



BID DOCUMENT FOR:

APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

BID NUMBER: VDM/TECH/25/07/2024/01

CIDB Grade: 8CE or Higher

BOOK 1 OF 2 (VOLUME 1)

Vhembe District Municipality Supply Chain Management: Contact: Ms. Sigida N Tel: (015) 960 2000 Fax: (015) 962 5277	Vhembe District Municipality Project Management Unit: Contact: Mr E.F. Chauke Tel: (015) 960 2000 Fax: (015) 962 5277
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Name of Bidder.	
Bid Amount (VAT Inclusive)	

Contractor

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VHEMBE DISTRICT MUNICIPALITY

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VHEMBE DISTRICT MUNICIPALITY

**APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE
– CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)**

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VHEMBE DISTRICT MUNICIPALITY

VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

VDM/TECH/25/07/2024/01

PART T1 TENDERING PROCEDURE

T1.1 TENDER NOTICE AND INVITATION TO TENDER

Bids are hereby invited for the project listed below:

BID NUMBER	DESCRIPTION	CIDB GRADING	DOCS AVAILABLE	COMPULSORY BRIEFING SESSION/SITE INSPECTION	CLOSING DATE	TECHNICAL ENQUIRIES
VDM/TECH/25/07/2024/01	APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)	8CE or Higher	11/10/2024	16/10/2024 at 10h00 at Mutale Purification Works	22/11/2024	General Manager Technical Services Mr. W Maluleke Tel: 015 960 2000

Tender documents can be bought from the Vhembe District Municipality, Old Parliament Building, Thohoyandou for a non-refundable fee of **R1991.00** per tender document during office hours from 08h00 -13h00 and 14h00 – 16h00 weekdays.

Completed Tenders in ink and clearly marked **“Contract No.: VDM/TECH/25/07/2024/01”** and **“Contract Description: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)”** must be placed in the Tender Box, VHEMBE DISTRICT MUNICIPALITY, next to Khoroni Hotel (Former Venda Tusk Hotel), Thohoyandou, not later than **12H00 on 22 November 2024**, soon after the tenders will be opened in public at VHEMBE DISTRICT MUNICIPALITY Head Offices. Tenders shall remain valid for a period of **12 weeks** from closing date and no late, faxed, e-mailed or other form of tenders will be accepted. The tender proposal shall be accompanied by an electronic copy in the form of a “USB” memory stick. It is the responsibility of the tenderer to scan all the physical copy submission to avoid disqualification.

Bids will be evaluated in terms of Vhembe District Municipality’s Supply Chain Management Policy, the MFMA SCM Regulations, the Preferential Procurement Policy Framework Act and its Regulations, 2011, the General Conditions of Contract (GCC) and, if applicable, any other Special Conditions of Contract.

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NB: All service providers/bidders are requested to pre-number and initial their documents before submission.

No bid will be accepted from person in the service of the state.

Administrative enquiries can be directed to the Manager Supply Chain Ms. Sigida N.P at telephone number 015 960 2000

**Mr. ZN Kutama
MUNICIPAL MANAGER
OLD PARLIAMENT BUILDING
CNR CASINO BVLD & TSHIVHASE STREET
THOHOYANDOU**

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PART: A: INVITATION TO BID:

MBD1

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE (VHEMBE DISTRICT MUNICIPALITY)					
BID NUMBER:	VDM/TECH/25/07/2024/01	CLOSING	2024/11/22	CLOSING TIME:	12:00
BID DESCRIPTION	APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)				
An official and compulsory briefing session will be held on 16 October 2024 at Vhembe District Municipality at 10h00.					
THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (MBD7) or SERVICE LEVEL AGREEMENT OF VHEMBE DISTRICT MUNICIPALITY.					
BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT (VHEMBE DISTRICT MUNICIPALITY, next to Khoroni Hotel (Former Venda Tusk Hotel) not later than 12:00 on the 22nd of November 2024.					
The Bid box is generally open on weekdays during working hours					
Completed Bid document, fully priced and signed must be sealed in an envelope marked “ BID NUMBER: VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM) ”					
Bidders should ensure that bids are delivered timeously to the correct address. If the bid is late, it will not be accepted for consideration.					
Bid documents containing the Conditions of Bid and other requirements in terms of the Supply Chain Management Policy shall be purchased with a non-refundable cash deposit of R1991.00 charged for each set of documents issued.					
SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUM BER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUM BER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
TAX COMPLIANCE STATUS	TCS PIN:		OR	CSD NO:	
NUMBER OF ITEMS QUOTED					
B-BBEE STATUS LEVEL NUMBER	-----		TOTAL BID PRICE	R	

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B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE [TICK APPLICABLE BOX]	☐ Yes ☐ No	B-BBEE STATUS LEVEL SWORN AFFIDAVIT	☐ Yes ☐ No
[A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE/ SWORN AFFIDAVIT (FOR EMES & QSEs) MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE]			
ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?	☐ Yes ☐ No [IF YES ENCLOSE PROOF]	ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES /WORKS OFFERED?	☐ Yes ☐ No [IF YES, ANSWER PART B:3]
MINIMUM WORK OPPORTUNITIES TO BE CREATED	50	CIDB GRADING	8CE or higher
SIGNATURE OF BIDDER		DATE	
CAPACITY UNDER WHICH THIS BID IS SIGNED			
BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO:		TECHNICAL INFORMATION MAY BE DIRECTED TO:	
MUNICIPALITY	VHEMBE DISTRICT	GENERAL MANAGER	Mr. W Maluleke
CONTACT PERSON	Ms Sigida N	TELEPHONE NUMBER	015 962 2000
TELEPHONE NUMBER	(015) 962 2000	FACSIMILE NUMBER	N/A
FACSIMILE NUMBER	(015) 962 5277	E-MAIL ADDRESS	malulekew@vhembe.gov.za
E-MAIL ADDRESS		Batatise Consulting Engineers (Pty) Ltd: Jabula Nkomo, Telephone: (010) 442 6759 Cell: 068 285 4350 E-mail address: jabula@batatiseconsulting.com	
 EXPANDED PUBLIC WORKS PROGRAMME Creating opportunities towards human fulfilment			

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Witness 2

Employer

Witness 1

Witness 2

PART B TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:	
1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.	
1.2. ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED–(NOT TO BE RE-TYPED) OR ONLINE	
1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.	
2. TAX COMPLIANCE REQUIREMENTS	
2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.	
2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.	
2.3 APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.	
2.4 FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.	
2.5 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.	
2.6 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED; EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.	
2.7 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.	
3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS	
3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?	☐ YES ☐ NO
3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA?	☐ YES ☐ NO
3.3. DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?	☐ YES ☐ NO
3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?	☐ YES ☐ NO
3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?	☐ YES ☐ NO
IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.	

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

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

SIGNATURE OF BIDDER:

CAPACITY UNDER WHICH THIS BID IS SIGNED:

DATE:

VHEMBE DISTRICT MUNICIPALITY

VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

T1.2 TENDER DATA

T1.2.1 CONDITIONS OF TENDER

The conditions of tender are the Standard Conditions of Tender as contained in Annex F of the CIDB Standard for Uniformity in Construction Procurement (SFU) of May 2010, as published in Government Gazette No 33239, Board Notice 86 of 2010 of 28 May 2010. Those Standard Conditions of Tender remained the same as those published in the previous edition of the SFU as published in Government Gazette No 31823, Board Notice 12 of 2009 of 30 January 2009 - See www.cidb.org.za.

Each Tenderer shall obtain its own copy of the Standard Conditions of Tender.

The Standard Conditions of Tender make several references to the Tender Data for details that apply specifically to this tender. In the interpretation of any ambiguity or inconsistency between the Tender Data and the Standard Conditions of Tender, the Tender Data shall have precedence.

Each item of data given below is cross-referenced to the clause in the Standard Conditions of Tender to which it mainly applies.

Clause number	Tender Data
<u>EMPLOYER</u> F1.1	The “Employer” is “Vhembe District Municipality” The Employer’s domicilium citandi et executandi (permanent physical business address) is: Vhembe District Municipality, Old Parliament Building, Thohoyandou. The Employer’s address for communication relating to this project is: Private Bag X 5006, Thohoyandou, 0950
<u>TENDER DOCUMENTS</u> F.1.2	“The following documents form part of this tender: VOLUME 1 Part T1 Tendering procedures T1.1 Tender notice and invitation to tender T1.2 Tender data T1.3 Standard and Particular conditions to tender Part T2 Returnable Documents T2.1 List of Returnable Documents T2.2 Returnable Schedules that will be incorporated into the Contract Part C1 Agreements and Contract Data C1.1 Form of offer and acceptance C1.2 Contract data C1.3 Performance Guarantee C1.4 Occupational Health and Safety Agreement C1.5 Agreement with Adjudicator Part C2 Pricing Data C2.1 Pricing Instructions C2.2 Bill of Quantities

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Clause number	Tender Data
	VOLUME 2 Part C3 Scope of Work C3.1 Standard Specifications C3.2 Project Specifications C3.3 Electrical Specifications C3.4 Mechanical Specifications C3.5 Mechanical: Materials and Workmanship C3.6 Detailed Mechanical Specifications C3.7 OHS Specifications Part C4: Site Information Part C5: Contract Drawings ANNEXURES Annexure 1 Baseline Risk Assessment
<u>EMPLOYER'S AGENT</u> F.1.4	The Employer's agents are: a) Principal Agent Batatise Consulting Engineers. Physical Address: Postal Address: Stone Ridge Office Park Same as physical Address Cnr Witkoppen and, Paulshof Unit 8, 1 Waterford Place, Kleve Hill Park Sandton, Johannesburg 2151 Tel.: +27(0)10 442 6759 Fax: N/A E-mail: info@batatisconsulting.com
<u>TENDERER'S OBLIGATIONS</u>	
<u>Eligibility</u> F.2.1	<i>Only those tenderers who can demonstrate that they will have in their employ management and supervisory staff satisfying the requirement of the scope of work for labour-intensive competencies for supervisory and management staff during the validity of the contract are eligible to submit tenders (NQF Level 5 LIC)</i>
F2.18	<i>The tenderer must submit to the Employer, 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.</i>
<u>Site Visit and Clarification Meeting</u> F.2.7	The arrangements for a compulsory pre-tender meeting are: Location: Mutale District Municipality Date: 16/10/2024 at 10h00.
<u>Insurance</u> F.2.9	No insurance cover will be provided by the Employer.
<u>Alternative Tender Offers</u> F. 2.12	Unless anything to the contrary has been determined in the Contract Data, a Tenderer may, together with tender original designs contained in the contract documents, submit alternative designs and tender offers for consideration. All designs, calculations, drawings and Operation and Maintenance manuals shall be fully endorsed by a third party registered engineer, accomplished in such specific field of practice and the cost thereof shall be borne solely by the Contractor. Such alternative designs and offers shall be subject to the following conditions and requirements:

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Clause number	Tender Data
	5.4.1. <u>Tenders</u> An alternative offer or design will be considered only if the tender for the original items has been fully priced and completed. The alternative tender offer is to be submitted in the same envelope as the main tender offer, together with a schedule that compares the requirements of the tender documents with the alternative requirements the Tenderer proposes. No alternative tender will be considered unless a tender free from qualifications is also submitted. Unless the alternative offer stipulates to the contrary, it shall be assumed that the period for completion of the Works shall be the same as for the original design. Designs, calculations, drawings and a modified schedule of quantities (as determined hereafter) in respect of each alternative offer or design shall accompany the alternative tender offer and shall be endorsed fully by a third party registered engineer, accomplished in such specific field of practice. 5.4.2. <u>Preliminary calculations</u> Preliminary calculations for an alternative design shall be submitted with the tender. Such calculations shall give adequate details so as to enable an assessment to be made of the general efficacy of the design and of its principal elements, also of the degree to which the design prescriptions and codes of the Employer are being complied with. The calculations shall be clear and in a logical sequence and shall clearly reflect all the design assumptions. 5.4.3. <u>Preliminary drawings</u> Preliminary drawings of the alternative designs shall also be submitted with the tender. These drawings shall comprise adequate layout plans, elevations and sections and shall clearly illustrate the general efficacy of the design and its principal elements. 5.4.4. <u>Quantities</u> Each alternative offer shall be accompanied by a modified priced schedule of quantities compiled in accordance with the specifications, in so far as it is applicable, which clearly shows the manner in which the price for the alternative offer has been determined and the items in the original schedule of quantities which fall away or are being changed. In addition to the schedule of quantities, a set of calculations shall be supplied to show how the quantities have been determined. All assumptions in regard to factors which will determine quantities shall be clearly and conspicuously marked by underlining or colouring and shall indicate whether or not the assumptions have been based on information furnished in the Contract Data (with the necessary references). 5.4.5. <u>Further details</u> Should the Employer's Agent find that the calculations and drawings submitted for alternative designs are not complete enough for proper adjudication of the alternative designs, the Employer reserves to itself the right to call on the Tenderer to submit such further calculations and drawings as may be required. If such further details are not submitted within ten days of having been requested, the alternative designs will not be given further consideration. 5.4.6. <u>Preliminary adjudication of alternative designs</u> The Employer's Agent will undertake a preliminary scrutiny of any alternative designs for compliance with the specified requirements of the Employer. Should he find any mistakes or unsatisfactory aspects, he may afford the Bidder the opportunity to rectify them within a period to be determined by the Employer's Agent. However, it is emphasized that the preliminary scrutiny of the design and tender by the Employer's

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Clause number	Tender Data
	Agent, by its very nature, cannot be comprehensive, and no guarantee can be given in this regard that all the mistakes made by the Bidder will in fact be detected. Any correction of such mistakes shall be made with the tender price of the bidder being retained, and, wherever necessary, the priced schedule of quantities for the alternative design shall be adjusted accordingly. 5.4.7. <u>Acceptance of alternative design</u> The Bidder shall note that the acceptance of a tender which includes alternative designs shall mean that the alternative designs have been approved in principle only. If the final calculations, drawings and details do not comply with the specified requirements, such alternative designs may be rejected, unless they are suitably amended by the Bidder so as to be acceptable to the Employer.
<u>Submitting a Tender Offer</u> F2.13	5.5.1. <u>Whole of the Works</u> (Cl. F.2.13.1) Tenderers shall offer to provide for the whole of the Works identified. 5.5.2. <u>Original tender documents</u> (Cl. F.2.13.3) The original tender document, issued to the Bidder, shall be submitted in its entirety, accompanied by an electronic copy in the form of a “USB” memory stick. 5.5.3. <u>Marking of Tender Submissions</u> (Cl. F.2.13.5) The complete tender documents shall be enclosed and sealed in a single envelope, marked: “VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM).” The Employer’s address for delivery of tender offers to be shown on each tender submission package is the Tender Box located at: Vhembe District Municipality, Old Parliament Building, Corner Casino Blvd Street and Tshivhase Street, Thohoyandou 5.5.4. <u>Two envelope system</u> (Cl. F.2.13.6) A two-envelope procedure will not be followed. 5.5.5. <u>Closing time</u> (Cl. F.2.15) The closing time for submission of tender offers is: 12H00 Telegraphic, telephonic, telex, facsimile, e-mail, electronic and late tender offers will not be accepted. 5.5.6. <u>Tender offer validity</u> (Cl. F.2.16) The tender offer validity period is 12 weeks after tender closing date. 5.5.7. <u>Clarification of tender offer after submission</u> (Cl. F.2.17) Delete the last part of the second sentence, commencing with the word “and”. Furthermore, delete the last two sentences of Cl. F.2.17. Add the following sentence: “The rates stated by the Bidder shall be binding”.
	5.5.8. <u>Provide other Material</u> (Cl. F.2.18.1) Upon request by the Employer, the Bidder shall promptly supply any other material that has a bearing on the tender offer, the bidder’s commercial position (including, where applicable, notarized joint venture agreements), preferencing arrangements, or

Contractor

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Clause number	Tender Data														
	samples of materials, considered necessary by the Employer for the purpose of a full and fair assessment. Should the Bidder not provide the information or material called for, by the time for submission stated in the Employer's request, the Employer will regard the tender offer as being non-responsive. 5.5.9. <u>Certificates (Cl. F.2.23)</u> The following certificates are to be provided with this tender: - Valid Central Supplier Database (CSD) number - Compensation Fund registration certificate - Certificate of Contractor Registration issued by the Construction Industry Development Board or a copy of the application Form for registration in terms of the Construction Industry Development Board Act (Form F006). A minimum grading of 8CE is required. Important Note: Failure to provide the required particulars as per the above-listed certificates implies a non-responsive tender and warrants rejection of the tender on account of non-compliance with the requirements of the Tender Data														
<u>EMPLOYER'S UNDERTAKING</u>															
<u>Opening of Tender Submissions</u> F3.4	The time and location for opening of the tender offers are: 12:00 on 22 November 2024 Location: Tender Box, VHEMBE DISTRICT MUNICIPALITY, next to Khoroni Hotel (Former Venda Tusk Hotel), Thohoyandou														
<u>Arithmetical Errors</u> F3.9.1	Delete paragraphs (b) and (c) of Cl. F.3.9.1 and replace with: - If a bill of quantities (or schedule of quantities or schedule of rates) applies and there is an error in the line item resulting from the product of the unit rate and the quantity, the rate shall be binding and the error of extension as entered in the tender offer will be corrected by the Employer in determining the Contract Price. - Where there is an error in addition, either as a result of other corrections required by this checking process or in the Bidder's addition of prices, such error will be corrected by the Employer in determining the Contract Price. - The Contract Price for the completed Contract shall be computed from the actual quantities of authorised work done and compliant with the Contract Data, valued at rates contracted against the respective items in the bill of quantities, schedule of Quantities or schedule of rates and shall include such authorised Provisional Sums and items of extra work as have become payable in terms of the Contract Data.														
<u>EVALUATION OF TENDER OFFERS</u> F3.11	The bids will be evaluated in two stages. The first stage will check whether the bidders have submitted all documents as requested on the advert. The second stage of the evaluation will be based on Functionality, Price (90) and preference points for Specific Goals (10) Goals at which points should be allocated. <table border="1"> <thead> <tr> <th>DESCRIPTION</th><th>TOTAL POINTS</th></tr> </thead> <tbody> <tr> <td>FUNCTIONALITY</td><td></td></tr> <tr> <td>Experience and references (company)</td><td>40</td></tr> <tr> <td>Financial references</td><td>15</td></tr> <tr> <td>Representatives Experience</td><td>15</td></tr> <tr> <td>Qualification of the key staff</td><td>15</td></tr> <tr> <td>Plant and Equipment</td><td>15</td></tr> </tbody> </table>	DESCRIPTION	TOTAL POINTS	FUNCTIONALITY		Experience and references (company)	40	Financial references	15	Representatives Experience	15	Qualification of the key staff	15	Plant and Equipment	15
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Contractor

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Employer

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Witness 2

Clause number	Tender Data				
	Price	90			
	Specific Goals Points	10			
	TOTAL	100			
	Refer to tables 1 to 6 to be completed for points claimed.				
	Service providers who score less than 75% on functionality will be regarded as non-responsive to this bid.				
	TABLE 1A: EXPERIENCE AND REFERENCES				
		TARGETED GOALS Name reference with contact details of projects involving Soil Conservation, Embarkment, Bulk Earth-filling as well as Pump Stations with a contract value of more than R30 million)	MAX POINT TO BE SCORED	POINTS CLAIMED BY TENDERER	ALLOCATED POINTS
	1	Project 1	10		
2	Project 2	10			
3	Project 3	10			
4	Project 4	10			
	SUB TOTAL: Reputation and References	40			
Note: The tender should attach the appointment letters and signed completion certificate issued by the Client as a proof for having completed such project. In case a Contractor was a sub-contractor, letter of appointment of the main Contractor by the Client and Completion certificate of the main Contractor must be attached in order to claim points.					
TABLE 2: FINANCIAL REFERENCES					
	TARGETED GOALS	TENDERED GOAL	POINTS CLAIMED BY TENDERER	ALLOCATED POINTS	
1	Tenderer submitted banking details proof attached	2			
2	Bank rating of "C" or better	8			
3	Registered financial Institution's full details as guarantor in the amount of 10% as specification for surety purposes shall be submitted. (Evaluation Committee to verify)	5			
	SUB TOTAL: Financial References	15			

Contractor

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Witness 2

Employer

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Clause number	Tender Data																																																																	
	Note: proof from the bank or financial institution must be attached. TABLE 3: EXPERIENCE OF KEY STAFF <table border="1"> <thead> <tr> <th></th><th>TARGETED GOALS</th><th>TENDERED GOAL</th><th>POINTS CLAIMED BY TENDERER</th><th>ALLOCATED POINTS</th></tr> </thead> <tbody> <tr> <td>1</td><td>Contract Manager: Minimum five (5) years soil conservation, Embankment, Bulk Earth-filling), reservoirs as well as Pump Stations</td><td>5</td><td></td><td></td></tr> <tr> <td>2</td><td>Site Agent: Minimum five (5) years any Soil Conservation, embankment, Bulk Earth-filling as well as Pump Stations</td><td>4</td><td></td><td></td></tr> <tr> <td>3</td><td>Foreman: Minimum five (5) years bulk water projects</td><td>3</td><td></td><td></td></tr> <tr> <td>4</td><td>Health and Safety Office: Minimum three (3) years of experience in water project</td><td>3</td><td></td><td></td></tr> <tr> <td></td><td>SUB TOTAL: EXPERIENCE REFERENCES</td><td>15</td><td></td><td></td></tr> </tbody> </table> Note: Project organogram of the project team should be attached. Curriculum vitae with detailed experience and contact details should be attached to the tender document for verification by the consultants. TABLE 4: QUALIFICATIONS OF KEY STAFF <table border="1"> <thead> <tr> <th></th><th>TARGETED GOALS</th><th>TENDERED GOAL</th><th>POINTS CLAIMED BY TENDERER</th><th>ALLOCATED POINTS</th></tr> </thead> <tbody> <tr> <td>1</td><td>Contract Manager: Civil Engineering</td><td>Degree = 5 National Diploma =3</td><td></td><td></td></tr> <tr> <td>2</td><td>Site Agent: Civil Engineering</td><td>Degree = 4 National Diploma =3</td><td></td><td></td></tr> <tr> <td>3</td><td>Foreman: Civil Engineering</td><td>Degree = 3 National Diploma =2 Certific= 1</td><td></td><td></td></tr> <tr> <td>4</td><td>Health and Safety Officer</td><td>National diploma = 3 Certific = 2</td><td></td><td></td></tr> <tr> <td></td><td>SUB TOTAL: Financial References</td><td>15</td><td></td><td></td></tr> </tbody> </table> Note: Certified relevant qualifications should be attached. Foreign Qualifications must be accompanied by SAQA Accreditation Certificate TABLE 5: PLANT AND EQUIPMENT <table border="1"> <thead> <tr> <th></th><th>TARGETED GOALS</th><th>TENDERED GOAL</th><th>POINTS CLAIMED BY TENDERER</th><th>ALLOCATED POINTS</th></tr> </thead> <tbody> </tbody> </table>		TARGETED GOALS	TENDERED GOAL	POINTS CLAIMED BY TENDERER	ALLOCATED POINTS	1	Contract Manager: Minimum five (5) years soil conservation, Embankment, Bulk Earth-filling), reservoirs as well as Pump Stations	5			2	Site Agent: Minimum five (5) years any Soil Conservation, embankment, Bulk Earth-filling as well as Pump Stations	4			3	Foreman: Minimum five (5) years bulk water projects	3			4	Health and Safety Office: Minimum three (3) years of experience in water project	3				SUB TOTAL: EXPERIENCE REFERENCES	15				TARGETED GOALS	TENDERED GOAL	POINTS CLAIMED BY TENDERER	ALLOCATED POINTS	1	Contract Manager: Civil Engineering	Degree = 5 National Diploma =3			2	Site Agent: Civil Engineering	Degree = 4 National Diploma =3			3	Foreman: Civil Engineering	Degree = 3 National Diploma =2 Certific= 1			4	Health and Safety Officer	National diploma = 3 Certific = 2				SUB TOTAL: Financial References	15				TARGETED GOALS	TENDERED GOAL	POINTS CLAIMED BY TENDERER	ALLOCATED POINTS
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Contractor

Witness 1

Witness 2

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Witness 2

Clause number	Tender Data																																
	1	1 X Excavator	3																														
	2	1 X Compactor	2																														
	3	1 X TLB	5																														
	4	1 X Tipper truck	5																														
		SUB TOTAL: Plant and Equipment	15																														
	NB: Proof of Ownership to be submitted with tender. If plant will be hired a letter from plant hire company confirming availability is required.																																
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N.B. failure to submit requested document will result in disqualification of points.																																	
Please note that a bidder who does not achieve a minimum of 75 percent will not be evaluated further.																																	
<u>ACCEPTANCE OF TENDER OFFER</u> F3.13	Tender offers will only be accepted if: a) The bidder has in his or her possession a Valid Central Supplier Database (CSD) Number b) The bidder is registered with the Construction Industry Development Board in an appropriate contractor grading designation. A minimum grading of 8CE is required for the main contractor; c) The bidder has demonstrated previous experience with the type of work required under this contract having successfully completed a project of similar scope and size. d) The bidder or any of its principals 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; and e) The bidder has not abused the Employer's Supply Chain Management System. f) The bidder has not failed to perform on any previous contract.																																

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Clause number	Tender Data
	g) has complete the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the bidder's ability to perform the contract in the best interests of the employer or potentially compromise the tender process.
<u>PROVIDE COPIES OF THE CONTRACT DOCUMENT</u> F.3.18	The number of paper copies of the signed Contract to be provided by the Employer to the successful bidder is one
<u>VHEMBE DISTRICT MUNICIPALITY</u> Special No.1	EME's (Exempt Micro Enterprises)/QSE's (Qualifying Small Enterprises: It is a requirement and compulsory of this contract that the successful tenderer must subcontract a minimum of 30% of the value (excluding 10% contingencies, P&Gs and Provisional Sums) of the contract to Local Content (starting from Local subcontractors in local ward, then local Municipality and if skills are not available it can be extended to Vhembe District Municipality.): (a) an EME or QSE; (b) an EME or QSE which is at least 51% owned by black people; (c) an EME or QSE which is at least 51% owned by black people who are youth; (d) an EME or QSE which is at least 51% owned by black people who are women; (e) an EME or QSE which is at least 51% owned by black people with disabilities; (f) an EME or QSE which is 51% owned by black people living in rural or underdeveloped areas or townships; (g) a cooperative which is at least 51% owned by black people; (h) an EME or QSE which is at least 51% owned by black people who are military veterans; or (i) more than one of the categories referred to in paragraphs (a) to (h). Vhembe District Municipality will make available the list of all suppliers registered on a database approved by the National Treasury to provide the required goods or services in respect of the applicable designated groups mentioned above from which the tenderer must select a supplier. The minimum target for participation is thirty percent (30%) of the total contract value (excluding 10% contingencies, P&Gs and Provisional Sums). This can be achieved through either one or more sub-contractors. Information in this regard needs to be provided by the contractor on Forms RDP 2 (E), RDP 2 (E1), RDP 2 (E2), etc. Commitment to these goals will be a condition of award.
<u>VHEMBE DISTRICT MUNICIPALITY</u> Special No.2	Labour Content: The minimum Labour content for this project shall be 5% of the works. Note: At least 60% of this labour content shall be from the LOCAL COMMUNITY where LOCAL COMMUNITY means those in the immediate vicinity of the project. The contractor's own skilled personnel will not be counted towards the said 60%.

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T1.3 STANDARD CONDITIONS OF TENDER

F1 General

F1.1 Actions

F1.1.1 The employer and each Bidder 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 F.2 and F.3, timeously and with integrity, and behave equitably, honestly and transparently, comply with all legal obligations and not engage in anticompetitive practices.

F1.1.2. The employer and the Bidder 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. Bidders 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.

F.1.2 Tender Documents

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

F.1.3 Interpretation

F.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.

F.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.

F.1.3.3 For the purposes of these conditions for the calling for expressions of interest, the following definitions apply:

a) **comparative offer** means the Bidder's financial offer after the factors of non-firm prices, all unconditional discounts and any other tendered parameters that will affect the value of the financial offer have been taken into consideration

b) **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; and

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c) **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

d) **quality (functionality)** means the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs

F.1.4 Communication and employer's agent

Each communication between the employer and a Bidder shall be to or from the employer's representative and also be documented in a form of email or relevant media tools for purpose of records. Writing shall be in the English language. The employer shall not take any responsibility for non-receipt of communications from or by a Bidder. The name and contact details of the employer's representative are stated in the tender data.

F.1.5 The employer's right to accept or reject any tender offer

F.1.5.1 The employer may accept or reject any variation, deviation, tender offer, or alternative tender offer, and may cancel the tender process and reject all tender offers at any time before the formation of a contract. The employer shall not accept or incur any liability to a Bidder for such cancellation and rejection but will give written reasons for such action upon written request to do so.

F.1.5.2 The employer may not subsequent to the cancellation or abandonment of a tender process or the rejection of all responsive tender offers re-issue a tender covering substantially the same scope of work within a period of six months unless only one tender was received and such tender was returned unopened to the Bidder.

F.2 Bidder's obligations

F.2.1 Eligibility

Submit a tender offer only if the Bidder complies with the criteria stated in the tender data and the Bidder, or any of his principals, is not under any restriction to do business with employer.

F.2.2 Cost of tendering

F2.2.1 Accept that, the employer will not compensate the Bidder 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 comply with requirements.

F.2.3 Check documents

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

F.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.

F.2.5 Reference documents

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Witness 1

Witness 2

Employer

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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.

F.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.

F.2.7 Clarification meeting

Attend, where required, a clarification meeting at which Bidders 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.

F.2.8 Seek clarification

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

F.2.9 Insurance

The Bidder is advised to seek qualified advice regarding insurance.

F.2.10 Pricing the tender offer

F.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 Bidder, such duties, taxes and levies being those applicable 14 days before the closing time stated in the tender data.

F.2.10.2 Show VAT payable by the employer separately as an addition to the tendered total of the prices.

F.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.

F.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.

F.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 Bidder. All signatories to the tender offer shall initial all such alterations. Erasures and the use of masking fluid are prohibited.

F.2.12 Alternative tender offers

F.2.12.1 Submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted. The alternative tender offer is to be submitted with the main tender offer together with a schedule that compares the requirements of the tender documents with the alternative requirements the Bidder proposes.

F.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.

Contractor

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Witness 2

F.2.13 Submitting a tender offer

F.2.13.1 Submit a tender offer 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.

F.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 in black ink.

F.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.

F.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 Bidder. Signatories for Bidders 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.

F.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 Bidder's name and contact address.

F.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 Bidder's name and contact address.

F.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.

F.2.13.8 Accept that the employer shall 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.

F.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.

F.2.15 Closing time

F.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. Proof of posting shall not be accepted as proof of delivery. The employer shall not accept tender offers submitted by telegraph, telex, facsimile or e-mail, unless stated otherwise in the tender data.

F.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.

F.2.16 Tender offer validity

F.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.

Contractor

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Witness 2

Employer

Witness 1

Witness 2

F.2.16.2 If requested by the employer, consider extending the validity period stated in the tender data for an agreed additional period.

F.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 total of the prices or substance of the tender offer is sought, offered, or permitted. The total of the prices stated by the Bidder shall be binding upon the Bidder.

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

F.2.18 Provide other material

F.2.18.1 Provide, on request by the employer, any other material that has a bearing on the tender offer, the Bidder'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 Bidder 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.

F.2.18.2 Dispose of samples of materials provided for evaluation by the employer, where required.

F.2.19 Inspections, tests and analysis

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

F.2.20 Submit securities, bonds, policies, etc.

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.

F.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.

F.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.

F.2.23 Certificates

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

F.3 The employer's undertakings

F.3.1 Respond to clarification

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Respond to a request for clarification received up to five working days prior to the tender closing time stated in the Tender Data and notify all Bidders who drew procurement documents.

F.3.2 Issue Addenda

If necessary, issue addenda that may amend or amplify the tender documents to each Bidder during the period from the date of the Tender Notice until seven days before the tender closing time stated in the Tender Data. If, as a result a Bidder applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, will then notify it to all Bidders who drew documents.

F.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 Bidder concerned.

F.3.4 Opening of tender submissions

F.3.4.1 Unless the two-envelope system is to be followed, open valid tender submissions in the presence of Bidders' 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.

F.3.4.2 Announce at the opening held immediately after the opening of tender submissions, at a venue indicated in the tender data, the name of each Bidder whose tender offer is opened, the total of his prices, preferences claimed and time for completion, if any, for the main tender offer only.

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

F.3.5 Two-envelope system

F.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 Bidders' agents who choose to attend at the time and place stated in the tender data and announce the name of each Bidder whose technical proposal is opened.

F.3.5.2 Evaluate the quality of the technical proposals offered by Bidders, then advice Bidders 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 Bidders, who score in the quality evaluation above the minimum number of points for quality stated in the tender data, and announce the score obtained for the technical proposals and the total price and any preferences claimed. Return unopened financial proposals to Bidders whose technical proposals failed to achieve the minimum number of points for quality.

F.3.6 Non-disclosure

Not disclose to Bidders, 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 Bidder.

F.3.7 Grounds for rejection and disqualification

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

F.3.8 Test for responsiveness

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Determine, on opening and before detailed evaluation, whether each tender offer properly received:

- a) meets 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.

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:

- detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work,
- change the Employer's or the Bidder's risks and responsibilities under the contract, or
- affect the competitive position of other Bidders 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.

F.3.9 Arithmetical errors

Check responsive tender offers for arithmetical errors, correcting them in the following manner:

- Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern.
- If bills of quantities (or schedule of rates) 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 will be corrected.
- 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 Bidder's addition of prices, the total of the prices shall govern and the Bidder will be asked to revise selected item prices (and their rates if a bills of quantities applies) to achieve the tendered total of the prices.

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

F.3.10 Clarification of a tender offer

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

F3.11 Evaluation of tender offers

F3.11.1 General

Appoint an evaluation panel of not less than three persons. Reduce each responsive tender offer to a comparative offer and evaluate them using the tender evaluation methods and associated evaluation criteria and weightings that are specified in the tender data.

F3.11.2 Method 1: Financial offer

In the case of a financial offer:

Rank tender offers from the most favourable to the least favourable comparative offer.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Recommend the highest ranked Bidder for the award of the contract, unless there are compelling and justifiable reasons not to do so.

Re-rank all Bidders should there be compelling and justifiable reasons not to recommend the highest ranked Bidder and recommend the highest ranked Bidder, unless there are compelling and justifiable reasons not to do so and the process set out in this subclause is repeated.

F3.11.3 Methods 2: Financial offer and preference

In the case of a financial offer and preferences:

Score each tender in respect of the financial offer made and preferences claimed, if any, in accordance with the provisions of 3.11.7 and 3.11.8.

Calculate the total number of tender evaluation points (T_{EV}) in accordance with the following formula:

$$T_{EV} = N_{FO} + N_P$$

Where: N_{FO} is the number of tender evaluation points awarded for the financial offer made in accordance with 3.11.7;

N_P is the number of tender evaluation point awarded for preferences claimed in accordance with 3.11.8.

Rank tender offers from the highest number of tender evaluation points to the lowest.

Recommend the Bidder with the highest number of tender evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so.

Rescore and re-rank all Bidders should there be compelling and justifiable reasons not to recommend the Bidder with the highest number of tender evaluation points, and recommend the Bidder with the highest number of tender evaluation points, unless there are compelling and justifiable reasons not to do so and the process set out in this subclause is repeated.

F3.11.4 Method 3: Financial offer and quality

In the case of a financial offer and quality:

Score each tender in respect of the financial offer made and the quality offered in accordance with the provisions of 3.11.7 and 3.11.9, rejecting all tender offers that fail to score the minimum number of points for quality stated in the tender data, if any.

Calculate the total number of tender evaluation points (T_{EV}) in accordance with the following formula:

$$T_{EV} = N_{FO} + N_Q$$

Where: N_{FO} is the number of tender evaluation points awarded for the financial offer made in accordance with 3.11.7;

N_Q is the number of tender evaluation point awarded for preferences claimed in accordance with 3.11.9.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Rank tender offers from the highest number of tender evaluation points to the lowest.

Recommend the Bidder with the highest number of tender evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so.

Rescore and re-rank all Bidders should there be compelling and justifiable reasons not to recommend the Bidder with the highest number of tender evaluation points and recommend the Bidder with the highest number of tender evaluation points, unless there are compelling and justifiable reasons not to do so and the process set out in this subclause is repeated.

F3.11.5 Method 4; Financial offer, quality and preferences

In the case of a financial offer, quality and preferences:

Score each tender in respect of the financial offer made, preference claimed, if any, and the quality offered in accordance with the provisions of 3.11.7 to 3.11.9, rejecting all tender offers that fail to score the minimum number of points for quality stated in the tender data, if any.

Calculate the total number of tender evaluation points (T_{EV}) in accordance with the following formula:

$$T_{EV} = N_{FO} + N_P + N_Q$$

Where: N_{FO} is the number of tender evaluation points awarded for the financial offer made in accordance with 3.11.7

N_P is the number of tender evaluation points awarded for preferences claimed in accordance with 3.11.8

N_Q is the number of tender evaluation points awarded for quality offered in accordance with 3.11.9.

Rank tender offers from the highest number of tender evaluation points to the lowest.

Recommend the Bidder with the highest number of tender evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so.

Rescore and re-rank all Bidders should there be compelling and justifiable reasons not to recommend the Bidder with the highest number of tender evaluation points and recommend the Bidder with the highest number of tender evaluation points, unless there are compelling and justifiable reasons not to do so and the process set out in this subclause is repeated.

F3.11.6 Decimal places

Score financial offers, preferences and quality, as relevant, to two decimal places.

Scoring Financial Offers

Score the financial offers of remaining responsive tender offers using the following formula:

$$N_{FO} = W_1 \times A$$

Where: N_{FO} is the number of tender evaluation points awarded for the financial offer.

W_1 is the maximum possible number of tender evaluation points awarded for the financial offer as stated in the Tender Data.

A is a number calculated using the formula and option described in Table 1 as stated in the Tender Data.

Table 1: Formulae for calculating the value of A

Formula	Comparison aimed at achieving	Option 1 ^a	Option 2 ^a
1	Highest price or discount	$A = \left(1 + \frac{(P - P_m)}{P_m} \right)$	$A = P / P_m$
2	Lowest price or percentage commission / fee	$A = \left(1 - \frac{(P - P_m)}{P_m} \right)$	$A = P_m / P$
P_m is the comparative offer of the most favourable comparative offer. P is the comparative offer of the tender offer under consideration.			

F3.11.8 Scoring preferences

Confirm that Bidders are eligible for the preferences claimed in accordance with the provisions of the tender data and reject all claims for preferences where Bidders are not eligible for such preferences.

Calculate the total number of tender evaluation points for preferences claimed in accordance with the provisions of the tender data.

F3.11.9 Scoring quality

Score each of the criteria and subcriteria for quality in accordance with the provisions of the Tender Data.

Calculate the total number of tender evaluation points for quality using the following formula:

$$N_Q = W_2 \times \frac{S_o}{M_s}$$

Where: S_o is the score for quality allocated to the submission under consideration;

M_s is the maximum possible score for quality in respect of a submission; and

W_2 is the maximum possible number of tender evaluation points awarded for the quality as stated in the tender data.

F.3.12 Insurance provided by the employer

No insurance is provided by the employer

F.3.13 Acceptance of tender offer

F3.13.1 Tender Offers will only be accepted on condition that:

the tender offer is signed by a person authorized to sign on behalf of the Bidder;

a valid original Tax Clearance Certificate is included with his tender;

Bidder's declaration of compliance with the Occupational Health and Safety Act No. 85 of 1993 and the construction Regulations 2014 as well as the Bidder's health and safety plan, is included with his tender submission;

a Bidder who submitted a tender as a Joint Venture has included an acceptable Joint Venture agreement with his tender;

the Bidder or a competent authorized representative of the PSP who submitted the tender has attended the compulsory clarification meeting or site inspection;

The Bidder or any of its principals 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;

The Bidder has not abused the Employer's Supply chain Management System or has failed to perform on any previous contract and has been given a written notice to his effect;

The Bidder or any of its principals, directors or managers is not employed in the service of the State or any municipality. In the event that such principals are involved, official approval from the Executing Authority regarding carrying out remunerative work outside of the public service must be included in the tender submission.

The Employer is satisfied that the Bidder or any of his principals have not influenced the tender offer and acceptance by the following criteria:

having offered, promised or given a bribe or other gift or remuneration to any person in connection with the obtaining or execution of this contract;

having acted in a fraudulent or corrupt manner in obtaining or executing this contract;

having approached an officer or employee of the Employer or the employer's Agent with the objective of influencing the award of a contract in the Bidder's favour;

having entered into any agreement or arrangement, whether legally or not, with any other person, firm or company to refrain from tendering for his contract or as to the amount of the Tender to be submitted by either party;

having disclosed to any other person, firm or company other than the Employer, the exact or approximate amount of his proposed Tender;

The Employer may, in addition to using any other legal remedies, repudiate the Tender offer and acceptance and declare the Contract invalid should it have been concluded already.

F.3.13.2 Notify the successful Bidder of the employer's acceptance of his tender offer by completing and returning one copy of the form of offer and acceptance before the expiry of the validity period stated in the tender data, or agreed additional period. Providing the form of offer and acceptance does not contain

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

any qualifying statements, it will constitute the formation of a contract between the employer and the successful Bidder as described in the form of offer and acceptance.

F.3.14 Notice to unsuccessful Bidders

After the successful Bidder has acknowledged the employer's notice of acceptance, notify other Bidders that their tender offers have not been accepted.

F.3.15. Prepare contract documents

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,
- c) other revisions agreed between the employer and the successful Bidder, and
- d) the schedule of deviations attached to the form of offer and acceptance, if any.

F.3.16 Issue final contract

Prepare and issue the final draft of contract documents to the successful Bidder for acceptance as soon as possible after the date of the employer's signing of the form of offer and acceptance (including the schedule of deviations, if any). Only those documents that the conditions of tender require the Bidder to submit, after acceptance by the employer, shall be included.

F.3.17 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.

F.3.18 Provide copies of the contracts

Provide to the successful Bidder 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.

F.3.19 Provide written reasons for actions taken

Provide upon request written reasons to Bidders 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 Bidders or might prejudice fair competition between Bidders.

END OF SECTION

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

VHEMBE DISTRICT MUNICIPALITY

VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

PART T2: RETURNABLE DOCUMENTS

TABLE OF CONTENTS

T2.1 LIST OF RETURNABLE DOCUMENTS

The Tenderer must complete the following returnable documents:

1. Returnable Schedules required only for Tender evaluation purposes

- A. Certificate of Authority of Signatory
- B. Certificate of Registration with the Construction Industry Development Board
- C. Certificate of authority for joint ventures (where applicable)
- D. Compulsory Enterprise Questionnaire
- E. Record of Addenda to Tender Documents
- F. Proposed Amendments and Qualifications
- G. Form of Intent to Provide a Performance Guarantee
- H. Schedule of Subcontractors
- I. Schedule of Available Infrastructure, Resources and Experience
- J. Financial Information of the Tenderer
- K. Certificate for Municipal Services and Payments: Annexure B
- L. Authorisation for deduction of outstanding amounts owed to Council: Annexure C
- M. Declaration of Tenderer's Past Supply Chain Management Practices: MBD 8
- N. Declaration of interest: MBD 4
- O. National industrial participation programme: MBD 5
- P. Declaration for procurement above R10 Million: MBD 5
- Q. Declaration certificate for local production and content: MBD 6.2
- R. Certificate of the Independent Tender Determination: MBD 9
- S. Compliance with OHSA (Act 85 of 1993)
- T. Original Bank rating letter
- U. Day Works
- V. Names of management and supervisory staff for the LIC works
- W. Preference Points Claim Form in Terms of the Preferential Procurement Regulations 2017

2. Other documents required only for Tender evaluation purposes

- CSD Summary report.
- Tax Clearance compliance status letter or Tax clearance compliance number. (MBD2)
- Company Registration certificate.
- Proof of Purchased tender document receipt.
- Proof that the bidder municipal business account or any of the Directors municipal account is not in arrears (N.B. Municipal Clearance not older than three months) or Letter from Traditional Authority indicating that they are not paying rates and taxes.
- CIDB Certificate.
- Audited Financial Statement
- Specific Goals
- Compensation Fund Registration Certificate
- Curricula Vitae of Personnel
- Rates of Labour and Materials (Day work Rates)

3. Schedules for Special Conditions of Tender

- A Labour Content
- B Employment of EME's or QSE's

4. Other documents that will be incorporated into the contract

- 3.1 The offer portion of the C1.1 Offer and Acceptance
- 3.2 C1.2 Contract Data (Part 2)
- 3.3 C2.2 Bills of Quantities

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

VHEMBE DISTRICT MUNICIPALITY

VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

T2.2 RETURNABLE SCHEDULES

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

1. RETURNABLE SCHEDULES REQUIRED ONLY FOR TENDER EVALUATION PURPOSES

- A. Certificate of Authority of Signatory
- B. Certificate of Registration with the Construction Industry Development Board
- C. Certificate of authority for joint ventures (where applicable)
- D. Compulsory Enterprise Questionnaire
- E. Record of Addenda to Tender Documents
- F. Proposed Amendments and Qualifications
- G. Form of Intent to Provide a Performance Guarantee
- H. Schedule of Subcontractors
- I. Schedule of Available Infrastructure, Resources and Experience
- J. Financial Information of the Tenderer
- K. Certificate for Municipal Services and Payments: Annexure B
- L. Authorisation for deduction of outstanding amounts owed to Council: Annexure C
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- P. Declaration for procurement above R10 Million: MBD 5
- Q. Declaration certificate for local production and content: MBD 6.2
- R. Certificate of the Independent Tender Determination: MBD 9
- S. Compliance with OHSA (Act 85 of 1993)
- T. Original Bank rating letter
- U. Day Works
- V. Names of management and supervisory staff for the LIC works
- W. Preference Points Claim Form in Terms of the Preferential Procurement Regulations 2017

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

A: CERTIFICATE OF AUTHORITY OF SIGNATORY

Indicate the status of the Tenderer by ticking the appropriate box hereunder. The Tenderer must complete the certificate set out below for the relevant category.

1	Company	
---	---------	--

2	Partnership	
---	-------------	--

3	Joint Venture	
---	---------------	--

4	Sole Proprietor	
---	-----------------	--

5	Close Corporation	
---	-------------------	--

1. Certificate for company

I,, chairperson of the board of directors of

....., hereby confirm that by resolution of the board

(copy attached) taken on 20.....,

Mr/Ms,

acting in the capacity of, was authorised to sign all documents in connection with this Tender and any contract resulting from it on behalf of the company.

As witnesses:

1.
Chairman

.....
Print Name

2.
Date

.....
Print Name

2. Certificate of partnership

We, the undersigned, being the key partners in the business trading as, hereby authorise Mr/Ms, acting in the capacity of, to sign all documents in connection with the Tender for Contract, and any contract resulting from it on our behalf.

--

Contractor

--

Witness 1

--

Witness 2
Witness 2

--

Employer

--

Witness 1

Name	Address	Signature	Date

NOTE: This certificate is to be completed and **signed by each and all of the key partners** upon whom rests the direction of the affairs of the Partnership as a whole.

3. Certificate for Joint Venture

We, the undersigned, are submitting this Tender offer in Joint Venture and hereby authorize Mr/Ms, authorised signatory of the firm, acting in the capacity of lead partner, to sign all documents in connection with the Tender offer for Contract and any contract resulting from it on our behalf.

This authorisation is evidenced by the attached power of attorney signed by legally authorised signatories of all the partners to the Joint Venture.

Name of Firm	Address	Authorising	
		Signature	Name
Lead Partner			

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

4. Certificate for sole proprietor

I,, hereby confirm that I am the sole owner of the business trading

as

As witnesses:-

1.
Signature: Sole Owner

.....
Print Name

.....
Print Name

2.

.....
Print Name

.....
Date

5. Certificate for Close Corporation

We, the undersigned, being the key members in the business trading as hereby authorise Mr/Ms, acting in the capacity of, to sign all documents in connection with the Tender for Contract and any contract resulting from it on our behalf.

Name	Address	Signature	Date

Note: This Certificate is to be completed and signed by each and all of the key members upon whom rests the direction of the affairs of the Close Corporation as a whole.

.....
Contractor

.....
Witness 1

.....
Witness 2
Witness 2

.....
Employer

.....
Witness 1

B: CERTIFICATE OF REGISTRATION WITH THE CONSTRUCTION INDUSTRY DEVELOPMENT BOARD

1. General

The Register of Contractors is established by the Construction Industry Development Board in terms of the CIDB Act 38 of 2000 and Construction Industry Development Regulations as published in Government Gazette number 26427 of 2004.

The Act makes it mandatory for public sector clients to apply this register when considering Tenders. Any enterprise that submits a Tender or enters into contract for construction works with the public sector, must be registered.

Once-off joint ventures do not have to register, provided that each partner of the joint venture is separately registered.

2. Status

Tenderers shall fill in the following sections of this form, depending on their status:

2.1 Section A

Tenderers who have accomplished registration and can provide proof of their grading designation.

2.2 Section B

Tenderers who are in the process of registration of an update to an existing registration or a renewal.

2.3 Section C

Tenderers who have submitted the first application.

2.4 Section D

Tenderers submitting this Tender offer in Joint Venture and can provide proof that each partner of the Joint Venture is separately registered.

SECTION B

I, acting in capacity of
was authorised to sign all documents in connection with this tender and any contract resulting from it on

behalf of the following entity:
hereby declare that the above mentioned entity has achieved registration with the Construction Industry Development Board on date, furthermore declare that the existing grading designation is:

Contract Value	
----------------	--

Type of Work		
--------------	--	--

and the following update has been applied for:

Amendment of category status	
Change of Particulars	
Annual confirmation of Particulars	
Renewal of Registration	

mark with "❄"

.....
Signature of Tenderer

.....
Signature of Witness

.....
Print Name

.....
Print Name

--

Contractor

--

Witness 1

--

Witness 2
Witness 2

--

--

Employer

--

Witness 1

SECTION C

I, acting in capacity of
was authorised to sign all documents in connection with this tender an any contract resulting from it on

behalf of the following entity:
hereby declare that the above mentioned entity has submitted its FIRST APPLICATION FOR REGISTRATION with the Contraction Industry Development board on date

I furthermore accept that failure to achieve registration with the Construction Industry Development Board in a category stipulated in the Tender Data within 10 days from the date of closing this tender, implies a non-responsive tender and warrants rejection of the Tender on account of non-compliance with the requirements of the Tender Data.

.....
Signature of Tenderer

.....
Signature of Witness

.....
Print Name

.....
Print Name

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

SECTION D																												
I, acting in capacity of the LEAD PARTNER in the Joint Venture was authorised to sign all documents in connection with this tender and any contract resulting from it, hereby declare that each partner of the Joint Venture is separately registered with the Construction Industry Development Board and declare that the grading designation is reflected in the following symbols on the registration certificates:																												
<table border="1" style="width: 100%;"><tr><td colspan="3">Name of Lead Partner:</td></tr><tr><td style="width: 60%;">Contract Value</td><td style="width: 20%;"></td><td style="width: 20%;"></td></tr><tr><td>Type of Work</td><td></td><td></td></tr></table> <table border="1" style="width: 100%;"><tr><td colspan="3">Name of 2nd Partner:</td></tr><tr><td style="width: 60%;">Contract Value</td><td style="width: 20%;"></td><td style="width: 20%;"></td></tr><tr><td>Type of Work</td><td></td><td></td></tr></table> <table border="1" style="width: 100%;"><tr><td colspan="3">Name of 3rd Partner:</td></tr><tr><td style="width: 60%;">Contract Value</td><td style="width: 20%;"></td><td style="width: 20%;"></td></tr><tr><td>Type of Work</td><td></td><td></td></tr></table>		Name of Lead Partner:			Contract Value			Type of Work			Name of 2 nd Partner:			Contract Value			Type of Work			Name of 3 rd Partner:			Contract Value			Type of Work		
Name of Lead Partner:																												
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Type of Work																												
Name of 2 nd Partner:																												
Contract Value																												
Type of Work																												
Name of 3 rd Partner:																												
Contract Value																												
Type of Work																												
..... Signature of Tenderer Print Name	 Signature of Witness Print Name																											

C: CERTIFICATE OF AUTHORITY FOR JOINT VENTURES (WHERE APPLICABLE)

Employer:

Contract Number:

NOTE 1 This form need only be completed in the event of a Joint Venture submitting this Tender.

NOTE 2 Fill in all the information requested in the spaces provided. Attach additional sheets if required.

NOTE 3 Provide a copy of the Joint Venture agreement. Demonstrate that the partners to the Joint Venture share in the ownership, control, management responsibilities, risks and profits of the Joint Venture. The Joint Venture agreement shall include specific details relating to:

- a) the contributions of capital and equipment;
- b) portions of the Contract to be performed by the partner's own resources; and
- c) portions of the Contract to be performed under the supervision of each partner.

NOTE 4 Provide copies of all written agreements between partners concerning the Joint Venture, including those that relate to ownership options and to restrictions/limits regarding ownership and control.

1. Joint Venture Particulars

Name

Postal Address
.....

Physical Address
.....
.....

Telephone

Fax

Name of authorized representative

2. Identity of Partner No. 1

Name
.....

Postal Address
.....

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

Physical Address

.....

Telephone

Fax

Contact Person.....

3. Identity of Partner No. 2

Name

Postal Address
.....

Physical Address

.....

Telephone

Fax

Contact Person
.....

4. Identity of Partner No. 3

Name

Postal Address
.....

Physical Address

.....

Telephone

Fax

Contact Person
.....

5. Description of the role of the partners in the joint venture

Partner No. 1:

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

.....

.....

Partner No. 2:

.....

.....

Partner No. 3:

.....

.....

6. Ownership of the joint venture

(i) Ownership percentage(s) Partner No. 1 %

Partner No. 2 %

Partner No. 3 %

(ii) Partner percentage in respect of:

a) Profit and loss sharing: Partner No. 1 %

Partner No. 2 %

Partner No. 3 %

b) Initial capital contribution Partner No. 1 R.....

Partner No. 2 R.....

Partner No. 3 R.....

(iii) Anticipated ongoing capital contributions:

Partner No. 1 R.....

Partner No. 2 R.....

Partner No. 3 R.....

(iv) Contributions of equipment (specify types, quality and quantities of equipment) to be provided by each partner:

Partner No. 1:

.....

.....

Partner No. 2:

.....

.....

Partner No. 3:

.....

.....

7. Recent contracts performed by partners in their own right or as partners in other joint ventures

a) Partner No. 1

- (i)
- (ii)
- (iii)
- (iv)
- (v)

b) Partner No. 2

- (i)
- (ii)
- (iii)
- (iv)
- (v)

c) Partner No. 3

- (i)
- (ii)
- (iii)
- (iv)
- (v)

8. Control and participation in the joint venture

(Identify by name and firm those individuals who are, or will be, responsible for, and have authority to engage in the relevant management functions and policy and decision

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

making, indicating any limitations in their authority, for example, co-signature requirements and monetary limits).

a) Joint Venture cheque signing

.....

b) Authority to enter into contracts on behalf of the Joint Venture

.....

c) Signing, co-signing or collateralizing of loans

.....

d) Acquisition of lines of credit

.....

e) Acquisition of demand bonds

.....

f) Negotiating and signing of labour agreements

.....

9. Management of the performance of the Contract

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

(Fill in the name and firm of the responsible person)

- a) Supervision of field operations.....
.....
- b) Major purchasing.....
.....
- c) Estimating
.....
- d) Technical management.....
.....

10. Management and control of the joint venture

- a) Identify the managing partner
.....
.....
.....
- b) What authority does each partner have to commit or obligate the other to financial institutions, insurance companies, suppliers, subcontractors or other parties participating in the performance of the contemplated works:

 Partner No. 1:

 Partner No. 2:

 Partner No. 3:

 c) Describe the management structure for the joint venture's work under this Contract

Management Function/Designation	Name	Partner

11. Personnel

- a) State the approximate number of operative personnel (by trade/function/discipline) needed to execute the Joint Venture contract.

Trade/function/discipline	Number

- b) State the number of operative personnel to be employed on the Contract who are currently in the employ of partners:

.....

- c) State the number of operative personnel who are not currently in the employ of the respective partners and shall be engaged on the project by the Joint Venture:

.....

- d) State the name of the individual who shall be responsible for hiring Joint Venture employees:

.....

- e) State the name of the partner who shall be responsible for the preparation of Joint Venture payrolls:

.....

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

12. Services

List the firms who provide the following services:

Service	Name	Contact Person	Telephone No.
Accounting			
Auditing			
Banking			
Insurance			
Legal			

13.

Control and structure of the Joint Venture

Briefly describe the manner in which the Joint Venture is structured and controlled.

.....

.....

The undersigned warrants that he/she is duly authorised to sign this Joint Venture disclosure form and affirms that the foregoing statements are correct and include all the material information necessary to identify and explain the terms and operations of the Joint Venture and the intended participation of each partner in the undertaking.

The undersigned further covenants and agrees to provide the Employer with complete and accurate information regarding actual joint venture work and the payment therefore, and any proposed changes in any provisions of the Joint Venture Agreement, and to permit the audit and examination of the books, records and files of the Joint Venture, or those of each partner relevant to the Joint Venture, by duly authorized representatives of the Employer.

Duly authorized to sign on behalf of:

..... (the Joint Venture)

Signature: Print Name:

Name:

Address:

.....

Telephone:

Date:

Duly authorized to sign on behalf of:

..... (Partner No. 1)

Signature: Print Name:

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

Name:

Address:

.....

Telephone:

Date:

Duly authorized to sign on behalf of:

..... **(Partner No. 2)**

Signature:

Print Name:

Name:

Address:

.....

Telephone:

Date:

Duly authorized to sign on behalf of:

..... **(Partner No. 3)**

Signature:

Print Name:

Name:

Address:

.....

Telephone:

Date:

D: COMPULSORY ENTERPRISE QUESTIONNAIRE

The following particulars must be furnished. In the case of a joint venture, **separate** enterprise questionnaires in respect of each partner must be completed and submitted.

Section 1: Name of enterprise:

Section 2: VAT registration number, if any:

Section 3: CIDB registration number, if any:

Section 4: Particulars of sole proprietors and partners in partnerships

Name*	Identity number*	Personal income tax number*

* Complete only if sole proprietor or partnership and attach separate page if more than 3 partners

Section 5: Particulars of companies and close corporations

Company registration number

Close corporation number

Tax reference number

Section 6: Record in the service of the state

Indicate by marking the relevant boxes with a cross, if any sole proprietor, partner in a partnership or director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months in the service of any of the following:

- | | |
|--|---|
| ☐ a member of any municipal council
☐ a member of any provincial legislature
☐ a member of the National Assembly or the National Council of Province
☐ a member of the board of directors of any municipal entity
☐ an official of any municipality or municipal entity | ☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)
☐ a member of an accounting authority of any national or provincial public entity
☐ an employee of Parliament or a provincial legislature |
|--|---|

If any of the above boxes are marked, disclose the following:

Name of sole proprietor, partner, director, manager, principal shareholder or stakeholder	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		Current	Within last 12 months

*insert separate page if necessary

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

Section 7: Record of spouses, children and parents in the service of the state

Indicate by marking the relevant boxes with a cross, if any spouse, child or parent of a sole proprietor, partner in a partnership or director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months been in the service of any of the following:

☐ a member of any municipal council ☐ a member of any provincial legislature ☐ a member of the National Assembly or the National Council of Province ☐ a member of the board of directors of any municipal entity ☐ an official of any municipality or municipal entity	☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999) ☐ a member of an accounting authority of any national or provincial public entity ☐ an employee of Parliament or a provincial legislature
--	---

Name of spouse, child or parent	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		Current	Within last 12 months

*insert separate page if necessary

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise:

- i) authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my / our tax matters are in order;
- ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004;
- iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption;
- iv) confirms that I / we are not associated, linked or involved with any other Tendering entities submitting Tender offers and have no other relationship with any of the Tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest; and
- v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

Signed		Date	
Name		Position	
Enterprise name			

Contractor

Witness 1

Witness 2

Witness 2

Employer

Witness 1

E: RECORD OF ADDENDA TO TENDER DOCUMENTS

We confirm that the following communications received from the Employer before the submission of this Tender offer, amending the Tender documents, have been taken into account in this Tender offer:			
No.	Date	Title or Details	
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Attach additional pages if more space is required.			
Signed		Date	
Name		Position	
Tenderer			

F: PROPOSED AMENDMENTS AND QUALIFICATIONS

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 F.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		
Signed		Date		
Name		Position		
Tenderer				

A. FORM OF INTENT TO PROVIDE A PERFORMANCE GUARANTEE

If my/our Tender is accepted, I/we will, when required and within the time stipulated, provide a guarantee of

(*) Insurance Company (name)

.....

(of address)

.....

(*) Commercial Bank (Name)

.....

(Branch)

(of address)

.....

.....

to be approved by you, the Employer, for the amount stipulated.

(*) : delete whichever is not applicable.

I/we understand that failure to produce an acceptable Performance Guarantee within the stipulated period is a fundamental breach of Contract, entitling the Employer to:

- (i) withhold all payments which may be due to the Contractor pending compliance with the stipulated requirements to produce an acceptable Performance Guarantee.
- (ii) instruct the Contractor to cease all work pending provision of the Performance Guarantee, and
- (iii) cancel the Contract.

Signed		Date	
Print Name		Position	
Tenderer			

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

H: SCHEDULE OF PROPOSED SUBCONTRACTORS

We notify you that it is our intention to employ the following Subcontractors for work in 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.

We confirm that all Subcontractors who are contracted to construct a house are registered as home builders with the National Home Builders Registration Council.

No	Name and address of proposed Subcontractor	Nature and extent of work	Previous experience with Subcontractor.
1.			
2.			
3.			
4.			
5.			
Signed		Date	
Name		Position	
Tenderer			

I: SCHEDULE OF AVAILABLE INFRASTRUCTURE, RESOURCES AND EXPERIENCE

1. Tenderer's List of Third Party Design Engineers

In the event that the Tenderer desires to design all or part of the Works or submit any alternative, he/she shall list here-following, the Design Engineers, accomplished in the specific field of practice, which he/she proposes to employ for the purpose of third party certification of all works designed by the Tenderer for the Works.

Notes: (i) All costs of third party designs shall be borne solely by the Tenderer.
(ii) This Schedule must be accurately completed. Phrases such as "to be advised" will not be accepted.

Section of Works	Name and Address of Registered Engineer				ECSA Registration No.

2. Tenderer's Personnel Profile

Key Staff Permanently employed, of foreman level and above	Number of staff
Sub-Total	
Other Permanent Staff	Number of staff
Sub-Total	
Temporary Staff	Number of staff
Sub-Total	

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

3. **List the Firms who provide the following services:**

Service	Name	Contact Person	Telephone
Accounting			
Auditing			
Insurance			
Legal			

4. **Identify any amounts of money loaned to your enterprise, indicating the loan source, date and amount**

Loan Source	Address	Date of Loan	Loan Amount

5. **List a maximum of five contract which your enterprise is engaged in and has not yet completed**

Contract Description	Location	Client	Contract Amount	Expected Completion (month & year)

6. **List the four largest assignments completed by your enterprise in the last three years**

Nature of Work Performed	Client	Consultant Contact Person	Telephone No.	Contract Amount

7. **Address of workshop facilities from where maintenance of works will be undertaken**

.....

8. **Address of Branch Offices in the RSA**

.....

9. **Address of Nearest Representative to Polokwane**

.....

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

10. **Has work previously been performed for the Employer?**

YES/NO* - Specify

11. **Tenderer's Financial Ability to execute and complete the Works**

Provide the estimated cash flow on the project in terms of submissions of payment certificates or payment schedules of the Employer

NOTES APPLICABLE:

- (i) Value added tax to be included in all amounts
- (ii) Assume for the purpose of this estimate, payment of certificates within 30 days after receipt by the Employer.
- (iii) In calculation of the last column,

$j = d$
 $m = l + g$
 $k = j + e$
 $n = m + h$
 $l = k + f$
 etc
- (iv) Failure to detail the required information, shall automatically signify that the Tenderer lacks the infrastructure and resources necessary to execute and complete the Works

Month No. in Contract Period	Estimated amount in Rands (VAT included)			
	a Received	b Payments made	a-b Net cash flow	Cumulative cash flow
1	-		d	j
2			e	k
3			f	l
4			g	m
5			h	n
6			etc.	etc.
7				
8				
9				
10				
11				
12				
Maximum negative cash flow. Take the largest negative number in the last column and write in here → → → → →				
Signed			Date	
Print Name			Position	
Tenderer				

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

J: FINANCIAL INFORMATION OF TENDERER

This information sheet has to be filled in by the financier of the Tenderer, duly signed and stamped on behalf of the financial institution he represents.

Tenderer Details

Tender Description :

Contract Period :

Name of Tenderer :

Bank Account Number :

Tendered Amount :

Performance Guarantee will be provided by this Bank: YES ☐ NO ☐

If yes, state amount of Performance Guarantee: R
.....

Financial Institution

Name of Commercial Bank :

Branch :

Name of Bank Manager :

Telephone Number :

I / We acting on behalf of the above Commercial Bank confirm that

..... (Tenderer)

has operated an account with us for the last years.

We have been requested to provide a bank rating based in relation to the financial capability of the Tenderer, taking into account directives set out in the following two tables.

Financial Capability	
Maximum value of contract that the Tenderer is considered capable of	Value on which Bank Rating must be used
up to R300 000	R24 000
R1 000 000	R78 000
R3 000 000	R240 000
R5 000 000	R480 000
R10 000 000	R900 000
R30 000 000	R2 400 000

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

R100 000 000	R7 800 000
--------------	------------

BANK RATING	
Bank Code	Description of Bank Code
A	Undoubted for the amount of enquiry
B	Good for the amount of enquiry
C	Good for the amount quoted if strictly in the way of business
D	Fair trade risk for amount of enquiry
E	Figures considered too high
F	Financial position unknown
G	Occasional dishonours
H	Frequent dishonours

The value on which our Bank Rating of the Tenderer is based is R.....

(In words only)

The Bank Rating is code:

.....

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

ANNEXURE: B

K: CERTIFICATE FOR MUNICIPAL SERVICES AND PAYMENTS

TO: MUNICIPAL MANAGER, VHEMBE DISTRICT MUNICIPALITY

FROM: _____(Name of Tenderer)

FURTHER DETAILS OF TENDERER(S); DIRECTORS/SHAREHOLDERS/PARTNERS, ETC.

Directors/share holders/Partner	Physical address of the Business	Municipal Account No.	Physical residential address of the Director/ Shareholder/ Partner	Municipal Account No.

NB: Please attach certified copy of ID document(s)

Signatory

Date

Witnesses

1. _____
Full Names

Signature

Date

2. _____
Full Names

Signature

Date

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

M: DECLARATION OF TENDERER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1. This Municipal Tendering Document 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 to combat the abuse of the supply chain management system.
3. **The of any Tenderer may be rejected if the Tenderer, or any of its directors have:**
 - a) Abused the Municipality's Supply Chain 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 or failed to comply with any government, municipal or 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 Corruption Activities Act (No 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	YES	NO
4.1	Is the Tenderer or any of its directors listed on the National Treasury's database as a company or person prohibited from doing business with the public sector? (Companies or persons who are listed on this database were informed in writing of this restriction by the National Treasury after the audi alteram partem rule was applied).		
4.1.1	If so, furnish particulars:		
4.2	Is the Tenderer or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corruption Activities Act (No 12 of 2004)? (To access this Register enter the National Treasury's website www.treasury.gov.za, 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).		
4.2.1	If so, furnish particulars:		
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?		
4.3.1	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 any other municipality/municipal entity, that is in arrears for more than three months?		
4.4.1	If so, furnish particulars:		

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

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?		
4.5.1	If so, furnish particulars:		

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME) _____
 CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM TO BE TRUE
 AND CORRECT.

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

 Signature

 Date

 Position

 Name of Tenderer

Contractor

Witness 1

Witness 2
 Witness 2

Employer

Witness 1

MBD 4

N: DECLARATION OF INTEREST

1. No Tender will be accepted from persons in the service of the State*.
2. Any person, having a kinship with persons in the service of the State, including a blood relationship, may make an offer/s in terms of this invitation to Tender. In view of possible allegations of favouritism, should the resulting Tender, or part thereof, be awarded to persons connected with or related to persons in service of the State, it is required that the Tenderer or their authorised representative declare their position in relation to the evaluating/adjudicating authority and/or take an oath declaring his/her interest.
3. In order to give effect to the above, the following questionnaire must be completed and submitted with the Tender.

Full Name: _____

Identity No: _____

Company Registration No: _____

Tax Reference No: _____

VAT Registration No: _____

Are you at present in the service of the State? **Yes/No**

If so, furnish particulars

-
-
- **Municipal Supply Chain Management Regulation:** "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 National Council of Provinces
- (b) A member of 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 Parliament or provincial legislature.
- (f) A member of the accounting authority of any national or provincial public entity; or
- (g) An employee of Parliament or a provincial legislature

Have you been in the service of the State for the past twelve months? **YES/NO**

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

If so, furnish particulars.

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

If so, furnish particulars.

Are you aware of any relationship (family, friend, other) between a Tenderer and any persons in the service of the State who may be involved with the evaluation or adjudication of this Tender? **YES/NO**

If so, furnish particulars?

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

If so, furnish particulars.

Are any spouses, child or parent of the company's directors, managers, principle shareholders or stakeholders in service of the State? **YES/NO**

If so, furnish particulars?

CERTIFICATION

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT. I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

Signature

Date

Position

Name of Tenderer

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

This document must be signed and submitted together with your Tender

O: THE NATIONAL INDUSTRIAL PARTICIPATION PROGRAMME

INTRODUCTION

The National Industrial Participation (NIP) Programme, which is applicable to all government procurement contracts that have an imported content, became effective on the 1 September 1996. The NIP policy and guidelines were fully endorsed by Cabinet on 30 April 1997. In terms of the Cabinet decision, all state and parastatal purchases / lease contracts (for goods, works and services) entered into after this date, are subject to the NIP requirements. NIP is obligatory and therefore must be complied with. The Industrial Participation Secretariat (IPS) of the Department of Trade and Industry (DTI) is charged with the responsibility of administering the programme.

1 PILLARS OF THE PROGRAMME

1.1 The NIP obligation is benchmarked on the imported content of the contract. Any contract having an imported content equal to or exceeding US\$ 10 million or other currency equivalent to US\$ 10 million will have a NIP obligation. This threshold of US\$ 10 million can be reached as follows:

- (a) Any single contract with imported content exceeding US\$10 million, or
- (b) Multiple contracts for the same goods, works or services each with imported content exceeding US\$3 million awarded to one seller over a 2 year period which in total exceeds US\$10 million. or
- (c) A contract with a renewable option clause, where should the option be exercised the total value of the imported content will exceed US\$10 million. or
- (d) Multiple suppliers of the same goods, works or services under the same contract, where the value of the imported content of each allocation is equal to or exceeds US\$ 3 million worth of goods, works or services to the same government institution, which in total over a two (2) year period exceeds US\$10 million.

1.2 The NIP obligation applicable to suppliers in respect of sub-paragraphs 1.1 (a) to 1.1 (c) above will amount to 30 % of the imported content whilst suppliers in respect of paragraph 1.1 (d) shall incur 30% of the total NIP obligation on a *pro-rata* basis.

1.3 To satisfy the NIP obligation, the DTI would negotiate and conclude agreements such as investments, joint ventures, sub-contracting, licensee production, export promotion, sourcing arrangements and research and development (R&D) with partners or suppliers

A period of seven years has been identified as the time frame within which to discharge the obligation

2. REQUIREMENTS OF THE DEPARTMENT OF TRADE AND INDUSTRY

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

2.1 In order to ensure effective implementation of the programme, successful Tenderers (contractors) are required to, immediately after the award of a contract that is in excess of **R10 million** (ten million Rands), submit details of such a contract to the DTI for reporting purposes.

2.2 The purpose for reporting details of contracts in excess of the amount of R10 million (ten million Rands) is to cater for multiple contracts for the same goods, works or services; renewable contracts and multiple suppliers for the same goods, works or services under the same contract as provided for in paragraphs 1.1.(b) to 1.1. (d) above.

3 TENDER SUBMISSIONS AND CONTRACT REPORTING REQUIREMENTS OF TENDERERS AND SUCCESSFUL TENDERERS (CONTRACTORS)

3.1 Tenderers are required to sign and submit this Standard Tendering Document (MBD 5) together with the Tender on the closing date and time.

3.2 In order to accommodate multiple contracts for the same goods, works or services; renewable contracts and multiple suppliers for the same goods, works or services under the same contract as indicated in sub-paragraphs 1.1 (b) to 1.1 (d) above and to enable the DTI in determining the NIP obligation, successful Tenderers (contractors) are required, immediately after being officially notified about any successful Tender with a value in excess of R10 million (ten million Rands), to contact and furnish the **DTI with the following information**:

- Tender / contract number.
- Description of the goods works or services.
- Date on which the contract was accepted.
- Name, address and contact details of the government institution.
- Value of the contract.
- Imported content of the contract, if possible.

3.3 The information required in paragraph 3.2 above must be sent to the Department of Trade and Industry, Private Bag X 84, Pretoria, 0001 for the attention of Mr Elias Malapane within five (5) working days after award of the contract. Mr Malapane may be contacted on telephone (012) 394 1401, facsimile (012) 394 2401 or e-mail at Elias@thedti.gov.za for further details about the programme.

4 PROCESSES TO SATISFY THE NIP OBLIGATION

4.1 Once the successful Tenderer (contractor) has made contact with and furnished the DTI with the information required, the following steps will be followed:

- (a) the contractor and the DTI will determine the NIP obligation;
- (b) the contractor and the DTI will sign the NIP obligation agreement;
- (c) the contractor will submit a performance guarantee to the DTI;
- (d) the contractor will submit a business concept for consideration and approval by the DTI;
- (e) upon approval of the business concept by the DTI, the contractor will submit detailed business plans outlining the business concepts;

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

(f) the contractor will implement the business plans; and

(g) the contractor will submit bi-annual progress reports on approved plans to the DTI.

4.2 The NIP obligation agreement is between the DTI and the successful Tenderer (contractor) and, therefore, does not involve the purchasing institution

Tender number Closing date:.....

Name of Tenderer.....

Postal address

.....

Signature..... Name (in print).....

Date.....

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

MBD 5

P: DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (ALL APPLICABLE TAXES INCLUDED)

For all procurement expected to exceed R10 million (all applicable taxes included), Tenderers must complete the following questionnaire

- 1 Are you by law required to prepare annual financial statements for auditing?
- 1.1 If yes, submit audited annual financial statements for the past three years or since the date of establishment if established during the past three years.

.....

.....

- 2 Do you have any outstanding undisputed commitments for municipal services towards any Municipality for more than three months or any other service provider in respect of which payment is overdue for more than 30 days?

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

- 2.2 If yes, provide particulars.

.....

.....

.....

.....

* Delete if not applicable

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

- 3.1 If yes, furnish particulars

.....

.....

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

- 4.1 If yes, furnish particulars

.....**CERTIFICATION**

I, THE UNDERSIGNED (NAME)

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

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

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

.....
Signature

.....
Date

.....
Position

.....
Name of Tenderer

Contractor

Witness 1

Witness 2
Witness 2

Employer

Witness 1

MBD 6.2

Q: DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT

This Municipal Tendering Document (MBD) must form part of all Tenders invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, Tenderers must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2011 and the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:201x.

1. General Conditions

- 1.1. Preferential Procurement Regulations, 2011 (Regulation 9. (1) and 9. (3) make provision for the promotion of local production and content.
- 1.2. Regulation 9.(1) prescribes that in the case of designated sectors, where in the award of Tenders local production and content is of critical importance, such Tenders must be advertised with the specific Tendering condition that only locally produced goods, services or works or locally manufactured goods, with a stipulated minimum threshold for local production and content will be considered.
- 1.3. Regulation 9.(3) prescribes that where there is no designated sector, a specific Tendering condition may be included, that only locally produced services, works or goods or locally manufactured goods with a stipulated minimum threshold for local production and content, will be considered.
- 1.4. Where necessary, for Tenders referred to in paragraphs 1.2 and 1.3 above, a two stage Tendering process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.
- 1.5. A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.
- 1.6. The local content (LC) as a percentage of the Tender price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 201x as follows:

$$LC = 1 - \left(\frac{x}{y} \right) \times 100$$

Where

x imported content

y Tender price excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by the South African Reserve Bank (SARB) at 12:00 on the date, one week (7 calendar days) prior to the closing date of the Tender as required in paragraph 4.1 below.

- 1.7. A Tender will be disqualified if:

- The Tenderer fails to achieve the stipulated minimum threshold for local production and content indicated in paragraph 3 below; and this declaration certificate is not submitted as part of the Tender documentation.

2. Definitions

- 2.1. **“Tender”** includes advertised competitive Tenders, written price quotations or proposals;
- 2.2. **“Tender price”** price offered by the Tenderer, excluding value added tax (VAT);

- 2.3. **“contract”** means the agreement that results from the acceptance of a Tender by an organ of state;
- 2.4. **“designated sector”** means a sector, sub-sector or industry that has been designated by the Department of Trade and Industry in line with national development and industrial policies for local production, where only locally produced services, works or goods or locally manufactured goods meet the stipulated minimum threshold for local production and content;
- 2.5. **“Duly sign”** means a Declaration Certificate for Local Content that has been signed by the Chief Financial Officer or other legally responsible person nominated in writing by the Chief Executive, or senior member / person with management responsibility (close corporation, partnership or individual).
- 2.6. **“imported content”** means that portion of the Tender price represented by the cost of components, parts or materials which have been or are still to be imported (whether by the supplier or its subcontractors) and which costs are inclusive of the costs abroad, plus freight and other direct importation costs, such as landing costs, dock duties, import duty, sales duty or other similar tax or duty at the South African port of entry;
- 2.7. **“local content”** means that portion of the Tender price which is not included in the imported content, provided that local manufacture does take place;
- 2.8. **“stipulated minimum threshold”** means that portion of local production and content as determined by the Department of Trade and Industry; and
- 2.9. **“Sub-contract”** means the primary contractor’s assigning, leasing, making out work to, or employing another person to support such primary contractor in the execution of part of a project in terms of the contract.

3. The stipulated minimum threshold(s) for local production and content for this Tender is/are as follows:

<u>Description of services, works or goods</u>	<u>Stipulated minimum threshold</u>
_____	_____ %
_____	_____ %
_____	_____ %

4. Does any portion of the services, works or goods offered have any imported content?
YES / NO

- 4.1 If yes, the rate(s) of exchange to be used in this Tender to calculate the local content as prescribed in paragraph 1.6 of the general conditions must be the rate(s) published by the SARB for the specific currency at 12:00 on the date, one week (7 calendar days) prior to the closing date of the Tender.

The relevant rates of exchange information is accessible on www.reservebank.co.za.

Indicate the rate(s) of exchange against the appropriate currency in the table below:

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Tenderers must submit proof of the SARB rate (s) of exchange used.

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR

**MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION,
PARTNERSHIP OR INDIVIDUAL)**

IN RESPECT OF TENDER No.

ISSUED BY: (Procurement Authority / Name of Municipality / Municipal Entity):
.....

NB The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the Tenderer.

I, the undersigned, (full names),

do hereby declare, in my capacity as

of(name of Tenderer entity), the following:

- (a) The facts contained herein are within my own personal knowledge.
- (b) I have satisfied myself that the goods/services/works to be delivered in terms of the above-specified Tender comply with the minimum local content requirements as specified in the Tender, and as measured in terms of SATS 1286.
- (c) The local content has been calculated using the formula given in clause 3 of SATS 1286, the rates of exchange indicated in paragraph 4.1 above and the following figures:

Tender price, excluding VAT (y)	R
Imported content (x)	R
Stipulated minimum threshold for Local content (paragraph 3 above)	
Local content % as calculated in terms of SATS 1286	

If the Tender is for more than one product, a schedule of the local content by product shall be attached.

- (d) I accept that the Procurement Authority / Municipality /Municipal Entity has the right to request that the local content be verified in terms of the requirements of SATS 1286.
- (e) I understand that the awarding of the Tender is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286, may result in the Procurement Authority / Municipal / Municipal Entity imposing any or all of the remedies as provided for in Regulation 13 of the Preferential Procurement Regulations, 2011 promulgated under the Policy Framework Act (PPPFA), 2000 (Act No. 5 of 2000).

SIGNATURE: _____

DATE: _____

WITNESS No. 1 _____

DATE: _____

WITNESS No. 2 _____

DATE: _____

MBD 6.2

DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Municipal Bidding Document (MBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2011, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

5. General Conditions

- 5.1. Preferential Procurement Regulations, 2011 (Regulation 9) makes provision for the promotion of local production and content.
- 5.2. Regulation 9.(1) prescribes that in the case of designated sectors, where in the award of bids local production and content is of critical importance, such bids must be advertised with the specific bidding condition that only locally produced goods, services or works or locally manufactured goods, with a stipulated minimum threshold for local production and content will be considered.
- 5.3. Where necessary, for bids referred to in paragraph 1.2 above, a two stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.
- 5.4. A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.
- 5.5. The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

$$LC = [1 - x / y] * 100$$

Where

- x is the imported content in Rand
y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on [http://www.thedti.gov.za/industrial development/ip.jsp](http://www.thedti.gov.za/industrial%20development/ip.jsp) at no cost.

1.6 A bid may be disqualified if –

- (a) this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation; and
- (b) the bidder fails to declare that the Local Content Declaration Templates (Annex C, D and E) have been audited and certified as correct.

