.12.2	Cable alive lamps:			
	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
	4.12.2.1	Make		State	
	4.12.2.2	Are suitable shunt resistors required?		Yes	
2		Operating & Maintenance Manuals (O&M M)			
1.1.2.3		Bus Coupler Panel (BCP)			
1		Bus Coupler Panel (BCP)			
(a)		1250A Current rating		See: A General requirements	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
(b)		2000A Current rating		See: A General requirements	
1.1		Protection for the BCP:			
1.1.1		Relay			
(a)		Frame leakage relay	state		
(b)		Frame leakage repeat relay	state		
(c)		VT selection relay	state		
1.1.2		Current transformer			
		Relevant standard:			
4.16.4		Current transformer rating plates			
4.16.1.1		State method used to attach rating plates			
4.8.5		Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	
4.8.1		Current transformers for frame leakage in BC panel			
4.8.2		Number of cores		1	
4.8.3		Class	-	5P10	
4.8.3		Ratios:	-	200/5	
4.8.3		Burden	VA	5	
1.2		Control & Indication & Test:			
1.2.1		Supervisory and Indication equipment:			
4.13		Alarm circuits		As detailed on drawings	
4.14.1		Auxiliary protection and alarm circuits		As detailed on drawings	
		Type (latch and release) supervisory Relay:	-	Telemecanique	
4.14.5.1		Voltage rating (contacts)	V	110 DC	
4.14.5.1		Voltage rating (coil)	V	24 DC	
4.14.5.1		Contact current rating	A	10	
4.14.5.1		Contacts	-	6 NO; 2 NC	
		Quantity required:			
4.14.5.1		Per Type BC Panel	-	4	
		Auto changeover timer	state		
1.2.3		Control:			
		Switch lead (Chicken lead) required?	yes	state	
		Trip, close and neutral switch		1	
		Local/Supv.switch		1	
2		Operating & Maintenance Manuals (O&M M)			
1.1.2.4		Bus Section Panel (BSP)			
1		Bus Section Panel (BSP)			
(a)		1250A Current rating		See: A General requirements	
(b)		2000A Current rating		See: A General requirements	
1.1		Protection for the BSP:			
		None			
1.2		Control & Indication & Test:			
1.2.1		Supervisory and Indication equipment:			
4.13		Alarm circuits		As detailed on drawings	
4.14.1		Auxiliary protection and alarm circuits		As detailed on drawings	
		Type supervisory Relay:	-		
4.14.5.1		Voltage rating (contacts)	V	110 DC	
4.14.5.1		Voltage rating (coil)	V	24 DC	
4.14.5.1		Contact current rating	A	10	
4.14.5.1		Contacts	-	2 NO; 2 NC	
		Quantity required:			
4.14.5.1		Per Type BS Panel	-	4	
1.2.3		Control:			
		Switch lead (Chicken lead) required?	yes	state	
		Trip, close and neutral switch		1	
		Local/Supv.switch		1	
2		Operating & Maintenance Manuals (O&M M)			
1.1.3		Busbar Blocking scheme with ICAP			
1.1.3.1		Transformer (Incommer) Panel (TRFP)			
1		Transformer Panels (TRFP)			
(a)		1250A Current rating		See: A General requirements	
(b)		2000A Current rating		See: A General requirements	
(b)		2500A Current rating		See: A General requirements	
1.1		Protection for the TRFP:			

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
1.1.1		Relay			
(a)		Bus-zone relay type		state	
(b)		Over-current & earth fault relay:		state	
1.1.2		Current transformers:			
		Relevant standard:			
4.16.4		Current transformer rating plates			
4.16.1.1		State method used to attach rating plates			
4.8.5		Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	
4.8.1		Current transformers for restricted earth fault protection TRF panel:			
4.8.2		Number of cores		1 per phase	
4.8.3		Class	-	X	
4.8.3		Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2100/1	
4.8.3		Knee-point voltage	V	> 350	
4.8.3		Excitation current at knee-point voltage	mA	Less than 15	
4.8.3		Resistance of secondary winding at 75 Ohm	Ohm	8,4	
4.8.1		Current transformers for biased differential protection TRF panel:			
4.8.2		Number of cores		1 per phase	
4.8.3		Class	-	X	
4.8.3		Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2100/1	
4.8.3		Knee-point voltage	V	> 350	
4.8.3		Excitation current at knee-point voltage	mA	Less than 15	
4.8.3		Resistance of secondary winding at 75 Ohm	Ohm	8,4	
4.8.1		Current transformers for O/C and earth fault protection and indication TRF panels:			
4.8.2		Number of cores		1 per phase	
4.8.3		Class	-	10P10	
4.8.3		Ratios:	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2100/1	
4.8.3		Burden	VA	15	
4.8.1		Current transformers for metering TRFpanels. Red and blue phase:			
4.8.2		Number of cores		1 per phase	
4.8.11		Relevant standard		NRS 057-2	
4.8.11		Class <10VA	-	0,5	
4.8.11		Class 10VA – 100VA		0,2	
4.8.11		Ratio:	-		
		For 20MVA TRF		1250/5	
		For 35MVA TRF		2000/5	
		For 40MVA TRF		2100/5	
4.8.11		Burden	VA	10	
		Current transformers for tapchanger blocking TRF panel. Yellow phase:			
4.8.2		Number of cores		1 per phase	
4.8.3		Class	-	10P10	
4.8.3		Ratio:	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2100/1	
4.8.3		Burden	VA	5 - 10 VA	
1.2		Control & Indication & Test:			
1.2.1		Voltage transformers:			
4.9.2		Relevant standard	-	NRS 057-2	SABS
4.9.3 a		One or three phase		Three phase	
4.9.3 b		Ratio	V	11000/110	
4.9.3 c		Accuracy class 10VA – 200VA	-	0,2	
4.9.3 c		Accuracy class <10VA		0,5	
4.9.3 d		Rated burden per phase	VA	200	
4.9.3 e		Voltage factor		1,2	
4.9.3 g		3 or 5 limb		5 Limb	
4.9.3 h		Primary connection at primary or circuit side?		Circuit side	
4.9.5		Insulating medium	-	Epoxy resin	
4.9.10		Required location of fuses		On VT	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
	4.9.7	Is removal of VT possible without affecting associated circuit required?		State	
	4.9.8	Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
	4.9.11	Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
	4.9.14	Must the White phase on 3 limb VT be brought out and earthed through a solid link?		Yes	
	4.9.13	Internal VT connection?		Star/Star	
	4.14.4.6	Detail of voltmeter selector switches offered		State	
	4.12.2.3	Voltage dividers:			
	4.12.2.3	Make		State	
	4.12.2.3	type		State	
	4.12.2.3	dielectric		State	
1.2.2		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H preferred 13 way test block	
	4.12.2	Cable alive lamps:			
	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
	4.12.2.1	Make		State	
1.2.3		Control:			
		Trip, close and neutral switch		1	
		Local/Supv. switch		1	
		Switch lead (Chicken lead) required?	yes	state	
2		Operating & Maintenance Manuals (O&M M)			
1.1.3.2		<b>Main Feeder Panel (MFP)</b>			
1		<b>Main Feeder Panels (MFP)</b>			
(a)		800A Current rating: 1250A BB Rating		<b>See: A General requirements</b>	
(b)		800A Current rating: 2000A BB Rating		<b>See: A General requirements</b>	
(c)		800A Current rating: 2500A BB Rating		<b>See: A General requirements</b>	
1.1		<b>Protection for the MFP:</b>			
1.1.1		<b>Relay:</b>			
(a)		Differential current protection:			
1		Translay relay	state		
(b)		Over-current & earth fault relay:	state		
1.1.2		<b>Current Transformers:</b>			
		Relevant standard:			
4.16.4		Current transformer rating plates			
4.16.1.1		State method used to attach rating plates			
4.8.5		Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	
4.8.1		Current transformers for Translay protection on MF panels:			
4.8.2		Number of cores per phase		1	
4.8.3		Class		X	
4.8.3		Ratios:		400/300/1	
				400/300/5	
4.8.3		Knee-point voltage	V	76	
4.8.3		Maximum excitation current at $10/i + i * (R_{ct} + 2R_w)$ volt	mA	16	
4.8.3		Excitation current at knee-point voltage	mA	50	
4.8.3		Resistance of secondary winding at 75 C	Ohm	0,16	
4.8.1		Current transformers Protection and Indication for MF panels			
4.8.2		Number of cores		1 per phase	
4.8.3		O/C, E/F, IDMT and INST O/C:			
4.8.3		Class	-	10P10	
4.8.3		Ratios:	-	400/300/1	
				400/300/5	
4.8.3		Burden	VA	15	
1.2		<b>Control &amp; Indication &amp; Test:</b>			
1.2.1		<b>Instruments &amp; Test:</b>			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	



ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
	4.12.2	Cable alive lamps:			
	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
	4.12.2.1	Make		State	
1.2.3		Control:			
		Trip, close and neutral switch		1	
		Local/Supv.switch		1	
		Switch lead (Chicken lead) required?	yes	state	
2		Operating & Maintenance Manuals (O&M M)			
1.1.3.3		<b>Bus Coupler Panel (BCP)</b>			
1		Bus Coupler Panel (BCP)			
(a)		1250A Current rating		See: A General requirements	
(b)		2000A Current rating		See: A General requirements	
(c)		2500A Current rating		See: A General requirements	
1.1		Protection for the BCP:			
1.1.1		Relay			
(a)		Over-current & earth fault relay:	state		
(b)		VT selection relay	state		
1.1.2		Current Transformers:			
		Relevant standard:			
	4.16.4	Current transformer rating plates			
	4.16.1.1	State method used to attach rating plates			
	4.8.5	Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	
	4.8.1	Current transformers for O/C and earth fault protection and indication BC panels:			
	4.8.2	Number of cores		1 per phase	
	4.8.3	Class	-	10P10	
	4.8.3	Ratios:	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2100/1	
	4.8.3	Burden	VA	15	
1.2		Control & Indication & Test:			
1.2.1		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
1.2.3		Control:			
		Trip, close and neutral switch		1	
		Local/Supv.switch		1	
		Switch lead (Chicken lead) required?	yes	state	
2		Operating & Maintenance Manuals (O&M M)			
1.1.3.4		<b>Bus Section Panel (BSP)</b>			
1		Bus Section Panel (BSP)			
(a)		1250A Current rating		See: A General requirements	
(b)		2000A Current rating		See: A General requirements	
(c)		2500A Current rating		See: A General requirements	
1.1		Protection for the BSP:			
1.1.1		Relay			
(a)		Over-current & earth fault relay:	state		
1.1.2		Current Transformers:			
		Relevant standard:			
	4.16.4	Current transformer rating plates			
	4.16.1.1	State method used to attach rating plates			
	4.8.5	Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	
	4.8.1	Current transformers for O/C and earth fault protection and indication BS panels:			
	4.8.2	Number of cores		1 per phase	
	4.8.3	Class	-	10P10	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
	4.8.3	Ratios:	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
		For 40MVA TRF		2100/1	
	4.8.3	Burden	VA	15	
1.2		Control & Indication & Test:			
1.2.1		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
1.2.3		Control:			
		Trip, close and neutral switch		1	
		Local/Supv.switch		1	
		Switch lead (Chicken lead) required?	yes	state	
2		Operating & Maintenance Manuals (O&M M)			
1.2		<b>11kV METAL-CLAD (MC) SWITCHGEAR (SG) IN 11kV SUBSTATIONS (SECONDARY SUBSTATIONS)</b>			
1.2.1		<b>Busbar Blocking scheme with wall mounted limited control panels</b>			
1.2.1.1		<b>Main Feeder Panel (MFP)</b>			
1		Main Feeder Panels (MFP)			
(a)		400A Current rating: 1250A BB Rating		<b>See: A General requirements</b>	
1.1		Protection for the MFP:			
1.1.1		Relay:			
(a)		Differential current protection:			
1		Translay relay	state		
2		Solcor relay	state		
(b)		Over-current & earth fault relay:	state		
1.1.2		Current Transformers:			
		Relevant standard:			
4.16.4		Current transformer rating plates			
4.16.1.1		State method used to attach rating plates			
4.8.5		Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	
4.8.1		Current transformers for Translay protection on MF panels:			
4.8.2		Number of cores per phase		1	
4.8.3		Class		X	
4.8.3		Ratios:		400/300/5	
4.8.3		Knee-point voltage	V	76	
4.8.3		Maximum excitation current at $10/i + i * (R_{ct} + 2R_w)$ volt	mA	16	
4.8.3		Excitation current at knee-point voltage	mA	50	
4.8.3		Resistance of secondary winding at 75 C	Ohm	0,16	
4.8.1		Current transformers Protection and Indication for MF panels			
4.8.2		Number of cores		1 per phase	
4.8.3		O/C, E/F, IDMT and INST O/C:			
4.8.3		Class	-	10P10	
4.8.3		Ratios:	-	400/300/5	
4.8.3		Burden	VA	15	
1.2		Control & Indication & Test:			
1.2.1		Supervisory and Indication equipment:			
4.13		Alarm circuits		As detailed on drawings	
4.14.1		Auxiliary protection and alarm circuits		As detailed on drawings	
		Type supervisory Relay:	-		
4.14.5.1		Voltage rating (contacts)	V	110 DC	
4.14.5.1		Voltage rating (coil)	V	24 DC	
4.14.5.1		Contact current rating	A	10	
4.14.5.1		Contacts	-	2 NO; 2 NC	
		Quantity required:			
4.14.5.1		Per Type MF Panel	-	2	
4.11		Transducers:			
4.11.1.1		Current transducer rating	-	0-5A / 0- 20mA	
		Quantity required		1 per MF panel	
4.11.1.1		Active Power (P) output	mA	+20 mA	
		Reactive Power (Q) output	mA	-20mA - 0 + 20 mA	
4.11.1.1		Interposing CT:			

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
		Quantity required: Yellow phase		1 per MF panel	
	4.11.1.1	Class		10VA Class 1	
	4.11.1.1	Ratio		5/5	
1.2.2		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
	4.11.2	Ammeter full scale length	mm	125 if not integral part of relay or 90° deflection to approval of engineer	
		Ammeters to indicate phase colours, red, white and blue	3	Yes	
	4.11.2.4 4.11.2.5 and 4.11.2.6	Are ammeters with thermal maximum demand indicators required?	3	Yes if 90° deflection ammeters are offered.	
	4.11.2.8 and 4.11.2.9	Are additional ammeter scales required ?	3	Yes if scales are not reversible then one scale per phase for each ratio.	
		Whether ammeters comply fully with the provisions of Clause 19.3 of the tender document	-	State/NA	
1.2.3		Switch lead (Chicken lead) required?	yes	state	
1.2.4		Voltage transformers:			
	4.9.2	Relevant standard	-	NRS 057-2	SABS
	4.9.3 a	One or three phase		Three phase	
	4.9.3 b	Ratio	V	11000/110	
	4.9.3 c	Accuracy class 10VA – 200VA	-	0,2	
	4.9.3 c	Accuracy class <10VA		0,5	
	4.9.3 d	Rated burden per phase	VA	200	
	4.9.3 e	Voltage factor		1,2	
	4.9.3 g	3 or 5 limb		5 Limb	
	4.9.3 h	Primary connection at primary or circuit side?		Circuit side	
	4.9.5	Insulating medium	-	Epoxy resin	
	4.9.10	Required location of fuses		On VT	
	4.9.7	Is removal of VT possible without affecting associated circuit required?		State	
	4.9.8	Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
	4.9.11	Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
	4.9.14	Must the White phase on 3 limb VT be brought out and earthed through a solid link?		Yes	
	4.9.13	Internal VT connection?		Star/Star	
	4.14.4.6	Detail of voltmeter selector switches offered		State	
	4.12.2.3	Voltage dividers:			
	4.12.2.3	Make		State	
	4.12.2.3	type		State	
	4.12.2.3	dielectric		State	
2		Limited control panels:			
2,1		Overall dimensions of control panel per 3 (three) circuits		250 x 600mm or 670 x 960mm preferred	
2,2		Items required per control panel:			
		a) Trip, close and neutral switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Ammeters		3	
		e) Local/Supv.switch		1	
	4.12.2	f) Cable alive lamps:			
	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
	4.12.2.1	Make		State	
	4.12.2.2	Are suitable shunt resistors required?		Yes	
	4.12.3.1	Are circuit breaker open/close indication lamps required?		Yes	
	4.12.3.3	What colour signal indications are required?		Closed/red and open/green	
1.2.1		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
	4.12.2	Cable alive lamps:			

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
	4.12.2.1	Make		State	
1.2.3		Control:			
		Trip, close and neutral switch		1	
		Local/Supv. switch		1	
		Switch lead (Chicken lead) required?	yes	state	
3		Operating & Maintenance Manuals (O&M M)			
1.2.1.2		Ring Feeder Panel (RFP)			
1		Ring Feeder Panels (RFP)			
(a)		400A Current rating: 1250A BB Rating		See: A General requirements	
1.1		Protection for the RFP:			
1.1.1		Relay:			
(a)		Over-current & earth fault relay:	state		
1.1.2		Current Transformers:			
		Relevant standard:			
4.16.4		Current transformer rating plates			
4.16.1.1		State method used to attach rating plates			
4.8.5		Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	
4.8.1		Current transformers Protection and Indication for RF panels			
4.8.2		Number of cores		1 per phase	
4.8.3		O/C, E/F, IDMT and INST O/C:			
4.8.3		Class	-	10P10	
4.8.3		Ratios:	-	400/300/5	
4.8.3		Burden	VA	15	
1.2		Control & Indication & Test:			
1.2.1		Supervisory and Indication equipment:			
4.13		Alarm circuits		As detailed on drawings	
4.14.1		Auxiliary protection and alarm circuits		As detailed on drawings	
		Type supervisory Relay:	-		
4.14.5.1		Voltage rating (contacts)	V	110 DC	
4.14.5.1		Voltage rating (coil)	V	24 DC	
4.14.5.1		Contact current rating	A	10	
4.14.5.1		Contacts	-	2 NO; 2 NC	
		Quantity required:			
4.14.5.1		Per Type RF Panel	-	2	
4.11		Transducers:			
4.11.1.1		Current transducer rating	-	0-5A / 0- 20mA	
		Quantity required		1 per RF panel	
4.11.1.1		Active Power (P) output	mA	+20 mA	
		Reactive Power (Q) output	mA	-20mA - 0 + 20 mA	
4.11.1.1		Interposing CT:			
		Quantity required: Yellow phase		1 per RF panel	
4.11.1.1		Class		10VA Class 1	
4.11.1.1		Ratio		5/5	
1.2.2		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
4.11.2		Ammeter full scale length	mm	125 if not integral part of relay or 90° deflection to approval of engineer	
		Ammeters to indicate phase colours, red, white and blue	3	Yes	
4.11.2.4 4.11.2.5 and 4.11.2.6		Are ammeters with thermal maximum demand indicators required?	3	Yes if 90° deflection ammeters are offered.	
4.11.2.8 and 4.11.2.9		Are additional ammeter scales required ?	3	Yes if scales are not reversible then one scale per phase for each ratio.	
		Whether ammeters comply fully with the provisions of Clause 19.3 of the tender document	-	State/NA	
1.2.3		Switch lead (Chicken lead) required?	yes	state	
2		Limited control panels:			
2.1		Overall dimensions of control panel per 3 (three) circuits		250 x 600mm or 670 x 960mm preferred	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
2.2		Items required per control panel:			
		a) Trip, close and neutral switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Ammeters		3	
		e) Local/Supv.switch		1	
	4.12.2	f) Cable alive lamps:			
	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
	4.12.2.1	Make		State	
	4.12.2.2	Are suitable shunt resistors required?		Yes	
	4.12.3.1	Are circuit breaker open/close indication lamps required?		Yes	
	4.12.3.3	What colour signal indications are required?		Closed/red and open/green	
1.2.1		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
	4.12.2	Cable alive lamps:			
	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
	4.12.2.1	Make		State	
1.2.3		Control:			
		Trip, close and neutral switch		1	
		Local/Supv.switch		1	
		Switch lead (Chicken lead) required?	yes	state	
3		Operating & Maintenance Manuals (O&M M)			
1.2.2		Ring main unit:			
1.2.2.1		Ring Main Unit for 11kV Transformer (F11)			
1		Single Busbar Feeder Panels (SFP)			
(a)		400A Current rating: 800A Busbar Rating		See: A General requirements	
1.1		Protection for the SFP:			
1.1.1		Relay:			
(a)		Magnetic cut out relay	state		
1.1.2		Current Transformers:			
		Relevant standard:			
	4.16.4	Current transformer rating plates			
	4.16.1.1	State method used to attach rating plates			
	4.8.5	Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	
	4.8.1	Current transformers Protection and Indication for SF panels			
	4.8.2	Number of cores		1 per phase	
	4.8.3	O/C, E/F, IDMT and INST O/C:			
	4.8.3	Class	-	10P10	
	4.8.3	Ratios:	-	50/25/5	
	4.8.3	Burden	VA	15	
1.2		Control & Indication & Test:			
1.2.1		Supervisory and Indication equipment:			
	4.13	Alarm circuits		As detailed on drawings	
	4.14.1	Auxiliary protection and alarm circuits		As detailed on drawings	
	4.11	Transducers:			
	4.11.1.1	Current transducer rating	-	0-5A / 0- 20mA	
		Quantity required		1 per SF panel	
	4.11.1.1	Active Power (P) output	mA	+20 mA	
		Reactive Power (Q) output	mA	-20mA - 0 + 20 mA	
	4.11.1.1	Interposing CT:			
		Quantity required: Yellow phase		1 per SF panel	
	4.11.1.1	Class		10VA Class 1	
	4.11.1.1	Ratio		5/5	
1.2.2		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
	4.11.2	Ammeter		1	
2		Operating & Maintenance Manuals (O&M M)			

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
1.2.2.2		Ring Main Unit for Consumer (F12)			
1		Single Busbar Feeder Panels (SFP)			
(a)		400A Current rating: 800A Busbar Rating		See: A General requirements	
1.1		Protection for the SFP:			
1.1.1		Relay:			
(a)		Magnetic cut out relay	state		
1.1.2		Current Transformers:			
		Relevant standard:			
4.16.4		Current transformer rating plates			
4.16.1.1		State method used to attach rating plates			
4.8.5		Limits of temperature rise:			
		Percentage of rated current for values in BS 3938 Table 1	%	150	
		Percentage of rated burden for values in BS 3938 Table 1	%	225	
4.8.1		Current transformers Protection and Indication for SF panels			
4.8.2		Number of cores		1 per phase	
4.8.3		O/C, E/F, IDMT and INST O/C:			
4.8.3		Class	-	10P10	
4.8.3		Ratios:	-	200/100/5	
4.8.3		Burden	VA	15	
1.2		Control & Indication & Test:			
1.2.1		Supervisory and Indication equipment:			
4.13		Alarm circuits		As detailed on drawings	
4.14.1		Auxiliary protection and alarm circuits		As detailed on drawings	
4.11		Transducers:			
4.11.1.1		Current transducer rating	-	0-5A / 0- 20mA	
		Quantity required		1 per SF panel	
4.11.1.1		Active Power (P) output	mA	+20 mA	
		Reactive Power (Q) output	mA	-20mA - 0 + 20 mA	
4.11.1.1		Interposing CT:			
		Quantity required: Yellow phase		1 per SF panel	
4.11.1.1		Class		10VA Class 1	
4.11.1.1		Ratio		5/5	
1.2.2		Instruments & Test:			
		Are test blocks required?		Yes	
		Location of test block		Relay panel door	
		Type of test block required		C & H 13 way test block preferred	
4.11.2		Ammeter		1	
1.3		Metering:			
1.3.1		Voltage transformers:			
4.9.2		Relevant standard	-	NRS 057-2	SABS
4.9.3 a		One or three phase		Three phase	
4.9.3 b		Ratio	V	11000/110	
4.9.3 c		Accuracy class 10VA – 200VA	-	0,2	
4.9.3 c		Accuracy class <10VA		0,5	
4.9.3 d		Rated burden per phase	VA	200	
4.9.3 e		Voltage factor		1,2	
4.9.3 g		3 or 5 limb		5 Limb	
4.9.3 h		Primary connection at primary or circuit side?		Circuit side	
4.9.5		Insulating medium	-	Epoxy resin	
4.9.10		Required location of fuses		On VT	
4.9.7		Is removal of VT possible without affecting associated circuit required?		State	
4.9.8		Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
4.9.11		Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
4.9.14		Must the White phase on 3 limb VT be brought out and earthed through a solid link?		Yes	
4.9.13		Internal VT connection?		Star/Star	
4.14.4.6		Detail of voltmeter selector switches		State	
4.12.2.3		Voltage dividers:			
4.12.2.3		Make		State	
4.12.2.3		type		State	
4.12.2.3		dielectric		State	
1.3.2		Current transformers for metering MF and RF panels. Red and blue phase:			
4.8.2		Number of cores		1 per phase	
4.8.11		Relevant standard		NRS 057-2	
4.8.11		Class <10VA	-	0,5	
4.8.11		Class 10VA – 100VA		0,2	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
	4.8.11	Ratio:	-	200/100/50/5	
	4.8.11	Burden	VA	5	
		Saturation factor:		state	
2		Operating & Maintenance Manuals (O&M M)			
1.2.2.3		Switch Disconnecter panels for Ring Main Units			
2,1	NRS 003-2: 4.1.5	2 Per ring main unit. One on either side of single bus switchgear panel.			
2,2	NRS 003-2: 4.1.5	Current Rating	A	400	
2,3	NRS 003-2: 4.1.5	Type		state	
2		JUGGLE BOX			
2,1		2000 (for 35MVA Trf): Double bus			
		Dimensions:			
		Height	mm	2 502	
		Depth	mm	2 433	
		Width	mm	800	
2,2		1250A (for 20MVA Trf & Sec Subs): Double bus			
		Dimensions:			
		Height	mm	2 502	
		Depth	mm	2 433	
		Width	mm	800	
3		CABLES AND CONNECTIONS			
		None			
4		ASSOCIATED WORK			
4,1		Taylor made modifications: Provisional item per panel.			
		None			
4,2		Modification to ICAP (Provisional item)			
		None			
4,3		Metering on 11kV Feeder panel			
4.3.1		Voltage transformers:			
	4.9.2	Relevant standard	-	IEC 61869-1:2023	
	4.9.3 a	One or three phase		Three phase	
	4.9.3 b	Ratio	V	11000/110	
	4.9.3 c	Accuracy class 10VA – 200VA	-	0,2	
	4.9.3 c	Accuracy class <10VA		0,5	
	4.9.3 d	Rated burden per phase	VA	200	
	4.9.3 e	Voltage factor		1,2	
	4.9.3 g	3 or 5 limb		5 Limb	
	4.9.3 h	Primary connection at primary or circuit side?		Circuit side	
	4.9.5	Insulating medium	-	Epoxy resin	
	4.9.10	Required location of fuses		On VT	
	4.9.7	Is removal of VT possible without affecting associated circuit required?		State	
	4.9.8	Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
	4.9.11	Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
	4.9.14	Must the White phase on 3 limb VT be brought out and earthed through a solid link?		Yes	
	4.9.13	Internal VT connection?		Star/Star	
	4.14.4.6	Detail of voltmeter selector switches offered		State	
	4.12.2.3	Voltage dividers:			
	4.12.2.3	Make		State	
	4.12.2.3	type		State	
	4.12.2.3	dielectric		State	
4.3.2	4.8.1	Current transformers for metering MF and RF panels. Red and blue phase:			
	4.8.2	Number of cores		1 per phase	
	4.8.11	Relevant standard		NRS 057-2	
	4.8.11	Class <10VA	-	0,5	
	4.8.11	Class 10VA – 100VA		0,2	
	4.8.11	Ratio:	-	400/300/5	

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
	4.8.11	Burden	VA	10	
		Saturation factor:		state	



## SECTION 5: SCHEDULE OF PARTICULARS AND GUARANTEES

### PART 11.1A: METAL-CLAD SWITCHGEAR

**SPECIFICATION No: PT.NRS 003-2: 1996 / SABS 1885: 2004 (Previous No: SG 20/01/98)**

- 1 All Tenderers shall complete the following schedules in full. Failure to provide the required detailed information called for in the schedules may cause a tender to be disqualified.
- 2 All information provided by the Tenderer, or specified by the Council and not qualified by the Tenderer will be regarded as offered and guaranteed by the Tender.

