BOOK 1 OF 1

higher education & training
Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

ORBIT TVET COLLEGE

TENDER NO: M01/2023

UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS

REQUEST FOR PROPOSAL DOCUMENT

JULY 2023

NAME OF TENDERER: .....

ISSUED BY:	PRINCIPAL AGENT	ENGINEER:
ORBIT TVET COLLEGE **PRIVATE BAG X1014** **MOGWASE** **0314**	**GPS ARCHITECTS** **P O BOX 11389** **SILVER LAKES** **0054** **CONTACT PERSON:** **MR. GIFT PHALATSE SETSHEDI** **012 813 8888**	**EMZANSI ENGINEERING CONSULTANTS** **P O BOX 2323** **WINGATE PARK** **0181** **CONTACT PERSON:** **MR AUBREY MACKENZIE** **TEL: 012 345 3383**

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PART 1:NOTICE AND INVITATION TO BID

M01/2023: UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS

1. COMPULSORY BRIEFING SESSION

A representative will meet prospective tenderers at the date and time as advertised in the Tender Bulletin at the main entrance to the ORBIT TVET College–Mankwe Campus for the Briefing Session. The representative will not be available at any other time.

The ORBIT TVET College – Situated at Mankwe, Mabele-a-Podi, 0354, North West Province

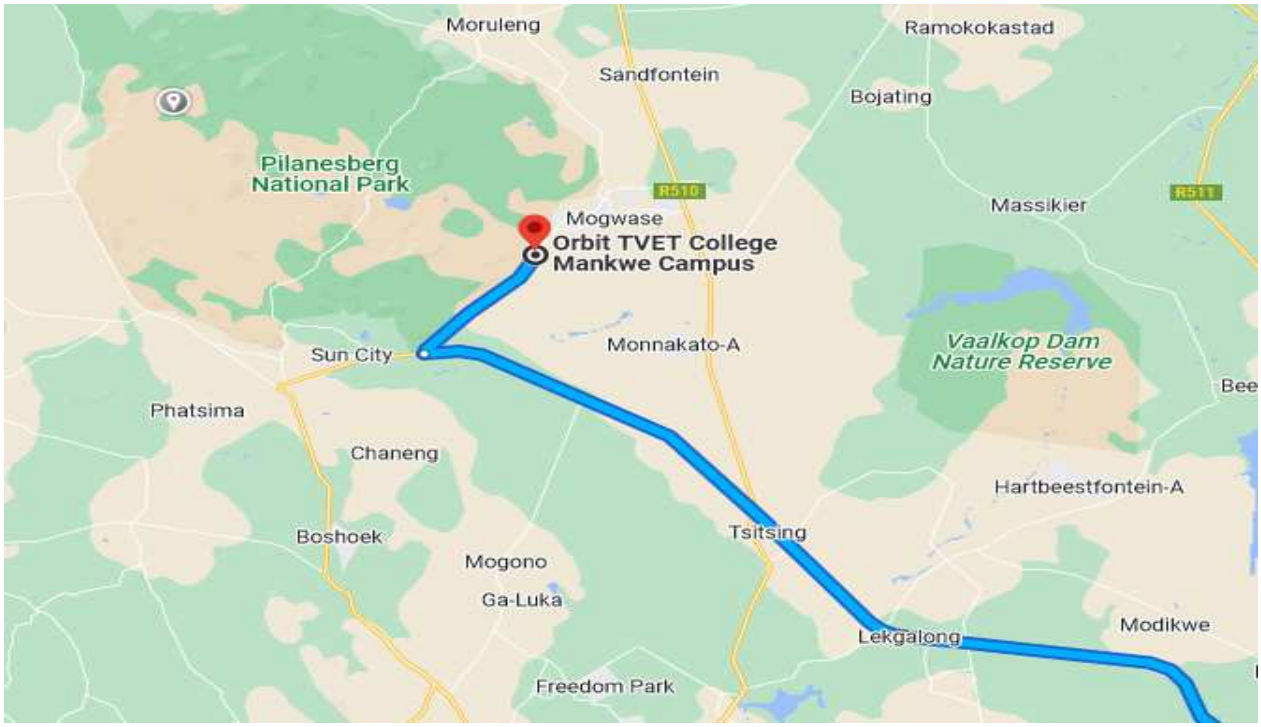
GPS Coordinates: 25°17'41.8"S 27°11'54.8"E

Tender No: M01/2023

Compulsory Briefing Session Date and Time : 01 August 2023 at 11:00

Tender Closing Date and Time : 15 August 2023 at 11:00

It is estimated that tenderers should have a CIDB contractor grading designation of **5EB PE or 6EB 5EP PE or 6EP**



1.1. ORBIT TVET College is inviting capable and competent service providers for the UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS.

1.2. COMPULSORY BRIEFING SESSION will be held, AS SPECIFIED.

1.3. The tender documents will be issued as from: 21-07-2023 and it must be downloaded/viewed on www.orbitcollege.co.za

1.4. Tender document will be issued at the college on condition that National Treasury website is not functioning/working.