6. Definitions

- 6.1. "bid" includes written price quotations, advertised competitive bids or proposals;
- 6.2. "bid price" price offered by the bidder, excluding value added tax (VAT);
- 6.3. "contract" means the agreement that results from the acceptance of a bid by an organ of state;
- 6.4. "designated sector" means a sector, sub-sector or industry that has been designated by the Department of Trade and Industry in line with national development and industrial policies for local production, where only locally produced services, works or goods or locally manufactured goods meet the stipulated minimum threshold for local production and content;
- 6.5. "duly sign" means a Declaration Certificate for Local Content that has been signed by the Chief Financial Officer or other legally responsible person nominated in writing by the Chief Executive, or senior member / person with management responsibility(close corporation, partnership or individual).
- 6.6. "imported content" means that portion of the bid price represented by the cost of components, parts or materials which have been or are still to be imported (whether by the supplier or its subcontractors) and which costs are inclusive of the costs abroad (this includes labour or intellectual property costs), plus freight and other direct importation costs, such as landing costs, dock duties, import duty, sales duty or other similar tax or duty at the South African port of entry;
- 6.7. "local content" means that portion of the bid price which is not included in the imported content, provided that local manufacture does take place;
- 6.8. "stipulated minimum threshold" means that portion of local production and content as determined by the Department of Trade and Industry; and
- 6.9. "sub-contract" means the primary contractor's assigning, leasing, making out work to, or employing another person to support such primary contractor in the execution of part of a project in terms of the contract.

7. The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

Item No.	Description	Quantity	Stipulated Minimum Threshold%
1	High Lift Pumpstation	As per BoQ	100%
2	Low Lift Pumpstation	As per BoQ	100%
3	Electrical Works	As per BoQ	100%
4	Access Roads	As per BoQ	100%
5	Provisional Sums	As per BoQ	100%
6	Weir Rehabilitation	As per BoQ	100%

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

4. Does any portion of the services, works or goods offered have any imported content?

(Tick applicable box)

YES		NO	
-----	--	----	--

- 4.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za.

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

5. Were the Local Content Declaration Templates (Annex C, D and E) audited and certified as correct? (Tick applicable box)

YES		NO	
-----	--	----	--

- 5.1. If yes, provide the following particulars:

- (a) Full name of auditor:
- (b) Practice number:
- (c) Telephone and cell number:
- (d) Email address:

(Documentary proof regarding the declaration will, when required, be submitted to the satisfaction of the Accounting Officer / Accounting Authority)

6. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

LOCAL CONTENT DECLARATION

(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF BID NO.

ISSUED BY: (Procurement Authority / Name of Institution):

NB

1 The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.

2 Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial_development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below. Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned, (full names),
 do hereby declare, in my capacity as
 of(name of bidder entity), the
 following:

(a) The facts contained herein are within my own personal knowledge.

(b) I have satisfied myself that:

- (i) the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
- (ii) the declaration templates have been audited and certified to be correct.

(c) The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above.

The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E.

(d) I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.

(e) I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies as provided for in Regulation 13 of the

Preferential Procurement Regulations, 2011 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act No. 5 of 2000).

SIGNATURE: _____

DATE: _____

WITNESS No. 1 _____

DATE: _____

WITNESS No. 2 _____

DATE: _____

Local Content Declaration - Summary Schedule

Note: VAT to be excluded from all calculations

Calculation of local content

Tender summary

[illegible]

R 0

R 0

R 0

R 0

R 0

ler	
-----	--

Date: _____

Imported Content Declaration - Supporting Schedule to Annex C

Note: VAT to be excluded from all calculations

EU	R 9.00	GBP	R 12.00
----	--------	-----	---------

Calculation of imported content

Summary

Tender Qty	Exempted imported value
(D17)	(D18)
Imported value	R 0

(D19) Total exempt imported value	R 0
-----------------------------------	-----

**This total must correspond with
Annex C - C 21**

Calculation of imported content

Summary

Tender Qty	Total imported value
(D30)	(D31)
by tenderer	R O

(D32) Total imported value by tenderer	R 0
--	-----

Calculation of imported content

Summary

Quantity imported	Total imported value
(D43)	(D44)
by 3rd party	R O

(D45) Total imported value by 3rd party	R 0
---	-----

Calculation of foreign payments

Summary of payments

Local value of payments

(D51)

(D53) Total of imported content & foreign currency payments - (D32), (D45) & (D52) above	R 0
--	-----

Date:

**This total must correspond with
Annex C - C 23**

Page 10

Page 10

11

11

11

Witness 2

SATS 1286.2011

Annex E

Local Content Declaration - Supporting Schedule to Annex C

(E1)	Tender No.	
(E2)	Tender description:	
(E3)	Designated products:	
(E4)	Tender Authority:	
(E5)	Tendering Entity name:	

Note: VAT to be excluded from all calculations

Local Products (Goods, Services)	Description of items purchased	Local suppliers	Value
	(E6)	(E7)	(E8)
(E9) Total local products (Goods, Services and Works)			R 0

(E10) **Manpower costs** (Tenderer's manpower cost) R 0

(E11) **Factory overheads** (Rental, depreciation & amortisation, utility costs, consumables etc.) R 0

(E12) **Administration overheads and mark-up** (Marketing, insurance, financing, interest etc.) R 0

(E13) **Total local content** R 0
This total must correspond with Annex C - C24

Signature of tenderer from Annex B

Date: _____

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

R: CERTIFICATE OF INDEPENDENT TENDER DETERMINATION

- 1 This Municipal Tendering Document (MBD) must form part of all Tenders¹ 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 Tendering (or Tender rigging).² Collusive Tendering 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 Tender of any Tenderer if that Tenderer 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 Tendering 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 Tenders are considered, reasonable steps are taken to prevent any form of Tender-rigging.
- 5 In order to give effect to the above, the attached Certificate of Tender Determination (MBD 9) must be completed and submitted with the Tender:

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

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

CERTIFICATE OF INDEPENDENT TENDER DETERMINATION

I, the undersigned, in submitting the accompanying Tender:

(Tender Number and Description)

in response to the invitation for the Tender made by:

(Name of Municipality / Municipal Entity)

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

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

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

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

(f) Tendering with the intention not to win the Tender.

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

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

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

.....
Signature

.....
Date

.....
Position

.....
Name of Tenderer

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

S: 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.

1. Is the Contractor familiar with the OHSA (ACT 85 of 1993) and its Regulations?		YES	/	NO
2. Who will prepare the Contractor's Health and Safety Plan? (Provide a copy of the person/s curriculum vitae/s or company profile).		YES	/	NO
3. Does the Contractor have a health and safety policy? (If yes, provide a copy). How is this policy communicated to all employees?		YES	/	NO
4. Does the Contractor keep records of safety aspects of each construction site? If yes, what records are kept?		YES	/	NO
5. Does the Contractor conduct monthly safety meetings? If yes, who is the chairperson of the meeting, and who attend these meetings?		YES	/	NO
6. Does the Contractor have a safety officer in his employment, responsible for the overall safety of his company? If yes, please explain his duties and provide a copy of his CV.		YES	/	NO
7. Does the Contractor have trained first aid employees? If yes, indicate, who.		YES	/	NO
8. Does the Contractor have a safety induction-training programme in place? (If yes, provide a copy)		YES	/	NO

Signature of Tenderer:Date:

T: ORIGINAL BANK RATING LETTER

Attached the Bank Rating to this Page

U: DAY WORK SCHEDULE

This Day work Schedule shall be used for the valuation of any additional or substituted work which cannot conveniently be valued at the rates and prices submitted in the schedule of quantities.

In respect of labour and materials used in the additional or substituted work not covered in the Day work Schedule the Contractor shall be paid the actual cost plus the percentage allowance stated in the schedule of quantities.

The Tenderer shall quote hereunder rates which shall apply for payment purposes if the Engineer orders additional or substituted work to be carried out on a day work basis and shall therefore be in accordance with the requirements of clause 37(2) of the General Conditions of Contract.

1. LABOUR AND MATERIALS

Rates and prices entered in the schedule shall be held to allow for net cost of labour and materials delivered to site respectively with the percentage allowances stated in the schedule of quantities.

2. PLANT AND EQUIPMENT

The Tenderers shall list all major items of plant and equipment to be used on the works and which may be required for use on day works. The proposed hire rates of these items shall be entered against each type of machine, such rates to include for all relevant costs of plant hire inclusive of fuels and lubricants but exclusive of labour charges for the operators, which will be paid for under sub-clause (1) above.

The rates for plant items not listed in the schedule will be the ruling plant hire rates, inclusive of fuels and lubricants but exclusive of labour charges for the operators, inclusive of a 7,5% handling charge. It is therefore in the Tenderers interest to ensure that the list is complete.

Should there be insufficient space on the pages provided; the Tenderer shall add further pages as required.

THE RATES FOR THE PLANT AND EQUIPMENT MENTIONED IN THE SCHEDULE SHALL BE FILLED IN FOR THE ITEMS REQUESTED. SHOULD AN ITEM BE OMITTED IT SHALL BE DEEMED TO HAVE BEEN INCLUDED IN THE OTHER DAYWORKS RATES.

I. LABOUR

DESIGNATION		RATE	
		R	C
Brick Layers	per hour		
Pipe Layers	per hour		
Plant Operators	per hour		
Truck Drivers	per hour		
Labour - unskilled	per hour		
- semi-skilled	per hour		
- skilled	per hour		

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

II. MATERIALS

DESIGNATION		RATE	
		R	C
Cement	per 50 kg pocket delivered		
Concrete Sand	per m ³ delivered		
Concrete Aggregate	per m ³ delivered		

III. TRANSPORT

DESIGNATION	RATE	
	R	C
Per cubic metre kilometre		

IV. PLANT AND EQUIPMENT

ITEM	DESCRIPTION	NON WORKING RATE*		OPERATING RATE		PER
		R	c	R	C	UNIT
	TLB					
	Excavator					

*Only applicable on authority of the Engineer

V: NAMES OF MANAGEMENT AND SUPERVISORY STAFF FOR THE LIC WORKS

Attached copies of LIC certificates for management and supervisory staff

--

Contractor

--

Witness 1

--

Witness 2

--

Employer

--

Witness 1

--

Witness 2

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

MBD 6.1

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

a) The applicable preference point system for this tender is the 90/10 preference point system.

b) 90/10 preference point system will be applicable in this tender. The lowest/highest acceptable tender will be used to determine the accurate system once tenders are received.

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
Price	90
Specific Goals	10
Total points for Price and SPECIFIC GOALS	100

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:

80/20	or	90/10
$Ps = 80 \left(1 - \frac{Pt - P_{min}}{P_{min}} \right)$	or	$Ps = 90 \left(1 - \frac{Pt - P_{min}}{P_{min}} \right)$

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	or	90/10
-------	----	-------

95

 Contractor

 Witness 1

 Witness 2

 Employer

 Witness 1

 Witness 2

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

Where

Ps = Points scored for price of tender under consideration
 Pt = Price of tender under consideration
 Pmax = 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—

- (a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or
- (b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system, then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

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

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

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

The specific goals allocated points in terms of this tender	MEANS OF VERIFICATION DOCUMENTS REQUIRED	Number of points allocated (90/10 system) (To be completed by the organ of state)	Number of points claimed (90/10 system) (To be completed by the tenderer)
---	--	---	---

Black (Enterprise Owned by 51% or more black people)	Company registration copy and ID Copies of directors	3	
Woman (All races) (Enterprise Owned by 51% or more woman)	ID copy of the directors	3	
Locality (Enterprise within Jurisdiction of Vhembe District Municipality)	municipal rates and taxes statement of account/ signed valid leasing agreement/	2	
Black South African who are Youth 18-35 years of age (Enterprise Owned by 51% or more youth)	ID copy of the directors	1	
People with Disability	Medical report indicating disability	1	

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

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

- 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:	
	
	
	

2. OTHER DOCUMENTS REQUIRED ONLY FOR TENDER EVALUATION PURPOSES

- CSD Summary report.
- Tax Clearance compliance status letter or Tax clearance compliance number. (MBD2)
- Company Registration certificate.
- Proof of Purchased tender document receipt.
- Proof that the bidder municipal business account or any of the Directors municipal account is not in arrears (N.B. Municipal Clearance not older than three months) or Letter from Traditional Authority indicating that they are not paying rates and taxes.
- CIDB Certificate.
- Audited Financial Statement
- Specific Goals.
- Compensation Fund Registration Certificate
- Curricula Vitae of Personnel
- Certificate of Attendance at Site Clarification Meeting

- CSD Summary report.

Attach report.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

- Tax Clearance compliance status letter or Tax clearance compliance number. (MBD2)

Attach letter

- Company Registration certificate.

Attach Certificate

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

- Proof of Purchased tender document receipt.

Attach Receipt

- Proof that the bidder municipal business account or any of the Directors municipal account is not in arrears (N.B. Municipal Clearance not older than three months) or Letter from Traditional Authority indicating that they are not paying rates and taxes.

Attach proof

- CIDB Certificate.

Attach Certificate

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

- Audited Financial Statement

Attach Financial Statement

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

- Specific Goals.

Attach Here

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

- Compensation Fund Registration Certificate

Attach Certificate

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

- Curricula Vitae of Personnel

Attach CVs

CERTIFICATE OF ATTENDANCE AT SITE CLARIFICATION MEETING

This is to certify that:

.....
(Tenderer)

of
(Address)

.....
was represented by the person(s) named below at the compulsory meeting held for all Tenderers at

.....(location) on (date), starting at

.....

We acknowledge that the purpose of the meeting was to acquaint ourselves with the Site of the Works and/or matters incidental to doing the work specified in the Tender documents in order for us to take account of everything necessary when compiling our entire Tender submission.

Particulars of person(s) attending the meeting:

Name Signature.....

Capacity.....

Name Signature.....

Capacity.....

Note: All particulars above this horizontal divide line to be filled in by the Tenderer **prior to** signature by Employer's representative.

Attendance of the above persons at the meeting is confirmed by the representative of Vhembe District Municipality namely:

Name Signature

Capacity..... Date

3. SCHEDULES FOR SPECIAL CONDITIONS OF TENDER

- A Labour Content
- B Employment of EME's or QSE's

A: SCHEDULE OF LABOUR CONTENT

The Tenderer must complete the table below to reflect the labour force anticipated to be employed on this contract, including labour employed by sub-contractors.

The specified target value is **10%** of the contract value

Type of Labour	Man-hours	Minimum Wage Rate per Unit	Total Wage Cost (Excl VAT)
Permanent Labour			
Temporary Labour			
SMME/HDI's Labour			
TOTAL PERCENTAGE			

Notes to Tenderer:

- (1) Labour is defined as hourly paid personnel.
- (2) The penalty will be applied for non-compliance during the contract or for fraudulent disclosure.
- (3) The Municipality has approved the daily wage rate of R 32.01 per hour

SIGNED ON BEHALF OF THE TENDERER:

B: EMPLOYMENT OF EMEs or QSE's

It is a requirement of this contract that the successful tenderer must subcontract a minimum of 30% (excluding P&Gs, 10% Contingencies, Provisional Sums and 15% VAT) of the value of the contract approved EMEs or QSEs. EMEs is defined as Exempt Micro Enterprises and QSEs is defined as Qualifying Small Enterprises. The minimum target for participation is thirty percent (30%) of the total contract value and this can be achieved through one or more sub-contractors.

ONLY EMEs/QSEs should be employed to do the work listed in the table below. For other subcontractors, refer to T2.1C SCHEDULE OF PROPOSED SUBCONTRACTORS (EXCL EMEs/QSEs (30%))

The tenderer must ensure **ALL WORKS SET ASIDE FOR THE SMME's ARE ADEQUATELY PRICED FOR ALL ITEMS AND THEIR PRELIMINARIES AND GENERALS ARE PRICED AT 8% MAXIMUM OF THE PROPOSED VALUE OF WORKS IN THEIR RESPECTIVE TRADES OR SECTIONS/ BILLS**

We notify you that it is our intention to employ EMEs/QSEs for work in this contract to comply with the stipulated **30% requirement**.

If we are awarded a contract, we agree that this notification does not change the requirement for us to submit the name of proposed subcontractors in accordance with requirements in the contract for such appointments.

Item No.	Description of Work to be executed by EMEs/QSEs	Value of the work
1.		R
2.		R
3.		R
4.		R
5.		R
Total value of work committed to EMEs/QSEs		R
Percentage of total contract value		%

Note: Forms RDP2 (E1), RDP2 (E2) etc should be completed for each contractor listed above and contributing towards the **30% goal**

Signed.....

Date.....

Name..... Position.....

RDP2 (E1): EME/QSE No. 1

SECTION	ITEM	SPECIFY SUB-ITEMS	AMOUNT
Schedule 1	Preliminary and General		R
Schedule 3	High Lift Pump Station 1		R
Schedule 4	Abstraction Works		R
Schedule 5	Electrical Works		R
Schedule 6	Access Roads		R
Schedule 8	Weir Rehabilitation		R
Schedule 4	Gabion & Pitching		R
			R
TOTAL FOR THIS EME/QSE			R
TOTAL EXPRESSED AS A PERCENTAGE OF TOTAL CONTRACT VALUE			%

RDP2 (E2): EME/QSE No. 2

SECTION	ITEM	SPECIFY SUB-ITEMS	AMOUNT
Schedule 1	Preliminary and General		R
Schedule 3	High Lift Pump Station 1		R
Schedule 4	Abstraction Works		R
Schedule 5	Electrical Works		R
Schedule 6	Access Roads		R
Schedule 8	Weir Rehabilitation		R
Schedule 4	Gabion & Pitching		R
			R
TOTAL FOR THIS EME/QSE			R
TOTAL EXPRESSED AS A PERCENTAGE OF TOTAL CONTRACT VALUE			%

RDP2(E3): EME/QSE No. 3

SECTION	ITEM	SPECIFY SUB-ITEMS	AMOUNT
Schedule 1	Preliminary and General		R
Schedule 3	High Lift Pump Station 1		R
Schedule 4	Abstraction Works		R
Schedule 5	Electrical Works		R
Schedule 6	Access Roads		R
Schedule 8	Weir Rehabilitation		R
Schedule 4	Gabion & Pitching		R
			R
TOTAL FOR THIS EME/QSE			R
TOTAL EXPRESSED AS A PERCENTAGE OF TOTAL CONTRACT VALUE			%

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

RDP2 (E4): EME/QSE No. 4

SECTION	ITEM	SPECIFY SUB-ITEMS	AMOUNT
Schedule 1	Preliminary and General		R
Schedule 3	High Lift Pump Station 1		R
Schedule 4	Abstraction Works		R
Schedule 5	Electrical Works		R
Schedule 6	Access Roads		R
Schedule 8	Weir Rehabilitation		R
Schedule 4	Gabion & Pitching		R
			R
TOTAL FOR THIS EME/QSE			R
TOTAL EXPRESSED AS A PERCENTAGE OF TOTAL CONTRACT VALUE			%

RDP2 (E5): EME/QSE No. 5

SECTION	ITEM	SPECIFY SUB-ITEMS	AMOUNT
Schedule 1	Preliminary and General		R
Schedule 3	High Lift Pump Station 1		R
Schedule 4	Abstraction Works		R
Schedule 5	Electrical Works		R
Schedule 6	Access Roads		R
Schedule 8	Weir Rehabilitation		R
Schedule 4	Gabion & Pitching		R
			R
TOTAL FOR THIS EME/QSE			R
TOTAL EXPRESSED AS A PERCENTAGE OF TOTAL CONTRACT VALUE			%

END OF SECTION

VHEMBE DISTRICT MUNICIPALITY

VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

PART C1: AGREEMENTS AND CONTRACT DATA

C1.1: FORM OF OFFER AND ACCEPTANCE

C1.2: CONTRACT DATA

C1.3: PERFORMANCE GUARANTEE AND RETENTION MONEY GUARANTEE

C1.4: AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT No 85 OF 1993

C1.5: AGREEMENT WITH ADJUDICATOR

C1.1 FORM OF OFFER AND ACCEPTANCE

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of construction works viz.:

APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

Contract No. _____

The Tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and addenda thereto as listed in the Tender 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
.....

..... (Amount in words); R..... (Amount in figures)
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 terms of the Conditions of Contract identified in the Contract Data.

Signature(s)
Print Name(s)

Capacity

For the Tenderer
.....
.....
(Name and address of organization)

Signature of witness.....Date:

Print Name

Important Note
This page to be duly completed by the Tenderer before submitting the Tender.

ACCEPTANCE

By signing this part of this Form of Offer and Acceptance, the Employer 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 1: Agreements and Contract Data (which include this Agreement)

Part 2: Pricing Data

Part 3: Scope of Work

Part 4: Site Information

and drawings and documents or parts thereof, which may be incorporated by reference into parts 1 to 4 above.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto, as listed in the Tender 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 Agreement. No amendments to or deviations from said documents are valid unless contained in this Schedule, which shall be signed by the authorized representative(s) of both parties.

The Tenderer shall, within 7 days of 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 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 fulfill any of the 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 copy of this original document, including the Schedule of Deviations (if any). Such date should be confirmed in a manner that can be read, copied and recorded and shall be accepted by the contracting parties as the Commencement Date. This agreement shall constitute a binding contract between the parties.

Signature(s)

Print Name(s)

Capacity

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

For the Employer

(Name of Organization)
.....
.....
(Address of Organization)

Signature of witness..... Date:

Print Name

SCHEDULE OF DEVIATIONS

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.

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, be the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here.

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.

Any change or addition to the Tender documents arising from the above agreements and recorded here shall also be incorporated into the final Contract Document.

- 3.1

Subject
Details
- 3.2

Subject
Details
- 3.3

Subject

Details

By the duly authorized representatives signing this Schedule of Deviations, the Employer and the Contractor 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 Tender Schedules, as well as any confirmation, clarification or changes to the terms of the offer agreed by the Contractor and the Employer in concluding this process of offer and acceptance; in witness thereof the parties hereto have caused this agreement to be executed.

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 Contractor of a completed signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this Agreement.

Signed by:

Print Name:

Address:

Signed by:

Print Name:

Address:

For and on behalf of the **Employer** in the Presence of

Witness:

For and on behalf of the **Contractor** in the presence of

Witness:

Print Name:

.....

Print Name:

.....

Date:

.....

Date:

.....

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

VHEMBE DISTRICT MUNICIPALITY

C.1.2 CONTRACT DATA

CONTENTS

C.1.2.1	Part 1:	Data provided by the Employer
C.1.2.1.1		Conditions of Contract
C.1.2.1.2		Contract-specific Data
C.1.2.1.2.1		Compulsory Data
C.1.2.1.2.2		Variations to the General Conditions of Contract
C.1.2.1.2.3		Additional clauses to the General Conditions of Contract

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

C.1.2.1 Part 1: Data provided by the Employer

C.1.2.1.1 Conditions of Contract

The Conditions of Contract are:

- the “General Conditions of Contract” as they appear in the commercially available publication “General Conditions of Contract for Construction Works, **Third Edition, 2015**”, hereinafter referred to as “**GCC 2015**”; and
- specific data as contained in this Contract Data.

Each party to the Contract shall purchase its own copy of the **GCC 2015** that applies to this Contract, available from its publisher:

South African Institution of Civil Engineering
Private Bag X200
Halfway House
1685
South Africa

Tel +27 (0)11 805 5947

The following Notes apply:

Note 1

The GCC 2015 makes several references to the Contract Data.

Each item of data below is cross-referenced to the clause in the Conditions of Contract to which it applies. Notwithstanding anything specified to the contrary, the Contract Data shall take precedence in the interpretation of any ambiguity or inconsistency between it and the GCC 2015.

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purpose of interpretation, the priority of the documents shall be in accordance with the following order of precedence:

- (a) the Form of Offer and Acceptance.
- (b) amendments to the General Conditions of Contract within the Contract Data.
- (c) additional conditions to the General Conditions of Contract within the Contract Data.
- (d) corrigenda to the General Conditions of Contract.
- (e) the General Conditions of Contract.
- (f) the Specifications, Drawings, Schedules and other documents forming part of the Contract (in that order) contained in the Scope of Work and the Site Information.

If any ambiguity or discrepancy is found in the documents, the Engineer needs to be contacted to issue any necessary clarification or instruction.

Note 2

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

Certain pro-forma forms and pro-forma agreements contained in the GCC 2015 have been adapted for this particular contract. Those pro-forma forms and pro-forma agreements contained in the GCC 2015 do not apply where replaced by similar pro-forma forms and pro-forma agreements in this document.

C.1.2.1.2 Contract-specific Data

The following contract-specific data, referring to the General Conditions of Contract, are applicable to this Contract:

C.1.2.1.2.1 Compulsory Data

Clause	Data
1.1.1.13	The Defects Liability Period is 12 months
1.1.1.14	The time for achieving Practical Completion is 12 months
1.1.1.15	The name of the Employer is Vhembe District Municipality
1.1.1.26	The Pricing Strategy of a Re-measurement Contract shall apply
1.2.1.2	The address of the Employer is: Physical address: Old Parliament Building Cnr Casino Blvd street & Tshivhase Street Thohoyandou Postal address: Private Bag X 5006 Thohoyandou 0950 e-mail address: gmtechnical@vhembe.gov.za Contact numbers: Corporate: 015 960 2000 Direct: 015 960 2163
1.1.1.16	The name of the Engineer is: Batatise Consulting Engineers (Pty) Ltd

Clause	Data																																																								
1.2.1.2	The address of the Engineer is: Physical address: Stone Ridge Office Park Cnr Witkoppen and Paulshof Unit 8, Waterford Place, Kleve Hill Park Sandton Johannesburg 2151 Postal address: Same as physical address e-mail address: info@batatiseconsulting.com Contact numbers: Corporate: (010) 442 6759 Mobile: 071 384 0090																																																								
3.1.3	The Engineer shall obtain the specific approval of the Employer before executing any of his functions or duties according to the following table: <table><tr><th>GCC Clause No</th><th>Description</th><th>Requires EWA*</th><th>Delegated to ER*</th></tr><tr><td>3.2.1</td><td>Engineer's Representative's appointment and termination</td><td>Y</td><td></td></tr><tr><td>3.2.4</td><td>Engineer's Representative acting on Engineer's behalf</td><td>Y</td><td></td></tr><tr><td>4.5.4</td><td>Payment for notices and fees</td><td>Y</td><td></td></tr><tr><td>4.7.1</td><td>Fossils, etc on Site</td><td>Y</td><td></td></tr><tr><td>5.7.2</td><td>Work at night</td><td>Y</td><td></td></tr><tr><td>5.7.3</td><td>Acceleration of rate of progress</td><td>Y</td><td></td></tr><tr><td>5.7.3</td><td>Payment for acceleration</td><td>Y</td><td></td></tr><tr><td>5.9.1</td><td>Instructions and drawings on Commencement Date</td><td></td><td>Y</td></tr><tr><td>5.11.1</td><td>Suspension of the Works</td><td></td><td>Y</td></tr><tr><td>5.11.3</td><td>Proceeding with Works after suspension</td><td>Y</td><td></td></tr><tr><td>5.12.4</td><td>Acceleration instead of extension of time</td><td>Y</td><td></td></tr><tr><td>5.13.2</td><td>Reduction in penalty</td><td></td><td>Y</td></tr><tr><td>6.3.1</td><td>Variation orders</td><td>Y</td><td></td></tr></table>	GCC Clause No	Description	Requires EWA*	Delegated to ER*	3.2.1	Engineer's Representative's appointment and termination	Y		3.2.4	Engineer's Representative acting on Engineer's behalf	Y		4.5.4	Payment for notices and fees	Y		4.7.1	Fossils, etc on Site	Y		5.7.2	Work at night	Y		5.7.3	Acceleration of rate of progress	Y		5.7.3	Payment for acceleration	Y		5.9.1	Instructions and drawings on Commencement Date		Y	5.11.1	Suspension of the Works		Y	5.11.3	Proceeding with Works after suspension	Y		5.12.4	Acceleration instead of extension of time	Y		5.13.2	Reduction in penalty		Y	6.3.1	Variation orders	Y	
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6.3.1	Variation orders	Y																																																							

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Clause	Data			
	GCC Clause No	Description	Requires EWA*	Delegated to ER*
	6.3.2.1	Confirmation of a Variation Order	Y	
	6.4.1.4	Dayworks as a Variation Order	Y	
	6.5.2	Materials for dayworks	Y	
	6.8.4	Costs due to changes in legislation	Y	
	6.11.1	Variations exceeding 20%		Y
	8.2.2.2	Damage due to excepted risks		Y
	10.1.5	Consultation on Contractor's claim	Y	Y
	10.1.5	Ruling on Contractor's claim	Y	N
	*The following abbreviations apply: ER Engineer's Representative EWA Engineer's Written Action N No NA Not Applicable Y Yes			
3.1.4	Delete this clause.			
4.9.1	The Contractor shall deliver to the Engineer, on a monthly basis, a detailed inventory of Construction Equipment kept on Site, full particulars given for each day of the month. Distinction shall be made between Owned Equipment and Hired Equipment as well as Equipment in working order and Equipment out of order. Such inventory shall be submitted by the seventh day of the month following the month to be reported.			
4.10.2	The Contractor shall deliver to the Engineer, on a monthly basis, a return in detail of supervisory staff and the number of categorized classes of labour employed each day for the said period by the Contractor for execution of the Contract. Such return shall be submitted by the seventh day of the month following the month to be reported.			

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Clause	Data
5.3.1	The documentation required before commencement with Works execution are: Health and Safety Plan (Refer to Clause 4.3) A signed Agreement between the Employer and the Contractor for the Works to be completed by the Contractor in terms of the provisions of Section 37(2) of the Occupational Health and Safety Act (Act No.85 of 1993) and the Construction Regulations promulgated thereunder (Refer to Clause 4.3). Proof of payment to the Employer, that the Contractor has paid all contributions required in terms of the Compensation for Occupational Injuries and Diseases Act, No 130 of 1993 (Refer to Clause 4.3). Initial programme (Refer to Clause 5.6). Security (Refer to Clause 6.2). Insurance (Refer to Clause 8.6).
5.3.2	The time to submit the documentation required before commencement with Works execution is 14 Days.
5.4.2	The access and possession of Site shall not be exclusive to the Contractor but shall be as set out elsewhere in the Contract.
5.8.1	The non-working Days are Sundays. The special non-working Days are: Statutory public holidays; and All annual year-end shutdown periods as recommended by the South African Federation of Civil Engineering Contractors (SAFCEC), and which commence after the Commencement Date and which commence before the Due Completion Date.
5.13.1	The penalty for failing to complete the Works is whichever is lessor of 0,01 percent of contract price per calendar day or R8500 per calendar day.
5.16.3	The latent defect period is 10 years, commencing on the Day after the date of certification of Practical Completion.
6.5.1.2.3	The percentage allowance to cover overhead charges is: 50 per cent for labour; and 15 per cent for materials.
6.10.1.5	The percentage advance on materials not yet built into the Permanent Works is 80%. Proof of ownership is required. In addition, the contractor to satisfy the Employer's Agent that material has not been prematurely delivered onsite and safely stored. No payment for material stored off site will be allowed.
6.10.3	Retention Money The percentage retention on the amounts due to the Contractor is 10%. The limit of retention money is 5% of the Contract Price A guarantee in lieu of "retention money" is not permitted.

Clause	Data
8.6.1.1.2	The value of Plant and materials supplied by the Employer to be included in the insurance sum is nil .
8.6.1.1.3	The amount to cover professional fees for repairing damage and loss to be included in the insurance sum is a maximum of 10% (ten percent) of the Contract Sum.
8.6.1.3	The limit of indemnity for liability insurance is equal to the contract amount.
10.5.1	Dispute resolution shall be by standing adjudication, use GCC 2015, Appendix 5.
10.7.1	The determination of disputes shall be by arbitration.
	Payment for labour-intensive component of the works <i>Payment for works identified in the Scope of Works 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 payment for such works shall not relieve the Contractor in any way from his obligations either in contract or in delict.</i> <i>The local SMMEs subcontractors should be paid by the Contractor within seven (07) days following the submission and approval of their invoices. The local SMMEs subcontractors should be paid every second week.</i> <i>The contractor should attach to the progress payment certificate a copy of invoices received from local SMMEs subcontractors including proof of payment.</i> <i>No payment certificate shall be processed by the Employer's Agent if there is outstanding payment due to local SMMEs subcontractors unless otherwise agreed by the two parties.</i>
	Linkage of payment for labour-intensive component of works to submission of project data <i>The Contractor's payment invoices shall be accompanied by labour information for the corresponding period in a format specified by the employer. If the contractor chooses to delay submitting payment invoices, labour returns shall still be submitted as per frequency and timeframe stipulated by the Employer. The contractor's invoices shall not be paid until all pending labour information has been submitted.</i>
	Applicable Labour Laws <i>The current Ministerial Determination (also downloadable at www.epwp.gov.za), Expanded Public Works Programmes, issued in terms of the Basic Condition of Employment Act of 1997 by the Minister of Labour in Government Notice, shall apply to works described in the scope of work as being labour-intensive and which are undertaken by unskilled workers.</i>

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C.1.2.1.2.2 Variations to the General Conditions of Contract

Clause	Data
2.5.1	Cession <i>Amend Clause 2.5.1 as follows:</i> <i>Delete the words "without the written consent of the other"</i>
5.14.5.1	Consequences of Completion <i>Amend Clause 5.14.5.1 as follows:</i> <i>In the second line, substitute the word 'Guarantor' with 'Contractor'.</i>
6.2	Security <i>Replace Sub-Clauses 6.2.1 and 6.2.2 with:</i> "The Contractor shall deliver to the Employer within such time as may be stated in the Contract Data, a Performance Guarantee, of an Insurance Company registered in terms of the Short-term Insurance Act (Act 53 of 1998) or of a registered Commercial Bank, in a sum equal to the amount stated in the Contract Data. The Performance Guarantee shall be issued by an entity subject to the approved of the Employer, and shall conform in all respects to the format contained in the Contract Data. The security to be provided by the Contractor shall be a Performance Guarantee of 10% of the Contract Sum. Wherever a joint venture constitutes the contracting party, the Performance Guarantee shall be issued on behalf of the joint venture. Failure to produce an acceptable Performance Guarantee within the period stated in the Contract Data, is a fundamental breach of Contract, entitling the Employer to cancel the Contract by due notice in terms of Clause 9.2 with specific reference to Sub-clause 9.2.2 as amended in the Contract Data."
6.3.1	Variations <i>Amend Clause 6.3.1, as follows:</i> <i>In the first paragraph, third line, after the words "or for any reason appropriate", add the phrase</i> <i>", including the limiting of contract expenditure so as not to exceed the Employer's budgeted project funding, "</i> <i>Add the following phrase to the last paragraph of Clause 6.3.1.6, after the words "ascertaining the amount of the Contract Price":</i> <i>", and no such variation shall give reason for consideration of any claim in terms of Clause 6.11."</i>

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Clause	Data
6.3.2	Orders for Variations to be in writing Omit the words “Provided that” under Clause 6.3.2 and omit Clause 6.3.2.1.
6.9.2	Definition of “materials” <i>Amend Clause 6.9.2, as follows:</i> <i>Substitute the word ‘plant’ with ‘Plant’.</i>
6.10.1	Interim Payments <i>Amend Clause 6.10.1.5 as follows:</i> <i>In the third line, add the words ‘not yet’ before the words ‘built into’</i>
6.10.5	Payment of retention money <i>Amend Clause 6.10.5 as follows:</i> <i>In the second line, add the words ‘, if any,’ after the words ‘Defects Liability Period’</i>
6.10.6	Set-off and delayed payments <i>Amend Clause 6.10.6.2 as follows:</i> <i>Delete the words ‘simple interest’ and substitute with the words ‘interest compounded monthly’.</i> <i>Delete the words ‘Contractor’s Bank’ and substitute with the words ‘Employer’s Bank’</i>
6.11	Variations exceeding 15 per cent <i>Replace the marginal heading with:</i> “Variations exceeding 20 per cent” <i>Replace “15 per cent” with “20 per cent” in the text of this Sub-Clause</i>
7.4.4	Cost of test specimens and tests <i>Amend Clause 7.4.4.2 as follows:</i> In the <u>second</u> line of paragraph two, add the words ‘the requirements of’ before the words ‘the Contract’
7.8.2	Cost of making good of defects <i>Amend Clause 7.8.2.1 as follows:</i> <i>In the first line, correct the spelling of ‘therefore’.</i>

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Clause	Data
8.1.3	Excessive loads and traffic In the third line, add a comma after the word 'Site' as follows: 'in the vicinity of the Site, from'.
8.3.1	Excepted risks <i>Amend Clause 8.3.1.10 as follows:</i> <i>In the second line, delete the words 'Employer or any of their' and substitute with 'or any of its'.</i>
8.6.6	Contractor to produce proof of payment "The Contractor shall before commencement of the Works produce to the Engineer: 8.6.6.1 The policies by which the insurances are effected, 8.6.6.2 Proof that due payment of all premiums there under, covering the full required period has been made, and 8.6.6.3 Proof of continuity of the policies for the required period.
	Should, during the currency of the Contract, the required period of insurance be extended for any reason, the Contractor shall timeously extend (so as to maintain) the said insurances for the full extended duration. The Engineer shall be empowered to withhold all payment certificates until the Contractor has complied with his obligations in terms of this Clause 8.6.6."
8.6.7	Remedy on Contractor's failure to insure <i>Delete sub-clause 8.6.7 and substitute with:</i> "Failure on the part of the Contractor to effect and keep in force any of the insurances referred to in Clause 8.6.1 and its sub-clauses, is a fundamental breach of Contract, entitling the Employer to cancel the Contract by due notice in terms of Clause 9.2 and with specific reference to sub-clause 9.2.2, as amended in the Contract Data."
9.1.2	State of emergency <i>In the <u>fourth</u> line, delete the words 'supply of' and substitute with 'availability of'.</i>
9.2	Termination by Employer <i>Delete the contents of Clause 9.2 and substitute with:</i> "9.2.1 The Employer may terminate the Contract by written notice to the Contractor if: 9.2.1.1 Sequestration of the Contractor's estate is ordered by a Court with due jurisdiction, or

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Clause	Data
	9.2.1.2 The Contractor publishes a notice of surrender or presents a petition for the surrender of his estate as insolvent, or makes a compromise with his creditors, or assigns in favour of his creditors, or agrees to carry out the Contract under the supervision of a committee representing his creditors, or (being a company) goes into liquidation, whether provisionally or finally (other than a voluntary liquidation for the purpose of amalgamation or reconstruction), or if the Contractor assigns the Contract without having first obtained the Employer's consent in writing, or if execution is levied on his goods, or
	9.2.1.3 The Contractor, or anyone on his behalf, or in his employ, offers to any person in the employ of the Employer or the Engineer, a gratuity or reward or commission, or
	9.2.1.4 The Contractor furnished materially inaccurate information in his Tender, which had a bearing on the award of the Contract, or
	9.2.1.5 The Contractor has abandoned the Contract. 9.2.2 If the Contractor: 9.2.2.1 Has failed to commence the Works in terms of Clause 10 hereof, or has suspended the progress of the Works for fourteen (14) days after receiving from the Engineer written notice to proceed, or 9.2.2.2 Has failed to provide the Guarantee in terms of Clause 7 within the time stipulated in the Contract Data, or 9.2.2.3 Has failed to proceed with the Works with due diligence, or 9.2.2.4 Has failed to remove materials from the Site or to pull down and replace work within fourteen (14) days after receiving from the Engineer written notice that the said materials or work have been condemned and rejected by the Engineer in terms of these conditions, or 9.2.2.5 Is not executing the Works in accordance with the Contract, or is neglecting to carry out his obligations under the Contract, or 9.2.2.6 Has, to the detriment of good workmanship or in defiance of the Engineer's instructions to the contrary, sublet any part of the Contract, or 9.2.2.7 Has assigned the Contract or any part thereof without the Employer's consent in writing,

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Clause	Data
	then the Employer may give the Contractor 14 days notice to rectify the default, and if the Contractor fails to rectify the default in said 14 days, then, without further notice, notify the Contractor in writing of the termination of the Contract and expel the Contractor and order the Contractor to vacate the site within 24 hours of issue of the Notice of Termination and to hand the Site over to the Employer, and the Employer may then enter upon the Site and the Works without affecting the rights and powers conferred on the Employer or the Engineer by the Contract and the Employer may himself complete the Works or may employ another contractor to complete the Works, and the Employer or such other contractor may use for such completion so much of the Construction Equipment, Temporary Works and materials brought onto the Site by the Contractor as the Employer may think proper, and the Employer may at any time sell any of the said Construction Equipment, Temporary Works and unused materials and apply the proceeds of sale towards payment of any sums that may be due or become due to the Employer by the Contractor under the Contract. In such circumstances the Contractor shall forthwith vacate the Site and shall not be entitled to remain on the Site on the grounds that he is entitled to do so on a right of retention until amounts due to him have been paid, neither will the Contractor be entitled to any further payments in terms of this Contract.
9.2.3	If the Contractor, having been given notice to rectify a default in terms of 9.2.2 above, rectifies said default, but later repeats the same or substantially the same default, then the Employer may notify the Contractor of the immediate termination of the Contract, and proceed as stated in the paragraph following the word 'writing' in Clause 9.2.2.7 above.
9.2.4	Should the amounts that the Employer must pay to complete the Works, exceed the sum that would have been payable to the Contractor on due completion by him, then the Contractor shall upon demand pay to the Employer the difference, and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly. Provided that should the Contractor on demand not pay the amount of such excess to the Employer, such sum may be determined and deducted by the Employer from any sum due to or that may become due to the Contractor under this or any previous or subsequent contract between the Contractor and the Employer."

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C.1.2.1.2.3 Additional clauses to the General Conditions of Contract:

Clause	Data
1.1	Definitions <i>Add the following at the end of Sub-Clause 1.1.1:</i>
1.1.1.35	“Client”, as used in the Occupational Health and Safety Act - Construction Regulations, means Employer.
1.1.1.36	“Principal Contractor”, as used in the Occupational Health and Safety Act - Construction Regulations, means Contractor.
4.12	Contractor’s superintendence <i>Add the following sub-clause 4.12.4 to Clause 4.12:</i> “Where a form is included in the Contract Data for this purpose, the Tenderer shall fill in the name of the person he proposes to entrust with the post of Contractor’s Site Agent on this Contract in the space provided therefore. Previous experience of this person on work of a similar nature during the past five (5) years is to be entered on the form. The Contractor’s Site Agent shall be on Site at all times when work is being performed. The person shall be subject to approval of the Engineer in writing and shall not be replaced or removed from Site without the written approval of the Engineer.”
5.6	Programme <i>Add the following sub-clause 5.6.6 to Clause 5.6:</i> “Failure on the part of the Contractor to deliver to the Engineer, the • programme of the Works in terms of Clause 5.6.1 and • supporting documents in terms of Clause 5.6.2 Within the period stated in the Contract Data, shall be sufficient cause for the Engineer to retain 25 per centum of the value of the Fixed Charge and Value-related items in assessment of amounts due to the Contractor, until the Contractor has submitted aforementioned first Programme of the Works and Supporting Documents”.

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Clause	Data
5.9.7	Engineer to approve Contractor’s Designs and Drawings <i>Add the following sub-clause 5.6.6 to Clause 5.6:</i> “All designs, calculations, drawings and operation and maintenance manuals shall be fully endorsed by a third-party registered engineer, accomplished in such specific field of practice and the cost thereof shall be borne solely by the Contractor. Once the alternative design has been approved, the Contractor shall indemnify and hold harmless the Engineer, the Employer, their agents and assigns, against all claims howsoever arising out of the said design, whether in contract or delict”.
5.11	Suspension of the Works <i>Add the following sub-clause 5.11.4 to Clause 5.11:</i> “If the Contractor does not receive from the Employer the amount due under an Interim Payment Certificate within 28 days after expiry of the time stated in sub-clause 6.10.4 within which payment is to be made (except for deductions in accordance with sub-clauses 6.10.1.6 and 6.10.1.7), the Contractor may, after giving 14 days’ notice to the Employer, suspend the progress of the Works. The Contractor’s action shall not prejudice his entitlements to a claim in terms of Clause 10.1 and to cancellation of the Contract in terms of Clause 9.3. If the Contractor subsequently receives full payment of the amount due under such Interim Payment Certificate before giving a notice of cancellation of the Contract, the Contractor shall resume normal working as soon as is reasonably practicable.”
5.12	Extension of Time for Practical Completion <i>Add the following at the end of Sub-Clause 5.12.2.2:</i> “The extension of time to be allowed due to abnormal rainfall shall be calculated separately for each calendar month or part thereof in accordance with the following formula: $V = (Nw - Nn) + \frac{Rw - Rn}{x}$ where

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Clause	Data
	V = Extension of time in calendar days for the calendar month under consideration Nw = Actual number of days during the calendar month on which a rainfall of 10 mm or more has been recorded Nn = Average number of days for the calendar month on which a rainfall of 10 mm or more has been recorded, as derived from existing rainfall records Rw = Actual recorded rainfall for the calendar month Rn = Average rainfall for the calendar month, as derived from existing rainfall records x = 20
	The rainfall records which shall provisionally be accepted for calculation purposes are: Based on records taken at: Rainfall Station: Polokwane Years of record: 2006 – 2016

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Witness

Clause	Data																																																																																																																																																																																																																																										
	Table 1 – RAINFALL RECORDS FOR PERIOD: 2006 – 2016 RAINFALL STATION: Polokwane Lat: 23.8570 Lon: 29.451 Height 1226m Average No of Days with Rainfall exceeding 10mm: 9.8 days/year Average Rainfall: 488.6mm/year station no: 0677802BX <table><tr><td>MON</td><td>AVE</td><td>ST</td><td>N DAY</td><td>NUM</td><td>1</td><td>5.1</td><td>10.1</td><td>20.1</td><td>50.1</td><td>100.1</td><td>MAX R</td><td>MAX RAIN</td></tr><tr><td>MON</td><td></td><td>DEV</td><td>RAIN</td><td>MON</td><td>5</td><td>10</td><td>20</td><td>50</td><td>100</td><td>900</td><td>DAY</td><td>DATE</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>MON</td><td>AVE</td><td>ST</td><td>N DAY</td><td>NUM</td><td>1</td><td>5.1</td><td>10.1</td><td>20.1</td><td>50.1</td><td>100.1</td><td>MAX R</td><td>MAX RAIN</td></tr><tr><td>MON</td><td></td><td>DEV</td><td>RAIN</td><td>MON</td><td>5</td><td>10</td><td>20</td><td>50</td><td>100</td><td>900</td><td>DAY</td><td>DATE</td></tr><tr><td>JAN</td><td>65.9</td><td>39.3</td><td>65.9</td><td>11</td><td>3.4</td><td>2.1</td><td>1.3</td><td>0.7</td><td>0</td><td>0</td><td>38</td><td>1/18/2013</td></tr><tr><td>FEB</td><td>47.3</td><td>49.7</td><td>47.3</td><td>11</td><td>1.6</td><td>0.9</td><td>1.1</td><td>0.6</td><td>0</td><td>0</td><td>49</td><td>2/26/2006</td></tr><tr><td>MAR</td><td>58.4</td><td>33.2</td><td>58.4</td><td>11</td><td>3</td><td>1.3</td><td>1.1</td><td>0.7</td><td>0.1</td><td>0</td><td>51.5</td><td>3/27/2006</td></tr><tr><td>APR</td><td>43.3</td><td>46.6</td><td>43.3</td><td>11</td><td>1.5</td><td>1</td><td>0.7</td><td>0.5</td><td>0.1</td><td>0</td><td>68</td><td>4/4/2011</td></tr><tr><td>MAY</td><td>10.4</td><td>14</td><td>10.4</td><td>11</td><td>0.5</td><td>0.4</td><td>0.3</td><td>0.1</td><td>0</td><td>0</td><td>29.2</td><td>5/8/2009</td></tr><tr><td>JUN</td><td>1.7</td><td>3.6</td><td>1.7</td><td>11</td><td>0.3</td><td>0</td><td>0.1</td><td>0</td><td>0</td><td>0</td><td>12</td><td>6/10/2009</td></tr><tr><td>JUL</td><td>2.4</td><td>4.3</td><td>2.4</td><td>11</td><td>0.3</td><td>0.1</td><td>0.1</td><td>0</td><td>0</td><td>0</td><td>12.1</td><td>7/4/2007</td></tr><tr><td>AUG</td><td>2.3</td><td>5.6</td><td>2.3</td><td>11</td><td>0.2</td><td>0</td><td>0.1</td><td>0</td><td>0</td><td>00</td><td>19.2</td><td>8/15/2011</td></tr><tr><td>SEP</td><td>6.6</td><td>8.2</td><td>6.6</td><td>11</td><td>0.4</td><td>0.4</td><td>0.1</td><td>0.1</td><td>0</td><td>0</td><td>22.5</td><td>9/4/2015</td></tr><tr><td>OCT</td><td>48.1</td><td>29.5</td><td>48.1</td><td>11</td><td>1.5</td><td>0.7</td><td>1.4</td><td>0.6</td><td>0</td><td>0</td><td>38.2</td><td>10/29/2009</td></tr><tr><td>NOV</td><td>97.7</td><td>40.5</td><td>97.7</td><td>11</td><td>3.1</td><td>2</td><td>1.3</td><td>1.5</td><td>0.2</td><td>0</td><td>65.5</td><td>11/12/2008</td></tr><tr><td>DEC</td><td>104.6</td><td>56.3</td><td>104.6</td><td>11</td><td>3.8</td><td>1</td><td>1.7</td><td>1.9</td><td>0.1</td><td>0</td><td>55</td><td>12/16/2014</td></tr><tr><td>YR</td><td>488.6</td><td></td><td>67.9</td><td></td><td>19.5</td><td>9.8</td><td>9.2</td><td>6.8</td><td>0.5</td><td>0</td><td>488.6</td><td></td></tr></table> The total extension of time shall be the algebraic sum of all monthly totals for the contract period, but if the algebraic sum is negative the time for completion shall not be reduced due to subnormal rainfall. Extensions of time for a part of a month shall be calculated using pro rata values of Nn and Rn.” For this project the rainfall formula will only apply as background information, or dispute resolution. Extension of time for rainfall will only be granted on Actual Delays experienced; noted and agreed upon by the engineer.	MON	AVE	ST	N DAY	NUM	1	5.1	10.1	20.1	50.1	100.1	MAX R	MAX RAIN	MON		DEV	RAIN	MON	5	10	20	50	100	900	DAY	DATE														MON	AVE	ST	N DAY	NUM	1	5.1	10.1	20.1	50.1	100.1	MAX R	MAX RAIN	MON		DEV	RAIN	MON	5	10	20	50	100	900	DAY	DATE	JAN	65.9	39.3	65.9	11	3.4	2.1	1.3	0.7	0	0	38	1/18/2013	FEB	47.3	49.7	47.3	11	1.6	0.9	1.1	0.6	0	0	49	2/26/2006	MAR	58.4	33.2	58.4	11	3	1.3	1.1	0.7	0.1	0	51.5	3/27/2006	APR	43.3	46.6	43.3	11	1.5	1	0.7	0.5	0.1	0	68	4/4/2011	MAY	10.4	14	10.4	11	0.5	0.4	0.3	0.1	0	0	29.2	5/8/2009	JUN	1.7	3.6	1.7	11	0.3	0	0.1	0	0	0	12	6/10/2009	JUL	2.4	4.3	2.4	11	0.3	0.1	0.1	0	0	0	12.1	7/4/2007	AUG	2.3	5.6	2.3	11	0.2	0	0.1	0	0	00	19.2	8/15/2011	SEP	6.6	8.2	6.6	11	0.4	0.4	0.1	0.1	0	0	22.5	9/4/2015	OCT	48.1	29.5	48.1	11	1.5	0.7	1.4	0.6	0	0	38.2	10/29/2009	NOV	97.7	40.5	97.7	11	3.1	2	1.3	1.5	0.2	0	65.5	11/12/2008	DEC	104.6	56.3	104.6	11	3.8	1	1.7	1.9	0.1	0	55	12/16/2014	YR	488.6		67.9		19.5	9.8	9.2	6.8	0.5	0	488.6	
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6.10	Payments Add the following at the end of Sub-Clause 6.10.1:																																																																																																																																																																																																																																										

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

Clause	Data
	"The Contractor shall complete the 'Contractor's Monthly Report Schedule', which pro forma documentation is obtainable from the Engineer. Pursuant to Sub-Clause (1), these, duly signed by all concerned, together with the Contractor's statement and a VAT invoice in original format are to be submitted to the Engineer. Issue by the Engineer to the Employer and Contractor of any signed payment certificate is conditional to this information being fully endorsed, accurately and timeously submitted to the Engineer".
	<i>Add the following at the end of Sub-Clause 6.10.1.5:</i> "All documentary evidence of such materials shall be unambiguous with respect to ownership having fully passed to the Contractor on or before the date of submittal of the Contractor's monthly statement. Should the Contractor fail to supply unambiguous documentary evidence, he shall, prior to submittal of his monthly statement, deliver to the Employer a Guarantor Guarantee in the form contained in the Appendices to the Contract Data."
9.3	Termination by the Contractor <i>Add the following at the end of Sub-Clause 9.3:</i> 9.3.5 "In addition to, or as an alternative to the rights to termination contained in this Clause 9.3, the Contractor may notify the default to the Employer, with a copy to the Engineer, and if the default is not rectified within 10 days the Contractor may suspend progress of the works until a date 7 days after the default is rectified. The Contractor shall be entitled to extension of time to the extent of delay caused by or resulting from such suspension, and to payment of additional costs caused by or resulting from the suspension. Such extension of time and additional costs shall be promptly ascertained by the Engineer, who shall then grant the extension of time and include the additional costs in all future payment certificates. Such suspension, extension of time and/or payment of additional costs, shall not prejudice the Contractor's rights to cancel the contract."

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

C.1.2.2 Part 2: Data provided by the Contractor

The General Conditions of Contract, as specified in Part 1, shall be used as a basis for this Data which is required to be completed.

Each item of data given below is cross-referenced to the clause in the Conditions of Contract to which it mainly applies.

Clause	Data
1.1.1.9	The Name of the Contractor is:
1.2.1.2	The address of the Contractor is: Physical address:

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

Clause	Data
1.2.1.2	Postal address: e-mail address: Contact numbers: Corporate: Direct: Mobile: Fax:

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

VHEMBE DISTRICT MUNICIPALITY
(Not to be completed at tender stage)

C1.3 PERFORMANCE GUARANTEE

In accordance with clause 6.2.1 of General Conditions of Contract, 3rd Edition 2015
Contract No: -----
Description of Contract: -----

GUARANTOR DETAILS AND DEFINATIONS

“Guarantor” means: -----
----- (Please put name of firm)

Please address: -----

Postal address: -----

Tel:-----

Fax: -----

“Employer” means: **VHEMBE DISTRICT MUNICIPALITY**.

“Contractor” means: -----
----- (Please put name of firm)

“Guarantee sum” means: 10% of the contract amount

“Engineer” means: -----

“Works” means: Permanent works together with temporary works

“Site” means: The land and other places, made available by the Employer for the purpose of the contract, on under over in or through which the works are to be executed or carried out.

“Contractor” means: The Agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contractor as may be agreed in writing between the parties.

“Contract Sum” means: The accepted amount inclusive for tax of R-----
Amount in words: -----

----- “Expiry
Date” This Guarantee shall expire upon the issue of the **Completion Certificate** issued by VHEMBE DISTRICT MUNICIPALITY signed by the Director of ENGINEERING Services, as such date is advised to the Guarantor in writing confirmed by the Employer.

CONTRACT DETAILS

Engineer issues: Interim Payment Certificates, Final Payment Certificate and the Certificate Completion of the Work as defined in the Contract.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

PERFORMANCE GUARANTEE

- 1. The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.
- 2. Expiry Date" This Guarantee shall expire upon the issue of the final completion certificate issued by VHEMBE DISTRICT MUNICIPALITY signed by the Director of ENGINEERING Services, as such date is advised to the Guarantor in writing confirmed by the Employer
The Engineer and/or the Employer shall advise the Guarantor in writing of the date on the Certificate of the works has been issued.
- 3. The Guarantor hereby acknowledges that:
 - 3.1. Any reference in this performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a surety ship;
 - 3.2 . Its obligation under this Performance Guarantee is restricted to the payment of money.
- 4. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 4.1 to 4.3:
 - 4.1. A copy of a first written demand issues by the Employer to the Contractor stating that payment of a sum certified by the Engineer and/ or Employer in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2;
 - 4.2. A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address and / or postal address with a copy to the Contractor stating that period of seven (7) days has elapsed since the first written demand terms of 4.1 and the sum certificate has still not been paid;
 - 4.3. A copy of the aforesaid payment certificate which entails the Employer to receive payment in terms of the Contract sum in 4.
- 5. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed sum or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor at the Guarantor's physical address and/ or postal address calling up this Performance Guarantee, such demand stating that:
 - 5.1. The contractor has been termination due to the Contractor's default and this performance Guarantee is called up in terms of 5; or
 - 5.2. A provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 5; and

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

- 5.3. The aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional /final sequestration and/or the provisional liquidation court order.
6. It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.
7. Payment by the Guarantor in terms of 4 or 5 shall be made within seven (7) calendar days upon receipt of the first written demand to the guarantor.
8. Payment by Guarantor in terms of 5 will only be made against the return of the original Performance Guarantee by the Employer.
9. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from his Performance Guarantee on account alleged to be prejudicial to the Guarantor.
10. The Guarantor chooses the physical address and postal address as stated above for the service of all notices for all purposes in connection herewith.
11. This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after on claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.
12. This Performance Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.
13. Where this Performance Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Court Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Sign at -----

Date -----

Guarantor's signatory (1) -----

Capacity -----

Guarantor's signatory (2) -----

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Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

Capacity -----

Witness signatory (1) -----

Witness signatory (2) -----

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

C1.4 OCCUPATIONAL HEALTH AND SAFETY AGREEMENT

This agreement is mandatory for all contractors appointed by the Vhembe District Municipality or any other institution that do work for or on behalf of Municipality.

This agreement is between:

THE CONTRACTOR:

Herein represented by

In his capacity asBeing duly authorized hereto hereinafter referred to as “contractor”.

Compensation Commissioner Number:

(Attach a copy of the Registration Certificate to this agreement)

Company : Name:

Registration Number:

CEO : Name:

ID Number:

Physical Address:

.....

And the VHEMBE DISTRICT MUNICIPALITY
(Hereinafter referred to as “the Council”)

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

1. DEFINITIONS

- 1.1 **CONTRACTOR** Means the “Contractor” as defined in the “Principal Contract”.
Annexed hereto in his capacity as mandatory.
- 1.2 **MANDATORY** Includes an agent, contractor or subcontractor for work to be done or service rendered, but without derogating from his status in his own right as an employer of people or user of equipment, machinery, tools or materials.
- 1.3 **THE PRINCIPAL CONTRACT** Means the contract annexed hereto as annexure “A”.
- 1.4 **COUNCIL** Means the VHEMBE DISTRICT MUNICIPALITY
- 1.5 **RISK CONTROL OFFICER** A person appointed in writing by Council.
- 1.6 Any definitions contained in any Statute hereinafter mentioned shall have the meaning allocated to it by the specific statute.

2. OBJECTIVE

- 2.1 Whereas Council and the Contractor have entered into a contract for service (work) as fully indicated in the “Principle Contract” and whereas the “Contractor” agreed to indemnify Council against the risks stated hereunder whether foreseeable or not, and, whereas it is agreed between the parties that it is of cardinal importance to safeguard both Council and the Contractor’s obligation in terms of relevant legislation as well as to extend the obligation as a company and/or legal person and/or person as an entity concerned with health, safety and the environment.
- 2.2 These rules are applicable to all contractors performing work for Council within the jurisdictional area of the Council and on any premises, which are owned, rented or developed by the Council.
- 2.3 The Council acts though those officials or persons who are generally or specifically charge with the responsibility, in terms of legislation, as well as any other official or person who is generally or specifically charged with the control and supervision of the project.

IT IS HEREBY AGREED AS FOLLOWS:

3. INDEMNITIES

- 3.1 The “Contractor” hereby indemnifies the “Council” against any loss in respect of all claims, proceeding, damages, costs and expenses arising out of any claim or proceeding pertaining to the non compliance by the “Contractor” of any statutory requirements and/or requirements regarding the following Acts in particular pertaining to the provisions of:
- 3.1.1 The Occupational Health and Safety Act 85 of 1993 (as amended), including the Construction Regulations, 2003 as promulgated on 18 July 2003, in terms of Section 43 of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), in Government Gazette No. 25207 and Regulation Gazette No. 7721. See Annexure B.
- 3.1.2 The Health Act 63 of 1977.

- 3.1.3 Road Traffic Act 29 of 1989 (as amended).
 - 3.1.4 Environment Conservation Act 73 of 1989.
 - 3.1.5 The National Water Act 36 of 1998.
 - 3.1.6 The Criminal Procedure Act 51 of 1977.
 - 3.1.7 The Explosives Act 26 of 1956.
 - 3.1.8 The Arms and Ammunition Act 75 of 1969.
 - 3.1.9 Compensation for Occupational Injuries and Diseases Act 130 of 1993.
 - 3.1.10 The Labour Relations Act 66 of 1995.
 - 3.1.11 The Unemployment Insurance Act 30 of 1966 (as amended).
 - 3.1.12 The Basic Conditions of Employment Act 75 of 1997 (as amended).
 - 3.1.13 Standards Act 29 of 1993.
 - 3.1.14 any statutory provisions in any act and/or any law or bylaw of any local government and/or any published official standard incorporated into any statute or bylaw relating to the completion of the work set out in the "Principal Contract".
 - 3.1.15 Any other health and safety standard prescribed by the "Council".
- 3.2 The "Contractor" shall ensure that he familiarizes himself with the requirements of the above legislation and that he, his employees and any subcontractor will comply with all the statutory provisions contained in them.
- 3.3 The "Contractor" shall indemnify the "Council" in respect of any physical loss or damage to any plant, equipment or other property belonging to the "Contractor" or for which he is responsible and he hereby indemnifies the "Council" against any loss in respect of all claims, proceedings, damages, costs and expenses consequent upon the loss of or damage to any plant, equipment or other property belonging to, or which is the responsibility of, any subcontractor, agent or employee of the subcontractor.
- 3.4 The "Contractor" shall and hereby indemnifies the "Council" against any liability, loss, claim or proceedings whatsoever, whether arising in common law or by statute, consequent on personal injuries to or the loss of health or death of any person whosoever arising out of or in the course of or caused by the execution of the "Principal Contract".
- 3.5 The "Contractor" shall and hereby indemnifies the "Council" against any liability, loss, claim or proceedings consequent on loss of or damage to any movable or immovable property arising out of or in the course of or caused by the execution of the "Principal Contract" and due to any act or omission of the "Contractor", his agents, servants or subcontractors.

4. PERFORMANCE SAFE WORKING PRACTICE

- 4.1 The "Council" requires a high standard of safe work performance from all employees and expects that the standard be maintained by the "Contractor" within the "Council's" jurisdictional area or on its premises.
- 4.2 Irrespective of human considerations, the maintaining of these health and safety rules shall be the execution of the prescribed legal requirements. These rules are not to hinder the "Contractor" in rendering services or indemnify the "Contractor" from any legal responsibility to ensure healthy and safe work circumstances.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

4.3 The “Council” shall assist the “Contractor” in any practical considerations to accommodate the healthy and safe execution of work and therefore require co-operation in the execution of these safety rules.

5. LOCK OUT PROCEDURE

5.1 When power or air driven machines or equipment, electrical apparatus or pipe lines are examined, repaired, adjusted, cleaned, lubricated or serviced in any other way than normal servicing, then all isolating switches, -levers, valves or appliances must be put in the “off” or “closed” position and locked.

5.2 Should more than one team work on a machine, then each person in control of a team, must put a separate lock on the switch, lever, valve or appliance.

6. CRANES, VEHICLES AND HOISTING

6.1 For each crane or hoisting equipment used, the “Contractor” must submit a valid and recent test certificate or other form of the last examination of the machine or equipment, to the “Council”.

6.2.1 Only trained personnel with written permission and where determined by Law, with a valid driver’s license, may be allowed to operate any electrical diesel or petrol driver overhead crane, hydraulic or electrical hoisting equipment, self driven forklift, tractor or any other crane or vehicle. No employee of the “Contractor” may perform any overhead work or work on an overhead crane or hoisting equipment or work near cranes or crane rail, before:

- i) An agreement was concluded with the “Council”.
- ii) Approval has been obtained from the “Council” to perform the work.
- iii) All applicable danger – and warning symbolic signs are put into position, or exemption, if applied for, is in operation.

6.3 The “Contractor” shall be wholly responsible for any loss or damage to cranes, hoisting equipment, plant, machines or equipment brought onto the work site by the “Contractor”

7. MACHINE VALANCES, PROTECTION AND FENDING

7.1 No machine valances, protection or fending may be removed from machines, manholes, etc without the written permission of “Council” if applicable exemption procedures were not appropriated.

8. SCAFFOLD, LADDERS, TOOLS AND EQUIPMENT

8.1 No equipment or appliance belonging to “Council” may be used without written permission from “Council”.

8.2 Unless prior arranged, “Contractors” must bring sufficient tools and equipment to the site to finish the contract, including offices and storerooms. The mentioned equipment remains the responsibility of the “Contractor” with respect to loss, damage and theft.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

8.3 In exceptional cases, where tools and equipment belonging to “Council” are used to finish the contract, the said equipment and tools are used on own risk and the “Contractor” indemnifies “Council” from any claims that may arise. The said indemnity must be in writing, as well as information regarding the loan period, identification and condition of tools and equipment. The “Contractor” is responsible for the returning of said tools and equipment in the same condition or better. The “Contractor” is responsible to “Council” for any damage or excessive wear of such tools or equipment and material.

9. EXCAVATIONS

- 9.1 Before any excavations commence, written permission must be obtained from “Council” to confirm the location of existing electrical cables, water pipes, etc.
- 9.2 All excavations and obstructions in floor, tar and dirt surfaces must be fenced effectively and safeguarded between sundown and sunup with a sufficient amount of red/yellow warning lights and symbolic signs.
- 9.3 The surrounding area must be kept clean, safe and tidy during excavation. Excess material may not obstruct unnecessarily.
- 9.4 If any property is in danger during excavation, it must be supported, and the proposed support work must be submitted to the Department of Labour (OHS) and “Council” for approval.
- 9.5 Written permission must be obtained from “Council” to grant admittance to restricted areas as well as areas where dangerous or poisonous gases are present.

10. FIRST AID

- 10.1 The “Contractor” must provide and maintain a first aid box equipped according to legal requirement where more than (5) five persons are employed. The first aid box must be in the care of a person with a competency certificate from one of the following organizations:
- (i) SA Red Cross Association;
 - (ii) St Johns Ambulance;
 - (iii) SA First Aid League; or
 - (iv) A person or organization approved by the Chief inspector for this purpose.
- 10.2 A visible notice must be put up on any work premises with the name of the person responsible for first aid. In an emergency “Council’s” Ambulance / Fire Department or emergency services may be contacted at (015) 290 2000.

11. FLAMMABLE LIQUIDS

- 11.1 The “Contractor” shall be held responsible for the necessary precautionary fire prevention measures. No smoking signs must be put up where applicable. The “Contractor’s” employees must be informed of “Council’s” fire prevention measures and evacuation procedures.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

12. COMPENSATION BY CONTRACTOR

12.1 The “Contractor” shall be held responsible for all loss of and damage to property, the death or injury of persons, the resultant loss or damage suffered as well as all law suits, claims, costs, charges, fines and expenses due to negligence, violation of statutory liability or neglect of the “Contractor” or the “Contractor’s” employees.

13. TRANSGRESSION OF RULES AND MISBEHAVIOUR

13.1 The “Contractor” is warned that any act(s) leading to damage or loss of employees of the “Contractor” or the “Council” shall not be tolerated. The “Council” may (without any reason) demand that any employee of the “Contractor” be withdrawn from the principal “Contract” or site.

14. INCIDENT REPORTING

- 14.1 All incidents referred to in Section 24 of the Occupational Health and Safety Act and or other incidents shall be reported, by the “Contractor”, to the Department of Labour, as well as to the “Council” and should such an incident take place outside normal working hours, on a Saturday, Sunday or Public holiday provided with a written report relating to any incident.
- 14.2 The “Council” will obtain an interest in the issue of any formal inquiry conducted in terms of the Occupational Health and Safety Act in any incident involving the “Contractor” and/or his employees and/or his subcontractors.
- 14.3 The “Contractor” undertakes to report to “Council” anything deemed to be unhealthy and/or unsafe and that he undertakes to verse his employees and/or subcontractors in this regard.

15. LIAISON AND SUPERVISION

15.1 The “Contractor” hereby undertakes to liaise on a regular basis with the designated Risk Control Officer and “Council” representative regarding any hazards or incidents that may be identified or encountered during the performance of the “Principal Contract”.

16. SERVICE INTERRUPTION

16.1 Should any work done by the “Contractor” cause a possible interruption, written permission must be obtained from “Council”, before such work commences. The “Contractor” may not switch on or off any compressed air, steam, oxygen, vacuum supply or electrical supply without written permission from the “Council”.

17. CONFIDENTIALITY

17.1 The “Contractor” and his employees shall regard all data, documentation and information of the contract and related documentation as confidential.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

- 17.2 Lost documentation/plans or related documentation shall immediately be reported in writing to the “Council”.
- 17.3 The “Contractor” shall not put up any advertisements or billboard at the site without permission.
- 17.4 The “Contractor” shall not take photographs of the contract site or part thereof or any work process or part thereof, without written permission from the “Council”, or have photographs taken, published or let it be published.

18. CONTRACT SITE AND PRESERVATION

- 18.1 Employees of the “Contractor” shall not be allowed entrance to the site unless a valid identity document, issued by “Council”, is displayed. The mentioned documents shall only be valid for a limited period, where after it must be renewed.

19. COMPLETION OF WORK

- 19.1 The “Contractor” or his employees shall not leave the contract site before the “Council” is satisfied that the contract is completed according to the requirements and standards set out in the contract and that the working site is left in a satisfactory and safe condition.

20. LIQUOR, DRUGS, DANGEROUS WEAPONS AND FIREARMS

- 20.1 The “Contractor” shall ensure that no liquor, drugs, dangerous weapons or firearms be brought onto the premises.

21. SEARCHES

- 21.1 The “Contractor” and any person engaged in the contract work may at any time be searched by “Council” appointed security personnel and all packages, suitcases, etc. must be presented to the access control point for examination prior to them being brought onto the property or leaving the property.

22. GENERAL CONDITIONS

- 22.1 Notwithstanding anything to the contrary in this agreement, it is hereby specifically determined that the “Contractor-“

22.1.1 shall have acquainted himself and be conversant with the contents of all statutory provisions applicable to the health and safety of workers and other persons on the site including the execution of the work, and in particular the conditions contained in the Occupational Health and Safety Act, 1993 (Act 85/1993), and the regulations promulgated in terms thereof, and shall comply therewith meticulously and in all aspects and/or take care that it is complied with;

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

22.1.2 shall be obliged to immediately execute all instructions given to him by an authorized representative of "Council" in order to ensure and uphold the implementation and enforcement of the provisions referred to in sub-paragraph 1, to the satisfaction of the said representative;

22.1.3 shall indemnify the "Council" against any or all liability which may be incurred by the "Council" as a result of the omission of the "Contractor", his employees, sub-contractors and/or representatives to comply with the provisions referred to in sub-paragraph 1, or to ensure that it shall be complied with;

22.1.4 shall undertake to pay upon demand any and/or all legal costs and other expenses which "Council" may have incurred as a consequence of any criminal charges or other proceedings pending against, or involving the "Council" as a result of the contravention or non-compliance by the "Contractor", his employees, sub-contractors and/or representative of any of the statutory provisions referred to in sub-paragraph 1.

22.1.5 Should the "Contractor" neglect to immediately execute any health and safety written orders issued to him, or to his employee in charge of the works, in terms of the stipulations of sub-paragraph 2, the "Council" shall be entitled to suspend the execution of the works and take the necessary steps to execute or have such order executed. Under these circumstances the contractor shall be obliged to pay "Council", upon demand, all costs and expenses incurred by "Council", in order to execute or have the said orders executed.

22.1.6 Should the abovementioned steps not establish a healthy and safe work environment the "Council" will be entitled to terminate the contract without incurring any further costs or claims from the contractor?

23. "CONTRACTOR" IDENTIFICATION BOARD

- 23.1 The "Contractor" shall provide on any work premises a temporary identification board containing at all worksites the following information:
- Company name on behalf of which division/department the work is being done.
 - The contact number and name of the person representing the "Contractor".
 - The contact number and name of the person representing "Council"

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

24. ACKNOWLEDGEMENT

24.1 The “Contractor” hereby acknowledges that he has read and received a copy of the “Principal Contract” and agrees to be bound by and undertakes to observe all the terms and conditions of the “Principal Contract”. This appointment is made in terms of Section 37(2) of the Occupational Health and Safety Act, 85 of 1993.

25. EXCEPTIONS AND OMISSIONS

26. REMARKS

THE CONTRACTOR

SIGNED AT ON THIS DAY OF

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

WITNESSES:

..... 1.
THE CONTRACTOR

2.

THE COUNCIL

SIGNED AT ON THIS DAY OF

WITNESSES:..... 1.

THE COUNCIL

2.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

b) INDEMNITY CERTIFICATE

Contractor:

Employer: VHEMBE DISTRICT MUNICIPALITY

Contract:

I/we
Hereafter the “Contractor”

“Contractor” hereby indemnifies the VHEMBE DISTRICT MUNICIPALITY (Council) against any claim of whatever sort which may arise directly or indirectly from the execution by me/us of the above-mentioned contract and which may be instituted against “Council”, as well as of any loss or damage which the “Council” suffers or expenditure the “Council” incurs to prevent responsibility for such claim, loss or damage, whatever the cause of such claim may be or whatever loss or damage the “Council” suffers.

THUS done and signed at on this day of 20.....

WITNESSES:

1.
CONTRACTOR

2.
COUNCIL

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

c) ACKNOWLEDGEMENT CERTIFICATE

I, in my capacity as.....

Duly authorized hereto representing

..... Contractors, acknowledge receipt of a copy of the VHEMBE DISTRICT MUNICIPALITY’s safety manual for contractors and the under mentioned person as my supervisor regarding all works and services which must be executed by the Contractor. The appointment is done in terms of the Occupational Health and Safety Act, 1993 (Act 85/1993).

SIGNED AT ON 200...

I, accept the abovementioned appointment, and declare that I am familiar with the contents of the VHEMBE DISTRICT MUNICIPALITY’s Safety Manual for contractors

CASUALTIES REGISTRATION NUMBER

SIGNED AT ON 200....

SIGNATURE:

WITNESSES: 1.
2.

A copy of this certificate shall be submitted to the “Council” before any work commences.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

C1.5: AGREEMENT WITH ADJUDICATOR

This agreement is made on the.....day of 20.....between: the Employer
(name of company / organisation).....
of (address).....
.....and the Contractor
(name of company / organisation)
of (address).....
..... (hereinafter
called **the Parties**)

and
(name).....
of (address)
..... (hereinafter
called **the Adjudicator**)

Disputes or differences may arise/have arisen* between the Parties under a Contract dated.....
and known as Contract No.....
(Contract title).....

and these disputes or differences shall be/have been* referred to adjudication in accordance with the
CIDB Adjudication Procedure, (hereinafter called "**the Procedure**") and the Adjudicator may be or has
been requested to act.
(* Delete as necessary)

IT IS NOW AGREED as follows:

- 1. The rights and obligations of the Adjudicator and the Parties shall be as set out in the Procedure.
- 2. The Adjudicator hereby accepts the appointment and agrees to conduct the adjudication in accordance with the Procedure.
- 3. The Parties bind themselves jointly and severally to pay the Adjudicator's fees and expenses in accordance with the Procedure as set out in the Contract Data.
- 4. The Parties and the Adjudicator shall at all times maintain the confidentiality of the adjudication and shall endeavour to ensure that anyone acting on their behalf or through them will do likewise, save with the consent of the other Parties which consent shall not be unreasonably refused.
- 5. The Adjudicator shall inform the Parties if he intends to destroy the documents which have been sent to him in relation to the adjudication and he shall retain documents for a further period at the request of either Party.

SIGNED by:

158

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

(Signature):	(Signature):	(Signature):
Name: who warrants that he/ she is duly authorised to sign for and on behalf of the First Party in the presence of	Name: who warrants that he/ she is duly authorised to sign for and on behalf of the Second Party in the presence of	Name: the Adjudicator in the presence of
Witness: (Signature).....	Witness: (Signature).....	Witness: (Signature).....
Name:	Name:	Name:
Address:	Address:	Address:
.....		
Date:	Date:	Date:

END OF SECTION

VHEMBE DISTRICT MUNICIPALITY

VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

PART C2: PRICING DATA

CONTENTS:

- C2.1 Pricing Instruction
- C2.2 Bill of Quantities

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

VHEMBE DISTRICT MUNICIPALITY

VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

C2.1 PRICING INSTRUCTIONS

1. GENERAL

The pricing instructions describe the criteria and assumptions which will be assumed in the Contract that the Bidder has taken into account when developing his prices. The Bills of Quantities record the Contractor’s rates for providing supplies, services, engineering and construction works in accordance with the Scope of Work.

The terms of payment and the provisions for price adjustment, if applicable, are established in the Contract Data. These items are not described in the Pricing Data.

The Bidder’s obligations in pricing the Bidder offer and the Employer’s undertakings in the checking and correction of arithmetical errors are dealt with in the Standard Conditions of Bidder contained in Annexure F of SANS 294, as amended in and read in conjunction with the Bidder Data.

Where excel Bills of Quantities are issued they should be read in conjunction with the hard copies. Where discrepancies appear the hard copy shall take precedence.

2. DOCUMENTS MUTUALLY EXPLANATORY

The documents forming the Contract are to be taken as mutually explanatory of one another. The Bill of Quantities forms an integral part of the Contract Documents and shall be read in conjunction with the Bidder Data, Contract Data, Scope of Work, Site Information General and Special Conditions of Contract, the Specifications and the Drawings.

3. DEFINITIONS

For the purpose of this Bill of Quantities, the following words shall have the meanings hereby assigned to them:

- Unit : The unit of measurement for each item of work as defined in the Scope of Work and Site Information.
- Quantity : The number of units of work for each item.
- Rate : The payment per unit of measurement at which the Contractor Contracts to do the work.
- Amount : The product of the quantity and the rate tendered for an item.
- Sum : An amount contracted for an item, the extent of which is described in the Bill of Quantities, the specifications or

elsewhere but the quantity of work of which is not measured in any units.

4. **DESCRIPTIONS**

Descriptions in the Bill of Quantities are abbreviated and comply generally with those in the Standardised Specifications. Clause 8 of each Standardised Specification, read together with the relevant clauses of the Scope of Work, set out what ancillary or associated activities are included in the rates for the operations specified. Should any requirements of the measurement and payment clause of the applicable Standardised Specification, or the Scope of Work, conflict with the terms of the Bill, the requirements of the Standardised Specification or Scope of Work, as applicable, shall prevail.

5. **REFERENCES**

The clauses in a specification in which further information regarding the schedule item can be obtained appear under “Reference clause” in the Bill. The reference clauses indicated are not necessarily the only sources of information in respect of scheduled items. Further information and specifications may be found elsewhere in the contract documents. Standardised Specifications are identified by the letter or letters which follow SABS in the SABS 1200 series of specifications, eg. G for SABS 1200 G.

6. **UNITS OF MEASUREMENT**

The units of measurement indicated in the Bill of Quantities are metric units.

The following abbreviations are used in the Bill of Quantities:

%	=	per cent
h	=	hour
ha	=	hectare
kg	=	kilogram
kl	=	kilolitre
km	=	kilometre
km-pass	=	kilometre-pass
kW	=	kilowatt
l	=	litre
m	=	metre
mm	=	millimetre
MN	=	meganewton
MN-m	=	meganewton-metre
MPa	=	megapascal
m ²	=	square metre
m ³	=	cubic metre
m ³ -km	=	cubic metre-kilometre
m ² -pass	=	square metre-pass
no	=	number
PC sum	=	Prime Cost sum
Prov Sum	=	Provisional Sum
sum	=	lump sum
t	=	ton (1 000 kg)

7. **NET MEASUREMENTS**

Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for off-cuts and waste.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

8. **QUANTITIES**

The quantities set out in these Bills of Quantities are approximate and do not necessarily represent the actual amount of work to be done. The quantities of work accepted and certified for payment will be used for determining payments due and not the quantities given in the Bills of Quantities.

The Contract Amount to be determined in accordance with the conditions of contract identified in the Contract Data shall be computed from the actual quantities of authorized work done, value at rates determined in terms of the Contract Data, against the respective items in the Bill of Quantities.

9. **CURRENCY**

All rates and sums of money quoted in the Bill of Quantities shall be in Rand and whole cents. Fractions of a cent shall be discounted.

10. **VALUE ADDED TAX**

Value Added Tax shall be excluded from the rates and sums contracted for the various items of work included in the Bill of Quantities. VAT will be added as a single entry to the summary.