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
<b>1</b>		<b>GENERAL</b>			
<b>1</b>		<b>Complete drawings of the switchboard with details</b>		3 Sets	
<b>1,1</b>	4.2.1.3 a	<b>Manufacturer of switchboard</b>		State	
1.1.1		Type		State	
1.1.2	4.2.1.3 b	Country of origin		State	
1.1.3	4.2.1.3 c	Catalogue/type designation		State	
1.1.4	4.2.4.1	Is installation and on site testing to be carried out by supplier		Yes/No	
1.1.5		Year of Manufacture			
<b>1,2</b>	4.3.2.1.7	<b>Busbar pattern</b>		Top and bottom preferred	
1.2.1		Type		Double/Single	
1.2.2	4.2.5.1	Is the switchgear to be joined to an existing board		Yes/No	
1.2.3	4.2.5.2	Details of existing switchboard		GEC SBV DBB MK 111/Hawker Siddeley	
1.2.4	4.2.8.1	What is the 11kV earth fault current:			
		Secondary substations		???	
		Primary substations 20MVA (1250A BB)		350	
		Primary substations 35MVA (2000A BB)		2000	
1.2.5	4.2.8.1	System earthing type		Liquid Resistance NEC or NECR	
1.2.6		D.C Circuit protection		D.C.MCB's	
1.2.7		Switchboard protection		Busbar blocking / Frame leakage	
1.2.8	4.17.2.1	State requirements for main circuit designation labels		White traffolite with black letters	
1.2.9	4.17.1.1	State method used to attach labels		Mechanical (screws)	
1.2.10	4.17.2.2	Where are main circuit labels to be placed?		On the front and back of each switchgear panel	
<b>1,3</b>		<b>Dimensions:</b>			
1.3.1		Height (Top/Bottom double busbar)	mm	2 502	
1.3.2		Depth (Top/Bottom double busbar)	mm	2 433	
1.3.3		Width (400 A, 630 A & 800 A panel)	mm	600	
1.3.4		Width (2 000 A & 1250 A panel)	mm	800	
<b>2</b>		<b>REQUIREMENTS (Ratings)</b>			

<b>2,1</b>	4.16.2	<b>Switchboard rating plate</b>		In compliance with SABS 1885 clause 4.16.2	
<b>2,2</b>		<b>Number of phases</b>	-	3	
<b>2,3</b>	4.1.1.2	<b>Frequency</b>	Hz	50	
2.3.1	4.1.1.1.b	Rated (Design) Voltage	kV	12	
2.3.2		Highest equipment voltage	kV	12	
2.3.3	4.1.1.3	Nominal Voltage	kV	11	
<b>2,4</b>		<b>Fault capacity:</b>			
2.4.1	4.1.1.7	Breaking capacity (350 MVA)	kA	20	
2.4.2	4.1.1.8	Making capacity	kA	50	
2.4.3	4.1.1.5.2	Through-fault rating for 3 seconds	kA	20	
2.4.4	4.1.1.4.2	Standard 1/50 micro second impulse rating at sea level	kV	95	
2.4.5		Corona extinction voltage:			
2.4.5.1		To earth	kV	8	
2.4.5.2		Between phases	kV	14	
<b>3</b>		<b>BUSBARS</b>			
<b>3,1</b>		<b>Relevant standard</b>	-	BS 159	
<b>3,2</b>		<b>Current rating:</b>			
3.2.1		For 20 MVA TRF and Secondary Subs	A	1250	
3.2.2		For 35 MVA TRF	A	2000	
<b>3,3</b>	4.2.9.1	<b>Insulating medium</b>	-	Air / Epoxy	
<b>3,4</b>		<b>Dimensions of each busbar chamber:</b>			
3.4.1		Height	mm	533	
3.4.2		Depth	mm	466	
<b>3,5</b>		<b>Clear access to busbars by removal of cover plate only</b>	-	Yes	
<b>3,6</b>		<b>Dimensions of access opening</b>			
3.6.1		Width	mm	466	
3.6.2		Depth	mm	600	
<b>3,7</b>		<b>Busbar segregation:</b>			
3.7.1		Busbars to pass through fire wall	-	Yes/No	
3.7.2		Distance bus section breaker to brick wall (where applicable)	mm	457 max/NA	
3.7.3		Thickness of brick wall	mm	230/NA	
3.7.4		Distance brick wall to adjacent panel (where applicable)	mm	457 max/NA	
3.7.5		Bottom or top busbars through the brick wall to be removed	-	Top/Bottom/NA	
3.7.6		Standard 1/50 micro-second impulse rating at sea-level of trunking	kV	95	
<b>4</b>		<b>CIRCUIT-BREAKERS</b>			
<b>4,1</b>		<b>Relevant standard</b>	-	BS 5311	SABS1885
4.1.1	4.16.3	Circuit-breaker rating plate		In compliance with SABS 1885 clause 4.16.3	
<b>4,2</b>	4.3.1.9.6	<b>Type</b>		XEM	
4.2.1	4.3.1.1.3	Interrupting medium vacuum or SF6	-	Vacuum preferred	
4.2.2	4.2.9.4	Is a device for monitoring the SF6 pressure required?		yes	
4.2.3	4.3.1.4.1	Are earthing facilities required for all main circuits?		Yes	
4.2.4	4.3.2.4.1	Details of earthing facilities offered		State	
4.2.4.1	4.4.1.4	Is an integral 3 pole earth switch on switch disconnector required		Yes	

4.2.4.2	4.5.1.4	Is an integral earthing facility on the circuit side of the switch disconnector required?		Yes	
4.2.4.3	4.4.1.5	Type of switch disconnector offered			
4.2.5	4.3.1.6.1	Are open/close switches for local electrical operation required?		Yes	
4.2.5.1	4.3.1.7	Is a panel connector for hand held remote control required?		Yes/No	
4.2.5.2		Is a wall mounted remote control panel required? Not required for RMU panels		Yes/No	
4.2.5.3		Overall dimensions of control panel per 3 (three) circuits		250 x 600mm or 670 x 960mm preferred	
4.2.5.4		Items required per control panel:			
		a) Circuit breaker cntrl switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Ammeters		3	
		e) Local/Supv.switch		1	
4.2.6		Is manual charging of circuit breaker also required?		Yes	
4.2.7	4.3.1.9.4	Supply voltage of spring charge motor	DC	110V	
4.2.7.1	4.3.1.9.6	Type of circuit breaker closing mechanism offered		State	
4.2.7.2		Peak power	kW	T.B.A.	
4.2.7.3		Steady power	KW	T.B.A.	
4.2.7.4	4.3.1.9.7	Current	A	T.B.A.	
4.2.7.5		Voltage	V	T.B.A.	
4.2.8	4.3.1.11.3	Number of contacts:			
4.2.8.1		a)SF6 Alarm		2b	
4.2.8.2		b)Lock- out SF6		2b	
4.2.8.3		c)Circuit-breaker auxiliary 'a'		6	
4.2.8.4		d)Circuit-breaker auxiliary 'b'		6	
4.2.8.5		e)Spring limit		1	
4.2.8.6		f)Circuit breaker earthed		1b	
4.2.8.7	4.3.1.11.5	Should the circuit breaker auxiliary contacts be wired to the multicore cable compartment behind the switchgear		Yes	
4.2.8.8	4.3.11.4	Number of spare contacts			
		- "a" contacts		2	
		- "b" contacts		2	
4.2.8.8	4.3.2.1.5	Circuit breaker details			
		a) manufacturer		State	
		b) country of origin		State	
		c) model/type designation		State	
		d) total mass		State	
		e) rating nameplate position		State	
4.2.8.9		Isolation displacement of circuit-breaker		Horizontal/ Vertical	
4.2.9	4.3.2.4.1	Is three pole integral earthing on the circuit side required ?		Yes	
4.2.10		Maximum current from battery	A		
<b>4.3</b>		<b>Current rating</b>			
4.3.1	4.1.1.3	For TRF, bus coupler, bus section and interconnector panels for 35 MVA TRF	A	2000	
4.3.2		For TRF, bus coupler, bus section and interconnector panels for 20 MVA TRF	A	1250	

4.3.3		For bus coupler, bus section and interconnector panels for Secondary subs	A	1250	
4.3.4	4.1.1.3	Feeder Panels in Secondary subs	A	630	
4.3.5	4.1.1.3	Feeder Panels in Primary subs	A	800	
<b>4.4</b>		<b>Closing mechanism</b>	-		
4.4.1		Type		Motor wound spring preferred	
4.4.2	4.17.4	ON, OFF,EARTH and SERVICE position labels		In compliance with clause 4.17.4 of SABS 1885	
<b>4.5</b>		<b>Hand closing mechanism:</b>			
4.5.1		To be provided	-	Yes/No	
4.5.2		Is hand closing in 'service position' safe?	-	State	
4.5.3		Pattern	-	Trip free	
<b>4.6</b>	4.3.1.10	<b>Trip and closing coil voltage</b>	V	110 DC	
4.6.1		Trip operating voltage limit	V	60% of 110V DC	
4.6.2		Close operating limits	V	80% and 120% of 110V DC	
<b>4.7</b>		<b>Mass of Switchgear panels:</b>			
4.7.1	4.2.1.3.d	Total mass of each DBB incomer TRF, Bus coupler, and Bus section panel	kg	To be advised by tenderer	
4.7.2	4.2.1.3.e	Mass of each DBB incomer TRF, Bus coupler, and Bus section circuit breaker.	kg	To be advised by tenderer	
4.7.3	4.2.1.3.e	Total mass of each SBB incomer TRF, Bus section or RMU panel	kg	To be advised by tenderer	
4.7.4	4.2.1.3.e	Mass of each SBB incomer TRF, and Bus section or RMU circuit breaker.	kg	To be advised by tenderer	
4.7.5	4.2.1.3.e	Mass of switch disconnecting panel type SW11/SW12	kg	To be advised by tenderer	
<b>4.8</b>		<b>Maintenance:</b>			
4.8.1		Number of operations under normal load conditions between maintenance services on mechanism	-	10 000	
4.8.2		Number of operations under rated fault conditions between maintenance services on mechanism	-	100	
4.8.3		Number of operations under normal load conditions between maintenance services on circuit-breaker	-	1000/630A	
4.8.4		Number of operations under rated fault conditions between maintenance services on circuit-breaker	-	100/2 000A	
4.8.5		Is a circuit-breaker maintenance trolley required?		State	Yes/No
<b>5.</b>	<b>4.8.1</b>	<b>CURRENT TRANSFORMERS</b>		<b>BS 3938</b>	
<b>5.1</b>	4.8.1	<b>Relevant standard</b>	-	<b>SABS IEC 60044-1</b>	
5.1.1	4.16.4	Current transformer rating plates		In compliance with SABS 1885 clause 4.16.4	
5.1.1	4.16.1.1	State method used to attach rating plates		State	
<b>5.2</b>	4.8.5	<b>Limits of temperature rise:</b>			
<b>5.2.1</b>		<b>Percentage of rated current for values in BS 3938 Table 1</b>	%	<b>150</b>	
<b>5.2.2</b>		<b>Percentage of rated burden for values in BS 3938 Table 1</b>	%	<b>225</b>	

<b>5.3</b>	<b>4.8.1</b>	<b>Current transformers for Translay protection on MF panels:</b>			
5.3.1	4.8.2	Number of cores per phase		1	
5.3.2	4.8.3	Class		X	
5.3.3	4.8.3	Ratios:			
5.3.3.1	4.8.3	MF630DBB, & MF800DBB with OC/EF, VT & M		400/300/5	
5.3.4	4.8.3	Knee-point voltage	V	76	
5.3.5	4.8.3	Maximum excitation current at $10/i + i * (R_{ct} + 2R_w)$ volt	mA	16	
5.3.6	4.8.3	Excitation current at knee-point voltage	mA	50	
5.3.7	4.8.3	Resistance of secondary winding at 75 C	Ohm	0,16	
5.3.8		On which panels must Translay relays be fitted		F13,F13+VT, F23, F23+VT,	
<b>5,4</b>	<b>4.8.1</b>	<b>Current transformers Protection and Indication for MF, and RF panels</b>			
5.4.1	4.8.2	Number of cores		1 per phase	
5.4.2	4.8.3	O/C, E/F, IDMT and INST O/C:			
5.4.3	4.8.3	Class	-	10P10	
5.4.4	4.8.3	Ratios:	-		
		MF630DBB, RF630DBB & MF800DBB with OC/EF, VT & M		400/300/5	
		MF630SBB & RF630SBB with OC/EF & M		200/100/5	
		MF630SBB & RF630SBB with MCCB for OC/EF		50/25/5	
5.4.5	4.8.3	Burden	VA	15	
<b>5,5</b>	<b>4.8.1</b>	<b>Current transformers for restricted earth fault protection TRF panel:</b>			
5.5.1	4.8.2	Number of cores		1 per phase	
5.5.2	4.8.3	Class	-	X	
5.5.3	4.8.3	Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.5.4	4.8.3	Knee-point voltage	V	> 350	
5.5.5	4.8.3	Excitation current at knee-point voltage	mA	Less that 15	
5.5.6	4.8.3	Resistance of secondary winding at 75 Ohm	Ohm	8,4	
<b>5,6</b>	<b>4.8.1</b>	<b>Current transformers for biased differential protection TRF panel</b>			
5.6.1	4.8.2	Number of cores		1 per phase	
5.6.2	4.8.3	Class	-	X	
5.6.3	4.8.3	Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.6.4	4.8.3	Knee-point voltage	V	> 350	
5.6.5	4.8.3	Excitation current at knee-point voltage	mA	Less that 15	
5.6.6	4.8.3	Resistance of secondary winding at 75 Ohm	Ohm	8,4	
<b>5,7</b>	<b>4.8.1</b>	<b>Current transformers for O/C and earth fault protection and indication TRF panels</b>			
5.7.1	4.8.2	Number of cores		1 per phase	
5.7.2	4.8.3	Class	-	10P10	

5.7.3	4.8.3	Ratios:	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.7.4	4.8.3	Burden	VA	15	
<b>5,8</b>	<b>4.8.1</b>	<b>Current transformers for metering TRF and FDR panels. Red and blue phase:</b>			
5.8.1	4.8.2	Number of cores		1 per phase	
5.8.2	4.8.11	Relevant standard		NRS 057-2	
5.8.3	4.8.11	Type		F23M F12M	
5.8.4	4.8.11	Class <10MVA	-	0.5S	
5.8.4.1	4.8.11	Class 10MVA – 100MVA		0.2S	
5.8.5	4.8.11	Ratio transformer panels	-	May-00	
5.8.5.1	4.8.11	MF630DBB, RF630DBB & MF800DBB with OC/EF, VT & M		400/300/5 or 400/200/5	
5.8.5.2	4.8.11	MF630SBB & RF630SBB with OC/EF & M		200/100/50/5	
5.8.5.3	4.8.11	MF630SBB & RF630SBB with MCCB for OC/EF		50/25/5	
5.8.6	4.8.11	Burden	VA	10	
<b>5,9</b>		<b>Current transformers for blocking TRF panel. Yellow phase:</b>			
5.9.1	4.8.2	Number of cores		1 per phase	
5.9.2	4.8.3	Class	-	10P10	
5.9.3	4.8.3	Ratio	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.9.4	4.8.3	Burden	VA	5 - 10 VA	
<b>5.10</b>		<b>Current transformers for bus-coupler and bus-section</b>			
5.10.1	4.8.2	Number of cores		1 per phase	
5.10.2	4.8.3	Class		10P10	
5.10.3	4.8.3	Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.10.4	4.8.3	Burden		15VA	
<b>5,11</b>		<b>Saturation factor of metering current transformers TRF panel:</b>			
5.11.1	4.8.11	2000/5 ratio 35MVA TRF		State	
5.11.2		1250/5 ratio 20MVA TRF		State	
5.11.3	4.8.11	400/300/5 ratio	-	State	
<b>6</b>	<b>4,9</b>	<b>VOLTAGE TRANSFORMERS</b>			
<b>6,1</b>	<b>4.9.2</b>	<b>Relevant standard</b>	-	NRS 057-2	SABS IEC 60044-2
<b>6,2</b>	4.9.3 a	One or three phase		Three phase	
<b>6,3</b>	4.9.3 b	Ratio	V	11000/110	
<b>6,4</b>	4.9.3 c	Accuracy class 10MVA – 100MVA	-	0,2	
6.4.1	4.9.3 c	Accuracy class <10MVA		0,5	
<b>6,5</b>	4.9.3 d	Rated burden per phase	VA	200	
<b>6,6</b>	4.9.3 e	Voltage factor		1,2	
<b>6,7</b>	4.9.3 g	3 or 5 limb		5 Limb	
<b>6,8</b>	4.9.3 h	Primary connection at primary or circuit side		Circuit side	
<b>6,9</b>	4.9.5	Insulating medium	-	Epoxy resin	
<b>6.10</b>	4.9.10	Required location of fuses		On VT	
6.10.1		Are test blocks required?		Yes	
6.10.2		Location of test block		Relay panel door	
6.10.3		Type of test block required		C & H preferred	

6.10.4		Type of test block offered		State	
6,11	4.9.7	Is removal of VT possible without affecting associated circuit required?		State	
6,12	4.9.8	Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
6,13	4.9.11	Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
6,14	4.9.14	Must the White phase on 3 limb VT be brought out and earthed through a solid link?		Yes	
6,15	4.9.13	Internal VT connection?		Star/Star	
6,16		To which panels are VT's to be fitted?		All transformer panels and panels with metering	
6,17	4.14.4.5	Where are voltage selector switches required?		All transformer panels and panels with metering	
6.17.1	4.14.4.6	Detail of voltmeter selector switches offered		State	
6,18	4.12.2	<b>Cable alive lamps</b>			
6.18.1	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
6.18.2	4.12.2.1	On which panels are live circuit indication required?		Ltd control / Switchgear panels	
6.18.3	4.12.2.1	Make		State	
6.18.4	4.12.2.2	Are suitable shunt resistors required?		Yes	
6.18.5	4.12.3.1	Are circuit breaker open/close indication lamps required?		Yes	
6.18.6	4.12.3.2	On which panels		Switchgear panels	
6.18.7	4.12.3.3	What colour signal indications are required?		Closed/red and open/green	
6,19	4.12.2.3	<b>Voltage dividers</b>			
6.19.1	4.12.2.3	Make		State	
6.19.2	4.12.2.3	type		State	
6.19.3	4.12.2.3	dielectric		State	
6.19.4	4.12.2.3	Rating		State	
7	4,13	<b>SUPERVISORY AND ALARM EQUIPMENT</b>			
7,1		<b>Relays:</b>			
7.1.1	4,13	Alarm circuits		As detailed on drawings	
7.1.2	4.14.1	Auxiliary protection and alarm circuits		As detailed on drawings	
7.1.3		Type	-	Oak, Schrack or equivalent (plug-in plus base)	
7.1.4	4.14.5.1	Voltage rating (contacts)	V	110 DC	
7.1.5	4.14.5.1	Voltage rating (coil)	V	24 DC	
7.1.6	4.14.5.1	Contact current rating	A	10	
7.1.7	4.14.5.1	Contacts	-	2 NO; 2 NC	
7.1.8		<b>Quantity required:</b>			
7.1.8.1	4.14.5.1	Per Type TRF Panel	-	2	
7.1.8.2	4.14.5.1	Per Type MF Panel	-	2	
7.1.8.3	4.14.5.1	Per Type RF Panel	-	2	
7.1.8.4	4.14.5.1	Per Type BC and BS Panel	-	4	
7,2	4,11	<b>Transducers</b>			
7.2.1	4.11.1.1	Voltage transducer rating	-	0-110V/ 0-5mA	
7.2.1.1		Quantity required	-	1 per MTA panel	
7.2.2		Current transducer rating		State	
7.2.2.1	4.11.1.1	For type TRF panels	-	0-1A / 0- 5mA	
7.2.2.1.1		Quantity required		1 per MTA panel	