11. **RATES AND PRICES**

11.1 **General**

- a) The Contractor must price each item in the Bill of Quantities in **BLACK INK**. Reproduced computer printouts of the Bills of Quantities will not be acceptable.
- b) The rates and prices to be inserted in the Bill of Quantities shall cover all the services and incidentals for the work described under the several items. Such prices and rates shall cover all costs and expenses that may be required in and for the execution of the work described, and shall cover the cost of all general risks, liabilities and obligations set forth or implied in the documents on which the Bidder is based, as well as overhead charges and profit. Reasonable prices shall be inserted as these will be used as a basis for assessment of payment for additional work that may have to be carried out.
- c) Where the Contractor is required to furnish detailed drawings and designs or other information in terms of the Contract Data, all costs thereof shall be deemed to have been provided for and included in the unit rates and sum amounts contracted for the items scheduled in the Bill of Quantities. Separate additional payments will not be made.
- d) A price or rate is to be entered against each item in the Bill of Quantities, whether the quantities are stated or not. An item against which no price is entered will be considered to be covered by the other prices or rates in the Bill. The Contractor will not be paid for items against which no rate or lump sum has been entered in the Bill of Quantities.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

- e) Should the Contractor group a number of items and contract one lump sum for such group of items, this single lump sum shall apply to that group of items and not to each individual item.
- f) Should the Contractor indicate against any item that compensation for such item is included in another item, the rate for the item included in another item shall be deemed nil.
- g) A submission may be regarded as non-responsive if any rates or lump sums in the Bill of Quantities are, in the opinion of the Employer, unreasonable or out of proportion.

11.2 “Rate only” items

The Contractor shall fill in a rate (in the rate column) against all items where the words "rate only" appear in the Amount column, which rate will constitute payment for work which may be done in terms of this item. Such "rate-only" items are used where it is estimated that little or no work will be required under the item or where the item is to be considered as an alternative to another item for which a quantity is given.

11.3 Arithmetic

Excepting where Sum Amounts are required or where Provisional Sums have been indicated, the Contractor shall enter an applicable rate in the Rate Column of the Bill of Quantities for each scheduled item. He shall also enter an appropriate sum in the Amount column for each scheduled item, by determining in the applicable line item the product of the Quantity and the Unit Rate.

If there is an error in the line item resulting from the product of the unit rate and the quantity, the rate shall be binding and the error of extension as entered in the Bidder offer will be corrected by the Employer in determining the Contract Price.

Where there is an error in addition, either as a result of other corrections required by this checking process or in the Bidder’s addition of prices, such error will be corrected by the Employer in determining the Contract Price.

11.4 Labour Intensive work

Those parts of the contract to be constructed using labour-intensive methods have been marked in the bill of quantities with the letters LI in a separate column or as a prefix or suffix against every item so designated. The works, or parts of the works so designated are to be constructed using labour-intensive methods only. The use of plant to provide such works, other than plant specifically provided for in the scope of works, is a deviation from the contract. The items marked with the letters 'LI' are not necessarily an exhaustive list of all the activities which must be done by hand, and this clause does not over-ride any of the requirements in the generic labour intensive specification in the Scope of Works.

Where minimum labour intensity is specified by the design the contractor is expected to use their initiative to identify additional activities that can be done labour-intensively in order to comply with the set minimum labour intensity target.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

Payment for items which are designated to be constructed labour-intensively (either in this schedule or in the Scope of Works) will not be made unless they are constructed using labour-intensive methods. Any unauthorised use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment.

12. VARIATION IN TEXT

No alteration, erasure or addition is to be made in the text of the Bill of Quantities. Should any alteration, erasure or addition be made, it will not be recognized; the original wording of the Bill of Quantities will be adhered to.

13. MONTHLY PAYMENTS

Unless otherwise specified in the Specifications and Project Specifications, progress payments shall be by means of interim progress instalments measured against actual deliverables achieved, according to the pre-approved Terms of Reference in the Tender Data

14. CONTRACT PRICE ESCALATION

Unless otherwise specified, consumer price index will be used to recompensate the contractor for all losses incurred on the project following the lapse of a 12-month project duration. The base date shall be date on which the tender closed and usage of SEIFSA indices with the relevant formular applied.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness

VHEMBE DISTRICT MUNICIPALITY

VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

C2.2 BILL OF QUANTITIES

The Bill of Quantities is structured as outline below. Where there is gaps and omissions in specifications and/or BOQ the applicable Standard shall apply.

SECTION	DESCRIPTION
BILL 1: PRELIMINARY AND GENERAL	
BILL 2: DAYWORKS	
BILL 3: HIGH LIFT PUMP STATION	
C	SITE CLEARANCE
D	BULK EARTHWORKS
DB	PIPE TRENCHES
GA	CONCRETE, FORMWORK AND REINFORCEMENT
L	MECHANICAL FITTINGS
L	PVC-O PRESSURE PIPE AND PIPE FITTINGS
LB	PIPE BEDDING AND BLANKET
BILL 4: LOW LIFT PUMP STATION	
C	DEMOLITIONS
L	MECHANICAL FITTINGS AT LOW LIFT PUMPSTATIONS
BILL 5: ELECTRICAL WORKS	
BILL 6: PROVISIONAL SUMS	

BILL 1: PRELIMINARY AND GENERAL

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

**VHEMBE DISTRICT MUNICIPALITY
MUTALE RAW WATER SCHEME: WEIR REHABILITATION AND
PUMPSTATIONS UPGRADE**



BILLS OF QUANTITIES

ITEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
1.1	SABS	<u>SCHEDULE 1: PRELIMINARIES AND</u>				
	1200A	<u>GENERAL</u>				
	8.3	<u>FIXED CHARGE AND VALUE-RELATED</u>				
		<u>ITEMS</u>				
1.1.1	8.3.1	Contractual Requirements	sum	1,00		
	8.3.2	<u>Establish facilities on site</u>				
	8.3.2.1	i) <u>Facilities for the Engineer</u>				
1.1.2		a) Name board as per Drw. No. 159-C1-GL-000-004	no	2,00		
	8.3.2.2	ii) <u>Facilities for Contractor</u>				
1.1.3		a) Offices and storage sheds	sum			
1.1.4		b) Workshops	sum			
1.1.5		c) Laboratories	sum			
1.1.6		d) Living accommodation	sum			
1.1.7		e) Ablution and latrine facilities	sum			
1.1.8		f) Tools and equipment	sum			
1.1.9		g) Water supplies, electric power and communications	sum			
1.1.10		h) Dealing with water	sum			
1.1.11		i) Access	sum			
1.1.12		j) Plant	sum			
CARRIED FORWARD TO NEXT PAGE						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

ITEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
BROUGHT FORWARD FROM PREVIOUS PAGE						
1.1.13		k) Occupational Health & Safety	sum			
1.1.14	8.3.3	Other fixed charge obligations	sum			
1.1.15	8.3.4	Removal of site establishment	sum			
	SABS 1200A					
1.2	8.4	TIME RELATED ITEMS				
1.2.1	8.4.1	Contractual requirements	month			
	8.4.2	<u>Operations and maintenance of facilities on site</u>				
	8.4.2.1	<u>Facilities for Engineer</u>				
1.2.2		i) <u>Facilities for the Engineer</u> a) One name board	no	2		
	8.4.2.2	<u>Facilities for Contractor</u>				
1.2.3		a) Offices and storage sheds	sum			
1.2.4		b) Workshops	sum			
1.2.5		c) Laboratories	sum			
1.2.6		d) Living accommodation	month			
1.2.7		e) Ablution and latrine facilities	month			
1.2.8		f) Tools and equipment	month			
1.2.9.		g) Water supplies, electric power and communications	month			
1.2.10		h) Dealing with water	month			
1.2.11		i) Access	month			
CARRIED FORWARD TO NEXT PAGE						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

ITEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
BROUGHT FORWARD FROM PREVIOUS PAGE						
1.2.12		j) Plant	month			
1.2.13		k) Occupational Health & Safety	month	12		
1.2.14		l) Supervision for duration of contract	month	12		
		j) Occupational Health and Safety Compliance in high risks working environment	month	12		
1.2.15	8.4.4	Company and Head Office overhead costs for the duration of the Contract	month			
	8.4.5	<u>Other time related obligations</u>				
1.2.16		a) Retention Money Guarantee	month	12		
1.2.17		b) All other time related obligations	month			
1.3	8.5	<u>SUMS STATED PROVISIONALLY BY THE ENGINEER</u>				
		<u>Provisional Sum</u>				
1.3.1		Material to be used during execution of dayworks (Refer PSA8.1)	sum			Rate Only
1.3.2		Community Liaison Officer (CLO)	month	12,00	8 500,00	102 000,00
1.3.3		Labour Desk Officer	Prov sum	1,00	2 800,00	2 800,00
1.3.4		Provision for Training	Prov sum	1,00	400 000,00	400 000,00
1.3.5 x		Wayleaves application at the discretion of the Engineer	Prov Sum	1,00	195 000,00	195 000,00
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ITEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
BROUGHT FORWARD FROM PREVIOUS PAGE						
1.3.6		Environmental Management at the discretion of the Engineer	month	12,00	20 500,00	246 000,00
		Project Steering Committee members for attendance of meetings	Prov Sum	1,00	180 000,00	180 000,00
		Compensation to communities - crops, sand mine etc	Prov Sum	1,00	245 000,00	245 000,00
		Construction machines, steep terrain accessibility and workability, etc	Prov Sum	1,00	500 000,00	500 000,00
		Additional Survey	Prov Sum	1,00	125 000,00	125 000,00
		Additional testing and inspections on site as required by the Engineer.	Prov Sum	1,00	310 000,00	310 000,00
1.3.7		Percentage adjustment to items 1.3.1 to 1.3.7 to cover Contractor's expenses with regard to the items (maximum 10%)	%	2 305 800,00		2300580,00
1,4		<u>TEMPORARY WORKS</u>				
1.4.1		<u>Existing Services</u>				
	L	(a) Excavation by hand in soft material to expose services	no	35,00		
1,5		<u>ACCOMMODATION OF TRAFFIC</u>				
1.5.1		<u>Accommodating traffic and maintaining temporary deviations</u>				
		(a) Traffic Accommodation	Sum	1,00		
1,5		<u>ENCROACHMENTS AND RELOCATIONS, ETC</u>				
1.5.1		<u>Encroachments, land expropriation, relocation, etc</u>				
		(b) Encroachments and relocation	Prov Sum	1,00		
TOTAL CARRIED FORWARD TO SUMMARY						

Contractor

Witness 1

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Witness 2

BILL 2: DAYWORKS

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

**MUTALE RAW WATER SCHEME: WEIR REHABILITATION AND PUMPSTATIONS
UPGRADE
BILLS OF QUANTITIES**

ITEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
2.1		<u>SCHEDULE 2: DAYWORKS</u> <u>Dayworks Labour</u> a) Contractor's Representative b) Surveyor c) Unskilled labourer d) Semi-skilled labourer e) Skilled labourer f) Gang leader g) Foreman h) Skilled artisan i) Engineer j) Quantity Surveyor	hr			
2.2		<u>Plant hire : Work Rates on Site</u>				
2.2.1		<u>Tipper truck (specify capacity)</u> a) 5m ³ (small) b) 10m ³ (large)	hr			
2.2.2		<u>Flat bed truck (specify capacity)</u> a) 5 ton (small)	km			
2.2.3		LDV	km			
2.2.4		Wheel loader: m ³ bucket (specify type)	hr			
2.2.5		<u>Bull dozer</u> a) m ³ (small)	hr			
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ITEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
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2.2.6		TLB (Tractor Loader Backhoe) (..... m ³ bucket) (specify type)	hr			
2.2.7		Compactor a) (specify applied force) kg	hr			
2.2.8		Concrete mixer (specify dry/wet capacity) a) (small towable)	hr			
2.2.9		Miscellaneous Compressor with capacity of a) ± 10m ³ /min	hr			
		b) Water pump with 80mm outlet - diesel driven	hr			
		c) Motor grader	hr			
		d) Vibratory roller	hr			
		e) Pneumatic roller	hr			
		f) Front end loader	hr			
		g) Excavator	hr			
		h) Compressor	hr			
		i) Vibrating plate compactor minimum power 2 kW	hr			
		j) Water tank truck	hr			
TOTAL CARRIED FORWARD TO SUMMARY						

Contractor

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Employer

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Witness 2

BILL 3: HIGH LIFT PUMPSTATION

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

**VHEMBE DISTRICT
MUNICIPALITY
MUTALE RAW WATER SCHEME: WEIR REHABILITATION AND
PUMPSTATIONS UPGRADE
BILLS OF QUANTITIES**



TEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
3.1	SABS 1200 C	SCHEDULE 3: HIGH LIFT PUMP STATION				
3.1.1	8.2.1	SITE CLEARENCE <u>Clear and grub area indicated in writing by the Client/Engineer.</u> a) Confined spaces b) All other areas	m ² m ²	0 625		
3.1.2	8.2.2	Remove and grub large trees and tree stumps of girth (i) over 1m and up to and including 2m (ii) over 2m and up to and including 3m (iii) over 3m and up to and including 4m	No No No	10 8 5		
3.1.3	8.2.9	Transport material and debris to unspecified sites and dump	m ³ .k m	3281		
3.1.4	8.2.10	Remove topsoil to nominal depth of 150mm	m ³	94		
3.2	SABS 1200 D	BULK EARTHWORKS				
3.2.1	8.3.2	Bulk Excavation a) Excavate in all material on site and stockpile	m ³	375		
3.2.2		<u>Extra over items for excavation in the following material:</u> b) Intermediate c) Hard rock	m ³ m ³	38 94		
3.2.4	8.3.4	<u>Cut to Spoil</u> Excavate from stockpile insitu material, spreading onsite in layers not exceeding 150mm in thickness and compacting fill to minimum of 90% AASHTO density	m ³	375		
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BROUGHT FORWARD FROM PREVIOUS PAGE							
3.2.4	8.3.4		<u>Borrow to fill</u> Excavate from stockpile insitu material, spreading onsite in layers not exceeding 150mm in thickness and compacting fill to minimum of 90% AASHTO density	m ³	375		
3.2.5	8.3.4		<u>Importing of Material</u> a) Rip and recompact, placing in layers not exceeding 200mm in thickness and compacting fill to minimum of 93% AASHTO density BUILDING PLATFORMS b) Fill G7 material from stockpile or cut including hauls, placing fill in layers not exceeding 150mm in thickness and compacting fill to minimum of 95% AASHTO density c) Fill G5 material from commercial sources, placing fill in layers not exceeding 150mm in thickness and compacting fill to minimum of 95% AASHTO density FILLING d) Fill G7 material from stockpile or cut including hauls, placing fill in layers not exceeding 150mm in thickness and compacting fill to minimum of 95% AASHTO density e) Fill G5 material from commercial sources, placing fill in layers not exceeding 150mm in thickness and compacting fill to minimum of 95% AASHTO density	m ³	125		
				m ³	800		
				m ³	480		
				m ³	281		
				m ³	94		
3.2.6	8.3.4		<u>OVERHAUL:</u> Spoil material hauled in excess of a free-haul distance 10km (ordinary overhaul) to unspecified sites and dump (Provisional)	m ³ -km	13125		
3.2.7			Compaction of ground surface under footings, etc. Scarifying for a depth of 100mm , including breaking down oversize material, adding suitable material where necessary and compacting to 93% Mod AASHTO density	m ²	400		
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3.2.8	SANS 1200D		Shoring and buttering excavation trenches Risk of collapse	m ²	192		
3.2.9		8.3.7	<u>SOIL POISONING</u> Weedkillers, Insecticides, etc. Environmental friendly and SABS approved applied in accordance to the manufacturer's instructions	m ²	592		
3.2.10			<u>Dewatering</u> Keeping excavations free of water	Item	1		
3.2.11	8.3.1 (a)	L	PIPE TRENCHES SITE CLEARANCE Clear vegetation on pipeline route only not already measured elsewhere	m	50		
3.2.12	8.3.1 (c)	L	Remove topsoil to depth of 150mm, stockpile next to trench, maintain and reinstate on completion	m ³	15		
3.2.13	8.3.2 (a)		EXCAVATION Excavate in soft and intermediate materials including backfill, compact, and dispose of surplus/unsuitable material, for pipes:- . Over 100 up to 300 mm diam. for total trench depth:				
		a)	up to 1,0 m deep	m ³			Rate Only
		b)	Over 1,0 m up to 1,5 m deep	m ³	75	115,00	8 625,00
3.2.14			Extra Over Item 3.2.13 Intermediate excavation (Provisional)	m ³	2	625,00	1 250,00
3.2.15	8.3.2 (c)		Excavate and dispose of unsuitable material from trench bottom (Provisional)	m ³	2	125,00	250,00
3.2.16	8.3.3.1(a)		EXCAVATION, ANCILLARIES Make up deficiency in backfill material (Provisional) From other necessary excavations on site				
3.2.17	8.3.3.1(c)		By importation from commercial or off-site sources selected by the Contractor				
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3.2.18	8.3.3.4		Overhaul Limited overhaul (Provisional)	m ³			Rate Only
3.2.19			Long Overhaul (Provisional)	m ³ .km	1800	8,50	15 300,00
3.2.20	8.3.49(a)	L	EXISTING SERVICES a) Cables (Provisional)	No	2	550,00	1 100,00
		L	b) Pipelines (Provisional)	No	3	550,00	1 650,00
3.3	SABS 1200 GA		<u>CONCRETE, FORMWORK AND REINFORCEMENT</u>				
3.3.1	8,2		<u>FORMWORK</u>				
3.3.1.1	8.2.1		Rough formwork :				
			a) Vertical to chamber floors	m ²	117		
3.3.1.2	8.2.2		Smooth formwork:				
			a) Vertical to walls	m ²	346		
			b) Horizontal to roof soffit	m ²	13		
3.3.1.3	8.2.3		Vertical narrow widths up to 300mm wide (Including 25x25mm chamfers on exposed faces) high lift pump stations	m	127		
	8.2.4		<u>Box out holes/form voids:</u>				
3.3.1.4	8.2.4.a		Small, circular, up to 0.35m diameter, depth over 100mm and up to 500mm	No.	3		
3.3.1.5	8.2.4.c		Large, circular, up to 0.8m diameter, depth over 100mm and up to 500mm	No.	1		
3.3.2	8.1.2		<u>REINFORCEMENT</u>				
3.3.2.1	8.3.1		<u>High tensile reinforcement to structural concrete work</u>				
			a) 10mm diameter bar	t	0,74		
			b) 12mm diameter bar	t	1,94		
			c) 16mm diameter bar	t	10,19		
			d) Ref. 617 Mesh in concrete surface beds	m ²	16		
3.3.3	8,4		<u>CONCRETE</u>				
3.3.3. 1	8.4.2		<u>15Mpa/19mm concrete</u>				
			a) Blinding layer	m ²	350		
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3.3.3. 2	8.4.3	30Mpa/19mm concrete					
		a) Ground beams, cast against excavated surfaces	m ³	39			
		b) Strip footing, cast against excavated surfaces	m ³	4			
		c) Surface beds on waterproofing	m ³	120			
		d) Walls in foundations	m ³	42			
		e) Concrete columns	m ³	8			
		f) Concrete apron flashing around the building	m ³	5			
		g) Concrete plinth	m ³	4			
	8.4.4	<u>Unformed surface finishes</u>					
3.3.4	8.4.4a	- Wood floated finish	m ²	180			
3.4	8,50	<u>JOINTS</u> Hydrophilic waterbar "Sika swell 2507H" or similar approved for:					
3.4.1		High lift pump stations	m	100			
3.5		- <u>MASONRY</u>					
3.5.1		<u>BRICKWORK</u>					
3.5.1.1		<u>Superstructures - Brickwork Claret (kiln stock) NFX - Cran Solid brick (14 Mpa nominal compressive strength) in Class II Mortar</u>					
		a) One brick walls	m ²	211			
3.5.2		<u>FACEBRICK</u>					
3.5.2.1		<u>Approved facebricks laid in stretcher bond manufactured in accordance with SANS 227:2007, bedded and jointed in Class II mortar and pointed with recessed vertical and recessed horizontal joints</u>					
		- a) Extra over 220mm facebrick laid in stretcher bond in superstructure	m ²	211			
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3.5.3			<u>Brickwork reinforcement</u> 75mm Wide reinforcement built into brick walls with sufficient laps at end joints, angles and intersections	m	842		
3.5.4			<u>Prestressed fabricated lintels including turning pieces, etc</u> 110 x 75 mm lintels in lengths not exceeding 3m	m	13		
3.5.5			<u>Hoop Iron Ties</u> 30 x 1,6mm Galvanised hoop iron roof tie 1.5m long with one end built six courses deep into top of brickwork and other end wrapped around and nailed to trusses (Provisional)	No	288		
3.5.6			<u>WATERPROOFING</u> <u>DAMP-PROOFING OF WALLS AND FLOORS</u> a) One Layer of 250 micron USB green DPM under surface bed b) One layer of micron USB green DPC on walls	m ² m ²	16 60		
3.6			<u>ROOF COVERING, CLADDINGS, ETC</u>				
3.6.1			<u>0,60mm Approved Z272 IBR 890 roof sheeting continuous lengths with zinalume® AZ150 coated steel G550 0.47mm (light industrial) with a clean colorbond™ finish to one side and a standard backing coat and fixed to steel purlins, in strict accordance with manufacturer's specifications and complete with all closers(ridge, bullnosing etc.), flashings, barge boards etc., fixed to engineer certified pre-fabricated steel roof trusses. colour - emerald green or similar approved</u> a) Roof covering with pitch not exceeding 25 degrees	m ²	400		
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3.6.2			<u>PROFILED TRANSLUSCENT SHEETING</u> <u>0,60mm Approved Z275 IBR profile</u> <u>translucent polycarbonate sheet in single</u> <u>lengths fixed to structural steel truss,</u> <u>purlins or rails in according to</u> <u>manufacturer's recommendations</u>				
			a) Side wall covering	m ²	89		
3.6.3			<u>Chromadek IBR roof sheeting on ex 38 x</u> <u>38mm sap purlins 32 x 420mm nailed with</u> <u>nails and non corrosive clips including 38</u> <u>x 38mm sawn softwood battens</u>				
			-				
			a) Roof covering with pitch exceeding 25 degrees	m ²	20		
3.6.7			- <u>Welded columns and beam in single</u> <u>lengths with flat section base, top, bearer</u> <u>and connection plates bolted to concrete</u> <u>plinth, bases etc including connection</u> <u>plates, stiffeners, anchors, bolts, etc.</u>				
			-				
			a) 60x60x6L Truss	t	0,48		
			b) 70X70X6L Truss	t	0,6		
			-				
			c) 125x50x20x3 CFLC Purlins on top of rafters	t	0,68		
			d) 125x50x20x3 CFLC side girt	t	0,51		
			-				
3.6.8			<u>ROOF ANCHORS</u>				
			a) 60 x 60 x 6L Knee bracing	t	0,37		
			b) 60 x 60 x 6L Cross bracing	t	0,32		
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3.6.9			<u>CARPENTRY AND JOINERY</u> Plate nailed timber roof truss construction Trusses are at maximum 900mm centres Roof covering is on purlins/battens Ceilings are on 38 x 38mm brandering The references given in the descriptions are to the respective types of trusses detailed on the architect's drawings accompanying these bills of quantities for tender purposes The dimensions in the descriptions of the trusses are nominal and actual measurements are to be obtained from the architect and/or the site before design or fabrication commences a) 114 x 38mm sap purlin b) 152 x 76mm sap rafters exceeding 3.9m but not exceeding 6.6m c) 76 x 50mm wall plate d) 50 x 50mm sap purlins	m	234		
3.7			<u>STRUCTURAL STEELWORK</u>				
3.7.1			<u>SUPPLY MANUFACTURED AND INSTALL STRUCTURAL STEEL COLUMN, BEAM, PURLIN, GIRTS, BRACING, ETC</u> <u>Welded columns in single lengths with flat section base, top, bearer and connection plates bolted to concrete plinth, bases etc including connection plates, stiffeners, anchors, galvanized bolts, etc.</u> a) 305x165x54UB column b) Supply, deliver and install handrails, access ladders, louvers, double doors and associated Pump Station steel sundry items.	t	2.8		
				Prov. Sum	1	350 000,00	350 000,00
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3.8			<u>CEILING AND PARTITIONING AND ACCESS FLOORING</u> <u>4mm Nutec ceiling boads at 1200mm centres fixed to 38 x 38mm SA pine timber battens and finished with rhinolite plaster trowelled and sanded to a smooth polished surface.</u>				
3.8.1			Ceiling including 38x50mm sawn soft wood bandering at 400mm centres <u>"Rhino" gypsum plasterboard cornice</u>	m ²	133		
3.8.2			75mm standard covered cornice	m	52		
3.8.3			Extra over ceiling for 600 x 600mm trap door of 38 x 50mm wrought softwood rebated framing with one 38 x 38mm sawn softwood cross brander covered with ceiling board and fitted flush in opening on 20 x 20mm pressed steel angle <u>Insulation</u>	no	4		
3.8.4			75mm thick "isotherm" thermal insulation blanket in cavity of partitioning	m ²	133		
3.9			<u>PLASTERING</u> <u>INTERNAL PLASTER</u> <u>Cement plaster steel trowelled on brickwork</u>				
3.9.1			On walls - -	m ²	211		
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3.10	SANS 1200 L 8.2.5	<u>MECHANICAL FITTINGS</u> <u>Supply and delivery of mild steel pipes, valves and specials (short pipe runs) as detailed on the drawings</u> HIGH LIFT PUMP STATION (drawing) Steel Grade X42 wt=6mm, 6mmHDPE lining and coated with 3ply FBE a) Horizontally split casing centrifugal pump with 300kW motor with a minimum pump efficiency of 78% (DNs250xDNd200 [Qp= 660m3/hr; Hp = 120m]) as per pump specifications for coating and lining b) DN400 Metal Seated Wedge gate valve, non-rising spindle, manually operated, ant-clockwise closing to SANS 664 flanges drilled to SANS 1123 table 1600/3 with 3ply epoxy coating and lining c) DN400 dismantling joint with tie rods, nuts and washers flanged to BS EN 1092-1 PN16 with rilsan nylon 11 coating d) DN300 Nozzle check, fast reacting, valve, both ends flanged, flanges drilled to SANS 1123 table 2500/3 including 3ply epoxy coating and lining e) DN300 viking Johnson flange adaptor including 3ply epoxy coating and lining f) DN300 Double Eccentric butterfly valve with electric actuators with 3ply epoxy coating and lining	No.	3		
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			g) DN DN600 X42 Steel Tee piece 1520 long F/F, wall thickness t=6mm, both ends flanged, flanges drilled to SANS 1123 table 1600/3, with a flanged DN400 outgoing leg, flange drilled to SANS 1123 table 1600/3 with all legs reinforced with collars including 3ply epoxy coating and lining	No.	3		
			h) DN600, SANS 719 API 5L x42 steel pipe, 2630mm long F/F wall thickness t=6mm both ends flanged, flanges drilled to SANS 1123 table 1600.3 including 3ply epoxy and lining	No.	3		
			i) DN400, SANS 719 API 5L X42 steel pipe, 1800mm long F/F. wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 table 1600/3.including 3ply epoxy coating and lining	No.	3		
			j) DN400, SANS 719 API 5L X42 steel pipe, 1000mm long F/F. wall thickness t = 6mm, both ends flanged, flanged drilled to SANS 1123 table 1600/3.including 3ply epoxy coating and lining	No.	3		
			k) DN400x250 concentric reducer , SANS 719 API 5L X42 steel pipe, 1760mm long, wall thickness t = 6mm, one end flanged and the other end fitted to item 12, flanges drilled SANS 1123 table1600/3, to be fitted with a 25mm boss nipple to fit a digital pressure transmitter and indicator including 3ply epoxy coating and lining	No.	3		
			l) DN250 Viking Johnson flange adaptor including 3ply epoxy coating and lining	No.	3		
			m) DN200x300 concentric reducer , SANS 719 API 5L X42 steel pipe, 500mm long F/F wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 table 2500/3.including 3ply epoxy coating and lining	No.	3		
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			n) DN300, SANS 719 API 5L X42 steel pipe, 1800mm long F/F wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 TABLE 2500/3 to be fitted with a 25mm boss nipple to fit a digital pressure transmitter and indicator including 3ply epoxy coating and lining	No.	3	
			p) DN600, SANS 719 API 5L X42 steel pipe delivery manifold, 2440mm long F/F wall thickness t = 6mm, both ends flanged, 1123 table 2500/3 with a DN300 flanged incoming sweep Tee leg and a DN450 350mm long flanged outgoing leg fitted to item 18 including 3ply epoxy coating and lining	No.	3	
			q) DN600, SANS 719 API 5L X42 steel pipe, 1710mm long F/F wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 TABLE 2500/3.including 3ply epoxy coating and lining	No.	3	
			r) DN600, SANS 719 API 5L X42 steel pipe, 2700mm long F/F wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 TABLE 2500/3 including 3ply epoxy coating and lining	No	3	
			s) DN100 double orifice with anti shock, air valve complete with a DN100, t=5mm spool piece 300mm long F/F and a wedge gate valve to SANS 664 flanges drilled to SANS 1123 table 2500/3 including 3ply epoxy coating and lining	No	3	
			t) DN600 90° long radius bend to the underground pipe including 3ply epoxy coating and lining	No	3	
			u) DN600x300 concentric reducer, SANS 719 API 5L X42 steel pipe, 1100mm long F/F wall thicknesst = 6mm, both ends flanged, flanges drilled to SANS 1123 table 2500/3 including 3ply epoxy coating and lining	No	2	
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Witness 1

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			u) DN300, SANS 719 API 5L X42 steel pipe, 300mm long F/F. wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 table 2500/3 including 3ply epoxy coating and lining	No	2		
			w) DN600, clamp on Ultrasonic flow meter	No	1		
			x) DN25, digital pressure transmitter and indicator	No	6		
			y) DN600 dismantling joint with tie rods, nuts and washers flanged to BS EN 1092-1 PN16 including rilsan nylon 11 coating	No	2		
			z) DN600 metal seated wedge gate valve, non-rising spindle, manually operated anti-clockwise closing to SANS 664 flanges drilled to SANS 1123 TABLE 1600/3 including 3ply epoxy coating and lining	No	3		
			aa) DN600, SANS 719 API 5L X42 steel pipe, 5260mm long F/F wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 table 1600/3. including 3ply epoxy coating and lining	No	1		
			ab) DN600, SANS 719 API 5L X42 steel pipe, 2270mm minimum length wall thickness t = 6mm, one end flanged , flanges drilled to SANS 1123 TABLE 1600/3. including 3ply epoxy coating and lining	No	1		
			ac) DN600, SANS 719 API 5L X42 steel pipe, 2270mm minimum length wall thickness t = 6mm, one end flanged, flanges drilled to SANS 1123 TABLE 1600/3. including 3ply epoxy coating and lining	No	1		
			ad) DN600, SANS 719 API 5L X42 steel pipe suction manifold, 2440mm long F/F wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 table 2500/3 with a DN600 flanged incoming sweep Tee leg and a DN600 flanged outgoing leg including 3ply epoxy coating and lining	No	1		
			ae) DN600, SANS 719 API 5L X42 steel pipe, 1490mm long F/F wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 table 2500/3. including 3ply epoxy coating and lining	No	1		
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			af) DN600 90° long radius bend flanged including 3ply epoxy coating and lining	No	1		
			ah) DN300 90° long radius bend flanged including 3ply epoxy coating and lining	No	1		
			ai) DN300, SANS 719 API 5L X42 steel pipe, 760mm minimum length F/F, the actual length to be confirmed onsite, wall thickness t = 6mm, one end fitted with a diffuser and the other end flanged, flanges drilled to SANS 1123 table 2500/3. including 3ply epoxy coating and lining	No	1		
			aj) Pipe support bracket	No	2		
			ak) DN300, blank flange, flanges drilled to SANS 1123 table 2500/3	No.	4		
			al) Supply, deliver and install handrails, access ladders, grating and associated pump station steel sundry items.	Prov. Sum	1	300 000,00	300 000,00
			ap) Supply, deliver and install ST18/06 744kl steel priming tanks at high lift pump stations	Prov. Sum	1	2 100 000,00	2 100 000,00
			aq) DN150 PN25, surge anticipating valve	No	1		
			ar) Supply, deliver and install 3.5 Ton overhead electric crane spanning 18m in length with electric chain hoist, overload protection, electric cross travel, electric long travel and fixed pendent	No	1		
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Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

3.11	SABC 1200L 8.2.1		<u>PVC -O PRESSURE PIPE AND PIPE FITTINGS</u> Supply, lay, bed & test complete with couplings and fittings for the following PVC-O pressure pipes (conforming with SANS 966 Part 1 Specifications) in 6m lengths each pipe fitted at one end with socket for Mechanical jointing, in the following diameters: a) 200 mm dia Class 16	m	50		
3.12	SABC 1200L 8.2.5		<u>FITTINGS AND SPECIALS FOR FIXING ON TO PVC-O PIPES</u> Fittings to be suitable for coupling directly (mechanically onto pipes. Each fitting socket for mechanical jointing. Fittings for PVC-O Class 16 (unless otherwise specified.) Fittings to be of PVC/cast iron construction. a) Bends 90 degree (PVC-O) 200 mm dia b) Bends 45 degree (PVC-O) 200 mm dia c) Bends 22,5 degree (PVC-O) 200 mm dia d) Bends 11,5 degree (PVC-O) 200 mm dia	No	2		Rate Only
3.13	8.2.11		<u>ANCHOR BLOCKS</u> Concrete anchor blocks complete as indicated in the drawings Price to Include Excavation, formwork, reinforcing and concrete: a) Volume less than 0.6m3 b) Volume between 0.6 - 1,2 m3	No	3		Rate Only
3.14	SABS 1200 LB 8.2.1 8.2.2.2 8.2.2.2		<u>PIPE BEDDING AND BLANKET</u> Selected granular material for bedding cradle and blanket a) Trench excavation b) Borrow pits c) Commercial source	m3	9		Rate Only
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Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

3.15	8.2.1		a) Provision of selected fill material	m3	16		Rate Only
			Trench excavation				
	8.2.2.2		b) Borrow pits	m3			
TOTAL CARRIED FORWARD TO SUMMARY							

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

BILL4: LOW LIFT PUMPSTATION

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

VHEMBE DISTRICT MUNICIPALITY
MUTALE RAW WATER SCHEME: WEIR REHABILITATION AND PUMPSTATIONS UPGRADE
BILLS OF QUANTITIES



ITEM NO	PAY REFERS		UNIT	TOTAL QTY	RATE	AMOUNT
4.1	SABS 1200 C	<u>SCHEDULE 4: LOW LIFT PUMPSTATION</u>				
		<u>DEMOLITIONS</u>				
4.1.1	8.2.1	<u>Removal and decommissioning of Mechanical fittings</u>				
		a) Decommission all mal-functional mechanical fittings in the pumpstation	Sum	1		
		b) Remove and take offsite all the mal-functional mechanical fittings	Sum	1		
4.2		<u>MECHANICAL FITTINGS AT LOW LIFT PUMP STATION</u>				
	SANS 1200 L	Supply and delivery of mild steel pipes, valves and specials (short pipe runs) as detailed on the drawings				
	8.2.5					
4.2.1		LOW LIFT PUMP STATION (drawing) Steel Grade X42 wt=6mm, 6mmHDPE lining and coated with 3ply FBE				
		a) DN355 enerseal flange adaptor, flanges drilled to sans 1123 table 2500/3.	No.	2		
		b) DN150, SANS 719 API 5l x42 steel pipe, 7 000mm long f/f. wall thickness t = 6mm, both ends flanged, flanges drilled to sans 1123 table 1600/3 , with puddle flange.	No.	3		
		c) DN300, SANS 719 API 5l x42 steel pipe delivery manifold, 3 700mm long f/f. wall thickness t = 6mm, both ends flanged, flanges drilled to sans 1123 table 1600/3 , with three DN150 l=500mm flanged incoming legs, and a DN300 l=500mm flanged outgoing leg. all legs to be reinforced with collars.	No.	1		
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Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

ITEM NO	PAY REFERS	UNIT	TOTAL QTY	RATE	AMOUNT
	d) DN150 pn16 AVK metal seated wedge gate valve, 403mm f/f, non-rising spindle, manually operated, anti-clockwise closing to sans 664 flanges drilled to sans 1123 table 1600/3.	No.	3		
	e) DN150 dismantling joint with tie rods, nuts and washers flanged to bs en 1092-1 PN16.	No.	3		
	f) DN150 X42 steel straight distance piece, 1 000mm long f/f. wall thickness t = 6mm, both ends flanged, flanges drilled to sans 1123 table 1600/3 , with DN20 boss nipple, DN20 stainless steel ball valve and glycerine filled pressure gauge and transmitter.	No.	6		
	g) DN150 PN16 nozzle check valve prepared for lever resilient seated, both ends flanged, flanges drilled to sans 1123 table 1600/3.	No.	3		
	h) DN150, SANS 719 API 5L X42 90° seamless steel bend t=6mm, both ends flanged, flanges drilled to sans 1123 table 1600/3.	No.	3		
	i) DN150 X42 steel straight distance piece, 500mm long f/f. wall thickness t = 6mm, with DN80mm I =150mm stub for air valve. All ends flanged, flanges drilled to SANS 1123 table 1600/3.	No.	1		
	j) DN150, SANS 719 API 5L X42 steel pipe, 4 000mm long f/f. wall thickness t = 6mm, both ends flanged, flanges drilled to SANS 1123 table 1600/3 , with puddle flange.	No.	1		
	k) DN80 mm Ø double orifice (small & large orifice) air valve PN16 rating with anti shock orifice mechanism (by vent-o-mat model rbx 2501 or similar), flange with screwed studs to fit ball valve.	No.	3		
	l) DN150, blank flange, flanges drilled to sans 1123 table 1600/3	No.	2		
	m) 1000 x 1000mm wall mounted PN10 sluice gates	No.	5		
TOTAL CARRIED FORWARD TO SUMMARY					

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

BILL 5: ELECTRICAL WORKS

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

VHEMBE DISTRICT MUNICIPALITY

MUTALE RAW WATER SCHEME: WEIR REHABILITATION AND PUMPSTATIONS UPGRADE



ITEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
5		<u>SCHEDULE 5: ELECTRICAL WORK</u>				
5.1		<u>LV MCC Container</u>				
5.1.1		6M MCC Container / Platform / Stairs and Supports Single Aircon	Sum	1		
5.1.2		6M MCC Container / Platform / Stairs and Supports Double Aircon	Sum	1		
5.2		<u>Engineering, Supervision & Design</u>				
5.2.1		Substation & Panel Design Work	Sum	1		
5.2.2		Engineering and SCADA Integration with Existing Mutale WTW	Sum	1		
5.2.3		FAT	Sum	1		
5.2.4		Document Control and Management	Sum	1		
5.2.5		Site Supervision Engineer	Sum	1		
5.3		<u>Other Site Work (Includes Eskom Bulk Supplies and Deposits PC Sum Estimate)</u>				
5.3.1		Cabling and earthing - LLP	Sum	1		
5.3.2		Cabling and earthing - HLP	Sum	1		
5.3.3		Lighting - LLP	Sum	1		
5.3.4		Lighting - HLP	Sum	1		
5.3.5		Civil works for Electrical - HLP	Sum	1		
5.3.6		Instrumentation - LLP	Sum	1		
5.3.7		Instrumentation - HLP	Sum	1		
5.3.8		Labels and Signage - LLP	Sum	1		
CARRIED FORWARD TO NEXT PAGE						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

ITEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
BROUGHT FORWARD FROM PREVIOUS PAGE						
5.3.9		Labels and Signage - HLP	Sum	1		
5.3.10		Trays and fasteners - LLP	Sum	1		
5.3.11		Trays and fasteners - HLP	Sum	1		
5.3.12		Trenching and sleeves - LLP	Sum	1		
5.3.13		Trenching and sleeves - HLP	Sum	1		
5.3.14		Fire, Intruder alarm and CCTV - LLP	Sum	1		
5.3.15		Fire, Intruder alarm and CCTV - HLP	Sum	1		
5.3.16		Eskom Connection Allowance	Sum	1		
5.4		<u>Low Lift Pumpstation</u>				
5.4.1		5KVA Control Transformer Section	Sum	1		
5.4.2		63A Spare Feeder Section	Sum	1		
5.4.3		58KW Soft Starter Feeder and Control Section	Sum	2		
5.4.4		58KW Field Isolator Station	Sum	2		
5.4.5		PLC with HMI and GSM Section	Sum	1		
5.4.6		3KVA UPS UNIT	Sum	1		
5.4.7		MCC Panel And Copper Work	Sum	1		
5.4.8		6M MCC Container / Platform / Stairs and Supports Single Aircon	Sum	1		
CARRIED FORWARD TO NEXT PAGE						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

ITEM NO	PAY REFERS	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
BROUGHT FORWARD FROM PREVIOUS PAGE						
5.5		<u>High Lift Pumpstation</u>				
5.5.1		5KVA Control Transformer Section	Sum	1		
5.5.2		63A Spare Feeder Section	Sum	1		
5.5.3		132KW Soft Starter Feeder and Control Section	Sum	2		
5.5.4		158KW Field Isolator Station	Sum	2		
5.5.5		PLC with HMI and GSM Section	Sum	1		
5.5.6		3KVA UPS UNIT	Sum	1		
5.5.7		MCC Panel And Copper Work	Sum	1		
5.5.8		6M MCC Container / Platform / Stairs and Supports Double Aircon	Sum	1		
5.6		Preliminaries				
5.6.1		Site Installation	Sum	1		
TOTAL CARRIED FORWARD TO SUMMARY						R6 384 490,03

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

BILL 6: PROVISIONAL SUMS

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2



ITEM NO	PAY REFERS	LIC	DESCRIPTION	UNIT	TOTAL QTY	RATE	AMOUNT
			SCHEDULE 6: PROVISIONAL SUMS				
6.1			Provisional sum for Soil Erosion and River Conservation Protection	Sum	1	250 000,00	250 000,00
6.2		L	Provisional sum for Stormwater Management and Reticulation	Sum	1	250 000,00	250 000,00
6.3			Provisional sum for Demolitions and Remedial Works	Sum	1	450 000,00	450 000,00
6.4			Provisional sum for Motor Control Centre Room	Sum	1	400 000,00	400 000,00
6.5			Provisional sum for Centrifugal Pumps for Low Lift Pumpstation	Sum	1	2 340 000,00	2 340 000,00
6.6			Provisional sum for obtaining material from commercial or off-site sources and forming of embankment	Sum	1	2 000 000,00	2 000 000,00
6.7		L	Provisional sum for Access Roads in Pumpstation 01	Sum	1	5 690 000,00	5 690 000,00
6.8			Provisional sum for Weir Rehabilitation (embankment Rehabilitation and Spill Way Rehabilitation	Sum	1	7 505 804,35	7 505 804,35
6.9		L	Contractor Mark up (Profit, attendance and handling fees) for items 6.1 to 6.8 as percentage	%	15%		2 330 370,65
TOTAL CARRIED FORWARD TO SUMMARY							R17 866 175, 00

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

SUMMARY

VHEMBE DISTRICT MUNICIPALITY

MUTALE RAW WATER SCHEME: WEIR REHABILITATION AND PUMPSTATIONS
UPGRADE
SUMMARY OF SECTIONS



SCHEDULE	DESCRIPTION	AMOUNT R-C
SCHEDULE 1	PRELIMINARIES AND GENERALS	
SCHEDULE 2	DAYWORKS	
SCHEDULE 3	HIGH LIFT PUMP STATION	
SCHEDULE 4	LOW LIFT PUMP STATION	
SCHEDULE 5	ELECTRICAL WORKS	
SCHEDULE 6	PROVISIONAL SUMS	
A SUBTOTAL (Use to calculate CPG amount and percentage)		
B CONTINGENCIES (Add 10% of Subtotal A)		
C SUBTOTAL (A + B)		
D CONTRACT PRICE ADJUSTMENT (Add 3% of Subtotal A) <i>(The provisional sum provided here may be employed only as necessary in terms of the Contract Price Adjustment Schedule)</i>		
E SUBTOTAL (C+ D)		
F VALUE ADDED TAX (Add 15 % of Subtotal E)		
TOTAL (E+F) CARRIED TO "SECTION A: OFFER" OF C1.1 FORM OF OFFER AND ACCEPTANCE		

SIGNED ON BEHALF OF TENDERER:

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Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2



BID DOCUMENT FOR:

APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

BID NUMBER: VDM/TECH/25/07/2024/01

CIDB Grade: 8CE or Higher

BOOK 2 OF 2 (VOLUME 2)

Vhembe District Municipality Supply Chain Management: Contact: Ms. Sigida N Tel: (015) 960 2000 Fax: (015) 962 5277	Vhembe District Municipality Project Management Unit: Contact: Mr E.F. Chauke Tel: (015) 960 2000 Fax: (015) 962 5277
Compiled by: Batatise Consulting Engineers (Pty) Ltd: Contact: Jabula Nkomo, Tel: (010) 442 6759 Cell: 068 285 4350 E-mail address: jabula@batatiseconsulting.com	
Name of Bidder.	

PART C3: SCOPE OF WORK

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Contractor

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Employer

Witness 1

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VHEMBE DISTRICT MUNICIPALITY

**VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW
AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND
REFURBISHMENT OF PUMPING SYSTEM)**

C3.1 STANDARD SPECIFICATIONS

C3.2 PROJECT SPECIFICATIONS

PART A: GENERAL

PS-1	Project Description
PS-2	Description of the Site and Access
PS-3	Details of the Works
PS-4	Construction Management Requirements
PS-5	Security Clearance of Personnel
PS-6	Subcontractors
PS-7	Supply of Materials
PS-8	Execution of Works

PART B: AMENDMENTS TO THE STANDARD SPECIFICATIONS

PSA	SABS 1200 A: General
PSC	SABS 1200 D: Earthworks

C3.3 PARTICULAR SPECIFICATIONS

SECTION PC Trimming Of Site
SECTION PC Maintenance
SECTION PE Contingencies
SECTION PG Generic Labour-Intensive Specification
SECTION POHS
OHS 1993 Safety Specification

VHEMBE DISTRICT MUNICIPALITY

VDM/TECH/25/07/2024/01: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

C3.1 Standard Specifications

The standard specifications on which this contract is based are listed below. Although not bound in nor issued with this Document, the following Sections of the Standardized Specifications shall apply:

SANS 1200 A – 1986 GENERAL

SANS 1200 C – 1990 SITE CLEARANCE

SANS 1200 D – 1990 EARTHWORKS

SANS 1200 DB – 1989 EARTHWORKS (PIPE TRENCHES)

SANS 1200 DM – 1981 EARTHWORKS (ROADS, SUBGRADE)

SANS 1200 ME – 1981 SUBBASE

SANS 1200 MF – 1981 BASE

SANS 1200 G – 1982 CONCRETE (STRUCTURAL)

SANS 1200 HA – 1990 STRUCTURAL STEELWORK (SUNDRY ITEMS)

SANS 1200 L – 1983 MEDIUM-PRESSURE PIPELINES

SANS 1200 LB – 1983 BEDDING (PIPES)

SANS 1200 LC – 1981 CABLE DUCTS

SANS 1200 MM – 1984 ANCILLARY ROADWORKS

SANS 10252: Part 1 – 2012 WATER SUPPLY AND DRAINAGE FOR BUILDING

SANS 10252: Part 2 – 2012 WATER SUPPLY AND DRAINAGE FOR BUILDING

SANS 10160-1: – 2011: PART 1 BASIS OF STRUCTURAL DESIGN

SANS 10160-2: – 2011: PART 2 SELF-WEIGHT AND IMPOSED LOADS

SANS 10160-1: – 2011: PART 5 BASIS FOR GEOTECHNICAL DESIGN AND ACTIONS

SANS 10100-1:2000: THE STRUCTURAL USE OF CONCRETE – PART 1: DESIGN

SANS 2001 – 2007 CONCRETE STRUCTURES – PART 3 AND 5 DESIGN AND CONSTRUCTION OF CONCRETE DAMS (INCLUDING REPAIR GUIDELINES)

The following SANS specifications are also referred to in this document and the Contractor is advised to obtain them from Standards South Africa (a division of SANS) in Pretoria:

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONSTRUCTION AND MANAGEMENT REQUIREMENTS FOR WORKS CONTRACTS:

SANS 1921-1 -2004

SANS 1921-2 -2004

SANS 1921-5-2004

The above mentioned South African National Standards are referenced in the Specification Data. The Standard shall have precedence in the interpretation of any ambiguity or inconsistency between standard and specifications.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

PROJECT DESCRIPTION: APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

C3.2: Project Specifications

STATUS

The Project Specification, consisting of two parts, forms an integral part of the contract and supplements the Standard Specifications.

Part A contains a general description of the works, the site and the requirements to be met.

Part B contains variations, amendments and additions to the Standardized Specifications and, if applicable, the Particular Specifications.

In the event of any discrepancy between a part or parts of the Standardized or Particular Specifications and the Project Specification, the Project Specification shall take precedence. In the event of a discrepancy between the Specifications, (including the Project Specifications) and the drawings and / or the Bill of Quantities, the discrepancy shall be resolved by the Engineer before the execution of the work under the relevant item.

The standard specifications which form part of this contract have been written to cover all phases of work normally required for civil contracts, and they may therefore cover items not applicable to this particular contract.

PART A: GENERAL

PS1 PROJECT DESCRIPTION

The Mutale Regional Water Scheme has its main source as the Mutale River and abstraction is through a weir and abstraction works. Raw water is pumped to a holding dam at the Mutale Water Purification Plant. The existing Mutale Water Purification Plant has a combined design capacity of 13Mℓ/d and comprises of A Slow Sand Filtration (SSF) system with an estimated capacity of 4.4Mℓ/d and a Rapid Gravity Filtration (RGF) system with an estimated capacity of 8.6Mℓ/d.

The SSF is currently not operating and the RGF is producing way less than its design capacity due to various constraints, one of which being the Raw Water Pumping System, which is the subject of this contract. The envisage upgrades seek upgrade and optimize the pumping system in order to deliver the required 21Mℓ/d

The total treatment capacity of the plant is 13Mℓ/day.

The raw water system comprises of the following:

- Low-Lift Pumpstation, which pumps directly to the high lift pumps suction (i.e., 2 duty / 2 standby pumps)
- High-Lift Pumpstation (i.e., 2 duty / 1 standby pumps.) but only one current at the pumpstation:

High-lift pumps connect directly to low-lift pumps. Communication system between the 2 pump sets is not functional. There is high mortality of the raw water pumps.

- Ø400mm steel pipeline rising main:

It has been established that the system is in a generally poor state of repair. The condition of the raw water supply system is poor due to damages to the weir caused by a recent flood event and a pumping operation that is susceptible excessive wear and tear. The high lift pump station is also susceptible to flood events. There is also a need to upgrade the raw water pumping system to meet future demands of the supply area.

The works entail the rehabilitation of the river embankments downstream of the Mutale Weir , upgrading of the low lift pumpstation, construction of a new 600kW pumpstation including 2 x priming tanks and access road.

NOTE: The refurbishment, upgrade and construction work must be carried out with minimum disruption of supply from the bulk raw water system.

PS2 DESCRIPTION OF THE SITE AND ACCESS

2.1 Description of the Site

The Mutale Weir and Pumpstation is located at LAT: -22.7714, LON: 30.5375 within the Vhembe District Municipality in the Limpopo Province, South Africa and falls within the administrative boundaries of the Thulamela Local Municipality.



Figure 1: Mutale Weir and Pumpstation

2.2 Access to site

Access to the site can be obtained via the public streets within the perimeter of the site of works. The contractor shall be responsible for the maintenance and reinstatement of damage caused by him or his agents/deliveries to any property (Private or State Owned), fauna and flora and rights of way.

The contractor shall take cognizance of the aforementioned items and should allow in his rates tendered for any costs that could be incurred due to damages by the contractor.

PS3 DETAILS OF THE WORKS

A brief detail of the works for which this specification is applicable is as follows:

Weir Rehabilitation

1. Reinstatement of damaged embankments
2. Stabilisation of banks downstream of the weir

Low-Lift Pump

3. Install 4 new submersible pumps in existing abstraction works Sump including all appurtenances (capacity 0.29m³/s). Operated as two duty; one standby

High-Lift Pump

4. Strip and remove pumps and motors.
5. Decommission existing High-Lift pump stations or repurpose it.
6. Construct new High-Lift Pump Station with 2 duty and 1 standby pumps
7. Construct new prefabricated corrugated iron priming tanks for the High Lift Pump Station. The Contractor is referred to the detailed Project Specifications in subsequent sections, Schedule of Quantities and associated Drawings for the purposes of developing his method statement.

Temporary Works

The Contractor shall provide, erect, maintain and remove on completion of the Contract, ample temporary offices and sheds for the proper storage of perishable materials and for the use of his workmen.

Construction

- Setting out of Works

The Employer shall arrange for the Contractor to be given sufficient reference pegs from which to work. The value of all benchmarks shall be given in writing. The Contractor shall bear the cost of any re-survey and the cost of re-establishment or checking of any pegs, bench marks, etc. disturbed, destroyed or interfered with in any way and the cost of any survey to prove the accuracy of the setting out after any disturbance of or interference with any peg or bench mark. All surveys or re-survey shall be by Surveyors appointed by the Employer.

PS4 CONSTRUCTION AND MANAGEMENT REQUIREMENTS

4.1 General

The Contractor is referred to **SANS 1921: 2004 parts 1, 2 and 3: Construction and Management Requirements for Works Contracts**. These specifications shall be applicable to the contract under consideration and the Contractor shall comply with all requirements relevant to the project.

Certain aspects however require further attention as described hereafter.

4.2 Drawings (Read with SANS 1921 – 1: 2004 clauses 4.1.7; 4.1.11 and 4.1.12)

The reduced drawings form part of the tender documents as mentioned under Part T1 and shall be used for tendering purposes only.

The contractor shall be supplied with three complete paper copies of the construction drawings free of charge. The Contractor shall at his own expense re-produce further paper prints required for the construction of the work.

At the completion of the Contract, the Contractor shall return to the Employer's Agent all drawings, provided or made, during the contract period.

Any information which the Contractor has control over and which is required by the Employer's Agent Representative to complete the as built drawings shall be made available to the Employer's Agent Representative before the Certificate of Completion is issued.

Only written dimensions may be used. Dimensions are not to be scaled from drawings unless ordered by the Employer's Agent. The Employer's Agent will supply all figures / dimensions which are not shown on the drawings. The levels or dimensions given on the drawings are subject to confirmation on site. The Contractor shall submit all levels and dimensions to the Employer's Agent for confirmation before he commences with any structural construction work. The Contractor shall also check all dimensions which are given on the drawings and inform the Employer's Agent of any conflicting dimensions.

4.3 Responsibilities for design and construction *(Read with SANS 1921 – 1:2004 Clause 4.2)*

4.3.1 The responsibility strategy followed in this contract shall be A.

4.3.2 The structural and civil engineer responsible for the design in accordance with the specification is: Dolmen Engineers CC

4.4 Planning, Programme and Method Statements *(Read with SANS1921-1:2004 clause 4.3)*

4.4.1 Preliminary programme

The Contractor shall include with his tender a preliminary programme on the prescribed form to be completed by all Tenderers. The programme shall be in the form of a simplified bar chart with sufficient details to show clearly how the works will be performed within the time for completion as stated in the Contract Data.

Tenderers may submit tenders for an alternative Time for Completion in addition to a tender based on the initial tendered Time for Completion. Each such alternative tender shall include a preliminary programme similar to the programme above for the execution of the works, and shall motivate his proposal clearly by stating all the financial implications of the alternative completion time.

The Contractor shall be deemed to have allowed fully in his tendered rates and prices as well as in his programme for all possible delays due to normal adverse weather conditions and special non-working days as specified in the Special Conditions of Contract, in the Project Specifications and in the Contract Data.

4.4.2 Programme in terms of Clause 5.6 of the General Conditions of Contract

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Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

It is essential that the construction programme, which shall conform in all respects to Clause 5.6 of the General Conditions of Contract, be furnished within the time stated in the Contract Data. The preliminary programme to be submitted with the tender shall be used as basis for this programme.

The following must be stated on the programme:

- (a) The quantity of work applicable to each bar item as well as the rate at which the work will be completed.
- (b) A budget of the value of completed work, month by month, for the full contract period.
- (c) The critical path.
- (d) Work to be undertaken by Local Contractor (if applicable)
- (e) Training Courses
- (f) Schedule of plant and resources to be utilized

The Contractor's attention is also drawn to clause 5.7 of the General Conditions of Contract 2015.

4.4.3 Time for Completion

The time within which the contract shall be completed is indicated in C1.2.1: **Data provided by Employer.**

4.4.4 Delay in Completion

The Contractor shall organize the Works in such a manner that no delays occur. Delays due to faulty organization or lack or shortage of materials or labour or co-operation with other parties or to any other cause within the control of the Contractor will not be countenanced and full power is reserved by the Engineer to order the Contractor to expedite the work should the work, in the opinion of the Engineer, not progress in a satisfactory way.

4.5 Quality Assurance (QA) (Read with SANS 1921 – 1: 2004 clause 4.4)

The Contractor will be solely responsible for the production of work that complies with the Specifications to the satisfaction of the Engineer. To this end, it will be the full responsibility of the Contractor to institute an appropriate Quality Assurance (QA) system on site. The Engineer will audit the Contractor's quality assurance (QA) system on a regular basis to verify that adequate independent checks and tests are being carried out and to ensure that the Contractor's own control is sufficient to identify any possible quality problems which could cause a delay or failure.

The Contractor shall ensure that efficient supervisory staff, the required transport, instruments, equipment and tools are available to control the quality of his own workmanship in accordance with his QA-system. His attention is drawn to the fact that it is not the duty of the Engineer or the Engineer's representative to act as foreman or surveyor.

4.6 Management and disposal of water (Read with SANS 1921 - 1: 2004 clause 4.6)

The Contractor shall pay special attention to the management and disposal of water and storm water on the site. It is essential that all completed works or parts thereof are kept dry and properly drained. Claims for delay and for repair of damage caused to the works as a result of the Contractor's failure to properly manage rain and surface water, will not be considered.

4.7 Earthworks (Read with SANS 1921 - 1: 2004 clause 4.10)

4.7.1 Borrow pits and spoil areas

No borrow pit has been identified for this project. If the contractor opt to open any borrow pit, he must ensure that he has made necessary arrangements for the permits for the use of such borrow pit.

4.8 Testing (Read with SANS 1921 – 1: 2004 clause 4.11)

4.8.1 Process control

The Contractor shall arrange for his own process control tests. The Contractor will be expected of to employ the services of the existing established laboratory on site. T Contractor must submit the results of tests carried out on materials and workmanship when submitting work for acceptance by the Engineer. The costs for these tests shall be deemed to be included in the relevant rates and no additional payment will be made for testing as required.

4.8.2 Acceptance control

The process control test results submitted by the Contractor for approval of materials and workmanship may be used by the Engineer for acceptance control. However, before accepting any work, the Engineer shall have his own acceptance control tests carried out by the laboratory. The cost of acceptance testing shall be to the account of the client.

4.9 Site Establishment (Read with SANS 1921 - 1: 2004 clause 4.14)

4.9.1 Contractor's camp site and depot

The Contractor is responsible to provide a suitable site for his camp and to provide accommodation for his personnel, labourer's, clerk of works and contracts manager. If the Employer can make any specific site available to the Contractor, such site will be pointed out to the Contractor.

The Contractor shall provide security watchmen for the contract as he deems fit at no extra cost for the Employer. The Contractor must ensure that all his employees as well as the employees of his subcontractors are able to identify themselves as members of the construction team.

The chosen site shall be subject to the approval of the Engineer and Employer. Possible locations for a campsite shall be pointed out at the Site Inspection. The Contractor shall conform to all local authority, environmental and industrial regulations.

4.9.2 Power Supply

The Contractor shall make his own arrangements concerning the supply of electrical power at the contractor's campsite. No direct payment shall be made for the provision of electrical services. Electrical power cannot be guaranteed by the service provider. During power failures and shortages, the Contractor must make his own arrangements for the provision of electricity.

The rates tendered for the relevant items in the Preliminary and General Section of the schedule shall include all costs for the establishment and maintenance of a power supply to the works.

4.9.3 Water Supply and Sewer

The Contractor shall erect and maintain on the site proper ablution facilities. The Contractor shall service and maintain the facilities in a clean and hygienic state for the duration of the contract period and on completion of the works from the site.

The Contractor shall make his own arrangements concerning the supply of water and sewer disposal at the contractor's campsite. No direct payment shall be made for the provision of water or sewer disposal.

The Contractor must supply all necessary materials for the water connection at a position pointed out by the Engineer. The availability of water cannot be guaranteed by the Municipality and in the event of water no longer being freely available, the Contractor must make his own arrangements to acquire it.

The rates tendered for the relevant items in the Preliminary and General Section of the schedule shall include all costs for the establishment and maintenance of water supply to the works and the Contractor shall make his own arrangements for the possible conveyance and storage of water if necessary. The Contractor will be held responsible for any wastage of water due to negligence.

4.9.4 Accommodation of Employees

No employees except for security guards will be allowed to sleep or be accommodated on the site in urban areas.

No housing is available for the Contractor's employees and the Contractor shall make his own arrangements to house his employees and to transport them to site.

No informal housing or squatting will be allowed.

The Contractor shall provide the necessary ablution facilities at his camp site and the site of the works for the use of his employees. Chemical toilets will only be allowed where temporary facilities have to be provided.

4.9.5 Water for construction

The Contractor shall make his own arrangements concerning the supply of water for construction. No direct payment shall be made for the provision of water.

The availability of water cannot be guaranteed by the Municipality and in the event of water no longer being freely available, the Contractor must make his own arrangements to acquire it.

The rates tendered for the relevant items in the schedule of quantities shall include all costs for the establishment and maintenance of water supply for the works and the Contractor shall make his

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own arrangements for the possible conveyance and storage of water if necessary. The Contractor will be held responsible for any wastage of water due to negligence.

4.9.6 Facilities for the Engineer

One site office as well as a meeting facility, as described under Clause PSAB1.1, is required for the Engineer.

Contractor shall provide housing for the Employers Agent or his Representative for the duration of the contract.

4.9.7 Telephone Facilities

Telephone and facsimile facilities are needed on the site.

4.9.8 Survey beacons *(Read with SANS 1921 - 1 : 2004 clause 4.15)*

The Contractor shall take special precautions to protect all permanent survey beacons or pegs such as benchmarks, stand boundary pegs and trigonometrical beacons, regardless whether such beacons or pegs were placed before or during the execution of the Contract. If any such beacons or pegs have been disturbed by the Contractor or his employees, the Contractor shall have them replaced by a registered land surveyor at his own cost.

4.10 Existing Services *(Read with SANS 1921 - 1: 2004 clause 4.17)*

The Contractor shall make himself acquainted with the position of all existing services before any excavation or other work likely to affect the existing services is commenced.

The Contractor will be held responsible for any damage to known existing services caused by or arising out of his operations and any damage shall be made good at his own expense. Damage to unknown services shall be repaired as soon as possible and liability shall be determined on site when such damage should occur.

Services belonging to the following service owners will be encountered:

SERVICE OWNER	TYPE OF SERVICE
Eskom	Electrical/Power lines
Telkom	Telephone lines
Vhembe District Municipality	Sewer, water and electrical infrastructure

4.11 Health and Safety *(Read with SANS 1921 - 1: 2004 clause 4.18)*

4.11.1 General statement

It is a requirement of this contract that the Contractor shall provide a safe and healthy working environment and to direct all his activities in such a manner that his employees and any other

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persons, who may be directly affected by his activities, are not exposed to hazards to their health and safety. To this end the Contractor shall assume full responsibility to conform to all the provisions of the Occupational Health and Safety Act (OHSA) No 85 and Amendment Act No 181 of 1993, and the OHSA 1993 Construction Regulations 2003 issued on 18 July 2003 by the Department of Labour.

For the purpose of this contract the Contractor is required to confirm his status as mandatory and employer in his own right for the execution of the contract by entering into an agreement with the Employer in terms of the Occupational Health and Safety Act in the form as included in section C1.4.

4.11.2 Health and Safety Specifications and Plans

(a) Employer's Health and Safety Specification

A Health and Safety Specification is included in Section C3.3, Part PE of the tender documents as part of the Particular Specifications.

(b) Tenderer's Health and Safety Plan

The Tenderer shall submit with the tender his own documented Health and Safety Plan proposed to be implemented for the execution of the work under the contract. The Health and Safety Plan must at least cover the following:

- (i) a proper risk assessment of the works, risk items, work methods and procedures in terms of Regulations 7 to 28;
- (ii) pro-active identification of potential hazards and unsafe working conditions;
- (iii) provision of a safe working environment and equipment;
- (iv) statements of methods to ensure the health and safety of subcontractors, employees and visitors to the site, including safety training in hazards and risk areas (*Regulation 5*);
- (v) monitoring health and safety on the site of works on a regular basis, and keeping of records and registers as provided for in the Construction Regulations;
- (vi) details of the Construction Supervisor, the Construction Safety Officers and other competent persons he intends to appoint for the construction works in terms of Regulation 6 and other applicable regulations; and
- (vii) details of methods to ensure that his Health and Safety Plan is carried out effectively in accordance with the Construction Regulations 2003.

The Contractor's Health and Safety Plan will be subject to approval by the Employer, or amendment if necessary, before commencement of construction work. The Contractor will not be allowed to commence work, or his work will be suspended if he had already commenced work, before he has obtained the Employer's written approval of his Health and Safety Plan.

Time lost due to delayed commencement or suspension of the work as a result of the Contractor's failure to obtain approval for his safety plan, shall not be used as a reason to claim for extension of time or standing time and related costs

4.11.3 Cost of compliance with the OHSA Construction Regulations

The rates and prices tendered by the Contractor shall be deemed to include all costs for conforming to the requirements of the Act, the Construction Regulations and the Employer's Health and Safety Specification as applicable to this contract.

Should the Contractor fail to comply with the provisions of the Construction Regulations, he will be liable for penalties as provided in the Construction Regulations and in the Employer's Health and Safety Specification.

4.12 Management of the environment (*Read with SANS 1921 - 1 : 2004 clause 4.19*)

Respect for the environment is an important aspect of this contract and the Contractor shall pay special attention to the following:

4.12.1 Natural Vegetation

The Contractor shall confine his operation to the limits of the pipeline reserve (4m wide) for the purpose of constructing the works and where applicable detours, shall be sited in consultation with the Engineer and the local communities.

Only those trees and shrubs directly affected by the works and such others as the Engineer may direct in writing shall be cut down and stumped. The natural vegetation, grassing and other plants shall not be disturbed other than in areas where it is essential for the execution of the work or where directed by the Engineer.

4.12.2 Fires

The Contractor shall comply with the statutory and local fire regulations. He shall also take all necessary precautions to prevent any fires. In the event of fire the Contractor shall take active steps to limit and extinguish the fire and shall accept full responsibility for damages and claims resulting from such fires which may have been caused by him or his employees.

4.12.3 Environmental Management Plan

In addition to the above all requirements according to the Environmental Management Plan will be adhered to.

4.13 Contract Name board

One official contract name board, as per C4.2 *Site Information: Construction Notice Board*, is required for this contract.

4.14 Railway Facilities

The nearest railway siding is Makhado Railway Station.

PS 5 SECURITY CLEARANCE OF PERSONNEL

Tenderers should note that Vhembe District Municipality may require that Security Clearance investigations be conducted on any number of the Tenderer's personnel.

If so required, by the Vhembe District Municipality, the Tenderer must remove personnel as indicated immediately and ensure that they have no access to the works or documentation or any other information pertaining the site.

The Employer shall not be liable for any cost concerning the removal of personnel or the effect thereof on the execution of the work.

PS 6 SUPPLY OF MATERIALS

All material to be used in the Works is to be supplied by the Contractor.

The Contractor shall ensure that the work is not delayed due to the lack of materials on Site, by placing orders for material required under this Contract as soon as possible. No extension of time will be allowed for any delay due to the supply of materials.

Although the quantities have been carefully calculated, it must be considered as approximate only and the Contractor, before ordering any materials, should check the quantities required. The bill of quantities is provisional.

PS 7 EXECUTION OF THE WORKS

7.1 Inspection by the Employers Agent

No portion of the work shall be proceeded with until the **Employers Agent** or his representative has examined and approved the previous stage. If any work is covered or hidden from view before the **Employers Agent** or his representative has inspected the work, the Contractor shall at his own cost expose the covered or hidden work for inspection. The Contractor shall also be responsible for making good any work damaged during the uncovering.

7.2 Certificate of Completion

When all the work under the Contract have been completed to the entire satisfaction of the Engineer, he will issue a certificate of completion to the Contractor informing the Contractor of the date the date at which the works are deemed to be completed and accepted by the Employer.

The sureties provided by the Contractor for the fulfilment and completion of the Contract in terms of the Form of Agreement will be released upon the issue of the Certificate of Completion.

PS 8 EXPANDED PUBLIC WORKS PROGRAMME (EPWP) LABOUR INTENSIVE SPECIFICATION *(Read with SANS 1914 -5 2002 and Guidelines for the implementation of Labour-Intensive Infrastructure Projects under the Expanded Public Works Programme (EPWP) third edition 2015)*

8.1 Labour intensive competencies of supervisory and management staff

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Contractors having a CIDB Contractor grading designation of 8CE and higher only shall engage supervisory and management staff in labour intensive works who have either completed, or for the period 1 April 2004 to 30 June 2006, are registered for training towards, the skills programme outlined in Table 1.

Table 1: Skills programme for supervisory and management staff

Personnel	NQF level	Unit standard titles	Skills programme description
Foreman/ supervisor	4	Implement labour Intensive Construction Systems and Techniques or the equivalent QCTO qualification	This unit standard must be completed, and
		Use Labour Intensive Construction Methods to Construct and Maintain Roads and Stormwater Drainage or the equivalent QCTO qualification	any one of these 3 unit standards
		Use Labour Intensive Construction Methods to Construct and Maintain Water and Sanitation Services or the equivalent QCTO qualification	
		Use Labour Intensive Construction Methods to Construct, Repair and Maintain Structures or the equivalent QCTO qualification	
Site Agent / Manager (i.e. the Contractor's most senior representative that is resident on the site)	5	Manage Labour Intensive Construction Processes or the equivalent QCTO qualification	Skills Programme against this single unit standard or part qualification

8.2 Employment of unskilled and semi-skilled workers in labor-intensive works

8.2.1 Requirements for the sourcing and engagement of labour.

8.2.1.1 Unskilled and semi-skilled labour required for the execution of all labour intensive works shall be engaged strictly in accordance with prevailing legislation and SANS 1914-5, Participation of Targeted Labour.

8.2.1.2 The rate of pay set for the SPWP is R per task or per day.

8.2.1.3 Tasks established by the Contractor must be such that:

- the average worker completes 5 tasks per week in 40 hours or less; and
- the weakest worker completes 5 tasks per week in 55 hours or less.

8.2.1.4 The Contractor must revise the time taken to complete a task whenever it is established that the time taken to complete a weekly task is not within the requirements of 5.2.1.3.

8.2.1.5 The Contractor shall, through all available community structures, inform the local community of the labour intensive works and the employment opportunities presented thereby. Preference must be given to people with previous practical experience in construction and / or who come from households:

- a) where the head of the household has less than a primary school education;
- b) that have less than one full time person earning an income;
- c) where subsistence agriculture is the source of income;
- d) those who are not in receipt of any social security pension income

8.2.1.6 The Contractor shall endeavor to ensure that the expenditure on the employment of temporary workers is in the following proportions:

- a) 55% women;
- b) 55% youth who are between the ages of 18 and 25; and
- c) 2% on persons with disabilities.

8.2.2 Specific provisions pertaining to SANS 1914-5

8.2.2.1 Definitions

Targeted labour: Unemployed persons who are employed as local labour on the project.

8.2.2.2 Contract participation goals

There is no specified contract participation goal for the contract. The contract participation goal shall be measured in the performance of the contract to enable the employment provided to targeted labour to be quantified.

The wages and allowances used to calculate the contract participation goal shall, with respect to both time-rated and task rated workers, comprise all wages paid and any training allowance paid in respect of agreed training programmes.

8.2.2.3 Terms and conditions for the engagement of targeted labour

Further to the provisions of clause 3.3.2 of SANS 1914-5, written contracts shall be entered into with targeted labour.

8.2.2.4 Variations to SANS 1914-5

The definition for net amount shall be amended as follows:

Financial value of the contract upon completion, exclusive of any value added tax or sales tax which the law requires the employer to pay the Contractor.

The schedule referred to in 5.2.2.3 shall in addition reflect the status of targeted labour as women, youth and persons with disabilities and the number of days of formal training provided to targeted labour.

8.2.2.5 Training of targeted labour

- a) The Contractor shall provide all the necessary on-the-job training to targeted labour to enable such labour to master the basic work techniques required to undertake the work in accordance with the requirements of the contract in a manner that does not compromise worker health and safety.
- b) The cost of the formal training of targeted labour, will be funded by the provincial office of the

Department of Labour. This training should take place as close to the project site as practically possible. The Contractor must access this training by informing the relevant provincial office of the Department of Labour in writing, within 14 days of being awarded the contract, of the likely number of persons that will undergo training and when such training is required. The employer must be furnished with a copy of this request.

- c) A copy of this training request made by the Contractor to the DOL provincial office must also be faxed to the EPWP Training Director in the Department of Public Works– Cinderella Makunike, Fax Number 012 328 6820 or email cinderella.makunike@dpw.gov.za Tel: 083 677 4026.
- d) The Contractor shall be responsible for scheduling the training of workers and shall take all reasonable steps to ensure that each beneficiary is provided with a minimum of six (6) days of formal training if he/she is employed for 3 months or less and a minimum of ten (10) days if he she is employed for 4 months or more.
- e) The Contractor shall do nothing to dissuade targeted labour from participating in training programmes.
- f) An allowance equal to 100% of the task rate or daily rate shall be paid by the Contractor to workers who attend formal training, in terms of d above.
- g) Proof of compliance with the requirements of b to f must be proven.

8.3 Typical construction work to be executed applying labour intensive principles

8.3.1

Contractor

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C3.3: Civil & Structural Specifications

Ps 9 Nature of Ground and Subsoil Conditions on Site

Geotechnical report is available on request.

PS 9.2 General

The Contractor is referred to SANS 1921: 2004 parts 1, 2, and 5: Construction and Management Requirements for Works Contracts. These specifications shall be applicable to the contract under consideration and the Contractor shall comply with all certain aspects however require further attention as described hereafter requirements relevant to the project.

Certain aspects however require further attention as described hereafter.

PS 9.2.1 Quality Assurance (QA)

(Read with SANS 1921 – 1: 2004 clause 4.4)

The Contractor will be solely responsible for the production of work that complies with the Specifications to the satisfaction of The Engineer . To this end it will be the full responsibility of the Contractor to institute an appropriate Quality Assurance (QA) system on site. The Engineer will audit the Contractor's quality assurance (QA) system on a regular basis to verify that adequate independent checks and tests are being carried out and to ensure that the Contractor's own control is sufficient to identify any possible quality problems which could cause a delay or failure.

The Contractor shall ensure that efficient supervisory staff, the required transport, instruments, equipment and tools are available to control the quality of his own workmanship in accordance with his QA-system. His attention is drawn to the fact that it is not the duty of The Engineer or the Supervisor to act as foreman or surveyor.

PS 9.2.2 Management and Disposal of Water

(Read with SANS 1921 - 1: 2004 clause 4.6)

The Contractor shall pay special attention to the management and disposal of water and storm water on the site. It is essential that all completed works or parts thereof are kept dry and properly drained. Claims for delay and for repair of damage caused to the works as a result of the Contractor's failure to properly manage rain and surface water, will not be considered.

PS 9.2.3 Disposal of spoil or surplus material

(Read with SANS 1921 - 1: 2004 clause 4.10)

The Contractor shall dispose all surplus and unsuitable material in legal spoil areas as agreed with The Engineer . He shall be responsible for all arrangements necessary to obtain such spoil sites.

PS 9.2.4 Process Control

The Contractor shall arrange for all tests required for process control to be done by a laboratory acceptable to and approved by The Engineer .

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Employer

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Witness 2

The Contractor may employ the services of an independent commercial laboratory. The Contractor must submit the results of tests carried out on materials and workmanship when submitting work for acceptance by The Engineer . The costs for these tests shall be deemed to be included in the relevant rates and no additional payment will be made for testing as required.

PS 9.2.5 Acceptance control

The process control test results submitted by the Contractor for approval of materials and workmanship may be used by The Engineer for acceptance control. However, before accepting any work, The Engineer may have further control tests carried out by a laboratory of his choice. The cost of such additional tests will be covered by a provisional sum provided in the bill of quantities, but tests that failed to confirm compliance with the specifications, will be for the account of the Contractor.

PS 9.2.6 Survey Beacons

(Read with SANS 1921 - 1: 2004 clause 4.15)

The Contractor shall take special precautions to protect all permanent survey beacons or pegs such as bench-marks, stand boundary pegs and trigonometrical beacons, regardless whether such beacons or pegs were placed before or during the execution of the Contract. If any such beacons or pegs have been disturbed by the Contractor or his employees, the Contractor shall have them replaced by a registered land surveyor at his own cost.

PS 9.2.7 Existing Services

(Read with SANS 1921 - 1: 2004 clause 4.17)

The Contractor shall make himself acquainted with the position of all existing services before any excavation or other work likely to affect the existing services is commenced.

The Contractor will be held responsible for any damage to known existing services caused by or arising out of his operations and any damage shall be made good at his own expense. Damage to unknown services shall be repaired as soon as possible and liability shall rest with the contractor.

PS 9.2.8 Management of the environment

(Read with SANS 1921 - 1: 2004 clause 4.19)

The Contractor shall pay special attention to the following:

PS 9.2.8.1 Natural Vegetation

The Contractor shall confine his operation to as small an area of the site as may be practical for the purpose of constructing the works.

Only those trees and shrubs directly affected by the works and such others as The Engineer may direct in writing may be cut down and stumped. The natural vegetation, grassing and other plants shall not be disturbed other than in areas where it is essential for the execution of the work or where directed by The Engineer .

PS 9.2.8.2 Fires

The Contractor shall comply with the statutory and local fire regulations. He shall also take all necessary precautions to prevent any fires. In the event of fire, the Contractor shall take active steps to limit and extinguish the fire and shall accept full responsibility for damages and claims resulting from such fires that may have been caused by him or his employees.

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For more details regarding the Environmental Management plan applicable to this contract (A copy of the Environmental Management Plan is available on request).

PS 9.2.9 Overhaul

No payment will be made for overhaul on this contract unless provision is made therefore in specific items in the bill of quantities.

PS-9.2.10 Security

The Contractor shall provide security watchmen for the contract as he deems fit at no extra cost for the Employer. The Contractor must ensure that all his employees as well as the employees of his subcontractors are able to identify themselves as members of the construction team.

PS 9.3 Construction Programme

PS-9.3.1 Tender programme

The Programme submitted have sufficient detail to indicate the ability to complete the Works within the completion times reflected and itemise each and every section of the work per discipline.

On award, the Contractor shall commence the Works and shall complete same in accordance with the dates detailed in the Contract or any amendment thereto that may be granted in terms of the Contract.

PS- 9.3.2 Contract Programme

The Contractor shall submit as a minimum a level 4 programme for The Engineer 's approval within fourteen (14) days of the Commencement Date.

The Programme shall reflect individual activities per discipline that forms part of the Scope of Work to be executed and that each section of the Works shall be of sufficient detail to allow for tracking and progress reporting of each discrete activity. e.g. Excavate, blinding, steel erection, cable pulling, etc

The programme submitted by the Contractor shall include, but not necessarily be limited to the following:

- Mobilisation time for manpower and equipment.
- Material deliveries to Site
- Incremental completion dates of key components.
- Start and completion dates of different segments (early and late dates).
- Any qualifying conditions of Engineer or Employer.
- The resources to be used for each key activity
- Supporting plant and labour histograms
- Other as instructed.

Upon approval by The Engineer the Programme shall become the Contract Programme.

PS- 9.3.3 – Schedule Preparation Standards

All Programmes prepared for the Project are to conform to the following standards:

- (a) All activities shall be logically linked. These logic links must be genuine dependencies- "Soft Logic" or linking unrelated activities to achieve desired dates is not acceptable.
- (b) All durations are to be of the "Fixed Duration" type and may not be effort driven.
- (c) The Project Calendar/s must include all mandated public holidays, and any period that the vendor will not be working (e.g. Builders Holiday, Pay weekends, Christmas week, etc.).
- (d) To prevent misunderstandings, the date format should display the month as "Aug" or "August" instead of "08". Using numbers to represent months is not desirable.
- (e) The Schedule will be at least at level 4 detail.

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- (f) All points of interface with other parties (including The Engineer are to be shown clearly on the schedule. The interface points must include the physical interactions (access required, hold and inspections points etc.) and the intellectual interactions (information required, submitting drawings etc.).
- (g) The methodology to define work content in the progress curves needs to be agreed to between the Contractor and Engineer within fourteen (14) days of Contract Award and may include parameters such as man-hours, m3 concrete, tonnes of steel, length of cable and cable rack to be installed, number of terminations, etc.
- (h) The schedule content needs to be specifically designed to suit the type of work to be executed and to effectively indicate actual progress against planned progress.
- (i) Schedule submissions must be through Project Document Control and must be in MS-Project or Primavera P6 native file format (or similar). This submission must also include a hard copy and a PDF soft copy that will be used for review and signature.

The Engineer reserves the right to modify the presentation of the printed document to make it more legible if required.

The Contractor shall include his manufacturing and delivery Programme, and this shall be in sufficient detail (at least down to element level) for verification of the reported progress. The Contractor shall ensure that detail Programmes from any sub-suppliers/ contractors are compatible with, and incorporated into, his Contract Programme and that these are made available to The Engineer on request.

Any Sub-Contractors Programmes can be provided in MS Project (or similar), provided that all dates and milestones are captured and reported on in the Programme of the Main Contractor.

The Contractor shall submit a detailed testing, inspection and acceptance Programme. It shall be compatible with the site installation/erection Programme and shall be integrated into the Contract Programme.

PS- 9.3.4 Progress Monitoring

Progress of the Works will be monitored by The Engineer . The Contractor shall, when so required, liaise with The Engineer to agree on the method for monitoring progress against the Programme.

PS- 9.3.5 Schedule updating Standards

All Suppliers and Contractors must produce schedule updates according to the following:

- Updates to be weekly or twice monthly if notified by The Engineer on dates to be agreed with The Engineer to suit the Project reporting cycle.
- Updates are to be submitted electronically in native format through The Engineer 's document control. Hard copies will also be submitted but shall not replace the electronic submission.
- The Employer (or his designate) and The Engineer may verify progress information at any stage.
- The update must show the following:
 1. Actual physical progress where it can be measure (e.g. possible compared to the latest agreed Contract Programme).
 2. The schedule must have a saved baseline, and this must be shown on the Gantt chart.
 3. Current Date" is not to be shown - "Status Date" at the time of progress update is to be used for calculation and shown graphically.
 4. Activities that are in progress or completed must have real "Actual Start" and/or "Actual Finish" dates recorded in the activity details. Using the originally scheduled dates as the actuals is unacceptable.
 5. Under no circumstances will a schedule update be accepted that shows either the Actual start or the Actual finish happening after the "Status Date".
 6. Every task that is being progressed at the time of the update must have the estimated "Remaining Duration" captured against the activity.
 7. All activities must be allowed to move according to their predecessor links.

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8. At every update, the Entire Project must be recalculated with option "Reschedule uncompleted work to start after:" and the "Status Date" must be inserted.
9. Under no circumstances will a schedule update be accepted that shows either the Early start or the Early finish happening before the "Status Date".
Activities on the Programme Critical Path must be shown at all times.

PS- 9.3.6 Reporting requirement and Coordination

Contractor shall promptly submit the schedules and reports set forth herein.

1. The Contractor shall attend weekly progress meetings at which he shall submit a written report showing "Actual Manhours Expended" versus "Planned Manhours" and "Planned and Scheduled Progress" versus "Actual Progress", giving details of the Work completed in relation to the Programme, together with a two (2) week "look ahead" which provides details of how the Works will be completed.
2. Contractor shall attend weekly coordination meetings and the Contractor shall ensure that all Sub-Contractors are represented. The Engineer shall hold the meetings and keep and circulate minutes.
3. The person or persons designated by the Contractor to attend the meetings shall have the required mandate to act on behalf of the Contractors Company in making decisions and commit to solutions agreed upon during any meeting.

PS- 9.3.7 Other meetings

Contractor participation in certain additional activities shall also be required. These activities shall include, but not be limited to:

Orientation of all Contractor's employees prior to commencing of the Work at Site. (This includes the entire labour force and all new hires). The meeting will last approximately eight (8) hours.

Weekly gang box safety meetings organised and conducted by Contractor and attended by all of Contractor's craft employees. Contractor shall be responsible for arranging and conducting these meetings with its craft employees. The meetings will last approximately forty five (45) minutes.

Safety Task Assignment (STA) to be conducted on a daily basis by crew foreman/leader. The meetings will last approximately thirty (30) minutes.

PS 9.4 Site Facilities Available

PS- 9.4.1 Contractors Camp Site and Depot

The Contractor is responsible to provide a suitable site for his camp off the works site and to provide accommodation for his personnel and labourers, if required. If the Employer can make any specific site available to the Contractor, such site will be pointed out to the Contractor.

PS- 9.4.2 Accommodation of Employees

No employees will be allowed to sleep or be accommodated on the site.

No housing is available for the Contractor's employees and the Contractor shall make his own arrangements to house his employees and to transport them to site. No informal housing or squatting will be allowed.

The Contractor shall provide the necessary ablution facilities at his off-site camp site and the site of the works for the use of his employees. Chemical toilets only will be allowed where temporary facilities have to be provided.

PS- 9.4.3 Power, Supply. Water and other sources

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Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

The Contractor shall make his own arrangements concerning the supply of electrical power, water and all other services. No direct payment will be made for the provision of electricity, water and other services. The cost thereof shall be deemed to be included in the rates and amounts tendered for the various items of work for which these services are required, or in the Contractor's preliminary and general items as the case may be.

PS 9.5 Site Facilities Required

PS- 9.5.1 Facilities for Contractor

The Contractor shall provide and maintain from the date of commencement of the contract to the completion date, his own site camp comprising offices and stores of a temporary nature providing adequate storage for tools, plant and materials. Amongst others at least one suitable building shall be provided especially for temporary storage of pipe-fittings, valves, etc.

Sheds for the storage of material that may deteriorate or corrode if exposed to the weather shall be weather-proof, adequately ventilated and provided with raised floors.

Sanitary services shall be provided within the area of the site camp complying with the regulations of the local authority. Where temporary toilets are provided, only chemical toilets will be allowed.

A security fence with a guard- controlled access gate shall surround the entire site camp.

The Contractor shall be responsible for the maintenance of the site in a clean and tidy condition and he shall ensure that the entire area of the site is free of erosion, pollution and/or any unwanted materials. All of these items shall be collected and disposed of in accordance with the waste management plan. The Contractor shall also keep all watercourses and adjoining properties free from pollution and erosion.

On completion of the contract, the Contractor shall remove all temporary buildings, structures, concrete floors, rubbish and unwanted materials from the site, which shall be restored to a clean and tidy condition to The Engineer 's and local authority's approval. The Final Certificate may be withheld if the Contractor does not comply with these requirements.

PS- 9.5.2 Facilities for Engineer

The following must be provided by the contractor for use by The Engineer:

1. Name Boards
2. Two name boards as contemplated and specified under SANS 1200 A are to be provided and erected.

The layout of the required name boards shall be as specified under PS6.1.

PS-9.6 Engineer's Office

PS-9.6.1 Office Buildings

The Engineer will require 1 office (approximately 10m x 2.5m internally) which will include functioning air conditioners, adequate lighting, desks and adequate furniture including a large table for laying down of A0 plans and an AO drawing filing rack.

Furnishing of the office buildings shall include an air-conditioning unit approved by The Engineer as part of each office. The unit shall be a compressor type with closed circuit and not an evaporation type. The capacity of the unit shall be at least 3 kW. The Contractor shall provide the necessary power for operating the unit.

PS-9.6.2 Carports

The carports shall be so constructed that the vehicle parked under it will at all times be protected against the direct rays of the sun. Provision should be made for 3 carports and the floor shall consist of a layer of crushed stone to alleviate dusty and muddy conditions.

PS-9.7 Requirements for Accommodation of Traffic

PS-9.7.1 General

The Contractor will be responsible for the safe and easy passage of public traffic past and on sections of roads of which he has occupation or where work has to be done near traffic.

Accommodation of traffic, where applicable shall comply with SANS 1921: - 2004: Construction and Management Requirements for Works Contracts, Part 2: Accommodation of Traffic on Public Roads occupied by the Contractor. The Contractor shall obtain this specification from Standards South Africa if traffic has to be accommodated on any part of the construction works.

PS-9.7.2 Basic Requirements

The traveling public shall have the right of way on public roads, and the Contractor shall make use of approved methods to control the movement of his equipment and vehicles so as not to constitute a hazard on the road.

The Contractor shall ensure that all road signs, barricades, delineators, flagmen and speed control devices are effective and that courtesy is extended to the public at all times.

Failure to maintain road signs, warning signs or flicker lights, etc, in a good condition shall constitute ample reason for The Engineer to suspend the work until the road signs, etc, have been repaired to his satisfaction.

The Contractor may not commence constructional activities affecting existing roads before adequate provision has been made to accommodate traffic in accordance with the requirements of this document and the South African Road Traffic Signs Manual

The Contractor shall construct and maintain all temporary drainage works necessary for temporary deviations.

The Contractor shall provide and grant access to persons whose properties fall within or adjoin the area in which he is working.

Where warranted by traffic conditions on or near the site, the Contractor shall nominate a suitable member of his staff to act as traffic safety officer responsible for the management of the traffic. Duties of the traffic

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

safety officer shall be as set out in SANS 1921 Part 2 and shall also be in compliance with the Occupational Health and Safety Act 1993 and the Construction Regulations 2003.

PS-9.7.3 Payment

The Contractor's tendered rates for the relevant items in the Bill of Quantities shall include full compensation for all possible additional costs which may arise from this, and no claims for extra payment due to inconvenience as a result of the modus operandi will be considered.

PS-9.8 Occupational Health and Safety

(Read with SANS 1921 - 1: 2004 clause 4.14)

PS-9.8.1 General Statement

It is a requirement of this contract that the Contractor shall provide a safe and healthy working environment and to direct all his activities in such a manner that his employees and any other persons, who may be directly affected by his activities, are not exposed to hazards to their health and safety. To this end the Contractor shall assume full responsibility to conform to all the provisions of the Occupational Health and Safety Act No 85 and Amendment Act No 181 of 1993, and the OHSA 1993 Construction Regulations 2014 issued by the Department of Labour.

For the purpose of this contract the Contractor is required to confirm his status as mandatory and Employer in his own right for the execution of the contract by entering into an agreement with the Employer in terms of the Occupational Health and Safety Act by executing the Agreement form C1.2.4 included in Section C1: Agreements and Contract Data.

PS 9.8.2 Health and Safety Specifications and Plans to be submitted at tender stage

(a) Employer's Health and Safety Specification

The Employer's Health and Safety Specification are included in the tender documents in **C3.7** and form part of this contract.

PS- 9.8.3 Cost of compliance with the OHSA Construction Regulations

The rates and prices tendered by the Contractor shall be deemed to include all costs for conforming to the requirements of the Act, the latest Construction Regulations and the Employer's Health and Safety Specifications

1. All activities shall be logically linked. These logic links must be genuine dependencies- "Soft Logic" or linking unrelated activities to achieve desired dates is not acceptable.
2. All durations are to be of the "Fixed Duration" type and may not be effort driven.
3. The Project Calendar/s must include all mandated public holidays, and any period that the vendor will not be working (e.g. Builders Holiday, Pay weekends, Christmas week, etc.).
4. To prevent misunderstandings, the date format should display the month as "Aug" or "August" instead of "08". Using numbers to represent months is not desirable.
5. The Schedule will be at least at level 4 detail.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

6. All points of interface with other parties (including The Engineer are to be shown clearly on the schedule. The interface points must include the physical interactions (access required, hold and inspections points etc.) and the intellectual interactions (information required, submitting drawings etc.).
7. The methodology to define work content in the progress curves needs to be agreed to between the Contractor and Engineer within fourteen (14) days of Contract Award and may include parameters such as man-hours, m3 concrete, tonnes of steel, length of cable and cable rack to be installed, number of terminations, etc.
8. The schedule content needs to be specifically designed to suit the type of work to be executed and to effectively indicate actual progress against planned progress.
9. Schedule submissions must be through Project Document Control, and must be in Primavera P6 native file format (or similar). This submission must also include a hard copy and a PDF soft copy that will be used for review and signature.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

PART B: AMENDMENTS TO THE STANDARD SPECIFICATIONS

**Amendments to the Standard SANS 1200 A
Specifications**

Introduction

In certain clauses the standard, SANS 1200 standardized and particular specifications allow a choice to be specified in the project specifications between alternative materials or methods of construction and for additional requirements to be specified to suit a particular contract. Details of such alternative or additional requirements applicable to this contract are contained in this part of the project specifications. It also contains additional specifications required for this particular contract.

The number of each clause and each payment item in this part of the project specifications consists of the prefix PS followed by a number corresponding to the number of the relevant clause or payment item in the standard specifications. The number of a new clause or payment item, which does not form part of a clause or a payment item in the standard specifications and which is included here, is also prefixed by PS, but followed by a new number which follows on the last clause or item number used in the relevant section of the standard specification.

PSA General

PSA-3 Materials

PSA-3.1 Quality

Where there is a standardization mark programme for any material, all such material supplied shall bear the official standardization mark.

Alternative materials or equipment proposed by the Contractor shall be tested. The test, as well as the materials or equipment, shall be approved by The Engineer prior to any such materials or equipment being built into the works and all costs involved in testing shall be deemed to be included in the rates tendered.

PSA-4 Plant

PSA 4.2 Contractor's Office, Stores and Services

It is not a requirement of this contract that the Contractor provide an approved field laboratory on site, although he may elect to do so. If no laboratory is provided, the Contractor shall nevertheless arrange to have the required quality control tests (e.g. densities and pressure testing of pipelines) performed by an approved commercial laboratory, and his tendered rate shall include full compensation for such tests.

The Contractor's camp shall be kept neat and clean at all times and all surplus or rejected material shall be removed from the site.

PSA-5 Construction

PSA-5.6 Pollution

Add the following to this sub clause :

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

"The Contractor shall maintain all access roads and the area where the offices, stores and workshops are situated to the satisfaction of The Engineer . It shall be kept damp to limit dust and inconvenience or disturbance to the residents in the neighbourhood of the works to a minimum."

PSA – 8 Measurement and payment

PSA – 8.3.3 Occupational health and safety act and regulation.....unit Sum

The rate shall cover all cost pertaining to the provision and maintenance for the duration of the contract of the health and safety measures required of clause 5 (Principle Contractor and contractor) of the occupational health and safety Act. The provision and maintenance for the duration of the contract of the health and safety plan as required in the Construction Regulation (2014). Inclusive for all risk assessment required as well as for the development and implementation of safe work procedures and method statement. The provision and/or collection of data (drawings, design, materials, operation and maintenance manuals etc.) to be contained in a health and safety file, co-operation with other parties, compilation and maintenance of the file during the duration of the contract and the handing over of the file to the Employer on completion of the contract. The rate shall exclude OHS for mechanical works as OHS for Mechanical works shall be measured under related section of the mechanical works bill of quantities

PSA – 8.8.1 Excavate by hand in soft material to expose all existing services.... UNIT m³

The rate shall cover the cost of excavating by means of hand tools within authorized dimension, for all precautionary measures to protect the services from damage during excavation and backfilling, and for subsequent backfilling and compacting. Compaction of material in all areas shall be to 90% of the modified AASHTO density. The tendered rates shall also include for keeping excavations safe, for dealing with surface and subsurface water, for removing surplus excavated material from the site, for transporting all material within the free-haul distance, and for supplying adequate supervision during both excavation and backfilling operations."

PSD-5 Construction

PSD-5.1 Precautions

PSD-5.1.1 Safety

PSD-5.1.2 Safeguarding of Excavations

- Replace

"Machinery and Occupational Safety Act" WITH "Mine Health and Safety Act, 1996 (Act 29 of 1996) and Occupational Health and Safety Act, 1993 (Act 85 of 1993)"

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

PSD-5.1.3 Explosives

- Replace the contents of this sub-clause with the following:
"The Contractor will generally be permitted to use explosives for breaking up hard material during excavations, for demolishing existing structures, and for other purposes where explosives are normally required, subject to the following conditions:
 - (a) The Engineer may prohibit the use of explosives in cases where, in his opinion, the risk of injury to persons or damage to property or to adjoining structures is too high. Such action by The Engineer does not entitle the Contractor to additional payment for having to resort to less economical methods of construction.
 - (b) The Engineer 's prior written approval shall be obtained for each and every blasting operation. This approval may be withheld if the Contractor does not use explosives responsibly and carefully.
 - (c) The Contractor shall comply fully with the requirements of the Explosives Act, Act 83 of 1997 and all other legislation and regulations as may be applicable to blasting and the use of explosives.
 - (d) Before blasting is undertaken, the Contractor shall satisfy The Engineer that he has established whether or not the insurers concerned require pre- and post-blasting inspections of buildings and structures within a certain radius of the proposed blasting. Should such inspections be required, the Contractor shall, together with The Engineer and the insurer, examine and measure the buildings, or structures in the vicinity of the proposed blasting site and establish and record, together with the owner and the client, the extent of any existing cracking or damage before the commencement of blasting operations.
 - (e) When there is a possibility of damage to power and telephone lines or any other services or property, the Contractor shall adapt his method of blasting and the size of the charges and shall use adequate protective measures (e.g. cover-blasting, to reduce the risk of damage.
 - (f) All accidents, injury to persons and animals and damage to property shall be reported to The Engineer in detail and in writing as soon as is practicable.
 - (g) The Engineer shall be given 24 hours' notice by the Contractor before each blasting operation is carried out.
 - (h) When blasting to specified profiles, the Contractor shall so arrange the holes and charges that the resulting exposed surfaces are as sound as the nature of the material permits. The Contractor shall make good, at its own expense, any additional excavation necessitated by the shattering of rock in excess of any "over break" allowances specified in the Project Specifications or given on any drawing.
 - (i) The Contractor to note that there is existing structures in the vicinity of the blasting Notwithstanding the Contractor's compliance with the above provisions, the Contractor shall remain liable for any injury to persons and animals and loss of or damage to property occurring as a result of blasting operation.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

No water shall be allowed to accumulate in any portion of the excavations. The excavations shall be protected against any water entering them whether by seepage, leaking services, rain, storm, flood or any other means. Any water found in excavations shall immediately be removed by pumping or bailing.

It is the Contractor's responsibility to keep all excavations free of water and the Contractor must supply all pumps etc that may be necessary for the clearing out of water. Water must be cleared in such a way that it cannot seep or flow back into the excavations.

The Contractor shall make allowance for this work in the tendered rates for the relevant items in the BOQ.

PSDB-5.5 Trench bottom

- Extend the sub clause to include the following:

On completion of excavation, before the bottom is trimmed or bedding is placed, the bottom of the trench in suitable material shall be so compacted that the density of the upper 100 mm thick layer of material is 90% of modified AASHTO density.

Should the nature of the material be such that the specified density cannot be achieved, the bottom of the trench shall be over-excavated, the bottom of over- excavation compacted, and the excavated material replaced and compacted. The depths of over-excavation, which shall be agreed with The Engineer , shall be such that the specified density is attained at the bottom of the trench."

PSDB-5.6 Backfilling

PSDB-5.6.1General

Notwithstanding the requirements of sub clauses 5.6.1 and 5.6.6 of SANS 1200 DB, no pipe joint or fitting shall be covered by either the blanket or the backfill prior to the successful completion of the visual inspection and the pressure testing of the relevant section of the pipeline.

PSDB-5.6.2 Material for backfilling

Hard rock material excavated from the trenches shall not be incorporated in the backfill above the bedding.

PSDB-5.6.3 Disposal of soft excavation material

Unsuitable or surplus material shall be disposed of at a legal spoil site found by the Contractor and approved by The Engineer .

PSDB-5.6.8 Transport for earthworks for trenches

The free haul distance for this contract is unlimited and no payment will be made for overhaul.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

PSDB-5.7 Compaction

PSDB-5.9.6 Maintenance of reinstated surfaces

In the event of a serious subsidence or failure taking place during the course of the work or during the maintenance period, the Contractor shall immediately take all necessary steps to make the subsidence safe and repair the damage. The Employer reserves the right, however, in cases of emergency to take all necessary measures, including lighting or barricading, refilling, reinstatement and repairing, and to charge the cost thereof to the Contractor if the subsidence or failure is a result of the Contractor's non-compliance with the Specifications. Such action by the Employer shall not relieve the Contractor of his liability to meet all claims arising out of the occurrence of subsidence.

The Contractor will in such cases be charged with the actual total cost of any reinstatement resulting from a subsidence which necessitates removal of surfacing material, importation of additional fill materials, compaction and reinstating of the surface.

PSDB-7 Testing

PSDB-7.1

All test results and the positions where samples were taken by the Contractor must be submitted to The Engineer. The number and positions of tests shall be adequate to cover all parts of the work as necessary.

The following are the minimum frequencies for the process control tests to be executed by the Contractor:

- a) Pipe bedding: one density test on each 50 m of pipe trench.
- b) Normal trench backfilling: one density test on every second layer for every 50 m of pipe trench.
- c) Backfilling in areas subject to vehicle loads: one test on each layer of 150 mm at each road crossing.

The positions of these minimum numbers of density tests shall be determined randomly and shall be clearly documented with the results. The results of the tests shall be submitted to The Engineer and shall prove to The Engineer that the work as a whole was done satisfactorily.

PSGA Concrete (Small works)

PSGA-3 Material

PSGA-3.2 Cement

The cement used in the works shall comply with SANS 50197-1 for common cements. The following types of cement are suitable for use on this project:

- CEM I 32,5
- CEM II/A-S 32,5
- CEM II/B-V 3222.1.2 PSGA-3.2.2 Storage of cement

Consignments of cement shall be stored in such a way that they are used in the same sequence as they are delivered on the site. Any cement that shows any degree of hydration and setting or which has been stored on the site for a period exceeding twelve weeks from the date of despatch by the manufacturer shall be removed from the site of the works and replaced at the Contractor's own expense.

PSGA-4 Plant

PSGA-4.4 Formwork

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

PSGA-4.4.2 Finish

All off-shutter concrete shall be smooth. All surfaces not shuttered shall be wood-floated.

PSGA-5 Construction

PSGA-5.1 Reinforcement

PSGA-5.1.2 Bending

No flame cutting of bars will be permitted except with the written approval of The Engineer . Hot-bending of bars will not be permitted. Bars already bent may not be straightened and re-used.

PSGA-5.1.2 Fixing

Welding of steel reinforcement will not be allowed.

PSGA-5.1.3 Cover

The minimum concrete cover to reinforcement shall be 40 mm.

PSGA-5.4 Concrete

PSGA-5.4.1 Quality

PSGA-5.4.1.2 Consistency

The slump for all concrete shall be between 50 mm and 75 mm.

PSGA-5.4.1.5 Strength Concrete

The classes of concrete to be used are specified in the Bill of Quantities.

The Contractor shall design trial mixes for each strength specified in accordance with SANS 10100-2, 1980, Appendix B. The target strength of the trial mix shall be determined using K equal to 1,7 and a standard deviation 5 MPa for a "good" degree of site control. The average 28 day cube strength of the trial mix shall be equal to or exceed the target strength with no test cube strength below the specified design strength. The Contractor shall submit the trial mixes and the 7 and 28 day test results to The Engineer for approval. No concreting may proceed until the trial mixes have been approved

PSGA-5.4.1.6 Ready-mixed Concrete

Ready-mixed concrete will be allowed on the site, provided that it complies with the requirements of this specification. The prior approval of The Engineer is however required, as well as test results of the concrete used.

Add the following additional sub clause:

PSGA-5.4.1.7 Durability

The maximum water: cement ratio shall be 0,5

PSGA-5.4.3 Mixing

- Replace sub clause (e) with the following:
Concrete shall be placed within thirty minutes after the start of mixing".

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

PSGA-5.4.6 Compaction

PSGA-5.4.6.3

Only mechanical vibrators shall be used for the compaction of the concrete. Any other method of compaction may only be used with the written approval of The Engineer .

PSGA-7 Tests

PSGA-7.1 Facilities and Frequency of Sampling

PSGA-7.1.1 Facilities

- Add the following:
"For his own quality control, the Contractor shall be fully responsible for sampling and testing the concrete at the frequency specified".

PSGA-7.1.2 Frequency of Sampling

- Add the following:
"One set of samples shall be taken from each day's casting and from at least every 20 m³ of concrete of each grade placed. More frequent slump tests shall be taken should the consistency of the concrete be seen to vary".

PSL Medium Pressure Pipelines

PSL-3 Materials

PSL-3.1 General

Unless otherwise specified, main pipes shall be uPVC Class 9 pipes to SANS 966 Part 1 with "Lyng" integral couplings, or similar. Pipes for boring shall be HDPE PE100 PN16 SDR11 solid wall pipes, butt-welded to SANS 10268 Part 1. Fittings and specials are normally Class 16. If required because of problems to maintain minimum cover (extensive rock excavation, narrow section, crossing of sewers or other reasons), uPVC pipes can be encased in concrete where ordered by The Engineer.

PSL-3.8 Jointing materials

PSL-3.8.4 Loose flanges

Bolts and nuts shall comply with the relevant requirements of SANS 1700-5-8 and 1700-5-9. Flanges shall be drilled to SANS 1123 or BS 4504, Table 10(1000/3).

PSL-3.9 Corrosion protection

PSL-3.9.5 Joints, bolts, nuts and washers

After satisfactory testing of pipelines all flanged and welded joints, slip-on and shoulder-end type couplings (including bolts, etc) shall be thoroughly cleaned and given two coats of approved bituminous paint on all exposed surfaces.

PSL-3.9.6 Corrosive soil

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Where indicated on the relevant drawings pipes, flanged and welded joints, and slip-on type couplings shall have a protective tape wrapping applied in addition to any other protective coating specified. In addition, and where so ordered by The Engineer , the pipelines shall likewise have a protective wrapping applied.

The tape shall be applied with a 50 % overlap and in the case of the joints the wrapping shall extend for at least 100 mm on either side of the joint.

The tape shall consist of a petrolatum impregnated tape (Denso tape), shall have a nylon, fibreglass or similar material web, and shall be at least 1,0 mm thick with a minimum tensile strength of 4,4 kg/cm width, and shall be suitable for both machine and hand application. In addition the tape shall be chemically resistant to all common acids and alkali's normally encountered and in particular those prevailing on the site.

PSL-3.10 Valves

Valves shall comply with the requirements of the relevant SANS specifications as well as Particular Specification PLK: VALVES.

PSL-5 Construction

PSL-5.1 Laying

PSL-5.1.1 General

Where necessary to avoid conflict with sewer manholes, storm water drains or other obstacles, the pipeline may have to be realigned locally as directed by The Engineer

PSL-5.1.3 Keeping Pipelines Clean

The interior surface of all pipes, specials, valves and fittings shall at all times be kept free from dust, silt, foreign matter, and access by rodents, animals and birds shall be prevented. Pipes and specials shall not be used as shelter by staff or for the storage of garments, tools, materials, food containers or similar.

Hydrostatic tests shall be carried out on approved suitably sized completed sections of the works as pipe laying proceeds.

The Contractor shall be responsible to arrange all aspects of the hydrostatic testing and for the supply of all equipment, material, water for testing and labour required.

The mains shall be carefully and slowly charged with potable water, so that all air is expelled and shall then be allowed to stand full for at least 48 hours before pressure testing is commenced.

Joints shall, except where otherwise approved, be exposed during testing. Except where unavoidable, testing shall not be carried out against closed valves and blank flanges, and other means of blanking off of sections under test shall be provided. Care shall be taken to strut and support the mains wherever necessary during testing such as at ends of pipelines, at bends, etc.

The pressure shall be applied by a manually operated force pump or by a power-driven pump which shall not be left unattended during testing. The Contractor shall ensure that pressure gauges are accurately calibrated before testing commences and precautions shall be taken to ensure that the quantity of make-up water pumped into the pipelines during testing is measured.

The test pressure applied to the section of mains being tested shall be such that the pressure in any pipe, fitting or valve in the section does not exceed its specified pressure rating.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

The test pressure shall be maintained by the pump for at least one hour and during the period the quantity of make-up water required to maintain the test pressure in the mains shall be measured and all joints shall be carefully inspected for signs of leakage.

The hydrostatic test shall be regarded as satisfactory if the amount of make-up water required during the last hour of the testing period does not exceed 0,005 litres per millimetre of diameter per kilometre of length of the pipelines making up the section for every 30 m head of water, and if no visible leaks were observed at joints, fittings, valves, etc. If any hydrostatic test result is unsatisfactory in any regard, the Contractor shall carry out all necessary remedial measures to approval and the test shall be repeated, all at his expenses.

Water used for hydrostatic testing shall be disposed of in an approved manner without causing damage, nuisance or injury.

The Contractor shall allow for the cost of all labour, equipment, water for testing and material for hydrostatic testing in his tendered rates for supply and laying of pipes and fittings and no separate payment will be made in respect of hydrostatic testing.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

C3.4 Electrical Specifications

EL-1.0 BASIC ELECTRICAL SCOPE OF WORKS

The electrical scope of work on the Mutale Raw And Portable Water System Upgrade project comprises of the design, selection, manufacture, supply, testing in factories, care and storage in the factories, delivery to site, off-loading on site, assembly and installation on site, connections, testing on site, “dry” commissioning and “wet” commissioning of the electrical works and equipment and handing over in working order of the complete electrical works as specified herein.

The scope of works also includes maintenance for 12 months and insurance against lightning and other damage of the total installation for 12 months.

The requirements of this Contract are specified in the sections of the document as indicated in the Index hereof.

All re-usable equipment shall be calibrated and certification (certificate of compliance and calibration certificates).

The contractor shall also be expected to trace circuits and reproduce “as-built” drawings for the enclosures as well as the site-wide electrical reticulation network.

The electrical scope of work consists of the following components:

a) Raw Water Abstraction Point *(Applicable to this tender)*

- Bulk power supply upgrade to the Mutale raw water abstraction point.
- Refurbishment of existing internal electrical reticulation installation, if any.
- Supply and installation of new motor control centres (MCCs) for the proposed raw water abstraction pumps.
- Installation of small power and area lighting.
- Instrumentation and control including telemetry system for communication with main Mutale water treatment plant (WTP) site.

b) Mutale Water Treatment Plant (WTP) *(Scope covered in another tender)*

- Bulk power supply upgrade to the Mutale water treatment plant
- Refurbishment of existing internal electrical reticulation installation, where necessary.
- Power supply to new pumps (clearwater pumps, low lift pumps, high lift pumps, backwash pumps, filter pumps, chlorine pumps etc) and control thereof including motor control centres (MCCs)
- Small power and lighting installation for new buildings (pump house, administration office, staff quarters, dosing rooms, guardhouse, area lighting etc).
- Supervisory, control and data acquisition (SCADA) installation at the new office building.

c) Telemetry

Any required communication between the various sites that form part of the Mutale Raw and Potable water system, namely, the raw water abstraction, the main WTP (including pump stations) will be achieved via a radio telemetry system in order to enable automatic control of the high lift and low lift pumps delivering water to the water system. The communication between the WTP and the raw water abstraction point will be achieved via a fibre link, where possible, due to the proximity of the two (2) sites to each other.

It has been established that a clear line of site is available between the main WTP and the raw water abstraction point to enable the proposed radio telemetry system for monitoring and control of the 2 sites.

The proposed radio network system shall be able to incorporate multiple master configuration using the Modbus and/or the IEC 870-5-10x communication protocols. The system shall also have full PLC programming capabilities and link to the SCADA HMI's or PCs at the Mutale WTP.

The master station at the Mutale water treatment plant shall then update and monitor information at the remote raw water abstraction sites and make this information available on the PLC/SCADA Modbus TCP/IP network at the Mutale WTP and at the client's central control centre, if applicable. This in turn displays and trends the relevant information of the remote sites within the Mutale water system.

The preferred architecture for the SCADA system is a compact architecture such as the Schneider SCADA Pack RTU module which has both communication and data storage functions.

The construction of all new structures, foundations, channels, etc. to accommodate and render complete the plant and equipment will be part of the Civil Engineering Works. The refurbishment, retrofitment, supply, installation, testing and commissioning of all plant and equipment, all as described in this Tender Document, will be part of this contract and adequate allowance thereof must be made in the Tender.

EL-1.1 Scope of Works Summary

The abbreviated summary of the required works can be summarized as follows:

- a) The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of indoor motor control centres at various locations within the Mutale Water Supply System including water purification plants and reservoir sites.
- b) The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of as indicated on the single line diagrams.
- c) The supply, installation and testing of 400V cable work and cable ends for sub-main feeders and machine connections including megger testing as applicable.
- d) The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of all the 400/230V indoor weatherproof distribution cubicles for the Mutale WTP and raw water abstraction points, where specified in the Particular or Project Specification.
- h) The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of all the 400/230V motor control centres containing main incoming panels, direct-on-line (DOL), soft starters, variable frequency drives (VSDs) and local 400/230V power distribution panels for lighting and plugs for the buildings and for site area lighting.

- i) The supply and installation of earthing and lightning protection systems and additional earthing as may be required by the Engineer.
- j) The manufacture, supply, delivery, off-loading, site erection, and handing over as a completed 304 grade stainless steel and/or hot-dip galvanized cable support system of cable ladders and ladder supports, ducting, junction boxes, fixing brackets, cable ties, etc., to complete the cable system at the shaft and treatment plant. Cable straps shall be acid resistant.)
- k) Assistance to other Contractors during the commissioning period of the pump sets and works.
- l) P.C. amounts for specialized work as may be required by the Employer or the Engineer.
- m) Maintenance for 12 months after commissioning and handing over.
- n) Submission of 3 sets of "As Built" drawings, information, operational- and maintenance manuals for all equipment.
- o) Wall mounted "As Built" drawings in frames behind glass in the pump station.
- p) Danger signs and notices in terms of OHS Act and Mine Regulations at all substations and on all electrical distribution boards.
- q) Full guarantee of the whole of the Electrical Works for a period of twelve (12) months after completion of commissioning.

Tenderers must include with their tenders a programme for manufacturing and testing and another for installation and commissioning.

The following activities are specifically excluded from this contract:

- Supply and installation of pumps and motors.
- Supply and installation of valve actuators.
- Supply and installation of pump line temperature, flow, vibration and pressure sensing and/or transmitting instruments which may be required by the Mechanical Engineer.
- Cathodic Protection of pipe lines.
- All civil works.
- All mechanical work.

The supply and installation of mechanical equipment and the control instrumentation associated with the mechanical equipment will be provided under separate contracts.

The Contractor shall be deemed to have carefully examined all the constituent parts of this document and all other documentation issued to him/her before the Tender or quotation was submitted. Any doubts as to the meaning of any terms, phrases or clauses of the document or any other document, or any missing pages, shall be submitted to the Engineer in writing before a Tender is submitted. No claims traceable to non-compliance with this requirement will be considered after the closing date of Tenders.

If it is found at any stage of a Contract that the Contractor has deviated from the requirements of this document without the written consent of the Engineer, then the Engineer shall have the right to order the Contractor to carry out the actions required by this document without any adjustment in the Contract price.

The **GENERAL TECHNICAL SPECIFICATION FOR LV INSTALLATION WORK UP TO 1kV** bound into this document contains statements, conditions and requirements which will have an influence on the Contract Price submitted by the Contractor, apart from the requirements of other Particular Specifications or of the main Conditions of Contract or Special Conditions of Contract which may be applicable to this Contract.

Tenderers are advised to study the **complete contents** of the **GTS** specification carefully, especially clause **GTS 1.0, “General Requirements”** thereof, before submitting their Tender Price.

EL-1.0 BASIC SCOPE OF WORKS

As part of the contract, the raw water pumpstations are to be upgraded to meet future demand.

The electrical scope of work comprises the design, selection, manufacture, supply, testing in factories, care and storage in the factories, delivery to site, off-loading on site, assembly and installation on site, connections, testing on site, “dry” commissioning and “wet” commissioning of the electrical works and equipment and handing over in working order of the complete electrical works as specified herein.

The scope of works also includes maintenance for 12 months and insurance against lightning and other damage of the total installation for 12 months.

The requirements of this Contract are specified in the sections of the document as indicated in the Index hereof.

The detailed scope of work shall be as follows;

- Power supply to abstraction works
- Power supply to new high lift pumpstation
- Small power and lighting installation

The following are existing structures:

- Abstraction works where low lift pumps are to be installed.

The construction of all new structures, foundations, channels, etc. to accommodate and render complete the plant and equipment will be part of the Civil Engineering Works. The retrofitment, supply, installation, testing and commissioning of all equipment, all as described in this Tender Document, will be part of this contract and adequate allowance thereof must be made in the Tender.

The existing return high lift) Pump Station will be decommissioned as part of the contract and a new high lift Pump Station will be built under a separate Civil and Structural Works Contract.

The abbreviated summary of the required works can be summarized as follows:

- a) The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of indoor motor control centres at various locations within the Mutale Raw Water Supply system. Some of the specified MCCs will replace existing MCCs whereas others will be for a new building and structure.
- b) The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of as indicated on the single line diagrams.
- c) The supply, installation and testing of 400V cable work and cable ends for sub-main feeders and machine connections including megger testing as applicable.
- d) The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of all the 400/230V indoor weatherproof distribution cubicles for the raw water supply works, where specified in the Particular or Project Specification.
- e) The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of all the 400/230V motor control centres

- containing main incoming panels, direct-on-line (DOL) or soft starters and local 400/230V power distribution panels for lighting and plugs for the buildings and for site area lighting.
- f) The supply and installation of earthing and lightning protection systems and additional earthing as may be required by The Engineer .
 - g) The manufacture, supply, delivery, off-loading, site erection, and handing over as a completed 304 grade stainless steel and/or hot-dip galvanized cable support system of cable ladders and ladder supports, ducting, junction boxes, fixing brackets, cable ties, etc., to complete the cable system at the shaft and treatment plant. Cable straps shall be acid resistant.)
 - h) Assistance to other Contractors during the commissioning period of the pump sets and works.
 - i) P.C. amounts for specialized work as may be required by the Employer or The Engineer .
 - j) Maintenance for 12 months after commissioning and handing over.
 - k) Submission of 3 sets of "As Built" drawings, information, operational- and maintenance manuals for all equipment.
 - a. Wall mounted "As Built" drawings in frames behind glass in the pump station.
 - l) Danger signs and notices in terms of OHS Act and Mine Regulations at all substation- and LV rooms.
 - m) Full guarantee of the whole of the Electrical Works for a period of twelve (12) months after completion of commissioning.

Tenderers must include with their tenders a programme for manufacturing and testing and another for installation and commissioning.

The following activities are specifically excluded from this contract:

- Supply and installation of pumps and motors.
- Supply and installation of valve actuators.
- Supply and installation of pump line temperature, flow, vibration and pressure sensing and/or transmitting instruments which may be required by the Mechanical Engineer.
- Cathodic Protection of pipelines.
- All civil works.
- All mechanical work.
- The supply and installation of mechanical equipment and the control instrumentation associated with the mechanical equipment.

The Contractor shall be deemed to have carefully examined all the constituent parts of this document and all other documentation issued to him/her before the Tender or quotation was submitted. Any doubts as to the meaning of any terms, phrases or clauses of the document or any other document, or any missing pages, shall be submitted to The Engineer in writing before a Tender is submitted. No claims traceable to non-compliance with this requirement will be considered after the closing date of Tenders.

If it is found at any stage of a Contract that the Contractor has deviated from the requirements of this document without the written consent of The Engineer , then The Engineer shall have the right to order the Contractor to carry out the actions required by this document without any adjustment in the Contract price.

The GENERAL TECHNICAL SPECIFICATION FOR LV INSTALLATION WORK UP TO 1kV bound into this document contains statements, conditions and requirements which will have an influence on the Contract Price submitted by the Contractor, apart from the requirements of other Particular Specifications or of the main Conditions of Contract or Special Conditions of Contract which may be applicable to this Contract.

Tenderers are advised to study the complete contents of the GTS specification carefully, especially clause GTS 1.0, "General Requirements" thereof, before submitting their Tender Price.

EL-2.0 GENERAL AND MISCELLANEOUS

EL-2.1 Emergency Stop Push Buttons and Weatherproof Isolators

Grade 304 stainless steel pedestal mounted emergency stop stations shall be provided at all motor installations as specified.

Emergency stop pedestals at submersible pump sets shall be installed on a wider than normal grade 304 stainless steel emergency stop pedestal that will house the motor cable terminations as specified in the Particular Specification.

EL-2.2 Notices and Danger Plates

This specification deals with the provision of Notices and Danger Plates and signage as required in terms of the Occupational Health and Safety Act No. 85 of 1993, as well as any other notices that may be required by law or by the nature of the finished Works.

All building signage on equipment's shall be covered under this contract, it is the Contractor responsibility to familiarize himself with applicable standards referred in particular specification and supply all necessary signage.

EL-2.3 Materials and Finish

Outdoor signs shall be either of vitreous enamelled type or of cast aluminium with raised or embossed letters.

The colours and sizes of letters and colours of background shall be in accordance with requirements of SANS 0140 and as approved by the Engineer.

Symbolic signs shall conform to the requirements of SANS 1186.

EL-2.4 Fire Extinguishers

5kg CO₂ and powder fire extinguishers shall be supplied and installed in all buildings in accordance with the requirements of the Local Authority. Each fire extinguisher shall have extinguisher cabinet, mounting bracket, tags, seals, inspection label, tags, and double-sided signage above the extinguisher.

EL-3.0 EARTHING AND LIGHTNING PROTECTION

EL-3.1 Scope

A comprehensive earthing or grounding installation shall be designed, supplied and installed for every substation, ring main unit and miniature substation position. The earth installation shall be designed, supplied and installed in accordance with the general electrical specification and as amplified hereafter. The installation work shall be performed by a specialist earthing and lightning protection company and the same company shall supply test certificates and a certificate of compliance for each installation and in line with the South African Bureau of Standards requirements for earthing and lightning protection.

Each of the buildings shall be provided with an extensive ring type mat to achieve an earth resistance value of one ohm or less, together with all supporting survey, reporting, design and certificate of compliance documentation.

This earth ring shall electrical and lightning protection earth for the structures and all electrical equipment. Earth bars shall be installed as required and all electrical equipment shall be earthed to the

bars. The earth mat shall be connected to the earth bar at two places and multiple earth bars shall be connected together. All metal structures and fittings shall be bonded to the earth points for the sake of equipotential bonding.

This earth mats shall serve the dual purpose of being the electrical and lightning protection earth for the structures and all electrical equipment.

An earth bars shall be installed as required in close proximity of the PLC & HMI enclosure and medium voltage equipment shall be earthed to this bar, including a connection for the buried earth mat.

The type and extent of the earth mats shall be determined by a specialist being employed to do a soil resistivity survey and resistance report, together with design recommendations for doing the final designs and installation.

Soil resistivity is generally average in Bronkhorstspruit because of the clay nature of the soil. It is therefore not uncommon to have earth electrodes installed to depths of between 6,5 and 12,5 metres to achieve the necessary earth resistance value. This requires drilling of the electrode holes and in some instances the holes need to be filled with chemicals to increase the soil resistivity. The contractor shall keep this in mind and ensure that a proper soil resistivity survey and report is carried out by a specialist firm before commencing with the installation of any earth mat. The report shall recommend the required installation at every substation and shall be submitted to the engineer for approval.

EL-3.2 Internal & External Lightning Protection System

Class 3 earthing shall be provided as part of the electrical installation.

The earthing shall be done by a qualified specialist who will submit SABS system using SABS standards and all calculations shall be submitted to the Engineer for approval. Earthing certificate (COC) for each above-mentioned system shall be completed and approved by and registered Engineer and only then submitted to the Engineer for approval.

All exposed external earthing and bonding shall be done with Kwena Anti-Theft Cable.

EL-4.0 ELECTRICAL DISTRIBUTION SYSTEM

Equipment shall be provided as specified and indicated on the drawings on the site of the Works.

EL-5.0 INSTRUMENTATION EQUIPMENT

EL-5.1 Pressure Sensors

Electronic pressure transducers reading the suction or delivery pressure of a pipeline shall be supplied and installed under this contract where specified. The suction pressure transducers will serve the dual function of producing an alarm at low suction pressure and trip the pump-set via the PLC and will be hardwired to the motor panel. The alarm will be triggered when the pump suction pressure drops to 1,3 times the 3% NPSH of the pump and will power the pumps down through the normal shut down procedure when the pressure drops to 1,1 times the 3% head loss at cavitation level.

Pressure transmitters shall be equal to or better than that described in the relevant Particular Specification.

EL-5.2 Flow Meter Equipment

Magnetic and turbine type flow meters will be supplied and installed by the mechanical or civil contractor. The above-mentioned flow meter controllers as free issue items will have to be installed under this contract in flow meter kiosks complete with a supply of electricity, surge protection and earthing system.

Clamp on flow meters will be supplied and installed under this contract. The Contractor shall coordinate with the mechanical contractor if all requirements are met regarding the clamp on flow meters.

EL-5.3 Inflow Flow Meters

Type: Outdoor powder coated 304 steel frame mounted with lockable front door and transparent window for meter reading purposes. Transparent window must be covered with top hinged powder coated 304 cover for ultra violet protection of controller.

Supply: 2.5mm² x 3 core PVC SWA PVC cable plus 10mm² bare copper earth plus 1mm² x 4pr twisted PVC SWA PVC (individually and overall screened) from Inlet Motor Control Centre Centre.

Colour: Electric orange

Fault level: 5kA

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	10Amp Continues Rated SP MCB: Plus	Main
All	Single Phase class 2 surge arrestor unit connection type 2 as per SANS 10142-1 equal or similar to Dehnguard. DVMTT255 with remote indicator panel & remote signalling contacts connected to the SCADA: Plus	Surge arrestor
All	Ultrasonic level controller equal and similar to FMU90 and transducer sensor unit mounted on grade 304 stainless steel bracket inside a ventilated grade 3CR12 stainless steel enclosure on top of the clear water reservoir for level measurement including cabling and all accessories: Plus	Level Controller & Transducer [for flow measurement over flume]
All	Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring
All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard.	Signal & Data Surge Protection

EL-5.4 Ultrasonic Flow Meters

Type: Outdoor powder coated 304 steel frame mounted with lockable front door and transparent window for meter reading purposes. Transparent window must be covered with top hinged powder coated 304 cover for ultra violet protection of controller.

Supply: 2.5mm² x 3 core PVC SWA PVC cable plus 10mm² bare copper earth plus 1mm² x 4pr twisted PVC SWA PVC (individually and overall screened)

Colour: Electric orange

Fault level: 5kA

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	10Amp Continues Rated SP MCB: Plus	Main
All	Single Phase class 2 surge arrestor unit connection type 2 as per SANS 10142-1 equal or similar to Dehnguard. DVMTT255 with remote indicator panel & remote signalling contacts connected to the SCADA: Plus	Surge arrestor
1	Supply and install clamp-on flow meter controller equal or similar to Prosonic Flow 91 complete with Modbus RS232 communication:	Level Controller & Transducer [for flow measurement over flume]
	Plus	
All	Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring
All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard.	Signal & Data Surge Protection

EL-5.5 Electronic Level Control

An electronic intelligent level transducers shall be supplied and installed on a grade 3CR12 stainless steel brackets and a ball type level sensor as indicated.

Field mounted level sensors shall be installed complete with local surge protection and earthing system. The level controllers shall be installed inside kiosk and mounted as specified. Stainless steel brackets, onto which the level sensors shall be screwed, shall be bolted to the wall; their mounting brackets being modified accommodate the insertion of the level sensors.

EL-5.6 Inlet Level Kiosks

Type: Outdoor powder coated 304 steel frame mounted with lockable front door and transparent window for meter reading purposes. Transparent window must be covered with top hinged powder coated 304 cover for ultra violet protection of level controller.

Supply: 2.5mm² x 3 core PVC SWA PVC cable plus 10mm² bare copper earth plus 1mm² x 4pr twisted PVC SWA PVC (individually and overall screened) from the relevant MCC.

Colour: Electric orange

Fault level: 5kA

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	10Amp Continues Rated SP MCB: Plus	Main
All	Single Phase class 2 surge arrestor unit connection type 2 as per SANS 10142-1 equal or similar to Dehnguard. DVMTT255 with remote indicator panel & remote signalling contacts connected to the SCADA: Plus	Surge arrestor
All	Ultrasonic level controller equal and similar to FMU90 and two transducer sensor unit mounted on grade 304 stainless steel bracket inside a ventilated grade 3CR12 stainless steel enclosure on top of the clear water reservoir for level measurement including cabling and all accessories: Plus	Level Controller & Transducer [for flow measurement over flume]
All	Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring
All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard.	Signal & Data Surge Protection

EL-5.7 Sump Level Kiosks [Quantity TBC]

Type: Outdoor powder coated 304 steel frame mounted with lockable front door and transparent window for meter reading purposes. Transparent window must be covered with top hinged powder coated 304 cover for ultra violet protection of level controller.

Supply: 2.5mm² x 3 core PVC SWA PVC cable plus 10mm² bare copper earth plus 1mm² x 4pr twisted PVC SWA PVC (individually and overall screened) from MCC.

Colour: Electric orange

Fault level: 5kA

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	10Amp Continues Rated SP MCB: Plus	Main
All	Single Phase class 2 surge arrestor unit connection type 2 as per SANS 10142-1 equal or similar to Dehnguard. DVMTT255 with remote indicator panel	Surge arrestor

	& remote signalling contacts connected to the SCADA: Plus	
All	Ultrasonic level controller equal and similar to FMU90 and two transducer sensor unit mounted on grade 304 stainless steel bracket inside a ventilated grade 3CR12 stainless steel enclosure on top of the clear water reservoir for level measurement including cabling and all accessories: Plus	Level Controller & Transducer [for flow measurement over flume]
All	Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring
All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard.	Signal & Data Surge Protection

EL-5.8 Radar Level Kiosks

Type: Outdoor powder coated 304 steel frame mounted with lockable front door and transparent window for meter reading purposes. Transparent window must be covered with top hinged powder coated 304 cover for ultra violet protection of level controller.

Supply: 2.5mm² x 3 core PVC SWA PVC cable plus 10mm² bare copper earth plus 1mm² x 4pr twisted PVC SWA PVC (individually and overall screened) from MCC.

Colour: Electric orange

Fault level: 5kA

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	10Amp Continues Rated SP MCB: Plus	Main
All	Single Phase class 2 surge arrestor unit connection type 2 as per SANS 10142-1 equal or similar to Dehnguard. DVMTT255 with remote indicator panel & remote signalling contacts connected to the SCADA: Plus	Surge arrestor
All	Ultrasonic level controller equal and similar to FMU90 and two transducer sensor unit mounted on grade 304 stainless steel bracket inside a ventilated grade 3CR12 stainless steel enclosure on top of the clear water reservoir for level measurement including cabling and all accessories: Plus	Level Controller & Transducer [for flow measurement over flume]
All	Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring

All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard.	Signal & Data Surge Protection
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EL-5.9 Ball Type Level Control

Type: The Float switch FTS20 Endress and Hauser for point level detection, it shall be used in inlet building, Blending Chamber, Mixing Chamber and Clear water tank. All accessories, 304 stainless steel clamp, wall bracket, float switch hanger, weight, cable and all bolts and nuts to complete the installation: Plus

Supply: 1mm² x 2pr twisted PVC SWA PVC (individually and overall screened) to all applicate MCC, all cable work shall be added in schedule of quantities.

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
All	Ball-type level sensor equal and similar to K FTS20 Endress and Hauser made from high impact and shock resistant material. All accessories, 304 stainless steel clamp, wall bracket, float switch hanger, weight, cable and all bolts and nuts to complete the installation: Plus	Ball type level for manual stop
All	Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring
All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard.	Signal & Data Surge Protection

EI-5.10 Dissolved Oxygen Meters

Dissolved oxygen probes shall be provided at suitable locations in the respective biological reactors. The final location of the probes shall be confirmed on site after award of the Contract. The DO probes shall be provided complete with swivel-type support brackets secured to reactor structure. Cables shall be installed in grade 304 stainless steel pipes or grade 304 stainless steel cable trays secured to the structure walls. The DO probe shall typically be located approximately 1m below the water level.

Type: Outdoor powder coated 3CR12 steel frame mounted with lockable front door and transparent window for meter reading purposes. Transparent window must be covered with top hinged powder coated 3CR12 cover for ultra violet protection of controller.

Supply: 2.5mm² x 3 core PVC SWA PVC cable plus 10mm² bare copper earth plus 1mm² x 4pr twisted PVC SWA PVC (individually and overall screened)

Colour: Electric orange

Fault level: 5kA

The following equipment shall be supplied and installed:

QTY	DESCRIPTION	IDENTIFICATION
1	10Amp Continues Rated SP MCB: Plus	Main
All	Single Phase class 2 surge arrestor unit connection type 2 as per SANS 10142-1 equal or similar to Dehnguard. DVMTT255 with remote indicator panel & remote signalling contacts connected to the SCADA: Plus	Surge arrestor
All	Supply and installation of Hach Dual Digital Controller C/W Modbus Protocol To Suit LDO Sensors complete with Modbus RS232 communication:Plus	Level Controller & Transducer [for flow measurement over flume]
All	Supply and install DO sensors at reactor DO metering positions as indicated on drawings. Both DO meters shall be connected to the above controller shall be equal or similar to Hach LDO Model 2 mounted on grade 304 stainless steel bracket at channel flume position on reactor: Plus	DO sensors (external equipment)
All	Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring
All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard.	Signal & Data Surge Protection

EL-6.0 STANDBY GENERATOR

EL-6.1 Scope

This specification covers the performance specifications, design parameters, manufacture, supply and delivery to site, installation, testing, adjustment and commissioning of the 500kVA, 400V standby emergency generator to be provided under this Contract.

EL-6.2 Generator Details

The contractor shall make sure that the space provided for the generator and plinth dimensions are sufficient for the generator offered under this contract, will be an outdoor type.

An automatic mains failure and change over system shall be provided for the generator set and it shall be housed with the electrical equipment associated with starting and stopping of the set, protection of the set, indications and starting battery charger. This cubicle shall be situated at the generator position.

The electrical loads listed in the load list will be expected at the Mutale WTP and the generator supplier shall ensure that the standby diesel generator set will be able to run the total standby load.

Simultaneous starting of motors in the automatic mode of operation after a power failure should not be possible, in order to limit start-up currents.

NB: The sized loads of each pump station (in the preceding Sections) indicate all the equipment for the particular type of pump station; the generator shall be sized to accommodate the mentioned loads. The respectable motor starters shall be taking into consideration regarding inrush current and additional loads when sizing the generator.

EL-7.0 SITE LIGHTING

This specification, covers the performance specifications, design parameters, manufacture, supply and delivery to site, installation, testing, adjustment and commissioning of the site lighting to be provided under this Contract.

EL-8.0 HIGH MASTS

Supply and install thirty 12m / 15m high scissor mast as indicated on the site layout drawing, complete with mast foundation and earthing system, final positions will be determined on site by the engineer or his representative.

Provide three (x3) warm white LED Type G floodlights with lamps on top of the mast.

Refer to particular specification for detail specifications.

EL-9.0 SCADA SYSTEM

EL-9.1 Technical Requirements

The Managed Ethernet Network Switches shall have the following minimum key features:

a) Security Features - shall include the following:

- User Passwords on multiple levels
- SSH/SSL 128 Bit encryption
- The Enable/Disable function of ports
- Port based network access control (802.1x)
- VLAN (802.1Q) for segregation of Network traffic
- Centralized password management
- SNMPv3 authentication and 56-bit encryption

b) Operating System Features – shall include the following:

- “Plug and Play” simplicity for negotiation and cross-over detection
- Rapid Spanning Tree functionality with typical recovery time of <5ms for RSTP Proposal-Agreement
- handshaking between two switches
- Link Aggregation or Port Trunking functionality (802.3ad)
- IGMP snooping functionality for multicast filtering
- Port rate limiting and Broadcast storm limiting
- Industrial automation protocol support, e.g. Modbus, PROFIBUS

c) Hardware Features - shall include the following:

- Shall be of a fan-less design
- Shall be of an industrial hardened design
- Shall have diagnostic ability with alarm logging
- Shall have a galvanized steel enclosure (available with conformal coating option, if required)

EL-9.2 Topology Design Requirements

The industrial network design shall be based on a redundant ring network topology. RSTP (Rapid Spanning Tree

Protocol - IEEE 802.1D-2004) shall be employed to ensure no traffic loops occur in the ring network. The “worst case” recovery time allowed for network communication recovery after a link failure shall depend on numerous factors. These are as follows:

Single Link Failures

Root Bridge Failure

For Information: The analytical method to calculate the single link failure time for a ring network is as follows:

$TL + (N-3)*TPA$, if the number of switches is an even number

$TL + (N-2)*TPA$, if the number of switches is an odd number

For Information: The analytical method to calculate the worst case failover of a root bridge failure for a ring network

is as follows:

$TL + (2*N-5)*TPA$, if the number of switches is an even number

$TL + (2*N-4)*TPA$, if the number of switches is an odd number

Where:

N – Number of switches in ring network

TL – Time it takes a switch to detect a link failure

TPA – Time required by a pair of switches to perform RSTP Proposal-Agreement “handshaking”. This equals the sum of the BPDU processing times in both switches.

These RSTP parameters shall be setup in the management software in the network switch, so that the root bridge failure time can be reduced to that value of a single link failure value. TPA and TL values are vendor and product specific. However, the following values shall be used as guideline to ensure that the switch proposed by the contractor is very similar in performance.

TPA = +/- 5ms

TL = +/- 4-6ms for 100Base-TX and 100Base-FX Links

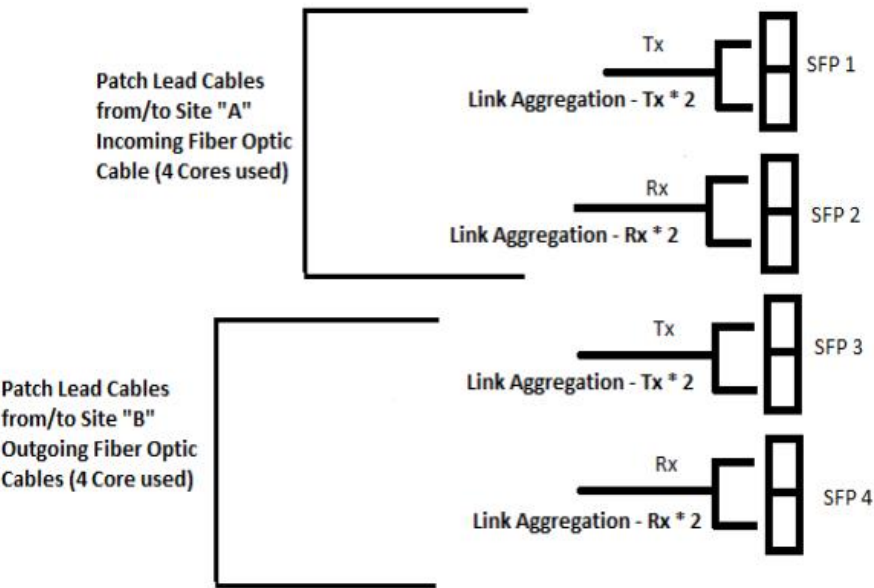
+/- 20ms for 1000Base-X Links

+/- 700ms for 1000Base-T Links

EL-9.3 Link Aggregation

Link Aggregation/Port Trunking shall also be done in conjunction with RSTP.

In order to achieve Link Aggregation/Port Trunking, two SFP transceiver units shall be utilized per uplink and two per downlink. Below is a typical diagram of the setup required to achieve Link Aggregation/Port Trunking:



Note: This shall be required for areas where a higher bandwidth throughput is required due to data intensive communication requirements. The contractor shall ensure that the bandwidth requirements between each link are completely understood, so that link aggregation can be implemented if and when required.

This shall however have an effect on the required SFP quantities and these quantities shall have to be determined before the Ethernet Network Switches are procured to prevent any of the Network Switches not complying with the project requirements. Any costs for the delivery of the incorrect equipment shall be for the contractor's account.

EL-9.4 Operator Station

Client work stations PC shall be state of the art while the main server will have the specifications as listed below.

Latest Editions Windows Server package professional operating system software and latest edition complete Windows Office professional software shall be supplied with the server and PC.

Qty	Description
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All Corporate business Server: Plus

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All	Intel Xeon Silver 4110 Processor (11M Cache, 3.00 GHz, 8 cores): Plus
Kit [4 x 16GB]	Corsair 16GB DDR4 2666MHz Memory Module Kit: Plus
All	Server Tower Case: Plus
2	500GB SATA 3 2.5 Solid State Drive [Main Drives]: Plus
2	3TB SATA 3 Hard Drives for Raid Back-Up: Plus
All	Power supply suitable for the application: Plus
2	27" Inch LED Screens: Plus
2	65" Inch 2k LED TV's: Plus
All	H330 Integrated Raid Controller: Plus
Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.3ab: Plus
All	Dual 10/100/1000 Gigabit Ethernet: Plus
All	All cable work and accessories to complete the installation.
All	42U 600mm(w) x 1000mm(d) x 2055mm(h) Cabinet with perforated front & back door which include all shelves, distribution, blanking panels, cable management, cage nuts and plinths which will complete the installation.

Contractor will allow data rack to store both the UPS and the Computer and shall be locked.

EL-9.5 Configuration of SCADA Software

An uninterruptable power supply shall be supplied and installed at the Server and PC as specified under the particular specification [SCADA] and shall provide at least 3 hours standby capacity.

Tenderers shall allow for the configuration of the System with all the available information on the specified plant Modules. Due allowance shall be made for all necessary drivers that may be required for proper communication between all plant devices.

Alarm and other reports as may be required must be provided for and all alarm conditions shall be provided with a utility to view possible causes and remedies for the relevant alarm condition in a detail window.

A security overview shall be provided.

EL-10.0 SMALL POWER AND LIGHTING IN BUILDINGS

The scope for the distribution board sections shall include everything to provide a complete small power distribution and lighting system. The design of the individual distribution boards will allow for single and three phase supplies to equipment on site.

EL-10.1 Light Fittings

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Note: All luminaires must be approved by the Engineers representative prior to the installation of or any order being placed. Only light fittings as well as all light fitting components carrying the SABS mark of approval will be acceptable. All fluorescent light fittings shall be equipped with electronic control gear.

Type	Description
Type A	55W LED enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 55W LED's lamps. Equal or similar to Roughguard from BEKA.
Type B	55W LED enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 55W LED's lamps. Equal or similar to Roughguard from Beka plus 1hour EMG maintained (emergency).
Type C	18W LED Bulkhead warm white enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 18W LED's lamps. Equal or similar to Bekabulk from BEKA.
Type D	18W LED Bulkhead warm white enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 18W LED's lamps. Equal or similar to Bekabulk from BEKA plus 1hour EMG maintained (emergency).
Type E	37W LED surface mounted fitting warm white. Rolled mild steel body with a white epoxy powder coated finish. Frosted prismatic diffuser and Tridonic LED module and driver. Equal or similar to M6V LED from LASCON.
Type F	37W LED surface mounted fitting warm white. Rolled mild steel body with a white epoxy powder coated finish. Frosted prismatic diffuser and Tridonic LED module and driver. Equal or similar to M6V LED from LASCON plus 1hour EMG maintained (emergency).
Type G	208W warm white LED Floodlight. The luminaire consists of an LED engine, power supply and spigot compartment. It shall be secured by stainless steel latches and an access screw. The LED engine, consisting of the LED light source and the power supply, shall be easily replaceable. Both compartments are rated IP66. Electronic temperature monitoring prevents overheating of LEDs and power supply, positioned directly next to LEDs. The luminaire housing shall be manufactured of marine grade aluminium. Equal or similar to LEDFlood from BEKA.
Type H	1200 x 600 3cell surface mounted ADMIRAL LED is a decorative, stylish recessed LED luminaire with clean lines and low glare specular aluminium louvre. Equal or similar to Admiral from lighting innovations.
Type I	1200 x 600 3cell surface mounted ADMIRAL LED is a decorative, stylish recessed LED luminaire with clean lines and low glare specular aluminium louvre. Equal or

similar to Admiral from lighting innovations plus 1hour EMG maintained (emergency).

EL-11.0 CABLE TRAYS AND CABLE LADDERS

All cable trays and cable ladders shall be 304 stainless steel grade type. Cable trays will only be acceptable for cable supports where small cables are involved.

Nuts, bolts and all supports shall also be 304 stainless steel.

Vertically installed cable ladders shall be used for floor mounted cable support purposes.

EL-12.0 INSTALLATION OF CABLES

It is the responsibly of the contractor, as a design and build contract, to ensure the correct supply and signal cabling is specified and utilized for the relevant electrical and electronic equipment.

In order to support the cable sections, the following information and documentation should be supplied before project implementation;

- 1) Equipment schedules (motor, valves, etc.);
- 2) Instrumentation list;
- 3) Motor List
- 4) Cable Schedules;

EL-13.0 LV SWITCHGEAR

This portion of the specification provides for the design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of free standing indoor 400/230V distribution assemblies and Motor Control Centres and outdoor, weatherproof, metal clad, 400/230V switchgear assemblies for power distribution and starting gear for the works.

The assemblies to supply the supply the mixers, aerators, cranes and other equipment shall be suitable for a 400/230V power supply and shall consists of an incoming circuit breaker and outgoing circuit breakers for feeders to the electrical and mechanical plant, all as indicated on the single line distribution diagram. All ratings are shown on the single line diagram.

The main fault current rating shall not be less than 10kA in any of the assemblies.

Distribution boards and all other assemblies containing 400/230V shall be constructed and carried out in compliance with SANS 1765, Clauses 6.6.1 and 6.6.2 of SABS 10142-1 for assemblies which operate fault ratings of <10kA and SANS 1473-1, Clauses 6.6.1 and 6.6.2 of SABS 10142-1 as well as SANS 61439-1 for assemblies which operate fault ratings of >10kA.

The Tenderer for this Contract shall only offer assemblies from a manufacturer who already has a test certificate from an accepted testing institution in compliance with SANS 1765, or SANS 1473-1 and IEC61439-1 and SABS 10142-1, as may be applicable, for his assemblies or from a manufacturer who can demonstrate that that he/she is far advanced in the process of obtaining the necessary certification in terms of these specifications.

The Engineer will decide whether the manufacturer of the distribution boards complies with this requirement before the final order is placed by the Contractor on the manufacturer of the boards.

All 400V assemblies and boards in this Contract shall be manufactured from 2 mm 3CR12 steel and shall be finished in "Light Orange" powder coating in colour B26 of SANS 1091 for indoor equipment and "AVOCADO" colour powder coated finish for outdoor equipment.

Power coating shall be done in compliance with **GTS 4.0**.

The assembly shall all have hinged face panels. All face panels shall have heavy duty pedestal stainless steel hinges and folded edges and shall fit over lips on their compartments and shall be sealed all round with neoprene seals. The number of hinges on face panels shall be in accordance with General Technical Specifications **GTS 2.4.3**.

Hinged face panels are required with 6 mm square cam type locks, top and bottom on the lock side of the panels.

The assembly shall also have hinged outer doors. All doors shall have heavy duty pedestal stainless steel hinges and folded edges and shall fit over lips on assembly and shall also be sealed all round with neoprene seals. The number of hinges shall be in accordance with **GTS 2.4.3**.

NOTE: The rating of the circuit breakers and other equipment required in the assembly shall be as shown on the single line diagram and/or as listed in the data tables accompanying this document.

Circuit breakers and instrumentation shall be mounted on removable chassis flush behind the face plates in the assembly.

All door handles shall be provided for padlocks.

Danger warning signs shall be fitted to outer doors as required by the OHS Act

Busbar compartments or busbar arrangements for indoor assemblies shall always be mounted at the top of assemblies.

Busbars of outdoor assemblies shall be mounted in the top section of the assembly, below the pitched roof, on high impact plastic insulators.

The roof shall be removable with inside studs and nuts.

Current density in busbars shall not exceed the following values:

- 2A/mm² for a busbar rating of up to and including 1600A
- 1,6A/mm² for a busbar rating above 1600A

It is, however, essential that the manufacturer shall make due allowance for the "proximity and skin" effects, the effect of ferrous enclosures, ventilation, etc., for the arrangement used in his switchboard design.

Manufacturers shall prove that their busbar- and enclosure design comply with the temperature rise limits as stated in IEC 61439-1.

Neutral busbars in three-phase, four wire assemblies containing three phase balanced loads shall have a cross-section of at least 50 % of the cross-section of the phase busbars. Also refer to clause **GTS 2.7.10** hereof in this regard.

The fault rating of busbars can be calculated in accordance with the formulae of IEC 60865-1 and 60865-2.

Ventilation louvres shall be provided on both sides of outdoor assemblies, top and bottom with brass mesh rodent screens on the inside thereof.

Outdoor assemblies shall have a channel iron frame with epoxy tar finish. The frame consists of a one-piece mounting base for the whole assembly.

Removable 3 mm thick gland plates (304 stainless steel), covering the whole bottom of assemblies for rodent proofing, shall be provided.

The gland plates shall consist of separate removable sections, lying front to back in the assembly.

Gland plates shall be at least 300 mm above floor level in assemblies for ease of cable gland assemblies.

Assemblies shall further be fitted with removable covers to give access to cable glands below gland plate level.

All other steelwork shall be 2 mm thick 3CR12, properly treated before final finishing.

The prices of outdoor assemblies shall include the cost of a concrete plinth for the mounting of the assembly.

A concrete plinth shall have a suitable number of slow bend 110 mm Ø sleeves from underground level to end 20 mm above plinth top level. (or a suitable box-out shall be provided for cables)

Concrete plinths shall be at least 300 mm thick and shall be 50 mm larger than the assembly channel iron frame all round. The outer edge of the plinth shall have 40 mm chamfer edges. The top of the plinth shall be at least 100 mm above normal ground level. Only needed when installed outdoors.

EL-14.0 CABLE LADDER INSTALLATIONS

All the cable ladder materials shall be factory manufactured and shall be stainless steel.

All cable ladders shall in general comply with the quality requirements of **GTS 8.0**. Cable ladder materials shall be stainless steel throughout and shall be of the O-LINE POWERSTRUT type as scheduled in the Schedules of Quantities.

Detailed layout drawings of the WWTW and WTW building and treatment structures are not available but sufficient materials have been measured in the Schedule of Quantities.

The Contractor shall measure the actual lengths and number of T-sections, bends, supports, etc required on site before ordering materials to avoid over-supply of material on site

All ladder rungs shall have 25 x 7 mm lateral slots at 25 mm centres to accept heavy duty cable ties.

All horizontal bends, internal- and external bends, T-off's and 4-way sections shall be manufactured from the same gauge steel and have the same side rung heights as the straight runs of ladder to which it fits.

All joints in ladders shall have heavy duty angle side splice plates with 8 x M8 bolts to each splice on each side of the ladder.

300 mm wide, "Powerspan", PS150/3, shall be used.

The horizontal supports for the ladder system shall consist of stainless steel OL2000 sections.

Supports shall be installed at 1000 mm distances along all the ladder routes.

EL-15.0 MOTOR EMERGENCY STOP/ISOLATING UNITS

EL-15.1 General

- The enclosure shall be equipped with a motor isolator to match each motor rating as specified in the motor equipment schedules.
- The Start/Stop pushbutton or control station shall be mounted adjacent to the motor which it shall control. and shall be located at a radius of 1000 mm at the most from the equipment it controls.
- The station shall be pedestal mounted at least 1100 mm above floor level. The pedestal design shall be approved by the Engineer.
- All START pushbuttons shall be GREEN and flush mounted with the bezel.
- A mushroom head latching push button suitable to serve as an EMERGENCY STOP shall be fitted to each of the enclosure provided under the contract.
- The EMERGENCY STOP button shall be a "twist to release" type.
- The EMERGENCY STOP button shall be lockable for added protection for maintenance staff.
- The station enclosure shall be designed to provide adequate space for the following:
 - The required switches, indicating lights and their respective labels.
 - Termination of all wiring to and from the station. The minimum strip length shall be 150 mm.
 - A single multi-core control cable (including glanding) shall be installed from the MCC to the station, from where the required signals shall be individually wired, as per the cable schedule.
 - Power cable/s (including glanding) shall be installed from the MCC to the station, providing power to the individual motor, as per the cable schedule.

EL-15.2 Dimensions for Isolation Units

The start/stop isolator pushbutton station shall be of IP65 rating to SANS 1222 and shall be fitted with a canopy. The minimum dimensions of the start/stop isolator pushbutton stations shall be 300 mm (L) x 250 mm (H) x 200 mm (D).

The junction box including the canopy and the support stand shall be painted B26 – Electric Orange.

EL-15.3 Fasteners

All fasteners in concrete shall be 316 SS and pedestal bases shall be sealed against the ingress of any crevice corrosion by means of a suitable non-shrink cementations grout and approved by the Engineer.

EL-16.0 EARTHING

EL-16.1 General

New main earth mats and earth conductors are required for the new LV switchgear on both sites of the works.

An earth resistivity measurement shall be undertaken on the site, before any earthing materials are installed.

The measurements shall be undertaken by a specialist firm.

A P.C. amount has been allowed in the Schedule of Quantities for the survey and the cost of the survey must accompany the survey report. The survey shall only be carried out upon an instruction in writing from the Engineer.

The Contractor shall submit a detailed report from the survey specialist to the Engineer together with recommendations on the earthing systems required. Thus meaning a detail design of routes and connections.

The report shall clearly indicate whether the systems as specified (or installed) are sufficient and, if not, the proposed additional earthing requirements plus the cost thereof.

The required survey shall be done in compliance with the SANS code for lightning protection and the maximum earth system value required is 1 ohm, referred to zero as measured with a null balance megger.

The maximum earth system value required is ≤ 1 ohm for electrical earths and ≤ 5 ohm for lightning protection earths.

These values shall be the values referred to zero as measured with a null balance megger.

Earthing materials have been measured in the Schedule of Quantities as preliminary quantities for earth systems and the final quantities will be determined by the test results and the extent of the works.

All earthing shall be carried out as specified herein and shall also comply with the requirements of **GTS 9.0**, as well as the requirements for earthing as stated in SANS 10142-1: Part 1: Low Voltage Installations (as amended).

Final testing of the earth system shall only be undertaken once the earthing system is fully completed.

No part of the new electrical installation shall be made alive until all earthing is solidly connected.

All main earth conductors shall be 70 mm² bare stranded copper earth wires and all joints in the ground shall be CADWELDED and taped with M23 self bonding tape.

Earthing electrodes used for the main earth system shall be solid steel with bonded copper protection.

The nominal diameter of earthing electrodes shall not be less than 16 mm unless the electrodes are specified for placing in pre-drilled holes in which event a minimum nominal diameter shall not be less than 12 mm.

Main earth conductor ends in LV distribution panels shall be lugged and bolted to the earth bars of such equipment.

All earthing materials have been measured in the Bills of Quantities.

EL-16.2 Main Earth Mats

The main earth mats shall each consist of five separate 1,8 m earth electrodes. Four electrodes shall be installed at the corners of a rectangle measuring 4 m x 4 m with the top of the electrodes at least 300 mm below the slab with one 1,8 m earth electrode placed at the centre of the rectangle.

Bare stranded 70 mm² copper earth wires shall be Cadwelded to the 4 corner electrodes and shall end and be extended to, and Cadwelded, to the centre electrode.

Earthing electrodes used for the earth mat shall be solid steel with bonded copper protection. The nominal diameter of earthing electrodes shall not be less than 16 mm Ø.

Bare stranded 70 mm² copper earth wire shall be installed from the earth mat to the earth bar of the LV switchgear and to the earth bars of the starters.

All metal structures carrying or housing electrical equipment shall be bonded together with 70 mm² copper earth wires.

Main 70 mm² copper earth wires shall be installed together with all main LV supply cables.

All LV cable armouring shall be properly bonded to the earth bars or cable box earth studs at the LV switchgear.

Earthing of the pump motors shall be done by means of one of the motor cable cores of the 4-core cable as allowed for in the Schedule of Quantities

EL-16.3 400V/230V Earthing

PVC wire in conduits may not be used in this Contract.

All 400/230V power distribution in this Contract shall be done using PVC armoured cables and all instrumentation cables shall be either armoured or screened for earthing purposes.

All cable types and the armouring thereof shall be as scheduled in the Schedule of Quantities.

All small power cable earth cores shall be terminated on the 400/230V assembly earth bars.

All earth ends shall be properly lugged and bolted.

All 400/230V earthing shall be carried out and tested in accordance with SANS 10142-1 and the test report shall be submitted to the Engineer.

Final tested earth readings shall be filled on the COC for each site or separate section of a site.

EL-17.0 TESTS, DRAWINGS, MANUALS AND COMPLETION OF INSTALLATION

For testing requirements of all equipment refer to the General Technical Specifications **GTS -16** and **GTS 2.11**.

For the requirements for drawings for the project refer to **GTS 1.14** and **GTS 2.12**.

For the requirements for manuals for the project refer to the General Technical Specifications **GTS-1.15**.

For all the requirements for completion of the project refer to **GTS 1.13**, **GTS 1.15** and **GTS 1.17** and **GTS 2.13**.

The contractor shall issue the Certification of Compliance for the project in terms of the General Technical Specifications **GTS 1.21**.

The Contract will not be regarded as completed and will not be accepted by the Engineer unless all the requirements for testing, drawings, manuals and the certification has not been completed and all data has been handed to the Engineer.

GTS-1 STANDARD SPECIFICATION FOR LV INSTALLATION WORK UP TO 1KV

GTS 1.0 GENERAL REQUIREMENTS

GTS 1.1 General

This document describes the general requirements for electrical contract Works for electrical installations up to 1 kV.

This document must be read together with:

- (a) all documentation for the purpose of obtaining formal tenders
- (b) all documents for the purpose of obtaining informal tenders
- (c) all documents for the purpose of obtaining quotations.
- (d) all other standard volumes of electrical documentation

as issued by The Engineer for electrical Works.

The stipulations of this document must be seen as forming part or being complementary to any Conditions of Tender, Conditions of Contract, Special Conditions of Contract, Project Specifications and Schedule of Quantities, and must be read together, and shall be regarded as forming part of such documentation for electrical Works.

Where any conflict exists between clauses in this document and relevant or applicable clauses of any Conditions of Tender, Conditions of Contract, Special Conditions of Contract or Project Specifications for a specific Contract, the order of preference

shall be:

- (a) Conditions of Tender
- (b) Conditions of Contract
- (c) Special Conditions of Contract
- (d) Project Specifications
- (e) this document.

Any such conflict shall, however, be brought to the attention of The Engineer , before the closing date of tenders.

The works and services required in terms of these General Requirements shall further be evaluated by the Contractor during the Tender period, with the purpose of determining whether the requirements herein will have an influence on his contract price or quotation, and if so, the Contractor shall allow for any costs arising from this document in his contract price or quotation.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

The Contractor shall be deemed to have carefully examined all the constituent parts of this document and all other documentation issued to him/her by The Engineer before the Tender or quotation was submitted. Any doubts as to the meaning of any terms, phrases or clauses of the document or any other document, or any missing pages, shall be submitted to The Engineer in writing before a Tender or quotation is submitted. No claims traceable to non-compliance with this requirement will be considered after the closing date of Tenders or quotations.

If it is found at any stage of a Contract that the Contractor has deviated from the requirements of this document without the written consent of The Engineer , then The Engineer shall have the right to order the Contractor to carry out the actions required by this document without any adjustment in the Contract price.

GTS 1.2 Definitions

For the purposes of this document, terms used herein or in accompanying documents shall have the following meaning:

“Agreement” shall mean the agreement entered into between the Employer and the Contractor for the execution of the accepted Tender Price or accepted quotation;

“Schedule of Quantities” or “Pricing Schedules” or “Bills of Quantities” shall mean the document attached to a Tender Document or Quotation in which are entered the quantities of work, labour, materials and articles required for the execution of the Contract, together with the rates or prices for such items;

“Schedule of Prices for Variations” shall mean the schedules attached to a Contract Document or Quotation in which are entered the amounts to be added to, or deducted from the Contract Amounts according to whether the items mentioned in the said schedule are extra to or omitted from the Contract as may be provided for in the General Conditions of Contract;

“Contract” or “Contract Documents” shall mean and include the Conditions of Tender, General Conditions of Contract, Special Conditions of Contract, Project Specifications, Schedules of Quantities or Pricing Schedules or Bills of Quantities, Schedule of Prices for Variations, Drawings, Form of Tender, Letter of Acceptance and the Agreement to follow there on and shall include such printed matter or explanatory memorandum submitted by a Tenderer with his tender as may be acceptable to the Employer;

“Contract Price” or “Contract Sum” shall mean the amount entered in the Form of Tender for the whole of the Works done or materials supplied for the Works, subject to additions or deductions as may be made in terms of the Contract;

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

“Contractor” shall mean the person or persons, partnership, firm or company, whose tender for the work referred to in the Contract has been accepted by the Employer or who has or have signed the Contract, and shall include his or their heirs, executors, administrators, judicial managers, trustees, successors in title and duly appointed representatives;

“Employer” or the “Client” shall mean the Owner of the completed Works or the official body who acts as the representative of the Owner and shall include their duly appointed representatives.

“Drawings” shall mean the drawings, sketches, diagrams, maps, plans, sections and other delineations which accompany or are referred to in the Contract Documents, and which have been signed by The Engineer and such further drawings as may be issued or approved by The Engineer in connection with the works, whether such further drawings indicate variations of the Works, whether by way of addition, alteration or omission, or merely elaborate in greater detail the signed Drawings;

"Engineer" shall mean The Engineer duly appointed by the Employer to act on it's behalf for the purpose of a Contract.

“Order in Writing” shall mean any printed, typewritten or written document or letter signed by The Engineer and addressed to the Contractor for the purpose of his guidance and directions.

“Site” shall mean the land and/or place to which plant is to be delivered or where work is to be executed or carried out under a Contract and any other land and/or place acquired or used by the Contractor in connection therewith, and includes any place wherever anything is made, manufactured, excavated or stored for the purpose of carrying out a Contract, together with so much of the area surroundings the said place or places as the Contractor shall with the consent of The Engineer actually use in connection with the Works otherwise than merely for the purpose of access to the said place or places;

“Specification” shall mean the section in the Contract document in which the detail method and standard of executing the Work and the nature of the materials to be used or supplied are described;

“Plant”, “Work” or “Works” shall mean all buildings, plant, materials, articles, matters and things comprised by, described in, or referred to in the Contract Documents and which are to be manufactured and/or delivered, constructed, erected and completed. These shall include all those details which are not particularly mentioned in the aforesaid Documents, nor shown upon the Drawings, but which are requisite for the perfect completion of each and every one of the several parts, and all additional Works that may be ordered to be executed according to the true intent and meaning of the Contract plus the maintenance for the prescribed period;

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

"Standard Practice" shall mean the methods and means of working normally as employed by the Employer;

“Sub-Contractor” shall mean the person or persons, partnership, firm or company named in the Contract for any part of the Work or to whom any part of the Contract has been sublet with the consent in writing of The Engineer and the legal representatives, successors and assigns of such person or persons, partnership, firm or company and all specialists, merchants, tradesmen or others executing any Work or supplying any goods for which prime cost prices or provisional sums are included in the Specification or Schedule of Quantities and Prices who may at any time be nominated, selected or approved by The Engineer ;

“Tests on Completion” shall mean such tests as are prescribed by the Specification to be made by the Contractor before the Plant is taken over by the Employer;

“Construction Equipment” shall mean all the materials, machinery, implements, tackle, vehicles, barrows, tools, etc. provided by the Contractor, for the due performance of the Contract, but not essentially forming part of the Contract;

Words imparting the singular only shall also include the plural and vice versa where the context so requires. The headings or notes in these General Requirements shall not be deemed to be part thereof, or be taken into consideration in the interpretation or construction thereof or of the Contract.