7.2.2.2	4.11.1.1	For other MF and RF panels in/out	A/mA	0 - 5A / 0 - 5mA	
7.2.2 2.1	4.11.1.1	Active Power (P) output	mA	+5 mA	
		Reactive Power (Q) output	mA	-5mA - 0 + 5 mA	
7.2.2 2.2		Quantity required		One of each per panel	
7.2.3.	4.11.1.1	Interposing CT:			
7.2.3.1	4.11.1.1	Class		10VA Class 1	
7.2.3.2	4.11.1.1	MF and RF Panels	Ratio	5/5 or 1/1	
7,3		<b>Contactors for Type BC panels:</b>			
7.3.1	4.11.1.1	Type (latch and release)	-	Telemecanique (CA2/DK 333 F or equivalent)	
7.3.2	4.14.5.1	Voltage rating (coil)	V	110V DC	
7.3.3	4.14.5.1	Contact current rating	A	10	
7.3.4.	4.14.5.1	Contacts		6 NO and 2 NC	
8		<b>CABLE END BOXES</b>			
8,1	NRS 12	<b>Clearance: Phase to phase</b>	mm	120mm minimum	NRS 12
	NRS 12	<b>Clearance: Phase to earth</b>	mm	120mm minimum	NRS 008-1991
8,2		<b>Type of cable end box</b>		Air with heat shrink termination	
8,3		<b>Number of glands :</b>			
		a)transformer		9 per transf.	
		b)Feeders		1 per panel	
8,4		<b>Types of glands</b>		Swivel	
8,5		<b>Type of cable termination required (NRS 0012)</b>		Air, Heat shrink Bottom entry	
9	4,11	<b>INSTRUMENTS AND RELAYS</b>			
9,1	4.11.2	<b>Ammeter full scale length</b>	mm	125 if not integral part of relay or 90° deflection to approval of engineer	
9.1.1		Ammeters to indicate phase colours, red, white and blue		Yes	
9.1.2	4.11.2.4 4.11.2.5 and 4.11.2.6	Are ammeters with thermal maximum demand indicators required?		Yes if 90° deflection ammeters are offered.	
9.1.3	4.11.2.8 and 4.11.2.9	Are additional ammeter scales required ?		Yes if scales are not reversible then one scale per phase for each ratio.	
9.1.4		Whether ammeters comply fully with the provisions of Clause 19.3 of the tender document	-	State/NA	
9,2	4.11.3	<b>Voltmeter scale length</b>	mm	125	
9.2.1	4.11.3.2	Voltmeter scale range	%	Zero to 120%	
9.2.2	4.11.3.3	Nominal voltage marked in red on scale		Yes	
9,3	4.10.2	<b>Make of O/C + E/F Prot. Relay MCGG.82, or DPU 2000 (REF 544) or equivalent</b>	-	a)Numeric or b)Electronic	
9.3.1		Relay protocol if applicable		State	
9,4	4.10.2	<b>Make of Translay relays:</b>	-	.	
9.4.1	4.10.2	Type	-	MHORO4 or equiv.	
9.4.2		On which panels are Translay relays required ?		F13, F13+VT F23, qnd 23+VT	
9.4.3		Are matching relays required for remote ends ?		Yes	
9.4.4		Tripping method		Battery	
9,5		<b>Are voltage change-over relays on panels B22F or F23M required?</b>		B22F-Yes/No F23M -Yes/No	
9,6	4.8.14	<b>Test block type:</b>	-	C & H, MMLG or equiv.	
9,7	4.10.2	<b>Bus zone relay (Bus section panel) MVAJ 53 or Equivalent</b>	-	Yes/No	



9,8	4.14.6.5	Where should external termination boxes be positioned?		At rear of each switchgear panel	
9.10	4.14.8	Detail of terminal blocks offered		Klippon Type R.S.F.1 or equivalent	
		<b>PROTECTION SCHEME AND RELAY TYPE</b>			
		<b>FRAME LEAKAGE SCHEME</b>			
		Buszone relay			
		Frame leakage relay			
		Neutral relay			
		Overcurrent/Earth fault relay			
		Unit protection relay			
		<b>BUSBAR BLOCKING SCHEME</b>			
		Busbar blocking relay			
		Overcurrent/Earth fault			
		Unit protection relay			
		<b>OTHER RELAYS</b>			
		Restricted earth fault relay			
		Differential relay			
		Repeat relay			
		Guard relay			
10		<b>SPRING WINDING MOTOR</b>			
10,1	4.3.1.9.4	Rated voltage	V	110V DC	
10,2	4.3.1.9.2	kW	kW	1,5	
10,3	4.3.1.9.4	Starting current	A	-T.B.A	
10.4	4.3.1.9.4	Running/Current	A	-T.B.A	
11.		<b>PAINT FINISH</b>			
11.1		<b>Switchgear:</b>			
11.1.1		Exterior		Cloud grey (SABS 1091 Colour No F48)	
11.1.2		Interior		Cloud grey (SABS 1091 Colour No F48)	
11,2		<b>Control Panels:</b>			
11..2.1		Exterior:		Cloud grey (SABS 1091 Colour No F48)	
11.2.2		Interior		Cloud grey (SABS 1091 Colour No F48)	
11.2.3		State special coating requirements		Powder coating	

**SECTION 5: SCHEDULE OF PARTICULARS AND GUARANTEES****PART 4.2: METAL-ENCLOSED SWITCHGEAR****SPEC No: IEC 62271**

1

**A**

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
<b>1</b>	<b>GENERAL</b>			
<b>1.1</b>	<b>Manufacturer of switchboard</b>		State	
1.1.1	Type		State	
1.1.2	Country of origin		State	
1.1.3	Catalogue/type designation		State	
1.1.4	Is installation and on site testing to be carried out by supplier		Yes	
1.1.5	Year of Manufacture			
<b>1.2</b>	<b>Busbar pattern</b>		State	
1.2.1	Type		Double	
1.2.2	What is the 11kV earth fault current:			
	Primary substations with NEC	A	350	
	Primary substations with NER	A	2000	
1.2.3	On load transfer of line circuits between the Main and Reserve busbar system possible		Required	
	Motorised transfer of line circuit between busbars from remote position		Required	
1.2.4	Busbar partitioning between:			
	between every third cubicle	Y/N	Y	
	or every cubicle	Y/N		
1.2.5	Loss of service continuity		LSC2B	
1.2.6	Partitioning Metallic		PM	
1.2.7	D.C Circuit protection		D.C.MCB's	
1.2.8	State requirements for main circuit designation labels		White traffolite with black letters	
1.2.9	State method used to attach labels		Mechanical (screws)	
1.2.10	Where are main circuit labels to be placed?		On the front and back of each switchgear panel	
<b>1.3</b>	<b>Dimensions Double bus:</b>			
1.3.1	Height (Top/Bottom double busbar)	mm	2 502	
1.3.2	Depth(Top/Bottom double busbar)	mm	2 433	
1.3.3	Width (400 A, 630 A , 800 A & 1250 A panel)	mm	state	
1.3.4	Width (2 500 A & 2 000 A panel)	mm	state	
<b>2</b>	<b>RATINGS</b>			
<b>2.1</b>	<b>Switchboard rating plate</b>		yes	
<b>2.2</b>	<b>Number of phases</b>	-	3	
<b>2.3</b>	<b>Frequency</b>	Hz	50	
2.3.1	Rated (Design) Voltage	kV	12	
2.3.2	Highest equipment voltage	kV	17,5	
2.3.3	Nominal Voltage	kV	11	
<b>2.4</b>	<b>Fault capacity:</b>			
2.4.1	Breaking capacity (350 MVA)	kA	31,5	
2.4.2	Making capacity	kA	50	
2.4.3	Through-fault rating for 3 seconds	kA	31,5	
2.4.4	Standard 1/50 micro second impulse rating at sea level	kV	95	
2.4.5	Corona extinction voltage:			
2.4.5.1	To earth	kV	8	
2.4.5.2	Between phases	kV	14	
<b>2.5</b>	<b>Internal Arc:</b>			
2.5.1	Internal arc protection system	Y/N	Yes	
	Internal Arc test to IEC 62271-200			

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
	Classification	IAC	AFLR	
	Fault current	KA	31,5	
	Duration	s	1	
2.5.2	Ducting between switchgear and exterior of S/S	Y/N	Yes	
	Number of external outlets required	each	6	
	Total Length of external ducting required (Distance between switchgear and exterior x outlets required)	Y/N each(m)		
2.6	Other measures to minimise the effects of internal arcing	State		
3	<b>BUSBARS</b>			
3.1	<b>Current rating:</b>			
3.1.2	132/11kV Substations with 35 & 20 MVA TRF	A	2000	
3.1.3	132/11kV Substations with 40 MVA TRF	A	2500	
3.2	<b>Insulating medium</b>	-	Air / Epoxy	
3.3	<b>Dimensions of each busbar chamber:</b>			
3.3.1	Height	mm	533	
3.3.2	Depth	mm	466	
3.4	<b>Clear access to busbars by removal of cover plate only</b>	-	Yes	
3.5	<b>Dimensions of access opening</b>			
3.5.1	Width	mm	466	
3.5.2	Depth	mm	600	
4	<b>CIRCUIT-BREAKERS</b>			
4.1	<b>Relevant standard</b>		IEC 62271-100	
4.2	<b>Type</b>		XEM	
4.2.1	Interrupting medium vacuum or SF6	-	Vacuum preferred	
4.2.2	Is a device for monitoring the SF6 pressure required?		yes	
4.2.3	Are earthing facilities required for all main circuits?		Yes	
4.2.4	Details of earthing facilities offered		State	
4.2.4.1	Is an integral 3 pole earth switch on switch disconnector required		Yes	
4.2.4.2	Is an integral earthing facility on the circuit side of the switch disconnector required?		Yes	
4.2.4.3	Type of switch disconnector offered	State		
4.2.5	Are open/close switches for local electrical operation required?		Yes	
4.2.7	Supply voltage of spring charge motor	DC	110V	
4.2.7.1	Type of circuit breaker closing mechanism offered		State	
4.2.7.2	Peak power	kW	state	
4.2.7.3	Steady power	KW	state	
4.2.7.4	Current	A	state	
4.2.7.5	Voltage	V	state	
4.2.8	Number of contacts:			
4.2.8.1	a)SF6 Alarm		2b	
4.2.8.2	b)Lock- out SF6		2b	
4.2.8.3	c)Circuit-breaker auxiliary 'a'		6	
4.2.8.4	d)Circuit-breaker auxiliary 'b'		6	
4.2.8.5	e)Spring limit		2	
4.2.8.6	f)Circuit breaker earthed		2a and 2b	
4.2.8.7	Should the circuit breaker auxiliary contacts be wired to the multicore cable compartment behind the switchgear		Yes	
4.2.8.8	Number of spare contacts			
	- "a" contacts		2	
	- "b" contacts		2	
4.2.8.8	Circuit breaker details			
	a) manufacturer		State	
	b) country of origin		State	
	c) model/type designation		State	
	d) total mass		State	
	e) rating nameplate position		State	
4.2.8.9	Isolation displacement of circuit-breaker		Horizontal/ Vertical	
4.2.9	Is three pole integral earthing on the circuit side required ?		Yes	

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
4.2.10	Maximum current from battery	A		
4.2.11	Mechanical endurance		M2	
4.2.12	Electrical endurance		E2	
4.2.13	Capacitive switching		C2	
4.2.14	Complete Racking behind closed door, i.e. from test to service positions and visa versa		Yes	
4.2.15	Interlocking between Circuit breaker and line isolator switches, with blocking magnets		Required	
<b>4.3</b>	<b>Current rating</b>			
4.3.1	For TRF, bus coupler, bus section and interconnector panels for 40 MVA TRF in 132/11kV Substations	A	2500	
4.3.2	For TRF, bus coupler, bus section and interconnector panels for 35 & 20 MVA TRF in 132/11kV Substations	A	2000	
4.3.7	Feeder Panels in Primary subs	A	800	
<b>4.4</b>	<b>Closing mechanism</b>	-		
4.4.1	Type		Motor wound spring preferred	
4.4.2	ON, OFF, EARTH and SERVICE position labels		Yes	
<b>4.5</b>	<b>Hand closing mechanism:</b>			
4.5.1	To be provided	-	Yes/No	
4.5.2	Is hand closing in 'service position' safe?	-	State	
4.5.3	Pattern	-	Trip free	
<b>4.6</b>	<b>Trip and closing coil voltage</b>	V	110 DC	
4.6.1	Trip operating voltage limit	V	60% of 110V DC	
4.6.2	Close operating limits	V	80% and 120% of 110V DC	
<b>4.7</b>	<b>Mass of Switchgear panels:</b>			
4.7.1	Total mass of each DBB incomer TRF, Bus coupler, and Bus section panel	kg	To be advised by tenderer	
4.7.2	Mass of each DBB incomer TRF, Bus coupler, and Bus section circuit breaker.	kg	To be advised by tenderer	
<b>4.8</b>	<b>Maintenance:</b>			
4.8.1	Number of operations under normal load conditions between maintenance services on mechanism	-	>10 000	
4.8.2	Number of operations under rated fault conditions between maintenance services on mechanism	-	>100	
4.8.3	Number of operations under normal load conditions between maintenance services on circuit-breaker	-	1000/800A	
4.8.4	Number of operations under rated fault conditions between maintenance services on circuit-breaker	-	100/2 000 & 2500A	
4.8.5	Is a circuit-breaker maintenance trolley required?		State	
<b>5</b>	<b>CABLE END BOXES</b>			
5.1	Clearance: Phase to phase	mm	120mm minimum	
	Clearance: Phase to earth	mm	120mm minimum	
5.2	Type of cable end box		Air with heat shrink termination	
5.3	Number of glands :			
	a)transformer: For 1250A TRFP (20MVA)		6 per transf.	
	For 2000A TRFP (35MVA)		9 per transf.	
	For 2500A TRFP (40MVA)		12 per transf.	
	b)Feeders		1 per panel	
5.4	Types of glands		Swivel	
5.5	Type of cable termination required (NRS 0012)		Air, Heat shrink Bottom entry	
<b>6</b>	<b>SPRING WINDING MOTOR</b>			
6.1	Rated voltage	V	110V DC	
6.2	kW	kW	1,5	
6.3	Starting current	A	-T.B.A	
6.4	Running/Current	A	-T.B.A	
<b>7</b>	<b>Contactors, according to IEC 62271-106</b>		Yes	

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
	Mechanical endurance		M2	
	Electrical endurance		E2	
	Capacitive switching		C2	
	Mechanism type		State	
	Magnetic coil / Magnetic actuated			
	Electrical or Mechanical Latching		State	
<b>8</b>	<b>Earth Switches, according to IES 62271-102</b>		Yes	
	Class according to IEC62271-102		E2	
	Busbar ES on each BB section		No	
	Mechanical key interlocking required		Yes	
	Separate Cable earth switch on each Incomer / Feeder cubicle		Yes	
	Auxillary contacts - 2 N/O & 2 N/C		Yes	
<b>7</b>	<b>PAINT FINISH</b>			
<b>7,1</b>	<b>Switchgear:</b>			
7.1.1	Exterior		Cloud grey (SABS 1091 Colour No F48)	
7.1.2	Interior		Cloud grey (SABS 1091 Colour No F48)	
<b>7,2</b>	<b>Control Panels:</b>			
7.2.1	Exterior:		Cloud grey (SABS 1091 Colour No F48)	
7.2.2	Interior		Cloud grey (SABS 1091 Colour No F48)	
7.2.3	State special coating requirements		Powder coating	

**B**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
<b>1</b>	<b>11kV METAL-ENCLOSED SWITCHGEAR (SG) IN 132/11kV SUBSTATIONS (PRIMARY SUBSTATIONS)</b>			
<b>1,1</b>	<b>Transformer (Incomer) Panel (TRFP)</b>			
1	Transformer Panels (TRFP)			
(a)	2000A Current rating		<b>See: A General requirements</b>	
(b)	2500A Current rating		<b>See: A General requirements</b>	
1,1	Protection for the TRFP:			
1.1.1	Busbar protection Relay			
(a)	Integrated/stand-alone arc protection		unit protection	
	Arc sensors (fibre links must be monitored)		per compartment	
(b)	Over-current & earth fault relay (Only applicable for busbar blocking)		state	
(c)	Neutral relay (Only applicable for frame leakage)		state	
1.1.2	Power Quality Metering		Standard	
1.1.3	Current transformers:			
	Relevant standard:		IEC 61869-1:2023	
	Current transformer rating plates			
	State method used to attach rating plates			
	Current transformers for restricted earth fault protection TRF panel:			
	Number of cores		1 per phase	
	Class	-	PX	
	Ratios:			

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
	For 20MVA TRF		1200/1	
	For 35MVA TRF		2000/1	
	For 40MVA TRF		2500/1	
	Knee-point voltage	V	> 350	
	Excitation current at knee-point voltage	mA	Less than 15	
	Resistance of secondary winding at 75 Ohm	Ohm	<9	
	Current transformers for biased differential protection TRF panel:			
	Number of cores		1 per phase	
	Class	-	5P20	
	Ratios:			
	For 20MVA TRF		1200/1	
	For 35MVA TRF		2000/1	
	For 40MVA TRF		2500/1	
	Burden	VA	15	
	Resistance of secondary winding at 75 Ohm	Ohm	8,4	
	Current transformers for O/C and earth fault protection and indication TRF panels:			
	Number of cores		1 per phase	
	Class	-	5P20	
	Ratios:	-		
	For 20MVA TRF		1200/1	
	For 35MVA TRF		2000/1	
	For 40MVA TRF		2500/1	
	Burden	VA	15	
	Current transformers for metering TRF panels:			
	Number of cores		1 per phase	
	Relevant standard		NRS 057-2	
	Class 10VA – 100VA		0,2	
	Ratio:	-		
	For 20MVA TRF		1200/1	
	For 35MVA TRF		2000/1	
	For 40MVA TRF		2500/1	
	Burden	VA	10	
	Current transformers for tapchanger blocking TRF panel. Yellow phase:			
	Number of cores		1 per phase	
	Class	-	10P10	
	Ratio:	-		
	For 20MVA TRF		1200/1	
	For 35MVA TRF		2000/1	
	For 40MVA TRF		2100/1	
	Burden	VA	5 - 10 VA	
1.1.4	Voltage Monitoring Relay			
(a)	Make		state	
(b)	DC undervoltage and overvoltage detection		Yes	
1.2	Control & Indication & Test:			
1.2.1	Voltage transformers:			
	Relevant standard	-	IEC 61869-1:2023	
	One or three phase		Three phase	
	Ratio	V	11000/110	
	<b>Winding 1 (Metering)</b>			
	Accuracy class 10VA – 200VA	-	0,2	
	Rated burden per phase	VA	200	
	Voltage factor		1,2	
	<b>Winding 2 (Protection)</b>			
	Accuracy class 10VA – 200VA	-	3P	
	Rated burden per phase	VA	200	
	Voltage factor		1,9	
	3 or 5 limb		5 Limb or 3 x single phase	
	Primary connection at primary or circuit side?		Circuit side	
	Insulating medium	-	Epoxy resin	
	Required location of fuses		On VT	
	Is removal of VT possible without affecting associated circuit required?		State	

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
	Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
	Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
	Internal VT connection?		Star/Star	
	Detail of voltmeter selector switches offered		State	
	Voltage dividers:			
	Make		State	
	type		State	
	dielectric		State	
1.2.2	Instruments & Test:			
	Are test blocks required?		Yes	
	Location of test block		Relay panel door	
	Types of test block required (metering)		C & H 13 way test block	
	Types of test block required (protection)		PK2 4 way test block	
	Cable alive lamps:			
	What type of live circuit indication of the circuit side is required?		IEC 61243-5	
	Make		State	
1.2.3	Control:			
	Trip, close and neutral switch		1	
	Local/Supv.switch		1	
	Switch lead (Chicken lead) required?	yes	state	
2	<u>Operating &amp; Maintenance Manuals (O&amp;M M)</u>	Yes/No	Yes	
1,2	<b>Main Feeder Panel (MFP)</b>			
1	<b>Main Feeder Panels (MFP)</b>			
(a)	800A Current rating: 2000A BB Rating		<b>See: A General requirements</b>	
(b)	800A Current rating: 2500A BB Rating		<b>See: A General requirements</b>	
1,1	<b>Protection for the MFP:</b>			
1.1.1	<b>Relay:</b>			
(a)	Differential current protection (fibre optic 13nm single mode):			
	Differential current protection (RS 485):			
(b)	Over-current & earth fault relay:	state		
c)	Sync check			
1.1.2	<b>Current Transformers:</b>			
	Relevant standard:			
	Current transformer rating plates			
	State method used to attach rating plates			
	Current transformers for Differential protection on MF panels:			
	Number of cores per phase		1	
	Class		PX	
	Ratios:		800/400/1	
	Knee-point voltage	V	>300	
	Excitation current at knee-point voltage	mA	<30	
	Resistance of secondary winding at 75 C	Ohm	<2	
	Current transformers Protection and Indication for MF panels			
	Number of cores		1 per phase	
	O/C, E/F, IDMT and INST O/C:			
	Class	-	5P20	
	Ratios:	-	800/400/1	
	Burden	VA	15	
	Current transformers Metering and Indication for MF panels			
	Number of cores		1 per phase	
	Class	-	0,5	
	Ratios:	-	800/400/1	
	Burden	VA	10	

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
1,2	Control & Indication & Test:			
1.2.1	Instruments & Test:			
	Are test blocks required?		Yes	
	Location of test block		Relay panel door	
	Types of test block required (metering)		C & H 13 way test block	
	Types of test block required (protection)		PK2 4 way test block	
	Cable alive lamps:			
	What type of live circuit indication of the circuit side is required?		IEC 61243-5	
	Make		State	
	Interlocked with cable earthswitch		Yes	
1.2.3	Control:			
	Trip, close and neutral switch		1	
	Local/Supv.switch		1	
	Switch lead (Chicken lead) required?	yes	state	
2	Operating & Maintenance Manuals (O&M M)			
1,3	<b>Bus Coupler Panel (BCP)</b>			
1	Bus Coupler Panel (BCP)			
(a)	2000A Current rating		<b>See: A General requirements</b>	
(b)	2500A Current rating		<b>See: A General requirements</b>	
1,1	Protection for the BCP:			
1.1.1	Relay			
(a)	Over-current & earth fault relay	state		
(b)	VT selection relay	state		
(c)	Frame leakage relay (Only applicable for frame leakage)			
(d)	Frame leakage repeat relay (Only applicable for frame leakage)			
1.1.2	Current Transformers:			
	Current transformers for frame leakage in BC panel (Only applicable for frame leakage)			
	Number of cores		1	
	Class	-	5P10	
	Ratios:	-	200/5	
	Burden	VA	5	
	Relevant standard:			
	Current transformer rating plates			
	State method used to attach rating plates			
	Current transformers for O/C and earth fault protection and indication BC panels:			
	Number of cores		1 per phase	
	Class	-	5P20	
	Ratios:	-		
	For 20MVA TRF		1200/1	
	For 35MVA TRF		2000/1	
	For 40MVA TRF		2500/1	
	Burden	VA	15	
1,2	Control & Indication & Test:			
1.2.1	Instruments & Test:			
	Are test blocks required?		Yes	
	Location of test block		Relay panel door	
	Type of test block required			
	Protection		PK2 test block preferred	
	Metering		C & H 13 way preferred	
1.2.3	Control:			
	Trip, close and neutral switch		1	
	Local/Supv.switch		1	
	Switch lead (Chicken lead) required?	yes	state	



ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
2	Operating & Maintenance Manuals (O&M M)			
1,4	<b>Bus Section/Interconnector Panel (BSP)</b>			
1	Bus Section/Interconnector Panel (BSP)			
(a)	2000A Current rating		See: A General requirements	
(b)	2500A Current rating		See: A General requirements	
1.1	Protection for the BSP:			
1.1.1	Relay			
(a)	Over-current & earth fault relay	state		
(b)	Differential current protection (fibre optic 13nm single mode):	state		
1.1.2	Current Transformers:			
	Relevant standard:		IEC 61869-1:2023	
	Current transformer rating plates			
	State method used to attach rating plates			
	Current transformers for O/C and earth fault protection and indication BS panels:			
	Number of cores		1 per phase	
	Class	-	5P20	
	Ratios:	-		
	For 20MVA TRF		1200/1	
	For 35MVA TRF		2000/1	
	For 40MVA TRF		2500/1	
	Burden	VA	15	
	Current transformers for Differential protection on BS panels:			
	Number of cores per phase		1	
	Class		PX or 5P20	
	Ratios:		800/400/1	
	Knee-point voltage (at the lowest ratio)	V	>300	
	Excitation current at knee-point voltage	mA	<30	
	Resistance of secondary winding at 75 C	Ohm	<2	
1.2	Control & Indication & Test:			
1.2.1	Instruments & Test:			
	Are test blocks required?		Yes	
	Location of test block		Relay panel door	
	Type of test block required			
	Protection		PK2 test block preferred	
	Metering		C & H 13 way preferred	
1.2.3	Control:			
	Trip, close and neutral switch		1	
	Local/Supv.switch		1	
	Switch lead (Chicken lead) required?	yes	state	
2	Operating & Maintenance Manuals (O&M M)			
2	<b>JUGGLE BOX</b>			
2,1	<b>2000 (for 35MVA Trf): Double bus</b>			
	Dimensions:			
	Height	mm	2 502	
	Depth	mm	2 433	
	Width	mm	800	
2,2	<b>1250A (for 20MVA Trf &amp; Sec Subs): Double bus</b>			
	Dimensions:			
	Height	mm	2 502	
	Depth	mm	2 433	
	Width	mm	800	
3	<b>CABLES AND CONNECTIONS</b>			

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
	None			
<b>4</b>	<b>ASSOCIATED WORK</b>			
<b>4.1</b>	<b>Taylor made modifications: Provisional item per panel.</b>			
	None			
<b>4.2</b>	<b>Modification to ICAP (Provisional item)</b>			
	None			
<b>4.3</b>	<b>Metering on 11kV Feeder panel</b>			
<b>4.3.1</b>	<b>Voltage transformers:</b>			
	Relevant standard	-	IEC 61869-1:2023	
	One or three phase		Three phase	
	Ratio	V	11000/110	
	Accuracy class 10VA – 200VA	-	0,2	
	Rated burden per phase	VA	200	
	Voltage factor		1,2	
	3 or 5 limb		3 Limb	
	Primary connection at primary or circuit side?		Circuit side	
	Insulating medium	-	Epoxy resin	
	Required location of fuses		On VT	
	Is removal of VT possible without affecting associated circuit required?		State	
	Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
	Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
	Must the White phase on 3 limb VT be brought out and earthed through a solid link?		Yes	
	Internal VT connection?		Star/Star	
	Detail of voltmeter selector switches offered		State	
	Voltage dividers:			
	Make		State	
	type		State	
	dielectric		State	
<b>4.3.2</b>	<b>Current transformers for metering MF and RF panels. Red and blue phase:</b>			
	Number of cores		1 per phase	
	Relevant standard		IEC 61869-1:2023	
	Class <10VA	-	0,5	
	Class 10VA – 100VA		0,2	
	Ratio:	-	400/300/1	
	Burden	VA	10	
	Saturation factor:		state	
<b>4.3.3</b>	<b>Instruments, Supervisory and Indication equipment required if there are no ICAP system:</b>			
1	Supervisory and Indication equipment:			
	Alarm circuits		As detailed on drawings	
	Auxiliary protection and alarm circuits		As detailed on drawings	
	Type supervisory Relay:	-		
	Voltage rating (contacts)	V	110 DC	
	Voltage rating (coil)	V	110 DC	
	Contact current rating	A	10	
	Contacts	-	2 NO; 2 NC	
	Quantity required:			
	Per Type TRF Panel	-	2	
	Transducers:			
	Voltage transducer rating	-	0-110V/ 0-5mA	

## SECTION 5: SCHEDULE OF PARTICULARS AND GUARANTEES

### PART 11.1A: METAL-CLAD SWITCHGEAR

**SPECIFICATION No: PT.NRS 003-2: 1996 / SABS 1885: 2004 (Previous No: SG 20/01/98)**

- 1 All Tenderers shall complete the following schedules in full. Failure to provide the required detailed information called for in the schedules may cause a tender to be disqualified.
- 2 All information provided by the Tenderer, or specified by the Council and not qualified by the Tenderer will be regarded as offered and guaranteed by the Tender.