"in writing" shall mean type written script or printed communication matter transmitted via land mail or via facsimile, or delivered by hand, to The Engineer .

GTS 1.3 Environmental Conditions

Except when otherwise specified, all equipment and materials shall be designed and selected for the following climatic and environmental conditions:

- | | |
|-----|---|
| (a) | Operating temperature range: -10°C to +55° C. |
| (b) | Relative humidity: maximum 95% below 35°C and maximum 75% above 35° C |
| (c) | Height above sea level: 0 to 2000 metres |
| (d) | Wind borne and air borne dust |

Corrodible metal parts of installations installed indoors in humid conditions or outdoors or within 50 km from the coast shall be manufactured from brass, aluminium or hot-dip galvanized steel.

Sheet metal work for LV boards or panels shall be of a suitable stainless-steel type (3CR12) with a minimum thickness of 2 mm and shall be powder coated to the standard specified by SANS and as approved by The Engineer .

Samples shall be submitted for approval before manufacturing takes place.

Masts, cable ladders- or trays and brackets for the mounting of equipment such as cables, antennas, solar cells or other instrumentation shall be hot dipped galvanised to SANS specifications as listed elsewhere in this document No drilling, cutting or welding will be permitted after galvanising. All bolts, nuts, washers, thimbles, turnbuckles and similar small parts shall be hot-dip galvanised after machining is completed.

Contact between dissimilar metals shall be avoided wherever possible. The following electrode potentials shall not be exceeded:

- (a) For connections exposed to the weather or salt water: 0,25 V.
- (b) For connections of interior parts exposed to condensation but not contaminated by salt: 0,5 V.

All housings containing electrical equipment, electronics or electrical wiring shall be completely rat- and vermin proof.

All housings containing electrical equipment or electronics, and which will be installed indoors in humid conditions or outdoors shall be IP55 rated in accordance with IEC 34 specifications, unless stated otherwise in the Project Specifications.

All outdoor housings with external hinged doors shall have seals between the doors and the frame of the housing and shall further have "drip lip" edges around the frame opening. Such housings shall further have overhang roofs over external doors.

In addition to the normal operating conditions specified above, the equipment shall also be capable of operating under the temporary adverse conditions that would prevail on site during the construction periods. If additional protection is required for the equipment and installation under these conditions, then such protection shall be provided by the Contractor at his cost until conditions have improved to the point where additional protection is no longer required.

The Contractor for this Contract shall protect his equipment on site against physical damage, dust and rubbish, paint smears by others and theft. The necessary insurance shall be taken out by the Contractor in case of damage to, or theft of equipment on site, before such equipment has been handed over to the Employer and the Practical Completion Certificate has been issued by The Engineer .

GTS 1.4 **Visit to Site**

Contractors are advised to visit the site to acquaint themselves with the local conditions, distance to the site from their offices or domicilium citandi, access to the site for equipment and personnel etc., before tenders are submitted. Upon submission of a tender, Contractors acknowledge that they are fully satisfied with site

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

conditions and site requirements and further acknowledge that they will not have any claims against the Employer or The Engineer or their legal representatives after the closing date of tenders or throughout the duration of this Contract. Any claims which may arise later because of lack of site information will not be considered by the Employer or The Engineer .

In the case of a compulsory site visit, this will be specified in the Project Specifications. Non-attendance of a compulsory site visit can result in the disqualification of a tender submitted by a firm not attending such a visit.

Contractors shall make the necessary arrangement with The Engineer , before the site is visited.

If Contract work is to be carried out in phases in accordance with the specifications or other stipulations by the Employer, then the Contractor will not be paid for intermediate or un-scheduled visits to site. Contractors shall communicate with The Engineer , in the case of work to be done in phases, to ensure that he is present on site, when required, for continuation of the next phase of work.

GTS 1.5 Scope and Description of Contract

The description and scope of the Works of Contract is normally contained in the Project Specifications. Should the Contractor require any further information in this regard, this shall be referred to The Engineer in writing before the closing date of Tenders.

GTS 1.6 Schedules to Be Completed

The attention of Contractors is drawn to any legal or other forms contained in the different parts or sections of Tender documentation, as well as to any Technical Data Schedules contained in Tender documents as well as the Schedules of Quantities therein.

These forms are part of the Contract Document and shall be completed in full and signed, except where otherwise stated on the forms.

Contract documents which do not comply with these requirements will be disqualified and will not be considered for adjudication.

GTS 1.7 Sub-Contract Work

All work specified in tender documentation shall only be performed by the Contractors own personnel and shall under no circumstances be sub-contracted without the written consent of The Engineer .

The names of all specialist Sub-contractors that will be employed on any site shall be submitted with the Tender for formal acceptance.

GTS 1.8 Ordering of Material and Equipment

Contractor's must note that materials and equipment on long delivery shall be ordered well in advance as late deliveries will be their sole responsibility. Any applicable escalation on equipment or materials ordered late will be calculated using indices suitable to the Employer. If for some reason late deliveries are found to be to the advantage of the Employer, the Contractor will be instructed in writing regarding the delay in ordering of such materials.

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The successful Tenderer shall attend meetings at venues and at times, as may be arranged by The Engineer , after having been advised that his/her Tender has been accepted, for the purpose of co-ordinating the technical requirements and the time frame of the project, so that orders can be placed for the correct materials.

Unless otherwise indicated or stated, all units of measurement indicated in the Pricing Schedules, Schedule of Quantities or Bills of Quantities, are metric units.

The lineal quantities of wire, conduit, trunking, cables, etc. as given in the Pricing Schedules, Schedule of Quantities or Bills of Quantities are normally measured from scaled drawings for Contract document compiling purposes. Contractors can thus not accept that such quantities are accurate when materials are ordered and Contractors shall measure such quantities on site before orders are placed, as they will not be paid for excess material on site after the completion of the Contract.

If such measurements cannot be taken at the onset of the Contract, the Contractor shall obtain approval from The Engineer to order the required materials that may cause delays or additional cost due to escalation before ordering such materials as allowed for in the Pricing Schedules, Schedule of Quantities or Bills of Quantities.

GTS 1.9 Delivery of Equipment

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

The Contractor shall pack equipment and material for transport and delivery in soundly constructed crates or other packages fitted with removable lids or openings for inspection. All parts of the equipment prior to packaging, shall have been thoroughly protected to preclude damage during transport and storage.

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

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

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

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

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

GTS 1.10 Payment for Stored Materials

The Engineer will not issue any certificate for interim payment of any equipment and material that are stored on site or off site in such a way as to hinder inspection thereof.

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Materials or equipment stored on site or off site and packed in crates or boxes must be opened for inspection and the serial numbers, types or quantities must be easily identifiable by The Engineer before payment for such materials will be processed.

Only large materials or equipment such as switchboard assemblies and equipment with serial numbers such as electric motors, magnetic flow meters, instrumentation, etc. that are stored on or off site will be considered for payment, subject to the conditions stated in (a) to (d) here following. Payment will further not be certified for small materials such as short pieces of cable, conduit, wire, conduit boxes, saddles, screws, etc., that are stored on or off site. Payment for such materials will only be certified once the materials have been built in.

Such interim payment will then only be considered subject to the following conditions:

- a) The equipment must be complete and in a ready state for installation. Loose components which are not yet built into or which will form part of the large materials mentioned in the previous paragraph, will not be considered for payment. (An example hereof is, for instance, are instruments that must be fitted in a distribution board and is still in separate storage.) The materials which are to be type tested, performance tested, or safety tested should have already passed inspections and/ or tests by the Contractor and/or the supplier of the equipment.
- b) The Contractor shall, prior to submitting such interim payment certificate, procure financial assurance by means of the guarantee of a registered bank, on the form provided by The Engineer , and equal to the total amount of payments to be made to the Contractor.
- c) The total value of such guarantee, provided by the Contractor to the Employer, may be varied by the Contractor, with the consent of the Employer, from time to time provided that the Employer will be covered at all times to the total amount paid by the Employer to the Contractor for items not yet built into the Works. The guarantee will lapse sixty 60) days after all the said equipment and/or materials have been built into the permanent Works.
- d) (The materials must be stored in a cordoned off area in the stores of the Contractor and a notice must be affixed to this area which states that the materials stored in that area are the property of the Employer. The area must be safe and not near flammable liquids or explosive equipment and must be kept clean and dry.

Cable drum numbers must remain on drums and cable and other large materials or equipment certified for payment may not be removed from the place of storage on or off site, except for the purpose of installation such material in the Works or when instructed in writing by The Engineer to move such equipment to another place of storage.

GTS 1.11 Workshop Assembly and Identification of Sub-Sections and Components

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

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

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

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

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

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

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

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

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

GTS 1.12 Construction Methods

GTS 1.12.1 Building Work

All the necessary chasing of brickwork, etc., for flush mounted materials, shall be done by the Contractor for the particular Contract, as allowance is not made in other contracts for such work.

No finished surfaces may be chased without the written permission of The Engineer . Face brick shall, under no circumstance, be chased.

The Contractor must take care that no unnecessary damage is caused to building structures during chasing and that other contractors are not delayed by him.

Chasing may only be done in exceptional cases where it is impossible to build in electrical materials that have to be flush mounted. The normal procedure to be followed for is for the Contractor under this Contract to place in position all materials and for the Civil- or Building Contractor to build in, cast in, or fix by any other means, such materials into the building structure. The responsibility for correct execution of the building in of materials will, however, remain with the Contractor for this Contract.

Where it becomes necessary to cut structural concrete, the permission of The Engineer shall be obtained in writing. The Contractor will be held responsible for any damage to a building structure due to unauthorised cutting of concrete.

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The Contractor shall, after the acceptance of his tender, and also with regular intervals thereafter, advise The Engineer of all the requirements for the cutting of slots and openings in the building work so that the civil- or building contractor can make provision at an early stage for all the requirements of the electrical work which must build into building work.

The Contractor shall take care that all materials which are to be built in, are firmly fixed in position. The civil- or building contractor will normally be responsible for the making good of all chases, etc.

GTS 1.12.2 Fixing of Materials in buildings and on structures

The Contractor shall fix fluorescent fittings, incandescent fittings, metal boxes on surface, industrial surface mounted switches and plugs, metal channels, wiring troughs or trays, cable trays, saddles, conduit accessories, brackets, braces, wiring channels and all other metal and non-metal surface mounted material and equipment only as described hereunder, unless otherwise stated in the Project Specifications:

- | | |
|--------------------|--|
| Into Concrete: | Expanding type bolts, bolts cast in or gun-bolted with sizes and lengths as permitted by The Engineer or as specified. |
| Into Brickwork: | Expanding type bolts or built-in metal fixings of size as approved by The Engineer or as specified. |
| Onto Steelwork: | Drilled, tapped and screwed with specified or approved sizes of machine screws or by means of welding where so permitted by The Engineer . |
| Onto woodwork: | Fixed by means of wood screws of quantity and sizes as specified or approved by The Engineer . |
| Into Hollow Tiles: | Spring toggles of not less than 6 mm dia. and then only upon specification or approval by The Engineer . |

Where any equipment or material is to be mounted on surface of ceilings, false ceilings or otherwise, such equipment or material shall only be mounted as specified by The Engineer or as permitted by The Engineer in writing.

Gun bolting into concrete will only be allowed into cast concrete and then only after written permission has been obtained from The Engineer .

No gun bolting shall be undertaken into ash-bricks, brickwork, gas concrete or pre-cast concrete except where written permission has been granted by The Engineer . The Contractor will be held responsible for any damage to builder's work due to unauthorised gun bolting.

Note: The use of plastic plugs, wooden plugs or any other soft substance type fixing plugs is strictly prohibited and the use of these materials will not be approved by The Engineer .

All cable ladders, cable trays, power skirting, brackets, etc., shall be fixed in a neat manner and shall be fixed vertically or horizontally and shall follow building structure lines.

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Fixings of such items that will carry heavy loads must be fixed in accordance with the requirements of the manufacturer thereof.

Sufficient space must be allowed for on cable ladders and trays as multi layers of cables on cable trays are not acceptable.

Cables on outdoor cable ladders shall be fixed with UV resistant fixing materials or stainless-steel banding straps in such a way that cables are not damaged. Outdoor cable shall, as far as possible, be protected from direct sunlight.

Underground sleeves and cables shall be installed at specified depths and in approved bedding materials. Sleeves for cable entry in buildings shall be placed in position before foundations are cast to ensure proper entry depths of cables. Appropriate matching of cables with cable sleeves shall be determined with The Engineer prior to construction.

GTS 1.12.3 Handling of materials and safety

GTS 1.12.3.1 Off-site handling

- (a) Equipment and materials stored off site for a Contract shall be stored in a clean and safe areas. Damaged equipment and materials, stored in factories or stores of the Contractor, will be rejected upon inspection. Electrical equipment shall not be assembled, stored or tested in areas where grinding, welding or painting work takes place.
- (b) Areas in stores or places of manufacture for testing or inspections of equipment and materials by The Engineer shall be clean and safe for the purpose of testing or inspections. Floors must be free of loose materials, dirt and debris.
- (c) Equipment and materials will not be inspected in noisy or dirty environments and also not in areas where welding, grinding, painting or such other manufacturing processes are underway. Testing or inspections will also not be undertaken in hazardous or explosive atmospheres.
- (d) Materials stored in the stores of the Contractor or in another storage space, and which is acceptable to The Engineer for off-site certification for payment, shall only be certified for payment under the conditions as laid down in GTS 1.10 hereof.

GTS 1.12.3.2 On-site handling

- (a) Equipment and materials stored on site shall be stored in a safe, dry and clean environment and shall be protected against damage and from the elements.
- (b) Heavy materials shall be stored in a manner as not to create a danger to other contractors or to the Employer or The Engineer .
- (c) Small materials shall not be left lying around on site. Expensive small items such as instrumentation shall be kept under lock and key until the installation thereof.
- (d) Storerooms shall be kept locked to prevent unnecessary loss of materials.

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- (e) Redundant material which is the property of the Employer shall be removed from site and dealt with in terms of the Project Specification requirements. If clear directions are not available in this regard, the Contractor shall obtain instructions for the removal of the equipment from The Engineer . No redundant material shall become the property of the Contractor or any other party and shall remain the property of the Employer unless decided otherwise by the Employer.
- (f) The Contractor will be responsible for the transport of all materials and equipment to the site and on the site and will provide the off-loading, rigging, lifting, handling and placement thereof into the permanent position as planned for the equipment. The Employer will not provide any assistance or equipment for the placing into position of equipment or materials.

GTS 1.12.3.3 Site Safety

- (a) The requirements of the Occupational Health and Safety Act, Act 85 of 1993 and the requirements of SANS 10142-1 (or the latest edition thereof) shall be complied with as far as site safety is concerned.
- (b) Excavations shall be barricaded and shall be backfilled and compacted as soon as possible after excavating to allow safe passage of persons and traffic on site. Contractors shall not allow any workers to work in excavations deeper than 1m unless the sides of the excavation are properly shored and supported, especially in sandy or wet soil conditions.
- (c) Open manholes shall be barricaded.
- (d) Deep waterlogged excavations shall be pumped empty as soon as possible after flooding or shall be solidly barricaded until pumped dry.
- (e) Open live or unsafe temporary power connections shall not be left unguarded or unprotected.
- (f) The construction site shall be kept clean and tidy on a daily basis.
- (g) Off-cuts and rubbish shall be removed from the site and deposited in the designated dumping place on a daily basis.
- (h) The Contractor shall adhere to all safety rules and regulations as may be existing on a site or as may be required by the Employer or The Engineer . The Contractor shall also ensure that their workforce on site adhere to safety rules.
- (i) A Contractor shall not drive or allow a vehicle or machine to be driven close to excavations.
- (j) All the necessary precautions shall be taken by the Contractor on a site to protect himself, his workers and other persons from coming into contact with drive belts or open rotating or moving machinery.
- (k) A Contractor shall keep all power connections and/or live equipment with voltages above 50V, temporary or permanent, in good and safe condition and shall keep all doors, shutters and covers closed on such equipment, during construction and during testing and commissioning and shall take all steps to prevent accidental contact of live equipment by any person.
- (l) A Contractor shall take control over any power cable or power circuit connected from equipment installed by him, or under his control and which operates at a voltage higher than 50V.

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The Contractor shall not cause such a cable or circuit to be made alive and shall not grant permission to any other person on the site to make such a cable or circuit alive without first having made sure that such action does not create a dangerous situation.

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

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

- (n) A Contractor shall not make alive any portion of an electrical installation until such installation has been properly bonded and earthed to a known good earth point with a value of 5 ohm or less, referred to zero, as tested with a null balance megger.
- (o) A Contractor shall not power up any motor or other equipment supplied by other contractors without such contractors being present and having given written permission that such motor(s) or equipment may be powered up.

GTS 1.13 Manuals and Data Records

All data pamphlets packed with equipment and other pamphlets, handbooks of equipment, operating instructions of equipment, drawings, etc., shall be kept in safe storage by the Contractor during the Contract period.

The Contractor shall also keep accurate records of all tests carried out on equipment and cables and of the test results so achieved. Records shall be kept of setting values of instrumentation and all meter readings taken during testing and commissioning, as well as records of all final adjustment readings or changed settings done during the maintenance period.

A comprehensive operational- and maintenance hard copy manual shall be built up by the Contractor, using the data mentioned in the first two paragraphs of "Manuals and Drawings", as well as other data and descriptions as specified further herein. Also refer to par. GTS 1.14 hereof for electronic copies of all data.

All drawings and diagrams shall be done in AUTOCAD 2002 (or later) format and all text shall be submitted in the latest edition of Microsoft Word format. All tabular data shall be submitted in the latest edition of Microsoft Excel format. All pamphlet and brochure data shall be submitted in Acrobat 5 (or later) format.

The number of copies as scheduled in the Pricing Schedules or Schedules of Quantities or Bills of Quantities, of the manuals described herein, shall be made up by the Contractor. The quantity of copies required is normally not less than five (5).

The manuals shall be presented to The Engineer on the first day of "wet commissioning", if handover of the Works is done on that day. (Refer to paragraphs GTS1.17.2 and GTS1.20 herein.) The manuals shall be neatly housed in lever arch files and shall be in typewritten and/or printed format, properly indexed, with appropriate 2 or 3 layer card dividers between each section to facilitate ready reference.

A main index shall be placed in the beginning of each manual. The project name and project description shall appear at the top on the main index of the manual. Coloured dividers shall preferably be used.

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The manuals and drawings shall cover all installation, operation, and maintenance schedule aspects of each item of equipment and all circuitry provided under this Contract, as specified in par. GTS1.14.3 and GTS1.15 herein.

The manuals, if approved, will be handed to the Employer or the representative of the Employer, so that the Works can be operated correctly and safely. (Also refer to Training further herein.)

Any changes which may be necessary to the contents of the manual after the commissioning of the Works shall be done by the Contractor and sufficient copies of the altered data shall again be submitted to The Engineer for binding into the manuals. This process shall be repeated for the duration of the maintenance period or until the final certificate is issued by The Engineer for the project.

A "Practical Completion Certificate" and subsequent "Certificate of Commissioning" will only be issued on receipt of accurate and final "as-built" drawings and documentation to the approval of The Engineer . Such documentation shall be presented to The Engineer on the first day of commissioning of the works. Any certification of "Practical Completion" or "Commissioning" of the works is subject to final approval of such documents and drawings by The Engineer .

Wherever manufacturer's manuals refer to types of equipment other than the exact type as installed, the exact type shall be highlighted throughout such manuals.

GTS 1.14 Drawings

GTS 1.14.1 GENERAL

A stringent requirement of a Contract is to have "as built" data when a contract is complete to ensure that:

- The Employer knows where all the equipment and materials are installed
- fault finding in the electrical system can be done in future
- alterations and additions can be undertaken in future by referring to the drawings to determine the built-in capacity of the electrical system without having to determine this data on site.

It is therefore imperative for the Contractor to produce acceptable manufacturing drawings at the onset of a project so that equipment can be manufactured and ordered.

Drawings such as layout drawings, single line diagrams, block diagrams, typical switchgear power- and control diagrams, etc. are normally issued by The Engineer together with documents for tender purposes.

If no drawings or limited drawings are issued by The Engineer at tender stage or thereafter, the Contractor shall arrange a technical meeting or meetings with The Engineer to determine the exact scope of the work, shall then prepare the necessary drawings to enable him to manufacture the specified equipment. This shall include "shop" drawings and/or constructional detail drawings. The drawing or drawings so prepared by the Contractor shall obviously make provision or include the drawings or standards normally used by the Contractor to produce acceptable quality of work. The Contractor shall further keep all drawings and diagrams prepared during the course of production and installation of the Works and shall present this to The Engineer on completion of the Contract. Such drawing shall at least consist of all the drawings the Contractor used for construction and installation work as well as all data of final positions and final settings

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of equipment. All cable positions on the site of the Works shall be shown on layout drawings, together with dimensions taken on site from fixed points to show exact location of underground cables.

Any electrical diagrams (standards or specific) issued by The Engineer shall not be used by the Contractor for making up his own design electrical drawings by adding data or wiring- and terminal numbers to such diagrams.

The Contractor shall draw up and submit his own diagrams and general arrangement drawings in the formats and quantities as required by The Engineer . Hand drawn drawings will not be acceptable, except in the case where formal site layout plans are not available to mark up equipment and cable positions.

All drawings shall be done on CAD and the preferred program for drawings shall be AutoCad 2013 (or later).

DXF files of other CAD programs can also be submitted, if these are suitable for conversion to AutoCad format, without scrambling of text or graphics upon conversion.

Drawings shall preferably be done in A3 format and on the standard border and title block sheets of the Employer or The Engineer , unless permission is granted in writing by The Engineer for other formats of title blocks.

All drawings shall be properly numbered with the numbering system required by the Employer or The Engineer and the number of the particular sheet and the total number of sheets shall be shown on each drawing.

The Contractor may use his own reference number in a separate block if The Engineer requires a special drawing numbering system.

Standard drawing sheets in electronic format can be obtained from The Engineer , if available.

Electronic copies, on disc or CD, of all “as built” drawings prepared by the Contractor during the course of the Contract, as well as all electronic copies of software and descriptions of equipment, handbooks or sales data shall also be handed to The Engineer , together with the hard copy “as built” drawings and manuals, in quantities and formats as specified in the Project Specifications

GTS 1.14.2 DRAWINGS FOR APPROVAL

A set of three (3) prints of the shop drawings for all the distribution boards, motor control panels and electronic control panels shall be submitted for approval before any of the aforementioned boards or panels are manufactured.

The following information shall be presented:

- (a) Single line power diagrams for each of the aforementioned boards or panels, showing rating of switchgear, fault rating of main incoming switchgear and busbars, current rating of all circuit breakers, ratings of DOL starters and soft starters, current transformer ratios and class, AC3 rating of all contactors, VA rating of all control transformers, sizes and quantities of cables and cable cores, sizes of loads on feeder circuits i.e. motor ratings, etc.

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- (b) Multi line power- and control wiring diagrams for each of the aforementioned boards, of each panel or starter, showing all the phases, neutrals, earths and control circuits and equipment of the boards with descriptions of:
- (i) the rating, type number, catalog number, ratio, class, etc. next to each component with the abbreviated reference number such as “R1”, “KM1”, etc next to or on the component symbol.
- (Note: If space for descriptions is limited on diagrams, letters and figures shall be shown next to equipment and tabulated data shall then be submitted with columns showing the reference number or letter together with the corresponding rating, type number, catalogue number, ratio, class, etc., next to the reference)**
- (ii) the functions of each control circuit or section of control circuit, above each control group of components, such as “Alarm circuit”, “Auto/Off/Manual”, “ Pump Selector”, etc.
 - (iii) the functions of each component on control diagrams below the component such as “Run”, “Stop”, “Trip”, “On”, “Pump 1”, etc.
 - (iv) wire and cable numbers for all control and power wiring together with the colours of all wires, phases, etc.
- (c) A General Arrangement drawing of each MCC, distribution board or panel layout showing:
- (i) overall dimensions of the whole board and of individual panels together with material type and thickness used for the framework, doors and covers as well as the type and colour of finish of the material. Bolted joint positions of the sections of boards or motor control panels shall be shown.
 - (ii) front elevations and sections for all the boards and MCC's.
 - (iii) positions of door locks, hinges, handles, vermin proofing, ventilation facilities, seals on doors and covers, etc.
 - (iv) busbar chamber outer covers as well as method of fixing of such covers. Internal busbar safety barriers manufactured from non-conducting materials shall be shown, independent of whether busbars are individually covered with protective shrink materials.
 - (v) the IP rating of all boards and panels.
 - (vi) placement positions of all front panel components on boards. All labelling information for each component shall be shown in tabulated form on general arrangement drawings.
 - (vii) all internal panel dimensions, clearances, fixings, ventilation arrangements and detailed busbar connections in the case of soft starters.
 - (viii) the positions, dimensions, method of support, joint positions and sizes of busbars in front elevation and in section of the boards or MCC's.
 - (ix) gland plate thickness, positions, methods of fixings, height from floor level, rat proofing, etc.

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All drawings shall be done using NRS symbols and the applicable SANS standards for drawings plus any further requirements for drawings which may be bound into this document and which may be required by the end user of the equipment.

The approval of drawings shall not relieve the Contractor of his responsibility to supply the switchboards according to the requirements of the General Technical and/or Project Specifications.

GTS 1.14.3 FINAL DRAWINGS

At least five (5) complete sets of “as built” drawings of all boards and panels shall be submitted to The Engineer prior to the installation being handed over to the Employer.

The drawings shall preferably be in A3 format (in hard copy and on CD) and shall also be bound into the “Operational and Maintenance Manuals” as specified herein.

The following information shall be presented:

- (a) All the information as described in the section “Drawings for Approval”, hereinbefore.
- (b) the final and updated drawings and diagrams specified in items (a) to (c) of the section “Drawings for Approval”, showing the latest revisions after commissioning of the Works.
- (b) all final terminal strip numbers, numbers and colours of conductors connected to the terminal strips and numbers and colours of the conductors utilized for the internal wiring.
- (c) a separate schedule of all equipment with the name-, manufacture-, type-, model-, catalog number of equipment, as well as the name, address and telephone number of the supplier of each component in each board or panel.
- (d) all site and building layout drawings, showing sizes and positions of cables and equipment, including substation layout drawings and plant rooms for emergency power generating sets.
- (e) The site layout drawings showing cables shall be dimensioned using fixed points on site such as buildings, beacons, boundary walls, canals, sumps, etc.

All further information and data shall also be submitted as may be specified in the Project Specifications.

GTS 1.14.4 WALL MOUNTED DRAWINGS

A set of “as built” wall mounted drawings of all boards or motor control panels is further required in each substation, pump station, control room, switchgear room or building where a board or boards are placed, in suitable positions on site as instructed by The Engineer .

The drawings shall consist of the final General Arrangement drawings, power diagrams and control diagrams of the project and shall depict the switchgear ratings, fault levels, load ratings, motor ratings, field instrumentation and all cable sizes of the Works.

The wall mounted drawings shall be printed, plotted copies on white 80 gr/m2. paper with an ink medium that does not fade (such as used for photostats).

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The drawings shall not be larger than A3 format but text shall be clearly legible in this size. The drawings shall be stuck with wood glue onto 10mm chipboard so that it is impossible to remove the drawings without damaging the paper.

The size of mounting boards can be limited to a maximum of 6 x A3 drawings on one mounting board. The wall space available on site must be taken into consideration if more than one mounting board will be required. The Engineer must be asked for a decision if insufficient mounting space is available or in the case where a very large number of drawings are involved.

The mounting boards must be framed behind 2 mm PERSPEX with surrounding frames of aluminium or wood.

The mounting board must have fixing lugs and must be fixed to the wall by means of plastic plugs and screws at a suitable height.

GTS 1.15 Operational and Maintenance Manuals

GTS 1.15.1 SCOPE

A minimum of three (3) complete sets (or as scheduled in the Schedules of Quantities) of operational- and maintenance manuals for all specified MCC's and main- and sub-main switchboards shall be supplied for a project.

Also refer to the section "Final Drawings" herein, regarding binding in of "as-built" drawings into the required manuals.

Operational manuals shall be submitted in two formats:

- The first format shall consist of a brief descriptive operating instruction (or manual) for the purpose of giving basic operating instructions to operators for installed equipment. This manual, consisting of a few pages, shall be brief and to the point and shall contain the data as specified in GTS 1.15.2 herein.
- The second format shall be the full and complete manual specified in par. GTS 1.15.3 hereof.

GTS 1.15.2 BRIEF OPERATING INSTRUCTIONS

These brief instruction sheets shall contain the following descriptions:

A basic description of the operation of all LV switchgear and control equipment in substations, motor control panels, distribution boards, UPS equipment, emergency power diesel generator sets, battery chargers, power factor correction equipment, etc. i.e. all proprietary assemblies, shall be provided to assist the user personnel of the Employer in the immediate "hands on" operation of the equipment of the Works.

- (i) The main incoming switch, fuse switch or circuit breaker of each LV board or control panel.
- (ii) The functions and reading of instruments on each board or control panel.
- (iii) The functions and meaning of each switch, control button and indicating lamp on the board or control panel.
- (iv) The functions of local distribution circuit breakers, timers, etc. on the board.

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- (v) The functions of motor protection circuit breakers of switch fuse units of motor starter panels
- (vi) The functions and normal operating readings of instruments of each panel.
- (vii) A general description of the function and basic operation field or control instrumentation external to the MCC's or boards or panels, such as level sensing devices, flow sensing devices, pressure sensing devices, etc.

GTS 1.15.3 DETAILED OPERATIONAL- AND DESCRIPTIVE MANUAL

This manual shall contain the detailed descriptions of all switchgear and control equipment in motor control panels, distribution boards, UPS equipment, emergency power diesel generator sets, battery chargers, power factor correction equipment, etc. i.e. all proprietary assemblies, shall be provided to assist the user personnel of the Employer with advanced knowledge of the equipment for short, medium and long term maintenance- and operations of the plant and the works.

The descriptions must be complete in all respects and the Contractor shall also ensure that these manuals are prepared in such a manner that, in the opinion of The Engineer , a competent and qualified technician can trace any fault, identify any defective component, replace it with the correct spare part and follow, without difficulty, the exact function of every component.

To this end, care must be exercised to correlate the text with the circuit diagrams, to relate the diagrams one with another and to provide a simple method of diagnosis and test to be used wherever breakdowns occur. The manuals shall also include block diagrams giving the layout of equipment as well as a description of the function and operation of every unit in the system.

The manuals shall be neatly prepared, in typewritten and/or printed format, indexed, with appropriate dividers between each section to facilitate ready reference. All documentation shall be presented in the English language.

The description shall, as a minimum requirement, include:

- (a) Operational and maintenance data and details of all assemblies or components of electrical equipment installed in the plant. Copies of operational manuals of manufacturers can be inserted in these descriptions. In the case of insufficient descriptions in manuals of manufacturers, the Contractor shall provide additional descriptions to enable maintenance of the equipment.

The descriptions shall include:

- (i) Technical details of all equipment installed
- (ii) A complete description of the operation of all equipment.
- (iii) A parts and spares list of every item of equipment together with a description of the item, the name, address and telephone number of the original supplier or wholesaler of the equipment. Brochures may be added as additional information but must not replace the data required.
- (iv) Complete equipment schematics

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- (v) All manufacturers handbooks having reference to the equipment
- (vi) Installation test and alignment procedures
- (vii) All circuit diagrams
- (viii) All interconnection and inter cabling diagrams
- (ix) Complete trouble shooting procedures and any other information deemed necessary to permit rapid and efficient maintenance of any part of the equipment by a qualified technician.

The operating procedures contained in the manuals shall contain the following detailed features in fully descriptive format:

(a.1) Operating Procedures

- a) Pre start-up checks of all electrical equipment
- b) Routine running attention
- c) Stopping the plant
- d) Prolonged shut-down of the plant
- e) Re-commissioning of the plant after repairs, maintenance or prolonged shut-down

(a.2) Maintenance

- a) Routine maintenance procedures
 - i) Description
 - ii) Schedule
- b) Preventative maintenance

(a.3) Fault Finding Procedures

- a) Supply faults
- b) Main control faults
- c) Investigation procedure for detection of motor starter faults and remedies:
 - i) Symptom ii) Probable fault iii) Remedy

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d) Investigation procedure for detection of auxiliary equipment faults and remedies:

i) Symptom ii) Probable fault iii) Remedy

(a.4) Safety Precautions

- a) The nature of each hazard
- b) The level of seriousness
- c) How to avoid the hazard
- d) The possible consequences of not avoiding the hazard

In the case of sealed assemblies or advanced assemblies of equipment that cannot be opened or maintained or repaired on site, the Contractor shall provide sufficient data and instructions for the replacement of the assembly and shall further describe the measures which the user or operator of the plant can follow to operate the plant in an emergency and, if necessary, operate the plant manually, to overcome total shut-down or non-operation of the plant or Works until a new replacement can be installed.

The descriptions for temporary operational measures shall be of sufficient nature to enable interim safe operating conditions of the plant and shall further not be of a nature which shall cause damage to other parts or sections of the plant.

- a) A schedule of every item of equipment in the plant or board together with a description of the item, part number, catalog number, etc., as well as the name, address and telephone number of the original supplier or wholesaler of the equipment. Brochures may be added as additional information but must not replace the data required.
- b) All as-built record drawings, including AC and DC schematic- and wiring diagram drawings for the equipment. The wiring diagrams shall contain all the terminal numbers and wire numbers of all wiring in the plant. Also refer to clause GTS 1.14.3 hereof.

A4 drawings may be used in manuals but all text must be clearly legible. A3 drawing sizes are preferred.

- c) Technical brochures and pamphlets of equipment as additional information. This shall, however, not serve for the fulfilment of clauses in par. (a) & (b) in "Detailed Operational Descriptions and Data".
- d) Routine and type test certificates issued by factories for all switchgear and all test data of cables, including OTDR testing data of fibre optic cable. (certificates shall indicate the instrument number as well as the calibration certificate number).
- e) All calibration data of instrumentation. This data shall contain all set-point data for electronic motor protection relays, overload current settings, adjustable circuit breaker settings, flow and pressure instrument settings, level instrument settings, etc.

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This data shall also contain all the embedded software, on disc or CD, issued together with the instruments as part and parcel of the selling price of instruments where the instruments cannot be purchased without the embedded software.

GTS 1.16 Testing and Test Equipment

GTS 1.16.1 GENERAL

All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with The Engineer 's instructions and shall be subjected from time to time to such tests and by such persons as The Engineer may direct at the place of manufacture or fabrication or on the site or at all or any of such places.

The LV equipment, MCC's and other distribution boards, emergency power generating sets, etc., shall be tested in the factory by the manufacturer and the Contractor in the presence of The Engineer before the equipment is shipped to site. The Engineer must be given a few days' notice ahead of testing, to enable him to attend the tests.

Except as otherwise provided in the Specification the Contractor shall supply such assistance, accommodation, instruments, machines, labour and materials as are normally required for examining, measuring and testing of any work and the quality, mass or quantity of any materials used and shall supply samples of materials before incorporation in the works for testing as may be selected and required by The Engineer .

All samples shall be supplied by the Contractor at his own cost if the supply thereof is clearly intended by or provided for in the Specification but if not, then at the cost of the Employer.

The cost of making any test shall be borne by the Contractor if such test is clearly intended by or provided for in the Specification and (in the case of a test under load or a test to ascertain whether the design of any finished or partly finished work is appropriate for the purposes which it was intended to fulfil) if such is particularised in the Specification in sufficient detail to enable the Contractor to price or allow for the same in his Contract Price.

If any test is ordered by The Engineer which is either -

- (a) not so intended by or provided for; or
- (b) not so particularised; or
- (c) though so intended by or provided for is ordered by The Engineer to be carried out by an independent person or body at any other place than the site or the place of manufacture or fabrication of the materials or equipment tested;

then the cost of such test shall be borne by the Contractor if the test shows the workmanship or materials not to be in accordance with the provisions of the Contract or The Engineer 's instructions, but otherwise by the Employer.

The Contractor shall keep records of all the data of tests and shall submit this data to The Engineer upon completion of all tests.

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Such data shall include the results of:

- (a) earth tests
- (b) insulation tests
- (c) continuity tests
- (d) pressure tests
- (e) impedance tests
- (f) performance or rating tests
- (g) impulse tests
- (h) temperature tests, etc.

Tests carried out in the factory of the manufacturer or at a testing facility shall be done in accordance with the prescribed standards for such tests.

The applicable standards for such tests shall be SANS, BSI, IEC, DIN, NEMA or such acceptable standard as may be applicable to the product or equipment or assembly.

The Contractor shall further carry out any other special test as may be required by The Engineer in a manner or in accordance with the standards as may be required by The Engineer .

The Engineer will have the right to obtain a quotation from the Contractor for any special tests which are required by him and to instruct the Contractor to carry out such tests.

If equipment should fail a standard or prescribed standard test by a testing authority, the cost thereof shall be for the account of the Contractor.

GTS 1.16.2 FACTORY TESTS AND INSPECTIONS

The Contractor shall inform The Engineer as soon as any equipment or any part of an installation in the place of manufacture or on site is ready for inspections or tests.

The Engineer shall be given sufficient notice in advance of inspections or tests and final dates and times of such inspection will then be confirmed with the Contractor by The Engineer .

The inspection or testing of manufactured equipment in a factory by the Contractor or by any other test facility in the presence of The Engineer must not be regarded as acceptance of responsibility by The Engineer for the correct performance of such equipment on site.

The Contractor shall provide a clean and safe testing area in the place of manufacture of any equipment to be tested and inspected by The Engineer .

The area shall be open and accessible, and tests or inspection will not be carried out in cramped or dangerous areas.

No tests or inspections will be carried out in areas where overhead cranes or hoists are in operation.

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All live equipment shall either be screened off or enclosed so that inspecting persons are not endangered during such tests or inspections.

Inspections or tests will not be carried out near paint areas, paint booths, ovens, grinding or polishing areas or on equipment which are still under construction.

Tests will not be done by The Engineer in areas where a normal conversation cannot take place due to background noise.

Tests on equipment emitting exhaust gases or other dangerous gases shall not be witnessed by The Engineer , if such gases are not expelled or exhausted away from the test area and out into free outside air.

Test equipment, test leads, clean writing top space and all other facilities shall be provided for The Engineer during such tests.

The Engineer reserves the right to instruct the Contractor to carry out the re-testing of any equipment which does not pass the first inspection or test.

The time and travelling cost of The Engineer for the purpose of any re-testing of equipment which did not pass the first or a previous test will be for the account of the Contractor. Any delays in Contract time caused by failures of inspections or tests will also be for the account of the Contractor

The factory tests shall be done as far as possible with full control conditions as may be experienced on site. All remote controls of equipment must be simulated during these tests by using temporary connected toggle switches to replace remote field devices such as probes, lock-stops, etc. No wire straps which have to be inserted or taken out whilst testing is under way, will be acceptable.

Temporary simulated signals for the future field instrumentation or signals for future telemetry controls and field instrumentation must be available during the factory tests and must be fully operative and all field signals must be simulated during these tests by using toggle switches or signal generators.

GTS 1.16.3 SITE TESTS AND INSPECTIONS

The inspections of The Engineer of any part of an installation or Works on site do not exempt the Contractor from his responsibilities in terms of the Contract. The Engineer will only accept the completed installation work after having received all test results, commissioning results and certificates of compliance or test certificates of the Supply Authority (if applicable) on completion of the whole of the Works.

The Contractor shall provide a clean and safe testing area on site of any equipment to be tested and inspected by The Engineer .

The area shall be open and accessible, and tests or inspection will not be carried out in cramped or dangerous areas. No tests or inspections will be carried out in areas where overhead construction work is in progress.

All live equipment shall either be screened off or enclosed so that inspecting persons are not endangered during such tests or inspections.

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Test equipment, test leads, clean writing top space and all other facilities shall be provided for Engineer during such tests. The Engineer reserves the right to instruct the Contractor to carry out the re-testing of any equipment which does not pass the first inspection or test.

The time and travelling cost of The Engineer for the purpose of any re-testing of equipment which did not pass the first or a previous test may be for the account of the Contractor. Any delays in Contract time caused by failures of inspections or tests will also be for the account of the Contractor

The Contractor shall carry out all tests and shall do all settings of electrical equipment to safeguard the equipment of other Contractors, before site testing is carried out by The Engineer . Any abnormal condition, beyond the control of the Contractor, which may come to the attention of the Contractor during any preliminary or final tests or commissioning procedures shall immediately be reported to The Engineer .

The Contractor shall not allow equipment of other contractors to stay connected to, or operate with electric power from his installation if any equipment of other contractors do not operate normally or within the limits laid down by the manufacturer of equipment for other contractors.

GTS 1.17 Commissioning

The commissioning on site shall include all of the following procedures and is defined as follows:

GTS 1.17.1 DRY COMMISSIONING.

The "Dry Commissioning" of the plant shall include the following actions (with the main power ON and safely connected):

- (a) Connection of cables to equipment such as motor connection box sizes, cable end boxes, etc., shall be discussed timeously with the supplier and/or Contractor of the mechanical equipment installation to ensure that specified cables can be connected to motors and other equipment.
- (b) Motor and other equipment numbers and positions shall be checked by the Contractor, to ensure that the cables to such equipment are installed to the correct machine or equipment number.

If more than one motor or machine is to be connected or where other motors or equipment are already installed and the contract includes the installation of new or additional motors or equipment, the numbering sequence of motors or machines shall be confirmed with the supplier and/or contractor of the mechanical equipment installation and /or The Engineer .

- (c) The cables to machines or motors shall be installed, leaving sufficient slack in trenches for back-filling of trenches and for screeding over or placing paving or covers, and vertical cables shall be supported from machine bases upwards by means of suitable supports, racks, ladders or brackets, to ensure that finishing off of civil- or other work does not put strain on cable ends.

NOTE: This is particularly important in the case where a machine is belt coupled and where allowance must be made for adjustment to tighten belts. Suitable slack must be provided on connections of adjustable machines.

- (d) Switchgear must be brought to a ready state, with lock-stop circuits, liquid level protection, external controls such as stop-start stations, telemetry connections, etc., i.e. all controls which can prevent start-up of the equipment, must be completed and in correct working order.

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Any temperature safety circuits of equipment shall be connected and checked.

- (e) All earthing installation work must be completed.
- (f) All lighting installations in the buildings and on site must be operative to render safe working conditions.
- (g) All safety checks and tests must be completed.
- (h) All basic settings of motor protection equipment and overloads must be set and checked.
 - (i) Motor direction of rotation must be checked together with the supplier and/or contractor of the mechanical equipment installation present, and preferably with The Engineer present. The Engineer must be notified in advance to allow him to attend the "dry commissioning", if he should so decide.
 - (ii) The responsibility of correct rotational or operational tests rests with the Electrical and Mechanical contractors.

NOTE: Water may not be present in pipelines at this stage at pumping installations and motors must not be energized for more than 3 seconds to check direction of rotation.

Couplings and/or belts of motors shall be uncoupled from pumps for the purpose of direction of rotation checking.

Submersible pumps shall be submersed in water during such tests.

All of the above shall be regarded as the "dry commissioning" stage of the Contract.

The Contractor can then proceed to complete the installation to bring it to a ready state for "wet commissioning" of the Works.

GTS 1.17.2 WET COMMISSIONING.

"Wet Commissioning" shall include the following actions and shall be done with The Engineer present and shall require the presence of the Contractor for as long as it is necessary to carry out all the actions hereunder or as may be further required by The Engineer .

- (a) The motors and pumps and other ancillary equipment shall be run under load with the equipment and loads connected, aligned and ready for operation, and with sufficient water in the suction lines in the case of pumping installations.
- (b) Protection equipment, such as protection relays, overloads, level settings, pressure settings, etc., shall be set by the Contractor in the presence of The Engineer . All the settings shall be recorded by the Contractor for handing over to The Engineer after commissioning.
- (c) Underload settings or phase angle settings of protection relays, pressure devices, flow monitor devices, level monitoring devices, etc., shall be set under test conditions, with the Contractor on standby, when inlet and/or outlet valves are closed and opened on pumps.

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- (d) Telemetry signals and/or remote controls shall be tested to ensure that level controls for emptying and/or filling of reservoirs and tanks or purification plants function correctly.
- (e) Other safety and/or remote starting and stopping devices shall be tested for correct functioning.
- (f) The plant shall be stopped when The Engineer is satisfied with all tests and all connections and after operation of the plant for the number of hours as required in the Project Specification. This period is normally not shorter than 4 hrs. Terminals in panels and at motors (power and controls) shall then be checked for tightness.
- (g) Any small items such as alterations to labels, faulty ammeters, etc. shall be recorded for repairs.
- (h) Any wall-mounted drawings specified shall be mounted in place as required by The Engineer .
- (i) The number of required maintenance and operational manuals (complete in all respects) shall be handed over to The Engineer . (Refer to the Project Specifications for requirements of manuals)
- (k) The spares and tools, complete with toolboxes as specified, shall be on site together with inventory sheets, ready for signature of the recipient party. (Toolboxes shall be mounted beforehand). A padlock shall be provided with each toolbox.
- (l) The switchboards and all instruments shall be clean and neat.
- (m) All lights and power points shall be operative, and all earthing and bonding shall be completed and tested.
- (n) A Certificate of Compliance shall have been handed to the power supply authority with a copy on site for The Engineer .
- (o) The Contractor shall hand to The Engineer all the test results of cables, earthing, switchgear, etc. which was logged by him together with the settings of all protection equipment, control equipment, level sensing equipment, circuit breakers, etc. This information shall be made available on properly structured test sheets and log sheets and shall be dated and signed by the Contractor.
- (p) The Contractor shall then proceed with training of the operating personnel of the Employer as may be required in the Project Specification.

No last-minute repairs or installation work shall be done by the Contractor on the day of "wet commissioning" of the Works:

The successful completion of all the above shall be the "wet commissioning" of the Works and shall be regarded as the "first hand over day" of the Works to the User or Owner of the installation. The retention period of the Works normally starts on that day, unless abnormal conditions prevent the handing over of the Works to the Client.

An abnormal occurrence that prevents handing over will not be seen as failure of the Contractor in this respect.

If the commissioning should have to be stopped or abandoned due to the failure of the Contractor to complete the Works and have the Works ready for inspection or if the Works has not gone through the "dry commissioning" procedures as stated in GTS1.17.1 or through the "wet commissioning" procedures as stated in GTS 1.17.2 (a) to (p) above, then the further costs for re-commissioning later will be for account

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of the Contractor. Such costs will include all the traveling, accommodation and time rate costs of The Engineer or Engineers.

The Works will not be regarded as being commissioned if all of the above requirements are not met on the day of "wet commissioning" of the works.

The Contractor shall allow for all the necessary test equipment and facilities for the proper testing of these units under load conditions on site before final commissioning takes place, as described under "Site Testing" herein.

The commissioning shall be regarded as incomplete until all tests have been conducted successfully and all datasheets of tests have been completed and all drawings have been updated to show any deviation from factory-built equipment details.

GTS 1.18 Training of Personnel

The training of personnel of the Employer or User of the plant shall only be applicable to the Contract as specified in the Project Specification and as allowed for in the Schedule of Quantities or Pricing Schedules or Bills of Quantities bound into the document.

A PC amount or full description will, where applicable, be provided in the Schedule of Quantities or Pricing Schedules or Bills of Quantities of the tender document, for tender purposes, where training is required.

Training provided by the Contractor shall be directly applicable to the actual equipment to be used at the installation. All training shall be carried out on site, unless otherwise requested by the Employer.

Four categories of training are normally required or as may be specified in the Project Specifications viz.:

- (a) Training of operators.
- (b) Maintenance training of technical staff.
- (c) Software training (related to PLC's - primary course.)

Operators of the installed equipment shall, with the brief description specified in par. GTS 1.15.2 at hand, be trained by The Contractor to safely operate the equipment and controls.

This training shall not be in depth training and no advanced technical training shall be presented in this training session.

This type of training session serves the purpose to train semi-skilled personnel to operate equipment that is not of the advanced type.

The training shall not last longer than 6 hours and may be carried out on the day of first handover of the Works.

The training of skilled operators and technical staff shall take place with the full operational- and maintenance manual specified in par. GTS 1.15.3 at hand.

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This training course shall include the training of technical personnel of the Employer during the installation period and commissioning stages of equipment on site to make the technical staff and or skilled operators completely conversant with the installed equipment and the use thereof.

The Employer thus reserves the right to appoint certain staff to the Contractor's team during the installation and commissioning phase of the work for training as described in the previous paragraph.

The Employer will bear the cost of salaries, accommodation and other allowances and traveling expenses of its personnel, but all other expenses to allow the personnel to attend the said training shall be borne by the Contractor.

The Employer may also decide to request the Contractor to make use of the ability of the staff of the Employer to assist with physical installation and commissioning work, and in such instance The Engineer will instruct the Contractor accordingly.

The Tenderer shall indicate his proposals and local facilities to provide training in particular aspects of operation and maintenance of the equipment being offered, if the on-site training as described herein, is allowed for in the Contract Project Specifications and the Schedule of Quantities.

If advanced training is specified and allowed for in the Schedule of Quantities, the training shall include the courses in par. (c) and (d) herein.

The Contractor shall provide all course material including manuals and training data in this case and shall present well prepared lectures of the courses in locations which suite the Employer.

Training courses shall proceed within one month after date of first hand-over of the particular section of the Works.

Advanced hardware maintenance training shall include maintenance of equipment such as MV switchgear, protection equipment, computers, microcomputers, programmable logic controllers and all the peripherals or field instrumentation equipment installed in a particular project.

Advanced software training shall include the full course as presented by information technology firms and can include programming of PLC's and setting up of software packages.

If such training is specified in the Project Specifications, the Contractor shall price the items allowed for this purpose in the Schedule of Quantities of the tender document.

At conclusion of any training period, either for the operation and maintenance of equipment, or for advanced software and programming, the Contractor shall issue the necessary certificates at the end of the course and/or a signed statement to the effect that these training sessions were adequate.

GTS 1.19 Spares

If so specified, the Contractor shall present The Engineer with a recommended spares list and/or a list of special maintenance tools or instruments at the end of the Contract.

A PC amount will, where applicable, be provided in the Schedule of Quantities of the tender document for this purpose.

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GTS 1.20 Certification by The Engineer

The certificates, in use by The Engineer for;

- (a) Practical Completion of Works
- (b) Certificate of Commissioning
- (c) Final Approval of Works are bound in at the end of this document.

The Certificate of Practical Completion will be issued when the Works have been practically completed.

The Certificate of Commissioning will only be issued after successful commissioning of the Works has been attained.

The Certificate of Final approval of the Works will be issued at the beginning of the guarantee and retention period. The date of Issue of this certificate may be the same date of the "Certificate of Commissioning", depending on the particular Contract and the Works on site.

GTS 1.21 Certification by the Contractor

The Contractor shall issue the necessary completion certificates and Certificate of Compliancy to The Engineer and the applicable Authorities as contained herein or in SANS 10142: Part 1: Low Voltage Installations, or as required in terms of the Occupational Health and Safety Act, Act 85 of 1993, as and when required by The Engineer or the Authorities. The certificates shall include the Certificate of Compliance as would be required by SANS 10142(latest amendment) where any 231/400 Volt (or higher voltage) work is carried out by the Contractor.

None of the certificates of The Engineer , as specified hereinbefore will be issued if the Contractor does not comply with the requirements of this clause.

Until the Certificate of Compliancy is issued by the Contractor, The Engineer will not consider issuing of a Certificate of Completion

The original Certificate of Compliancy for every separate site or installation shall be handed to the Employer. Copies must be issued to The Engineer and the Supply Authority and copies can further be included in the Operational and Maintenance manuals.

GTS 1.22 Technical Requirements and Regulations

GTS 1.22.1 Scope

This General Technical Specification describes the usual materials required for electrical installations and general methods of installing these materials. This General Technical Specification forms a part of the drawings and the Project Specification for a specific contract. Where the Project Specification and/or the drawings differ from this General Technical Specification, the Project Specification and the drawings shall take preference.

GTS 1.22.2 Statutory Requirements

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All material and equipment to be used for this installation shall be new and of an acceptable quality.

The installation of electrical equipment shall always comply with the requirements, stipulations and regulations contained in the following Acts and shall be carried out in strict compliance with the following;

- Machinery and Occupational Safety Act 85 of 1993 with special reference to Section 1 (Act & Regulations), Section 2 (Administrative Regulations), Section 6 (Electrical Installation Regulations), Section 13 (Driven Machinery Regulations), Section 14 (Electrical Machinery Installations), Section 15 (General Machinery Regulations) and Section 16 (General Safety Regulations).
- The Mines and Works Act, No.27 of 1956 and subsequent amendments and regulations issued thereunder.
- The Electricity Act, No.40 of 1958.
- Explosives Act, No.26 of 1956.
- Code of Practice for the Wiring of Premises - SANS 10142-1: Part 1: low Voltage Installations (latest edition)

The Electrical Contractor shall, on completion of all electrical plant and installation work, issue a Certificate of Compliance as given in SANS 10142-1, Part 1, Low voltage Installations (latest edition), with particular reference to the forms contained in clause 8.8.

GTS 1.22.3 Standards

All work shall comply with the relevant SANS specifications for workmanship and material. Where no SANS specification exist, the applicable BS, DIN or IEC specification shall be applicable.

The following standards shall, unless otherwise stated in the Project Specifications, apply:

SPECIFICATION	SANS	IEC	NRS	VC	BS
Graphical Symbols for Electrical Diagrams			NRS 002		
Wiring of Premises: Part 1: Low Voltage Installations (Latest Ed.)	SANS 10142-1				
PVC -Insulated cables (600/1000V)	SANS 1507-2, -3 SANS 1574				
On-load Isolators		IEC 60947-3	NRS 031	VC 8003	
Busbars	SANS 1195	IEC 60439-2			

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SPECIFICATION	SANS	IEC	NRS	VC	BS
(Short Circuit design & busbar supports)		IEC 60865-1&2			
Solid drawn high conductivity copper	SANS 804, 1195				
Busbar trunking		IEC 60439-2			
Circuit breakers(magnetic -& other)	SANS 61008-1 SANS 60934 SANS 60947-1 SANS 60947-2 SANS 156			VC 8036	
Contactors		IEC 60947-4-1 IEC 60947-1			
Surge Arrestors	SANS 60099-4 SANS 60099-5 SANS 61643-1		NRS 039-1 NRS 039-2		
LV Fuses	SANS 172	IEC 60269-1 IEC 60269-2 IEC 60269-3 IEC 60269-4 IEC 60269-3-1 IEC 60269-2-1			

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SPECIFICATION	SANS	IEC	NRS	VC	BS
Earth Leakage Relays	SANS 767-1 SANS 767-2 SANS 1433-1 SANS1433-2	IEC 60947-7-1	NRS 028	VC8035	
Terminals & lugs & ferrules		IEC 60947-7-2			
Heavy duty terminals		IEC 60998-2-1			
kWh meters	SANS 61036 SANS 61358	IEC 60998-2-2			BS 37
Indicating instruments					BS 89
Electrical Indicating Instruments (part 1,2,7,8 &9)		IEC 51			
Current transformers		IEC 185			BS 3938
Single phase Voltage Transformers		IEC 186-2			
Electrical Relays (Part1)		IEC 255-1			
LV Assemblies	SANS 1473-1 SANS 1473-2	IEC 60439-1 IEC 60439-2 IEC 60439-3 IEC 60439-4 IEC 60439-5			
Distribution Boards & Safety of DB's	SANS 1765				
Enclosure for electrical equipment (IP Code)	SANS 1222				

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SPECIFICATION	SANS	IEC	NRS	VC	BS
Glands & terminals for PVC-insulated cables	SANS 808 SANS 1433-1 SANS 1433-2 SANS 1213				
Installation, Handling, Termination & Jointing of Cables	SANS 10198-1 to -14				
Earth Electrodes	SANS 10199 SANS 1063				
Earth Wire	SANS 1411-1				
Code of Practice for Lightning Protection	SANS 03				
PVC Conduit	SANS 950				
Metal Conduit	SANS 60614-1 SANS 60614-2-1 to SANS 60614-2-7 SANS 1065-1 SANS 1065-2				
Flexible Conduit	SANS 60614-2-5				
Light Switches	SANS 60669-2-1 to SANS 69699-2-3			VC 8003	
Socket Outlets	SANS 1239			VC 8008	
Wall boxes (for switches and socket outlets)	SANS 1085				
	SANS 61084-1				

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SPECIFICATION	SANS	IEC	NRS	VC	BS
Trunking and ducting	SANS 61084-2-1 SANS 61084-2-4				
Photoelectric switches	SANS 1777				
Metal Light Fittings	SANS 60598-1 SANS 60598-2-1 to SANS 60598-2-6				
Fluorescent lamps	SANS 1041				
Tubular fluorescent lamp luminaries	SANS 1119				
Ballasts for tubular fluorescent lamp luminaries	SANS 890-1 SANS 890-2 SANS 891				
Ballasts for discharge lamps	SANS 1266				
Capacitors for tubular fluorescent lamp luminaries	SANS 1250				
Hot-dip Galvanizing	SANS 121 SANS 935				
Standard Voltages and Currents	SANS 1019				
Colour Codes for Identification	SANS 10140-1 SANS 10140-2		NRS 040-2		
Colour Codes for Cables	SANS 1574				
UPS Equipment	SANS 50091-1 SANS 50091-2 SANS 62040-3				
Lightning Protection	SANS 61024-1 SANS 61024-1-1		NRS 042		

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SPECIFICATION	SANS	IEC	NRS	VC	BS
	SANS 61024-1-2 SANS 61312-1 SANS 61312-2 SANS 61312-4 SANS 10313 SANS 61662				
Colours for Painting	SANS 1091				
Emergency Stop Buttons	SANS 60947-5-5				

Any conflict that should arise between any of the above-mentioned regulations and this Specification shall forthwith be referred to The Engineer in writing for his ruling. Under no circumstances shall the Contractor modify any part of the works to comply with amended regulations that may come in force during the construction period before the matter has been cleared with The Engineer .

If any equipment or material to be used does not comply with the tabled standards hereinbefore but complies with a standard issued by another recognised international standards organisation, then this shall be stated unequivocally in the tender document.

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GTS 2.0 Switchboards (up to 1 KV)

GTS 2.1 General

GTS 2.1.1 Scope

This section covers the manufacturing and testing of flush mounted and floor standing switchboards for general installations in normal environmental conditions and for system voltages up to 1 kV.

All power-, motor control- and distribution board assemblies shall be designed, constructed and installed in compliance with SANS 1765, Clauses 6.6.1 and 6.6.2 of SABS 10142-1 for assemblies for fault ratings of <10kA and SANS 1473-1, Clauses 6.6.1 and 6.6.2 of SABS 10142-1 as well as SANS 60439-1 for assemblies for fault ratings of >10kA.

The Tenderer for this Contract shall only offer assemblies from a manufacturer who already has a test certificate from an accepted testing institution in compliance with SANS 1765, or SANS 1473-1 and IEC60439-1 and SABS 10142-1, as may be applicable, for his assemblies or from a manufacturer who can demonstrate that that he/she is far advanced in the process of obtaining the necessary certification in terms of these specifications. The Engineer will decide whether the manufacturer of the new MCC complies with this requirement before the final order is placed by the Contractor on the manufacturer of the MCC.

Also refer to clause GTS 2.7 in this regard.

GTS 2.1.2 Size

All switchboards shall be of ample size to accommodate the specified switchgear and provide space for future switchgear. For every 4 (or part of 4) circuit breakers on a switchboard, space for one additional circuit breaker, with the applicable fault rating, shall be allowed for unless future space requirements are clearly specified. The clearance between adjoining switchgear openings shall be as specified in GTS 2.6.2.

GTS 2.1.3 External Dimensions

The maximum allowable height of free-standing switchboards is 2,2 m. Cubicle type boards may be up to 2,4 m high if they can be fully dismantled into individual cubicles. Where, due to space restrictions, a board exceeds 2,2 m in height, equipment not normally requiring access, shall be installed in the top section, enabling equipment normally requiring access to be installed lower down in the board.

All other specified external dimensions for switchboards shall be strictly adhered to. If the clearances specified in GTS 2.6.2 cannot be adhered to as a result of restricting external dimensions, the Contractor shall obtain the approval of The Engineer before manufacturing the switchboards.

GTS 2.1.4 Moisture and Vermin Proofing

All switchboards shall be rendered moisture proof and vermin proof and shall be adequately ventilated. Also refer to the Project Specification in this regard.

GTS 2.1.5 Load Balance

The load shall be balanced as equally as possible across multiphase supplies.

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GTS 2.2 Construction of Flush Mounted Switchboards

GTS 2.2.1 Standard

Flush mounted switchboards shall comply fully with the relevant SANS specifications in GTS 1.22.3. Unless the depths of the switchboards are specified, the depths shall be determined in accordance with par. GTS 2.3.6.

GTS 2.2.2 Expanded Metal

Where switchboards are to be built into 115 mm thick walls, expanded metal shall be spot welded to the rear of the bonding trays. The expanded metal shall protrude at least 75 mm on each tray side to prevent plaster from cracking.

GTS 2.2.3 Knock-Outs

Knock-outs shall be provided in the top and bottom ends of each switchboard tray to allow for the installation of conduits for the specified and future circuits. Knock-outs shall be provided for an equal number of 20 mm and 25 mm dia. conduits.

GTS 2.2.4 Panels

Front panels shall have machine punched slots for housing the specified and future flush mounted switch gear. The distance between the inside of the closed doors and the panel shall not be less than 20 mm. No equipment may be mounted on the panel unless the panel is permanently hinged to the switchboard frame.

GTS 2.2.5 Fixing of Front Panels

The front panel shall be secured to the architrave frame by means of square key captive fasteners similar to "CAMLOC". Alternatively, the panel may be secured to the architrave frame by means of two pins at the bottom and CAMLOC catches at the top of the panel. Self-tapping screws or studs will not be allowed. All front panels shall be provided with a minimum of one chrome plated handle.

GTS 2.2.6 Door Handles and Catches

Switchboard doors shall be equipped with heavy duty swing type catch-handles. Locks shall only be provided when specified. In all cases where lockable doors are required and, in all cases, where the switchboard doors are higher than or wider than 450 mm, heavy duty swing type catch-handles combinations shall be installed.

GTS 2.3 Construction of Surface Mounted Switchboards

GTS 2.3.1 Standards

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Surface mounted switchboards shall comply fully with SANS, IEC requirements stated in GTS 1.22.3 hereof. All steelwork of boards shall be 2mm 3CR12 with powder coated finish, unless stated otherwise in the Project Specifications.

GTS 2.3.2 Switchboard Tray

Surface mounted switchboards shall be equipped with a reinforced tray, suitably braced and stiffened to carry the chassis, door and equipment.

Lugs to secure the switchboard to a vertical surface shall be provided.

GTS 2.3.3 Construction

All joints shall be welded or securely bolted. The tray shall be square and neatly finished without protrusions. The front tray sides shall be rounded with an edge of at least 20 mm to accommodate flush doors.

GTS 2.3.4 Chassis

A sheet steel chassis for the mounting of equipment shall be bolted to the tray and shall comply with the requirements of GTS 2.6.1 and GTS 2.6.3

GTS 2.3.5 Front Panel and Door

The front panel and door shall comply with GTS 2.2.4 to GTS 2.2.6 above. Doors shall fit flush in the tray when closed.

GTS 2.3.6 Dimensions

Unless the depth of the switchboard is specified, the dimensions shall be determined in accordance with the requirements of GTS 2.6.2 and GTS 2.6.3

GTS 2.4 Construction of Free-Standing Switchboards

GTS 2.4.1 Framework

A metal work for free standing switchboards shall be manufactured from 2 mm minimum 3CR12 folded sheet steel. A solid U-channel base-frame sufficiently braced to support all equipment and span floor trenches and access holes shall be provided. Switchboards shall be of cubicle design with 2 mm side panels forming divisions between cubicles. The minimum or maximum allowable cubicle width shall be as specified in the

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project specifications. (Refer also to GTS 2.4.7). Joints shall be non-continuously butt welded. Welds shall be ground smooth and the joint wiped with plumber's metal in order to provide a smooth finish. Switchboards wider than 2 m shall be fitted with screwed eyebolts attached to the framework to facilitate loading and transportation of the board. Also refer to the Project Specification in this regard.

GTS 2.4.2 Rear and Side Panels

The rear panels shall be removable and shall be manufactured from 2 mm minimum 3CR12 sheet steel. The panels shall have returned edges which are recessed in the frame or which fit over lips on the switchboard frame. The panels shall be secured to the frame by means of square key captive fasteners equal or similar to "CAMLOC".

Where switchboards are intended for installation in vertical building ducts or against walls, the rear and side panels may consist of a single folded sheet which is either bolted or welded to the frame or which forms part of the folded metal frame.

GTS 2.4.3 Front Panels

The front panels of floor standing switchboards shall preferably be hinged except where flush mounted equipment prevents this. Alternatively, panels shall be secured by means of the methods described in GTS 2.2.5. The panels shall be arranged in multi-tiered fashion to allow for the logical grouping of equipment in accordance with par. GTS 2.2.6.

The hinged front panels shall have a dished appearance with 20 mm upturns that fit over a lip on the switchboard frame. Alternatively, the hinged panels shall have folded edges and shall be fitted flush or slightly recessed in the switchboard frame. The latter method shall be used where doors are required. (Also refer to GTS 2.4.6) Corners shall be welded and smoothed.

The panels shall be of 2 mm minimum 3CR12 sheet steel with machine punched slots to allow for the flush mounting of instrumentation, switchgear toggles and operating handles. A minimum clearance of 50 mm shall be maintained between the rear of equipment mounted on the panels (taking into account terminals or other projections) and the frame and chassis of the switchboard.

Separate panels shall preferably be provided for the mounting of instrumentation and for covering flush mounted switchgear. Enclosed switchgear with front panels e.g. combination fuse-switch units, may be flush mounted in the board in lieu of separate hinged panels.

Hinged panels shall be suitably braced and stiffened to carry the weight of flush mounted equipment and to prevent warping.

Hinged panels with flush mounted equipment and panels higher than 600 mm shall be supported by hinges of adequate strength to ensure smooth and reliable operation. 16 mm pedestal or similar heavy duty hinges with single fixing bolts may be used on panels smaller than 600 mm. On the larger panels long pedestal type hinges with two fixing bolts per hinge are preferred. Piano hinges are not acceptable for this application.

A tubular chromium-plated handle shall be fitted on each panel.

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Blanking plates shall be fitted over slots intended for future equipment. These plates shall be fixed in a manner which does not require the drilling of holes through the front panel. Dummy circuit breakers may be fitted where applicable.

Front panels containing live equipment such as instrumentation or control switches, shall be bonded to the switchboard frame with a braided copper earth strap with an equivalent cross-sectional area of at least 4 mm².

GTS 2.4.4 Securing of Front Panels

Hinged panels shall be secured in position by means of 6mm. square key operated non-ferrous fasteners designed to draw the panels closed. Self-tapping screws or studs and dome nuts are not acceptable. Where non-hinged removable panels are specified, they shall be secured in position by means of 6 mm. square key captive fasteners at each corner of the panel.

GTS 2.4.5 Chassis

A suitably braced chassis for the mounting of switchgear and equipment shall be firmly secured to the frame of the switchboard. The chassis shall be designed so that the switchgear can be installed in accordance with par. GTS 2.6. Circuit breakers and isolating switches which are not of the moulded-case air-break type and the insulators of busbars for ratings of 200 A and more may be secured directly to the framework.

GTS 2.4.6 Doors

- (a) Doors need only be provided when specified in the Project Specification. Doors shall be arranged in multi-tiered fashion to allow for the logical grouping of equipment in accordance with par. GTS 2.6.
- (b) Doors shall have a dished appearance with a minimum of 20 mm upturns that fit over a lip on the switchboard frame or shall fit flush in the switchboard frame. Corners shall be welded and smoothed.
- (c) Doors shall be of 2 mm minimum 3CR12 sheet steel with machine punched slots to allow for the flush mounting of instrumentation, control and protection equipment. Switchgear shall be flush mounted in the front panels behind the doors unless specified to the contrary. A minimum clearance of 50 mm shall be allowed between the rear of equipment mounted on doors (including terminals and projections) and the frame, front panel and chassis.
- (d) Doors shall be suitably braced and stiffened to carry the weight of the equipment and to prevent warping.
- (e) Hinges for doors shall be provided as described in GTS 2.4.3. At least three hinges shall be provided on doors higher than 1,2 m.
- (f) Doors shall be fitted with handles consisting of a push-button-and-handle combination with spring loaded catch or a rotary handle-and-catch combination. Flush mounted ring type handles or

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square key operated latches are not acceptable. The same key shall fit all locks on the switchboard in cases where locks are required.

- (g) Doors shall be fitted with neoprene seals.
- (h) Doors containing any electrical equipment shall be bonded to the switchboard frame with a braided copper earth wire with an equivalent cross-sectional area of at least 4 mm² .

GTS 2.4.7 Sections

For ease of transportation and to facilitate access to the allocated accommodation, switchboards may be dismantled into cubicles or sections. Each section shall be rigidly manufactured to ensure that damage to the switchgear will not occur during transportation and handling. Where required, switchboards shall have temporary wood or steel bracing to protect switchgear and facilitate handling.

GTS 2.4.8 Grouping of Switchgear

The switchgear shall be logically arranged and grouped as described in par. GTS 2.6. Depending upon the number and size of components, a common front panel may be installed over one or more groups of equipment. All equipment shall be installed in accordance with the requirements of par. GTS 2.6.

GTS 2.4.9 Cable Gland Plate

A cable gland plate shall be installed across the full width of each power cubicle at a minimum height of 300 mm above the bottom of the switchboard to house the cable glands. A support channel or other approved support shall be provided to carry the weight of the cable and remove mechanical stress from the cable glands. A minimum distance as required by the bending radius of outgoing cables shall be provided between the lowest terminals of major equipment and the gland plate.

GTS 2.4.10 Ventilation

Switchboards shall be properly ventilated, especially cubicles containing contactors, motor starters, lighting dimmers and other heat producing equipment. Louvers shall be fitted to provide adequate upward or cross ventilation. All louvers shall be vermin proofed with 1,5 mm brass mesh or perforated steel plate internally spot welded over the louvers or clamped to the louvers with rectangular frame plates. The internal ambient temperature shall not exceed 40°C. Also refer to the Project Specification in this regard.

GTS 2.4.11 Vermin Proofing

Free standing boards shall be protected against vermin, especially from below. Where cables have to pass through the gland plate, rubber grommets shall be provided, and enough non-hardening compound shall be delivered with the board so that these holes can be sealed properly after installation of the cables.

GTS 2.5 **Construction of Main Low-Tension Switchboards**

Main low-tension switchboards and sub-main low tension switchboards heavily equipped shall comply with GTS 2.4 as well as the following exceptions or additions:

- (a) These boards shall be fully extensible with removable busbar cover plates in the side panels.
- (b) Doors shall not be supplied unless specifically called for.
- (c) Switchgear and equipment shall be installed in accordance with the requirements of par. GTS 2.6.
- (d) Provision for metering equipment shall be made in accordance with requirements of local authorities where applicable.

GTS 2.6 **Mounting of Equipment**

GTS 2.6.1 General

The mounting of equipment shall comply the relevant SANS specifications in GTS 1.22.3 hereof, where applicable. Equipment to be mounted on the chassis shall be mounted by bolts, washers and nuts or by bolts screwed into tapped holes in the chassis plate. In the latter case the minimum thickness of the chassis plate shall be 2,5 mm. The latter method shall not be used where boards will be subject to vibration or mechanical shocks. Self-tapping screws will not be accepted.

GTS 2.6.2 Space Requirements

In designing the switchboards, the following requirements shall be strictly adhered to:

- (a) A minimum of 50 mm between any piece of equipment and the frame or internal partitioning. This minimum space is required on all sides of the equipment. In the case of a single row of single-pole circuit breakers the spacing on one side of the row may be reduced to 25 mm if the incoming side of the circuit breakers is busbar connected.
- (b) A minimum of 75 mm between horizontal rows of equipment. The maximum outside dimensions of equipment shall be considered.
- (c) Circuit breakers up to a fault rating of 10 kA may be installed adjacent to each other. For higher ratings a minimum of 40 mm shall be allowed between circuit breakers or isolators.
- (d) Sufficient space shall be provided for wiring allowing for the appropriate bending radius.
- (e) Space for future equipment shall be allowed as described in GTS 2.1.2.

GTS 2.6.3 Mounting of Chassis

The chassis of flush mounted and smaller surface mounted boards shall be mounted in accordance with relevant SANS specifications in GTS 1.22.3 hereof. For all freestanding switchboards and surface mounted switchboards where the main switch rating exceeds 100 A. (triple-pole), space for wiring shall be provided between the chassis and tray. This space shall be adequate to install the supply cable behind the chassis and terminate on the main switch without sharp bends in the cable cores.

GTS 2.6.4 Grouping of Equipment

Equipment shall be arranged and grouped in logical fashion as follows:

- (a) Main switch - shall be installed at the centre of the board.
- (b) Busbars - shall be installed at the top of the board.
- (c) Short circuit protection - circuit breaker, fuse gear or fuse-switches.
- (d) Change-over contactors or other contactors controlling the supply.
- (e) Motor supplies.
- (f) Fuse-switches for outgoing circuits.
- (g) Other circuits and equipment.

Where earth leakage units are required, the associated circuit-breakers shall be installed adjacent to the unit.

GTS 2.6.5 Mounting of Circuit-Breakers

All moulded-case circuit breakers shall be flush mounted with only the toggles protruding. Miniature circuit breakers may be installed in clip-in trays mounted on the frame. All other circuit breakers shall be bolted to the chassis. Special provision shall be made for large main switches when designing the framework. Care shall be exercised that the rear studs of circuit breakers are properly insulated from the steel chassis. Where necessary, insulating material shall be installed between the rear studs and the chassis. Circuit breakers shall be installed so that the toggles are in the up position when "ON" and down when "OFF".

GTS 2.6.6 Instrumentation

All metering instruments shall be flush mounted in the front panel or door in the top of the board.

The rear terminals of instruments mounted on doors shall be covered with an insulating material to prevent accidental contact.

Current transformers for metering shall be mounted so that the rating plate is clearly visible.

Fuses for instrumentation shall be mounted in an easily accessible position and clearly marked inside the board.

GTS 2.6.7 Mounting of Fuses

Fuse holders shall be mounted inside the board in a position so that fuses can readily be changed without danger of touching busbar droppers or other live terminals.

Back-up busbar mounted fuses for instrumentation shall be used as far as possible, in accordance with the Project Specification.

Where equipment requiring fuses is specified on a board (fuse switches etc.), a ruling shall be obtained from The Engineer on the quantity of spare fuses to be provided.

GTS 2.6.8 Equipment in Main Boards

Equipment in main low-tension switchboards and sub-main boards shall be grouped in individual compartments.

Equipment shall be installed as follows:

- Rack-out type air circuit breakers shall be mounted in the bottom section, flush behind the panel with the handle only protruding.
- If this is not possible, the panel shall be omitted and the air circuit breakers installed behind a door.
- If the main switch is a moulded-case circuit breaker or isolator it shall be flush mounted in the front panel or on a chassis inside the board with a fitted shaft and handle on the face plate of the board.
- Contactors controlling the supply shall be installed behind separate front panels.
- All metering, protection and indicating equipment shall be clearly visible from the front of the board.
- Current transformer ratios and multiplication factors shall be clearly marked.
- Where doors are specified the equipment shall be installed flush in the doors and covered as described in GTS 2.6.6.
- All circuit breakers and fuses (with the exception of fuse-switches) may be grouped together behind one or more panels as described in GTS 2.4.8.
- Fuse or fuse-switches providing back-up protection for circuit breakers, shall be grouped with the associated circuit breakers.
- Exposed surfaces of fuse-switches shall be of the same finish and colour as the rest of the board where practical.

GTS 2.7 Busbars

GTS 2.7.1 Application

Busbars shall be manufactured of solid drawn high conductivity copper and with a yield point stress of 275 N.mm² and with rectangular cross-section accordance with relevant SANS specifications in GTS 1.22.3 hereof, where applicable.

Also refer to GTS 2.1.1 hereof for the applicable SANS and IEC requirements for the manufacture of board assemblies.

Although SANS refers to overhead and rising busbars, busbars in miniature substations shall comply with applicable sections of this specification, especially as far as insulation and clearance values, creepage distance, joints, insulation resistance, dielectric strength, deflection test, absorption resistance, ventilation and rated short time withstand current are concerned.

Busbar compartments or busbar arrangements shall always be mounted at the top of assemblies.

Vertical bar arrangements will only be allowed by The Engineer in exceptional circumstances.

Busbars of assemblies shall be installed for the following applications:

- (a) Distribution of supply voltage.
- (b) Connection of equipment with ratings exceeding the current rating of 70 mm² flexible conductors. (GTS 2.8.5)
- (c) Connection of outgoing circuits with current ratings in excess of that followed for 70 mm² conductors. (GTS 2.7.8)
- (d) Collector (stub) bars for parallel cables. (GTS 2.8.1)
- (e) Connection bars for neutral conductors. (GTS 2.7.9)
- (f) Earth busbars. (GTS 2.7.10)
- (g) Connections to miniature circuit breakers. (GTS 2.8.6)

GTS 2.7.2 Voltage Rating

Busbars for system voltages up to 600 V shall be designed to withstand a test voltage of 2,5 kV for one minute.

GTS 2.7.3 Current Rating

The maximum allowable temperature of busbars (including joints) carrying full load current in an ambient temperature as specified shall not exceed 80°C.

Unless different ambient temperatures are specified, an ambient temperature of 35°C shall be assumed with a maximum temperature increase of 40°C.

The acceptable temperature rise of components, terminals, bus bars, conductors, plug-in contacts, metal handles, insulated handles, metal surfaces and insulating surfaces shall not exceed the values as stated in Table 2 of clause 7.3 of IEC 60439-1.

Table 1 hereof may be used as a guide in determining copper busbar ratings. Not all available copper sizes are shown in the table.

Table 1: Copper busbar ratings

Busbar Size	Current Rating (A)		kVA (Unity Power Factor)	Current Rating (A)		kVA (Unity Power Factor)	Ekwivalent
	2 A/mm ²			1,6 A/mm ²			Transformer
25 x 6,3	315	218	252	175	100		
31,5 x 6,3	397	275	318	220	200		
40 x 6,3	504	349	403	279	250		
50 x 6,3	630	436	504	349	315		
63 x 6,3	794	550	635	440	400		
80 x 6,3	1008	698	806	559	500		
100 x 6,3	1260	873	1008	698	630		
125 x 6,3	1575	1091	1260	873	800		
160 x 6,3	2016	1397	1613	1117	1000		
25 x 10	500	346	400	277	200		
30 x 10	600	416	480	333	250		
40 x 10	800	554	640	443	400		
50 x 10	1000	693	800	554	500		
63 x 10	1260	873	1008	698	630		
80 x 10	1600	1108	1280	887	800		
100 x 10	2000	1386	1600	1108	1000		
125 x 10	2500	1732	2000	1386	1250		
160 x 10	3200	2217	2560	1774	1500		
50 x 12,5	1250	866	1000	693	630		
63 x 12,5	1575	1091	1260	873	800		
80 x 12,5	2000	1386	1600	1108	1000		
100 x 12,5	2500	1732	2000	1386	1250		
125 x 12,5	3125	2165	2500	1732	1500		
160 x 12,5	4000	2771	3200	2217	2000		

Current density in busbars shall not exceed the following values:

- 2A/mm² for a busbar rating of up to and including 1600A
- 1,6A/mm² for a busbar rating above 1600A

It is, however, essential that the manufacturer shall make due allowance for the "proximity and skin" effects, the effect of ferrous enclosures, ventilation, etc., for the arrangement used in his switchboard design.

Manufacturers shall prove that their busbar- and enclosure design comply with the temperature rise limits as stated in IEC 60439-1.

Neutral busbars in three phase, four wire supplies shall have a cross-section of at least 50% of the cross-section of the phase busbars. Also refer to clause GTS 2.7.10 hereof in this regard. Main busbars may not be reduced in size. The same copper size shall be used throughout the length of an assembly.

The rating of the bars shall be at least equal to the incoming current rating. In cases where the main switch is an isolator, the isolator rating may not be taken as the incoming current rating.

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The fault rating of busbars can be calculated in accordance with the formulae of IEC 60865-1 and 60865-2. It is, however, preferred that the manufacturer of an assembly shall have the necessary test certificate of an accepted testing institution in compliance with SANS 1765, or SANS 1473-1 and IEC60439-1 and SABS 10142-1

GTS 2.7.4 Mounting

All busbars shall be installed horizontally or vertically, preferably with the longer side of the section in the vertical plane. Main busbars shall be supported by resin bound synthetic supports of other suitable dielectric material. The surface of these supports shall be treated to prevent surface tracking. The supports shall be bolted securely to the framework and busbars shall fit tightly in the supports. Alternatively, busbars may be supported on high impact plastic insulators.

Porcelain insulators will not be allowed.

The rating and fixing of busbars shall be designed to withstand mechanical and temperature stresses during a fault condition within the fault rating limits for which the busbars were designed. The minimum clearance for system voltages up to 600 Volt is 8 mm and the minimum creepage distance shall be 16mm.

All secondary and "dropper" busbars, also in fault free zones of assemblies, shall be mounted on suitable supports or directly onto circuit breaker terminals, where practical.

GTS 2.7.5 Covering

All busbars shall be marked with phase colours by means of coloured heat-shrinkable or air-drying shrinkable material and at least in positions which will be visible when busbar compartment covers are removed.

The colour of the material shall correspond with the colour of the incoming supply phase. Manufacturers may also cover the full length of busbars by means of coloured heat-shrinkable or air-drying shrinkable material. Busbar joints shall be bolted. Bolted joint shall be free from insulating material.

The section of main busbars and the end of dropper bars shall be exposed where joints occur. Busbars shall be radius-edged where these change direction and radii shall be of dimensions not to cause stress cracks in the copper. Insulation tape shall under no circumstances be used for the marking of phase colours in assemblies.

GTS 2.7.6 Busbar Sections

Not applicable unless specified in the Project Specification. Bars shall be continuous and shall only be joined to enable the transportation of the panels in sections. The overlap shall be equal to 2 times the width of the bar to prevent localized heating. Contact surfaces shall surface ground and shall be tinned, or silver plated and bolted with cadmium plated bolts and nuts with an applied torque in accordance with the relevant SANS specifications.

GTS 2.7.7 Connections

Conductor tap-off ends from busbars shall be fitted with crimped or solid sweated lugs which are bolted to the busbar.

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Where lugs are crimped evidence shall be submitted that the crimping technique used will comply with the performance requirements of BS 4579, Part 1: "COMPRESSION JOINTS IN COPPER".

GTS 2.7.8 Outgoing Circuits

Flexible conductors up to a maximum size of 70 mm² may be used for connections from switchgear equipment to terminals for external cable connections. The terminations shall comply with par. GTS 2.8.1. Solid busbars below switchgear shall extend to a suitable height above the cable gland plate for outgoing circuits. These busbars shall also be marked in phase colours in the same way as main busbars.

GTS 2.7.9 Neutral Busbars

Neutral busbars in three phase, four wire supplies shall have a cross-section of at least 50% of the cross-section of the phase busbars.

Neutral conductors for circuits protected by a single-pole circuit breaker or fuse-switch in a small distribution board shall be connected to a neutral busbar mounted in a suitable position. A separate neutral bar shall be provided for each earth leakage unit provided.

These neutral bars shall have a cross-section of at least 6,3 x 25 mm and shall be long enough for the lugs of all neutral conductors to be bolted separately to the busbar without overlapping the lugs. The requirements of par. GTS 2.7.7 and GTS 2.7.12 are applicable. The rating of neutral busbars for three-phase circuits is specified in par. GTS 2.7.3

GTS 2.7.10 Earth Bar

An earth busbar (PEN or PE) shall be installed in the bottom of the board and towards the front of the board above the gland plate. The earth bar shall be installed along the entire length of the L.V. board.

The requirements of par. GTS 2.7.4, GTS 2.7.7, GTS 2.7.8 and GTS 2.7.12 are applicable to earth busbars with the exception that earth busbars may be bolted directly to the steel framework. The minimum cross-sectional area of any earth bar shall be 10mm².

The rating of PEN and PE bars shall be in accordance with Table 3 of clause 7.4.3.1.7 of IEC 60439-1. In addition, the longer side of the earth busbar shall be at least twice the diameter of the largest bolt that will be fitted to the busbar.

GTS 2.7.11 Earthing of Metal Parts

All non-current carrying metal parts of boards, e.g. framework, panels, doors, etc., shall be bonded to the earth bar. Refer to GTS 2.4.3 and GTS 2.4.6 (h) as well. Doors of assemblies which house equipment shall be earthed to the main earth bar of the assembly by means of flexible copper straps, properly lugged on both ends of the strap. Care shall be taken that paint surfaces of doors do not form an isolation barrier for such earths.

GTS 2.7.12 Bolts and Nuts

Only cadmium-plated high tensile steel bolts and hexagonal nuts may be employed at busbar joints and connection points. All nuts shall be provided with spring washers or be of the "NYLOCK" type with washers. The largest possible size bolt that will fit into holes in lugs and fixing holes of equipment shall be used in

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every instance. Bolts shall be of sufficient length that at least two but not more than five threads protrude beyond the nut.

GTS 2.7.13 Pre-drilling

Where busbars terminating at the ends of switchboards are intended for future extension, these busbars shall be pre-drilled to accommodate the extension.

Where pre-fitted space is specified for future equipment, the busbars in the proposed position shall be pre-drilled and nuts and bolts shall be provided to accommodate the future busbars or cables feeding the equipment.

GTS 2.8 Wiring

GTS 2.8.1 Cabling

Incoming and outgoing cables shall be terminated on the gland plate or in other positions as may be required in the Project Specifications.(Refer to GTS 2.4.9)

Cable tails with sizes up to 70 mm² may terminate on clamp type terminals where the clamping screws are not in direct contact with the conductor. All cables larger than 70 mm² shall terminate on busbar studs that are connected directly to the equipment. Parallel connection cables shall be connected to a collector busbar or busbar stub without crossing the conductors.

GTS 2.8.2 Terminal Strips

External wiring for low voltage-, control-, interlocking-, alarm-, measuring- and D.C. circuits shall terminate on numbered wiring terminals complying with the quality specifications herein.

The correct terminal size as recommended by the manufacturer for each conductor to be connected shall be used throughout. The terminal numbers shall appear on the wiring diagrams of the switchboard. Terminals for power wiring shall be separated from terminals where voltages of < 50V are present. Terminals for internal wiring shall not be interposed with terminals for external circuits. All connections to terminals shall be identified as described in par. GTS 2.8.7.

Where switchboards consist of separate sections, the control wiring passing between sections shall be terminated on strips in each section or in an interposing marshalling panel, so that control wiring can be readily re-instated when assembling the assembly on site.

GTS 2.8.3 Current Ratings

The current rating of conductors for the internal wiring shall be sufficient to carry the maximum continuous current than can occur in the circuit. This value shall be determined from the circuit breaker or fuse

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protection of the circuit. The current ratings of conductors in assemblies shall comply with tables 6.1 to 6.6 of SANS 10142-1 (as amended) with de-rating factors applied as per table 6.14 thereof.

GTS 2.8.4 Internal Wiring

- (a) Standard 600/1000 Volt grade PVC-insulated stranded annealed copper conductors to the relevant SANS specifications in GTS 1.22.3 hereof, shall be employed for the internal power wiring of switchboards.

The smallest PVC covered conductor size to be used for power wiring in switchboard assemblies shall be 2,5 mm². PVC covered wires of minimum size 1 mm² or 1,5 mm² may be used for control wiring.

- (b) Where heat generating equipment is present and the internal temperature of the board is likely to exceed 50°C, silicon-rubber insulated stranded conductors shall be used.
- (c) Wiring shall be arranged in horizontal and vertical rows and shall be bound with suitable plastic straps or installed in PVC wiring channels.

Under no circumstances may PVC adhesive tape be used for the bunching of conductors or for the colour identification of conductors.

- (d) Bunched conductors shall be neatly formed to present a uniform appearance without twisting or crossing the conductors.

Conductors leaving the harnesses shall be so arranged that they are adjacent to the chassis.

- (e) Conductors to hinged panels and doors shall be secured on both the door and the frame and shall be looped between the two points. The loop shall be arranged to produce a twisting motion when the door is opened or closed. A flexible protection sleeve shall be installed over the conductors.

- (f) Where wiring channels are used, they shall be installed horizontally and vertically. Under no circumstances may power and control circuit wiring be installed in the same wiring channel.

Channels shall not be more than 40% full.

- (g) All wiring between different panels within the same switchboard shall be installed in wiring channels.

- (h) Grommets shall be installed in each hole in the metalwork through which conductors pass.

- (i) All wiring shall be installed away from terminals, clamps or other current carrying parts.

Wiring shall also be kept away from exposed metal edges or shall be protected where they cross metal edges.

- (j) Conductors may be jointed at equipment terminals or numbered terminal strips only. No other connections are allowed.

- (k) Where conductors change direction, smooth bends shall be formed with a radius of at least 5 times the outside diameter of the conductor or harness.

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- (l) Where screened cables are specified, the screening shall be earthed in the switchboard or control board only unless clearly specified to the contrary. Screened cables entering control boxes through pressed knock-outs, shall terminate in compression glands. Conductors shall as far as possible remain inside the screening at terminations.

Where conductors have to separate from the screen, the braiding shall be separated and the conductors drawn through the braid without damaging the braiding. The conductors shall then be connected to their respective terminals and the screening smoothed and connected to the earth terminal.

- (m) Where neutral connections are looped between the terminals of instruments, it is essential that the two conductor ends be inserted into a common lug or ferrule and are crimped or soldered together in order that the neutral connection is not broken when the conductors are removed from one of the instruments.
- (n) Wiring should as far as possible be confined to the front portions of switchboards for ease of access. This requirement is important for wiring between smaller circuit breakers and the associated main circuit breaker as well as the wiring from circuit breakers to lighting and socket-outlet circuits.
- (o) A maximum of two conductors will be allowed per equipment terminal. Where more conductors must be connected to the same equipment terminal (e.g. a main circuit breaker feeding other circuit breakers), stub busbars shall be provided for the various conductors.

GTS 2.8.5 Wiring To Circuit Breakers

Equipment with a rating exceeding the current rating of 70 mm² conductors shall be connected by means of busbars to the main busbars. Looped connections may only be installed for a maximum of two outgoing circuits. Where there are more than two outgoing circuits, busbars shall be used, and equipment connected individually to the busbars. Where miniature circuit breakers are mounted in continuous rows and supplied by busbars connected to each MCB, each busbar shall be supplied by a separate conductor. This conductor shall be connected to the busbar by means of a separate lug and not via an MCB terminal.

GTS 2.8.6 Conductor Terminations

Conductors connected to terminals complying with the General Technical Specifications, par. GTS 2.8.2 shall be soldered or ferruled. Connections to circuit breakers, isolators or contractors shall be made by one of the following methods:

- (i) A ferrule or lug of the correct size,
- (ii) soldering the end of the conductor

All conductors terminating on meters, fuse holders and other equipment with screwed terminals shall be fitted with lugs. The lugs shall be soldered or crimped to the end of the conductor. The correct amount of insulation shall be stripped from the end to fit into the terminal. Strands may not be cut from the end of the conductor.

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Neutral wires may not be cut where these are looped on control gear terminals, but the insulation must be removed and the wire looped and crimped or soldered into the lug.

GTS 2.8.7 Identification

The colour of the conductors for all 220/250 Volt circuits shall correspond to the colour of the supply phase for that circuit. Neutral conductors shall be black.

All other conductors in the board, supplying control circuits, etc., shall be coded in colours other than those specified above. A colour code shall be devised for each board and the colour code shall be shown on the wiring diagrams.

All conductors that terminate at wiring terminals and all conductors used for the internal wiring of the switchboard, shall further be identified at both ends by means of durable cable marking labels. GRAPHOPLAST printed labels are preferred. PVC or other tape is not acceptable. Clip-on type wire labels or ring labels are not acceptable.

The numbers on the labels shall be shown on the wiring diagrams.

GTS 2.9 Paint Finish

Metal components of the framework, panels and chassis shall be powder coated in the standard colour as required in the specific SANS specification for electrical equipment.

GTS 2.10 Labelling

GTS 2.10.1 General

Care shall be taken to ensure that all equipment is fully labelled and that accurate descriptions and safety warning notices appear in English only. The Engineer must be approached by the Contractor to obtain the specific requirements for labels before the labels are manufactured.

GTS 2.10.2 Material

Engraved plastic or ivory sandwiched strips shall be used throughout. The strips shall bear white lettering on a black background for normal labels and red letters on a white or yellow background for danger notices.

GTS 2.10.3 Main Switchboards

Main switchboards and sub-main switchboards shall be supplied with the following English labels or as prescribed by The Engineer on site:

(a) Number and Allocation Of Switchboard

Example: CONTROL BOARD A4

SUPPLY CABLE XX mm²

Lettering: at least 10 mm high. Label on the outside top of the board in a prominent position.

(b) Designation Of Busbar Sections

Example: BUSBAR SECTION 2

Lettering: at least 10 mm high. Label on the outside in a prominent position.

(c) Designation of all switchgear including circuit breakers, isolators, contactors, etc. If the current rating of circuit breakers is not clearly marked on the equipment, the value shall be indicated on the engraved label.

Example: SUPPLY TO BOARD C3

PUMP SUPPLY NO.1

Letters at least 5 mm high. Label on the outside of the switchboard.

(d) All other equipment including meters, instruments, indicator lights, switches, push buttons, circuit breakers, fuses, contactors, control relays, protection relays, etc., shall be identified as described further herein. The function of the equipment and circuits shall be clearly indicated. The main switch shall be labelled as such and designated:

"SWITCH OFF IN CASE OF EMERGENCY"

All equipment mounted flush in front panels or doors shall have labels mounted in slide-in type aluminium extrusion label holders mounted below the equipment and all equipment mounted inside the boards shall be labelled above the equipment with a label mounted against the chassis plate and not on equipment or wiring channel covers.

If this equipment is positioned too close together to accommodate descriptive engraved labels, the equipment may be identified by a code or number on an engraved label which shall be fixed close to the equipment. The code numbers shall also be shown on the "as built" drawings and diagrams for the project.

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Abbreviations such as R1, R2, etc., for relays, F1, F2, etc., for fuses, may be used.

GTS 2.10.4 Other Switchboards

All equipment on switchboards shall be identified with the necessary bilingual labels. The circuit numbers shall appear at grouped single-pole circuit breakers. The circuit numbers shall correspond to the circuit numbers on the final installation drawings. The above-mentioned circuits shall be identified on a legend card, which shall be installed on the inside of the switchboard door, or in any other position where it can conveniently be observed. All fuses, including instrument fuses, shall have labels stating function, fuse rating and duty or type where applicable. All other equipment shall be identified separately, and their functions shall be clearly indicated.

GTS 2.10.5 Fixing of Labels

Labels shall not be fixed to components or trunking but to doors, panels, chassis or other permanent structures of the switchboard.

Engraved strips shall be secured to facilitate a neat alteration of the designation of the labels. Sufficient fixing points shall be provided to prevent labels from warping. Labels in slotted holders shall be secured in position to prevent unauthorized removal. Labels may be secured by the use of brass bolts and nuts, stainless steel machine screws, and slotted label holders.

GTS 2.11 Tests

The Engineer shall be notified when the mechanical construction of the switchboard, i.e. frame, panels and base frame, is complete in order that it may be inspected at the factory.

Function tests of all equipment, control and interlocking circuits shall be conducted to the satisfaction of The Engineer . Testing equipment and facilities including instruments, dummy loads and additional switchgear and cables shall be provided by the Contractor at no extra cost. The Engineer shall be notified in writing two weeks in advance of any test to be conducted, to allow its representative to be present at such tests. A complete report on the tests shall be handed to The Engineer .

GTS 2.12 Drawings

Refer to GTS 1.14.0 hereof for the requirements of submission of drawings and the supply of final drawings and manuals for the project.

GTS 2.13 Completion

The contract shall be regarded as incomplete until:

- (a) all tests and settings have been conducted successfully on motor control equipment, distribution boards and control panels of all other electrical/mechanical plant
- (b) all drawings and manuals as specified further herein have been handed to The Engineer .

GTS 3.0 Switchgear and Instrumentation in MCC's and Distribution Boards

GTS 3.1 Metal Clad Air Circuit Breakers, Withdrawable Type

This section covers withdrawable air circuit-breakers for use in power distribution systems up to 1 kV, 50 Hz. The circuit-breakers shall be metal clad and shall comply with BS 4752 and IEC 157.

The circuit-breaker shall be horizontally withdrawable and shall be a self-contained unit of the dead front type, allowing maintenance tests to be carried out without having to remove the circuit breaker from the withdrawal mechanism. The unit shall contain the necessary mechanical interlocks to prevent:

- (a) Access to "LIVE" terminals when the circuit-breaker is withdrawn.
- (b) The withdrawal or insertion of the unit, when the circuit is in the closed position.
- (c) Closing of the circuit-breaker following an automatic trip condition without re-setting the mechanism.

Adjustable thermal overload releases shall be provided to suit the required current range. In addition, instantaneous magnetic short circuit trips which are adjustable shall be fitted. The tripping device shall be direct acting. The delay adjustment shall be bypassed with an instantaneous making current release when the circuit breaker is closed to prevent the delay timer from operating when the circuit breaker is closed on a fault.

The air circuit breakers shall be of the quick-make and the quick-break type with a stored-energy spring assisted mechanism provided with:

- (a) A trip free mechanical hand operated closing mechanism.
- (b) A mechanical operated mechanical trip mechanism suitably protected to prevent inadvertent tripping.
- (c) A positively driven mechanical device to provide ON/OFF/TRIP indication. This indication shall be clearly visible with the circuit-breaker in position.

Provision shall exist for the addition, if required, of a supply side undervoltage release.

Air circuit-breakers shall have electrically separate auxiliary contacts as specified. Where none are specified two N/O and two N/C auxiliary contacts shall be provided. Shunt trips and electrically stored energy circuit breakers shall be interlocked to prevent repeated operation of the trips or winding mechanisms when the circuit-breaker is in the tripped or closed position.

All non-current carrying metal parts of air circuit-breakers shall be solidly interconnected and connected to an earth contact on the truck which shall engage with a mating contact or copper plate on the cradle which is connected to the earth busbar of the switchboard. The arrangement shall be such that the air circuit breaker frame is earthed, in the test position and before the circuit-breaker contacts the live fixed contacts.

The fixed cradle shall be of high mechanical strength.

The circuit-breaker shall have "RACKED-OUT", "TEST" and "ENGAGED" positions that are clearly marked. The air circuit-breaker shall bear a clearly legible rating plate indicating the current rating, breaking capacity and voltage rating.

The complete circuit-breaker and its electrical and mechanical constituents and accessories shall be from a standard product range of a single original supplier. Extension type operating handles shall be fixed to the air circuit-breaker on completion of the installation.

A description and illustration of the circuit-breaker as well as trip curves, operating manuals and rupturing test certificates shall be provided.

Circuit-breakers shall be de-rated if necessary to compensate for following environmental factors:

- (a) Maximum ambient air temperature in excess of 40°C or the daily average ambient air temperature in excess of 30°C. This is especially important with regard to the type of enclosure in which the circuit-breaker is to be installed.
- (b) Height above sea level.
- (c) Operational duty cycle and estimated loading.

GTS 3.2 Moulded-Case Circuit Breakers

This section covers single or multi-pole moulded-case circuit breakers for use in power distribution systems, suitable for panel mounting, for ratings up to 1000 A, 600 Volt, 50 Hz.

The circuit breakers shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

The contacts shall be silver alloy and shall close with a high pressure wiping action. Where specified, the circuit breaker shall be capable of accommodating factory fitted shunt trip or auxiliary contact units or similar equipment. The operating handle shall provide clear indication of "ON", "OFF" and "TRIP" positions. The mechanism shall be of the TRIP-FREE type preventing the unit from being held in the ON position under overload conditions.

All moulded-case circuit breakers in a particular installation shall as far as is practical be supplied by a single manufacturer. The incoming terminals of single-pole miniature circuit breakers shall be suitable for connection to a common busbar. The circuit breaker shall have a rating plate indicating the current rating, voltage rating and breaking capacity. Extension type operating handles shall be provided for units of 600 A rating and above.

GTS 3.3 Combination Fuse-Switch Units

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Combination fuse-switch units shall be triple pole devices fitted with neutral links and shall comply fully with the relevant SANS specifications in GTS 1.22.3 hereof

The fuse-switches shall be of the on-load type capable of carrying the rated current continuously, making and breaking rated current and tested to IEC 408 for making and breaking capacity. The units shall be of the double air-break, quick-make, quick-break type with an arc chamber. The mechanism shall be driven by springs on both sides. The unit shall consist of a fixed contact assembly, heavy duty mechanism, moving contact carriage and a retractable operating handle mounted on a rigid frame. The contacts shall be of high-quality material, e.g. silver-plated.

The fixed contacts shall be shrouded. When the fuse-switch is in the open position, the double air-break shall isolate the HRC fuse links, permitting fuse replacement in safety. Interlocks shall be provided to prevent the cover from being opened when the switch is "ON" and to prevent the switch from being operated when the cover is open unless purposely defeated.

The cartridge fuses used in the units shall comply with IEC 60269-2 or BS 88 or the equivalent DIN and VDE standards. The category of duty shall be suitable for the voltage level and the fault level at the point where the fuses are installed. Time/current characteristics shall be matched to the equipment supplied and protected by the switch. Fuse gear carrying the HRC fuses on the cover, the cover also forming the operating lever, is regarded as a fuse isolator and is not acceptable.

GTS 3.4 Direct Acting Instruments

This section covers direct acting indicating instruments suitable for flush mounting in switchboards or instrument panels.

GTS 3.4.1 General Requirements

Instruments shall be suitably rated for the supply voltage and frequency to be applied, which shall be 400/230 Volt, 50 Hz unless specified to the contrary.

All the instruments used for a particular application or a specific project shall be from the range of a single reputable supplier and shall have the same face dimensions. The face dimensions shall be square and not less than 96 x 96 mm.

All instruments shall comply with BS 89 and/or IEC 51. Instruments shall be screened against magnetic interference and shall have anti-static, impact-resistant glass or "MACROLON" faces.

Preference will be given to locally manufactured instruments. Instruments shall be insulated to achieve a 2kV insulation resistance to earth. All instruments shall be splash-proof and dust-proof unless more stringent requirements are specified for hazardous locations. Instruments shall be sufficiently resistant to vibration that may be encountered in the specific application.

For normal environmental and supply conditions, instruments shall be suitable for use inside the limits specified in Tables III and VI of IEC 51. All instruments shall be capable of withstanding overloads of continuous or short duration in accordance with section 8.3 of IEC 51. Instruments shall be provided with studs for rear connection. Shrouds shall be provided to prevent accidental contact where instruments are to be installed in hinged panels of switchboards.

GTS 3.4.2 Voltmeters and Voltmeter Selector Switches

Unless specified to the contrary, voltmeters shall be scaled from 0-250 Volt in the case of L.V applications. Voltmeters shall be of the moving iron type with class 1,5 accuracy as specified in IEC 51.

A zero-adjustment screw shall be provided. Unless specified to the contrary, a single voltmeter and selector switch shall be provided. The voltmeter switch shall have an "OFF" and three metering positions to indicate readings between neutral and each of the three phases.

The markings shall be indicated clearly on the face plate of the selector switch and the handle position shall be accurate in relation to the markings on the face plate.

The selector switch shall be of the cam-actuated or wiping air-break type with two breaks per pole.

GTS 3.4.3 Ammeters

Ammeters shall have a moving iron element to indicate instantaneous values.

Direct reading ammeters up to a maximum rating of 60 A may be used. Current transformer operated ammeters shall be 5 A full scale, calibrated to read actual primary circuit currents. The current transformer ratio shall be indicated on the face plate.

A zero- adjustment screw shall be provided. Where combined maximum demand and indicating ammeters are specified, a bimetallic spiral element shall be provided in the same housing to indicate mean value over a 15-minute period. The bi-metal element shall drive a residual pointer to indicate maximum mean current between re-settings. This pointer shall operate on the main scale and shall be of a distinctive colour. The pointer shall be resettable from the face of the meter.

The bi-metal element shall be designed to compensate for limits of ambient temperature between -20°C and 70°C. Full load or rated current shall be clearly indicated, preferably with a red line. Unless specified to the contrary, a 100% condensed overscale shall be provided for instantaneous reading instruments and no overscale for combined maximum demand ammeters.

The intrinsic error, expressed in terms of the fiducial value in accordance with IEC 51, shall be class 1,5 for the instantaneous readings and class 2,5 for the mean maxima. Where saturation current transformers are required, these shall form an integral part of the meter. Separate saturation current transformers are unacceptable to The Engineer .

GTS 3.4.4 Kilowatt-Hour Meters

Unless specified to the contrary, kilowatt-hour meters shall be suitable for operation on 220/250 Volt, 50 Hz systems.

Meter elements shall be of the inductor disc type and designed to carry the rated current continuously. Kilowatt-hour meters shall comply with the relevant parts of BS 37 and BS 5685. The integrating period on

maximum demand meters shall be 30 minutes unless specified to the contrary. The registering mechanism shall be of the cyclometer type, providing a six digit readout with the sixth digit indicating one-tenth of a unit. Unless specified to the contrary, the meters shall conform to accuracy Class 1 as specified in IEC 51.

Kilowatt-hour meters shall be graded and calibrated for the specific application to avoid the application of multiplication factors where possible. Where multiplication factors are unavoidable this shall be clearly indicated in unit form and not as a combination of several factors. Current transformer ratios shall be incorporated in the factor. The kilowatt-hour meter shall preferably be provided with a magnetic type of bearing for the disc spindle. Facilities for a security seal shall be provided on the fixing screws of the cover.

GTS 3.4.5 Frequency Meters

Frequency meters may be of the vibrating reed type or the direct indicating type consisting of a moving coil milli-ammeter and a current/frequency transducer.

Unless specified to the contrary, the indicating range shall be 45 Hz - 55 Hz. The accuracy class shall be class 0,5 in accordance with IEC 51 unless otherwise specified. Where required an adjustable speed alarm contact shall be provided, adjustable over the complete scale length.

GTS 3.4.6 Running Hour-Meters

Running hour-meters shall be of the electrically operated cyclometer type, suitable for flush mounting.

Numerals shall be clearly defined white on a black background. The range of hour-meters shall be five digits, the fifth digit indicating one-tenth of an hour, i.e. from 0 to 9999,9 hours. The accuracy class shall be class i in accordance with IEC 51 unless otherwise specified.

GTS 3.5 Wiring Terminals

Terminal bodies and screws shall be of non-corrosive metal, enclosed in fire resistant, moulded plastic insulating bodies. Terminal bodies or screws shall not project beyond the insulating material and shall afford suitable protection against accidental contact by personnel and against short circuits and tracking.

The construction of the terminal block and mounting rail shall be such as to ensure a firm and positive location of the terminal blocks. It shall be possible to add additional terminal blocks within the terminal sequence without having to disconnect or dismantle the terminal strip. The terminal blocks shall be held in position by means of standard end clamps.

It shall be possible to intermix terminals of various sizes, i.e. for different sizes of conductors, whilst utilizing the same mounting rail. Where smaller terminal blocks occur adjacent to larger terminal blocks, suitable shielding barriers shall be inserted to cover the terminals that might otherwise be exposed.

The terminal bodies and clamping screws shall be so constructed as to ensure that conductors are not nicked or severed when the clamping screws are tightened. Screws shall not come in direct contact with the conductors.

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Terminals shall be sized and rated to match the conductors that are connected to them.

Each terminal block shall have provision for clip-in numbering or labelling strips to be installed, together with protective, clear caps over the sheets.

GTS 3.6 Earth Leakage Relays

Earth leakage relays shall be single or three-phase units with a sensitivity of 20 mA for domestic accommodation, 30 mA for factories and workshops, 50 mA for heavy duty tools and equipment and 1000 mA for main incoming panel protection and for electric motor applications, with associated circuit breaker or on-load switch for use on 220/250 Volt single phase or 400/231 Volt three-phase, 50 Hz, supplies.

The units shall be suitable for installation in switchboards in clip-in DIN rails or bolted to the chassis.

The earth leakage relay shall function on the current balance principle and shall comply with the relevant SANS specifications in GTS 1.22.3 hereof, as amended, and shall bear the SANS mark. Integral test facilities shall be incorporated in the unit.

Circuit breakers with trip coils used integrally with earth leakage units (two-pole for single-phase units and three-pole for three-phase units) shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

On-load switches used integrally with earth leakage units (two-pole for single-phase units and three-pole for three-phase units) shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

The fault current rating of the unit shall be 2,5 kA or 5 kA as required, when tested in accordance with the relevant SANS specifications in GTS 1.22.3 hereof.

GTS 3.7 Current Transformers

GTS 3.7.1 General

Current transformers shall comply with the requirements of the relevant SANS specifications in GTS 1.22.3 hereof with the exception of the required impulse test level, sub par. 6 below.

GTS 3.7.2 Ratings

Current transformers shall be suitable for the primary currents listed here-under and their decimal multiples:

10, 12,5, 15, 20, 25, 30, 40, 50, 60 and 75.

The preferred values are:

10, 15, 20, 30, 50 and 75.

Current transformers shall have secondary ratings of 1, 2 and 5 A, with 5 A being preferred.

Current transformers shall have standard outputs of 2.5, 5, 10, 15 or 30 VA as applicable in terms of the burden of the instruments and interconnecting wiring. The current transformer output shall match the actual instrument burden as possible in order not to introduce unnecessary errors.

GTS 3.7.3 Accuracy Class

For metering applications, accuracy classes of 0.1, 0.2, 0.5, 1, 3 or 5 are applicable. Where no accuracy class has been specified, the following table may be used as a guide:

Application	Primary Current Suggested Class	
Indicating Instruments	All	5
Metering Applications	Up to 200 A	1
Metering Applications	250 to 600 A	0.5
Metering Applications	800 A and above	0.2

Where ring type current transformers are specified, the aperture shall not be unnecessary large as accuracy is thereby reduced.

The classes for protection are 5P, 10P, 15P, 20P or 30P with 5P and 10P being standard. Turns compensation shall not be employed on protection current transformers for ratios greater than 150/5.

Class X current transformers shall be used in differential protection systems.

Manufacturers shall supply the magnetization curve details and saturation factors for each different transformer ratio.

GTS 3.7.4 Markings

All current transformers shall come complete with a label on which the following information is indelibly stamped:

Manufacturer.

Serial No. or Type.

Rated primary and secondary current.

Rated Frequency.

Rated output and accuracy class.

Highest system voltage.

Rated insulation level.

GTS 3.7.5 Fault Current

Current transformers shall be capable of withstanding the dynamic forces resulting from the maximum through-fault current which may be encountered at the point where they are installed. The short time current rating of current transformers shall be as least equal to that of the associated circuit breaker.

GTS 3.7.6 Impulse Level

Current transformers used in system voltages in excess of 660 Volt shall withstand an impulse test level of 95 kV. Impulse levels for current transformers used in system voltages up to 660 Volt shall comply with BS 3938.

GTS 3.7.7 Tests

One protection current transformer of each type used in a contract shall be tested to confirm the estimated characteristics. The following results shall be submitted:

- (a) Magnetization curve.
- (b) Secondary resistance.
- (c) Secondary leakage reactance, if not negligible or if required by The Engineer .

The power frequency, secondary to earth and over-voltage interturn test in accordance with BS 3938 shall be conducted on all current transformers. Impulse tests shall be conducted on all current transformers intended for use in system voltages in excess of 660 Volt.

GTS 3.8 Contactors

Contactors shall be of the open or totally enclosed, triple- or double pole, electromechanically operated, air-break type suitable for 400/231 V supplies and shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

Contactors shall have the following characteristics:

- (a) Enclosed coil easily replaceable.
- (b) A permanent air gap in the magnetic circuit to prevent sticky operation.
- (c) Provision for quick and simple inspection of contacts.
- (d) Clearly marked main and auxiliary terminals.

All parts shall be accessible from the front.

Contactors which are not located in switchboards shall be housed in enclosures which comply with IP 54 of IEC 144.

The current rating of the contactor shall be as specified for the circuit with a switching duty in accordance with the relevant SANS specifications in GTS 1.22.3 hereof or IEC 158-1, utilization category AC1 for lighting and power circuits and utilization category AC3 for motor starting.

In addition to the required current carrying capacity and switching duty of a contractor, the contactor chosen for a particular application shall be rated for the maximum through fault current allowed by the back-up protection devices at the point where the contactor is installed. Careful co-ordination of the short circuit devices shall take place.

All laminations of the magnetic system of the contactor shall be tightly clamped. Noisy contactors will not be accepted.

Non-current-carrying metallic parts shall be solidly inter-connected, and a common screwed terminal shall be provided. The contactor shall be earthed to the switchboard earth bar.

Latched contactors shall be provided with a trip coil and a closing coil. The contactor shall remain closed after de-energizing the closing coil and shall only trip on energizing the trip coil.

Contactor operating coils shall have a voltage rating as required by the control circuitry and shall have limits of operation and temperature rise as specified in clause 7.5 and Table IV of IEC 158-1. Latched contactors shall be capable of being tripped at 50 % of the rated coil voltage.

Contactors for normal/standby change-over circuits shall be electrically and mechanically interlocked. Contactors in star-delta starters shall be electrically interlocked.

Contactors with provision to add auxiliary contacts on site are preferred. Contactors with permanently fixed auxiliary contacts shall have at least 1 x N/O and 1 x N/C spare auxiliary contacts in addition to the contacts specified for control purposes and in addition to the contacts required for self-holding operations or economy resistances. Where the number of auxiliary contacts required is greater than the number of contacts that can be accommodated on the contactor, an auxiliary relay or additional contactor shall be provided to supply the additional contacts.

It shall be possible to replace main contacts without disconnecting wiring.

Auxiliary contacts shall be capable of making, carrying continuously and breaking 6 A at 220 V AC, unity power factor for contactors used on 400/231 V systems.

Auxiliary contact functions required e.g. "lazy" contacts, late-make, late-break, make-before-break, etc. shall be inherent in the contact design. Under no circumstances may these functions be improvised by bending contacts, loading contacts, etc. These functions shall be available in all contactors.

Spare auxiliary contacts shall be wired to numbered terminal strips in the switchboard and shall appear on the switchboard drawings.

Contractor

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Employer

Witness 1

Witness 2

All contactors on a specific project shall be from a standard range of one single manufacturer, unless specified to the contrary.

When contactors are arranged to form star-delta starters, the star contactor shall not be reduced in size. All three such contactors shall be of the same size, rating and manufacture and the AC3 rating of starting contactors shall always be at least one size larger than the standard size of contactors for a specific motor application.

Contactors shall be suitable to accept a starter overload relay directly below the contactor.

**GTS 3.9 Push Buttons, Push Button Assemblies
and Indicator Lamps**

GTS 3.9.1 Push button and Push Button Assemblies

Pushbuttons and pushbutton arrangements may be used in switchboards and control boards or in self-contained units for control functions.

Pushbuttons and pushbutton assemblies for one specific project shall be supplied from a single reputable supplier's product range.

The various types of pushbuttons employed shall be specifically selected for the required duty and mounting characteristics, e.g. flush mounted, enclosed, self-contained, illuminated, etc.

All pushbuttons on a specific switchboard shall be of the same physical dimension (round) and shall be fully interchangeable and shall fit in 22 mm dia. holes in the panels. Pushbuttons must preferably be interchangeable with indicator lamps, key switches, etc.

Pushbuttons shall be labelled by means of labels which fit into extruded aluminium label strip holders.

Pushbuttons shall be designed for long life, low contact bounce and constant contact resistance. Mechanisms may be of the mechanical type with spring control and a clutch or catch frame or of the solid-state type operating on the principle of a non-contacting, inductive proximity switch.

All pushbuttons shall be provided with replaceable front plates with a variety of symbols. Legend plates shall be interchangeable.

Pushbutton terminals shall be suitable for the application with regard to spacing, conductor capacity, etc. Terminals shall be suitable for conductor sizes to be used. Pushbutton assemblies mounted on doors of control boards shall be enclosed to prevent inadvertent contact with the terminals and when doors are open.

Pushbuttons shall be suitable for the environmental conditions to be encountered, e.g. moisture, excessive temperatures, mechanical shock, vibration, etc.

Contact duty shall be chosen to suit the application. Wiping contacts shall be used for low voltages and currents and snap-action contacts for high voltages and currents. Contacts shall be constructed of high-quality material such as silver-tipped or gold laminated contacts.

Illuminated pushbuttons may only employ LED lamps. Lamp voltages shall suit system control voltages. Lamps shall be de-rated when used for continuous duty.

Pushbuttons may be grouped together in purpose-made stations, suitable for the environment in which they are to be installed.

Keylock pushbuttons shall be supplied with duplicate keys. The removal action of the key shall suit the application.

Pushbuttons shall comply with the applicable requirements of the relevant SANS specifications in GTS 1.22.3 hereof.

The following are the preferred colours for pushbuttons:

- | | | | |
|-----|----------------------|---|--|
| (a) | RED | : | Stop or emergency stop. |
| (b) | GREEN | : | Start or run (preparation). |
| (c) | GREEN (or black) | : | Start (implementation) |
| (d) | YELLOW | : | Interrupt a function (action) |
| (e) | WHITE (or pale blue) | : | Any function not covered by the above colours. |

GTS 3.9.2 Indicator lamps

Indicator lights shall be of the LED types and shall be of the bayonet insertion lamp type which can be replaced by screwing off the lens cap on the LED unit.

LED lamps shall be of the multi-chip type, with all chips in a single replaceable bayonet lamp.

Fixed cluster LED lamps, where the whole unit is moulded into a single combined unit, will not be acceptable.

Lenses and replacement lamps shall be available in the RSA for the LED indication lamps offered for a Contract.

Lamp voltages shall suit the supply or control voltage. Lamps shall be de-rated for continuous duty by using economy resistors or using input voltages at least 20 % lower than the rated lamp voltages.

LED's used as indicators on main supply voltages shall have a suitable current limiting resistor(s) and reverse voltage protection diode shall be used. For low AC or DC voltages (± 24 V) a current limiting resistor will suffice.

All indicator lamps on a specific switchboard shall be of the same physical dimension (round) and shall be fully interchangeable and shall fit in 22 mm dia. holes in the panels. Lamps must preferably be interchangeable with buttons, key switches, etc.

Contractor

Witness 1

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Employer

Witness 1

Witness 2

Indicator lights shall further comply with BS 1050 where applicable.

Indicator lights be suitable for installation in switchboard panels and doors and shall consist of interchangeable lenses, lamp base, suitably rated and accessible terminals and a chrome screw-on retaining ring or other suitable means to secure the unit.

It shall be possible to replace the LED lamps and lenses from the front of the panel without the use of tools. Surface mounted indicator lights shall be mounted in purpose-made boxes with suitable cover plates. Indicator lights shall be labelled by means of labels which fit into extruded aluminium label strip holders. All indicator lights for a specific application or switchboard shall be from the range of one manufacturer and shall preferably of the same size and shall use the same lamp types.

The following are the preferred colours for indicator lights:

- (a) RED : Stopped state or fault.
- (b) YELLOW OR AMBER : Attention or caution.
- (c) GREEN : Started or in operation.
- (d) WHITE (or clear) : Circuit live or circuit operating normally.

GTS 3.10 Motor Protection Relays

GTS 3.10.1 Standard overload relays

Standard overload relays shall only be used to protect DOL started or Star-delta started motors up to and including the motor ratings specified in the project Specification.

Standard overload relays shall be suitable to mount directly to the underside of main contactors of starters.

The relays shall have facilities to adjust the trip rating of the relay by means of a screwdriver type turn-pot and shall further have an AUTO/MANUAL reset button on the relay.

The trip setting range of the overload relay shall be selected by the manufacturer of the board to provide an adjustment range of current with the top of the range at least 15% higher than the full load current of the motor which the relay must protect.

The relay shall be set for MANUAL resetting unless otherwise stated in the Project Specifications or when instructed otherwise by The Engineer . Overload relays shall further have at least on set of N/C contacts and one set of N/O contacts for further use as indication or control facilities. Overload relays shall further be stabilized for temperature rise under normal operating conditions up to ambient temperatures of 40° C without going into “temperature run-away” condition. If so, specified in the Project Specifications, overload relays shall have remote or front panel reset facilities.

GTS 3.10.2 Electronic Motor Protection Relays

Electronic motor protection relays shall be flush mounted in front panels of motor starter cubicles and shall have dedicated current transformers suitably sized to protect the specific motor rating as specified in the Project Specification.

All the electronic motor protection relays in a project shall be of the same manufacture and shall be from a well-known and reputable range of equipment which shall carry the approval of The Engineer .

The settings of the relay must be possible from front panel buttons on the relay and relays which needs setting up or up-loading and down-loading of data or settings by means of computers or external programming devices by means of infrared communication, will not be acceptable.

The data of settings and all other stored or logged data must visible on a front LCD or other type of modern panel display.

The methods of settings or insight into data stored on the relay must be user friendly. Complicated programming procedures will not be acceptable.

Electronic motor protection relays shall provide at least the following protection facilities:

- (a) Current overload protection
- (b) Rotor lock protection
- (c) Electrical phase failure protection
- (d) Electrical phase rotation reversal protection
- (e) Under-load protection
- (f) Motor thermal overload protection

Electronic motor protection relays shall provide, in addition, the following setting facilities:

The relay shall further have the facilities to program the following data:

- Full load current in Amps. (I_e)
- Locked rotor current level as a factor of I_e .
- Locked rotor time (duration before tripping after exceeding set locked rotor current)
- Thermal overload warning level setting
- Thermal overload warning when the setting level is exceeded
- Adjustable asymmetry level setting (% of I_e)
- Asymmetry warning level setting
- Overcurrent trip level setting as a factor of I_e .
- Overcurrent trip time when the level setting is exceeded.
- Overcurrent warning level setting.

Contractor

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- Underload trip level setting as a factor of I_e .
- Underload trip time when the level setting is exceeded.
- Underload warning level setting.

The relay shall further have the facilities to log and display the following data:

- Actual average current drawn by the motor when running. (Average of current in three phases)
- Actual current in each phase as a % of I_e .
- Total running time of motor
- Time since last start
- Time since last trip
- Cause of last trip.
- Thermal energy level of the motor when running, expressed as a factor of I_e .

The relays shall be suitable for all the above functions and shall further have the facility to add circuit cards for further functions if required in future. The relay shall also have the facilities to add a communication card to communicate on a computer network for remote logging facilities, if required in future.

Reset and test facility buttons shall also be available on the front face of the unit.

GTS 4.0 Standard Paint Specification

GTS 4.1 Finish Required

Metalwork of electrical equipment such as switchboards, equipment enclosures, sheet steel luminaire components, purpose-made boxes, etc., shall be finished with a high quality paint applied according to the best available method. Baked enamel, electrostatically applied powder coating or similar proven methods shall be used.

GTS 4.2 Corrosion Resistance

Painted metal shall be corrosion resistant for a period of at least 168 hours when tested in accordance with the relevant SANS specifications in GTS 1.22.3 hereof.

GTS 4.3 Edges

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Care shall be taken to ensure that all edges and corners are properly covered.

GTS 4.4 Surface Preparation

Surface preparation shall comply with the relevant SANS specifications in GTS 1.22.3 hereof. Prior to painting, all metal parts shall be thoroughly cleaned of rust, mill scale, grease and foreign matter to a continuous metallic finish. Sand or shot blasting or acid pickling and washing shall be employed for this purpose.

GTS 4.5 Baked Enamel Finish

Immediately after cleaning all surfaces shall be covered by a rust inhibiting, tough, unbroken metal-phosphate film and then thoroughly dried.

Within forty-eight (48) hours after phosphating, a passivating layer consisting of a high quality zinc chromate primer shall be applied, followed by two coats of high quality alkyd-based baked enamel.

The enamel finish on metal luminaire components shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

Other metal parts e.g. switchboard panels, etc., shall comply with the relevant SANS specifications in GTS 1.22.3 hereof with a minimum paint thickness after painting of 0,06 mm. In coastal areas, the dry film thickness shall be increased to at least 0,1 mm.

The paint shall have an impact resistance of 5,65 on cold-rolled steel plate and a scratch resistance of 2 kg.

GTS 4.6 Powder Coated Finish

Immediately after cleaning the metal parts shall be pre-heated and then covered by a micro-structured paint powder applied electrostatically.

The paint shall be baked on and shall harden within 10 minutes at a temperature of 190°C.

The minimum paint thickness after baking shall be 0,05 mm. The dry film thickness shall be increased in coastal areas. The paint cover shall have an impact resistance of 5,65 J on cold-rolled steel plate and a scratch resistance of 2 kg.

GTS 4.7 Touch-Up Paint

In the case of switchboards and larger equipment enclosures, a tin of matching touch-up paint not smaller than 1 litre shall be provided.

GTS 4.8 Colours

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

The colour of HV switchboards and HV switchgear enclosures shall be "DARK ADMIRALTY GRAY", colour G12 of SANS 1091.

The colour of L.V switchboards and equipment enclosures in buildings shall be "LIGHT ORANGE", colour B26 of SANS 1091 as recommended in SANS 0140, Part II unless specified to the contrary.

The colour of L.V distribution kiosks and miniature substations shall be "AVOCADO GREEN", colour C17 or "LIGHT STONE", colour C37 of SANS 1091.

The standby power section of LV switchboards in buildings shall be coloured "SIGNAL RED", colour A11 of SANS 1091.

Switchboards for No-Break Power Supplies or sections of switchboards containing No-break power supplies, shall be coloured "DARK VIOLET", colour F06 or "OLIVE GREEN", colour H05 of SANS 1091.

Contractor

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GTS 5.0 Cables

GTS 5.1 PVC-Insulated Cables - 600/1000 Volt Grade

GTS 5.1.1 General

This section covers the requirements for PVC-insulated cables for general installations under normal environmental conditions.

GTS 5.1.2 Construction

Cables shall be manufactured in accordance with the relevant SANS specifications in GTS 1.22.3 hereof, shall come only from fresh stocks, and shall be constructed as follows:

- (a) Un-armoured cables : PVC-insulated/PVC-sheathed.
- (b) Armoured cables : PVC-insulated/PVC-bedded/armoured/black extruded PVC outer sheath.
- (c) Single core cables : PVC-insulated/unsheathed.

The conductors shall be of high conductivity annealed stranded copper and the cores may be shaped or circular.

The insulation shall be general purpose PVC, 600/1000 Volt Grade.

The bedding shall consist of a continuous impermeable sheath of PVC extruded to fit the core or cores closely and in the case of multi-core cables, to fill the interstices between the cores.

When armouring is specified it shall consist of one layer of galvanized steel wire in the case of multi-core cables and non-magnetic metallic wire in the case of single core cables. Aluminium strip or tape armouring is not acceptable.

Where specified, an earth continuity conductor shall be provided in the armouring in accordance with the relevant SANS specifications in GTS 1.22.3 hereof.

GTS 5.2 Cable Terminations and Joints

GTS 5.2.1 Heat - Shrinkable Materials

GTS 5.2.1.1 General

Heat-shrinkable materials may only be used in exceptional circumstances with the written permission of The Engineer .

The materials shall comply with VDE 0278 and the supplier shall be called upon to confirm this aspect before acceptance of the materials or installation.

The heat-shrinkable and other materials used for the terminations and joints shall be of a high quality and shall retain their electrical and mechanical properties without deterioration.

GTS 5.2.1.2 Terminations with Heat-Shrinkable Materials

Terminations shall be made of a material that gives lasting protection against ultraviolet radiation.

The cores of all cables terminated outdoors and terminated indoors, shall be completely covered with a shrunk-on protective layer against surface tracking, ultraviolet radiation and weathering.

Outdoor terminations shall be designed to prevent flash-over under wet or contaminated conditions and to ensure additional mechanical strength. This shall be achieved with shrunk-on insulating spacers and rain shields.

GTS5.2.2 Resin Filled Joints

The resin filled joint kit shall comprise a self-sealing plastic mould of high mechanical strength having sufficient connector space.

The exact amount of cold hardening resin shall be provided in a two-compartment plastic bag.

The resin shall have absolute minimum shrinkage.

The mould and resin shall be completely waterproof and non-hygroscopic and shall be resistant to ultraviolet radiation.

Joint kits shall be of "SCOTCHCAST", "CELLPACK" or similar.

GTS 5.2.3 Cable Box Joints

Cable boxes shall be manufactured of die cast aluminium material for normal conditions or glass fibre reinforced thermosetting compound where exposed to corrosive conditions.

The lid shall provide an absolute moisture barrier.

Boxes shall contain 2, 3, or 4 entries as required.

Unused entries shall be sealed with watertight blanking plugs.

Earth continuity shall be maintained through the box by means of the material of the box in the case of aluminium boxes or by means of earth straps and studs in the case of glass fibre reinforced boxes.

Cable boxes shall be of "PRATLEY", "CCG HANDIFIT" or similar manufacture.

GTS 5.3 **Glands for PVC-Insulated Cables**

Glands to be used for terminating PVC/PVC/SWA/PVC cables shall be of the adjustable type.

Glands shall be suitable for general purpose 600/1000 Volt Grade cable with steel armouring.

The glands shall be made of nickel-plated bronze or brass.

The glands shall consist of a barrel carrying a cone bush screwed into one end and a nickel-plated brass nipple carrying a nickel-plated brass or a heavy galvanized steel locknut screwed into the other end. The galvanizing shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

Non-watertight glands must be easily converted to watertight glands by means of a waterproofing shroud and inner seal kit. On the cable entry side of the barrel a concave groove shall be provided to accommodate the top rim of the waterproofing shroud.

The shrouds shall be made of non-deteriorating neoprene or other synthetic rubber, and shall be resistant to water, oil and sunlight. The shrouds shall fit tightly around the glands and cable.

Glands shall be provided with ISO threads and shall be suitable for the specified cable sizes.

Flame proof glands shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

Suitable accessories shall be provided with glands to be used on ECC armoured cables to facilitate a bolted lug connection of the earth continuity conductors. Grooves cut into the barrel or cone bush to accommodate the earth continuity conductors are not acceptable.

For un-armoured cables the cone bush and compression ring of the gland shall be replaced with a synthetic rubber compression bush and ring to provide the required grip on the outer sheath of the cable.

GTS 6.0 Installation of Cables

This section covers the installation of cables for the distribution of power in buildings, other structures and in ground for system voltages up to 1 kV, 50 Hz.

GTS 6.1 General

GTS 6.1.1 Cable Types

- (a) All cables and jointing and termination accessories used for power distribution shall comply with the General Technical Specifications contained herein.
- (b) Cables with copper conductors shall be used throughout unless otherwise specified or approved.
- (c) All un-armoured cables shall be installed in metal trunking, sleeves or conduit unless clearly specified to the contrary.

GTS 6.1.2 Competence of Personnel

It is a definite requirement that the Contractor shall only employ personnel fully conversant with cable manufacturer's recommendations for joining and terminating cables.

GTS 6.2 Identification of Cables

Cables shall be identified at all terminations by means of strap-on type cable labels with PVC digit inserts. (Refer also to SANS 10142)

The use of PVC tape with punched characters is not acceptable.

The identification numbers of cables shall be shown on "as built" drawings of the Installation.

GTS 6.3 Trenching

GTS 6.3.1 General

The Contractor shall be responsible for all trenching excavations unless specified to the contrary.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

The Contractor shall, before trenching commences, familiarize himself with the routes and site conditions and the procedure and order of doing the work shall be planned in conjunction with the general construction program for other services and building requirements.

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

The Contractor will be held responsible for damage to any existing services brought to his attention by The Engineer and shall be responsible for the cost of repairs.

The Contractor shall take all the necessary precautions and provide the necessary warning signs and/or lights to ensure that the public and/or employees on site are not endangered.

The Contractor shall ensure that the excavations will not endanger existing structures, roads, railways, other site constructions or other property.

GTS 6.3.2 Mechanical Excavators

Power driven mechanical excavators may be used for trenching operations provided that they are not used in close proximity to other plant, services or other installations likely to be damaged by the use of such machinery.

The use of power-driven mechanical excavators shall be subject to the approval of The Engineer . Should the excavator produce trenches that exceed the required dimensions, payment based on volumetric excavation rates will be calculated on the required dimensions only.

GTS 6.3.3 Blasting

No guarantee is given or implied that blasting will not be required.

Should blasting be necessary and approved by The Engineer , the Contractor shall obtain the necessary authority from the relevant Government Departments and Local Authorities. The Contractor shall take full responsibility and observe all conditions and regulations set forth by the above authorities.

GTS 6.3.4 Routes

Trenches shall connect the points shown on the drawings in a straight line. Any deviations due to obstructions or existing services shall be approved by The Engineer beforehand.

The Engineer reserves the right to alter any cable route or portion thereof in advance of cable laying. Payment in respect of any additional or wasted work involved shall be at the documented rates.

The removal of obstructions along the cable routes shall be subject to the approval of The Engineer .

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

GTS 6.3.5 Shoring and Water logging

The Contractor shall provide shoring for use in locations where there is a danger of the sides of the trench collapsing due to water logging or other ground conditions. Refer to the Occupational Health and Safety Act.

The strength of shoring must be adequate for site conditions prevailing and the shoring must be braced across the trench.

The Contractor shall provide all pumps and equipment required to remove accumulated water from trenches. Water or any other liquid removed shall be disposed of without any nuisance or hazard.

GTS 6.3.6 Trenching

Trenching shall be programmed in advance and the approved program shall not be departed from except with the consent of The Engineer .

Trenches shall be as straight as possible and shall be excavated to the dimensions indicated in this specification.

The bottom of the trench shall be of smooth contour and shall have no sharp dips or rises which may cause tensile forces in the cable during backfilling.

The excavated material shall be placed adjacent to each trench in such a manner as to prevent nuisance, interference or damage to adjacent drains, gateways, trenches, water furrows, other works, properties or traffic. Where this is not possible the excavated materials shall be removed from site and returned for backfilling on completion of cable laying.

Surplus material shall be removed from site and disposed of at the cost of the Contractor.

Trenches across roads, access ways or footpaths shall not be left open. If cables cannot be laid immediately the Contractor shall install temporary "bridges" or cover plates of sufficient strength to accommodate the traffic concerned.

In the event of damage to other services or structures during trenching operations the Contractor shall immediately notify The Engineer and institute repairs.

Prior to cable laying the trench shall be inspected thoroughly and all objects likely to cause damage to the cables either during or after laying shall be removed.

Where ground conditions are likely to reduce maximum current carrying capacities of cables or where the cables are likely to be subjected to chemical or other damage or electrolytic action, The Engineer shall be notified before installing the cables.

Extreme care shall be taken not to disturb surveyor's pegs. These pegs shall not be covered with excavated material. If the surveyor's pegs are disturbed, they shall be replaced by a person qualified to do so.

GTS 6.3.7 Dimensions of Trenches

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Cable trenches for one or two cables shall not be less than 300 mm wide and need not be more than 450 mm wide. This dimension shall be valid for the total trench depth.

The width shall be increased where more cables are installed to allow for the spacing stipulated in par. GTS 6.4.2.

Where trenches change direction or where cable slack is to be accommodated, the Contractor shall ensure that the requirements of the relevant SANS Specification regarding the bending radii of cables are met when determining trench widths.

Trench depths shall be determined in accordance with cable laying depths and bedding thickness.

Payment will be made on a volumetric excavation rate calculated on the basis of the given maximum dimensions or the actual dimensions, whichever is the lesser. Refer also to par. GTS 6.3.2 and the first paragraph above.

GTS 6.3.8 Joint Holes

Where cable joints are required to be made in the course of a cable run, a joint hole shall be excavated of sufficient size to enable the cable jointer to work efficiently and unimpeded.

GTS 6.3.9 Bedding

The bottom of the trench shall be filled across the full width with a 75 mm layer of suitable soil sifted through a 6 mm mesh and levelled off.

Only sandy clay or loam soil with a satisfactory thermal resistivity (not exceeding 1,5°C m/W) may be used for this purpose. Sea or river sand, ash, chalk, peat, clinker or clayey soil shall not be used. The use of crusher sand is acceptable.

Where no suitable soil is available on site, the Contractor shall import fill from elsewhere and make all the necessary arrangements to do so. The cost of importing soil for bedding purposes shall be included in the unit rates for excavations.

After cable laying a further layer of bedding shall be provided to extend to 75 mm above the cables.

The bedding under joints shall be fully consolidated to prevent subsequent settling.

GTS 6.3.10 Cable Sleeves

Where cables cross under roads, railway tracks, other service areas, etc. and where cables enter buildings, the cables shall be installed in hot dip galvanised conduit or class A PVC sleeves. Pitch fibre pipes are not acceptable because of the adhesion that occurs after a period of time between the pipe and the sheathing or outer serving of the cables.

Pipes shall be joined in accordance with the manufacturer's instructions.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Sleeves shall cross roads and railway tracks at right angles.

Sleeves shall have a minimum diameter of 100 mm. They shall extend at least 2 m beyond the tracks of a railway line or of the outermost tracks where there is more than one line. In the case of roads, the sleeves shall extend at least 1 m beyond the road edge or kerb on both sides of the road.

All sleeves shall be graded 1:400 for water drainage.

Cable sleeves shall be installed to the spacings and depths stated in par. GTS 6.4.2 hereof.

The ends of all sleeves shall be sealed with a non-hardening watertight compound after the installation of cables. All sleeves intended for future use shall likewise be sealed.

All cable sleeves shall be installed by the Electrical Contractor or electrical sub-contractor unless otherwise stated in the Project Specifications.

GTS 6.3.11 Backfilling

The Contractor shall not commence with the backfilling of trenches without prior notification to The Engineer so that the cable installation may be inspected. Should the Contractor fail to give a timeous notification, the trenches shall be re-opened at the Contractor's cost. Such an inspection will not be unreasonably delayed.

For cables (up to 1 kV) a coloured plastic marking tape shall be installed 400 mm above the cable. The tape shall be yellow, with red skull and crossbones or with the words "ELECTRIC CABLE/ELEKTRIESE KABEL". These markings shall not be more than 1 m apart from centre to centre.

Backfilling shall be undertaken with soil suitable to ensure settling without voids. The maximum allowable diameter of stones presents in the backfill material, is 75 mm.

The Contractor shall have allowed in his tender for the importation of suitable backfill material if required.

The backfill shall be compacted in layers of 150 mm and sufficient allowance shall be made for final settlement. The Contractor shall maintain the refilled trench at his expense for the duration of the contract. Surplus material shall be removed from site and suitably disposed of.

On completion, the surface shall be made good to match the surrounding area.

In the case of roadways or paved areas the excavations shall be consolidated to the original density of the surrounding material and the surface finish reinstated.

GTS 6.3.12 Cable Markers

Cable markers shall be provided along all cable routes as specified or required in Project Specifications.

Cable markers shall consist of concrete blocks in the shape of truncated pyramids, approximately 300 mm high, 150 x 150 mm at the top and 250 x 250 mm at the bottom.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Brass plates shall be cast into the tops of the blocks in such a manner that they cannot be prized 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 the underground routes and shall project 35 mm 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 of 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 indicated on the "as built" drawings.

GTS 6.3.13 Provincial Administration or National Road Crossings

The Engineer will arrange for the necessary wayleaves and permission to cross Provincial or National road reserves and TELKOM Authority approval of proposed cable routes.

The Contractor shall carry out the crossing installation in strict accordance with the Provincial Administration's requirements and stipulations. Where these requirements are in contradiction with this specification, The Engineer 's ruling shall be sought.

The Contractor shall ensure that he will comply with the various Administration's requirements regarding crossing of Provincial and National roads, especially with regard to the safeguarding of the public. The Contractor shall also provide proof of adequate insurance cover against any claim from any accident as a result of work done by the Contractor during the crossing operation. The Engineer shall also be indemnified from all liability in this regard.

The Contractor shall liaise with the various Administrations well in advance regarding the intended dates, times and expected duration of the crossing operations and obtain their approval of the program and method of operation before commencing with the work.

GTS 6.4 Installation of Underground Cables

GTS 6.4.1 Installation Depths

Cables shall be installed at the following minimum depths below final ground level:

Up to 1 kV : 600 mm.

All cable depth measurements shall be made to the top of the cable when laid directly in ground or to the top of the duct or sleeve where these are provided.

The above depths shall apply to the top layer where cables are installed in layers.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

The Contractor may only deviate from the above depths provided prior authority in writing has been obtained from The Engineer . In this event the cables shall be protected with a suitable concrete covering.

The depth of cable pipes or ducts beneath railway lines or roads shall be not less than 1,1 m below the formation level.

GTS 6.4.2 Cable Spacing

Cables installed in the same trench shall be laid parallel to each other with the following spacing between the cables:

LV/LV : 2 cable diameters.

LV/ Existing HV : 300 mm minimum.

Where HV and LV cables have to be installed in the same trench, the HV cable shall be laid on the one side of the trench at a depth of 800 mm and then covered with 300 mm of soil. The LV cable shall then be laid on the other side of the trench, i.e. not above the HV cable, and then completely backfilled. (HV cables referred to in this paragraph are existing HV cables)

Cables for telephones, communication systems and other low voltage systems (less than 50 Volt) shall be separated from power cables by at least 1 m. All control or pilot cables shall be laid at least 300 mm from power cables.

Cables shall not be buried on top of each other unless layers are specified. The minimum spacing between layers shall be 200 mm.

GTS 6.4.3 Cable Laying

Except where ducts, tunnels or pipes are provided, cables shall be laid directly in the ground.

The cable shall be removed from the drum in such a manner that the cable is not subjected to twisting or tension exceeding that stipulated by the cable manufacturer.

Cable rollers shall be used as far as possible to run out cables. Rollers shall be spaced so that the length of cable in the trench will be totally suspended during the laying operation and sufficiently close to prevent undue sagging and the cable from touching the ground. Rollers shall also be placed in the trench in such a manner that they will not readily capsize.

Cable rollers shall have no sharp projecting parts liable to damage the cables.

Where cables have to be drawn around corners, well-lubricated skid plates shall be used. The skid plates shall be securely fixed between rollers and shall constantly be examined during cable laying operations.

Where cables have to be drawn through pipes or ducts, a suitable cable sock shall be used and particular care shall be exercised to avoid abrasion, elongation or distortion of any kind. In the case of oil filled cables, a cable sock may never be used. Special eyes giving access to the interior of the cable, must be utilized.

The maximum allowable tension when pulling a cable, is 70 N/mm² of conductor area.

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It will be assumed that the price or rates contained in the tender includes for the installation of cables in pipes and ducts or below existing or newly installed services.

The Engineer shall be informed timeously of the intention to carry out all cable laying operations to allow an inspection of the works by The Engineer if so required.

**GTS 6.5 Installation of Cables In Concrete
Trenches**

GTS 6.5.1 General

This paragraph covers the installation of cables in building trenches, service ducts, etc. The trenches, ducts, etc. inside buildings will be constructed and installed by others.

GTS 6.5.2 Installation

Cables shall be installed in one of the following ways:

- (a) On horizontal cable trays.
- (b) On horizontal metal supports with suitable clamps.
- (c) On vertical cable trays or metal supports fixed to the side of the trench. The cables shall be clamped in position.

Cables shall not be bunched and laid on the floor of the building trenches.

GTS 6.5.3 Covers

The covering of concrete trenches shall as a rule fall outside the scope of the electrical installation. The Contractor shall, however, be responsible for the cutting or drilling and smoothing of holes for cables through chequer plates, concrete or other coverings as required.

Cables shall enter and exit the trench through sleeves protruding 300 mm beyond the covering. The sleeves shall be permanently secured in position and the open space between the cable and sleeves shall be sealed with a non-hardening, watertight compound.

GTS 6.5.4 Filled Trenches

Where specified floor trenches shall be filled with sand.

If a sand filling is specified, the cables shall be fixed to non-corroding supports.

Sand-filled trenches other than in substations shall be covered in one of the following ways:

- (a) Reinforced concrete covers.
- (b) Sand and cement screed. (Normally used in waterworks rooms and in pump stations)
- (c) Removable chequer plates in steel edge frames. (Normally used in indoor switchgear rooms)

Method (a) above shall be used where vehicular traffic may be encountered over trenches. Unless otherwise specified allowance for a mass of 2 tons shall be made.

Cable trenches in substations, switch rooms, pump stations and generator rooms shall be covered in accordance with the Project Specifications.

GTS 6.6 Fixing of Cable to Trays or Structures

GTS 6.6.1 Installation

Cables may be installed in one of the following ways:

- (a) On horizontal cable trays.
- (b) Against vertical cable trays with suitable clamps.
- (c) Against horizontal or vertical metal supports or brackets with suitable clamps
- (d) On clamps which are fixed to the structure.

GTS 6.6.2 Clamps

Suitable clamps (cleats) which will secure cables without damage shall be used. Metal clamps or expanding type fixings shall be used. Clamps shall consist of adjustable metal wings which clamp to a metal support or consist of two halves that are bolted together. The correct clamp size to fit the cable shall be used. Cables of different sizes may only be fixed by a common clamp when the clamp is specially made to accommodate the various cables.

GTS 6.6.3 Spacing of Supports

Two methods of supporting cables are found in practice. The most generally known method is the restrained installation where the distance between supports is small enough to prevent any noticeable sag in the cable. The alternative method is the unrestrained installation where the distance between supports should be great enough to ensure that there will be obvious sag in each span between supports.

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GTS 6.6.4 Spacing of Supports of Unrestrained Cables

Large single core cables (if specified in the Project Specifications) shall always be installed according to this method. Generally, single core cables with conductors exceeding a cross sectional area of 185 mm² should be supported at spacing in excess of 2 m since the sag between supports will safely accommodate any thermal expansion.

Reducing the spacing between the supports to 1,5 m or less shall be avoided at all costs, as expansion cannot be taken up by a change of sag and chances of sheath failure become considerable.

GTS 6.6.5 Spacing of Supports of Restrained Cables

The maximum spacing between cleats (clamps) to which cables are fixed in horizontal and vertical cable routes shall be determined from Table 6.1 below.

Additional cleats shall be installed at each bend or offset in the cable run.

The maximum distance between supports or cleats for multi-core control cables shall be 20 times the outside diameter of the cable with a maximum spacing of 550 mm for un-armoured cables and 30 times the outside diameter of the cable with a maximum spacing of 900 mm for armoured cables. Spacing of supports for cables for high voltage lighting shall be in accordance with the relevant SANS specifications in GTS 1.22.3 hereof.

A minimum of 20 mm ventilation clearance shall be maintained between cables and the wall to which they are cleated.

GTS 6.7 Grouping and Spacing of Cables in
Buildings and Structures

GTS 6.7.1 Spacing Correction Factors

Cables shall be as a rule be spaced two cable diameters apart, for which no grouping correction factor need be applied.

GTS 6.7.2 Cables on Different Levels

Where parallel cable runs are installed at different levels (e.g. on parallel cable trays) and where the spacing of the layers is not specified, a minimum spacing of 300 mm shall be maintained.

GTS 6.7.3 Single Core Cables

Where single core cables are installed along a three-phase circuit, the cables shall be installed in trefoil formation and bound together at 300 mm intervals.

GTS 6.7.4 Cables for Other Services

Cables for telephones, communication systems and other low voltage systems (less than 50 Volt) shall be separated from power cables. In building ducts, a physical barrier shall be provided between power cables and cables for other services. Where armoured cables are used for such other services, they shall be installed on separate cable trays or shall otherwise be at least 1 m away from power cables. Where un-armoured cables are used for these other services, they shall be installed in separate conduits or metal channels.

For larger cables the spacing shall be 10 x outside diameter of the cable.

GTS 6.8 Termination and Jointing of Cables

GTS 6.8.1 General

Cable ends shall be terminated with glands or in cable boxes with the associated accessories such as clamps, shrouds, etc. complying in all respects to the General Technical Specification.

Connection of cables to switchgear shall always be effected in such a way that the various phases, seen from the front of the switchgear will be in the following positions:

- No.1 conductor : left (red) (A).
- No.2 conductor : centre (white) (B).
- No.3 conductor : right (blue) (C).

Exposed armouring shall be covered with bitumen-base paint.

All cable ends shall be supplied with the necessary earth connection.

An O-Line channel or other approved means of support shall be provided to remove mechanical stress from the glands.

Cable cores shall be marked with heat-shrunk sleeves where necessary to identify the phases. Refer to the relevant SANS specifications in GTS 1.22.3 hereof.

The current-carrying capacity and breakdown voltage of the cable end shall be the same as for the complete cable.

Cables shall be determined in accordance with the recommendations laid down by the manufacturers of the cables and glands employed.

GTS 6.8.2 Termination of PVC-insulated Cables

Cable ends shall be terminated by means of adjustable glands in accordance with the General Technical Specification for "GLANDS FOR PVC-INSULATED CABLES".

The glands shall be fitted in accordance with the cable and gland manufacturer's instructions.

The correct size and type of gland shall be used for the particular cable and application.

GTS 6.8.3 Connection of Cable Conductors

Suitable lugs shall be used, preferably solidly sweated to the cable conductor ends. Lugs may be crimped, using mechanical or pneumatic tools designed for this purpose, on condition that evidence is submitted that the method used complies with the performance requirements of BS 4579, Part 1: "COMPRESSION JOINTS IN COPPER".

Contact surfaces shall be thoroughly cleaned and smoothed and fixing bolts shall match the hole size of the lug. Cables that are connected to clamp type terminals where the clamping screws are not in direct contact with the conductor, need not be lugged but the correct terminal size shall be used. Ferrules shall be used as far as possible where cable conductors are connected directly to equipment with screws against the conductor strands. When cutting away insulation from cable conductors to fit into lugs, care shall be taken that no strands are left exposed. Under no circumstances may any of the conductor strands be cut away to fit into lugs.

GTS 6.8.4 Joints

Joints in cable runs will not be allowed unless specified in the Project Specification or authorized by The Engineer .

Jointing shall be carried out strictly in accordance with the manufacturer's instructions and by personnel competent in jointing the types of cables used.

During outdoor jointing operations, the joint bays shall be adequately covered by tents of waterproof material suitably supported. Where necessary a trench shall be excavated around the bay to prevent the ingress of moisture. The sides of the hole shall be draped with small tarpaulin or plastic sheeting to prevent loose earth from falling in during jointing operations.

The joint shall not impair the anti-electrolysis characteristics of the cable.

The Contractor shall notify The Engineer timeously of the day on which jointing is to be carried out in order that an inspection may be arranged if so required. Any cable joint not inspected by The Engineer because

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of insufficient notice being given, shall be opened for inspection and redone at the discretion of The Engineer at the cost of the contractor.

LV cable joints shall be of the epoxy-resin type.

Joints shall be fully water- and airtight and shall be free of voids and air pockets.

The crossing of cores in joints will not be permitted under any circumstances.

GTS 6.9 Testing

Each cable shall be tested after installation in accordance with the relevant SANS specifications in GTS 1.22.3 hereof (up to 1 kV) as well as the requirements of the Local and Supply Authorities.

LV cables shall be tested by means of a suitable megger at 1 kV and the insulation resistance shall be tabulated and certified.

The Contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The cost of testing shall have been included in the tender price. The Contractor shall notify The Engineer timeously so that a representative of The Engineer may witness the tests. On completion of the tests on any cable, the Contractor shall without delay, submit three copies of the certified Test Reports to The Engineer .

GTS 6.10 Measurements

All measurements for payments shall be made jointly by the representatives of The Engineer and the Contractor shall obtain the signature of The Engineer 's representative including approval of such measurements.

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.

The classification shall be as follows:

- Very hard rock - shall mean rock that can only be excavated by means of explosives.
- Hard rock - shall mean granite, quartzitic sandstone, slate and rock of similar or greater hardness, solid shale and boulders in general requiring the use of jack hammers and other mechanical means of excavations.
- Soft rock and earth - shall mean rock and earth that can be loosened and removed by hand-pick and shovel.

Where very hard rock and hard rock are encountered, the prior approval of The Engineer shall be obtained before proceeding with the excavation. This requirement is stipulated in order to afford The Engineer the opportunity to determine whether an alternative cable route is justified.

All cable lengths indicated in the Project Specification and/or shown in the cable route drawings shall be regarded as estimates and are given for tendering purposes only. The successful tenderer shall measure actual cable lengths on site before ordering.

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The final price for the supply and installation of all cables will be adjusted, on the basis of the actual lengths of installed cables, in accordance with the unit rates quoted at the time of tendering. Cable lengths shall be measured on site to the nearest 500 mm for this purpose and surplus cable will not be paid for.

GTS 6.11 Completion

The Engineer reserves the right to inspect the installation at any stage during the course of construction. Such inspections will, however, not deem the portions inspected as being complete or accepted and the Contractor shall remain responsible for completing the installation fully in accordance with the Contract Documents.

The Contractor shall carry out a final "as built" survey of the cable routes and present to The Engineer "as built" route plans of the complete installation. The following information shall be reflected on the plans or submitted as separate schedules with the plans:

- (a) Overall length of each cable.
- (b) Locations of all joints (if any) in relation to permanent reference points. Dimensions shall be shown and the method of triangulation i.e. two dimensions to each joint, shall be used.
- (c) Identification of each cable.

The works will be deemed to be incomplete until all tests have been conducted successfully and all "as built" drawings and schedules have been handed to The Engineer .

GTS 7.0 Electrical Fittings

GTS 7.1 Light Switches

GTS 7.1.1 General

This section covers the requirements for switches for use in general installations under normal environmental conditions.

GTS 7.1.2 Flush and Surface Mounted Switches

All switches shall be suitable for mounting in 100 x 50 x 50 mm boxes, shall comply with the relevant SANS specifications in GTS 1.22.3 hereof and shall bear the SANS mark.

Switches shall be of tumbler operated micro-gap type rated at 16A, 220/250 Volt.

Switches shall have protected terminals for safe wiring.

Contacts shall be of silver material.

On multi-lever switches, it shall be possible to individually change any of its switches.

The yoke strap shall be slotted to allow for easy alignment.

The covers of surface mounted switches shall have toggle protectors.

Where light switches are installed in partitions, they shall, where possible, be of the special narrow type intended for installation into the mullions.

GTS 7.1.3 Watertight Switches

Watertight switches shall be of the micro-gap type suitable for surface mounting and shall bear the SANS mark.

The housing shall be of galvanized cast iron or die cast aluminium with watertight cover plate and toggle.

The switch shall have a porcelain base and a quick acting spring mechanism and shall be rated at 16A, 220/250 Volt.

The ON/OFF positions shall be clearly marked on the switch housing.

GTS 7.1.4 Cover Plates for Standard Switches

Cover plates shall be finished in ivory coloured baked enamel, anodized bronze or aluminium unless otherwise specified.

Cover plates shall overlap the outlet to cover wall imperfections.

Cover plates shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

GTS 7.2 Switched Socket-Outlets

GTS 7.2.1 General

This section covers the requirements for switched socket-outlets for use in general installations under normal environmental conditions.

GTS 7.2.2 Flush and Surface Mounted Switched Sockets

All switched socket-outlets shall be suitable for mounting in 100 x 100 x 50 mm or 100 x 50 x 50 mm boxes, shall comply with the relevant SANS specifications in GTS 1.22.3 hereof and shall bear the SANS mark.

Switches shall be of the tumbler operated micro-gap type rated at 16A, 220/250 Volt.

Terminals shall be enclosed for safe wiring.

Contacts shall be of silver material.

Safety shutters shall be provided on live and neutral openings.

The yoke strap shall be slotted to allow for easy alignment.

The covers of surface mounted switched sockets shall have toggle protectors.

Miniature circuit breakers shall be used in lieu of a switch where specified.

Where 13A flat pin switched socket-outlets are specified, these shall comply with BS 1363.

GTS 7.2.3 Watertight Switched Sockets

The housing of watertight switched sockets shall be of galvanized cast iron or die cast aluminium with watertight machined joints.

The switch shall have porcelain base and a quick-acting spring mechanism and shall be rated at 16A, 220/250 Volt.

The ON/OFF positions shall be clearly marked on the switch housing.

The socket openings shall be rendered watertight by means of a gasketed cover plate which is screwed onto the body of the unit. The cover plate shall be secured to the body of the unit by means of a chain.

GTS 7.2.4 Three-Phase Switched Socket-Outlets

Three-phase switched socket-outlets shall have 13 pins, one for each phase, neutral and earth. The current rating shall be as specified in the Project Specification.

The units shall be interlocked to prevent switching on if the plug top is not installed.

The units shall be supplied complete with plug top.

The live terminals shall be shrouded and shall be completely safe when the plug top is removed.

Samples shall be submitted to The Engineer for approval prior to the installation.

GTS 7.3 Tubular Fluorescent Lamp Luminaires for Interior Applications

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GTS 7.3.1 General

Luminaires, associated equipment and control gear shall be new and unused and shall be supplied complete with lamps, control gear, diffusors, mounting brackets, etc. as applicable, and shall be delivered to site in a protective covering.

Lamps shall be delivered separately.

Tenders shall be accompanied by full descriptive information of the luminaires offered. Photometric data, i.e. polar curves and coefficients of utilization certified by the SANS shall be submitted with tenders for all luminaires offered.

Manufacturer's catalogue numbers, descriptions, etc., where mentioned in the Project Specification, are quoted as a guide for easy identification. Similar equipment from other manufacturers will be considered.

GTS 7.3.2 General Technical Requirements

(a) General

Tubular fluorescent lamp luminaires shall comply fully with the relevant SANS specifications in GTS 1.22.3 hereof and all amendments as well as the additional requirements of this specification. Luminaires which bear the SANS mark are preferred.

(b) Construction

A luminaire shall consist of a ventilated body manufactured of cold rolled sheet steel not less than 0,8 mm thick, suitably braced or stiffened to prevent distortion. The body shall be of sufficient strength for the mounting of the entire luminaire.

The luminaire body shall be designed to accommodate the control gear, wiring, lamp holders and, where applicable, the diffusors. It shall be possible to reach the control gear without disconnecting wiring or removing the luminaire.

Except for mounting holes and/or slots and the required openings in air-return luminaires, the back of the body channel shall be closed over the full length of the luminaire.

Suitable knock-outs shall be provided in the rear of the luminaire body for wire entry.

All components, including screws, bolts and nuts utilized in the construction of the luminaire or fixing of its components, shall be corrosion proof.

(c) Internal Wiring

Luminaires shall be completely wired internally. Conductors shall be protected with grommets where they pass through holes in the body.

The wiring shall be totally metal enclosed to prevent any possible contact with live components while changing lamps.

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The conductor insulation shall be rated to withstand the temperature inside the luminaire body without deterioration.

The wiring shall terminate on a suitable terminal block. There shall be no joints in the internal wiring.

An earth terminal, welded to the luminaire body, shall be provided. To ensure good earth continuity the earth terminal shall not be spray painted. The earth conductor shall be connected to this terminal by means of a crimped lug.

(d) Lamp Holders

Lamp holders shall preferably be of the telescopic spring-loaded type. Where twist-lock type lamp holders are provided, the mounting of the holders shall be able to accommodate the tolerances experienced in the length of lamps and in the manufacture of luminaires.

(e) Control Gear

The control gear, ballasts, capacitors and starters shall be designed and manufactured to suit the control circuitry adopted. Ballasts shall comply with the relevant SANS specifications in GTS 1.22.3 hereof, suitable for operation on 220/250 Volt, 50 Hz supplies. Ballasts shall further be suitable for the particular luminaire to ensure that the thermal limits specified in the relevant SANS specifications in GTS 1.22.3 hereof are not exceeded. Noisy ballasts will not be accepted and shall be replaced at no cost. Starters shall comply with the relevant SANS specifications in GTS 1.22.3 hereof. Starters with metal cans shall contain integral earthing facilities to earth the can upon insertion.

Starters shall be accessible from the outside of the luminaire, and the replacement of the starter shall not necessitate the removal of lamps.

(f) Capacitors

Capacitors shall comply with the relevant SANS specifications in GTS 1.22.3 hereof. The power factor of each complete fitting shall be corrected to at least 0,85.

(g) Lamps

Fluorescent lamps shall be suitable for the control circuitry used. Lamps shall comply with the relevant SANS specifications in GTS 1.22.3 hereof. If no colour is specified in the Project Specification, the light colour shall correspond to colour 2 (4300 K) of the relevant SANS specifications in GTS 1.22.3 hereof. Lamps of the same colour shall be provided for an entire installation unless specified to the contrary.

There shall be no visible flicker in the lamps and lamps shall readily strike when switched on.

Faulty lamps or ballasts shall be replaced at no cost to The Engineer .

GTS 7.3.3 Channel Luminaires

Channel luminaires shall consist of a ventilated, enclosed channel body with one or more lamps as specified. The channel body shall house the ballast, capacitor, terminals and internal wiring.

Provision shall be made for the addition of reflector wings and/or diffusers.

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Three sets of mounting slots and knock-outs suitable for mounting onto standard round conduit boxes and/or 20 mm Ø. conduit pendant rods, shall be provided in the rear of the channel, one in the centre and one approximately one sixth from each end.

A knock-out suitable for a 20 mm Ø. conduit entry shall be provided at each end of the channel. The distance between the back of the luminaire and centre of the knock-out shall be approximately 25 mm.

The knock-outs shall be positioned on the centre line of the channel.

The body channel shall incorporate a removable cover acting as a reflector, manufactured of cold rolled steel, not less than 0,8 mm thick, designed and mounted to completely cover the interior of the body channel and its contents and extending over the full length of the luminaire up to the lamp holders.

The reflector shall be firmly held in position with a latching device consisting of knurled, coin slot, captive screws. Plastic, used as a spring mechanism, is not acceptable as a fixing device for reflectors. The action of the latching device shall not deteriorate due to use and/or ageing.

GTS 8.0 Cable Trays and Ladders

GTS 8.1 **Cable Ladders**

Metal cable ladders shall consist of a 76 mm high side rail of 2 mm minimum thickness. Cross pieces consisting of channel sections shall be spaced at maximum intervals of 375 mm. Where cables of 10 mm2 or smaller are installed on cable ladders, the spacing of the cross pieces shall be 125 mm. Cables shall be clamped in position by means of purpose-made cable clamps that fit into the cross pieces or shall be starpped, using heavy duty plastic cable straps.

Cable ladders consisting of slotted metal rails which accommodate plastic or metal cable binding bands may be used in vertical cable runs against walls, etc. These cable ladders will be considered in horizontal cable runs for small cables for communication and control wiring upon the prior approval of The Engineer .