ITEM NO	SABS 1885	DESCRIPTION	UNIT	SPECIFIED REQUIREMENTS	OFFERED AND GUARANTEED
<b>1</b>		<b>GENERAL</b>			
<b>1</b>		<b>Complete drawings of the switchboard with details</b>		3 Sets	
<b>1,1</b>	4.2.1.3 a	<b>Manufacturer of switchboard</b>		State	
1.1.1		Type		State	
1.1.2	4.2.1.3 b	Country of origin		State	
1.1.3	4.2.1.3 c	Catalogue/type designation		State	
1.1.4	4.2.4.1	Is installation and on site testing to be carried out by supplier		Yes/No	
1.1.5		Year of Manufacture			
<b>1,2</b>	4.3.2.1.7	<b>Busbar pattern</b>		Top and bottom preferred	
1.2.1		Type		Double/Single	
1.2.2	4.2.5.1	Is the switchgear to be joined to an existing board		Yes/No	
1.2.3	4.2.5.2	Details of existing switchboard		GEC SBV DBB MK 111/Hawker Siddeley	
1.2.4	4.2.8.1	What is the 11kV earth fault current:			
		Secondary substations		???	
		Primary substations 20MVA (1250A BB)		350	
		Primary substations 35MVA (2000A BB)		2000	
1.2.5	4.2.8.1	System earthing type		Liquid Resistance NEC or NECR	
1.2.6		D.C Circuit protection		D.C.MCB's	
1.2.7		Switchboard protection		Busbar blocking / Frame leakage	
1.2.8	4.17.2.1	State requirements for main circuit designation labels		White traffolite with black letters	
1.2.9	4.17.1.1	State method used to attach labels		Mechanical (screws)	
1.2.10	4.17.2.2	Where are main circuit labels to be placed?		On the front and back of each switchgear panel	
<b>1,3</b>		<b>Dimensions:</b>			
1.3.1		Height (Top/Bottom double busbar)	mm	2 502	
1.3.2		Depth (Top/Bottom double busbar)	mm	2 433	
1.3.3		Width (400 A, 630 A & 800 A panel)	mm	600	
1.3.4		Width (2 000 A & 1250 A panel)	mm	800	
<b>2</b>		<b>REQUIREMENTS (Ratings)</b>			

<b>2,1</b>	4.16.2	<b>Switchboard rating plate</b>		In compliance with SABS 1885 clause 4.16.2	
<b>2,2</b>		<b>Number of phases</b>	-	3	
<b>2,3</b>	4.1.1.2	<b>Frequency</b>	Hz	50	
2.3.1	4.1.1.1.b	Rated (Design) Voltage	kV	12	
2.3.2		Highest equipment voltage	kV	12	
2.3.3	4.1.1.3	Nominal Voltage	kV	11	
<b>2,4</b>		<b>Fault capacity:</b>			
2.4.1	4.1.1.7	Breaking capacity (350 MVA)	kA	20	
2.4.2	4.1.1.8	Making capacity	kA	50	
2.4.3	4.1.1.5.2	Through-fault rating for 3 seconds	kA	20	
2.4.4	4.1.1.4.2	Standard 1/50 micro second impulse rating at sea level	kV	95	
2.4.5		Corona extinction voltage:			
2.4.5.1		To earth	kV	8	
2.4.5.2		Between phases	kV	14	
<b>3</b>		<b>BUSBARS</b>			
<b>3,1</b>		<b>Relevant standard</b>	-	BS 159	
<b>3,2</b>		<b>Current rating:</b>			
3.2.1		For 20 MVA TRF and Secondary Subs	A	1250	
3.2.2		For 35 MVA TRF	A	2000	
<b>3,3</b>	4.2.9.1	<b>Insulating medium</b>	-	Air / Epoxy	
<b>3,4</b>		<b>Dimensions of each busbar chamber:</b>			
3.4.1		Height	mm	533	
3.4.2		Depth	mm	466	
<b>3,5</b>		<b>Clear access to busbars by removal of cover plate only</b>	-	Yes	
<b>3,6</b>		<b>Dimensions of access opening</b>			
3.6.1		Width	mm	466	
3.6.2		Depth	mm	600	
<b>3,7</b>		<b>Busbar segregation:</b>			
3.7.1		Busbars to pass through fire wall	-	Yes/No	
3.7.2		Distance bus section breaker to brick wall (where applicable)	mm	457 max/NA	
3.7.3		Thickness of brick wall	mm	230/NA	
3.7.4		Distance brick wall to adjacent panel (where applicable)	mm	457 max/NA	
3.7.5		Bottom or top busbars through the brick wall to be removed	-	Top/Bottom/NA	
3.7.6		Standard 1/50 micro-second impulse rating at sea-level of trunking	kV	95	
<b>4</b>		<b>CIRCUIT-BREAKERS</b>			
<b>4,1</b>		<b>Relevant standard</b>	-	BS 5311	SABS1885
4.1.1	4.16.3	Circuit-breaker rating plate		In compliance with SABS 1885 clause 4.16.3	
<b>4,2</b>	4.3.1.9.6	<b>Type</b>		XEM	
4.2.1	4.3.1.1.3	Interrupting medium vacuum or SF6	-	Vacuum preferred	
4.2.2	4.2.9.4	Is a device for monitoring the SF6 pressure required?		yes	
4.2.3	4.3.1.4.1	Are earthing facilities required for all main circuits?		Yes	
4.2.4	4.3.2.4.1	Details of earthing facilities offered		State	
4.2.4.1	4.4.1.4	Is an integral 3 pole earth switch on switch disconnecter required		Yes	

4.2.4.2	4.5.1.4	Is an integral earthing facility on the circuit side of the switch disconnector required?		Yes	
4.2.4.3	4.4.1.5	Type of switch disconnector offered			
4.2.5	4.3.1.6.1	Are open/close switches for local electrical operation required?		Yes	
4.2.5.1	4.3.1.7	Is a panel connector for hand held remote control required?		Yes/No	
4.2.5.2		Is a wall mounted remote control panel required? Not required for RMU panels		Yes/No	
4.2.5.3		Overall dimensions of control panel per 3 (three) circuits		250 x 600mm or 670 x 960mm preferred	
4.2.5.4		Items required per control panel:			
		a) Circuit breaker cntrl switch		1	
		b) Mimic diagram and system of indication lights with test and select indication		1	
		c) Designation label		1	
		d) Ammeters		3	
		e) Local/Supv.switch		1	
4.2.6		Is manual charging of circuit breaker also required?		Yes	
4.2.7	4.3.1.9.4	Supply voltage of spring charge motor	DC	110V	
4.2.7.1	4.3.1.9.6	Type of circuit breaker closing mechanism offered		State	
4.2.7.2		Peak power	kW	T.B.A.	
4.2.7.3		Steady power	KW	T.B.A.	
4.2.7.4	4.3.1.9.7	Current	A	T.B.A.	
4.2.7.5		Voltage	V	T.B.A.	
4.2.8	4.3.1.11.3	Number of contacts:			
4.2.8.1		a)SF6 Alarm		2b	
4.2.8.2		b)Lock- out SF6		2b	
4.2.8.3		c)Circuit-breaker auxiliary 'a'		6	
4.2.8.4		d)Circuit-breaker auxiliary 'b'		6	
4.2.8.5		e)Spring limit		1	
4.2.8.6		f)Circuit breaker earthed		1b	
4.2.8.7	4.3.1.11.5	Should the circuit breaker auxiliary contacts be wired to the multicore cable compartment behind the switchgear		Yes	
4.2.8.8	4.3.11.4	Number of spare contacts			
		- "a" contacts		2	
		- "b" contacts		2	
4.2.8.8	4.3.2.1.5	Circuit breaker details			
		a) manufacturer		State	
		b) country of origin		State	
		c) model/type designation		State	
		d) total mass		State	
		e) rating nameplate position		State	
4.2.8.9		Isolation displacement of circuit-breaker		Horizontal/ Vertical	
4.2.9	4.3.2.4.1	Is three pole integral earthing on the circuit side required ?		Yes	
4.2.10		Maximum current from battery	A		
<b>4.3</b>		<b>Current rating</b>			
4.3.1	4.1.1.3	For TRF, bus coupler, bus section and interconnector panels for 35 MVA TRF	A	2000	
4.3.2		For TRF, bus coupler, bus section and interconnector panels for 20 MVA TRF	A	1250	

4.3.3		For bus coupler, bus section and interconnector panels for Secondary subs	A	1250	
4.3.4	4.1.1.3	Feeder Panels in Secondary subs	A	630	
4.3.5	4.1.1.3	Feeder Panels in Primary subs	A	800	
<b>4.4</b>		<b>Closing mechanism</b>	-		
4.4.1		Type		Motor wound spring preferred	
4.4.2	4.17.4	ON, OFF,EARTH and SERVICE position labels		In compliance with clause 4.17.4 of SABS 1885	
<b>4.5</b>		<b>Hand closing mechanism:</b>			
4.5.1		To be provided	-	Yes/No	
4.5.2		Is hand closing in 'service position' safe?	-	State	
4.5.3		Pattern	-	Trip free	
<b>4.6</b>	4.3.1.10	<b>Trip and closing coil voltage</b>	V	110 DC	
4.6.1		Trip operating voltage limit	V	60% of 110V DC	
4.6.2		Close operating limits	V	80% and 120% of 110V DC	
<b>4.7</b>		<b>Mass of Switchgear panels:</b>			
4.7.1	4.2.1.3.d	Total mass of each DBB incomer TRF, Bus coupler, and Bus section panel	kg	To be advised by tenderer	
4.7.2	4.2.1.3.e	Mass of each DBB incomer TRF, Bus coupler, and Bus section circuit breaker.	kg	To be advised by tenderer	
4.7.3	4.2.1.3.e	Total mass of each SBB incomer TRF, Bus section or RMU panel	kg	To be advised by tenderer	
4.7.4	4.2.1.3.e	Mass of each SBB incomer TRF, and Bus section or RMU circuit breaker.	kg	To be advised by tenderer	
4.7.5	4.2.1.3.e	Mass of switch disconnecting panel type SW11/SW12	kg	To be advised by tenderer	
<b>4.8</b>		<b>Maintenance:</b>			
4.8.1		Number of operations under normal load conditions between maintenance services on mechanism	-	10 000	
4.8.2		Number of operations under rated fault conditions between maintenance services on mechanism	-	100	
4.8.3		Number of operations under normal load conditions between maintenance services on circuit-breaker	-	1000/630A	
4.8.4		Number of operations under rated fault conditions between maintenance services on circuit-breaker	-	100/2 000A	
4.8.5		Is a circuit-breaker maintenance trolley required?		State	Yes/No
<b>5.</b>	<b>4.8.1</b>	<b>CURRENT TRANSFORMERS</b>		<b>BS 3938</b>	
<b>5.1</b>	4.8.1	<b>Relevant standard</b>	-	<b>SABS IEC 60044-1</b>	
5.1.1	4.16.4	Current transformer rating plates		In compliance with SABS 1885 clause 4.16.4	
5.1.1	4.16.1.1	State method used to attach rating plates		State	
<b>5.2</b>	4.8.5	<b>Limits of temperature rise:</b>			
<b>5.2.1</b>		<b>Percentage of rated current for values in BS 3938 Table 1</b>	%	<b>150</b>	
<b>5.2.2</b>		<b>Percentage of rated burden for values in BS 3938 Table 1</b>	%	<b>225</b>	

<b>5.3</b>	<b>4.8.1</b>	<b>Current transformers for Translay protection on MF panels:</b>			
5.3.1	4.8.2	Number of cores per phase		1	
5.3.2	4.8.3	Class		X	
5.3.3	4.8.3	Ratios:			
5.3.3.1	4.8.3	MF630DBB, & MF800DBB with OC/EF, VT & M		400/300/5	
5.3.4	4.8.3	Knee-point voltage	V	76	
5.3.5	4.8.3	Maximum excitation current at $10/i + i * (R_{ct} + 2R_w)$ volt	mA	16	
5.3.6	4.8.3	Excitation current at knee-point voltage	mA	50	
5.3.7	4.8.3	Resistance of secondary winding at 75 C	Ohm	0,16	
5.3.8		On which panels must Translay relays be fitted		F13,F13+VT, F23, F23+VT,	
<b>5,4</b>	<b>4.8.1</b>	<b>Current transformers Protection and Indication for MF, and RF panels</b>			
5.4.1	4.8.2	Number of cores		1 per phase	
5.4.2	4.8.3	O/C, E/F, IDMT and INST O/C:			
5.4.3	4.8.3	Class	-	10P10	
5.4.4	4.8.3	Ratios:	-		
		MF630DBB, RF630DBB & MF800DBB with OC/EF, VT & M		400/300/5	
		MF630SBB & RF630SBB with OC/EF & M		200/100/5	
		MF630SBB & RF630SBB with MCCB for OC/EF		50/25/5	
5.4.5	4.8.3	Burden	VA	15	
<b>5,5</b>	<b>4.8.1</b>	<b>Current transformers for restricted earth fault protection TRF panel:</b>			
5.5.1	4.8.2	Number of cores		1 per phase	
5.5.2	4.8.3	Class	-	X	
5.5.3	4.8.3	Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.5.4	4.8.3	Knee-point voltage	V	> 350	
5.5.5	4.8.3	Excitation current at knee-point voltage	mA	Less that 15	
5.5.6	4.8.3	Resistance of secondary winding at 75 Ohm	Ohm	8,4	
<b>5,6</b>	<b>4.8.1</b>	<b>Current transformers for biased differential protection TRF panel</b>			
5.6.1	4.8.2	Number of cores		1 per phase	
5.6.2	4.8.3	Class	-	X	
5.6.3	4.8.3	Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.6.4	4.8.3	Knee-point voltage	V	> 350	
5.6.5	4.8.3	Excitation current at knee-point voltage	mA	Less that 15	
5.6.6	4.8.3	Resistance of secondary winding at 75 Ohm	Ohm	8,4	
<b>5,7</b>	<b>4.8.1</b>	<b>Current transformers for O/C and earth fault protection and indication TRF panels</b>			
5.7.1	4.8.2	Number of cores		1 per phase	
5.7.2	4.8.3	Class	-	10P10	

5.7.3	4.8.3	Ratios:	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.7.4	4.8.3	Burden	VA	15	
<b>5,8</b>	<b>4.8.1</b>	<b>Current transformers for metering TRF and FDR panels. Red and blue phase:</b>			
5.8.1	4.8.2	Number of cores		1 per phase	
5.8.2	4.8.11	Relevant standard		NRS 057-2	
5.8.3	4.8.11	Type		F23M F12M	
5.8.4	4.8.11	Class <10MVA	-	0.5S	
5.8.4.1	4.8.11	Class 10MVA – 100MVA		0.2S	
5.8.5	4.8.11	Ratio transformer panels	-	May-00	
5.8.5.1	4.8.11	MF630DBB, RF630DBB & MF800DBB with OC/EF, VT & M		400/300/5 or 400/200/5	
5.8.5.2	4.8.11	MF630SBB & RF630SBB with OC/EF & M		200/100/50/5	
5.8.5.3	4.8.11	MF630SBB & RF630SBB with MCCB for OC/EF		50/25/5	
5.8.6	4.8.11	Burden	VA	10	
<b>5,9</b>		<b>Current transformers for blocking TRF panel. Yellow phase:</b>			
5.9.1	4.8.2	Number of cores		1 per phase	
5.9.2	4.8.3	Class	-	10P10	
5.9.3	4.8.3	Ratio	-		
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.9.4	4.8.3	Burden	VA	5 - 10 VA	
<b>5.10</b>		<b>Current transformers for bus-coupler and bus-section</b>			
5.10.1	4.8.2	Number of cores		1 per phase	
5.10.2	4.8.3	Class		10P10	
5.10.3	4.8.3	Ratios:			
		For 20MVA TRF		1250/1	
		For 35MVA TRF		2000/1	
5.10.4	4.8.3	Burden		15VA	
<b>5,11</b>		<b>Saturation factor of metering current transformers TRF panel:</b>			
5.11.1	4.8.11	2000/5 ratio 35MVA TRF		State	
5.11.2		1250/5 ratio 20MVA TRF		State	
5.11.3	4.8.11	400/300/5 ratio	-	State	
<b>6</b>	<b>4,9</b>	<b>VOLTAGE TRANSFORMERS</b>			
<b>6,1</b>	<b>4.9.2</b>	<b>Relevant standard</b>	-	NRS 057-2	SABS IEC 60044-2
<b>6,2</b>	4.9.3 a	One or three phase		Three phase	
<b>6,3</b>	4.9.3 b	Ratio	V	11000/110	
<b>6,4</b>	4.9.3 c	Accuracy class 10MVA – 100MVA	-	0,2	
6.4.1	4.9.3 c	Accuracy class <10MVA		0,5	
<b>6,5</b>	4.9.3 d	Rated burden per phase	VA	200	
<b>6,6</b>	4.9.3 e	Voltage factor		1,2	
<b>6,7</b>	4.9.3 g	3 or 5 limb		5 Limb	
<b>6,8</b>	4.9.3 h	Primary connection at primary or circuit side		Circuit side	
<b>6,9</b>	4.9.5	Insulating medium	-	Epoxy resin	
<b>6.10</b>	4.9.10	Required location of fuses		On VT	
6.10.1		Are test blocks required?		Yes	
6.10.2		Location of test block		Relay panel door	
6.10.3		Type of test block required		C & H preferred	



6.10.4		Type of test block offered		State	
6,11	4.9.7	Is removal of VT possible without affecting associated circuit required?		State	
6,12	4.9.8	Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?		Yes/No	
6,13	4.9.11	Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
6,14	4.9.14	Must the White phase on 3 limb VT be brought out and earthed through a solid link?		Yes	
6,15	4.9.13	Internal VT connection?		Star/Star	
6,16		To which panels are VT's to be fitted?		All transformer panels and panels with metering	
6,17	4.14.4.5	Where are voltage selector switches required?		All transformer panels and panels with metering	
6.17.1	4.14.4.6	Detail of voltmeter selector switches offered		State	
6,18	4.12.2	<b>Cable alive lamps</b>			
6.18.1	4.12.2.1	What type of live circuit indication of the circuit side is required?		Neon lamps	
6.18.2	4.12.2.1	On which panels are live circuit indication required?		Ltd control / Switchgear panels	
6.18.3	4.12.2.1	Make		State	
6.18.4	4.12.2.2	Are suitable shunt resistors required?		Yes	
6.18.5	4.12.3.1	Are circuit breaker open/close indication lamps required?		Yes	
6.18.6	4.12.3.2	On which panels		Switchgear panels	
6.18.7	4.12.3.3	What colour signal indications are required?		Closed/red and open/green	
6,19	4.12.2.3	<b>Voltage dividers</b>			
6.19.1	4.12.2.3	Make		State	
6.19.2	4.12.2.3	type		State	
6.19.3	4.12.2.3	dielectric		State	
6.19.4	4.12.2.3	Rating		State	
7	4,13	<b>SUPERVISORY AND ALARM EQUIPMENT</b>			
7,1		<b>Relays:</b>			
7.1.1	4,13	Alarm circuits		As detailed on drawings	
7.1.2	4.14.1	Auxiliary protection and alarm circuits		As detailed on drawings	
7.1.3		Type	-	Oak, Schrack or equivalent (plug-in plus base)	
7.1.4	4.14.5.1	Voltage rating (contacts)	V	110 DC	
7.1.5	4.14.5.1	Voltage rating (coil)	V	24 DC	
7.1.6	4.14.5.1	Contact current rating	A	10	
7.1.7	4.14.5.1	Contacts	-	2 NO; 2 NC	
7.1.8		<b>Quantity required:</b>			
7.1.8.1	4.14.5.1	Per Type TRF Panel	-	2	
7.1.8.2	4.14.5.1	Per Type MF Panel	-	2	
7.1.8.3	4.14.5.1	Per Type RF Panel	-	2	
7.1.8.4	4.14.5.1	Per Type BC and BS Panel	-	4	
7,2	4,11	<b>Transducers</b>			
7.2.1	4.11.1.1	Voltage transducer rating	-	0-110V/ 0-5mA	
7.2.1.1		Quantity required	-	1 per MTA panel	
7.2.2		Current transducer rating		State	
7.2.2.1	4.11.1.1	For type TRF panels	-	0-1A / 0- 5mA	
7.2.2.1.1		Quantity required		1 per MTA panel	

7.2.2.2	4.11.1.1	For other MF and RF panels in/out	A/mA	0 - 5A / 0 - 5mA	
7.2.2 2.1	4.11.1.1	Active Power (P) output	mA	+5 mA	
		Reactive Power (Q) output	mA	-5mA - 0 + 5 mA	
7.2.2 2.2		Quantity required		One of each per panel	
7.2.3.	4.11.1.1	Interposing CT:			
7.2.3.1	4.11.1.1	Class		10VA Class 1	
7.2.3.2	4.11.1.1	MF and RF Panels	Ratio	5/5 or 1/1	
7,3		<b>Contactors for Type BC panels:</b>			
7.3.1	4.11.1.1	Type (latch and release)	-	Telemecanique (CA2/DK 333 F or equivalent)	
7.3.2	4.14.5.1	Voltage rating (coil)	V	110V DC	
7.3.3	4.14.5.1	Contact current rating	A	10	
7.3.4.	4.14.5.1	Contacts		6 NO and 2 NC	
8		<b>CABLE END BOXES</b>			
8,1	NRS 12	<b>Clearance: Phase to phase</b>	mm	120mm minimum	NRS 12
	NRS 12	<b>Clearance: Phase to earth</b>	mm	120mm minimum	NRS 008-1991
8,2		<b>Type of cable end box</b>		Air with heat shrink termination	
8,3		<b>Number of glands :</b>			
		a)transformer		9 per transf.	
		b)Feeders		1 per panel	
8,4		<b>Types of glands</b>		Swivel	
8,5		<b>Type of cable termination required (NRS 0012)</b>		Air, Heat shrink Bottom entry	
9	4,11	<b>INSTRUMENTS AND RELAYS</b>			
9,1	4.11.2	<b>Ammeter full scale length</b>	mm	125 if not integral part of relay or 90° deflection to approval of engineer	
9.1.1		Ammeters to indicate phase colours, red, white and blue		Yes	
9.1.2	4.11.2.4 4.11.2.5 and 4.11.2.6	Are ammeters with thermal maximum demand indicators required?		Yes if 90° deflection ammeters are offered.	
9.1.3	4.11.2.8 and 4.11.2.9	Are additional ammeter scales required ?		Yes if scales are not reversible then one scale per phase for each ratio.	
9.1.4		Whether ammeters comply fully with the provisions of Clause 19.3 of the tender document	-	State/NA	
9,2	4.11.3	<b>Voltmeter scale length</b>	mm	125	
9.2.1	4.11.3.2	Voltmeter scale range	%	Zero to 120%	
9.2.2	4.11.3.3	Nominal voltage marked in red on scale		Yes	
9,3	4.10.2	<b>Make of O/C + E/F Prot. Relay MCGG.82, or DPU 2000 (REF 544) or equivalent</b>	-	a)Numeric or b)Electronic	
9.3.1		Relay protocol if applicable		State	
9,4	4.10.2	<b>Make of Translay relays:</b>	-	.	
9.4.1	4.10.2	Type	-	MHORO4 or equiv.	
9.4.2		On which panels are Translay relays required ?		F13, F13+VT F23, qnd 23+VT	
9.4.3		Are matching relays required for remote ends ?		Yes	
9.4.4		Tripping method		Battery	
9,5		<b>Are voltage change-over relays on panels B22F or F23M required?</b>		B22F-Yes/No F23M -Yes/No	
9,6	4.8.14	<b>Test block type:</b>	-	C & H, MMLG or equiv.	
9,7	4.10.2	<b>Bus zone relay (Bus section panel) MVAJ 53 or Equivalent</b>	-	Yes/No	

9,8	4.14.6.5	Where should external termination boxes be positioned?		At rear of each switchgear panel	
9.10	4.14.8	Detail of terminal blocks offered		Klippon Type R.S.F.1 or equivalent	
		<b>PROTECTION SCHEME AND RELAY TYPE</b>			
		<b>FRAME LEAKAGE SCHEME</b>			
		Buszone relay			
		Frame leakage relay			
		Neutral relay			
		Overcurrent/Earth fault relay			
		Unit protection relay			
		<b>BUSBAR BLOCKING SCHEME</b>			
		Busbar blocking relay			
		Overcurrent/Earth fault			
		Unit protection relay			
		<b>OTHER RELAYS</b>			
		Restricted earth fault relay			
		Differential relay			
		Repeat relay			
		Guard relay			
10		<b>SPRING WINDING MOTOR</b>			
10,1	4.3.1.9.4	Rated voltage	V	110V DC	
10,2	4.3.1.9.2	kW	kW	1,5	
10,3	4.3.1.9.4	Starting current	A	-T.B.A	
10.4	4.3.1.9.4	Running/Current	A	-T.B.A	
11.		<b>PAINT FINISH</b>			
11.1		<b>Switchgear:</b>			
11.1.1		Exterior		Cloud grey (SABS 1091 Colour No F48)	
11.1.2		Interior		Cloud grey (SABS 1091 Colour No F48)	
11,2		<b>Control Panels:</b>			
11..2.1		Exterior:		Cloud grey (SABS 1091 Colour No F48)	
11.2.2		Interior		Cloud grey (SABS 1091 Colour No F48)	
11.2.3		State special coating requirements		Powder coating	

**SECTION 5: PARTICULARS & GUARRANTEES****PART 5.1: SCADA INTERFACE****SPEC NO:**

ITEM	DESCRIPTION	UNIT	REQUIREMENTS	OFFERED
	<b>SCADA INTERFACE</b>			
1	Type of interface		Harris D20++	
2	Protocol offered at the SCADA Access Point on the SMMI			
3	Mounting of SCADA Interface Unit		In 19" Communication Equipment rack	
4	Modes of Operation		Polled Report by Exception Operation	
5	Testing		Contractors responsibility to the front end processor at Capital Park	
6	Pre-testing Contractors must pre- test there SCADA equipment with the TSHWANE system to prove compatibility		Contractors to pre-test and sign doc YES	

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TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS: AS AND WHEN REQUIRED: OVER A THREE (3) YEAR PERIOD

PART C2.2 – SECTION 7 - ACTIVITIES, QUANTITIES & BILL SCHEDULE

## **PART C2.2**

### **ACTIVITY, QUANTITIES & BILL SCHEDULES**

#### **CONTENTS**

<b>PART</b>	<b>DESCRIPTION</b>	<b>APPLICABLE</b>
1	General:	Yes
2	Insulated Cables	Yes
3	11kV Switchgear Panels	Yes
4	Control and Protection Equipment	Yes
5	Unit Prices	Yes
6	Contingencies for unforeseen changes	Yes

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CTMM – Signatures - Contractor

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PART C2.2: ACTIVITY SCHEDULE (AS), QUANTITIES (QTY) & BILL (R) SCHEDULES

**TENDER NO: EEBU 08 2025/26**

2025/12/12 11:31

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(a)	(h) (f x g)
2	<b>INSULATED CABLES</b>									
2.1	<b>Multi-core Control Cables: Underground, PVC-Insulated:</b> Where multicore cables runs in 11kV cable trenches it must be strapped on cable racks/trays.									
2.1.1	<b>2,5 mm² multi-core cable:</b>									
	- 2 core	m							5000	
	- 4 core	m							5000	
	- 7 core	m							5000	
	- 12 core	m							5000	
	- 19 core	m							5000	
	- 27 core	m							5000	
	- 37 core	m							5000	
2.1.2	<b>4 mm² multi-core cable :</b>									
	- 4 core	m							5000	
	- 7 core	m							5000	
2.1.3	<b>6 mm² multi-core cable :</b>									
	- 3 core	m							3000	
	- 4 core	m							3000	
2.1.4	<b>16 mm² multi-core cable :</b>									
	- 2 core	m							3000	
	- 4 core	m							3000	
2.1.5	<b>35 mm² multi-core cable :</b>									
	- 4 core	m							2000	

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(g)	(h) (f x g)
2.1.6	Galvanized cable tray :									
	- 100 mm wide	m							100	
	- 150 mm wide	m							100	
	- 300 mm wide	m							100	
	- 500 mm wide	m							100	
2.1.7	Multi-core cable identification and testing									
	- 2 core	cable							100	
	- 3 core	cable							100	
	- 4 core	cable							100	
	- 7 core	cable							100	
	- 12 core	cable							100	
	- 19 core	cable							100	
	- 27 core	cable							100	
	- 37 core	cable							100	
2.1.8	Multi-core cable termination and gland									
	- 2 core	end							100	
	- 3 core	end							100	
	- 4 core	end							100	
	- 7 core	end							100	
	- 12 core	end							100	
	- 19 core	end							100	
	- 27 core	end							100	
	- 37 core	end							100	
	Total of Item 2 (Total to Price Summary)									



ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(a)	(h) (f x g)
3	11kV INDOOR METAL-CLAD SWITCHGEAR (SG)									
3.1	11kV Indoor Metal-clad SG for 132/11kV Substations (Primary Substations)									
3.1.1	Transformer (Incomer) Panel: (TRF-P) Complete with standard wiring, Circuit Breaker, Busbars and items in particulars.									
3.1.1.1	2000A Current Rating	each							10	
3.1.1.2	2500A Current Rating	each							10	
3.1.2	Main Feeder Panel: (MF-P) Complete with standard wiring, Circuit Breaker, Busbars and items in particulars.									
3.1.2.1	2000A Busbar Rating	each							16	
3.1.2.2	2500A Busbar Rating	each							16	
3.1.3	Bus-Section Panel: (S-P) Complete with standard wiring, Circuit Breaker, Busbars and items in particulars.									
3.1.3.1	2000A Current Rating	each							10	
3.1.3.2	2500A Current Rating	each							10	
3.1.4	Bus-Coupler Panel: (BC-P) Complete with standard wiring, Circuit Breaker, Busbars and items in particulars.									
3.1.4.1	2000A Current Rating	each							10	
3.1.4.2	2500A Current Rating	each							10	
3.2	11kV Indoor Metal-clad SG for 11kV Substations (Satellite Substations)									
3.2.1	Main Feeder Panel: (MF-P) Complete with standard wiring, Circuit Breaker, Busbars and items in particulars.									
3.2.1.2	2000A BB Rating	each							16	
3.2.2	Rina Feeder Panel: (RF-P) Complete with standard wiring, Circuit Breaker, Busbars and items in particulars.									
3.2.2.1	2000A BB Rating	each							10	
3.3	Removable Circuit Breakers (CB's) for 11kV Indoor Metal-Clad Switchgear:									
3.3.1	800A Current Rating	each							10	
3.3.2	2000A Current Rating	each							10	
3.3.3	2500A Current Rating	each							10	
3.4	Associated Work:									
3.4.1	Metering on 11kV feeder panel: As per particulars									
3.4.1.1	Voltage transformers	each							10	
3.4.1.2	Current transformers	each							10	
3.4.2	Ltd Control Panels: As per particulars									
3.4.2.1	Free standing limited control panels	each							10	
3.4.2.2	Wall mounted limited control panels	each							10	
3.4.2.3	Instruments, Supervisory and Indication equipment required if there are no ICAP system: As per particulars	each							10	

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(g)	(h) (f x g)
3.5	<b>Juggle Box:</b> A panel to align 11kV BB when new 11kV switchgear is added to old existing 11kV switchgear.									
3.5.1	2000A BB Rating	each							10	
3.5.2	2500A BB Rating	each							10	
3.6	<b>Bus Bar Trunking:</b> 2.5m long through wall bus bar trunking for fire/smoke bearer between two stages of panels including bus bar ventilation chimney	each							2	
3.7	<b>Set of Tools:</b>	each							1	
3.8	<b>Automatic racking device:</b>	each							1	
3.9	<b>Set of Bus Bars:</b> For a Feeder Panel									
3.9.1	2000A Current Rating	each							1	
3.9.2	2500A Current Rating	each							1	
3.10	<b>Set of Bus Bars:</b> For a Transformer Panel									
3.10.1	2000A Current Rating	each							1	
3.10.2	2500A Current Rating	each							1	
3.11	<b>Retrofit of old and redundant 11kV circuit breaker</b>	PI							1	R 200 000
	<b>Total of Item 3</b> (Total to Price Summary)									

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(a)	(h) (f x g)
4	CONTROL & PROTECTION (C&P) EQUIPMENT (with bay controller)									
4.1	Frame Leakage protection relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.2	Busbar blocking protection relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.3	Arc Protection relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.4	Main Protection Feeder Cable Differential relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.5	Main Protection Feeder Line Differential relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.6	Distance Protection relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.7	Back up Feeder Protection Overcurrent and Earth Fault with Sensitive Earth Fault relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.8	Voltage Monitoring relay (SCADA comms enabled); with integrate switchgear mimic control diagram and configuration of all devices.	each							20	
4.9	Buszone relay	each							20	
4.10	Neutral relay	each							20	
4.11	VT selection relay	each							20	
4.13	Frame Leakage repeat relay	each							20	
4.14	Trip Circuit Supervision relay	each							20	
4.15	11kV Switchgear Control Common Equipment: System IEC61850 enabled:									
4.15.1	11kV SG Bay Controller per stage of 11kV SG Panels: Complete panel, wiring, assembly, with integrated switchgear mimic control diagram and configuration of all devices.	each							1	
4.15.2	HMI Panel & Wiring: Complete panel, wiring, assembly, with computer, monitor, keyboard, mouse and basic interfaces as well as all necessary configured software which comprise the local control computer for the substation	each							1	

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(a)	(h) (f x g)
	Total of Section 4 (Total to Price Summary)									
5	UNIT RATES (Additional and only applicable when required by the Engineer )									
5.1	LABOUR:									
5.1.1	Civil/Mechanical/Electrical Engineer: Allow for a professional engineers reports	hour							10	
5.2	TRAINING:									
5.2.1	Operators (Switching): training course for 10 people.	Unit							1	
5.2.2	Maintenance: training course for 10 people.	Unit							1	
5.2.3	Protection: training course for 10 people.	Unit							1	
5.2.4	Scada: training course for 10 people.	Unit							1	
5.3	Communication: training course for 10 people.	Unit							1	
5.3.1	TRAINING: Accredited institutions to be used.									
5.3.2	Mini Apps Course for 4 people	Unit							1	
5.3.3	Switchgear design and installation course for 10 CoT Personnel	Unit							1	
5.3.4	1 year internship program for 10 people	Unit							1	
5.3.5	High Voltage Substation Design Course.	Unit							1	
5.3.6	Omicron Course	Unit							1	
5.3.7	Basic Scada Course	Unit							1	
5.3.8	Essential Micro Station Course	Unit							1	
5.3.9	Energy System Planning Course	Unit							1	
	Total of Section 5 (Total to Price Summary)									
6	ENGINEERING CHANGES: CHANGE CONTROL / VARIATION ORDER (VO's)									
6.1	Contingency sum for unforeseen and engineering changes. 10% of the total sum of item 1 to 4	Sum							1	
	Total of Section 6 (Total to Price Summary)									

ITEM NO  A	DESCRIPTION	Total price (ex. VAT) (l) (j x k)
1	General	
2	Insulated Cables	
3	11kV Switchgear Panels	
4	Control and Protection Equipment	
5	Unit Rates	
6	Contingencies for unforeseen changes	
Total tender price (excluding VAT)		
Value Added Tax (VAT)		
Total Tender Price (including VAT)		

SIGNATURES AND NAME OF PERSON(S) AUTHORISED TO SIGN TENDERCAPACITY OF SIGNATORY/SIGNATORIES

1

2

WITNESSES

1

2

PART C2: PRICING DATA

PART C2.2: ACTIVITY SCHEDULE (AS), QUANTITIES (QTY) & BILL (R) SCHEDULES

ITEM 2: METAL ENCLOSED SWITCHGEAR PANELS

TENDER NO: EEBU 08 2025/26

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..g)	(q)	(h) (f x q)
1	GENERAL:									
1.1	<b>Implementation Plan:</b> A plan with a work-breakdown structure with at least three levels of detail (1st - Overview of main elements, 2nd - each main element broken up into sub-elements, 3rd - detail description of each sub-element / work-order).	sum							1	
1.2	<b>Safety</b>									
1.2.1	<b>Safety training &amp; supervision:</b> Provision must be made to comply with the Occupational Health and Safety Act (Act 85 of 93) and the Construction Regulation 2003 (GNR 1010 of 18/7/2003) or the latest updated acts/regulations or the replacement thereof.	sum							1	
1.2.2	<b>Safety officer</b>	sum							1	
1.2.3	<b>Safety plan</b>	sum							1	
1.2.4	<b>Safety implementation Plan:</b>	sum							1	
1.2.5	<b>OHS file</b>	sum							1	
1.3	<b>Storage of Equipment:</b> Safe and protected storage for a full stage of switchgear panels for a month period.	sum							1	
1.4	<b>Permits &amp; notices:</b> Obtain switching requests/permits, co-operation with other trades, etc as per specification. Also regular meetings with the CTMM Network Operations and Electricity Tariff staff.	sum							1	
1.5	<b>Commissioning &amp; testing:</b> Supply all test equipment and labour for testing, commissioning and adjustments of the final installation as well as being in attendance for any inspections and tests that the Engineer may call for.									
1.5.1	<b>Commissioning &amp; testing:</b> 11kV Switchgear Panel	each							1	
1.5.2	<b>Commissioning &amp; testing:</b> Integration of 1 x 11kV Switchgear Panel with bay controllers and or micro SCADA systems complete.	PI							1	R300 000,00
1.5.3	<b>Commissioning &amp; testing:</b> 11kV Bay controllers complete including to all equipment	sum							1	
1.5.4	<b>Commissioning &amp; testing:</b> Substation HMI panels for a stage of panels (consisting of 16x main feeders, 2 x Transformer Incomers, 1 x Bus Coupler and 1x Bus Section Panels)	sum							1	
1.5.5	<b>Commissioning &amp; testing:</b> Substation HMI Panel for a 132kV line by	sum							1	
1.5.6	<b>Commissioning &amp; testing:</b> Substation HMI panel for a 132/11kV transformer bay	sum							1	
1.5.7	<b>Commissioning &amp; testing:</b> Substation HMI panel for a 132kV bus coupler bay	sum							1	
1.6	<b>Guarantee:</b> Defect Liability Period of 12 months for defects in equipment, material and workmanship, but excluding abuse, wear and tear and maintenance of existing equipment.	sum							1	
1.7	<b>Operating &amp; Maintenance Manuals (O&amp;M M's):</b> Provide for O&M Manuals including "As-Built" drawings, test certificates, etc. Also include the existing equipment in the O&M Manuals. Specific equipment manuals can be obtained from CoT Primary Maintenance Section. All the technical data of the equipment must be supplied in electronic format of the existing and new equipment.	each							3	
1.8	<b>Hand-over:</b> Hand-over inspections on completion of the construction and guarantee phases.	each							1	
1.9	<b>Dismantelling to add 11kV panels:</b> In order to add additional or new panels some of the existing 11kV switchgear and associated equipment must be dismantled, moved and removed to CoT stores or sales-yard in Pretoria-West.	each							10	
1.10	<b>Security Services:</b> Provide for 24hour security services during the installation work with armed response. The security company must be registered with PSIRA. The security guard must be grade B. At least two guards at night and one during the day. Provide for guard house.	Month							1	
1.11	<b>Insurance: Items must be insured as per order</b>	PI							1	R200 000,00
<b>Total of Item 1 (Total to Price Summary)</b>										

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(g)	(h) (f x g)
2	INSULATED CABLES									
2.1	Multi-core Control Cables: Underground, PVC-Insulated: Where multicore cables runs in 11kV cable trenches it must be strapped on cable racks/trays.									
2.1.1	2,5 mm² multi-core cable:									
	- 2 core	m							5000	
	- 4 core	m							5000	
	- 7 core	m							5000	
	- 12 core	m							5000	
	- 19 core	m							5000	
	- 27 core	m							5000	
	- 37 core	m							5000	
2.1.2	4 mm² multi-core cable :									
	- 4 core	m							5000	
	- 7 core	m							5000	
2.1.3	6 mm² multi-core cable :									
	- 3 core	m							3000	
	- 4 core	m							3000	
2.1.4	16 mm² multi-core cable :									
	- 2 core	m							3000	
	- 4 core	m							3000	
2.1.5	35 mm² multi-core cable :									
	- 4 core	m							2000	

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(g)	(h) (f x g)
2.1.6	Galvanized cable tray :									
	- 100 mm wide	m							100	
	- 150 mm wide	m							100	
	- 300 mm wide	m							100	
	- 500 mm wide	m							100	
2.1.7	Multi-core cable identification and testing									
	- 2 core	cable							100	
	- 3 core	cable							100	
	- 4 core	cable							100	
	- 7 core	cable							100	
	- 12 core	cable							100	
	- 19 core	cable							100	
	- 27 core	cable							100	
	- 37 core	cable							100	
2.1.8	Multi-core cable termination and gland									
	- 2 core	end							100	
	- 3 core	end							100	
	- 4 core	end							100	
	- 7 core	end							100	
	- 12 core	end							100	
	- 19 core	end							100	
	- 27 core	end							100	
	- 37 core	end							100	
	Total of Item 2 (Total to Price Summary)									



ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment) (a)	Currency (b)	FOR (SA factory) (c)	All S.A. transport to site (d)	Installation & Commissioning (e)	Total unit price (ex. VAT) (f) sum(a..e)	Estimated quantity (g)	Total price (ex. VAT) (h) (f x g)
3	11kV INDOOR METAL ENCLOSED SWITCHGEAR (SG)									
3.1	11kV Indoor Metal-Enclosed SG for 132/11kV Substations (Primary Substations)									
3.1.1	Transformer (Incommer) Panel: (TRF-P) Includes standard wiring, BB and items in particulars.									
3.1.1.1	2000A Current Rating	each							10	
3.1.1.2	2500A Current Rating	each							10	
3.1.2	Main Feeder Panel: (MF-P) Includes standard wiring, BB and items in particulars.									
3.1.2.1	2000A BB Rating	each							16	
3.1.2.2	2500A BB Rating	each							16	
3.1.3	Bus-Section Panel: (S-P) Includes standard wiring, BB and items in particulars.									
3.1.3.1	2000A Current Rating	each							10	
3.1.3.2	2500A Current Rating	each							10	
3.1.4	Bus-Coupler Panel: (BC-P) Includes standard wiring, BB and items in particulars.									
3.1.4.1	2000A Current Rating	each							10	
3.1.4.2	2500A Current Rating	each							10	
3.2	11kV Indoor Metal-Enclosed SG for 11kV Substations (Satellite Substations)									
3.2.2	Main Feeder Panel: (MF-P) Includes standard wiring, BB and items in particulars.									
3.2.2.1	2000A BB Rating	each							16	
3.2.3	Ring Feeder Panel: (RF-P) Includes standard wiring, BB and items in particulars.									
3.2.3.1	2000A BB Rating	each							16	
3.3	Removable Circuit Breakers (CB's) for 11kV Indoor Metal-Enclosed Switchgear:									
3.3.1	800A Current Rating	each							10	
3.3.2	2000A Current Rating	each							10	
3.3.3	2500A Current Rating	each							10	
3.4	Associated Work:									
3.4.1	Metering on 11kV feeder panel: As per particulars									
3.4.1.1	Voltage transformers	each							10	
3.4.1.2	Current transformers	each							10	
3.4.2	Limited Control Panels: As per particulars									
3.4.2.1	Free standing limited control panels	each							10	
3.4.2.2	Wall mounted limited control panels	each							10	
3.4.3	Instruments, Supervisory and Indication equipment required if there are no ICAP system: As per particulars	each							10	
3.5	Jugale Box: A panel to align 11kV BB when new 11kV switchgear is added to old existing 11kV switchgear.									
3.5.1	2000A BB Rating	each							10	
3.5.2	2500A BB Rating	each							10	
3.6	Bus Bar Trunking: 2.5m long through wall bus bar trunking at a height of 2.1m for fire/smoke bearer between two stages of panels including bus bar ventilation chimney	each							2	
3.7	Set of Tools:	each							10	
3.8	Automatic racking device:	each							1	
3.9	Set of Bus Bars: For a Feeder Panel									
3.9.1	2000A Current Rating	each							1	
3.9.2	2500A Current Rating	each							1	
3.10	Set of Bus Bars: For a Transformer Panel									
3.10.1	2000A Current Rating	each							1	
3.10.2	2500A Current Rating	each							1	
3.11	Retrofit of old and redundant 11kV circuit breaker	PI							1	200000
	Total of Item 3 (Total to Price Summary)									

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(g)	(h) (f x g)
4	CONTROL & PROTECTION (C&P) EQUIPMENT (with bay controller)									
4.1	Frame Leakage protection relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.2	Busbar blocking protection relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.3	Arc Protection relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.4	Main Protection Feeder Cable Differential relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.5	Main Protection Feeder Line Differential relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.6	Distance Protection relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.7	Back up Feeder Protection Overcurrent and Earth Fault with Sensitive Earth Fault relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.8	Voltage Monitoring relay (SCADA comms enabled); with integrated switchgear mimic control diagram and configuration of all devices.	each							20	
4.9	Buszone relay	each							20	
4.10	Neutral relay	each							20	
4.11	VT selection relay	each							20	
4.13	Frame Leakage repeat relay	each							20	
4.14	Trip Circuit Supervision relay	each							20	
4.15	11kV Switchgear Control Common Equipment: System IEC61850 enabled:									
4.15.1	11kV SG Bay Controller per stage of 11kV SG Panels: Complete panel, wiring, assembly, with integrated switchgear mimic control diagram and configuration of all devices.	each							1	
4.15.2	HMI Panel & Wiring: Complete panel, wiring, assembly, with computer, monitor, keyboard, mouse and basic interfaces as well as all necessary configured software which comprise the local control computer for the substation.	each							1	
	Total of Section 4 (Total to Price Summary)									

ITEM NO	DESCRIPTION	UNIT	IMPORTED CONTENT		LOCAL CONTENT			TOTALS		
			FOB (Port of shipment)	Currency	FOR (SA factory)	All S.A. transport to site	Installation & Commissioning	Total unit price (ex. VAT)	Estimated quantity	Total price (ex. VAT)
			(a)	(b)	(c)	(d)	(e)	(f) sum(a..e)	(g)	(h) (f x g)
5	UNIT RATES (Additional and only applicable when required by the Engineer )									
5.1	LABOUR:									
5.1.1	Civil/Mechanical/Electrical Engineer: Allow for a professional engineers reports	hour							10	
5.2	TRAINING:									
5.2.1	Operators (Switching): One day training course for 8 people.	day							1	
5.2.2	Maintenance: One day training course for 8 people.	day							1	
5.2.3	Protection: One day training course for 8 people.	day							1	
5.2.4	Scada: One day training course for 8 people.	day							1	
5.3	TRAINING: Accredited institutions to be used.									
5.3.1	Mini Apps Course for 4 people	Unit							1	
5.3.2	Switchgear design and installation course for 10 CoT Personnel	Unit							1	
5.3.3	1 year internship program for 10 people	Unit							1	
5.3.4	High Voltage Substation Design Course.	Unit							1	
5.3.5	Omicron Course	Unit							1	
5.3.6	Basic Scada Course	Unit							1	
5.3.7	Essential Micro Station Course	Unit							1	
5.3.8	Energy System Planning Course	Unit							1	
	Total of Section 5 (Total to Price Summary)									
6	ENGINEERING CHANGES: CHANGE CONTROL / VARIATION ORDER (VO's)									
6.1	Contingency sum for unforseen and engineering changes. 10% of the total sum of item 1 to 4	Sum							1	
	Total of Section 6 (Total to Price Summary)									

ITEM NO  B	DESCRIPTION	Total price (ex. VAT) (l) (j x k)
1	General	
2	Insulated Cables	
3	11kV Switchgear	
4	Control and Protection Equipment	
5	Unit Rates	
6	Contingencies for unforceen changes	
Total tender price (excluding VAT)		
Value added tax		
Total tender price (including VAT)		

SIGNATURES AND NAME OF PERSON(S) AUTHORISED TO SIGN TENDERCAPACITY OF SIGNATORY/SIGNATORIES

1

2

WITNESSES

1

2

## **PART C3**

# **SCOPE OF WORK**

## **CONTENTS**

<b>ITEM</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>Scope of Contract</b>
<b>2</b>	<b>Location</b>
<b>3</b>	<b>Extent of Work</b>
<b>4</b>	<b>Tender meeting and/or site visit</b>
<b>5</b>	<b>Socio-economic plan</b>
<b>6</b>	<b>Sub-contractors</b>
<b>7</b>	<b>Drawings</b>
<b>8</b>	<b>Activity, Quantities and Bill Schedule</b>
<b>9</b>	<b>Alternative offers</b>
<b>10</b>	<b>Community Liaison Officer</b>
<b>11</b>	<b>Evaluation criteria</b>
<b>12</b>	<b>CIDB grading</b>
<b>13</b>	<b>Reference</b>
<b>14</b>	<b>Surety</b>

## **PART C3: SCOPE OF WORK**

### **1. SCOPE OF TENDER/CONTRACT**

The scope is for the supply, delivery, installation, testing and commissioning of 11kV switchgear panels at various 132/11kV substations, as follows:

- 1.1 The contractor and sub-contractor must be fully trained, experienced and competent to carry out the work according to the tender/contract and articles of agreement of the OHS-Act (Act 85 of 1993) or the latest act.
- 1.2 The scope is inclusive of the supply, delivery, installation, testing and commissioning of 11kV Metal Clad and Metal Enclosed Indoor switchgear panels (11kV SWG) and associated work at various substations within the City of Tshwane electricity supply area.
- 1.3 The Contractor will be responsible for the complete scope of work including the integration (protection, control, scada, etc.) of the panels when installing at existing substations.
- 1.4 The tender has been divided into two items in the bill of quantities. Each item will be evaluated and awarded separately.
- 1.5 Tenderers can tender on anyone or both items. Each item tendered on must be completed in full, failing to do so will result in a tender being disqualified.
- 1.6 The items have been divided as follows:
  - Item 1: 11kV Metal Clad Indoor Switchgear
  - Item 2: 11kV Metal Enclosed Indoor Switchgear
- 1.7 The quantities indicated against each item are only approximate figures and the Municipality does not guarantee to purchase this or any quantity.