Purpose-made cable trays consisting of 6 mm angle iron and 6 x 40 mm minimum cross pieces are acceptable in industrial applications. Cross pieces shall be welded in pairs at 250 mm maximum centre-to-centre intervals. The pairs shall be spaced approximately 10 mm apart to allow cable clamps or metallic binding bands to affix the cables to the tray.

(a) General

Cable trays and cable ladders complying with the General Technical Specification for "CABLE TRAYS AND LADDERS", shall be supplied and installed where specified and/or where generally suitable for cable distribution.

(b) Responsibility of The Contractor

The Contractor shall supply and install all cable trays and/or ladders as specified or as required by the cable routes including the necessary supports, clamps, hangers, fixing materials, bends, angles, junctions, reducers, T-pieces, etc. He shall further liaise with the Main Contractor for the provision of holes and access through the structure and finishes.

GTS 8.2 **Supports and Joints**

GTS 8.2.1 Supports

Cable tray supports shall consist of two steel hanger rods, at least 8 mm in diameter, on both sides of the tray with a substantial steel cross-member on the underside of the tray and bolted to the rods. Alternatively, cable trays may be cantilevered from walls on suitable brackets.

GTS 8.2.2 Spacing of Horizontal Supports

Horizontal trays shall be supported at the following maximum intervals:

O-LINE or similar cable ladders with 100 mm side rail of 2 mm thickness and with channel cross rungs - 1,5 m spacing.

In addition to the above spacing on the longitudinal run, trays and ladders shall be supported at each end, offset and T-junction.

GTS 8.2.3 Joints

Joints shall be smooth and without projections or rough edges that may damage the cables. The Contractor will be required to cover joints with rubber cement or other non-hardening rubberized or plastic compounds if in the opinion of The Engineer joints may damage cables.

Joints shall as far as possible be arranged to fall on supports. Where joints do not coincide with supports, joints shall be made by means of wrap-around splices of the same material as the tray and at least 450 mm long. The two cable tray ends shall butt tightly at the centre of the splice and the splice shall be bolted to each cable tray by means of at least 8 round head bolts, nuts and washers. Splices shall have the same finish as the rest of the tray.

Splices as described above shall be provided with joints which do coincide with supports if the loaded tray sags adjacent to the joint due to the interruption of the bending moment in the tray.

GTS 8.2.4 Fixing to Supports

Trays shall be bolted to supports by at least two round head bolts per support. Bolts shall be securely tightened against the tray surface to avoid projections which might damage cables during installation.

GTS 8.2.5 Fixing to the Structure

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Where installed on concrete or brick, the supports for cable trays and ladders shall be securely fixed by means of at least 2 heavy duty, expansion type anchor bolts. Cantilevered trays shall be supported by a minimum of two 6 mm diameter expansion bolts per support.

It is the responsibility of the Contractor to ensure that adequate fixing is provided since cable trays and ladders that work loose shall be rectified at his expense. The fixing shall take into account site conditions that prevail during installation.

On horizontal steelwork, use may alternatively be made of "CADDY" type fasteners.

Horizontal trays and ladders shall in general be installed at least 450 mm below slabs, ceilings, etc., to facilitate access during installation of cables.

GTS 8.3 **Installation of Cables**

Cables shall be installed adjacent and parallel to each other on the trays with spacings as specified in The Engineer 's General Technical Specification for "INSTALLATION OF CABLES", and snaked slightly to allow for expansion. Cables shall present a neat appearance and shall under no circumstances be bunched. Cables shall be fixed at maximum intervals of 1000 mm when installed on horizontal trays and at maximum intervals of 500 mm when installed on vertical trays.

GTS 8.4 **Earthing**

Metal trays and ladders shall be bonded to the earth bar of the switchboard to which the cables are connected. Additional bare copper stranded conductors or copper tape shall be bolted to the tray or ladder where the electrical continuity cannot be guaranteed. These additional conductors or tapes shall always be installed in outdoor applications and in coastal regions. Continuous copper strip of 3 x 25 mm shall be installed on trays for cable distribution in factories, with tap-offs where necessary and as specified

GTS 8.5 **Finishes**

Metal cable trays and ladders shall be finished as follows:

- (a) In coastal areas - Hot-dip galvanized to the relevant SANS specifications in GTS 1.22.3 hereof or epoxy powder coated.
- (b) Vertical building ducts - hot-dip galvanized to the relevant SANS specifications in GTS 1.22.3 hereof or epoxy powder coated.
- (c) Plant rooms, substations, service tunnels, basements - Electro-galvanized or epoxy powder coated.
- (d) Damp areas exposed to weather - hot-dip galvanized to the relevant SANS specifications in GTS 1.22.3 hereof or epoxy powder coated.
- (e) Undercover industrial application - hot-dip galvanized to the relevant SANS specifications in GTS 1.22.3 hereof or epoxy powder coated.

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The above-mentioned finishes shall apply unless specified to the contrary in the Project Specification. hot-dip galvanized or electro-galvanized trays and ladders shall be cold galvanized at all joints, sections that have been cut and at places where the galvanizing has been damaged. Powder coated trays and ladders shall likewise be touched up at joints, cuts and damaged portions using spray canisters recommended by the manufacturer of the trays and ladders.

GTS 8.6 Accessories

Horizontal and vertical bends, T-junctions and cross connections shall be supplied by the Contractor. The dimensions of these connections shall correspond to the dimensions of the linear sections to which they are connected. The radius of all bends shall be 1 m minimum. The inside dimensions of horizontal angles or connections shall be large enough to ensure that the allowable bending radius of the cables is not exceeded. Sharp angles shall be 45° mitred.

GTS 9.0 Earthing

This section covers the earthing of electrical installations in buildings or other structures. The total earthing system of any electrical installation shall be in complete accordance with SANS 10142.

**GTS 9.1 General Recommendations of the
Practical Installation of Earth Electrodes**

GTS 9.1.1 Requirements of an Effective Earth

An effective earth must prevent dangerous over-voltages arising between metallic structures, frames, supports or enclosures of electrical equipment and the ground during fault conditions.

An effective earth must be able to permit fault currents of sufficient magnitude to flow so as to operate protective devices to isolate the fault before damage can occur.

The ohmic resistance of an effective earth must be low enough to ensure that the step potential on the ground in the vicinity of the earthing point is within safe limits under fault conditions i.e. a voltage gradient not exceeding 40 V/m fault durations exceeding 1 sec.

GTS 9.1.2 Types of Earth Electrodes

Three types of earth electrodes are suitable:

(a) Trench Earths

Trench earths comprise a bare copper or galvanized iron conductor laid at a minimum of 500 mm below ground level, usually when underground cables are installed. This type of earth electrode provides a relatively large contact area between electrode and surrounding ground, makes contact with a variety of types of soil and soils of varying moisture content en route and is economical to install.

(b) Spike Earths

Spike earths comprise rods of bare copper, copper-coated steel, stainless steel or galvanized steel designed for the purpose of penetrating ground to depths of up to several metres. A low resistance earth may sometimes be obtained by driving multiple spikes at some distance from each other in order to provide parallel paths.

In hard or rocky ground, it is usually necessary to drill holes into which earth spikes are inserted and then packed with soft soil.

(c) Foundation Earths

Foundation earths comprise bare copper or galvanized iron conductors laid under the foundations of buildings, miniature substations, distribution pillars, bases of wooden, concrete or steel poles and structures. Because soil under foundations usually retains moisture, foundation earths are located to take advantage of this favourable condition. Furthermore, they are economical to install.

GTS 9.1.3 Materials for Earth Electrodes

Bare copper, either in stranded, strip or rod form, is considered the most suitable general purpose material for earth electrodes. Its main disadvantage is its cost and susceptibility to theft.

Bare galvanized iron and steel, either in stranded, strip or rod form, has a satisfactory record of survival in non-aggressive soils and is more economical than copper.

Bare aluminium is unsuitable as electrode material.

GTS 9.1.4 Corrosion

Because galvanized ferrous metals corrode sacrificially to copper, galvanized iron and steel electrodes should not be buried in close proximity to bare copper.

GTS 9.2 Technical Requirements Of Neutral Earthing Of Distribution System (Multiple Earthed Neutral (MEN) and Protective Multiple Earthing (PME) systems)

NOTE: The following relevant aspects have been extracted from the "AMEU CODE OF PRACTICE FOR THE APPLICATION OF NEUTRAL EARTHING ON LOW VOLTAGE DISTRIBUTION SYSTEMS"

Distribution equipment associated with transformer substations that are either ground mounted or pole mounted and fed by underground cable or overhead line, with or without an earth continuity conductor, (ECC), should be installed, connected and earthed in accordance with the following requirements:

- (i) Where the resistance to earth of the HV equipment earth is 1 ohm or less, it is permissible to earth the LV neutral to the HV earth electrode.

- (ii) Where the HV equipment earth exceeds 1 ohm the LV neutral shall be earthed at a minimum distance of 6 m from the HV equipment earth (i.e. 6 m from the HV electrode/s and also from any earthed metalwork connected thereto).
- (iii) Notwithstanding the requirements of (i) above, where transformers are associated with HV overhead lines, it is considered good practice to separate the HV and LV earth electrodes. The minimum earth separation should be 6 m or 1 LV span.
- (iv) The overall resistance to earth of the neutral of an LV distributor or distribution system must not exceed 10 ohms.
- (v) The LV neutral may be connected to other supply neutrals, earth electrodes, cable sheaths and armouring and these connections used to obtain the required earthing value of 10 ohms or less specified in par. (iv) above.
- (vi) The neutral of underground and overhead LV distributors must be earthed at the remote ends of each distributor.
- (vii) Where the overall resistance to earth of the neutral of the distribution system exceeds 10 ohms, the neutral shall be earthed at intermediate positions on the distributor/s to reduce its resistance to earth to below this limit.
- (viii) The cross-sectional area of the neutral of all LV distributors must not be less than that of a phase conductor.
- (ix) No circuit breakers, isolators, fuses, switches or removable links shall be installed in the neutral between the transformer star point and the remote end of any LV distributor or service connection.
- (x) All metallic sheathing and armouring of cables and all metalwork associated with meter cabinets, fuse pillars, etc., supporting or enclosing LV cables shall be bonded to the distributor neutral conductor.
- (xi) Where a Separate Neutral Earth (SNE) cable is part of an MEN or PME system, the armouring and/or metallic sheath and any ECC shall be bonded to the neutral at the supply end of the cable.
- (xii) To ensure the integrity of the neutral, it is recommended that all connections and joints on or to overhead line conductors be made by compression fittings or, alternatively double bolted connectors.
- (xiii) MEN or PME may be applied to any single LV distributor without alterations to other LV distributors supplied from the same transformer.

GTS 9.3 Earthing

In order to comply with the requirements of par. 1 and 2 above, an earth resistivity measurement shall be undertaken at the site of the new pump station, preferably by a specialist firm. The Contractor shall then submit to The Engineer details of a proposed substation earth indicating whether a trench earth, spike earth or foundation earth is intended and the proposed inter-connections with the installation.

GTS 9.4 Fences

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Boundary fences within the site shall be earthed as follows:

- (a) A 70 mm² earth wire shall be installed 400 mm below ground level and 500 mm from the building wall on the outside along the entire length of the wall. This earth wire shall be earthed at each corner by means of a 1,8 m earth rod and the rod and earth wire bonded to the fence. The earth wire shall also be bonded, at least at two points, to the main earthing system.

GTS 9.5 Earthing of a General Electrical Installation

GTS 9.5.1 General

All earth conductors shall be stranded copper with or without green PVC insulation. The conductors shall comply with the General Technical Specification for "PVC-INSULATED CABLES". All earth conductor sizes shall be determined in accordance with SANS 10142, where the earth does not form an integral part of the cable.

GTS 9.5.2 Switchboards

A separate earth connection shall be supplied between the earth busbar of the main switchboard and the earth busbar of every sub-switchboard. These connections shall consist of bare or insulated stranded copper conductors installed along the same routes as the supply cables or in the same conduit as the supply conductors. Alternatively, armoured cables with earth continuity conductors included in the armouring may be utilised.

GTS 9.5.3 Sub-Circuits

The earth conductors of all sub-circuits shall be connected to the earth busbar in the supply switchboard in accordance with SANS10142.

GTS 9.5.4 Ring Mains

Common earth conductors may be used where various circuits are installed in the same wiring channel in accordance with SANS 10142. In such instances the sizes of earth conductors shall be specifically approved by The Engineer . Earth conductors for individual circuits branching from the ring main shall be connected to the common earth conductor with T-ferrules or soldered. The common earth shall not be broken.

GTS 9.5.5 Connections

Under no circumstances shall connection points, bolts, screws, etc., used for earthing be utilized for any other purpose. It will be the responsibility of the Contractor to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided. Unless earth conductors are connected to proper terminals, the ends shall be tinned and lugged. Lugs may be crimped, using mechanical

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or pneumatic tools designed for this purpose, on condition that evidence is submitted that the method used complies with the performance requirements of BS 4579, Part 1: "COMPRESSION JOINTS IN COPPER".

GTS 9.5.6 Non-Metallic Conduit

Where non-metallic conduit is specified or allowed, stranded copper earth conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including switch boxes, socket-outlet boxes, draw-boxes, switchboards, luminaires, etc. The securing of earth conductors by means of self-threading screws will not be permitted.

GTS 9.5.7 Flexible Conduit

An earth conductor shall be installed in all non-metallic flexible conduit. This earth conductor shall not be installed external to the flexible conduit but within the conduit with the other conductors. The earth conductor shall be connected to the earth terminals at both ends of the circuit.

GTS 9.5.8 Water Pipes

Metal cold water mains shall be bonded to the earth busbar in the Main Switchboard by solid 15 x 2 mm copper strapping. All other hot and cold pipes shall be connected by 12 x 0,8 mm perforated or solid copper strapping (not conductors) to the nearest switchboard. The strapping shall be fixed to the pipe work by brass nuts and bolts and against walls by brass screws at 150 mm centres.

In all cases where metal water pipes, down pipes, flues, etc., are positioned within 1,6 m of switchboards, an earth connection consisting of copper strapping shall be installed between the pipe work and the board. In vertical building ducts accommodating both metal water pipes and electrical cables, all the pipes shall be earthed at each switchboard.

GTS 9.5.9 Roofs

Where service connections consist of overhead conductors, all metal parts of roofs, gutters and down pipes shall be earthed. One bare 10 mm² copper conductor shall be installed and fixed to the top purlin and connected to the main earth conductor of each switchboard where applicable. The roof and gutters shall be connected at 15 m intervals to this conductor by means of 12 x 0,8 mm copper strapping (not conductors) and galvanized bolts and nuts. Self-tapping screws are not acceptable. Where service connections consist of underground supplies, the above requirements are not applicable.

GTS 10.0 Conduit and Conduit Accessories

GTS 10.1 General

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This section covers the requirements for conduit and conduit accessories for general installations under normal environmental conditions.

GTS 10.2 Screwed Conduit

Conduits shall comply with the relevant SANS specifications in GTS 1.22.3 hereof and shall bear the SANS mark.

All conduit shall be heavy gauge, welded or solid drawn, hot-dip galvanised or black enamelled, screwed tube.

Galvanised conduit shall be hot-dipped inside and outside in accordance with the relevant SANS specifications in GTS 1.22.3 hereof.

All conduit ends shall be reamed and threaded on both sides and delivered with a coupling at one end and a plastic cap on the other end.

GTS 10.3 Metal Conduit Accessories

All metal conduit accessories shall be of malleable cast iron or pressed steel with brass bushes in accordance with the relevant SANS specifications in GTS 1.22.3 hereof. Alloy or pressure cast metal accessories or zinc base alloy fittings are not acceptable. All fittings whether galvanised or black enamelled shall be fitted with brass screws.

GTS 10.4 Circular Type Boxes

The boxes shall be of the long spout pattern, manufactured of malleable cast iron or pressed steel and stove enamelled jet black or galvanised as required. The two cover fixing holes shall be diametrically opposite each other, drilled and tapped at 50 mm centres.

Junction, draw-in and inspection boxes shall be of adequate size and shall be supplied with heavy gauge metal cover plates.

Boxes shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

GTS 10.5 Switch Boxes and Socket-Outlet Boxes

All switch boxes and socket-outlet boxes shall be manufactured of pressed galvanised steel of at least 1 mm thickness. All boxes shall be fitted with the necessary lugs to suit standard flush mounted switches and socket-outlets manufactured in accordance with the relevant SANS specifications in GTS 1.22.3 hereof.

Light switch boxes shall be 100 x 50 x 50 mm with two 20 mm knock-outs on the sides, one 20 mm knock-out on the top, bottom, side and back.

Socket-outlet boxes shall be 100 x 100 x 50 mm with two 20 mm knock-outs each on the top, bottom, sides and back.

Switch and socket-outlet cover plates shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

GTS 10.6 Flexible Conduit

Flexible steel conduit and adaptors shall comply with the relevant SANS specifications in GTS 1.22.3 hereof, where applicable. Flexible conduit shall be of galvanised steel construction and in damp areas of the plastic sheathed galvanised steel type. Flexible conduit shall only be used as specified and shall then be installed in accordance with the relevant SANS specifications in GTS 1.22.3 hereof.

GTS 10.7 Plain-End Metallic Conduit

As an alternative to the threaded conduit, plain-end (unthreaded) metallic conduit with accessories may be used under the conditions stated in The Engineer 's standard specification for "INSTALLATION AND TERMINATION OF CONDUITS AND CONDUIT ACCESSORIES", GTS 11.0.

Unthreaded conduit shall be manufactured of mild steel with a minimum thickness of 0,9 mm and shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

Bending and setting of conduits shall be done with the correct apparatus recommended by the manufacturer of the conduit.

The Contractor or Supplier shall be responsible for obtaining the approval of local authorities for the use of this system.

All conduit and accessories used in areas within 50 km of the coast shall be hot-dip galvanised to the relevant SANS specifications in GTS 1.22.3 hereof. In inland areas electro-galvanised or cadmium-plated accessories will be accepted.

GTS 10.8 Non-Metallic Conduit

Non-metallic conduit systems will only be acceptable after specific approval by The Engineer in writing.

Where approved by The Engineer in writing non-metallic conduit shall comply fully with the relevant SANS specifications in GTS 1.22.3 hereof and shall be installed in accordance with Appendix C of the same specification as well as The Engineer 's standard specification for "INSTALLATION AND TERMINATION OF CONDUITS AND CONDUIT ACCESSORIES" hereof.

GTS 10.9 Earth Clamps

Earth clamps shall consist of copper strips at least 1,2 mm thick and not less than 12 mm wide secured with a brass bolt, nut and washer and shall be so constructed that the clamp will fit firmly to the conduit without any additional packing.

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GTS 11.0 Installation and Termination of Conduits and Conduit Accessories

GTS 11.1. General

GTS 11.1.1 Scope

This section covers the installation of conduits and conduit accessories in buildings and other structures under normal environmental conditions and for system voltages up to 600 V.

The following types of conduit installations are included:

- a. Screwed metallic conduit - black enamelled and galvanised.
- b. Plain-end metallic conduit - black enamelled and galvanised, including "BOSAL" or similar systems.
- c. Non-metallic conduit. (After written approval of The Engineer)
- d. Flexible conduit.

Conduits may be installed as follows:

- a. In open roof spaces. (Conduit to follow roof structure – metallic conduit to be saddled at 2m intervals – non-metallic conduit (where allowed) to be saddled at 1m intervals.)
- b. Cast in concrete.
- c. Surface mounted against walls, concrete slabs, etc.
- d. In wall chases.

Where conduits are to be installed in concrete, this shall be undertaken while the building work is still in progress. Conduits may only be surface mounted where specified or where The Engineer has given his written consent.

GTS 11.1.2 Other Services

Conduits may not be installed closer than 150 mm to pipes containing gas, steam, hot water or other materials which may damage the conduits or conductors. Conduits may not touch pipes of other service installations in order to prevent electrolytic corrosion. Where this is unavoidable, cathodic protection shall be provided.

GTS 11.2 Conduits and Terminations

GTS 11.2.1 General

In general, BOSAL steel conduit shall be used in the wiring of buildings.

The installation shall comply with SANS 10142.

GTS 11.2.2 Galvanised Conduit

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Hot Dip Galvanised conduit and accessories shall be used in the following:

- a. In damp areas.
- b. In areas exposed to the weather.
- c. For all installations within 50 km of the coast.
- d. In plenum chambers containing humidifying equipment.
- e. For surface mounted conduit installations in kitchens and boiler rooms.
- f. In screeds resting directly on soil.
- g. For connection points to future installations.
- h. For underground conduit containing earthing conductors.
- i. In buildings where animals are housed such as cattle, sheep, dogs, etc.

GTS 11.2.3 Terminations

Spouted Connections

Conduits shall be connected directly to draw-boxes with spouted connections. Conduits shall be screwed tightly home, and no threads shall be visible.

Switchboards, Powerskirting, etc

Conduits shall be terminated by means of a brass female bush and two locknuts in pressed steel switchboards and distribution boxes, cable ducts, powerskirting, etc. The conduit end shall only project far enough through the entry hole to accommodate the bush and locknut.

Draw-boxes

A female bush and two locknuts shall be used to terminate conduits at draw-boxes and outlet boxes without spouts, should there be sufficient room in the box. Where there is insufficient room, a coupling, brass male bush and locknut may be used with sufficient allowance for the reduction of the internal diameter by the male bush.

Holes

Holes to accommodate brass bushes shall be large enough to accommodate the bush with a minimum of clearance.

Bush-nuts

Bush-nuts for the connection of earth conductors to conduits are not acceptable.

Screws, Bolts and Nuts

Steel locknuts of thick gauge steel with milled sides shall be used in all cases. Cadmium-plated bolts and nuts shall be used except where the installation is exposed to the weather in which case brass bolts and nuts shall be used. Screws shall be installed in all tapped holes in fittings and accessories to prevent damage to the screw thread by concrete or plaster. The screws shall be screwed completely down to prevent damage to the thread on the screw.

Conduit Ends

Conduit ends shall be cut at right angles to ensure that ends butt squarely at joints. Threads shall not be visible at joints and connections except at running joints. The total length of the thread on the two conduit ends shall not exceed the length of the coupling.

Joints

All conduit ends shall be reamed and all joints tightly screwed. Only approved couplings shall be used. Running joints in screwed conduit with long threads shall be kept to a minimum and locknuts shall be provided to ensure a strong mechanical and a continuous electrical joint.

Finish

All joints shall be painted with red lead to prevent them from rusting in damp areas, areas within 50 km of the coast and in cases where the Installation is exposed to the weather for any length of time. Where the galvanising or black paint has been damaged, the area shall first be cleaned, and a coat of zinc base paint applied subsequently. Additional coats of paint shall only be applied after the undercoat has completely dried. All surface mounted non-galvanised metallic conduit must be painted. (Refer to par. 8.8 of Section B1).

Continuity

Mechanical and electrical continuity shall be maintained throughout the conduit installation.

GTS 11.3 Plain-End Metallic Conduit

As an alternative to the screwed conduit, plain-end conduit complying with The Engineer 's standard specification for "CONDUITS AND CONDUIT ACCESSORIES", of GTS 10.7, may be installed subject to the following additional conditions:

Bending and setting of plain-end conduit must be done with special benders and apparatus manufactured for this purpose and which are obtainable from the suppliers of the system. Damaged conduit resulting from the use of incorrect bending apparatus shall be completely removed and any wiring already drawn into such damaged conduits shall be completely renewed at the Contractor's expense.

Screwed conduit must be used in the following instances:

- (a) In flameproof installations.
- (b) Load bearing conduit.
- (c) For the suspension of luminaires.
- (d) Surface mounted conduit.

Plain-end conduit and associated accessories shall be manufactured of mild steel having a minimum thickness of 0,9 mm and shall comply with the relevant SANS specifications in GTS 1.22.3 hereof. Conduit manufactured of lighter gauge material, i.e. 0,7 mm, will not be permitted.

All conduit and accessories used in areas within 50 km of the coast shall be hot-dip galvanised to the relevant SANS specifications in GTS 1.22.3 hereof. In inland areas electro-galvanised or cadmium-plated accessories will be accepted.

GTS 11.4 Non-Metallic Conduit

GTS 11.4.1 Installation Conditions

Where specified for a particular service, non-metallic conduit may be installed under the following conditions:

All non-metallic conduit shall comply fully with the relevant SANS specifications in GTS 1.22.3 hereof and shall be installed in accordance with Appendix C of the same specification as well as to SANS 10142.

Insulated heat-resistant boxes shall be used for outlets of totally enclosed luminaires and other fittings where excessive temperatures are likely to occur.

Luminaires and other fittings shall not be supported by non-metallic conduit or conduit boxes. These fittings shall be secured to the surrounding structure in a way that is acceptable to The Engineer .

The conduit shall be supported and fixed with saddles with a maximum spacing of 1 m, even in roof spaces. (Refer to the relevant SANS specifications in GTS 1.22.3 hereof). The Contractor shall supply and install all additional supporting timbers required.

It shall be possible to rewire the completed installation in the future without undue difficulty.

Non-metallic conduit and fittings shall not be used under the following conditions:

- (a) Outside a building (unless protected, or sheltered under eaves).
- (b) For mechanical load bearing.
- (c) Where they may be subjected to temperatures below -10°C or above 70°C for prolonged periods.
- (d) As primary electrical insulation.
- (e) In areas where they may be subject to mechanical damage.

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- (f) For applications other than those for which they are designed.

GTS 11.4.2 Painting of Conduits

Exposed conduit may be painted with normal oil or PVA paints, but care must be taken to ensure that the paint used does-not contain any component that will soften or have any other detrimental effect on the materials from which the conduit and fittings are manufactured.

GTS 11.4.3 Connecting of Conduit to Metal Equipment/Components

When any part of a non-metallic conduit system has to be connected to metal equipment or components (e.g. switchboard, surface socket-outlet or switch box, existing metallic conduit system, etc.) fittings and joints manufactured specifically for this purpose must be used. Non-metallic conduit must not be threaded to fit metallic connectors.

GTS 11.4.4 Bends

In conduit of nominal size not exceeding 25 mm, bends may be made in accordance with par. 4.5. In all other cases bends must be achieved by the use of accessories that are introduced into the conduit run. Bends shall comply with SANS 10142.

GTS 11.4.5 Bending

Conduit of nominal size up to and including 25 mm may be cold bent by hand provided that the radius of the bend is greater than six times the nominal size of the conduit, and that the external angle of the bend does not exceed 90°. The procedure (which involves the use of a bending spring) should be as follows :

- (a) Determine the angle through which the conduit is to be bent.
- (b) Warm the cold conduit over the length to be bent by rubbing with hands.
- (c) Select a bending spring which matches the conduit size and insert it into the conduit beyond the point where the bend is required.
- (d) Bend the conduit slowly with one motion (either with the hands alone approximately 1 m apart, or across the knee) to double the required angle, release the conduit and, when its position is stable, withdraw the bending spring (turning it in an anti-clockwise direction to reduce its diameter) and gently correct the angle.
- (e) Install and secure the conduit immediately following bending.

GTS 11.4.6 Adhesive Joints

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All adhesive joints must be made in a clean dry area. The surfaces of all components to be bonded must be dry and clean.

The insertion depth should be marked on the conduit end and the adhesive applied (by means of a soft clean brush) as quickly as possible to the surfaces to be bonded by brushing lengthwise along the conduit, ensuring that a thin coating of uniform thickness is formed. The joint must be made immediately after the application of the adhesive by pushing the prepared parts squarely together with a twisting motion to the full insertion depth. Care must be taken to avoid squeezing adhesive into the cableway and all excess adhesive must be wiped off.

NOTE: Solvent adhesives containing highly volatile liquids and their containers should not be left open.

GTS 11.4.7 Cutting of Conduit

A fine-tooth hacksaw should be used to cut conduit to the required length. Each cut end should be square and free from swarf, burrs and loose material. When determining the length of conduit to be cut, allowance must be made for the length of couplings or accessories attached to the conduit. Incorrect determination will cause bulging of the conduit or insufficient joint length.

GTS 11.5. Flexible Conduit

In installations where the equipment has to be moved frequently to enable adjustment during normal operation, for the connection of motors or any other vibrating equipment, for the connection of thermostats and sensors on equipment, for stove connections and where otherwise required by The Engineer , flexible conduit shall be used for the final connection to the equipment.

The installation shall comply with the relevant SANS specifications in GTS 1.22.3 hereof.

Flexible conduit shall preferably be connected to the remainder of the installation by means of a draw-box. The flexible conduit may be connected directly to the end of a conduit if an existing drawbox is available within 2 m of the junction and if the flexible conduit can easily be rewired.

Flexible conduit shall consist of metal-reinforced plastic conduit or PVC-covered metal conduit with an internal diameter of at least 15 mm, unless approved to the contrary. In false ceiling voids, flexible conduit of galvanised steel construction may be used. Connectors for coupling to the flexible conduit shall be of the gland or screw-in type, manufactured of either brass or mild steel plated with either zinc or cadmium.

GTS 11.6 Installation Requirements

GTS 11.6.1 Positions of Outlets

All accessories such as boxes for socket-outlets, switches, lights, etc. shall be accurately positioned. It is the responsibility of the Contractor to ensure that all outlets are installed level and square, at the correct height from the floor, ceiling or roof level and in the correct position relative to building lines and equipment positions as specified. It shall be the responsibility of the Contractor to determine the correct final floor,

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ceiling and roof levels in conjunction with the Main Contractor. Draw-boxes shall not be installed in positions where they will be inaccessible after completion of the installation. Draw-boxes shall be installed in inconspicuous positions to the approval of The Engineer and shall be indicated on the "as built" drawings.

GTS 11.6.2 Cover plates

All draw-boxes and outlets shall be fitted with cover plates, either as part of the switch or socket assembly or with blank cover plates if unused. Blank cover plates shall match other cover plates in the same area. Flush mounted cover plates in both ceilings and walls shall overlap the draw-box and edges of the recess. If the fixing lugs are substantially deeper than the finished wall surfaces, suitable coiled steel wire or tubes shall be used as spacers.

GTS 11.6.3 Draw-wires

Galvanised steel draw-wires shall be installed in all unwired conduits e.g. conduits for future extensions, telephone installations and other services.

GTS 11.6.4 Bends

A maximum of two 90° bends or the equivalent displacement will be allowed between outlets and/or boxes.

Draw-boxes shall be installed at maximum intervals of 15 m in straight runs. All bends shall be made without heating the conduit or without reducing the diameter of the conduit. The inside radius of a bend shall not be less than five times the outside diameter of the conduit. (Also refer to SANS 10142)

GTS 11.6.5 Wall Socket-outlets

Where more than one socket-outlet is connected to the same circuit, the conduit shall be looped from one outlet box to the following on the same circuit. Where a metal channel is used, the conduit may be installed from the channel directly to the outlet box on condition that the conductors can be looped from one outlet to the next without making any joints in the wires.

GTS 11.6.6 Luminaires

Where the conduit end is used to support luminaires, a ball-and socket type lid shall be fitted to the pendant box in all cases where the conduit is longer than 500 mm. In all other cases a dome lid may be used. Where luminaires are specified which are fixed directly to the pendant box, the pendant box shall be fixed independently of the conduit installation except where the pendant box is cast into concrete.

GTS 11.6.7 Flush Mounted Outlet Boxes

The edges of flush mounted outlet boxes shall not be deeper than 10 mm from the final surface. Spacer springs shall be used under screws where necessary.

GTS 11.6.8 Excess Holes

All excess holes in draw-boxes or other conduit accessories shall be securely blanked off by means of brass plugs to render the installation verminproof.

GTS 11.6.9 Debris

Care shall be taken to prevent debris or moisture from entering conduits during and after installation. Conduit ends shall be sealed by means of a solid plug which shall be screwed to the conduit end.

Conduits shall be cleaned and swabbed to remove oil, moisture or other debris that may be present before conductors are installed. Swabs shall not be attached to the conductors.

GTS 11.6.10 Defects

Each length of conduit shall be inspected for defects and all burrs shall be removed. All conduits that are split, dented or otherwise damaged or any conduits with sharp internal edges shall be removed from site. The Contractor shall ensure that conduits are not blocked.

GTS 11.6.11 Withdrawal of Conductors

To ensure that all electrical conductors are easily withdrawable from conduits and to ensure that there are no joints in the conductors, The Engineer's representative will have the right to have the conductors of any circuit removed at his discretion. If the conductors are found to be in a satisfactory condition after having been withdrawn, The Engineer shall bear the cost of withdrawing and re-installing such conductors. If the conductors are found to have been damaged during installation or removal or if joints are found, they shall be replaced, and the cost shall be borne by the Contractor.

GTS 11.7 Installation in Concrete

GTS 11.7.1 Timeous Installation

In order not to delay building operations, the Contractor shall ensure that all conduits and accessories which are to be cast in concrete are placed in position in good time. The Contractor or his representative shall be in attendance when the concrete is cast.

GTS 11.7.2 Draw-boxes

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Draw-boxes, expansion joints and round ceiling boxes shall be installed where required and shall be neatly finished to match the finished slab and wall surfaces. Ceiling draw-boxes shall be of the deep type. In hollow block slabs, rear-entry draw-boxes shall be used. In columns where flush mounted draw-boxes are installed, the conduits shall be offset from the surface of the column immediately after leaving the draw-box.

GTS 11.7.3 Elbows

Elbows for conduits of 32 mm dia. and smaller and sharp bends will not be allowed in concrete slabs.

GTS 11.7.4 Cover Plates

Draw-boxes and/or inspection boxes shall, where possible, be grouped together under a common approved cover plate. The cover plate shall be secured by means of screws.

GTS 11.7.5 Neutral Axis

All conduits shall be installed as close as possible to the neutral axis of concrete beams, slabs and columns. The conduits shall be rigidly secured to the reinforcing to prevent movement towards the surface of the concrete.

GTS 11.7.6 Fixing to the Shuttering

All conduits, draw-boxes etc. shall be securely fixed to the shuttering to prevent displacement when concrete is cast. Drawboxes and outlet boxes shall preferably be secured by means of a bolt and nut installed from the back of the box through the shuttering. Fixing lugs may also be used to screw the boxes to the shuttering. Wire will not be accepted for securing boxes to the shuttering where off-shutter finishes are required. Where fibreglass shuttering is used by the Builder, the equipment shall be fixed to the steel only and no holes shall be drilled or made in shuttering. All draw-boxes and outlet boxes shall be plugged with wet paper before they are secured to the shuttering.

GTS 11.7.7 Concrete Floor Slabs

Conduits will not be allowed in concrete floor slabs of boiler rooms (or boiler houses), laundries or other damp areas. All socket-outlets and three-phase outlets in damp areas shall be supplied from above with galvanised conduit and accessories.

GTS 11.7.8 Expansion Joints

As far as possible, conduits shall not be installed across expansion joints. Where this is unavoidable a conduit expansion joint shall be provided. (Refer to par. GTS 11.10)

GTS 11.7.9 Screeds

The installation of conduits in floor screeds shall be kept to a minimum. Where conduits are installed in screeds, the top of the conduit shall be at least 20 mm below the surface of the screed. Where the screed is laid directly on the ground, galvanised conduits shall be used. This ruling will always be applicable to the lowest floor of a building. A minimum distance of twice the outside diameter of the conduit shall be left free between adjoining conduits. Conduits shall be secured to the concrete slab at intervals not exceeding 2 m. The Contractor shall ensure that conduits are not visible above the screed where the conduits leave the screed.

GTS 11.7.10 Inspection

All draw-boxes, conduits, etc. which are installed in concrete shall be cleaned with compressed air and provided with draw-wires two days after removal of the shuttering. Errors that occurred during the installation of the conduits, or any lost draw-boxes, or blocked conduits shall be immediately reported to The Engineer by telephone and confirmed in writing in order that an alternative route can be planned and approved by The Engineer before the additional concrete is cast. Any additional cost shall be for the Contractor's account.

**GTS 11.8 Surface Installations and Installations in
Roof Spaces**

GTS 11.8.1 Appearance

- (a) All conduits shall be installed horizontally or vertically as determined by the route and the Contractor shall take all measures to ensure a neat installation.
- (b) Where conduits are to be installed directly alongside door frames, beams, etc. that are not true, conduits shall be installed parallel to the frames, beams, etc.
- (c) All labels shall be removed from surface mounted conduit.

GTS 11.8.2 Saddles

Conduits shall be firmly secured by means of saddles and screws and in accordance with SANS 0142. Where saddles are used to secure vertical lengths of conduit connected to surface mounted switch boxes or socket-outlet boxes, the saddles shall be spaced so that the intervals between the box and the first saddle, between any two successive saddles and between the last saddle and the ceiling or roof are equidistant. Conduits shall be secured within 150 mm before and after each 90° bend and within 100 mm of each outlet box.

GTS 11.8.3 Joints

Joints will only be allowed in surface conduit lengths exceeding 3,5 m. Threads shall not be visible at joints of completed installations, except where running joints are used. Running joints will be allowed only when absolutely necessary. All running joints shall be provided with locknuts and shall be painted with red lead immediately after installation.

GTS 11.8.4 Accessories

Inspection bends or tee pieces shall not be used. Non-inspection type bends may be used in the case of 32 mm or 50 mm diameter conduits. All draw-boxes supporting luminaires or other equipment shall be fixed independently of the conduit installation.

GTS 11.8.5 Offsets

Where an offset is required at conduit terminations or crossovers, the conduit shall be saddled at the offset.

GTS 11.8.6 Cross-over

Conduit routes shall be carefully planned to avoid cross-overs. Where a cross-over is inevitable, one conduit only shall be offset to cross the other. Cross-overs shall be as short as possible and shall be uniform. Alternatively, cross-overs shall be installed in purpose-made boxes. This method shall be employed on face brick walls and in other circumstances where required by The Engineer .

GTS 11.8.7 Parallel Conduit

Parallel conduit runs shall be equidistant, and saddles shall be installed in line. Alternatively, a special clamp may be used to secure all conduits in unison. In the case of conduits of different diameters, the latter method shall only be used if a purpose-made clamp designed to accommodate the various conduit sizes, is provided.

GTS 11.8.8 Painting of Conduit

All surface mounted conduits and accessories shall be painted with a high-quality enamel paint or as otherwise specified. The colour shall comply with the colour code specified for the installation or where no code has been specified, shall match the colour of the surrounding finishes.

GTS 11.8.9 Conduit in Roof Spaces

In open roof spaces (no ceiling) conduits shall run along the wall plates and the rafters. The installation of conduits suspended between the rafters is not acceptable.

Conduit in roof spaces shall be installed parallel or at right angles to the roof members and shall be secured at intervals not exceeding 1,5 m by means of saddles screwed to the roof timbers.

Nails or crampets will not be allowed.

Under flat roofs in false ceilings or where there is less than 900 mm clearance, or in instances where the ceilings are insulated with glasswool or other insulating material impeding access, the conduit shall be installed in a manner which allows for wiring from below the ceilings.

Conduit runs from switchboards shall terminate in fabricated sheet steel draw-boxes installed directly above or in close proximity to the boards.

Spare conduits covering the total number of spare ways on switchboards, shall be provided between the boards and the roof draw-box.

GTS 11.8.10 Fixing to Walls

Only approved plugging materials such as fibre plugs or plastic plugs, etc., and round-head screws shall be used when fixing saddles, switches, plugs etc. to walls. Wood plugs are not acceptable nor should plugs be installed in joints in brick walls.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

GTS 11.9 Future Extensions

GTS 11.9.1 Open Roof Spaces

Conduits intended for future switches and socket-outlets, shall terminate 40 mm above the tie beams in roof spaces with more than 900 mm free space. The conduit ends shall be threaded and fitted with a coupling and brass plug.

GTS 11.9.2 Concrete Slabs

Conduit ends shall protrude 150 mm from the concrete to facilitate the installation of future extensions above, below or to the side of the concrete slabs. All these conduits shall be connected to a draw-box which is cast into the concrete within 2 m of the end of the concrete. Conduit ends shall be threaded and fitted with a coupling and brass plug. In cases where holes cannot be drilled through the shuttering to accommodate the conduit end, a deep draw-box with rear entry may be placed over the conduit end.

GTS 11.9.3 Cover Plates

Unused boxes for switches and socket-outlets shall be covered with metal cover plates. Unused boxes for luminaires shall be covered with round galvanised metal cover plates which fit tightly against the finished surface. The cover plate shall overlap the outlet box and recess.

GTS 11.9.4 Galvanised Conduit

Galvanised conduit shall be installed at all free ends intended for future extensions. The conduit shall be treated with a paint which will prevent corrosion and white rust.

GTS 11.10 Expansion Joints

Where conduits cross expansion joints in the structure, approved draw-boxes which provide a flexible connection in the conduit installation shall be installed.

The draw-box shall be installed adjacent to the expansion joint of the structure and a conduit sleeve, one size larger than that specified for the circuit, shall be provided on the side of the draw-box nearest the joint. The one end of the sleeve shall terminate at the edge of the joint and the other shall be secured to the draw-box by means of locknuts.

The circuit conduit passing through the sleeve shall be terminated 40 mm inside the draw-box and in the case of metallic conduit, the conduit end shall be fitted with a brass bush. The gap between the sleeve and the conduit at the joint shall be sealed with 'Pratley Tic-Tac' or equal sealing compound, to prevent the ingress of wet cement. In the case of metallic conduit, an earth clip shall be fitted to the conduit projection inside the draw-box and the conduit bonded to the box by means of 2,5 mm² bare copper earth wire and a brass bolt and nut.

The end of the other circuit conduit shall be secured to the draw-box by means of locknuts and a brass bush in the case of screwed metallic conduit or a standard bushed adaptor for other conduit types.

In the case of metallic conduit, a 2,5 mm² bare copper wire shall be installed between the first conduit boxes on either side of the joint, in addition to an earth wire which may be specified for the circuit. The conduit boxes shall be drilled and tapped, and the earth wire shall be bonded to the boxes by means of lugs and brass screws.

Suitable steel cover plates shall be screwed to draw-boxes installed along the expansion joint. The cover plates shall be installed before the ceilings are painted.

Where a number of conduits are installed in parallel, they shall cross the expansion joint of the structure via a single draw-box. A number of draw-boxes adjacent to each other will not be allowed.

C3.5 : Mechanical Specifications

Mechanical and Process

D.1 DESCRIPTIVE

The Mechanical Works Section of the Contract covers the stripping, inspection, retrofitment, re-installation, supply, delivery, transport, handling, storage, erection, installation, commissioning, testing, adjustment, handing over in complete working order and upholding during the Defects Liability Period of all mechanical plant, existing and new, to be incorporated in the project.

D.2 SCOPE AND SUB-DIVISION OF CONTRACT

The construction of all new structures, foundations, channels, etc. to accommodate and render complete the plant and equipment will be part of the Civil Engineering Works. The refurbishment, retrofitment, supply, installation, testing and commissioning of all plant and equipment, all as described under Section D of this Tender Document, will be part of the Mechanical Works Section and adequate allowance thereof must be made in the Tender.

D.3 SITE OF WORKS

The location of the Site of Works is indicated on the locality plan C3.2. The site accessible by road and the pumpstation has internal access path that will be improved as part of this project.

Tenderers must visit the Site of Works and satisfy themselves as to the means of access and everything affecting the delivery, storage, handling and complete erection and installation of the plant and equipment.

D.4 SITE CONDITIONS

Water and electricity will be available on site and the contractor shall make arrangements with the Employer for obtaining these services. The Tenderer shall make allowance in his Tender Prices for use of these services.

Water and electricity will be made available free of charge for commissioning the plant.

The contractor shall provide, maintain and supervise all ablution facilities and latrine accommodation necessary for his employees in accordance with the requirements for the Authority/ties concerned and shall clear the Site properly on completion of the work, if directed by The Engineer , on completion of any portion of it. The Contractor shall provide his own office facilities.

The Contractor shall also be required to make his own arrangements in respect of telephone services.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

The Contactor shall be held responsible for any damage caused by his employees to the Council's buildings, structures, buried and overhead services, work under construction or other assets, and for safeguarding traffic, man and beast against injury from the presence and execution of his works. He is to provide suitable watchmen, guard rails, lights and warning for plant, equipment, stacks of materials or open trenches in his care. All the measures he adopts are subject to the approval of The Engineer .

D.5 COMPLIANCE WITH REGULATIONS

All equipment including temporary works and construction equipment must comply with the requirements of the Occupational Health and Safety Act, Act no. 85 of 1993. The Contractor must meet all costs involved should alteration be necessary to secure compliance with the regulations mentioned.

D.6 POWER SUPPLY

The power supply at the site of works is 230 V (AC), 50 Hz, ($\pm 5\%$) for single phase and 400V (AC) at 50 z, ($\pm 5\%$) for three phase.

D.7 ACCEPTANCE OF TENDERS

Tenders will be assessed on the Employer's estimate of the best value offered and to be able to do this, the Employer will itself estimate, at current rates, the cost of civil engineering works associated with the mechanical equipment and/or works offered under the Mechanical Works Section. In adjudicating the Tenders, account will also be taken of:

- Delivery period
- Annual cost of running the plant during the period of its normal life
- Ease of maintenance
- Technical resources and previous experience of the Tenderer
- General soundness and robustness of design
- Reliability of components
- Any special conditions or qualifications put forward by the Tenderer

D.8 INFORMATION TO BE SUPPLIED BY TENDERER

To facilitate assessment of Tenders on the basis indicated in Clause D.7 above, Tenderers shall supply the following information with their Tenders:

Dimensioned scale drawings, size A3 of the layout of all the plant in relation to each other and to the structure to house them and in sufficient detail to permit assessment of the cost of the civil engineering works by the Employer. Full information regarding space, requirements, loading and supporting structures and major openings to be left in the structure must be included.

A full and detailed description and illustrations or drawings of the plant and ancillaries and of materials used in the construction thereof.

Drawings, illustrations, etc. referred to in this clause shall be submitted with the Tender, and in the event of the Tender being accepted, two further copies of the abovementioned drawings, illustrations, etc. shall be submitted by the Tenderer for inclusion in copies of the formal Contract Document.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

The information called for in either the Specification or Technical Data Sheets shall be supplied at the time of tendering. However, these are not necessarily comprehensive and the responsibility for the supply of sufficient information rests with the Tenderer.

Any additional information shall be given either in the form “Alterations by Tender” or in a covering letter referred to in “alterations by Tenderer” and all drawings, sketches, pamphlets, etc. submitted with the Tender shall be listed in “Alterations by Tenderer”.

D.9 DATA TO BE SUPPLIED BY SUCCESSFUL TENDERER

Refer to Contract Data (C1.2)

D.10 DOCUMENTS

The whole of this Specification, together with all Schedules and Parts thereof and any drawings or information submitted by the successful Tenderer, will be considered as part of the Contract Document.

D.11 PERIOD FOR WHICH TENDER HOLDS GOOD

The submission of a Tender shall be deemed to constitute an agreement between the Tenderer and the Employer whereby such Tender shall remain open for acceptance by the Employer for a period of 90 (ninety) days from date on which tenders are, in terms of the advertisement calling for Tenders, returnable, during which period the Tenderer agrees not to withdraw his Tender or derogate from its effect.

D.12 SUFFICIENCY OF TENDER

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his Tender and of the prices stated in the Schedule of Prices which prices shall cover all his obligations under this Section of the Contract and all matters and things necessary for the proper completion and upholding of the Works.

Since there may be minor operations, items of materials, matters and details necessary for the proper execution and completion of the Works under this Section of the Contract, which are neither shown on the drawings nor particularly mentioned in the Specification, the Contracts shall include for such minor operations, materials, matters and details as if they had been expressly detailed and described. The Contractor shall execute as part of this Section of the Contract every requisite for the full and perfect completion of the whole Works, except as may be specifically accepted in the Contract

D.13 INTENT OF SPECIFICATION

The Specifications for the Mechanical Works supplied with the Tender Document are not intended to be either complete in detail or to prescribe rigidly the plant to be offered or the general layout of the works but are intended only as guide to Tenderers. The Specification details the minimum requirements of the Employer and Tenderers must provide everything necessary, whether mentioned or not, to provide a satisfactory, efficient and workmanlike installation. Should Tenderers consider that deviations from or additions to the plant as specified by the Employer are necessary, these must be described and accounted for in detail as set out in Clause D.14. any exclusion by the Tenderer to the installation as specified shall be itemized and described in detail.

D.14 VARIATION FROM SPECIFICATION

Should the Tenderer desire to make any alterations to the Specification with regard to the material or plant offered to the conditions testing or other procedure, he shall set out his proposals in detail on the forms provided in this Document, or alternatively, shall set them out in detail in a separate letter accompanying his Tender. No alteration, amendment or exclusion will be recognized unless adequately set out as described above.

D.15 SCHEDULE OF PRICES

The prices quoted in the Schedule of Prices for the Mechanical Works shall cover the cost of all work required for the execution of the Contract and each piece shall be considered as the full value of the work described in each item and as covering all contingent expenses.

No special item has been provided in the Schedule of Prices for Mechanical Works to cover costs such as establishment charges, royalties, insurances, etc. and Tenderers shall allow for these costs in their prices for the supply, erection, installation and upholding of the plant offered.

D.16 MARKING

All plant delivered under this Contract shall have painted or marked thereon or on the container the relative item number given in the Schedule of Prices.

D.17 OFF-LOADING, STACKING AND LIABILITY FOR BREAKAGES

The Contractor will be required at his own expense to make all arrangements for off-loading and carefully staking all plant delivery under this Contract at the Site of Works. The off-loading and stacking shall be carried out strictly in accordance with the requirements of The Engineer so as to permit a thorough and careful examination and testing of all items for breakages, fractures, etc. and any routine maintenance during storage.

The Contractor shall be fully responsible for the protection of all plant delivered by him to Site but still in storage, against damage by water, weather, fire and any other interference until such time as it is erected and installed, put into satisfactory operation and accepted by the Employer as complete.

D.18 STORAGE

Facilities for extended storage at Site for plant may not always be available and the Contractor shall therefore make his own arrangements for any off-site storage which may be required for plant which become available before installation thereof can be commenced. Tenderers shall state in their tenders what the cost of such off-site storage will be.

Should the Contractor claim payment of a portion of the value of some or all of the plant held in off-site stores, the items concerned must be clearly marked: "The property of the Vhembe District Municipality" and a certificate to this effect shall accompany his claim detailing the items and serial numbers included in his claim as well as the street address of the store where the plant is held. In addition, a certificate must also be

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

finished by the company with whom the plant has been insured in terms of the requirements of the Contract, in which it is certified that the plant for which the Contractor is claiming payment is fully covered by the insurance policy concerned while the plant is stored away from the Site (street address of store to be stated).

D.19 INSPECTION AT SITE

All plant will be carefully examined upon delivery at the Site by The Engineer 's representative and all items showing defects or damage of any description shall be laid aside as not being in accordance with the requirements of the contract and these shall be removed and replaced by the Contractor at his own cost.

D.20 TEMPORARY HOUSING, STORES, ETC.

The Contractor shall provide and maintain at his own cost all sheds of a temporary nature necessary for the convenience of his workmen and for the accommodation and proper protection of plant from damage and loss. These are erected only on sites which shall have been approved by The Engineer and they shall be removed as soon as their necessity ceases and the site thereof restored to its original condition and the ground left clean and sanitary.

D.21 ERECTION, INSTALLATION, ADJUSTMENT AND OPERATION

Installation of the plant is to be carried out by skilled artisans, experienced in the type of work to be executed, under the personal supervision of the Mechanical Sub-Contractor's Erection Engineer, whose qualifications and experience to supervise this work must be acceptable to The Engineer . The plant, when erected and installed, shall be of neat and workmanlike appearance, solidly and evenly supported, true to line and level, plump and in proper working order. The methods used and equipment employed will be subject to the approval of The Engineer .

Before handing over the plant, the Contractor is to ensure that every component is operating satisfactorily. The Contract will not be deemed to have been completed until The Engineer is fully satisfied in this connection.

D.22 PROGRAMME OF WORK

Where the work must of necessity be carried out in conjunction with the work of other contractors or with that of the Employer, it shall be co-ordinated and arranged in such a manner as to interfere as little as possible with the progress of such other work, and so as to offer every reasonable facility to other contractors or to employees of the Employer.

The contractor shall allow for the presence on site of other contractors engaged with other contracts on the same site. He shall assure them of access to their places of work and make allowance for short delays while they perform certain work.

D.23 TIME OF DELIVERY AND COMPLETION

The Tenderer is to state in the Schedule of Prices:

- The period in which he undertakes to effect complete delivery of all plant purchased by the Employer in terms of the Contract.

- The period, from the date of notification from The Engineer to proceed, he requires to complete the erection and installation.
- The period, from the date of notification from The Engineer to proceed, he requires to complete the putting into operation, testing and handing over to the Employer of the plant in a clean and proper operating condition.

Subject to any requirements in the Specification as to completion of any portion of the Works, it shall be completed within the times mentioned at the end of the Schedule of Prices, subject to any extension of time that may be granted in accordance with the Contract.

D.24 PERFORMANCE TESTS

On the completion of erection and installation the Contractor must carry out the following tests, where applicable, in addition to any other tests which may be specified elsewhere:

- Before commissioning:
- Installation tests are required by the Council's By-Laws.
- Earth continuity tests.
- Tests for correct direction of rotation of motors and reverse if necessary.
- Test for correct operation of control gear setting of overload protection equipment, etc.
- Test for correct alignment of shaft bearings
- After commissioning:
- Checking overall functions of the unit under specified conditions.

On completion of installation and putting into proper operation all the plant and equipment, the Contractor will be required to make suitable arrangements for the testing of all plant and equipment supplied under this Contract, in presence of The Engineer or his representative.

The entire cost of testing, including supply of test equipment, must be borne by the Contractor and an adequate allowance for such tests must be made in the tendered price.

D.25 DEFECTS LIABILITY PERIOD

During this period (i.e. 52 weeks stated as the Defects Date according to NEC3), the Contractor must visit the Site at least three times, 1, 6 and 12 months respectively, after the Commissioning Date, to inspect and check all the plant supplied and installed by him for proper operation and to adjust where necessary, and to satisfy himself that the regular maintenance of the plant is being carried out correctly and in accordance with the written instructions supplied by him.

Visits for the various Sections of the Mechanical Works will naturally coincide with each other in which case the Contractor will be reimbursed at the rates submitted under one section only.

D.26 OPERATING AND MAINTENANCE INSTRUCTIONS

Before completion of the testing of the plant, the Contractor shall provide the Employer with adequate and complete working, operating and maintenance instructions in triplicate, with the necessary drawings and diagrams clarifying the instructions.

Instructions are to be made up in book form and particular reference is to be made to:

- maintenance of equipment
- types of lubricants to be used

- bearings and moving parts which require particular attention, including a spare part list and drawings showing the individual items
- frequency of lubrication services
- precautions to be taken in running the plant
- maintenance of speed reducers/increasers
- all instruments and components must be fully described in data sheets supplied by the relevant suppliers
- wiring diagrams of the complete electrical installation
- the manual must be specific for the plant supplied and all extraneous material not connected with the relevant plant shall be deleted, leaving the manual as a comprehensive coherent document, bound in a professional way such that it may be used frequently without falling apart. Standard pamphlets may be supplied as addenda, bound separately in a good quality file to serve as a reference but will not be allowed as part of the main manual. The Contractor shall allow in his tender price for the supply of these operating maintenance instructions.

D.27 QUALITY OF MATERIALS AND EQUIPMENT

All material, plant and equipment shall be the best quality available and shall, where applicable, comply with the relevant standard specifications of the SABS. In cases where no specification of the SABS exists, the relevant British, German or American specifications will be applicable as determined by The Engineer . The latest amendments of these specifications shall apply.

The Contractor shall submit for the approval of The Engineer and before any orders are placed, the names of the firms from which he proposed to obtain his supplies of materials and manufactured articles.

He shall also apply samples as and when required by The Engineer .

The Engineer may also, in exercising the powers vested in him, order the Contractor to remove all or any of the material and equipment which, in his opinion, is of an inferior quality and to replace them with proper materials or equipment at his own expense.

D.28 CONTRACTOR'S DRAWINGS, DATA AND DESCRIPTIONS

Sufficient preliminary information shall be submitted with the tender, in respect of the mechanical equipment offered, to enable The Engineer to assess the offer.

The drawings shall contain the following:

- All dimensions of the equipment offered including all details of the foundations, holes, ducts, layout, etc.
- Wiring diagrams for motor control centres.

If The Engineer requires any modifications to be made, the relevant Drawings will be returned to the Contractor, suitably marked up with the modification required. He shall amend his Drawings and submit these in triplicate to The Engineer within 14 days after The Engineer has posted or given the Drawings to the Contractor. The Engineer will sign one copy of each Drawing approved in principle and return it to the Contractor. Only if such approved Drawings have been received, will interim certificates be considered for payment. The full responsibility for the Drawings shall rest with the Contractor notwithstanding The Engineer 's approval thereof.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

All construction Drawings of structures in which equipment will be fixed or operated will be supplied by the contractor.

Fabrication (vendor) Drawings shall be submitted to The Engineer for approval in principle only.

D.29 ENGINEER TO APPROVE PLANT

It is a condition of this Contract that the Contractors shall submit details of all equipment (i.e. motors, gearboxes, electrical equipment, etc) to the Engineer for his written approval before placing final orders for such equipment. This is to ensure that the equipment ordered is in accordance with that offered according to the Technical Data Sheets.

The shop details for all fabricated steel items shall be submitted to the Engineer for checking prior to commencing fabrication. The Engineer shall require the Contractor to change any design details that on checking are found not to comply with the Specifications given herein, and no extra payment will be made for such changes. The Engineer's approval will not relieve the Contractor of his full responsibilities for the due performance of the equipment installed.

The design of all methods of joining and fixing concrete structures shall be submitted to the Engineer for approval. Such approval will not relieve the Contractor of his full responsibility for the proper performance of the Works.

Mechanical joints subject to vibration or movement during the working life of the equipment, or those in inaccessible places, shall have the nuts locked or pinned, or the bolts peened over.

He shall also supply samples as and when required by The Engineer .

The Engineer may also, in exercising the powers vested in him, order the contractor to remove all or any of the material and equipment which, in his opinion, is of an inferior quality and to replace them with proper materials or equipment at his own expense.

D.30 DEWATERING, INSTALLATION, ERECTION AND AFFIXING OF MECHANICAL AND ELECTRICAL EQUIPMENT TO STRUCTURES

Dewatering of structures in which installation of the plant is to take place will also be the responsibility of the Contractor and he must either allow therefore in his rates or give a rate for the use of a pump of specified size and pumping capacity in his covering letter.

The Contractor shall be responsible for ensuring that any work carried out by his own staff or any sub-contractor working for him is carried out to his satisfaction and that the equipment meets all the requirements of the Specification as well as of all laws and all statutory regulations applicable to the Works.

All connectors such as anchor bolts (cast in situ or grouted), expansion bolts, base plates, etc, shall be designed by the Contractor to suit the equipment supplied by him and to ensure compliance with these Specifications.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

All mechanical/electrical equipment supplied and delivered under this Contract shall be placed and firmly fixed in position by the Contractor on holding bolts supplied by him to ensure that it will operate efficiently to the satisfaction of the Engineer. Affixing shall mean the supply and installation of all nuts, bolts, plates, grout etc. and shall include for all labour and other activities such as sawing, cutting, filing, grinding, drilling, welding, repair of corrosion protection, grouting, etc. required for fixing the equipment. If the Contractor does not have the qualified personnel at his disposal, he shall appoint the necessary specialists at his own cost.

The Contractor shall be responsible for providing all bolts, nuts and washers. Bolts, nuts and washers below water level shall be of stainless steel 316L unless otherwise specifically approved by the Engineer. All other bolts, nuts and washers shall be galvanized in accordance with SABS 769 for Class B2 articles.

All dimensions of all equipment shall be checked by the Contractor after manufacture and on delivery.

D.31 TESTING AND COMMISSIONING OF EQUIPMENT

Before starting up any section of the mechanical plant or filling tanks and sumps with liquid, the Sub-Contractor for the Mechanical Works shall clean out the tanks or structures or, if necessary, arrange with the Main Civil Contractor to remove any building rubble from the structures, check that all nuts are tightened correctly, that all equipment is complete and ready for start-up, that the plant has been installed correctly and that three copies of the operating manuals have been handed over.

Each section of the equipment shall be started up by the contractor and he shall ensure that all oil fillings, lubrication, vibration monitoring, etc. have been correctly completed. In addition, he shall be responsible for the first re-filling of all lubricating oils as well as for adjusting the plant to operate according to Specification. These costs shall be allowed for his Tender.

The Contractor shall carry out his own tests on the equipment and only when these tests meet the requirements of the Specification shall he notify the Engineer, giving him 24 hours' written notice, that he is ready to commence with official commissioning tests.

The contractor shall carry out his own tests required to satisfy the Engineer that the plant is capable of performing the duties prescribed in the Specification and shall allow for this in his Tender. Any defects detected during the testing operation shall be made good by and at the expense of the Contractor, including all additional costs incurred by the Employer and his representatives and the engineer. These tests shall be carried out to certify that the plant as installed on Site, is operating in accordance with the specified and guaranteed hydraulic, mechanical and electrical performance of the equipment and must be witnessed by the Engineer. Three copies of reports on all tests shall be submitted within two weeks after the tests have been carried out.

When all the tests required before commissioning of the Works have been completed and accepted by the Engineer, the commissioning may proceed. The Contractor shall instruct the operating staff in the correct procedure of operating the plant in all circumstances of operation, including emergency conditions, the correct servicing of every part, type of oil or grease to use, and similar instructions. This shall be done by demonstration and confirmation in writing, and operating manuals shall be referred to for this purpose.

All tests that have not been carried out shall be completed during the commissioning period and be approved before handing over the equipment to the Employer.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

During the commissioning period the Contractor shall be responsible for providing all labour and materials (including testing equipment) and shall carry out all servicing and any adjustment of plant required to ensure that it operates as specified.

Testing of the plant shall include operating at conditions as guaranteed and required in the Contract for hydraulic requirements, process requirements and power consumption of all equipment. All safety devices, standby plant, automatic controls and protection devices shall be adequately tested for reliability and correct functioning.

D.32 DRAWINGS AND MANUALS

One month before the Mechanical Works are commissioned the Contractor shall provide the Engineer with the following, for which he shall have provided for in his Tender:

- three sets of paper prints of all mechanical as-built Drawings, A3 size.
- three sets of operating manuals, operating and maintenance instructions of each item of mechanical/electrical plant, made up in book form.
- A high standard of draughtsmanship shall be required for the as-built Drawings. Apart from complying with SABS 0143, the following requirements shall apply:
- Each drawing shall be A3 size

No drawing shall have lettering that is less than 3mm in height.

The Engineer will scrutinize all Drawings submitted to him and may reject any Drawing of which the standard of draughtsmanship is not to his approval. It goes without saying that all technical information on all Drawings shall be correct.

Particular reference is to be made in the operating manual to:

- precautions to be taken in running the plant,
- maintenance instructions, including bearings and moving parts that required special attention,
- types of lubricants to be used,
- maintenance and routine tests which the Contractor suggests be carried out on the plant to ensure that the plant is kept in good repair,
- wiring diagrams of the complete electrical installation (as installed).

The Certificate of Completion will not be issued nor will the Works be deemed to be completed before the operating and maintenance instructions and Drawings have been supplied and approved.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

C3.6 Mechanical Specifications: Materials and Workmanship

E.1General

All materials and components used in the manufacture and fabrication o plant to be supplied under this Section of the Contract shall be the best quality and suitable for the purposes for which they are intended and shall, where applicable, comply with the relevant standard specifications of the SABS. In cases where no specifications will be applicable as determined by The Project Manager, the latest amendments of these Specifications shall apply.

E.2Quality Management

E.2.1 Applicable Quality Assurance Standards

The Tenderer shall provide a co-ordinated and formally documented statement of his quality management system, including quality management objectives, policies, organization and procedures, for the compulsory implementation of SABS 0157, Code of Practice for Quality Management Systems, Part III. The same applies to Part II of the said Code of Practice, which must be implemented on certain selected items only. However, although Part II will not be implemented in all instances it will not exempt the Contractor of compliance with the quality requirements laid down in the tender documents. Monitoring and control by The Project Manager may be done at any time on any material.

The Contractor shall submit with his tender an assessment report on his quality management and quality control system issued by an independent Quality assurance Authority approved by The Project Manager. The inspection on which this assessment report is based shall have taken place not more than twelve months prior to the closing date of this tender.

Responsibility for and all associated costs of compliance with this sub-clause shall rest with the Contractor.

E.2.2 Quality Assurance Enhancement

Should the Contractor or any of the proposed sub-contractors not comply with Sub-Clause 1 at the time of tender a Contract may be awarded subject to a written undertaking to enhance his own and/or sub-contractor's quality assurance system to the satisfaction of The Project Manager before commencement of the Contract.

E.2.3 Quality Assurance Staff

The Contractor shall satisfy The Project Manager that a quality specialist together with sufficient and suitably qualified staff will be assigned to control the quality of material used by the Contractor and to monitor the quality of the material used by each sub-contractor engaged in the supply of critical and major components and major assemblies.

The curriculum vitae of the quality specialist shall be submitted to The Project Manager at the time of tender. The Project Manager shall approve the proposed quality staff in writing and changes of staff shall require the written agreement of The Project Manager.

If The Project Manager considers that the proposed quality specialist and/or quality staff is inadequate or becomes inadequate during the course of the Contract due to staff changes or for any other reason, the Contractor shall employ for the period of the Contract and at his own cost an independent specialist and/or sufficient and suitably qualified staff approved by The Project Manager.

E.2.4 Engineers Quality Assurance Representative

The Project Manager may elect to appoint an independent quality assurance representative to act in a surveillance capacity on his behalf for part or all of the Contract.

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Employer

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Witness 2

E.2.5 Classification of Material

Part II of the above mentioned Code of Practice i.e. a quality system for manufacture and installation, will apply only to certain critical material, products and services indicated in the tender documents, of which The Project Manager considers the manufacturing and the installation stages of such critical importance that quality assurance by the Contractor shall be of an even higher level than that prescribed in Part III.

E.2.6 Sub-letting

All enquiries made and contracts placed by the Contractor for critical components shall require that sub-contractors comply with the requirements of the preceding Sub-Clauses. Responsibility for and all associated costs of compliance shall rest with the Contractor. In instances where CABS 0157 is not applicable, Tenderers must indicate what equivalent alternative Code of Practice is being implemented.

E.2.7 Disqualification

Tenderers who do not include the formally documented statements called for in Sub-Clause 1 and who do not respond in terms of Sub-Clause 2 above will be disqualified.

E.3Standard Specifications

Reference made hereinafter to specifications of the South African Bureau of Standards, (SABS) or the British Standards Institution (BS) shall be deemed to include all revisions of and/or additions to such specifications ruling at the closing date of tenders.

E.4Protection Against Corrosion

Where corrosion of metal may be expected, the Contractor shall supply materials which are resistant to corrosion, any material showing signs of corrosion, tuberculation or pitting before expiry of the Defects Liability Period must be replaced by the Contractor. The tendered prices will be held to include the cost of all painting or other surface treatment which is not separately specified or scheduled but which is nevertheless necessary for the protection of surfaces against corrosion. All corrosion protection shall conform to the Corrosion Protection Specification for Civil, Mechanical and Electrical Engineering Construction, New Revised 2001 Edition, prepared by Wates, Meiring and Barnard (Pty) Ltd.

E.5Structural Steelwork

The design of structural steelwork and the materials and workmanship used in the construction of same shall comply with the requirements of SABS 0162 and 1431. Grade 300 W steel shall be used.

In the case of welded connections, in addition to welds required for structural strength, a sealing weld shall be carried right around the connection so as to facilitate protection against corrosion.

E.6Screwed and Socketed Steel Pipes and Malleable Cast Iron Fittings

All screwed and socketed pipes shall be solid-drawn, seamless, medium duty and shall comply with the requirements of SABS 62. Welding will not be permitted on galvanized piping. Malleable cast iron fittings used in conjunction with screwed and socketed pipes shall comply with the requirements of SABS 14. Pipes and fittings shall be galvanized inside and outside in accordance with SABS 32.

E.7 Steam, Gas and Compressed Air Pipework

Pipework for conveying steam, gas and compresses air in sizes up to and including 150 mm nominal bore shall comply with the requirements of SABS 60 for seamless steel pipes. Unless otherwise specified, these pipes shall be heavy quality with flanged joints, the latter suitable for a working pressure of 1.6 MPa.

E.8 Polyethylene Pipes and Fittings

Polyethylene pipes shall be of high-density type complying with the requirements of SABS 33-2 type IV and shall be of type(s) and class(es) as specified for each application. Pipe fittings shall be of the compression type.

E.9 Unplasticized Poliviny Chloride Pipes and Fittings

Unplasticized Polyvinyl Chloride (uPVC) pipes and fittings shall comply with the requirements of SABS 966 and shall be of the clas9es) as specified for each application and shall be fitted with spigot and socket Z-joints with rubber sealing rings. Except for bends, which shall be of uPVC with a factory-applied Z-joint at one end, all fittings for use with uPVC pipes shall be of cast iron with wall thickness in accordance with SABS 546 and socket dimensions in accordance with SABS 966 for larger diameters and of uPVC with equal or higher strength class for smaller diameters.

E.10 Copper Tubes

Copper tubes shall be of light gauge conforming to SABS 460. Where bends are required, they shall be formed with a proper tube-bending machine. Joints shall be brass compression fittings conforming to BS 864.

E.11 Cast Iron Pipes and Fittings

Al cast iron pipes and fittings shall comply with the requirements of BS and unless otherwise specified, shall be of class D quality for straight pipes and of class CD quality for fittings. Materials used shall comply with the requirements of SABS 1034 Grade 300 for "Grey Iron Castings". Before leaving the foundry, all cast iron pipes and fittings shall be protected against corrosion in accordance with the Standardised Corrosion Protection Specification.

For treatment of mating faces and flanges see Clause E.14

E.12 Mild Steel Pipes, Fittings and Specials

All Pipework up to and including 150 mm diameter shall comply with the requirements of SABS 62, heavy wall standard welded pipes.

All mild steel pipes and fittings with diameter greater than 150 mm shall comply with the requirements of SABS 719 Grade A. specials shall be manufactures from straight pipes in accordance with the relevant requirements of BS 534. All welding in pipes and specials shall be electric fusion welding.

Before leaving the factory, all mild steel pipes and fittings shall be protected against corrosion in accordance with the Standardised Corrosion Protection Specification.

For treatment of mating faces of flanges see Clause E.14

Plain ends of pipes and fittings shall be recovered and protected against damage while being transported from the factory to the Site.

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Wall thickness of pipes and fittings shall be 6 m, unless specified otherwise in the Detailed Specifications.

E.13 Valves

- (a) Gate valves shall be double flanked with non-rising spindle and shall be fitted with gun metal seats, bronze spindles and gun metal nuts. The direction of closing, which shall be clockwise when viewed from above, must be clearly indicated on the handwheel of each valve. Gate valves shall be of standard waterworks pattern complying with the requirements of SABS 664 for working pressures as specified for each application.
- (b) Reflux valves shall, except where otherwise specified, be Nitrite covered single door swing type and shall be double flanged and mounted horizontally. The design shall be such that the gate rests against the seat in the absence of flow or of differential pressure, without the aid of springs. Reflux valves shall comply with the requirements of SABS 1551-1 for working pressures as specified for each application.
- (c) Butterfly valves shall be either of double flanged lugged or wafer type as may be approved and shall conform where applicable to the requirements of BS 5155 for tight shut-off type with resilient seats. Butterfly valves shall be suitable for a working pressure as specified for each application. Closure of valves shall be by clockwise movement of the handwheel or ratchet handle and the fully open and fully closed position shall be positively stopped.
- (d) Pinch valves shall be double flanged and shall be suitable for fitting and electrically operated actuator to the valve if required and shall close in a clockwise direction when viewed from above. The valve body shall be manufactured in S.G iron in accordance with BD EN 10213-2 Grade 680. The sleeve shall be manufactured in neoprene and reinforced with steel cord. The valves shall be suitable for a working pressure as specified for each application.
- (e) Plug valves shall be flanged and shall be suitable for fitting as electrically operated actuator to the valve if required and shall close in a clockwise direction if viewed from above.

Port arrangements shall be specified for each application. The valve shall be antistatic, and the body shall be manufactured in S.G iron in accordance with BS EN 10213-2 Grade 480. The plug shall be manufactures in stainless steel. The body of the valve shall be suitable for a working pressure as specified for each application.

- (f) Resilient Seal Gate Valves shall be double flanged with non-rising spindle and shall conform to the requirements of SABS 664 for working pressures as specified for each application. Spindles shall be in stainless steel with bronze nuts. The direction of closing, which shall be clockwise when viewed from above, must be clearly indicated on the handwheel of each valve.
- (g) Air Valves shall have single or double openings as specified and shall be manufactured, when applicable, to the same standards of quality and finish as laid down in SABS 664 for gate valves.

Each single acting air valve shall incorporate either a large or a small orifice, s specified, and shall be fitted with a detachable copper-alloy isolating gate valve.

Each double-acting air valve shall incorporate both a large and a small orifice as well as an isolating valve that forms an integral part of the air valve. Such isolating valves shall have bronze or stainless-steel spindles fitted with CI cap tops and shall close clockwise.

Tenderers shall, with their tenders, furnish the minimum working pressure at which the specified air valves are watertight.

- (h) Knife gate valves shall have a solid body casting and shall be suitable for mounting between flanges or as a terminal valve. The knife gate valve shall have a polished 304 stainless steel gate with chamfered edge at the base. The gate shall seal either on a replaceable nitrile O ring or P.T.F.E. seal secured in

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the body. The seal shall be an internal resilient seal, mechanically retained, to ensure that the blade is guided throughout its travel and that bi-directional drop tight leak proof sealing is obtained.

Knife gate valves shall be fitted with non-rising Grade 304 stainless steel spindles. The direction of closing, which shall be clockwise when viewed from above, shall be indicated clearly on the handwheel. The knife gate valves shall comply with the requirements of SABS 664, for working pressures as specified for each application.

(i) General Before leaving the factory valve bodies shall be treated as follows:

- Internally: 150 mm diameter and smaller: manufacturer's Standard Corrosion Protection Treatment
- Internally: larger than 150 mm diameter: as specified in the Standard Corrosion Protection Specification.
- Externally: as specified in the Standardised Corrosion Protection Specification.

For treatment of mating faces of flanges see Clause E.14

E.14 Flanges

The dimensions and the drilling of standard flanges shall comply with the requirements of SABS 1123 for a working pressure of 1 MPa. Flanges shall be machined flat, i.e. without a raised joint face. Puddle flanges shall have the same dimensions as standard flanges but shall be undrilled.

Faces of flanges which will be in contact with jointing gaskets shall receive a protective coating of such thickness and consistency as will not impair the air/gas/water tightness of the joint.

E.15 Jointing Material for Flanged Joints

Bolts for flanges shall comply with the requirements for BS 4504 for the working pressures specified and shall furthermore, together with the nuts and washers used in conjunction therewith, be of the material as specified in Clause E.16. The jointing gaskets shall comply with the requirements of BS 3063 and shall be cut to the full width of the flange and holed for bolts.

E.16 Bolts, Nuts and Washers

All mild steel bolts and nuts shall comply with the requirements of SABS 135. Washers shall be provided at each nut and shall be of the same material (or coating where applicable) to match the bolt and nut. Nuts and bolts subject to vibration shall be machine finished, fitted with plain washers and treated with "Loctite" or equivalent.

Bolts other than jacking bolts shall project not less than 3 mm and not more than 10 mm from the heads of the nuts after tightening.

Bolts to be built into concrete work as well as to be installed above ground level (outside buildings), directly above and under water shall be of stainless-steel Grade 304. Bolts for underground installation of flexible couplings and flanges as well as bolts to be installed inside buildings shall be hot-dip galvanized except where otherwise specified. Galvanizing shall be in accordance with Clause 7 of the Standardised Corrosion Protection Specification (Heavy coating).

Suitable plastic sleeves and/or washers shall be used for protection against corrosion caused by bimetallic action.

E.17 Spares, Tools and Lubricants

Tenderers must submit in the appropriate Schedule in the Data Sheets a list of spare parts which is recommended to be kept by the Employer for maintenance of the plant. All spares must be packed separately, and the cases appropriately marked. All spares must be new and unused. A full range of spares must be kept locally for not less than 15 years.

Tenderers must also submit in the appropriate Schedules in the Document a list of spanners, keys and special tools required for the operation, adjustment and overhaul of the plant supplied. All spanners, keys and tools shall be new and unused.

In addition to the lubricating oil to be provided for commissioning the plant an additional quantity of oil adequate for at least two refills of such plant must also be provided.

A grease gun suitable for use in conjunction with all the grease nipples on the plant must be provided together with at least 5 kg of the appropriate grease to be used. If more than one type of grease is required, a separate grease gun for each type of grease and 5 kg of each type of grease must be provided.

Supply of the above must be included in the rates of the equipment.

E.18 Metal Walkways

All metal walkways shall be made of square pattern type approved open grid flooring manufactured with 40 x 5 m minimum thickness bearer bars spaced at not more than 40 mm centres.

Individual panels shall be fully banded.

Open grid flooring shall be made of 3CR12 steel. Pickling and passivation shall be carried out in accordance with the Standardised Corrosion Protection Specification.

E.19 Handrailing

Stanchions for hand railing shall be approved prefabricated ball type made in one piece without welding at ball joints to accept the hand and knee rails and shall have 150 x 75 x 10 mm base plates drilled for M12 bolts at 100 mm centres.

Hand and knee rails shall consist of 25 mm nominal inside diameter tubing cut and bent to shape. Stanchions shall be spaced not more than 1.5 meters apart. Unless otherwise shown, all hand railing shall be 900 mm above walkway level.

All tubing, stanchions and base plates shall either be manufactured in galvanized mild steel or in grade 304 stainless steel called for in the detailed specification. Galvanizing of handrails shall comply with the Standardised Corrosion Protection Specification. Stainless steel handrails shall have a No. 1 surface finish and pickling, and passivation shall be carried out in accordance with the Standardised Corrosion Protection Specification.

Bolts shall comply with the requirements of Clause E.16 of the Specification.

E.20 Electric Actuators for Valve and Sluice Gate Control

Electric actuators for valve (other than plug valves) and sluice gate control shall be equal and similar to Auma Modulating type actuator complete with Auma Matic Profibus-DP for indication and control. Optional Analog/digital inputs are to be provided as well.

Electric actuators for plug valve control shall be suitable for valve position selection by means of a local as well as a remote non-maintained signal and limit switches built into the actuator to facilitate positive positioning of the plug valve in any of the positions selected. The actuator shall be provided with local valve position indicating as well as facilities for remote position indication.

NB: gears of Synthetic materials will not be acceptable in these units.

E.21 General Requirements for the Supply and Installation of Electrical Materials and Equipment

E.21.1 Standards

All material and equipment supplied and/or installed under this Contract shall be new and the best of their respective kinds and shall comply with the requirements laid down in the latest editions of the relevant SABS or BS Specifications and their amendments (if any) and the requirements of this Specification. In the event of items bearing the SABS mark being available in respect of the materials and equipment required, only items bearing this mark will be acceptable.

This workmanship and finish of work shall be of a high standard throughout and to the satisfaction of The Project Manager Equipment of the same rating and function shall be identical, of the same manufacture and inter-changeable.

E.21.2 Compliance with Laws and Regulations

The work shall be carried out strictly in accordance with and all material and equipment supplied shall comply with the following laws and regulations where applicable:

- a) The latest edition of the "Code of Practice for the Wiring of Premises", SABS 0142, as amended;
- b) the Occupational Health and Safety Act No. 85 of 1993;
- c) the "Electricity Supply By-laws and Regulations" of the Supply Authority;
- d) the local Fire-Office Regulations;
- e) the Regulations of the Department of Communications;
- f) the Acts and Regulation applicable to the use of Explosives; and
- g) "The Code of Practice for the Installation and Maintenance of Electrical Equipment used in Explosive Atmospheres" (SABS 086).

The Contractor will be responsible for serving all notices and paying all fees due in terms of the above laws and regulations.

E.21.3 Radio and TV Interference

All equipment installed under this Contract shall comply with the Government Notice No. R 2246 and any other applicable rules and regulations in respect of radio and TV interferences. Any equipment found producing interference subsequent to commissioning, shall be suppressed or replaced to the satisfaction of The Project Manager without any additional cost.

E.21.4 Site Conditions

The following climatic and general conditions are prevalent on site and all equipment supplied and built into the works shall operate satisfactorily under these conditions at the total specified capacities:

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Maximum ambient temperature : 47 deg. C

Minimum ambient temperature : 27 deg. C

24-hour average maximum temperature : 27 deg. C

Altitude : 933 m.a.s.l.

Humidity : Up to saturation point

Atmosphere : dusty and highly corrosive; organic acids from sewage works.

Solar : long periods of sunshine giving rise to high temperatures in enclosed outdoor housings; high breakdown incidence due to effect of ultra-violet rays of outdoor synthetic materials

Lighting : a very high lighting rate is encountered.

The electricity supply system will be a 380/230 V, 50Hz, three phase, four wire system with solidly earthed neutral and all material and equipment supplied and installed under this Contract shall be rated, designed and manufactured for satisfactory operation on this system.

It must be noted that severe voltage surges and/or spikes may be experienced on the electricity supply system due to lightning or switching operations and where necessary the Contractor shall provide the necessary protective devices against such surges and spikes for the equipment supplied and installed by him with special reference to electronic devices.

E.21.5 Drawings and Operating Instructions

The Contractor shall use the ENGLISG language on all drawings.