### **2. LOCATION**

The 132/11kV substation sites are located all over the City of Tshwane Electrical Supply Area.

### **3. EXTENT OF WORK**

The total project work includes the following, but not necessarily in the order as listed:

#### **3.1 Electrical Works**

The design work will include all the following work that is specified in more detail in the specifications and particulars schedule (The contractor's design must be approved before manufacturing can start):

- a) Electrical single line diagram: All equipment in circuit format with descriptions.
- b) Electrical equipment diagrams: Mostly obtained from the suppliers of the equipment.

- c) Protection system: The protection equipment system operation and control.
- d) The relays will be specified per order by the CoT Engineer and relays software might be requested by an Engineer with no cost to CoT.

### **3.2 Project Implementation Plan**

- a) Project Implementation Plan per order must be provided before the any implementation of the works.
- b) The plan must allow for the CoT switching requirements, peak power loads, etc.
- c) A shutdown of construction work must be provided for over the Christmas period to the New Year.

### **3.3 Commissioning of Works**

- a) Test all switchgear panels and associated equipment.
- b) Check and test all mechanical structures.
- c) A test plan and procedures must be provided before any testing starts.
- d) Supply Operating and Maintenance Manuals (O&MM) of all the equipment and the system.
- e) Remote/Limited Control Panels where applicable/ordered.

### **3.4 Factory Acceptance Tests**

All factory acceptance tests must be communicated two (2) weeks before and the contractor must make sure that the equipment to be tested is 100% ready.

- a) The contractor must reserve a minimum of 2 day for the FAT's to be conducted.
- b) The updated detailed design and protect drawings to be available.
- c) For the FATs, inspections and witness testing of all equipment outside Gauteng area, the contractor must allow for the cost of 2 technical staff members from CoT or appointed consultants by CoT (contractor travel, accommodation, hourly rates and subsistence) to carry out inspections.
- d) A test plan and procedures must be provided before any testing starts.
- e) Equipment will be Inspect.
- f) Check and test all mechanical structures.
- g) Test all switchgear panels and associated equipment.
- h) All the point-to-point testing of the panel to be tested.
- i) FATs report to be produced after one week.

### 3.5 Site Acceptance Tests

All site acceptance tests must be communicated two (2) weeks before and the contractor must make sure that the equipment to be tested is 100% ready.

- a) A test plan and procedures must be provided before any testing starts.
- b) The updated detailed design and protect drawings to be available
- c) Check and test all mechanical structures.
- d) Test all switchgear panels and associated equipment.
- e) Interfacing of switchgear panels
- f) Updated as commissioning drawings to be submitted after one week of the SATs
- g) SATs report to be produced after one week.

### 3.6 Site Works

The site work will include all the following work that is specified in more detail in the specification and particulars schedule:

- a) Installation of panels and associated work.
- b) Adhere to the Site Entrance procedure.
- c) Adhere to the Occupational Health and Safety Act.
- d) Site cleaning: Remove all the excess material.
- e) Adhere to the Site Safety requirements and procedures.

### 3.7 City Of Tshwane Safety Agent

The CoT Quality Safety and Environment Section representative or third-party will be the Safety Agent and he/she will be responsible for all safety aspects during the execution of the project.

### 3.8 Other

- a) If required, the dismantling and relocation of 11kV switchgear panels and all auxiliary equipment to a site that will be specified (allow for 80km of travel distance across the City of Tshwane)
- b) No telephone and facilitation facilities are available on sites/substations and the CoT will not provide any.
- c) All sanitary facilities shall be neat and hygienic throughout the contract period.



#### **4. TENDER MEETING AND/OR SITE VISIT**

- a) There will be a compulsory tender meeting but no site visit.

#### **5. SOCIO-ECONOMIC PLAN**

- a) Contractors must submit a detailed proposal on the number of jobs to be created.
- b) The contractor must provide skills development and technical training as specified in the activities quantities bill schedule for CoT employees:-
- Operators (switching)
  - Maintenance
  - Scada
  - Protection
  - Communication
- c) The contractor must allow for a formal technical training for four (4) CoT employees per course at accredited institutions to enhance their skills on the listed courses below:-
- High Voltage Substation Design Course.
  - Omicron Course
  - Mini Apps Course
  - Basic Scada Course
  - Essential Micro Station Course
  - Energy Systems Planning Course
- d) The technical training must have a minimum of at least 2 CPD (Continuing Professional Development) points which are recognised by ECSA (Engineering Council of South Africa). Certificates must be issued to employees upon completion of attending the course.
- e) Switchgear panels installation course for 10 CoT personnel.

#### **6. SUB-CONTRACTORS**

- a) The contractor must appoint Sub Contractor(s) within the City of Tshwane Municipal Area. The first preference should be given to sub-contractors within the ward where the project is being executed. If sub-contractors are not available and cannot be sourced in the ward, then subcontractors can be sourced from the adjacent wards or the nearest area to the site.

#### **7. DRAWINGS**

- a) Tenderers must provide detail drawings of the switchgear offered with their tender.

#### **8. ACTIVITY, QUANTITIES & BILL SCHEDULE (pART C2.2)**

- a) The bill of quantities are divided in two (2) items, namely:

- Item 1: Metal Clad Switchgear Panels
- Item 2: Metal Enclosed Switchgear Panels

- b) The prices must be completed in pen (black) in the schedule and included in the tender document as was issued.
- c) All item/activities as listed in the bill must be priced individually and no item prices are allowed to be included somewhere else combined with other item prices.
- d) If an item/activity is not priced it would be regarded as free of charge.
- e) This schedule will be provided in electronic format to tenderers with the minutes of the tender briefing meeting.
- f) The description of items may not be changed or deleted as well as the quantities. Only changes that are minute / instructed by the Project Manager will be allowed.
- g) All tenderers must tender to the above as their main offer.

## 9. ALTERNATIVE OFFERS

- a) Alternative offers will only be considered if tenderer(s) have submitted a fully completed main offer. For alternative offers a complete separate detailed activity, quantities and bill/price schedule must be submitted as a separate document.
- b) Tenderers must for each offer provide a typed copy on memory stick (PDF and soft copy format) of the above schedule with their offers.

## 10. COMMUNITY LIAISON OFFICER

- a) The successful tenderer shall follow the CoT policy to appoint the CLO when instructed to do so by the Engineer.
- b) The agreement shall make provision for the payment of the CLO by the Contractor at a salary equivalent to the City of Tshwane entry task level 5 scale of the administrator officer (the engineer shall provide the contractor with details of the remuneration of the CLO at the time of appointment).

## 11. EVALUATION CRITERIA

**Refer part T1.**

## 12. CONSTRUCTION INDUSTRY DEVELOPMENT BOARD GRADING

- 12.1 Only those tenderers who are registered with the Construction Industry Development Board (CIDB), or are capable of being so prior to the evaluation of submissions, in a contract grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered for a 6EP or higher class of construction work, are eligible to submit tenders.

## 12.2 Joint ventures are eligible to submit tenders provided that:-

- a) Joint venture/s must register with the CIDB before the closing date of tender, if not it automatically be disqualified.
- b) The combined contractor grading designation calculated in accordance with the Construction Industry Development Board Regulations is equal to or higher than a contractor designation in accordance with the sum tendered for a 6EP class of construction work or a value determined in accordance with the Construction Industry Development Board Regulations.

## 13. FORWARD COVER

- a) Forward cover to be taken by the successful bidder for all the imported equipment's.
- b) The contractor must carry the cost of the forward cover to be provided for the supply, delivery, installation, testing and commissioning of 11kV switchgear panels at various 132/11kV substations.

## 14. SURETY

- a) The Tenderer must supply a letter of intent, from a financial institution, with the tender for providing a surety of 10% of the tender price.
- b) The Contractor must provide a surety of 10% of the contract price within 14 days after appointment/award.
- c) The Contractor must carry the cost to provide the surety.

## 15. REFERENCE

The following words will have the same meaning:

- BID(S) and TENDER(S).
- BIDDER(S) and TENDERER(S)
- BIDDING and TENDERING

If anywhere in this document it still refers to Bid(s), Bidder(s) and Bidding it shall be replaced with Tender(s), Tenderer(s) or Tendering.

## ANNEXURE A

### HEALTH AND SAFETY SPECIFICATIONS

#### CONTENTS

1. Document purpose and intent
2. Application and Interpretation
  - 2.1. Definitions
3. Notification of Construction Work
4. Legal Documentation/Appointments
5. General duties of Principal Contractor
6. Supervision of Construction Work
7. Risk Assessment
8. Safe Work Procedures
10. Safety of Public/Pedestrians
11. Fall Protection
12. Registers
13. Training
14. Agent Health and Safety Instruction Register
15. General Requirements
16. Hazardous Chemical Substances (including Asbestos and Lead)
17. Asbestos (additional requirements)
18. Lead (additional requirements)
19. Noise Induced Hearing Loss
20. Lighting
21. Hazardous Biological Agents (HBA)
22. COVID-19 OCCUPATIONAL HEALTH AND SAFETY MEASURES

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CoT – Signatures - Contractor

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## REFERENCES TO THE SCOPE OF WORKS IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, REGULATIONS AND THE BASELINE RISK ASSESSMENT: HEALTH AND SAFETY SPECIFICATION

### 1. DOCUMENT PURPOSE AND INTENT

The specifications contained in this document relate to the health and safety requirements pertaining to the **CONTRACT NO: EEBU 08 2025/26, TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY 132/11KV SUBSTATIONS**, so as to ensure the health and safety of the persons carrying out the associated works for the period of 3 years.

Compliance to the Occupational Health and Safety Act (Act 85 of 1993) and the Regulations shall not be limited to the specifications and definitions contained in this document.

A comprehensive, documented Health and Safety Plan is to be drawn up by the Main Contractor, based on the results of Health and Safety Risk Assessments conducted by him, and the specifications provided, and presented to the engineer for approval prior to commencement of work.

Monitoring of compliance on site shall be to the requirements of the OHS Act and Regulations as well as the contents of the H&S Plan(s) of the Main-Contractor and Sub-Contractors.

### 2. APPLICATIONS AND INTERPRETATION

This document is to be read and understood in conjunction with the following:

- Occupational Health and Safety Act (Act 85 of 1993).
- All regulations published in terms of the Occupational Health and Safety Act.
- Construction Regulations, 2003.
- SABS codes referred to by the Occupational Health and Safety Act.
- Contract Documents
- Basic Conditions of Employment Act (Act 75 of 1997)
- South African Rail Commuter Corporation Ltd: General conditions and specifications for work on, over, under or adjacent to Railway lines and near High Voltage Equipment. (SPK7/2)

#### ABBREVIATIONS

- OHS: Occupational Health and Safety
- CEO: Chief Executive Officer
- CR: Construction Regulations
- HCS: Hazardous Chemical Substances
- MSDS: Material Safety Data Sheet
- AIA: Approved Inspection Authority
- HBA: Hazardous Biological Agents
- OEL: Occupational Exposure Limit

### 3.1 DEFENITIONS

The following definitions from the Occupational Health and Safety Act are listed as follows:

**Chief Executive Officer**

In relation to a body corporate or an enterprise conducted by the State, means the person who is responsible for the overall management and control of the business of such body corporate or enterprise.

**Danger**

Means anything that may cause injury or damage to persons or property.

**Employee (Contractor)**

Means, subject to the provisions of Subsection (2), any person who is employed by or works for any employer and who receives or is entitled to receive any remuneration or who works under the direction or supervision of an employer or any other person.

**Employer (Client / Engineer)**

Means, subject to the provisions of Subsection (2), any person who employs or provides work for any person or remunerates that person or expressly or tacitly undertakes to remunerate him, but excludes a labour broker as defined in Section 1(1) of the Labour Relations Act, 1953 (Act No. 28 of 1956).

**Healthy**

Means free from illness or injury attributable to occupational causes.

**Machinery**

Means any article or combination of articles assembled, arranged or connected and which is used or intended to be used for converting any form of energy to performing work, or which is used or intended to be used, whether incidental thereto or not, for developing, receiving, storing, containing, confining, transforming, transmitting, transferring or controlling any form of energy.

**Medical Surveillance**

Means a planned program of periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner or, in prescribed cases, by an occupational medicine practitioner.

**Plant**

Includes fixtures, fittings, implements, equipment, tools and appliances, and anything which is used for any purpose in connection with such plant.

**Properly Used**

Means used with reasonable care, and with due regard to any information, instruction or advice supplied by the designer, manufacturer, importer, seller or supplier.

**User**

In relation to plant or machinery, means the person who uses plant or machinery for his own benefit or who has the right of control over the use of plant or machinery, but does not include a lessor of, or any person employed in connection with, the plant or machinery.

**Reasonably Practicable**

Means practicable having regards to:

- (a) the severity and scope of the hazard or risk concerned,
- (b) the state of knowledge reasonably available concerning that

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hazard or risk and of any means to remove or mitigate that hazard or risk.

(c) the availability and suitability of means to remove or mitigate that hazard or risk; and

(d) the cost of removing or mitigating that hazard or risk in relation to the benefits deriving there from.

### ***Risk***

Means the probability that injury or damage will occur.

### ***Safe***

Means free from any hazard.

### ***Standard***

Means any provision occurring:

(a) in a specification, compulsory specification, code of practice or standard method as defined in Section 1 of the Standards Act, 1993 (Act No. 29 of 1993); OR

(b) in any specification, code or any other directive having standardization as its aim and issued by an institution or organization inside or outside the Republic which, whether generally or with respect to any particular article or matter and whether internationally or in any particular country or territory, seeks to promote standardization.

**The following definitions from the Construction Regulations are listed as follows:**

### ***Agent***

Means any person who acts as a representative for a client.

### ***Competent Person***

Means any person having the knowledge, training, experience and qualifications specific to the work or task being performed:

Provided that where appropriate qualifications and training are registered in terms of the provisions of the South African Qualifications Authority Act, 1995 (Act No. 58 of 1995), these qualifications and training shall be deemed to be the required qualifications and training.

### ***Construction***

Means any work in connection with:

(a) the erection, maintenance, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure;

(b) the installation, erection, dismantling, or maintenance of a fixed plant where such work includes the risk of a person falling;

(c) the construction, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system or any similar civil engineering structure; OR

(d) the moving of earth, clearing of land, the making of an excavation, piling or any similar type of work.

### ***Contractor***

Means an employer, as defined in Section 1 of the Act, who performs construction work and includes principal contractors.

### ***Hazard Identification***

Means the identification and documenting of existing or expected hazards to the health and safety of persons, which are normally associated with the type of construction work being executed or to be executed.

***Health and Safety File***

Means a file, or other record in permanent form, containing the information required as contemplated in these regulations.

***Health and Safety Plan***

Means a documented plan, which addresses hazards, identified and includes safe work procedures to mitigate, reduce or control the hazards identified.

***Health and Safety Specification***

Means a documented specification of all health and safety requirements pertaining to the associated works on a construction site, so as to ensure the health and safety of persons.

***Method Statement***

Means a document detailing the key activities to be performed in order to reduce as reasonably as practicable the hazards identified in any risk assessment.

***Principal Contractor (Main Contractor)***

Means an employer, as defined in Section 1 of the Act who performs construction work and is appointed by the client to be in overall control and management of a part of or the whole of a construction site.

***Risk Assessment***

Means a program to determine any risk associated with any hazard at a construction site, in order to identify the steps to be taken to remove, reduce or control such hazard.

#### **4. NOTIFICATION OF CONSTRUCTION WORK**

- The Principal/Main Contractor shall notify by registered mail, the local relevant Provincial Director of the Department of Labour, before commencing with construction work, of the intended work in the form of Annexure A of the Construction Regulations.
- A copy of the completed Annexure A of the Construction Regulations, as well as proof of notification shall be included in the Health and Safety Plan. (Proof of fax or proof of hand delivery)
- A copy of the completed Annexure A is to be kept on site by the principal Contractor.

#### **5. LEGAL DOCUMENTATION/APPOINTMENTS**

The following documents must be provided in the Health and Safety Plan:

- Health and Safety Policy signed by CEO.
- Letter of good standing with the Compensation Commissioner, Federated Employers or similar insurer.
- Health and Safety Organogram (or table), outlining the Health and Safety Team, as well as the appointment(s) they have under the Act and Regulations (reference to specific section/regulation applicable to appointment)



Example:

Tom Smith  
Section 16(2)  
Construction supervisor CR 6(1)

Dick Smith  
Construction vehicle competent person CR 21(1)(j)  
Excavation competent person CR 11(1)

Harry Smith  
H&S Rep - Section 17(1)

- The competency of each member of the Health and Safety Team must be provided and should include knowledge, training, experience & qualifications specific to the work or task being performed.

Signed copies of the following legal appointments must be provided in the Health and Safety Plan:

APPOINTMENT	OHS-ACT / REGULATION REFERENCE
Section 16.2 appointment	Section 16.2
Health and Safety Representative (if necessary)	Section 17
Health and Safety Committee Members (if necessary)	Section 19
Incident Investigator	GAR 8(2)
First Aiders (Include training certificates)	GSR 3
Fire Fighters	ER 9 & CR 27(h)
Risk Assessor	HC (Incl. Asbestos & Lead); CR 7

The following information must be provided in the Health and Safety Plan:

- Indicate the estimated number of employees to be working on site.
- Indicate the expected number of contractors to be appointed by the Principal/Main Contractor.

The following Competent Persons, **where applicable**, shall be appointed in writing by the Principal/Main Contractor, prior to any work being carried out, and shall adhere to the requirements of the specific sub-regulations.

**The competency of each of these appointed competent persons must be provided and should include knowledge, training, experience & qualifications specific to the appointment.**

EED 02-2024/25

TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY  
132/11KV SUBSTATIONS: AS AND WHEN REQUIRED: OVER A THREE (3) YEAR PERIOD: WITH EFFECT FROM 01 JUNE 2021 OR NEAREST DATE

PART C3A: Annexure A: Health and Safety Specifications

The table below indicates the applicability of the appointments but contractors should by no means be limited to these indications.

APPOINTMENT	OHS-ACT / REGULATION REFERENCE
Construction Supervisor	CR 6 (1)
Assistant Construction Supervisor	CR 6 (2)
Fall Protection Competent Person	CR 8 (1)
Formwork/ Support Work Competent Person	CR 10 (a)
Excavation Work Competent Person	CR 11 (1)
Demolition Work Competent Person	CR 12 (1)
Scaffolding Competent Person	CR 14 (2)
Batch Plant Competent Person	CR 18 (1)
Explosive Powered Tools Competent Person	CR (b) 19
Construction Vehicle and Mobile Plant Competent Person	CR 21 (1)(j)
Electrical Installation Competent Person	CR 22 (d)
Stacking Competent Person	CR 26 (a)
Fire equipment Competent Person	CR 27 (h)
Confined Spaces Competent Person	GSR (5)
Blasting Competent Person	
Safety Officer Full time or part time	CR 6(6)
Traffic Safety Officer	CR 6(6)
General Machinery Competent Person	GMR (2)
Lifting Machines Operators	DMR 18(11)
Pipe Jacking Competent Person	
Competent Person referred to in South African Rail Commuter Corporation Ltd: General conditions and specifications for work on, over, under or adjacent to Railway lines and near High Voltage Equipment. (SPK7/2)	(SPK7/2)

- **Indicate in the H&S Plan, which of these listed appointments are applicable to the construction work in question.**
- no work involving any of the listed appointments may be performed without the knowledge and approval of an appointed competent person.
- The competent person shall be responsible to determine the level of supervision required for each activity.
- The agent/engineer must be informed of any changes made to the above appointments.
- The agent/engineer reserves the right to require from any contractor at any stage to appoint a full or part time construction health and safety officer.

## 6. GENERAL DUTIES OF PRINCIPAL CONTRACTOR

- The principal contractor will be responsible for co-operation between all contractors to ensure compliance to the OHS–Act and Regulations on site.
- To ensure the above, the Principal/Main Contractor must carry out the following and provide proof of such in his H&S plan:
  - Provide health and safety specifications to Contractors.
  - Appoint Contractors in writing.
  - Proof that Contractors H&S Plan has been approved, implemented and maintained.
  - Proof that Contractors are registered with the Compensation Commissioner or similar insurer.
  - Proof that Contractors made provision for the cost of Health and Safety measures during the construction process.
  - A comprehensive & updated list of all contractors on site, also indicating the type of work being done.
  - Copies of Section 37(2) agreements with the relevant contractors.

## 7. SUPERVISION OF CONSTRUCTION WORK

- The agent/engineer must be informed if the Construction Work Supervisor is also appointed as a Construction Supervisor for another site.