The Tenderer shall submit with the Tender, certified drawings, which show dimensions of the cabinets he intends using in the outstations, as well as all the drawings, which he deems necessary to describe the equipment. The electrical Contractor will provide the necessary accommodation required inside the various motor control centres.

The Tenderer shall within two weeks after the placing of an order, provide The Project Manager with 4 paper copies of the drawings showing the dimensions of all equipment to ensure that the necessary accommodation for the monitoring and control system is provided for timeously.

The Contractor shall provide The Project Manager with 2 complete sets and an electronic format copy of drawings for approval within 1 month after the order has been placed.

A set of drawings shall contain the following:

- a) General arrangement drawing of equipment
- b) Circuit diagrams showing the incorporation systems to be monitored or controlled.
- c) Drawings or schedules showing cable connections to field and system equipment.

A provisional set of instruction manuals containing complete instructions, descriptions, drawings and diagrams to describe the complete operation of the system and of each equipment shall be handed to The Project Manager before construction work commences for comments and acceptance.

Within 1 month after the completion of the Contract, the Tenderer shall supply The Project Manager with:

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One complete set of sepia copies of all the drawings (as built) with all the latest versions.

Two months before commissioning of the system the Contractor shall hand over four sets of handbooks that contain the following:

- i. Technical description and specifications of equipment;
- ii. Erection and commissioning instructions;
- iii. Operating instructions of the equipment and system as a whole;
- iv. Description of operation, tuning, fault finding and maintenance of each individual equipment; and
- v. Spare parts list with illustrations and serial numbers for correct identification of spares for ordering.

Wiring schedules

Electronic format copies of all drawings and PLC programming.

An amount of R 15 000-00 will be withheld from each and every payment certificate until such time as the requirements of this clause have been fully met.

E.21.6 Protection of Equipment Against Voltage Surges and Spikes

Tenderers shall allow in their Tender prices for adequate protection of the equipment supplied and installed under this Contract against direct as well as induced voltage surges and spikes which may be experienced on the system. Surge arresters shall be provided on each phase as well as neutral on the incoming power supply terminals of each board.

Electronic equipment shall be adequately protected on both the incoming and outgoing terminals by means of suitable arresters compatible with the relevant equipment.

Arresters shall be of DEHN manufacture (as supplied by Pontis Earthing and Lightning Services (Pty) (Ltd)) or equal and similar thereto.

All arresters shall be connected directly to earth along the shortest possible route and only conductors of adequate rating for the discharge currents catered for shall be used for connections to arresters.

Tenderers shall submit full particulars of the arresters offered as well as written confirmation that it will provide adequate protection for the relevant equipment against possible voltage surges and spikes on the system.

E.21.7 Fixing And Support Materials

All fixing and support materials for outdoor use in connection with the installation of electrical material and equipment such as surface mounted cable sleeve pipes, conduit, saddles, clamps, brackets, bolts, nuts, washers and screws shall be grade 304 stainless steel.

E.21.8 Paint Finishes For Electrical Materials And Equipment

The paint finishes for electrical materials and equipment where applicable shall strictly comply with the Corrosion Protection Specification, New Revised 2001 Edition, published by Wates, Meiring and Barnard (Pty) Ltd.

E.21.9 Low Voltage Electric Motors

Motors of local manufacture shall fully comply with the following standards:

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Single phase motors : SABS 1189

Three phase motors : SABS 948

Imported motors shall fully comply with either BS 4999 and BS 5000 or IEC 34 and IEC 72.

When ordering electric motors for a specific application the Contractor shall ensure that the orientation of the terminal on the motors are suitable for vertical cable entry from below with motor installed in position and provided with suitable cable entry holes to accommodate the specific cable glands (Holes to be tapped in case of cast boxes).

All three phase low voltage motors shall be of the squirrel cage induction type.

Unless a power rating of a motor is specified, all motors shall be rated for continuous operation (Duty Class S1) at an output of 10 % in excess of the maximum power requirements of the associated driven plant when operating at the maximum specified duty at an ambient temperature of 37°C and an altitude of 1 450 m.a.s.l.

The motors shall be of a recommended standard rating and if the requirements given above fall between two standard ratings, motors of the next higher standard rating must be provided.

The motors shall be either fixed speed or dual speed units, as required.

The motor speed shall match that of the driven plant but shall not be in excess of 1 500 r.p.m.

All motors shall be suitable for "direct-on-line" starting unless "star/delta" or other starting methods are prescribed by the supply authority.

The maximum starting current of these motors under locked rotor conditions with specified voltage applied to the motor terminals shall not exceed six times normal full load current.

The motors shall be suitably rated for 15 starts per hour at an ambient temperature of 37°C and an altitude of 1 450 m.a.s.l.

All submersible motors shall be of the IP 68 type and all other motors shall be of the IP 55 IC 01 41 type.

Anti-condensation heating shall be provided on motors rated at 7.5 kW and above and shall be effected by means of an internally fitted 230 V tape heater. Motors rated at 22 kW and above shall each be equipped with three thermistors with a positive temperature coefficient to resistance embedded in the overhang of the stator windings (one per phase) to facilitate the operation of protective devices on overheating of the relevant motor. These thermistors and heaters shall be wired to suitable **separate** terminal boxes on the outside of the motors.

All submersible motors shall be supplied complete with adequately rated underwater cables factory connected onto the motors, of power supply as well as sensing where applicable. These cables shall be sufficient length to reach the connection points, i.e. the nearest readily accessible dry area, without straining the cables and shall have watertight connections onto the motor. Exact lengths of cables required shall be verified on site before finalizing orders.

Each motor shall be provided with a Grade 304 stainless steel or brass nameplate.

The following information shall be submitted with each Tender in respect of all the three phase low voltage motors offered:

- a) Two copies of an outline drawing showing main overall dimensions
- b) Guaranteed continuous rating under site conditions.

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- c) Guaranteed number of starts per hour at an ambient temperature of 37°C.
- d) Guaranteed maximum starting current under locked rotor conditions with the normal voltage connected to the incoming terminals.
- e) Guaranteed efficiency of the motor at 50 % and 100 % normal full load with motor windings connected in delta.
- f) Guaranteed power factor of the Motor at 50 % and 100 % normal full load with the motor windings connected in delta.
- g) The mass of each motor
- h) Copies of SABS test reports if these motors carry the SABS mark.

The following tests shall be carried out at the Manufacturer's Works on these motors after manufacture:

- a) If the motors do not carry the SABS mark, performance and efficiency tests shall be carried out to prove the guaranteed information submitted with the successful Tender
- b) All motors shall be subjected to routine tests as prescribed in Appendix D to SABS 948.

The manufacturer must submit to The Project Manager two certified copies of the test certificates reflecting the conditions and results of the test carried out on each motor.

After installation on Site, but prior to commissioning, the following tests shall be carried out:

- a) Ensure that the bearings are properly lubricated
- b) Ensure that all power and earth connections are properly made.
- c) Check all ventilation openings for obstruction
- d) Measure the insulation resistance between phases mutually and between each phase and earth to ensure that the windings are dry.
- e) Spin the motor by briefly switching the supply on to check the correctness of the direction of rotation.

After the motor has been started the following shall be observed:

- f) Smoothness and period of acceleration up to maximum speed.
- g) Noise, vibration and temperatures of motor and bearings.

E.21.10 Electric Cables, Cable Terminating Glands and Earth Wires

- All multicore cables used in this Contract shall comply with the requirements laid down in SABS 1507-1970 as amended to date for PVC SWA PVC cables with copper conductors and installed for either 600/1000 volt.
- Cables for 4-20mA signals shall consist of the requisite number of 1 mm² copper twisted pairs, individually and overall screened, PVC sheathed, steel wire armored and PVC covered, complying with the requirements of SABS 1507 where applicable.

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- Cables and earth wires for a specific application shall be selected strictly in accordance with the requirements laid down in SABS 0142 in respect of current rating and voltage drop. Where practicable the earth continuity conductor shall form an integral part of the cable.
- Each multicore cable connection shall be terminated at each end by means of a suitable sized adjustable chromium plated, brass terminating gland complete with armour clamp and neoprene shroud. Cable terminating glands for outdoor use shall be provided with waterproofing inner seals as well as waterproofing seals on nipples. Cable armouring shall be earthed at each end but may not be used as earth continuity conductor.
- Each earth wire shall be terminated at each end by means of a suitably sized bolted lug either sweated or crimped onto the wire. The lugs shall be bolted onto the relevant earth bars or earthing terminals
- Cables on walls and structures shall be installed on galvanized stainless steel, as may be required; cable trays shall be properly supported and firmly fixed at suitable regular intervals to prevent it from sagging under its own weight.
- All exposed cable runs shall be installed neatly horizontally and vertically, and all exposed vertical cable runs between ground level and 2 m above ground level shall be installed in cable sleeve pipes or stainless-steel pipes. These pipes shall extend to at least 300 mm below ground level. Intervals between fixing points for sleeves and conduit shall not exceed 1 m.
- Only plugging materials of an approved type may be used for fixing to brick walls and concrete – wood will not be acceptable. Plugging in joints of brick walls will not be acceptable.
- Cable trenches shall be deep enough to facilitate the laying of cables at depth of 750 mm below final ground level. Cable trench floors shall be smooth and free from boulders and sharp rock projections.
- All cables shall be laid in a bedding of river sand or sifted soil 75 mm over and 75 mm below the cables, clayish soil will not be accepted as bedding. Once the cables have been laid, straightened, inspected, approved and covered with the top layer of bedding soil, the trenches shall be backfilled with soil which does not contain more than 40 % rock or shale and which will pass through a sieve with 100 mm diameter holes.
- Backfilling of cable trenches shall be done in easy stages with thorough consolidation at each stage in order to prevent subsequent subsidence.
- Cable sleeves shall be installed across road sections and paved vehicle entrances. Cable sleeves shall be similar and equal to Kableflex type cable sleeves. Cable sleeves shall extend at least 450 mm beyond the edge of the road or vehicle entrances.
- The separation between power cables shall be 150 mm and between any cable for 4-20 mA signal and the nearest parallel power cable not be less than 500 mm. the separation between power cables connected to frequency converters for variable speed applications and signal cables shall be 500 mm.
- Earthing of cable screens shall be carried out in accordance with the requirements dictated by the associated equipment.

E.21.11 Electrical Switchboards and Motor Control Boards

a) Type and construction

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All electrical switchboards and motor control boards shall be either of the surface mounting or floor standing type depending on the physical size of the board with IP 55 insect proofed closure, consisting of a bounding tray removable front panel and chassis all constructed of at least 2 mm thick metal plate. Sufficient provision shall be made for heat dissipation and ventilation of the board.

Switchboards for outdoor use shall be of the waterproof type constructed of grade 304 stainless steel.

Switchboards for indoor use shall be constructed of sheet steel and painted in compliance with the Corrosion Protection Specification for Civil, Mechanical and Electrical Engineering Construction, New Revised 2001 Edition, published by Wates, Meiring and Barnard (colour B26, SABS 1091-1975).

The type of plant to be used on internal surfaces shall not cause corrosion of cadmium plated or zinc plated surfaces.

These boards shall comply with the requirements of SABS 1180: Part I where applicable.

The bonding tray for any specific board shall be big enough to accommodate all the relevant equipment without cramping. All trays shall be substantially braced by means of suitable gussets.

Doors shall be rigid and shall be secured in position by means of robust grade 304 stainless steel hinges. No single door shall be wider than 600 mm.

The doors shall each be provided with at least two "square key" panel locks – one at the top and one at the bottom of the lock side of the door.

The chassis shall be rigid, and facilities shall be provided in the chassis for mounting all the relevant equipment.

The panel shall be rigid and readily removable without necessitating the disturbance of any of the equipment on the board. Panels shall be mounted in such a way that all equipment are flush behind the panel with only operating handles, instrument faces, indicator lights, push buttons projecting through neat machine punched slots and holes in the panel. All panels shall be provided with chromium plated brass handles to facilitate removal and shall be secured in position by means of knurled captive thumb screws.

Each board shall be provided with suitably rated main switch machinery interlocked with the removable front panel in such a way that it will be impossible to remove the front panel without switching off the main switch.

It shall be possible to adjust control equipment e.g. Time switches without having to remove the front panel

All screws, studs, bolts, nuts and washers used for these boards shall be rustproofed. The use of self-tapping screws will not be permissible.

b) Busbars for switchboards and motor control boards

The board shall be provided with one set of four solid, copper busbars in the top section and extending over the entire length of the board. Provision shall be made at the end of each busbar for future extensions.

Busbars shall comply with the requirements of BS 1433 and the relevant clauses of BS 159.

Busbars shall be rigidly supported at suitable intervals to prevent undue damage resulting hereunder short circuit conditions. Ceramic or other approved busbar insulators shall be used. The busbars shall be arranged horizontally with the longer sides of the cross sections in the vertical plane and one above the other, in the horizontal plane.

Busbars shall be clearly and indelibly marked Red, Yellow and Blue for the three phases and Black for Neutral.

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Connections to busbars shall be effected by means of cable lugs and suitably sized cadmium-plated, high tensile steel and nuts with cadmium-plated up washers or lock washers.

A solid copper earthbar shall be provided inside the board at the back and along the entire length at the bottom.

The earthbar shall be drilled and provided with the required number of 6 mm dia and 10 mm dia cadmium-plated, high tensile steel bolts and nuts complete with cadmium-plated washers and cup washers or lock washers, from making the earth connections. The earthing positions shall be evenly spaced along the entire length of the busbar.

c) Internal wiring for switchboards and motor control boards

The internal wiring of the boards shall consist of the coloured PVC insulated conductors of adequate copper cross-section, which shall be neatly installed horizontally and vertically and bunched where possible by means of perforated plastic tape. (String will not be applicable). Numbered ferrules of an approved type shall be provided on each end of each wire, to facilitate the tracing of circuits. Wiring for external circuits shall be terminated on suitably sized DIN rail mounted “Klippon” or equal terminal blocks at the bottom.

d) Labelling of switchboards and motor control boards

A screwed on engraved label of the black and white “trefolite” type shall be provided below each item of equipment on the front panel of each board as well as on the chassis in the close proximity to the relevant equipment to identify such equipment in English in 6.5 mm high lettering.

Each board shall further be provided with a screw-on reverse engraved yellow Perspex nameplate with black 20 mm high lettering to identify the board in English on the outside of the door at the top thereof.

e) Equipment for switchboards and motor control boards

Each switchboard or motor control board shall be provided with all the necessary equipment to ensure proper functioning of the plant it controls as well as a main switch as specified above and a busbar connected voltmeter with a 4 position selector switch to measure busbar voltage on all three phases and switch the voltmeter off in the remaining position.

All switchboards or motor control boards with more than one motor starter and with a total connected load in excess of 50 kW shall be equipped with maximum demand ammeters.

The equipment shall comply with the specifications below where applicable.

f) Motor Starters

i. Direct-On-Line Starters for motors rated 5 kW or less

A direct-on-line air break contractor type starter shall be provided for each motor below 5 kW. The starter shall be complete with the following:

- a) A suitably rated isolating switch
- b) Adjustable thermal overload trip relays with adjustable time lags in each phase for motors below 5kW.
- c) An under-voltage release
- d) Protection against single phasing – the operation of which shall be independent of the settings of the overload trip relay.

- e) HRC back-up protection fuses.
- f) An ammeter in one of the phases for all motors rated below 5kW as well as a running hour meter.
- g) A selector switch to facilitate the selection of either off, local manual control or remote automatic control where applicable.
- h) A set of normally open and a set of normally closed potential free auxiliary contacts on the starter Contractor wired for remote indication.
- i) A set of "STOP" and "START" push buttons for local manual control.
- j) A set of "GREEN", "AMBER" and "RED" indicator lights for local indication of motor "Power-on", "Running" and "Tripped" conditions respectively.

It shall further be possible to trip and lock-out the starter by means of a remote emergency stop button to be provided at the relevant monitor.

Provision shall also be made for locking the mains fused switch handle in the OFF position.

ii. Direct-on-Line Starters for motors rated above 5kW

These starters shall be of the manually operated (locally and remotely) type and each starter shall be contained in its own separate compartment on the relevant motor control board.

Each of these units shall comprise amongst other the following components:

- 1 Only mains fused switch connected to the busbars of the board and interlocked with the door of the compartment to prevent opening of the door with the switch closed and to prevent closing of the switch with the door open.
- 1 Set HRC control fused links with carriers and basis;

All necessary relays as required;

- 4 Lightning arrestors;
- 1 Only mains contractor;
- 1 Set of START and STOP push buttons;
- 1 A selector switch to facilitate the selection of either off, manual or automatic control where applicable;
- 1 Only mains operated timing device to limit starts to 15 starts per hour;
- 1 Only mains operated timing device to delay automatic starting after a power failure where applicable;
- 1 Only power factor correction capacitor unit

The following protective and indicating devices complete with the necessary suitable rated potential fuses, current transformers, test blocks and auxiliary relays;

- 1 Only motor protection relay equal and similar to CET4 Sprecher & Schuh;
- 1 Only instantaneous indicating ammeter for motor current;
- 1 Only ammeter selector switch;
- 1 Current transformers;
- 1 Only running hour meter;
- 1 Only anti-dither circuit;
- 1 Only anti-cycle timer;
- 4 Only indicator lights as follows:

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Green - Supply 'On';
Amber – 'Motor Running';
Red – 'Motor Tripped'
Blue – 'Time delayed starting period'

Potential free contacts for monitoring purposes

It shall further be possible to trip and lock-out the starter by means of a remote stop button to be provided at the relevant motor.

Provision shall also be made for locking the mains fused switch handle in the OFF position.

iii. Star/Delta Starters for motors rated below 5kW

These starters shall be of the automatic star/delta type and each starter shall be contained in its own separate compartment on the relevant motor control board.

Each of these units shall comprise amongst others the following components:

- 1 Main Isolator connected to the busbars of the board and interlocked with the door of the compartment to prevent opening of the door with the switch closed and to prevent closing of the switch with the door open;
- 3 HRC fuses rigidly attached to the load side of the abovementioned Mains Isolator and the rating of which shall be carefully selected for back-up protection for the relevant motor;
- 1 Set of HRC control fused links with carriers and bases;

All necessary relays as required;

- 4 lightning arrestors;
- 1 only Mains Contractor;
- 1 only Star Contractor;
- 1 only Delta Contractor
- 1 only Star to Delta timer of the clockwork or electromagnetic type;
- 1 only mains operated timing device to delay automatic starting after power failure where applicable;
- 1 only Mains operated timing device to limit the starts to 15 starts per hour;
- 1 Selector switch to facilitate the selection of either off, manual or automatic control where applicable;
- 1 set START or STOP pushbuttons;
- 1 only Three phase Power Factor Correction Capacitor unit; and
- All necessary relays.

The following protective and indicating devices complete with the necessary suitably rated potential fuses, current transformers and auxiliary relays shall be provided:

- 1 only Motor Protection Relay, equal and similar to CET4 Sprecher & Schun.
- 1 only instantaneous indicating Ammeter for motor current;
- 1 only Ammeter selector switch;
- 3 current transformers;
- 1 only Blue Indicator light to indicate time delayed starting period;
- 1 only Running Hour Meter;
- 1 only Earth Leakage Relay Unit; and
- 3 only indicator lights as follows:

Green – "Supply On"
Amber – "Motor Running"
Red – "Motor Tripped".

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It shall further be possible to trip and lock-out the starter by means of a remote stop button to be provided at the relevant motor.

Potential free contacts for monitoring purposes

Provision shall also be made for locking the mains fused switch handle in the OFF position.

g) Switch-and Control Board Components

I. Isolators

All isolators shall be of the “Load-breaking” and “Fault-Making” type and shall comply with the requirements of BS 5419-1977 where applicable.

II. Fused Switches

All fused switches shall be of the “load-breaking” and “fault-making” type complying with BS 5419 where applicable and fitted with HRC cartridge fused links to BS 88.

III. Moulded case circuit breaker

All moulded case circuit breakers shall comply with the requirements of SABS 156-1977 and shall be equal and similar to Heinemann manufacture.

These circuit breakers shall be fitted with copper terminal collector bars where more than one cable tail has to be terminated on the same terminal.

IV. Airbreak contractors

All contractors shall be of the totally enclosed three pole, double air break per pole, automatic magnetic type complying with the requirements of IEC 158-1 for Class AC 3 contractors of Intermittent Duty Class 0,3.

All contractors shall be provided with arc extinguishers and readily replaceable silver or silver-alloy contacts rated for at least 2-million “on” and “off” switching operations at rated current.

Each contractor shall be provided with a closing coil suitable for continuous operation and at least 15 closing operations per hour.

An adequate number of auxiliary contacts shall be fitted.

The contractor may not hum or chatter in service and the contacts may not bounce on closing.

All contractors shall be equal and similar to Telemecanique manufacture.

V. Current transformers

All current transformers shall be of the air insulated type complying in all respects with the requirements laid down in BS 3938: 1973.

The Contractor shall carefully select the ratio, burden and accuracy class to suit its specific application in accordance with the recommendations and requirements of BS 3938: 1973.

VI. Indicating instruments

All indicating instruments shall comply with the requirements laid down in BS 89: Part I : 1970 for instruments of a 2,5 Accuracy Class. All indicating instruments shall have 96 mm square dials.

The maximum demand ammeters shall be of the 6 Amp combined maximum demand registering and instantaneous indicating type having MISC movement and thermal demand indication with an integrating time lag of 15 minutes. The ammeter scales shall be direct reading with a full scale deflection corresponding to 120% of the rated primary current of the relevant current transformer. Each ammeter shall be clearly and indelibly marked to indicate the colour of the phase to which it is connected.

The ammeters for motor starters shall be instantaneous indicating meters with MISC movement and direct reading scales. The meters shall be able to withstand overcurrents resulting under starting conditions and the full load current of the relevant motor shall be clearly marked in red on the face of the meter.

Voltmeters shall be of the direct reading moving iron suppressed zero type.

The running hour meters shall have cyclometer dials indicating up to 5 digits and two decimals.

VII. Selector switch

A rotary type instrument selector switch shall be mounted in such a way that only the selector knob and indicator plate are on the panel, and the switch itself is behind the panel.

The selector knob shall consist of Bakelite, and shall have an arrow engraved on it, indicating the switch position.

The switch shall have a positively driven switching mechanism.

The indicator plate shall consist of Bakelite and shall have the positions for the three phases and "OFF" engraved in it in 5 mm high lettering. Selector switches shall be equal and similar to Krus & Naimer manufacture.

VIII. Indicator lights

All indicator lights shall be equal and similar to Mimic Craft Type MAC-22 220 volt LED pilot lights of the specified colours.

IX. Auxiliary rays

Auxiliary rays shall be adequately rated for their respective duties and shall be silent in operation. All switching relays shall be fitted with robust silver or silver-alloy self-cleaning contacts which shall not bounce or chatter on closing and which shall be designed and manufactured to limit arcing, welding and putting an absolute minimum.

X. Earthleakage relays

Earthleakage relays for low voltage distribution boards shall comply with the requirements of SABS 767 and shall have a sensitivity of 30 mA.

XI. Power factor correction capacitors for 400 volt motors

Each of these capacitors shall be of the indoor switchboard mounting 400 Volt 50 cps three phase self-contained type with a dead casing and shall fully comply with the requirements laid down in BS 1650-1971 as amended.

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Each capacitor unit shall be of carefully selected rating to correct the power factor of its isolated motor to 0,95 at full load and should not exceed a value which compensates for 85 % of the no-load magnetizing current.

The dielectric shall consist of plastic film and low-loss paper situated between aluminium foil and impregnated with a synthetic liquid agent with scavenger additive.

The capacitor losses shall not exceed 1 watt/kV.Ar

The capacitor units shall have the following admissible overloads at an ambient temperature of 40 deg. C and an altitude of 1 550 m.a.s.l.:

- a) 10 % excess volts continuously ;
- b) 50 % excess current continuously ; and
- c) 30 % excess kV.A continuously.

Each of these capacitor units shall be provided with discharge resistors and the fuse for each winding element which will disconnect the affected element in event of a dielectric breakdown.

XII. Lightning arrestors

Adequate protection shall be provided for all equipment supplied and installed against direct as well as induced voltage surges and spikes which may be experienced on the system.

Surge arrestors shall be provided on each phase as well as neutral on the incoming power supply terminals of each board.

Electronic equipment shall be adequately protected on both the incoming and outgoing terminals by suitable arrestors compatible with the relevant equipment.

h) Information to Be Submitted with Tenders In Respect Of Switch Boards And Motor Control Boards

The following information shall be submitted with each Tender in respect of all boards offered:

- a) Full technical details and descriptive literature regarding all equipment and instruments offered; and
- b) Three paper prints of an outline drawing of each board indicating the main overall dimensions and general layout of the boards.

i) Information to Be Submitted By The Successful Tenderer In Respect Of All Boards

The successful Tenderer shall submit three paper prints of each of the following drawings, in respect of each of the boards to The Project Manager for approval prior to manufacture:

- I. Outline the general arrangement drawings, showing main overall dimensions and construction details;
- II. A wiring diagram; and
- III. A schematic line diagrams

Plastic transparent prints of the following diagrams shall be supplied by the successful Tenderer in respect of each of the final layouts of the boards:

- a) Outline and general arrangement drawings of each board;
- b) A wiring diagram of each board;

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- c) A schematic line diagram of each board
- d) A paper unit of the schematic line diagram for that specific switch board, shall be framed and installed behind perlex on the side of the door of each of the switch boards; and
- e) A paper print of the schematic line diagrams for each LT starter panel shall be installed behind perlex on the side of the door of each starter panel.

j) Testing of Switch/Motor Control Boards At The Manufacturer’s Works

Each switch/motor control board shall be subjected to the following tests in the manufacturer’s works after manufacture:

- a) A thorough inspection shall be carried out to ensure compliance with the Specification and approved drawings and wiring diagrams and to ascertain that all connections are properly made.
- b) A high voltage test on all primary connections to check the installation between phases mutually and between each phase and earth.
- c) The polarities and ratios of all potential and current transformers shall be checked.
- d) Primary and secondary injection tests shall be carried out on all switching, protection, metering interlocking and indication circuits.
- e) The manufacturer shall submit three copies of test certificates giving details of conditions and results of tests carried out to The Project Manager.

k) Testing and Commissioning Of Switch/Motor Control Boards After Installation On Site

After installation on site but prior to commissioning the following inspections and tests shall be performed on each switch/motor control board:

- a) Check all components to ensure that they are free from dust and protective packing material;
- b) Check the operation of all components liable to damage in transit such as meters and protection relays;
- c) The insulation of all primary circuits between phases mutually and between each phase and earth shall be measured.
- d) All fused links shall be checked for electrical continuity; and
- e) All control supplies shall be checked.

All adjustable protection devices shall then be set, and the boards commissioned all in consultation with and to the instructions of The Project Manager.

E.21.12 External Control and Sensing Units Associated with Electrical Switch Boards and Control Boards

Each Emergency Stop Push Button Station shall consist of a totally enclosed outdoor weatherproof type heavy duty pad lockable stop push button station with a cable gland entry at the bottom to accommodate a 3 core, 1,5 mm² LT PVC SWA PVC cable. The unit shall have an IP 55 insect proofed enclosure.

This push button station shall be mounted on an approved rigid 1-meter high Grade 304 stainless steel pedestal designed to be bolted to a concrete slab or against the structure at the height of 1,0 m above ground level.

The pedestal shall be manufactured as per the drawings at the end of the document

E.21.13 Conduit and Conduit Accessories

All conduit and conduit accessories shall comply with the requirements of SABS 162 and shall bear the SABS mark.

All conduit and conduit accessories shall either be finished in black stove enamel on the inside as well as on the outside or shall be hot-dip galvanized on the inside as well as on the outside, depending on the circumstances. All conduit fittings shall be of malleable cast iron, zinc base alloy or die cast fittings will not be acceptable.

Only brass bushes and bush nuts will be acceptable.

E.21.14 Standard 100 x 100 x 50 mm and 100 x 50 x 50 mm Boxes

These boxes shall be heavy gauge, hot-dip galvanized, pressed steel boxes, complying with SABS 518.

E.21.15 Light Switches

All light switches shall comply with the requirements of SABS 163 and shall be suitable for mounting in a standard 100 x 50 x 50 mm box

The switches shall be equal and similar to Crabtree flush switches.

E.21.16 PVC Insulated Conductors

These conductors shall be of high conductivity, stranded copper with Polyvinyl Chloride insulation of 600/1 000 volt grade, complying with the requirements of SABS 150, with special reference to table H.

E.21.17 Three Phase and Multipin Plug Outlets

Three phase plug outlets shall be of the 63 A, 380 V, 5 pin units complete with plug and interlocked isolating switch.

These units shall be equal and similar to the WACO CEE Metal-Clad-Industrial Plugs and socket type.

The 7 pin plug outlets shall be of the 32 A, 7 pin units complete with plug and interlocked isolating switch.

E.21.18 Light Fittings

All light fittings shall be complete with lamps and control equipment as prescribed. Lamps for fluorescent fittings shall have colour temperature of 3 000_oK unless otherwise specified.

Although catalogue numbers are used to describe the light figures, equal and similar fittings will also be accepted.

Fluorescent light fittings shall conform to the requirements of SABS 1119 and SABS 890.

Where light fittings with filament lamps are used, the wiring between the terminal box and the lamp holder shall have heat resisting insulation.

E.21.19 Site Light Poles

- The site light poles are specified in the detail specification.

E.21.20 Luminaires

Cable ladders shall be of the heavy-duty type, equal and similar to O-line.

Cable ladders shall not be hot dipped galvanized the height of the sides shall be 76 mm with the width to suit the number and size of cables to be installed.

The cable ladders shall be secured on the suitable lengths, which shall be suspended from the roof slab by means of suitable lengths 8 mm dia threaded hot, dipped galvanized steel rods.

The threaded rods shall be secured to the roof slab with suitable sized hot dipped galvanized steel rawl bolts and shall be secured to the channel sections by means of two hot dipped galvanized nuts and washers

Clamps of the "K" series, suitable for the specific cable shall be employed to secure the cable onto the tray.

E.21.22 Lightning Protection

a) Plant

The lightning protection of the lighting structures, poles and plant of the works, including buildings and handrails on the new plant, form part of this Contract.

The lightning protection must be a SABS approved scheme and SABS approved drawings of the scheme must be submitted to The Project Manager.

b) Lightning Arrestors

Tenderers shall show in their Tender prices for adequate protection of the equipment supplied and installed under this Contract against direct as well as induced voltage surges and spikes which may be experienced on the system. Surge arrestors shall be provided on each phase as well as neutral on the incoming power supply terminals of each board.

Electronic equipment shall be adequately protected on both the incoming and outgoing terminals by means of suitable arrestors compatible with the relevant equipment. 4-20mA signal cables shall be protected on both sides of the cable against surges. Arrestors shall be of DEHN manufacture (as supplied by Surgetech (Pty) Ltd. or equal and similar thereto.

All arrestors shall be connected directly to earth along the shortest possible route and only conductors of adequate rating for the discharge currents catered for shall be used for connections to arrestors.

Tenderers shall submit full particulars of the arrestors offered as well as written confirmation that it will provide adequate protection for the relevant equipment against possible voltage surges and spikes on the system. (Also see item 6.30 and 6.32)

E.21.23 Earth Slabs

The cable slabs supplied and installed under this Contract shall be formed solidly out of concrete with steel reinforcing and shall have dimensions of 1 000 x 350 x 100 mm. alternative block sizes will be considered. The following concrete mixture is desired:

1. Portland cement (dry) – 1 part per volume
2. Clean dry river sand – 3 parts per volume
3. Crushed stone (size 10 mm) – 6 parts per volume

E.21.25 Underground Cable Sleeves

All cable sleeves shall be of the Kabelflex type, manufactured and supplied by Nextube (Pty) Ltd. unless sleeve ends shall be sealed by means of Nextube Closure Caps.

Cable sleeves to be installed across roads shall extend at least 450 mm beyond the edge of the road on each side. Each run of cable sleeve shall be laid straight and without any projections on the inside, which may cause damage to or obstruct the threading through the cable.

E.21.26 Notices and Danger Plates

a) Scope

This specification deals with the provision of Notices and Danger Plates as required in terms of the Occupational Health and Safety Act No. 85 of 1983, as well as any other notices that may be required by law or by the nature of the finished works.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

The following standard specifications are referred to in this specification:

SABS 0140; Parts I to IV: Identification colour marking.

SABS 1186: Symbolic safety signs.

Occupational Health and Safety Act No. 85 of 1993

b) Materials and Finish

Outdoor signs shall be either of vitreous enamelled type or of cast aluminium with raised or embossed letters.

Indoor notices shall be of non-deteriorating plastic, Perplex or fiberglass.

The colours and sizes of letters and colours of background shall be in accordance with requirements of SABS 0140 and as approved by The Project Manager.

Symbolic signs shall conform to the requirements of SABS 1186.

Signs shall be pre-drilled for fixing.

All fixing accessories shall be of non-corrosive material.

c) Installation and Erection

The Contractor shall supply and fix permanently in position the signs and notices required by law for all the relevant working area of the Works. Positions of signs shall be prescribed by the relevant Regulations and as agreed by The Project Manager.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

C3.7 Detailed Mechanical Specifications

Equipment Data Sheets, Preamble to The Schedule of Prices and Schedule of Prices

SECTION -400: PUMPS

401 Scope

This section of the Contract covers the supply, delivery, transport, handling, storage, erection, installation, commissioning, testing, adjustment, handing over incomplete working order and upholding during the Defects Liability Period of the following equipment:

- a) i) **THREE** (Pump Duty Flow rate: 660m³/hr; Pump Head: 21 m) 75kWx2 Low Lift Pumps;
ii) Pipework and accessories for the above pumps; running on a 2-duty 1-stand-by arrangement making the pumpstation a 150kW pumpstation

- b) i) **THREE** (Pump Duty Flow rate: 660m³/hr; Pump Head: 120 m) 300kW High Lift Pumps;
running on a 2-duty 1-stand-by arrangement making the pumpstation a 600kW pumpstation.
ii) Pipework and accessories for the above pumps;

The heads provided herewith are subject to verification on site when details of pipe work have been confirmed.

402 General

Dry-well pumping equipment shall mean pumping equipment of which the motors may or may not be submersible, but which operate in a non-submersible mode. Wet-well pumping equipment shall mean pumping equipment of which the motors are submersible and operate in a submersible mode.

The design of the pumps shall be in accordance with BS 5257.

All working parts of the pumps shall be removable and serviceable and shall under no circumstances be integrated into the body of the pumps.

All pipework and support structures for the pumps for the conveyance of fluid, as shown on the drawing, must be supplied by the mechanical contractor under this section of the contract. The pipework shall include all fittings.

The construction of the civil works shall form part of another Contract.

All steelwork for the supporting of the pumps, as shown on the drawing must be supplied by the mechanical contractor under this section of the contract.

403 Centrifugal Pumps

403.1 General

Dry-well and wet-well pumps supplied under this contract shall be of the centrifugal non-clogging self-priming type. If applicable it shall be suitable to pump the media mentioned in the particular specification for each type of application (sludge or settled sewage, etc.).

403.2 Pump Layout

Together with their tenders, Tenderers shall provide full details of any proposed pump layout, including all pipework to comply with the requirements of the pumping systems and as shown on the drawings for consideration by The Project Manager.

403.3 Material of construction and casing

The pumps shall be of maker's standard and approved design, low maintenance and robust.

The pump casing shall be manufactured from high grade cast iron, rigidly secured to a bed plate and shall be finished off smoothly before a high-quality corrosion protection system is applied in accordance with Clause 407 below.

The casing shall be selected for a minimum of 1 000 kPa or 1.5 times actual discharge pressure, whichever is the greater.

All pumps shall be provided with removable coverplates for quick and easy access to the pump interior without disturbing the pipework.

403.4 Speed Pumps

The pumps shall have a rotational speed of 1 450 r.p.m and shall be so balanced that there will be no end thrust when the pumps are new or after wear has taken place, or alternatively suitable heavy duty thrust bearings shall be provided.

Pumps shall be of the self-regulating type where the power consumption characteristic is such that with an increase in delivery beyond a certain limit the power consumption decreases thereby ensuring that the motor is not overloaded in the event of a large deduction in pumping head.

403.5 Pumping Impellers

The impellers shall be carefully bored and keyed. All parts inaccessible to machining shall have a smooth finish. Impellers shall be made of high-grade cast iron.

403.6 Pump Shafts

The shaft will be manufactured of high-tensile steel. Where the shaft passes through stuffing boxes it shall be fitted with renewable sleeves of high-quality, wear resistant alloys. The shaft shall be so designed that the running speed is well below the first critical speed and the rotor shall be accurately balanced after assembly. The rotating elements shall be accurately balances statistically and dynamically to eliminate noise and vibration when running.

403.7 Bearings

All pumps shall be fitted with either ball or roller bearings. Suitable lubrication arrangements shall be provided for the bearings, as well as sufficient bearing area.

Special bearings shall be provided to absorb any axial thrust that may be caused by the characteristic of the impeller or by the type of coupling selected between the pump and the motor.

All numbers shall be given for all bearings in the pumps to facilitate replacement.

Bearings shall have a B10-life of 50 000 hours.

403.8 Wearing rings

Pumps containing wearing rings shall be fitted with high-quality wearing rings which shall be easily replaceable.

403.9 Stuffing boxes

Pumps fitted with stuffing boxes shall have packings of adequate depths. A lantern or water seal shall be housed between the inner and outer packing rings and shall be connected by copper tubing to the discharge volute. A hand cock shall be fitted in this line to control the flow of water through the seal.

The packing shall be designed to permit high speed rotation without the possibility of seizing and charring the material. An automatic water seal shall be provided to prevent entry of air into the pump.

Drains from the pump seals shall be provided. These shall discharge visibly into funnel-shaped receivers before discharging to waste.

403.10 Coupling between pump and motor

The pumps and motors shall be directly coupled with a suitable type of coupling which will satisfactorily take up minor misalignment or off-setting of the motor and pump shaft.

The coupling shall be designed in such a manner that no thrust will be transmitted from the motor to the pump or vice versa,

The coupling shall be robust and shall be readily dismantled and reassembled. A strong steel cover shall be provided over the coupling for the prevention of accidents. Pumps shall not be fitted with V-belt coupling systems.

403.11 Pump Motors

Unless otherwise specified each pump shall be fitted with an electric motor. Each electric motor shall comply with the requirements as specified in Clause E.21.9.

403.12 Base Plate and Alignment

The pump and electric motor shall be mounted on a combination base plate of fabricated steel construction. Machined facings shall be provided to receive the pump motor.

The base plate shall be bolted down onto a concrete base. The concrete base will be constructed by others. Detailed drawings of the combination bases including their exact positions in buildings shall be submitted to The Project Manager for approval before fabrication is commenced.

The contractor shall be responsible for the rectification of any excessive noise and/or vibration caused by the operation of the pump installation.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

If required by the pump manufacturer, or excessive vibration can be expected, vibration isolating mounting shall be installed in accordance with the manufacturer's instructions. However, the contractor shall be responsible to ensure that the amplitude of motion and vibration transmission will not exceed the specified limits.

403.13 Accessories

All pumps shall be fitted with air cocks, drain cocks, lifting eyes if the weight of the pump is more than 30 kg and all guards, etc. required in terms of the Occupational Health and Safety Act, (Act 85 of 1993). Furthermore, the pump shall be fitted with adequate protection devices, e.g. positive displacement pumps shall be fitted with pressure relief devices set at maximum working head of the pump and piped back to the pump sump.

All dry-well pumps shall be equipped with a facility for attaching mechanical pressure gauges on the delivery and suction sides of the pumps. These facilities shall be equipped with isolating cocks to allow removal of gauges when not in use. The facilities shall be located two diameters from the inlet and outlet flanges of pumps, as per BS 5316.

Each pump set shall be fitted with necessary approved and calibrated glycerine filled pressure gauges suitably dampened against vibration. One pressure gauge shall be supplied on the delivery side of each pump and one pressure gauge on the suction side. Gauges shall be filled with clog free in-line pressure sensors with flexible rubber sleeves of the membrane type.

- i. The discharge pressure gauge shall have a maximum reading of not more than 40% in excess of the closed valve pressure of the pump.
- ii. The suction pressure gauge shall have a scale reading from at least -50 kPa to at least +50 kPa.

The location of pressure gauges shall also be such that the gauge is easily accessible and can be clearly seen from the pump stop/start box.

403.14 Pump Technical Details

The pump shall be a currently catalogued product. Documentation shall include performance curves or selection tables, indicating flow, head, NPSH required, power absorbed, speed and efficiency for the expected range of operational conditions.

Performance curves and selection tables shall be based on a reproducible and certified test carried out in an approved laboratory.

The flow rate at break-off point of the curve for the impeller selected shall be at least 1.5 times that of the maximum flow rate specified.

The head at zero delivery of the curve for the impeller selected shall be at least 1.2 times the maximum head in the pump's duty range.

The pump shall be installed on a vibration-isolated steel and concrete base and shall be leveled.

The pump and electric motor shall be aligned to within 0.05mm, both radially and directionally, to avoid vibration, and shall be bolted to the base.

Construction: Pumps shall be of the horizontal or vertical pull-out, in-line block design, with pump and motor having separate shafts. Standard flange-mounted motors shall be used in order to facilitate easy replacement of either pump or motor in the event of failure.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Pumps shall be easily designed and selected for quiet operation.

All pumps shall be supplies complete with electrical motors.

Complete overhauling of the pump shall be positive without damaging the piping.

Water shall not be spilt over the pump house floor; condensate and gland leakage shall be piped to the outside of the pump house.

A metal lubrication plate shall be attached to the pump where it is clearly visible. The plate shall indicate the recommended lubricant, points of lubrication and the recommended frequency of lubrication.

The Project Manager or his representative reserves the right to call for:

- a) Test certificates and reports from the manufacturer's quality control laboratory or an independent test laboratory such as SABS, and/or
- b) Site inspection, customer reports/references and user's interviews, and/or
- c) Full engineering, design and component selection details in order to check the correctness of the service life claimed.

403.15 Air Release

All horizontal spindle pumps and delivery pipework with local high points or positions upstream of the reflux valves where air can be trapped shall be equipped with the necessary drains and air cocks or automatic air release equipment with pipe connections for discharging from the drains to the drainage system in the pump house.

403.16 Gland Sealing

The pumps shaft shall be sealed against leakage by a mechanical seal. Both the stationery sealing member and mated rotating member shall be tungsten titanium carbide alloy. Each of the mating surfaces shall be lapped to a flatness of one-half light band (5.8 millionths of an inch), as measured by the optical flat monochromatic light. The stationery seal seat shall be double floating so that faces will not lose alignment during periods of shock loads that will cause deflation, vibration, and axial or radial movement of the pump shaft.

The seal shall be lubricated with oil from a separate oil-filled reservoir. The same oil shall not be used to lubricate both shaft seal and shaft bearing.

403.17 Pipework

Layouts of pumps and pipework are shown on the drawings. Should the Tenderer consider alternative layouts then fully detailed drawings showing the proposed layout of pumps and pipework shall be submitted with the tender.

The delivery pipework shall terminate (unless otherwise shown on the drawing) in a flanged puddle pipe 300 mm clear of the wall outside the structure, suitable for connection to the delivery pipes.

The pipework shall be of mild steel as specified hereinbefore with corrosion protecting as specified in Clause 407 below and unless otherwise stated shall be flanged and drilled to SABS 1123 for a working pressure of 1 000kPa (10 bar). Bends and branches shall provide non-turbulent flow conditions and the layout of paperwork shall be such as to facilitate dismantling and inspection. The pipes are to be properly supported and so arranged that all stresses created in the pipeline by static and dynamic forces, including recoil shock,

Contractor

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Employer

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will be taken up by suitable anchors. Unless a specific size is specified, pipework shall be sized so as to limit maximum flow velocities to 1.5 metres per second.

All suction pipework shall be provided with a flexible coupling in a convenient position (downstream of the gate valve if applicable) to facilitate removal and reinstallation of a pump. Any reducers used on the suction pipework shall have level soffits (as installed) and the length of such reducers shall be four times the difference in diameters.

All suction pipework shall start with a suitable bellmouth, equipped with adequate anti-vortex baffles.

Suction pipework for self-priming pumps shall not contain horizontal (or downwards sloping) sections exceeding 1.5m in length.

Check valves on delivery mains shall only be used in a horizontal position.

All brackets and supports in dry wells of pump stations shall be of galvanized mild steel and of grade 304 stainless steel in wet wells of pump stations.

404 Site Testing Of Pumping Plant

On completion of erection of the pumps and of rendering them operational, the Contractor shall make suitable arrangements to test them in the presence of The Project Manager.

Each pump shall be tested individually over its whole range of delivery. Where pumps are to operate in parallel, tests shall also be carried out to check these operating conditions.

The rate of delivery during testing shall be determined by cutting off the inflow to the sump and timing the drop-in water level therein.

During the tests, the average values of voltage and current drawn by the motor shall be noted and recorded. Motor efficiencies and power factors shall be used as supplied by the maker.

The test results shall be compared with the tendered pump characteristics and the following tolerances will be allowed:

Delivery rate	:	0+10%
Overall efficiency	:	-5%

In the event of a pump failing to achieve the tendered performance in regard to discharge or efficiency within the tolerance allowed, then the Employer shall have the right to reject the pumps, to recover all monies paid to the Contractor under the Contract for such pumps and to confiscate the surety by way of agreed and liquidated damages; where upon the Contractor at his own expense shall remove all rejected plant where ordered to do so by The Project Manager. Alternatively, The Project Manager shall have the right to negotiate with the Contractor a reduction in the price of the pumping plant based on the increased power consumption over a twelve (12) year life.

Each pump shall be operated, and checks made that no undesirable effects occur when it is tripped.

405 Control Of Pumps

All control and switchgear will form the subject of the Electrical Works Section of the Contract.

406 Electrical Installation

The electrical scope of supply for the pumping equipment shall be the electric motors. The motors shall comply with the specifications.

The supply and installation of motor control switchgear, stop/start station and cables shall form part of the electrical installation section of the contract. All special requirements of the Sub-Contractor completing this Section of the Contract shall be specifically identified e.g. single line diagrams indicating the exact electrical requirements and interlocks of all the equipment. The electrical equipment forms an integral part of the mechanical equipment and should be included in the scope of supply of the Contractor thereby completing this section.

407 Corrosion Protection

Corrosion protection shall be carried out strictly in accordance with the requirements of the Standardised Corrosion Protection Specification, to the following systems:

a) Motors, baseplates, speed reducers and pipework in dry wells (above water level):

System A.1, A.2 or A.3 (to conform with colour scheme selected by Engineer). If existing paints on these items are incompatible with alkyl paints, the Contractor shall provide suitable alternatives to the approval of The Project Manager.

b) Pipework, Valves and Fittings

- | | | | |
|-----|-----------------------------------|---|--------------|
| i. | Above ground (outside) | : | System B.1.A |
| ii. | Below water level or below ground | : | System B.1 |

c) General

Equipment inside buildings and above ground level not painted on System B.1.A, shall not receive a further coat of paint after installation.

408 Spares, Tools And Lubricants

As required in Clause e.17 lubricants are to be supplied with the equipment included under this Contract.

Spares and special tools are to be listed in the Schedules following the Technical Data Sheets. Provisional items have been allowed in the Schedule of Prices to cater for this.

409 Bolts

Holding down bolts which are to be built into concrete work for securing the plant shall be supplied and installed under this section of the Contract.

All bolts and nuts shall be specified in Clause E.16 of the project specification.

410 Lifting Gear For Pumps

The Tenderer shall provide lifting gear (where applicable) (travelling trolley, block and tackle) for the pumps. The crawl beam for the lifting gear shall be supplied and installed under the Civil and Structural Works Section of the Contract but the Sub-Contractor under this section of the Contract shall supply and install suitable manually operated lifting gear for the pumps. Full detail of the lifting gear shall be provided with the tender.

411 Particular Requirements Of Pumps

411.1 Low Lift Pumps

THREE pumps (2 duty one standby) with available frequency control are required to pump raw water from the abstraction well at the weir to a priming tanks.

Each pump shall be selected to deliver a maximum of **417/s** against a total dynamic head of **21 m**.

411.2 High Lift Pumps

THREE pumps (2 duty one standby) with available frequency control are required to pump raw water from the raw water pumping station to the raw water holding dams at the Mutale purification works located About 5 km away.

Each pump shall be selected to deliver **417/s** against a total dynamic head of **120 m**

805 Corrosion Protection

Corrosion protection must be carried out strictly in accordance with the Standardised Corrosion Protection Specification.

806 Spares, Tools And Lubricants

As required in Clause E.17, spares, special tools and lubricants are to be supplied with the plant included under this Section of the Contract. Details are to be listed in the schedule following the “Technical Data Sheets”.

807 Bolts

Holding down bolts which are to be built into concrete work for securing the plant shall be supplied and installed under this section of the Contract. Grouting up of these bolts will be done by the construction contractor after completion of setting up of the plant by the Contractor under this Contract.

All bolts and nuts shall be as specified in Clause E.16.

SECTION -800: MISCELLANEOUS EQUIPMENT

SCHEDULE OF PRICES

F-800 Preamble To The Schedule Of Prices

All costs involved in meeting the obligations and liabilities imposed by the Conditions of Contract and in complying generally with the requirements of the Contract shall be deemed to be apportioned to and included under the various items, and the price quoted against each item must cover the full inclusive cost of all work to be completed under that item, plus such appointment of the general costs.

The Tenderer must also provide in his prices for anything not specially mentioned but obviously required to enable the plant and equipment as described to function correctly as specified.

Should a Tenderer wish to exclude certain items of plant and/or operations from his offer he must clearly state such exclusions in a schedule accompanying his tender. Any items of plant and/or operation which are specified in the Specification, but which are not so scheduled will be deemed to be included in the Tender.

Any additional charges in connection with off-site storage which there may be over and above the prices quoted in the various sections of this Schedule of Prices shall be set out in detail in a separate schedule accompanying the Tender.

A price is to be entered against each item in the Schedule of Prices. Items against which no price is entered will be considered to be covered by other prices in the Schedule.

The Tenderer must price each item in the Schedule of Prices in BLACK INK or type script.

Mistakes made by the Tenderer in the completion of the Schedule of Prices shall not be erased or painted out. A line shall be drawn through the incorrect entry and the correct entry shall be written above and the correction initialled by the Tenderer. Failure to observe this Condition of Contract may lead to the Tender being disqualified.

The Employer reserves the right to sub-divide the Contract. Prices quoted in this Schedule are deemed to apply for that section only. The Tenderer may offer a reduction in price if awarded more than one section.

Where an item has been allowed to cover the cost of maintenance of equipment during off-site storage in accordance with Clause D.18 of the Specification payment shall be made to the Contractor after the equipment has been delivered to site.

Time required for delivery of complete plant from the date of notification to commence fabrication _____ weeks

Time required for erection and installation of plant from date of notification of availability of structures for erection and installation, or from time of completion of delivery, whichever is later _____ weeks

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Time required for testing, commissioning and putting into proper _____ weeks
working order of complete plant from date of notification

.....

SIGNATURE OF TENDERER

.....

DATE

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

C3.8 OHS Specifications for Construction Projects

C3.8.1. SPECIFICATIONS

1. PREAMBLE

In terms of Construction Regulation 4(1)(a) of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), the Department of Public Works, as the Client and/or its Agent on its behalf, shall be responsible to prepare Health & Safety Specifications for any intended construction project and provide any Principal Contractor who is making a bid or appointed to perform construction work for the Client and/or its Agent on its behalf with the same.

The Client's further duties are as described in The Act and the Regulations made there-under. The Principal Contractor shall be responsible for the Health & Safety Policy for the site in terms of Section 7 of the Act and in line with Construction Regulation 5 as well as the Health and Safety Plan for the project.

This 'Health and Safety Specifications' document is governed by the "Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), hereinafter referred to as 'The Act'. Notwithstanding this, cognisance should be taken of the fact that no single Act or its set of Regulations can be read in isolation. Furthermore, although the definition of Health and Safety Specifications stipulates 'a documented specification of all health and safety requirements pertaining to associated works on a construction site, so as to ensure the health and safety of persons', it is required that the entire scope of the Labour legislation, including the Basic Conditions of Employment Act be considered as part of the legal compliance system. With reference to this specification document this requirement is limited to all health, safety and environmental issues pertaining to the site of the project as referred to here-in. Despite the foregoing it is reiterated that environmental management shall receive due attention.

Due to the wide scope and definition of construction work, every construction activity and site will be different, and circumstances and conditions may change even on a daily basis. Therefore, due caution is to be taken by the Principal Contractor when drafting the Health and Safety Plan based on these Health and Safety Specifications. Prior to drafting the Health and Safety Plan, and in consideration of the information contained here-in, the contractor shall set up a Risk Assessment Program to identify and determine the scope and details of any risk associated with any hazard at the construction site, in order to identify the steps needed to be taken to remove, reduce or control such hazard. This Risk Assessment and the steps identified will be the basis or point of departure for the Health and Safety Plan. The Health and Safety Plan shall include documented 'Methods of Statement' (see definitions under Construction Regulations) detailing the key activities to be performed in order to reduce as far as practicable, the hazards identified in the Risk Assessment.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

2. SCOPE OF HEALTH AND SAFETY SPECIFICATION DOCUMENT

The Health and Safety Specifications pertaining to the project; “(name of the project) – Phase 1 and Phase 2” etc. etc. – see paragraph 8 on page 13), cover the subjects contained in the index and is intended to outline the normal as well as any special requirements of the Department pertaining to the health and safety matters (including the environment) applicable to the project in question. These Specifications should be read in conjunction with the Act, the Construction Regulations and all other Regulations and Safety Standards which were or will be promulgated under the Act or incorporated into the Act and be in force or come into force during the effective duration of the project. The stipulations in this specification, as well as those contained in all other documentation pertaining to the project, including contract documentation and technical specifications shall not be interpreted, in any way whatsoever, to countermand or nullify any stipulation of the

Act, Regulations and Safety Standards which are promulgated under, or incorporated into the Act.

3. PURPOSE

The Department is obligated to implement measures to ensure the health and safety of all people and properties affected under its custodianship or contractual commitments and is further obligated to monitor that these measures are structured and applied according to the requirements of these Health and Safety Specifications.

The purpose of this specification document is to provide the relevant Principal Contractor (and his /her contractor) with any information other than the standard conditions pertaining to construction sites which might affect the health and safety of persons at work and the health and safety of persons in connection with the use of plant and machinery; and to protect persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work during the carrying out of construction work for the Department of Public Works. The Principal Contractor (and his /her contractor) is to be briefed on the significant health and safety aspects of the project and to be provided with information and requirements on inter alia:

- safety considerations affecting the site of the project and its environment;
- health and safety aspects of the associated structures and equipment;
- submissions on health and safety matters required from the Principal Contractor (and his /her contractor); and
- the Principal Contractor’s (and his /her contractor) health & safety plan.

To serve to ensure that the Principal Contractor (and his /her contractor) is fully aware of what is expected from him/her with regard to the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the Regulations made there-under including the applicable safety standards, and in particular in terms of Section 8 of the Act.

To inform the Principal Contractor that the Occupational Health and Safety Act, 1993 (Act 85 of 1993) in its entirety shall apply to the contract to which this specification document applies. The Construction Regulations promulgated on 18 July 2003 and incorporated into the above Act by Government Notice R 1010, published in Government Gazette 25207 shall apply to any person involved in construction work pertaining to this project, as will the Act.

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

4. DEFINITIONS

“Purpose of the Act” –

To provide for the health and safety of persons at work and the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.

“**Agent**” – means any person who acts as a representative for a client;

“**Client**” – means any person for whom construction work is performed;

“**Construction Work**” is defined as any work in connection with the erection, maintenance, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure;

- the installation, erection, dismantling or maintenance of a fixed plant where such work includes the risk of a person falling;
- 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
- 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;

“**Health and Safety File**” – means a file, or other record in permanent form, containing the information required a contemplated in the regulations;

Contractor

Witness 1

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“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” – 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 needed to be taken to remove, reduce or control such hazard.

Contractor

Witness 1

Witness 2

Employer

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5. OCCUPATIONAL HEALTH & SAFETY MANAGEMENT

5.1 Structure and Organisation of OH&S Responsibilities

5.1.1. Overall Supervision and Responsibility for OH&S

- The Client and/or its Agent on its behalf to ensure that the Principal Contractor, appointed in terms of Construction Regulation
 - 4(1)(c), implements and maintains the agreed and approved H&S Plan. Failure on the part of the Client or Agent to comply with this requirement will not relieve the Principal Contractor from any one or more of his/her duties under the Act and Regulations.
 - The Chief Executive Officer of the Principal Contractor in terms of Section 16 (1) of the Act to ensure that the Employer (as defined in the Act) complies with the Act. The pro forma Legal Compliance Audit may be used for this purpose by the Principal Contractor or his/her appointed contractor.
 - All OH&S Act (85 /1993), Section 16 (2) appointee/s as detailed in his/her/their respective appointment forms to regularly, in writing, report to their principals on matters of health and safety per routine and ad hoc inspections and on any deviations as soon as observed, regardless of whether the observation was made during any routine or ad hoc inspection and to ensure that the reports are made available to the principal Contractor to become part of site records (Health & Safety File).
 - The Construction Supervisor and Assistant Construction Supervisor/s appointed in terms of Construction Regulation 6 to regularly, in writing, report to their principals on matters of health and safety per routine and ad hoc inspections and on any deviations as soon as observed, regardless of whether the observation was made during any routine or ad hoc inspection and to ensure that the reports are made available to the principal Contractor to become part of site records (Health & Safety File).
- Health and Safety Representatives (SHE-Reps) shall act and report as per Section 18 of the Act.

5.1.2. Legal Appointments

Several appointments or designations of responsible and /or competent people in specific areas of construction work are required by the Act and Regulations. The following competent appointments, where applicable, in terms of the Construction Regulations are required to ensure compliance to the Act, Regulations and Safety Standards.

Contractor

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Witness 2

Employer

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Required appointments as per the Construction Regulations:-

Item	Regulation	Appointment	Responsible Person
1.	4(1)(c)	Principal contractor for each phase or project	Client
2.	5.(3)(b)	Contractor	Principal Contractor
3.	5(11)	Contractor	Contractor
4.	6(1)	Construction supervisor	Contractor
5.	6(2)	Construction supervisor sub-ordinates	Contractor
6.	6(6)	Construction Safety Officer	Contractor
7.	7(1)	Person to carry out risk assessment	Contractor
8.	7(4)	Trainer/Instructor	Contractor
9.	8(1)(a)	Fall protection planner	Contractor
10.	10 (a)	Formwork & support work supervisor	Contractor
11.	10(e) + (f)	Formwork & support work examiner	Contractor
12.	11(1)	Excavation supervisor	Contractor
13.	11(3)(b)(ii)(b)	Professional engineer or technologist	Contractor
14.	11(3)(k)	Explosives expert	Contractor
15.	12(1)	Supervisor demolition work	Contractor
16.	12(2) + (3)	Demolition expert	Contractor
17.	12(11)	Explosives expert	Contractor
18.	14(2)	Scaffold supervisor	Contractor
19.	15(1)	Suspended platform supervisor	Contractor
20.	15(2)(c)	Compliance plan developer	Contractor
21.	15(8)(c)	Suspended platform expert	Contractor
22.	15(13)	Outrigger expert	Contractor
23.	17(8)(a)	Material hoist inspector	Contractor
24.	18(1)	Batch plant supervisor	Contractor
25.	18(7)	Batch plant operator	Contractor

Contractor

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Witness 2

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Item	Regulation	Appointment	Responsible Person
26.	19(2)(b)	Power tool expert	Contractor
27.	19.2 (g) (i)	Power tool controller	Contractor
28.	20(f)	Tower crane operator	Contractor
29.	21(1)(d)(i)	Construction vehicle and mobile plant operator	Contractor
30.	21(1)(j)	Construction vehicle and mobile plant inspector	Contractor
31.	22(d)	Temporary electrical installations inspector	Contractor
32.	22 (e)	Temporary electrical installations controller	Contractor
33.	26 (a)	Stacking and storage supervisor	Contractor
34.	27 (h)	Fire equipment inspector	Contractor

This list may be used as a reference or tool to determine which components of the Act and Regulations would be applicable to a particular site, as was intended under paragraph 3 & 4 of the Chapter “Preamble” (page 4) above. This list must not be assumed to be exclusive or comprehensive

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Witness 2

5.2 Communication & Liaison

5.2.1 OH&S Liaison between the Employer, the Principal Contractor, the other Contractors, the Designer and other concerned parties shall be through the Project Committee as per the procedures determined by the Project Committee.

5.2.2 In addition to the above, communication may be directly to the Client or his appointed Agent, verbally or in writing, as and when the need arises.

5.2.3 Consultation with the workforce on OH&S matters will be through their Supervisors and H&S Representatives ('SHE – Reps')

5.2.4 The Principal Contractor will be responsible for the dissemination of all relevant OH&S information to the other Contractors e.g. design changes agreed with the Client and/or its Agent on its behalf and the Designer, instructions by the Client and/or his/her agent, exchange of information between Contractors, the reporting of hazardous/dangerous conditions/situations etc.

6. RESPONSIBILITIES

6.1 Client

6.1.1 The Client or his appointed Agent on his behalf will appoint each Principal Contractor for this project or phase/section of the project in writing for assuming the role of Principal Contractor as intended by the Construction Regulations and determined by the Bills of Quantities.

6.1.2 The Client or his appointed Agent on his behalf shall discuss and negotiate with the Principal Contractor the contents of the health and safety plan of the both Principal Contractor and Contractor for approval.

6.1.3 The Client or his appointed Agent on his behalf, will take reasonable steps to ensure that the health and safety plan of both the Principal Contractor and Contractor is implemented and maintained. The steps taken will include periodic audits at intervals of at least once every month.

6.1.4 The Client or his appointed Agent on his behalf, will prevent the Principal Contractor and/or the Contractor from commencing or continuing with construction work should the Principal Contractor and/or the Contractor at any stage in the execution of the works be found to:

have failed to have complied with any of the administrative measures required by the Construction Regulations in preparation for the construction project or any physical preparations necessary in terms of the Act;

have failed to implement or maintain their health and safety plan;

have executed construction work which is not in accordance with their health and safety plan; or

act in any way which may pose a threat to the health and safety of any person(s) present on the site of the works or in its vicinity, irrespective of him/them being employed or legitimately on the site of the works or in its vicinity

6.2 Principal Contractor

6.2.1 The Principal Contractor shall accept the appointment under the terms and Conditions of Contract. The Principal Contractor shall sign and agree to those terms and conditions and shall, before commencing work, notify the Department of Labour of the intended construction work in terms of Regulation 3 of the

Contractor

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Employer

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Construction Regulations. Annexure B of this Specification contains a “Notification of Construction Work” form. The Principal Contractor shall submit the notification in writing prior to commencement of work and inform the Client or his Agent accordingly.

6.2.2 The Principal Contractor shall ensure that he is fully conversant with the requirements of this Specification and all relevant health and safety legislation. This Specification is not intended to supersede the Act nor the Construction Regulations or any part of either. Those sections of the Act and the Construction Regulations which apply to the scope of work to be performed by the Principal Contractor in terms of this contract (entirely or in part) will continue to be legally required of the Principal Contractor to comply with. The Principal Contractor will in no manner or means be absolved from the responsibility to comply with all applicable sections of the Act, the Construction Regulations or any Regulations proclaimed under the Act or which may perceivable be applicable to this contract.

6.2.3 The Principal Contractor shall provide and demonstrate to the Client a suitable and sufficiently documented health and safety plan based on this Specification, the Act and the Construction Regulations, which shall be applied from the date of commencement of and for the duration of execution of the works. This plan shall, as appendices, include the health and safety plans of all Sub- contractors for which he has to take responsibility in terms of this contract.

6.2.4 The Principal Contractor shall provide proof of his registration and good standing with the Compensation Fund or with a licensed compensation insurer prior to commencement with the works.

6.2.5 The Potential Principal Contractor shall, in submitting his tender, demonstrate that he has made provision for the cost of compliance with the specified health and safety requirements, the Act and Construction Regulations. (Note: This shall have to be contained in the conditions of tender upon which a tenderer’s offer is based.)

6.2.6 The Principal Contractor shall consistently demonstrate his competence and the adequacy of his resources to perform the duties imposed on the Principal Contractor in terms of this Specification, the Act and the Construction Regulations.

6.2.7 The Principal Contractor shall ensure that a copy of his health and safety plan is available on site and is presented upon request to the Client, an Inspector, Employee or Sub-contractor.

6.2.8 The Principal Contractor shall ensure that a health and safety file, which shall include all documentation required in terms of the provisions of this Specification, the Act and the Construction Regulations, is opened and kept on site and made available to the Client or Inspector upon request. Upon completion of the works, the Principal Contractor shall hand over a consolidated health and safety file to the Client.

6.2.9 The Principal Contractor shall, throughout execution of the contract, ensure that all conditions imposed on his Sub-contractors in terms of the Act and the Construction Regulations are complied with as if they were the Principal Contractor. 6.2.10 The Principal Contractor shall from time to time evaluate the relevance of the Health and Safety Plan and revise the same as required, following which revised plan shall be submitted to the Client and/or his/her Agent for approval.

7. SCOPE OF WORK

These specifications are applicable to the specific scope of work pertaining to the project as detailed in the tender documents. Refer to

Project Specification.

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8. HEALTH AND SAFETY FILE

The Principal Contractor must, in terms of Construction Regulation 5(7), keep a Health & Safety File on site at all times that must include all documentation required in terms of the Act and Regulations and must also include a list of all Contractors on site that are accountable to the Principal Contractor and the agreements between the parties and details of work being done.

The Health and Safety File will remain the property of the Client and/or its Agent on its behalf throughout the period of the project and shall be consolidated and handed over to the Client and/or its Agent on its behalf at the time of completion of the project.

The safety file shall contain the following documentation:

- safety records
- notification documents
- appointment letters
- records of incidents
- records of safety meetings
- records of PPE provision
- and any other documented related to safety issues on site.

9. MONITORING AND REVIEWING OH&S PERFORMANCE

The Principal Contractor is required to maintain an acceptable incident rate and report on this to the Client and/or its Agent on its behalf on a monthly basis. The frequency rates must reflect permanent disability, lost workdays, restricted workdays, medical treatment and first aid treatment.

10. HAZARDS AND DEVELOPMENT OF RISK ASSESSMENTS

The Principal Contractor is required to develop Risk Assessments, Standard Working Procedures (SWP) and Method Statements for each activity executed in the contract or project. This identification of hazards is over and above the hazards identification programme and those hazards identified during the drafting of the Health and Safety Plan. Hazard identification should be conducted continuously over and above the baseline risk assessment.

11. ARRANGEMENTS FOR MONITORING AND REVIEW

11.1 Monthly Audit by Client

The Client and/or its Agent on its behalf will be conducting Periodic Audits at times agreed with the Principal Contractor Audit to comply with Construction Regulation 4(1)(d) to ensure that the principal Contractor has implemented, is adhering to and is maintaining the agreed and approved OH&S Plan.

11.2 Other audits and inspections by client and/or its agent on its behalf.

The Client and/or its Agent on its behalf reserves the right to conduct any other ad hoc audits and inspections as it and/or its Agent on its behalf deem necessary.

A representative of the Principal Contractor and the relevant Health and Safety Representative(s) (SHE-Reps) must accompany the Client and/or its Agent on its behalf on all Audits and Inspections and may conduct their own audit/inspection at the same time. Each party will, however, take responsibility for the

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results of his/her own audit/inspection results. The Client and/or its Agent on its behalf may require to be handed a copy of the minutes of the previous Health and Safety Committee meeting reflecting possible recommendations made by that committee to the Employer for reference purposes and any other related issues.

11.3 Reports

11.3.1 The Principal Contractor shall report all incidents where an employee is injured on duty to the extent that he/she dies, becomes unconscious, loses a limb or part of a limb, is injured or becomes ill to such a degree that he/she is likely either to die or to suffer a permanent physical defect or likely to be unable for a period of at least 14 days either to work or continue with the activity for which he/she was usually employed or where a major incident occurred, the health or safety of any person was endangered, where a dangerous substance was spilled, the uncontrolled release of any substance under pressure took place, machinery or any part of machinery fractured or failed resulting in flying, falling or uncontrolled moving objects, machinery ran out of control, to the Provincial Director of the Department of Labour within seven days and at the same time to the Client and/or its Agent on its behalf.

11.3.2 The Principal Contractor is required to provide the Client and/or its Agent on its behalf with copies of all statutory reports required in terms of the Act and the Regulations.

11.3.3 The Principal Contractor is required to provide the Client and/or its Agent on its behalf with a monthly "SHE Risk Management Report".

11.3.4 The Principal Contractor is required to provide a.s.a.p. the Client and/or its Agent on its behalf with copies of all internal and external accident/incident investigation reports. As soon as the occurrence of any accident/incident of whatever nature comes to the notice of the Principal Contractor, it shall be reported immediately to any of the following:

11.4 Review

The Principal Contractor is to review the Hazard Identification, Risk Assessments and Standard Work Processes at each Production Planning and Progress Report meeting as the construction work develops and progresses and each time changes are made to the designs, plans and construction methods and processes. The Principal Contractor must provide the Client and/or its Agent on its behalf, other Contractors and all other concerned parties with copies of any changes, alterations or amendments.

11.5 Site Rules and other Restrictions

11.5.1 Site OH&S Rules

The Principal Contractor must develop a set of site-specific OH&S rules that will be applied to regulate the Health and Safety Plan and associated aspects of the construction. When required for a site by law, visitors and non-employees upon entering the site shall be issued with the proper Personal Protective Equipment (PPE) as and when necessary.

Contractor

Witness 1

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Employer

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Witness 2

11.5.2 Security Arrangements

The Principal Contractor must establish site access rules and implement and maintain these throughout the construction period. Access control must include the rule that non-employees shall at all times be provided with fulltime supervision while on site. The Principal Contractor must develop a set of Security rules and procedures and maintain these throughout the construction period.

If not already tasked to the H&S Officer appointed in terms of Construction Regulation 6(6), the Principal Contractor must appoint a competent Emergency Controller who must develop contingency plans for any emergency that may arise on site as indicated by the risk assessments. These must include a monthly practice/testing programme for the plans e.g. January: trench collapse, February: flooding etc. and practiced/tested with all persons on site at the time, participating.

11.6 Training

The Principal Contractor shall ensure that all employees under his or her control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences, and thereafter at such times as may be determined in the risk assessment.

The Principal Contractor shall ensure that all labourers are informed regarding any hazard as stipulated in the risk assessment before any work commences, and thereafter at such times as may be determined in the risk assessment.

The Principal Contractor shall ensure that as far as is reasonably practicable, ergonomic are analysed, evaluated and addressed in the risk assessment.

No Principal Contractor shall allow or permit any employee to enter any site, unless such person has undergone health and safety induction training pertaining to the hazards prevalent on the site at the time of entry.

The Principal Contractor shall ensure that all visitors to a construction site undergoes health and safety instruction pertaining to the hazards prevalent on the site and shall be provided with the necessary personal and protective equipment: Provided that where visits are made only to the site office which is not in direct contact with the construction work activities, those health and safety instructions and the provision of personal protective equipment may not apply.

The contents and syllabi of all training required by the Act and Regulations including any other related or relevant training as required must be included in the Principal Contractor's Health and Safety Plan and Health and Safety File.

11.6.1 General Induction Training

The Principal Contractor must ensure that the employees on site are conversant with the general health and safety requirements on site. All employees of the Principal and other Contractors must be in possession of proof of General Induction training

11.6.2 Site Specific Induction Training

All employees of the Principal and other Contractors must be in possession of Site Specific Occupational Health and Safety Induction or other qualifying training .

11.6.3 Other Training

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All operators, drivers and users of construction vehicles, mobile plant and other equipment must be in possession of valid proof of training. All employees in jobs requiring training in terms of the Act and Regulations must be in possession of valid proof of training as follows:

- General Induction (Section 8 of the Act)
- Site/Job Specific Induction (also visitors) (Sections 8 & 9 of the Act)
- Site/Engineer
- Construction Supervisor
- OH&S Representatives (Section 18 (3) of the Act)
- Training of the Appointees indicated in 12.6.1 & 12.6.2 above
- Operation of Cranes (Driven Machinery Regulations 18 (11))
- Operators & Drivers of Construction Vehicles & Mobile Plant (Construction Regulation 21)
- Basic Fire Prevention & Protection (Environmental Regulations 9 and Construction Regulation 27)
- As a minimum basic First Aid to be upgraded when necessary (General Safety Regulations 3)
- Storekeeping Methods & Safe Stacking (Construction Regulation 26)
- Emergency, Security and Fire Co-ordinator

11.7 Accident and Incident Investigation

The Principal Contractor is responsible to oversee the investigation of all accidents/incidents where employees and non-employees were injured to the extent that he/she/they had to receive first aid or be referred for medical treatment by a doctor, hospital or clinic. (General Administrative Regulation 9).

The Principal Contractor is responsible for the investigation of all non-injury incidents as described in Section 24 (1) (b) & (c) of the Act and keeping a record of the results of such investigations including the steps taken to prevent similar incidents in future. Notwithstanding the requirements of Section 24 of the Act, ALL incidents shall be investigated and reported on in writing, irrespective of whether such incident gave rise to injury or damage.

11.8 H&S Representatives and H&S Committees

11.8.1 Designation of H&S Representatives

Where the Principal Contractor employs more than 20 persons (including the employees of other Contractors (sub-contractors) he has to appoint one H&S Representative for every 50 employees or part thereof. (Section 17 of the Act and General Administrative Regulation 6.

& 7.). H&S Representatives have to be designated in writing and the designation shall be in accordance with the Collective Agreement as concluded between the parties as is required in terms of General Administration Regulation 6.

11.8.2 Duties and Functions of the H&S Representatives

The Principal Contractor must ensure that the designated H&S Representatives conduct at least a weekly inspection of their respective areas of responsibility using a checklist and report thereon to the Principal Contractor, after which these reports shall be consolidated for submission to the Health and Safety Committee. H&S Representatives must be included in and be part of accident/incident investigations. H&S Representatives shall be members of at least one H&S Committee and must attend all meetings of that H&S committee.

11.8.3 Establishment of H&S Committee(s)

Contractor

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Employer

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The Principal Contractor must establish H&S Committees consisting of designated H&S Representatives together with a number of Employers Representatives appointed as per Section 19(3) that are not allowed to exceed the number of H&S Representatives on the committee. The persons nominated by the employer on a H&S Committee must be designated in writing for such period as may be determined by him. The H&S Committee shall co-opt advisory (temporary) members and determine the procedures of the meetings including the chairmanship.

Contractor

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Employer

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12. HOUSEKEEPING

Good housekeeping will be maintained at all times as per Construction Regulation No. 25. Poor housekeeping contributes to three major problems, namely, costly or increased accidents, fire or fire hazards and reduction in production. Good housekeeping will enhance production time.

Particular emphasis is to be placed on the following crucial elements of a construction site:

- Phase priorities and production/plant layout
- Enclosures
- Pits, openings and shoring
- Storage facilities
- Effective, sufficient and maintained lighting and illumination
- Principal sources of injuries, e.g., stairways, runways, ramps, loose building material
- Oil, grease, water, waste, rubble, glass, storm water
- Color coding
- Demarcations
- Pollution
- Waste disposal
- Ablution and hygiene facilities
- First aid disposals
- Hazardous chemical substances

This list must not be taken to be an exclusive or exhaustive

In promotion of environmental control all waste, rubble, scrap etc., will be disposed of at a registered dumping site and records will be maintained. Where it is found to be impractical to use a registered dump site or it is not available, the Principal Contractor will ensure that the matter is brought to record with the client or his representative, after which suitable, acceptable alternatives will be sought and applied. Dross capable of fermentation, putrefaction or constituting a nuisance shall be treated or disposed of by methods approved by an inspector.

13. OPERATIONAL CONTROL

The Principal Contractor shall take reasonable steps to ensure that necessary control measures are taken to promote a safe working environment during all operational works. Routine safety inspections shall be carried out to ensure plant, machinery and tools are safe enough for employees to work with. Operational control measures shall be taken for the following activities and plant or machinery where applicable:

- Fall protection;
- Excavation work;
- Scaffolding;
- Mobile plants;
- Electrical installation and machinery; and
- Other associated activities

14. SUB-CONTRACTORS

The Principal Contractor shall ensure that agreements are entered into by all sub-contractors on site and ensure that all sub-contractors are in compliance with the health and safety standards on site. Particulars of sub-contractors involved in specialized work such as blasting, concrete works and electrical installations must be submitted to the designers for approval and their safety plans submitted to the Client for approval.

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PART C4: SITE INFORMATION

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

VHEMBE DISTRICT MUNICIPALITY

SITE INFORMATION

1. GENERAL

1.1 Documentation

The documentation included in this section describes the site as at the time of tender to enable the Tenderer to price his tender, furthermore, to decide upon his method of working and programming and to evaluate his risks.

1.2 Information

Only actual information about physical conditions of the site and its surroundings (if any available) is included in this Site Information and interpretation thereof is a matter for the Tenderer.

2. SITE INFORMATION

2.1 Records and Test Results

2.1.1 Subsoil records

Available on request.

2.1.2 Borehole records

Information not available

2.2 Reports on Physical Conditions

2.2.1 Mapping

N/A

2.2.2 Hydrographic data

Available on request.

2.2.3 Hydrological information

Available on request.

2.3 Publicly available Information

2.3.1 Published papers and interpretation of geotechnical information

N/A

2.4 Information about services below the surface of the site

2.4.1 Water

Existing underground services are not known at this stage.

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Should the Contractor damage an existing service he shall immediately contact the Engineer who will investigate the matter and determine liability for the damage.

2.4.2 Sewage

Not available on site.

2.4.3 Electricity

All cables and pipes shall be considered "live" unless confirmed otherwise by the relevant authority.

2.4.4 Gas

Not available on site.

2.4.5 Communications

Not available on site.

2.5 Information about adjacent main infrastructure

2.5.1 Buildings

Unavailable.

2.5.2 Structures

Major structures will be constructed in the project.

2.5.3 Internal Roads

Unavailable.

2.5.4 Restrictions for Heavy Loads

Unavailable.

2.6 Atmospheric criteria

Unavailable.

2.7 Environmental criteria

A copy of the Environmental Management Plan is available on request.



BID DOCUMENT FOR:

APPOINTMENT OF CONTRACTOR FOR MUTALE RAW AND PORTABLE WATER SYSTEM UPGRADE – CONTRACT C1 (WEIR REHABILITATION AND REFURBISHMENT OF PUMPING SYSTEM)

BID NUMBER: VDM/TECH/25/07/2024/01:

CIDB Grade: 8CE or Higher

TENDER DRAWINGS

Vhembe District Municipality Supply Chain Management: Contact: Ms. Sigida N Tel: (015) 960 2000 Fax: (015) 962 5277	Vhembe District Municipality Project Management Unit: Contact: Mr E.F. Chauke Tel: (015) 960 3500 Fax: (015) 962 5277
Name of Bidder.	

PART C5. CONTRACT DRAWINGS

The drawings that form part of the tender documents shall be used only for tender purposes. Only “approved for construction” drawings, to be issued by the Engineer / Engineer, may be used for the execution of the work under the contract. It must be noted that certain specifications, which appear on the drawings, are not necessarily repeated in the Project Specifications. Where applicable certain items in the Bill of Quantities refer to the drawings.

Table 1: Tender Drawing Register

Drawing Number	Status	Revision	# of Sheets	Drawing Title
159-C1-GL-000	T	A	1	LOCALITY MAP
159-C1-GL-001	T	A	1	GENERAL SCOPE OF WORKS LAYOUT
159-C1-GL-002	T	A	1	SITE LAYOUT NEW AND EXISTING STRUCTURES LAYOUT
159-C1-GL-003	T	A	1	PROPOSED SITE CAMP LAYOUT
159-C1-CE-105	T	A	1	ACCESS ROAD LAYOUT AND SECTIONS
159-C1-CE-106	T	A	1	PUMPSTATION PLATFORM LAYOUT AND SECTIONS
159-C1-PS-200	T	A	1	NEW RAW WATER HIGH LIFT PUMP STATION - GENERAL ARRANGEMENT: SHEET 1 OF 1
159-C1-PS-201	T	A	2	NEW RAW WATER HIGH LIFT PUMP STATION - LAYOUT, SECTIONS AND DETAILS: SHEET 1 OF 2
159-C1-PS-202	T	A	2	NEW RAW WATER HIGH LIFT PUMP STATION - LAYOUT, SECTIONS AND DETAILS: SHEET 2 OF 2
159-C1-ME-800	T	A	1	"MUTALE RAW WATER HIGH LIFT PUMPSTATION AND RESERVOIR MECHANICAL FITTINGS"
159-C1-ME-801	T	A	2	MUTALE RAW WATER HIGH LIFT PUMPSTATION - PIPE SCHEDULE: SHEET 1 OF 2
159-C1-ME-802	T	A	2	MUTALE RAW WATER HIGH LIFT PUMPSTATION - PIPE SCHEDULE: SHEET 2 OF 2



BID DOCUMENT FOR:

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BID NUMBER: VDM/TECH/25/07/2024/01

CIDB Grade: 8CE or Higher

ANNEXURES

Vhembe District Municipality Supply Chain Management: Contact: Ms. Sigida N Tel: (015) 960 2000 Fax: (015) 962 5277	Vhembe District Municipality Project Management Unit: Contact: Mr E.F. Chauke Tel: (015) 960 2000 Fax: (015) 962 5277
Compiled by: Batatise Consulting Engineers (Pty) Ltd: Contact: Jabula Nkomo, Tel: (010) 442 6759 Cell: 068 285 4350 E-mail address: jabula@batatiseconsulting.com	
Name of Bidder.	

ANNEXURE 1: BASELINE RISK ASSESSMENT