## 8. RISK ASSESSMENT

- Risk assessments of all required activities/hazards shall form an integral part of the Health and Safety plan.
- All risk assessments shall be conducted in terms of an acceptable methodology, prior to commencement of work, according to the provisions of CR 7 and should cover at least the following:
  - Excavations
  - Backfilling in trenches
  - Pipe laying
  - Blasting
    - open trench blasting

- pipe jack blasting
    - Identification of existing Services
    - Clearing of vegetation
    - Work in the vicinity of houses/buildings
    - Movement of Construction Vehicles
    - Working in confined spaces
    - Demolition
    - Temporary stockpiling
    - Connecting to existing sewer
    - Accommodation of traffic
    - Accommodation of pedestrians
    - Temporary vehicle bridges
    - Control of access of public/pedestrians to excavations
    - Work surrounding live sewage connection
- All health hazards that can be present during any of the above activities and should include individual dusts, gases, fumes, vapours, noise, extreme temperatures, illumination, vibration and ergonomic hazards due to any of the above activities.
- The above list is by no means exhaustive and should not be limited to these activities but must cover all activities that forms part of the said construction work. Each activity must be split down to individual tasks and all associated hazards identified and listed in the risk assessment. This ensures that critical tasks and subsequent critical hazards are not missed.
- The risk assessment to be included in the H&S Plan must clearly indicate:
  - The methodology used to do the risk assessments.
  - Breakdown of processes and activities covered.
  - High risks anticipated.
- All risk assessments are to be conducted by competent persons as appointed under paragraph 5 of this document. The plan must include a declaration in this regard or the risk assessment must contain the signature(s) of this appointed persons.
- Risk assessments are to be handed to the agent prior to commencement of work.
- The agent reserves the right to stop any work if such work is not conducted in terms of the recommendations of the risk assessment.
- Risk assessments are to **cover safety as well as health and ergonomically hazards.**

## 9. SAFE WORK PROCEDURES

Safe Work Procedures are to form part of the H&S Plan and **must be compiled for all the above-identified activities.**

**The safe work procedures must address the following elements:**

- The work method to be followed to conduct work safely
- Mitigation of identified risks

## PART C3A: Annexure A: Health and Safety Specifications

- Reducing and controlling risks and hazards that have been identified
- Responsibilities of competent persons
- Required personal protective equipment
- Correct equipment/tools/machinery to be used
- Reference to relevant registers to be completed
- Reference to applicable risk assessment
- **The following two tables provides information on all factors to be taken into account when the Risk Assessments and Safe Work Procedures are compiled:**

Physical	Chemical	Biological	Mechanical	Psycho-social
Noise	Liquids	Insects	Guards	Stress
Vibration	Dusts	Fungi	Hand tools	Work pressure
Ionizing radiation	Fumes	Bacteria	Machinery	Monotony
Non-ionizing radiation	Fibers	Viruses		Unsociable hours
Health and cold	Mists			Ergonomically:
Electricity	Gases			• Posture
Pressure	Vapors			• Movement
				• Repetitive tasks

System	Stress/Agency	Illness/Disease
Musculoskeletal	Lifting/loads Repetitive strain Abnormal postures Whole body vibration	Muscular pain syndromes Tenosynovitis Bursitis Osteoarthritis
Sensory	Noise	Hearing loss
Skin	Cement (chromates), rubber Thinners, epoxies Tar, pitch Solar radiation	Allergic contact dermatitis Irritant contact dermatitis Acne, Skin cancer Keratosis, Cancer
Respiratory	Silica Asbestos Spray paints, woods, epoxies Irritant dusts, welding fumes Organic Solvents	Silicosis, TB Asbestosis, Cancer Asthma Bronchitis Headaches, Dizziness, Cancer
Psychosomatic	Physical stress Psychosocial stress	Head aches Depression Fatigue Substance abuse
Nervous System	Lead Organic solvents	Peripheral and central neuropathy Headaches, Dizziness, Mood disorder, Dementia, Cancer

## 10. SAFETY OF PUBLIC/PEDESTRIANS

Access to the construction site must be cordoned off as much as possible in all work areas.

All excavations are to be fenced/barricaded to prevent access by public / pedestrians. Barriers must be of an impenetrable nature – barrier tape will not be seen as a sufficient barrier mechanism.

Work must be planned in such a manner as to ensure that the minimum amount of trenches is left open after hours or during weekends.

No trenches/excavations are to be left open during any December shutdown period.

Temporary pedestrian crosses over excavations are to be of adequate width and provided with sturdy handrails.

## 11. FALL PROTECTION

In addition to the requirements of this regulation (CR 8) the following shall apply:

- The fall protection plan is to be prepared by a competent person. This competent person must sign the fall protection plan.
- Contents of the fall protection plan must cover all the requirements as stated in sub-regulation CR 8.
- The fall protection plan is to be handed to the agent before work commences.
- The level of supervision is to be stated in the fall protection plan.
- Medical certificates, work near edges, presence of dew, dangerous walking areas etc. should be addressed in the fall protection plan.

## 12. REGISTERS

- Examples of the registers listed below must be provided in the Health and Safety Plan.
- All registers must be available at the site offices at all times for inspection by the agent.
- The list of registers to be kept is by no means exhaustive and the H&S Plan should list all the registers that are applicable and at what frequency they are going to be maintained.

ACTIVITY	FREQUENCY	FORMAT
Form work / Support work	Daily, prior to any shift	
Excavation Work	Daily, prior to any shift, after rain or blasting or after unexpected fall of ground	
Scaffolding	Daily, prior to any shift, after rain or blasting.	
Material Hoist	Daily	
Batch Plants	Daily	
Explosive Powered Tools	Daily Before Use	
Crane(s) Logbook	As per DMR 18	
Construction Vehicles and Mobile Plant	Daily	
Temporary Electrical Installation	Weekly	
Stacking	Weekly	
Fire Extinguishers	Bi – Monthly	
Ablution Facilities	Weekly	
Ladders	Weekly	
Incident Register in terms of GAR 9	As Required	Annex 1 of GAR
Fall Protection Equipment	Daily	
Portable electrical tools	Weekly	
Suspended Platforms	Daily	
Accommodation of traffic	Daily	
Fire fighting equipment	Monthly	

### 13. TRAINING

Each Health and Safety Plan shall indicate the following regarding training:

- Name and contents of the following training courses which have to be conducted:
  - Induction Training
  - Training regarding hazards identified and any corrective measures in place
  - Training regarding all applicable regulations
  - Specific training regarding applicable competencies
- Attendance registers must be kept as proof of training provided
- Method of informing visitors and other persons entering the site of hazards prevalent on site.
- Method of providing personal protective equipment to visitors and non-employees.
- An example of ID training card for each employee (if used).
- Methodology to be used in the issuing and communication of written instructions/safe work procedures.

### 14. AGENT HEALTH AND SAFETY INSTRUCTION REGISTER

- All Health and Safety instructions will be given via the resident engineer in writing
- The Principal Contractor shall be required to sign the register at the end of each day to acknowledge any instructions issued.

### 15. GENERAL REQUIREMENTS

- ***Personal Protective Equipment***  
The procedures for issuing and control over PPE shall be indicated in the Health and Safety Plan, as well as the enforcement for the wearing thereof.
- ***Hired Plant***  
The responsibility for the safe condition and use of all hired plant shall be that of the contractor.
- ***Transport of Employees***  
Transport of employees shall be carried out in terms of the National Road Ordinances and the OHS Act - Construction Regulations.  
The Health and Safety Plan shall detail the arrangements and methods of the transportation of workers.
- ***Signs***  
The Principal Contractor shall indicate in his Health and Safety Plan the arrangements regarding the posting of danger signs.
- ***Certificates of fitness***  
The Principal Contractor shall include in his H&S Plan copies of medical fitness certificates for the following:
  - **Crane Operators**
  - **Construction vehicles and Mobile plant operators**
  - **Pipe Jacking employees**

- **Any other medical certificates that might be applicable in terms of the other regulations governing health & safety of construction personnel such as HCS regulations and Noise induced hearing loss etc.**
- **Site Visitors Register**
  - A site visitor's register is to be kept on site and steps are to be taken to ensure that all visitors sign the visitors' register before entering the site.
  - A sign should also be provided directing all visitors to report to
  - the site officer.
- **Safety of excavations**
  - Provision should be made for the utilisation of geo technical services on a monthly basis to independently evaluate the safety off all excavations
  - All excavations are to be fenced/barricaded to prevent access by inter alia children and other members of the public
  - All barricading is to be maintained and protected against theft and vandalism
- **Blasting**
  - A separate Health and Safety Plan will be required from the blasting contractor
  - The Health and Safety Plan must also be approved by the relevant Petronet servitude supervisor
  - All the requirements of the Petronet Standard Crossing Conditions and Requirements for underground Services document (Ref P2-18 (CE8)) must be complied with. This document is attached to the back this Health and Safety Specification.

## 16. HAZARDOUS CHEMICAL SUBSTANCES (including Asbestos and Lead)

In addition to the requirements in the HCS Regulations, the principal contractor must provide proof in the H&S Plan that:

- Material Safety Data Sheets (MSDS's) of the relevant materials/hazardous chemical substances are available prior to use by the contractor. Mention should be made how the principal contractor is going to act according to special/unique requirements made in the relevant MSDS's. All MSDS's shall be available for inspection by the agent at all times.
- Risk assessments are done at least once every two years.
- Exposure monitoring is done according to OESSM and by an AIA and that the medical surveillance programme is based on the outcomes of the exposure monitoring.
- How records are going to be kept safe for the stipulated period of 30 years.
- How the relevant HCS's are being/going to be controlled by referring to:
  - Limiting the amount of HCS
  - Limiting the number of employees
  - Limiting the period of exposure
  - Substituting the HCS
  - Using engineering controls
  - Using appropriate written work procedures
- The correct PPE is being used.
- HCS are stored and transported according to SABS 072 and 0228.
- Training with regards to these regulations was given.
- The H&S plan should make reference to the disposal of hazardous waste on classified sites and the location thereof (where applicable).



**17. ASBESTOS**

Should asbestos be identified as a hazard **whilst work is carried out**, the following must be included in the health and safety plan:

- Notification to the Provincial Director in writing, prior to commencement of asbestos work.
- Proof of a structured medical surveillance programme, drawn up by an occupational medicine practitioner.
- Proof that an occupational health practitioner carried out an initial health evaluation within 14 days after commencement of work.
- Copies of the results of all assessments, exposure monitoring and the written inventory of the location of the asbestos at the workplace.
- Only proof that medical surveillance has been conducted and not the actual records itself since these areas of a confidential nature.
- How records are going to be kept safe for the stipulated period of 40 years.
- Proof that asbestos demolition (if applicable) is going to be done by a registered asbestos contractor and provide proof that a plan of work for such demolition is submitted to an Approved Asbestos Inspection Authority 30 days prior to commencement of the demolition.
- Provide proof that the plan of work was approved by the asbestos AIA and submitted to the provincial director 14 days prior to commencement of demolition work together with the approved standardised procedures for demolition work

**18. LEAD**

Besides the requirements listed under par. 15 should lead be identified as a hazard at the workplace, the following must be included in the health and safety plan or as soon as its available:

- Proof that an occupational health practitioner carried out an initial health evaluation within 14 days after commencement of work.
- Copies of the results of all assessments, exposure monitoring and the written inventory of the location of the lead at the workplace.
- Only proof that medical surveillance has been conducted and not the actual records since these are of a confidential nature.
- How records are going to be kept safe for the stipulated period of 40 years.

**19. NOISE INDUCED HEARING LOSS**

Where noise is identified as a hazard the requirements of the NIHL regulations must be complied with and the following must be included/ referred to in the Health and Safety Plan:

- Proof of training with regards to these regulations.
- Risk assessment done within 1 month of commencement of work.
- That monitoring carried out by an AIA and done according to SABS 083.
- Medical surveillance programme established and maintained for the necessary employees.
- Control of noise by referring to:
  - Engineering methods considered
  - Admin control (number of employees exposed) considered
  - Personal protective equipment considered/decided on

- Describe how records are going to be kept for 40 years.

## 20. LIGHTING

Where poor or lack of illumination is identified as a hazard the lighting regulations must be complied with and the following must be included in the H&S Plan:

- How lighting will be ensured/ provided where daylight is not sufficient and /or after hours are worked.
- Planned maintenance programme for replacing luminaries.
- Proof of illumination levels of artificial illumination equipment.

## 21. HAZARDOUS BIOLOGICAL AGENTS (HBA)

Because of the possible exposure of workers to raw sewage the H&S Plan shall include details of the following:

- The conducting of Risk Assessment specifically aimed at exposure to HBA which shall include the following:
  - Nature and dose of HBA
  - Where HBA may be present and in what physical form
  - The nature of work or process
  - Steps in the event of failure of control measures
  - The effect of the HBA
  - The period of exposure
  - Control measures to be implemented
- Monitoring of exposure of workers shall be conducted to establish whether any worker is infected with an HBA associated with working or being exposed to raw sewage, in terms of the following:
  - By an occupational medical practitioner
  - Before entering the site to establish the workers baseline
  - During the period of the contract the risk assessment indicate possible exposure
  - After completion of the contract
- Medical surveillance should such be required after the above-mentioned by an occupational health practitioner.
- Indication on how all records of assessment, monitoring, etc will be kept, taking into account that records have to be kept for a period of 40 years.
- How exposure to HBA is to be controlled
- The provision of personal protective equipment
- What information and training is to be provided to employees regarding the following:
  - The contents of these regulations
  - Potential risks to health
  - Control measures to be implemented
  - The correct use and maintenance of personal protective equipment
  - The results of the risk assessment.

## **22. COVID 19 PROTOCOL**

The duties of Principal Contractor will be to ensure that the latest COVID-19 OCCUPATIONAL HEALTH AND SAFETY MEASURES IN WORKPLACES are followed:

- COVID-19 (C19 OHS), 2020 No. R.2020 DIRECTIVE BY THE MINISTER OF EMPLOYMENT AND LABOUR IN TERMS OF REGULATION 10 (8) OF THE REGULATIONS ISSUED BY THE MINISTER OF COOPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS IN TERMS OF SECTION 27 (2) OF THE DISASTER MANAGEMENT ACT, 2002 (ACT NO. 57 OF 2002).

## ANNEXURE B

### ENVIRONMENTAL MANAGEMENT PLAN

#### Contents

1.	GENERAL .....	2
2.	ENVIRONMENTAL MANAGEMENT PLAN (CONSTRUCTION) .....	2
2.1.	Site establishment and preparation .....	2
2.2.	Construction staff .....	3
2.3.	Vegetation clearing .....	4
2.4.	Conservation of topsoil.....	4
2.5.	Access roads.....	5
2.6.	Excavation, backfilling and trenching .....	6
2.7.	Levelling .....	7
2.8.	Stockpiling of building materials.....	8
2.9.	Materials handling and storage .....	8
2.10.	Servicing and refueling of construction equipment .....	9
2.11.	Solid waste management.....	10
2.12.	Liquid waste management.....	10
2.13.	Hazardous materials .....	12
2.14.	Erosion protection work .....	13
2.15.	Use and rehabilitation of gravel pits.....	14
2.16.	Run-off from construction camps.....	16
2.17.	Fire .....	16
2.18.	Accidents.....	17
2.19.	Storm and wind conditions .....	17
2.20.	Dust .....	17
2.21.	Noise .....	18
2.22.	Visual.....	18
2.23.	Loitering .....	18
2.24.	Site clean up.....	18

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**1. GENERAL**

- 1.1. This plan is to be adhered to by the Contractors for the life of construction operations; this includes rehabilitation of areas as and when required. The Contractors shall ensure that all construction staff, sub-contractors, suppliers, etc. are familiar with, understand and adhere to the Construction Management Plan. In addition, during construction the Contractors must ensure that all personnel are fully aware of any environmental issues relating to the construction activities that are being undertaken on site and the related environmental precautions that need to be taken. Construction supervisors and crews will be trained to recognize 'chance finds' during construction, and such finds (i) will not be disturbed, damaged or removed and (ii) will be brought to the immediate attention of the relevant authority.
- 1.2. The Client (Council) shall order the Contractors to suspend part or all of the works if the Contractors and/or any sub-contractors, suppliers, etc. fail to comply with the Environmental Management Plan.
- 1.3. Prior to construction the Contractors shall provide layout designs of the site indicating the position of all of the following: offices, ablution facilities, storage areas, workshops, batching plant, stockpile areas (i.e. soil/granular chemicals/cement fines, etc.), waste disposal facilities, hazardous substance storage area, access route, etc. This layout plan is to be submitted to the Client (Council) for acceptance prior to site establishment.
- 1.4. An "Environmental Site Book" should be supplied and kept on site. This book will reflect all issues, and proposed actions as noted during site visits. This site book should be in the form of a file wherein all Environmental Status Reports are kept. In addition, a separate file containing the EMP should also be kept on site. A copy of the Scoping Report, the EMP report and construction layout plan are to be available on site.
- 1.5. To reduce the effect of habitat loss, construction activities must be planned and implemented in a way that facilitates the restoration of plant communities. Specifications for soil preparation, endemic plant/seed mixes, fertilizer, and mulching should be provided for all areas disturbed by construction activities.
- 1.6. Restoration activities should be accomplished (established) within a year after construction is completed. The minimum vegetation disturbance must be permitted and the removal of vegetation must be managed and monitored to ensure a minimum exposed period. Monitoring must occur to ensure that revegetation was successful, plantings were maintained, and unsuccessful plant materials replaced.

**2. ENVIRONMENTAL MANAGEMENT PLAN (CONSTRUCTION)****2.1. Site establishment and preparation**Management Action:

- 2.1.1. Limit site to existing road and/or already disturbed areas as far as possible.

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- 2.1.2. Demarcate the boundaries of the total works site clearly for site management purposes. The preferred method of demarcation consists of steel droppers placed at regular intervals with nylon rope between the markers.
- 2.1.3. Fence off entire works area with 2.4m high temporary fence.
- 2.1.4. The Contractors shall maintain the demarcation line and ensure that materials used for construction on site do not blow or move outside the site and environs, or pose a threat to animals.
- 2.1.5. The Contractors shall restrict construction activities to within these boundaries. This extends to ensuring that all construction personnel and equipment remain within the demarcated construction site at all times.
- 2.1.6. Routes for temporary access and haul roads are to be located within the approved demarcated areas and vehicle movement is to be confined to these roads.
- 2.1.7. Movement of vehicles outside the designated working areas is not permitted.
- 2.1.8. Clearly indicated which activities are to take place in which areas within the site e.g. the mixing of cement, stockpiling of materials, etc. Limit these activities to single sites only, preferably on the existing road or otherwise on an already disturbed area.
- 2.1.9. Remove all markers when the construction phase comes to an end.
- 2.1.10. Fully rehabilitate (e.g. clear and clean area, rake, pack branches, etc.) the disturbed areas and protect them from erosion.
- 2.1.11. The Contractor shall only prune or remove vegetation where absolutely necessary. No large trees shall be removed. Topsoil should be stockpiled for later use in revegetation efforts.

## 2.2. Construction staff

### Management Action:

- 2.2.1. Demarcate the boundaries of the construction staffs' eating and storage areas by means of a 1.5m diamond mesh fence.
- 2.2.2. Adequate ablutions must be erected on site for construction staff. It is critical that the services (water and sewerage) be properly monitored to ensure that these services are not overused or overloaded. Adequate provision for water shall be made for construction, drinking and washing.
- 2.2.3. Construction staff (emergency only) may only be accommodated on site once all the necessary services (water, sewerage and waste) are in place.
- 2.2.4. Dry chemical toilets must be made available on site.
- 2.2.5. Chemical toilets shall be cleaned and serviced regularly.
- 2.2.6. A designated place for food preparation and eating must be established.
- 2.2.7. An adequate number of refuse bins shall be provided.
- 2.2.8. No pets allowed on site.

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2.2.9. All staff to be identifiable through identity badges.

2.2.10. No explosives (with the exception of blasting requirements) or fire-arms to be permitted on site.

2.2.11. No open fires will be allowed.

### 2.3. Vegetation clearing

#### Management Action:

2.3.1. While bush will have to be undertaken in some areas, the areas needing to be cleared and the degree of clearing required will be determined and demarcated prior to construction. Ancillary activities, such as stockpiles, and storage yards, will be demarcated to areas already disturbed or where they will cause minimal disturbance.

2.3.2. Identify areas to be affected by construction and secure plant species/habitat in these areas. Prevent unnecessary harvesting, destruction and removal of plant material.

2.3.3. No large trees (with trunk diameter exceeding 200mm) are to be removed.

2.3.4. Consider the selective trimming of branches to allow for free vehicle movement before opting to remove any trees.

2.3.5. Remove alien/exotic vegetation, and monitor regularly.

2.3.6. Ensure no exotic vegetation is introduced into the surrounding natural habitat.

2.3.7. All sites disturbed by construction activities shall be monitored for colonization by invasive alien plant species.

2.3.8. The collection of firewood for cooking and other uses is strictly prohibited.

2.3.9. The Contractors may not deface, paint or otherwise mark and/or damage natural feature/vegetation on the site. Any features/vegetation defaced by the Contractors shall be restored.

### 2.4. Conservation of topsoil

#### Management Action:

2.4.1. The Contractors are required to strip topsoil (as defined in this specification) together with grass/groundcover from all areas where permanent or temporary structures are located, construction related activities occur, and access roads are to be constructed, etc.

2.4.2. Topsoil is to be handled twice only – once to strip and stockpile, and secondly to replace, level, shape and scarify.

2.4.3. Topsoil is to be replaced along the contour.

2.4.4. Topsoil is to be replaced by direct return where feasible (i.e. replaced immediately on the area where construction is complete), rather than stockpiling it for extended periods.

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- 2.4.5. Topsoil stockpiles are not to exceed 1,5m in height and should be protected by a mulch cover. This mulch cover must not contain alien vegetation/seeds.
- 2.4.6. Topsoil stockpiles are to be maintained in a weed free condition.
- 2.4.7. Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it.
- 2.4.8. Topsoil, which is to be stockpiled for periods exceeding 4 months, is to be vegetated. A groundcover or grass seeding may be specified.

## 2.5. Access roads

### Management Action:

- 2.5.1. All disturbed areas along the fringes of the road must be rehabilitated once the road is complete.
- 2.5.2. Contractors will be required to submit a delivery timetable. Strict control is to be exercised over entering and exiting traffic and delivery procedures.
- 2.5.3. Special attention will be paid to limit the number of deliveries as far as possible.
- 2.5.4. Any damage caused by the construction activities to the access roads must be rehabilitated completely upon completion of the works.
- 2.5.5. Proactively protect steep access roads and cuttings against erosion. Mitre drains, Reno mattresses, extended concrete drifts, drainage pipes, etc. should be considered for this.
- 2.5.6. Any cement and gravel spillage on the roads is to be cleared up completely.
- 2.5.7. Construction staff should only use authorised paths and roads.
- 2.5.8. Construction access roads should not be wider than necessary with a maximum of 3m.
- 2.5.9. If two-way traffic is to take place, passing bays are to be used to prevent access/detours into the surrounding areas, unless otherwise stated. The drivers delivering construction materials to site are to be made aware of this and are to be forced to utilise the passing bays. They may not drive off the road in order to allow another vehicle to pass.
- 2.5.10. During the contract period, the Contractors shall ensure that all existing water attenuation and drainage structures are maintained in a state in which they can optimally perform their function.
- 2.5.11. Vehicles used during construction or to transport material or staff on site, should have the minimum impact on the environment (trees, roads or other) or other road users. The size, height and weight of vehicles must be kept in mind; the access route will determine the type of vehicle that can be used.
- 2.5.12. Construction vehicles are to be maintained in an acceptable state of repair and cleanliness when leaving the site. Sand, dust and spillages from these vehicles that inevitably fall on the main roads should be cleared on a regular basis.

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2.5.13. Drivers of all vehicles on site are to be licensed.

2.5.14. Upon completion of the construction period, the Contractors shall ensure that the access roads are returned to a state no worse the prior to construction commencing.

2.5.15. Continual use of dirt access roads by heavy machinery and increased transport loads means they will have to be carefully monitored and regularly graded as soon as potholes or rutting occurs.

2.5.16. Traffic speeds on the site need to be reduced to a maximum of 25km/hour and regular application of water on gravel road surfaces may be required to prevent high dust disturbance.

## 2.6. Excavation, backfilling and trenching

### Management Action:

2.6.1. Excavation of sand to solid ground to be done carefully and appropriate drainage incorporated i.e. sand and debris need to be removed and solid rock preferably exposed to ensure proper binding with concrete material.

2.6.2. Construction must preferably be extended over rocky substrate to give maximum anchoring opportunity.

2.6.3. Blasting operations, if required, to be planned by competent specialists, with due regard to adjacent land users. Blasting to be programmed in cooperation with adjacent land owners to result in the most impact limiting operation.

2.6.4. Record to be kept of infrastructure and facility conditions prior to and after the blasting operations.

2.6.5. Consider using any excess rocks or boulders that were excavated from the construction site for any erosion protection work which is required on site. Consider removing the rocks for the packing of gabions at other soil erosion sites.

2.6.6. If need be, spread the rocks in as natural a manner as possible in the veld along the access roads. This should be considered as the last option only and only if a few excess rocks remain.

2.6.7. Similarly, excess sand as a result of excavation activities is not to be dumped along the roadsides.

2.6.8. Removed soil is to be used to backfill areas where required and excess is to be landscaped into natural looking banks that fit the surrounding topography.

2.6.9. During excavation, topsoil is to be conserved.

2.6.10. Excavated material is to be stockpiled along a pipeline trench within the working servitude, unless otherwise authorised.

2.6.11. Deficiency of backfill material shall not be made up by excavation in the protected area. Where backfill material is deficient, it should ideally be made up by importation from an approved borrow pit.

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2.6.12. The Contractors shall backfill in accordance with the requirements of progressive reinstatement. 'Progressive reinstatement' is defined as: reinstatement of disturbed areas to topsoil profile on an ongoing basis, immediately after selected construction activities (e.g. backfilling of trench) are completed. This allows for passive rehabilitation (i.e. natural re-colonisation by vegetation) to commence.

2.6.13. The following trenching specification shall apply:

2.6.13.1. The trench will be excavated to a depth of 1m where possible. Where shallow bedrock makes this impractical the trench should only then be excavated to the maximum depth possible.

2.6.13.2. Care will be taken to remove the topsoil and then the subsoil and to stockpile these separately.

2.6.13.3. The pipeline/cable should be placed on a 200mm bed of river sand to protect it.

2.6.13.4. The subsoil will then be backfilled.

2.6.13.5. The topsoil will then be replaced and the entire length of the trench compacted.

2.6.13.6. The trench should be compacted to 90-93% AASHTO.

2.6.13.7. Sections of the trench that are excavated in a roadway should be compacted to 98% AASHTO.

2.6.14. Contract personnel at all levels to be made aware of potential archaeological and/or paleontological artefacts/occurrences.

2.6.15. Any discovery of artefacts to be reported immediately to SAHRA.

2.6.16. Works in areas where artefacts are discovered are to cease immediately until the area has been investigated and a go-ahead has been obtained from SAHRA.

## 2.7. Levelling

### Management Action:

2.7.1. Excess sand and soil resulting from levelling activities of the work area should be stored in low heaps either on the access road or already disturbed area.

2.7.2. Excess topsoil is to be spread evenly over the area in a manner that blends in with the natural topography.

2.7.3. Excess stockpiled building material is to be removed completely and the areas levelled.

2.7.4. Once heavy machinery has cleared the bulk of these material stockpiles, the disturbed areas should be levelled and cleared of any foreign material manually. It is unacceptable to leave foreign material behind with the knowledge that it will become hidden amongst the rejuvenating vegetation with time.

2.7.5. Regular inspections must be undertaken to monitor and audit the effects and impacts of such removals.

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## 2.8. Stockpiling of building materials

### Management Action:

- 2.8.1. Limit to demarcated sites only.
- 2.8.2. Single sites should be a priority. This may not always be possible for example heaps of topsoil, but should definitely be the case for activities such as the mixing of cement.
- 2.8.3. Stockpiles of expensive materials such as bags of cement should be such that they can easily be removed from the site over weekends or during rainy weather.
- 2.8.4. Specific sites should be allocated for waste e.g. empty cement bags, discarded planks, etc. A low temporary fence should possibly be erected around such a site in order to contain the waste and assist the effective removal thereof from the site.
- 2.8.5. A specific site should be allocated for the storage and handling of diesel, grease, oils, solvents and soap, which create cleaning and disposal issues. This area should be banded, and thus should take place in the area allocated for permanent storage of such materials.
- 2.8.6. Fuels required during construction shall be stored in a central depot at the construction camp. This storage area must be banded.
- 2.8.7. Rehabilitate the sites as required.

## 2.9. Materials handling and storage

### Management Action:

- 2.9.1. Tanks containing fuel shall have lids, which are to remain firmly shut.
- 2.9.2. Fuel stores shall be placed on a concrete, or similar, base surrounded by a brick bund.
- 2.9.3. The bund shall have a volume of 30% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- 2.9.4. The slab shall be sloped towards a sump to enable any spilled fuel and water to be removed.
- 2.9.5. Any wastewater collected at the sump shall be disposed of as hazardous waste.
- 2.9.6. Gas and liquid fuel shall not be stored in the same storage area.
- 2.9.7. No smoking shall be allowed inside the stores or within 3m of a bund.
- 2.9.8. The Contractors shall ensure that there is adequate fire-fighting equipment at the fuel stores.
- 2.9.9. Do not store fuels and chemicals under trees.
- 2.9.10. Exercise extreme care with the handling of diesel and other toxic solvents so that spillage is minimised.
- 2.9.11. Excess concrete from mixing shall be deposited in a designated area awaiting removal to an appropriate landfill site. Liquid wastes to be treated at an approved facility.

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2.9.12. The Contractors shall ensure that all operations that involve the use of cement and concrete are carefully controlled.

2.9.13. Concrete mixing shall only take place in the construction camp or in agreed specific areas on site.

2.9.14. Concrete shall not be mixed directly on the ground. No mixed concrete shall be deposited directly onto the ground prior to placing. A board or other suitable platform/surface is to be provided onto which the mixed concrete can be deposited whilst it waits placing.

2.9.15. All visible remains of excess concrete shall be physically removed immediately and disposed of as waste.

2.9.16. Timber products should be treated off-site prior to use in construction.

2.9.17. Periodic on-site application of timber treatment products (for maintenance purposes) should take place with due care for the nature of the product (toxicity) and for potential spillages that may occur. Areas where timber is to be treated should have secondary containment measures instituted, such as the placement of plastic layer (some form of covering) over soils, beneath the timber structures to prevent contamination of the soil surface.

## 2.10. **Servicing and refueling of construction equipment**

### Management Action:

2.10.1. The Contractors shall ensure that servicing and/or refuelling of vehicles and equipment takes place within the construction camp.

2.10.2. Should construction vehicles have to serviced on site, it must be done in a designated area with a concrete floor and drain system that will prevent oils and fuels from contaminating the environment.

2.10.3. The ground under the servicing and refuelling areas shall be protected against pollution caused by spills and/or tank overfills (bunded/lined).

2.10.4. All water run-off from these areas shall be collected, contained on site and stored in water-tight containers prior to disposal off-site as hazardous waste

2.10.5. All equipment that leaks shall be repaired immediately or shall be removed from site.

2.10.6. The Contractors shall only change oil or lubricant at agreed and designated locations, except if there is a breakdown or emergency repair, and then any accidental spillages must be cleaned up/removed immediately.

2.10.7. In such instances the Contractors shall ensure that he has Drizit pads or similar, and/or drip trays available to collect any oil or fluid.

2.10.8. The only permitted method of refuelling and refilling lubricants is by means of a pump.

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**2.11. Solid waste management****Management Action:**

- 2.11.1. If construction workers are to eat on site other than at the construction camp, the Contractors shall designate specific areas for eating and shall provide adequate steel refuse bins at all places. The refuse bins shall be cleaned on a daily basis.
- 2.11.2. The bins shall be provided with lids and an external closing mechanism to prevent their contents blowing out and shall be scavenger-proof.
- 2.11.3. The Contractors shall supply steel waste bins/skips throughout the site at locations where construction personnel are working
- 2.11.4. The Contractors shall not dispose of any waste and/or construction debris by burning, or by burying.
- 2.11.5. The Contractors shall ensure that all personnel immediately deposit of waste in waste bins for removal by the Contractors.
- 2.11.6. All waste shall be disposed of off-site at an approved landfill site.
- 2.11.7. Remove loose building materials and waste from the site and dispose of them at an appropriate waste disposal site.
- 2.11.8. Old cement mixing bags shall be placed in wind and spill proof containers as soon as they are empty. The Contractors shall not allow closed, open or empty bags to lie around the site.
- 2.11.9. All waste, which includes cigarette butts, cable ties, paper, plastic, tin, glass, organic waste like fruit pips and peels, planks, wire, tins of grease, etc. must be transported in an appropriate manner (e.g. plastic rubbish bags) to an appropriate waste site.

**2.12. Liquid waste management****Management Action :**

- 2.12.1. Construction water refers to all water affected by construction activities.
- 2.12.2. The Contractors may discharge 'clean' silt laden water overland and allow this water to filter into the ground. However, they shall ensure that they do not cause erosion as a result of any overland discharge.
- 2.12.3. All washing of plant/equipment/concreting equipment etc. shall take place within the construction camp.
- 2.12.4. Water from washing operations shall be collected in a conservancy tank removed from site and disposed of in the agreed manner.
- 2.12.5. The Contractors are encouraged to recycle dirty wash water to minimise the amount to be removed off-site.
- 2.12.6. Trucks delivering concrete shall not be washed on site.

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- 2.12.7. All washing operations shall take place off-site at a location where wastewater can be disposed of in an acceptable manner.
- 2.12.8. Adequate ablution facilities to be provided on site, conveniently located near to work areas to avoid localised water pollution from camp sewerage.
- 2.12.9. Neither the river nor any other natural watercourse is to be used for cleaning of tools or any other apparatus. This includes for purposes of bathing, or washing of clothes etc.
- 2.12.10. A drainage diversion system is to be installed to divert runoff from areas of potential pollution, e.g. batching area, vehicle maintenance area, workshops, chemical and fuel stores, etc.
- 2.12.11. No spills may be hosed down into a storm water drain or sewer, or into the surrounding natural environment.
- 2.12.12. Discard construction waste at a registered waste management facility/landfill site, particularly those wastes or products that could impact on surface or groundwater quality by leaching into or coming into contact with water.
- 2.12.13. Construction vehicles are to be maintained in an acceptable state of repair and cleanliness when leaving site. Sand, dust and spillages from these vehicles that inevitably fall on the main roads should be cleared on a regular basis.
- 2.12.14. All soil contaminated, for example by leaking machines, refuelling spills, etc., is to be excavated to the depth of contaminant penetration, placed in 200 litre drums and removed to an appropriate landfill site.
- 2.12.15. The Contractors shall contain wash water from cement mixing operations, by directing the water into a sump for collection. The material contained in the sump shall be removed to an appropriate landfill site.
- 2.12.16. Water and slurry from concrete mixing operations shall be contained to prevent pollution of the ground surrounding the mixing points.
- 2.12.17. All visible remains of excess concrete shall be physically removed immediately and disposed as waste. Washing the visible signs into the ground is not acceptable. All excess aggregate shall also be removed.
- 2.12.18. Where, due to construction requirements, pollution of a water body may potentially occur, the Contractors are to ensure adequate measures (e.g. attenuation/settlement dams/oil absorbent products) are in place to prevent pollution. A method statement is to be provided to this effect.
- 2.12.19. Exercise extreme care with the handling of diesel and other toxic solvents so that spillage is minimised.
- 2.12.20. The Contractors shall take reasonable precautions to prevent the pollution of the ground and /or water resources on and adjacent to the site as a result of his activities.

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- 2.12.21. Such pollution could result from the release, accidental or otherwise, of chemicals, oils, fuels, sewage and waste products, etc.
- 2.12.22. The Contractor shall obtain Drizit pads or similarly designed products or materials to soak up oil, petrol and diesel.
- 2.12.23. These materials shall be readily available for use wherever construction equipment is working, fuel and lubricants are being offloaded and stored and equipment is filled and serviced.
- 2.12.24. The Contractors shall ensure that he is familiar with the correct use and disposal of any materials designed to soak up petroleum products.
- 2.12.25. The Contractors shall ensure that no oil, petrol, diesel, etc. is discharged onto the ground.

### 2.13. Hazardous materials

#### Management Action:

- 2.13.1. The Contractors shall comply with all national, regional and local legislation with regard to storage, transport, use and disposal of petroleum, chemical, harmful and hazardous substances and materials.
- 2.13.2. The Contractors shall obtain the advice of the manufacturer with regard to the safe handling of such substances and materials.
- 2.13.3. The Contractors shall provide a list of all petroleum, chemical, harmful and hazardous substances and materials on site, together with storage, handling and disposal procedures for these materials.
- 2.13.4. The Contractors shall furthermore be responsible for the training and education of all personnel on site who will be handling the material about its proper use, handling and disposal.
- 2.13.5. Storage of all hazardous material is to be safe, tamper proof and under strict control.
- 2.13.6. Petroleum, chemical, harmful and hazardous waste throughout the site shall be stored in enclosed bunded areas. The bunded areas shall be clearly marked. Such waste shall be disposed of off site at a hazardous waste disposal site.
- 2.13.7. The bunded area is to be sufficiently large to contain a spillage equivalent to the volume of one container of the substances stored.
- 2.13.8. Temporary fuel storage tanks and transfer areas also need to be located on an impervious surface adequately bunded to contain accidental spills. Appropriate run-off containment measures must be in place.
- 2.13.9. All products to be dispensed from 200 litre drums shall be done with appropriate equipment, and not dispensed by tipping of the drum.
- 2.13.10. Any accidental chemical/fuel spills to be corrected immediately.

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2.13.11. Fuels, solvents and other wastes will be stored in vessels equipped with secondary containment structures and will be removed from the concession area and the park being disposed of in compliance with national and local requirements

2.13.12. The containers in which the products are kept should, in compliance with hazardous material management procedures, be removed from the site once empty. Hazardous products should otherwise be stored on adequately bunded surfaces in the designated hazardous material storage areas.

#### 2.14. **Erosion protection work**

##### Management Action:

2.14.1. Correct any cause of erosion at the onset thereof through the most appropriate mechanism.

2.14.2. Soils should not be stripped when they are wet. This can lead to compaction and loss of soil structure.

2.14.3. During construction the Contractors shall protect all areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible and by taking such other measures as may be necessary to prevent surface water being concentrated in water sources and from scouring the slopes, banks or other areas.

2.14.4. In essence soil erosion protection is about reducing the velocity of water run-off in the disturbed areas. There are many appropriate methods, depending largely upon the size and topography of the area to be protected against erosion.

2.14.5. The stabilisation of disturbed areas, access roads and/or steep cuttings is very site specific and could include:

2.14.5.1. Mitre drains;

2.14.5.2. Drainage pipes;

2.14.5.3. Reno mattresses (biodegradable material, upon which soil and rocks are packed which then keeps it in place to bind the soil);

2.14.5.4. Benches (consisting of sand bags);

2.14.5.5. Gabions;

2.14.5.6. Gabion mattresses;

2.14.5.7. Scarifying (ripping) areas along the natural contours; or

2.14.5.8. Packing branches and rocks in small gullies and disturbed areas.

2.14.6. Drainage of access routes and mitre drains to be maintained and kept open and functional.

2.14.7. Block off access to gravel pits and temporary routes so as to prevent them being used as 'roads' at a later stage.

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2.14.8. Surface erosion protection measures shall be required to prevent erosion where slopes are steeper than 1:8 on all soil types.

2.14.9. Erosion protection measures required should include all or some of the below, as specified by the Engineer:

2.14.9.1. Use of groundcover or grass, retention of as much of the indigenous vegetation as possible;

2.14.9.2. Construction of cut off berms (earth and/or rock pack) – these are to be angled across the contour and normally would approximate an angle of 30° from the bisector of the contour;

2.14.9.3. Placing of brush wood on bare surface;

2.14.9.4 Hard landscaping, e.g. gabions etc.

2.14.10. Scour chambers are to be fitted with energy dissipaters, or the jet of water directed onto a protected (i.e. grouted stone pitching/rock pack/Reno mattress) area to dissipate water velocity and to control and prevent erosion.

2.14.11. Storm water drainage measures shall be required on site to control runoff and prevent erosion.

## 2.15. Use and rehabilitation of gravel pits

### Management Action:

2.15.1. The extent of the borrow area (envelope area) is to be clearly explained to the contractors prior to the commencement of gravel extraction activities. This gravel area is not to be increased.

2.15.2. Topsoil is to be stockpiled separately and used to recover and rehabilitate the pits after use.

2.15.3. Plan to reuse the soil, as soon as possible; the biological components will deteriorate over long periods of storage.

2.15.4. Do not stockpile in large piles. Store in low heaps no more than one or two metres high to best retain the organic components in good condition.

2.15.5. The stockpiles should be located where they will not be disturbed by activities within the gravel pit. Disturbing the topsoil can further damage the soil structure prior to final reuse.

2.15.6. Soils should not be stripped when wet. This can lead to compaction and loss of structure of the soil.

2.15.7. The stripping of the gravel pit to solid bedrock with no chance for rehabilitation should be avoided. Such areas within the gravel pit should be rehabilitated immediately.

2.15.8. The natural slopes in the area, which have evolved as a result of natural erosion processes, should be studied and used as a guideline to determine the inclination of

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the reconstructed slopes. Obviously, the size of the area to be rehabilitated is a major consideration.

- 2.15.9. Slopes should be designed to reduce the velocity of the run-off as the catchment area of the increases. Where the area of the site limits formation of the stable slope profile, contoured benches or similar erosion control methods may be required. Slopes with an overall convex profile should always be avoided.
- 2.15.10. Where the size of the slope area to be rehabilitated is small, benches consisting of sandbags can be considered. These temporary structures should under no circumstances be left in a place beyond their projected life, as they will deteriorate in a very short period of time.
- 2.15.11. Benches are best located in the middle of the slope. Where long spaces cannot be avoided several benches may be required. In such cases the slope and run-off characteristics must be considered.
- 2.15.12. The site must be surveyed to maintain the contours. Where banks are graded to direct run-off to specific draw points ensure that run-off is dissipated or properly controlled.
- 2.15.13. Topsoil will commonly not adhere to slopes that are steeper than 27 degrees. The maximum slope for mechanically spreading topsoil is approximately 19 degrees.
- 2.15.14. Depending on the characteristics of the site, such as geology, the nature of the soils and other site specific topographical features, more gentle slopes may be necessary.
- 2.15.15. When contouring, always rip and scarify precisely along the contour. This prevents inadvertently creating down slopes channels.
- 2.15.16. The contour line should be surveyed and marked by posts, if necessary.
- 2.15.17. The ripping should normally be as deep as is possible depending on the material, the equipment that is available and the sub-surface conditions. However, some subsoil conditions (e.g. where boulders are present) may not permit ripping to these depths.
- 2.15.18. The spacing of the lines when ripping or scarifying should be such that they overlap each other.
- 2.15.19. When soil conditions are wet, soil will not break up so avoid ripping and scarifying under wet conditions.
- 2.15.20. Water discharge from small retention structures (e.g. earth embankments and artificially created pits that hold water) should be implemented. Where practical, it can be controlled via corrugated metal or plastic pipe/s that drain the water through the retention structures into a safe discharge area (i.e. one, which does not promote erosion or the creation of another artificial water pit).
- 2.15.21. These temporary structures should under no circumstances be left in place beyond their projected life, as they will deteriorate in a very short period of time.

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2.15.22. The siting of any disposal sites for waste rock, within a specific borrow pit should be considered in the earliest plans. In many cases the filling and rehabilitation of any artificial water pits within the gravel pit could be considered. The site is covered by at least 0,5m of local gravel and then the available topsoil.

2.15.23. Access point to the borrow pit site is closed when not in use.

## 2.16. Run-off from construction camps

### Management Action:

2.16.1. Pumps and other machinery requiring oil, diesel, etc., which are to remain in one position for longer than two days shall be placed on drip trays. The drip trays shall be watertight and shall be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing.

2.16.2. A drainage diversion system is to be installed to divert runoff from areas of potential pollution, e.g. batching area, vehicle maintenance area, workshops, chemical and fuel stores, etc.

2.16.3. Contaminated runoff and wastewater is to be directed into a collection system (e.g. sump, attenuation dam, PVC porta-ponds, etc.) for treatment or collection and disposal. The final collection point (e.g. sump) is to be PVC lined.

2.16.4. Collected contaminated runoff/wastewater is to be pumped out of the final collection point and disposed of at an appropriate waste disposal site. Sump liners are to be treated in the same manner.

## 2.17. Fire

### Management Action:

2.17.1. The Contractors shall take all the necessary precautions to ensure that fires are not started as a result of activities on site.

2.17.2. No open fires for heating or cooking shall be permitted on site.

2.17.3. Closed fires or stoves shall only be permitted at agreed designated safe sites in the construction camp.

2.17.4. Adequate suitable fire fighting equipment shall be provided at each fireplace or stove.

2.17.5. The Contractors shall be responsible for providing the necessary basic fire-fighting equipment.

2.17.6. All equipment shall be maintained in good operating order.

2.17.7. The Contractors shall supply all site offices, kitchen areas, workshop areas, material stores and other areas identified with suitable, tested and approved fire fighting equipment.

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2.17.8. Workers are to be provided with gas for cooking and shall be prevented from burning fires.

2.17.9. No open fires shall be allowed anywhere on site.

2.17.10. The Contractors shall ensure he has the necessary fire fighting equipment on site in terms of SANS 1200. This shall include at least rubber beaters when working in 'veld' areas. A minimum requirement for construction in a high fire risk area shall be a water bowser/cart (minimum 5 000 litres) equipped with pump and hose (min 30m) which shall be permanently on site.

2.17.11. The construction site must also be protected against fire, and a sufficient fire break must be constructed, around the construction site.

2.17.12. A road to be constructed along the entire boundary of the site.

2.17.13. A firebreak to be made along the site boundary road.

## 2.18. Accidents

### Management Action:

2.18.1. The Contractors shall comply with the Occupational Health and Safety Act.

2.18.2. The Contractors shall be responsible for establishing an emergency procedure for dealing with spills or releases of petroleum.

## 2.19. Storm and wind conditions

### Management Action:

2.19.1. Special care will be taken during rainy periods to prevent the contents of sumps from overflowing.

2.19.2. The Contractors shall set up a procedure for rapidly emptying any collection points to prevent their filling with rainwater.

2.19.3. The Contractors shall ensure that rainwater does not run off areas containing pollutants and thus result in a pollution threat.

2.19.4. Stockpiles of the fine material such as sand, topsoil material, cement, etc. must also be protected from runoff and wind.

## 2.20. Dust

### Management Action:

2.20.1. At all times the Contractors shall control dust on site.

2.20.2. Dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments. These impacts include visual pollution on gravel and earth roads.

2.20.3. A dust abatement program shall be used. Standard dust abatement measures include watering or otherwise stabilizing soils, covering haul trucks, employing speed limits on unpaved roads, minimizing vegetation clearing, and promptly revegetating after construction is completed.

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2.20.4. Revegetation plans should be developed for areas impacted by construction activities. Salvaged vegetation, rather than new planting or seeding, should be used to the extent possible.

2.20.5. Efforts to reduce dust and soil loss are to be undertaken, as appropriate, for all excavation, grading, construction, and other dust-generating and soil-disturbing activities.

## 2.21. Noise

### Management Action:

2.21.1. Machinery and vehicle silencer units are to be maintained in good working order. Offending machinery and/or vehicles shall be banned from use on site until they have been repaired.

2.21.2. Noise levels shall be kept within acceptable limits for a protected area, and shall not be of such nature as to detract from the natural experience of other visitors to the protected area.

2.21.3. Music and other social noise to be controlled on site so as to not impose on others.

2.21.4. The Contractors shall at all times use equipment that is appropriate to the task in order to minimise the extent of damage to the environment and minimise noise levels.

2.21.5. Construction work will take place during the day as far as possible.

2.21.6. Work will only be undertaken at night in the case of emergencies.

2.21.7. Work hours will be from approximately 07:00 to 17:00

## 2.22. Visual

### Management Action:

2.22.1. The type and colour of roofing and cladding materials are to be selected to reduce reflection.

2.22.2. Security lighting (both temporary and permanent) and lighting required for specific work activities must be placed such that it is not a nuisance to residents, visitors and the general public. Shields may be required to prevent lights from being visible from other parts of the area.

2.22.3. Construction will only take place at night during emergency situations and not as common practice.

2.22.4. Care will be taken when positioning the lights to ensure the least visual impact, while still providing a safe work environment for construction staff.

## 2.23. Loitering

2.23.1. The contractors shall ensure that loitering around the construction sites is not permitted. This includes job seekers, socialisers, food vendors, squatters, etc.

## 2.24. Site clean up

### Management Action:

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EEBU 08 2025/26

TENDER FOR THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF 11KV SWITCHGEAR PANELS IN VARIOUS PRIMARY  
132/11KV SUBSTATIONS: AS AND WHEN REQUIRED: OVER A THREE (3) YEAR PERIOD: WITH EFFECT FROM 01 JUNE 2021 OR NEAREST DATE

PART C3: ANNEXURE B: ENVIRONMENTAL MANAGEMENT PLAN

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2.24.1. The Contractors shall ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project.

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## CONTENTS

**NOTE:** Larger drawings are available on request.

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Part C4: Site Information



**CENTURION COUNCIL CHAMBERS**  
**CORNER RABIE STREET AND BASDEN AVENUE – DIE**  
**HOEWES, CENTURION**

**Revision 1**

**Drawing No: CCC-1**