1.5. Tender must be submitted on the tender documentation that is issued by the College.

1.6. **NO LATE TENDERS WILL BE ACCEPTED AFTER THE CLOSING DATE AND TIME OF THIS TENDER.**

1.7. The bid/tender shall be valid and open for acceptance for a period of 90 DAYS from the date of closing of tenders.

1.8. Bidders must make sure that original completed bid document is in a sealed envelope, marked "M01/2023: UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS" is received and deposited in the tender box on or before 15-08-2023 at 11:00am at the following address:

ORBIT TVET COLLEGE - MANKWE CAMPUS
Mankwe, Mabele-a-Podi,
0354

PART 2:APPLICABLE DRAWINGS

The following drawings part of this contract:

1. DB TYPE A AND DB TYPE B
2. BD-SMB1 AND DB-SMB2
3. KIOSK FEMALE RESIDENCE-1
4. KIOSK MALE RESIDENCE-1
5. KIOSK-STAFF QUARTERS-1
6. NK SINGLE LINE DIAGRAM-1
7. PV DB'S
8. PV PLANT MAIN DB-1
9. TYPE B KIOSK 2-1
10. TYPICAL SCHEMATIC OF MV + PV + GEN SUPPLY
11. TYPICAL STAFF DB-1
12. GA OF EXISTING CIRCUIT BREAKERS (OEM DRAWING)

PART 3:IMPORTANT PROJECT DATES

ITEM / ACTIVITY	DATE	TIME
COMPULSORY CLARIFICATION MEETING	01-08-2023	11h00 am
TENDER CLOSE	15-08-2023	11h00 am

PART 4:SPECIAL TECHNICAL CONDITIONS TO THE TENDER

1. MINIMUM CIDB REGISTRATION GRADING REQUIRED: **5EB PE or 6EB; 5EP PE or 6EP**.

PART 5:TECHNICAL SPECIFICATIONS

1. RETURNABLE SCHEDULE - EQUIPMENT AND SUPPLIERS
2. RETURNABLE SCHEDULE - PARTICULARS OF ELECTRICAL CONTRACTOR
3. SECTION C ELECTRICAL INSTALLATION WORKS SPECIFICATION

higher education & training
Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

RETURNABLE SCHEDULE

(To be completed by tenderers and submitted together with the tender form).

OF

PROPOSED EQUIPMENT AND SUPPLIERS

ELECTRICAL ENGINEERS
Name: Emzansi Consulting
Tel: (012) 345 3383
Contact Person: Aubrey Mackenzie

GENERAL

The tenderer must list below any equipment and suppliers he/she intends to use to carry out part(s) of the Works.

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

ITEM	MAKE OR TYPE	MANUFACTURER/SUPPLIER
11000/430/230V Miniature Substations		
MCCB's & MCB's		
Metal Work		
PVC, BCEW, XLPE Copper Clad Steel Conductors		

TENDERER'S NAME AND ADDRESS

.....

Signature of Tenderer/s

..... Authorised Signatory

.....

TEL NO. ..... DATE: .....

(To be completed by tenderers and submitted together with the tender form).

PARTICULARS OF ELECTRICAL CONTRACTOR

Project Title:			
Tender no:		**Reference no:**	

Name of Electrical contractor:	
Address:	
Electrical Contractor Registration number at the Electrical Contracting Board of SA Attach valid certificate	

Name of Tenderer	**Signature of Tenderer/s Authorised Signatory**	**Date**

ELECTRICAL ENGINEERS

Name: Emzansi Consulting

Tel: (012) 345 3383

Contact Person: Aubrey Mackenzie

(EC) CONTRACT DATA- (GCC (2004) 1st EDITION: 2004)

CONTRACT DATA

	PART 1: DATA PROVIDED BY THE EMPLOYER
	CONDITIONS OF CONTRACT
	The General Conditions of Contract for Construction Works (2004) [hereinafter referred to as GCC 2004], published by the South African Institution of Civil Engineering, is applicable to this Contract.
	CONTRACT SPECIFIC DATA
	The following contract specific data; amendments; additions; or omissions are applicable to this Contract.

CLAUSES	Compulsory Data
1.1.14	"Employer" means the TVET ORBIT College
1.2.2	The addresses of the Employer, where the Employer shall receive notices, are as follows: Physical Address: Mabela –A –Podi Mogwase 0354 Postal Address: ORBIT TVET COLLEGE Private Bag X104 Mogwase 0314
1.1.15	The name of the Engineer is: ***EMZANSI CONSULTING ENGINEERS INLAND CC***
1.2.2	The address of the Engineer, where the Engineer shall receive notices, are as follows: Physical Address:

	36 JOCHEM STREET WATERKLOOF A/H PRETORIA 0181 Postal Address: P.O.BOX 2323 WINGATE PARK 0153 Telephone: 012 345 4583
1.1.21	Not applicable to this Contract
1.1.24	Omit reference to “telex, telegram, cable, electronic communication” and “or any like communication”
1.1.25	Add the following Clause 1.1.25 **“Value of Works” means the value of Works certified by the Engineer as having been satisfactorily executed and shall include the value of the work done, the value of the materials and/or goods and Contract Price Adjustments.**
1.1.26	“Contract Sum” means the total of Prices provided for in the Agreement made in terms of the Form of Offer and Acceptance.
1.1.27	“Corrupt Practice” means the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.
1.1.28	“Fraudulent Practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any tenderer and includes collusive practice among tenderers (prior to or after the tender submission) designed to establish tender prices at artificial non-competitive levels and to deprive the tenderer or the benefits of free and open competition.
1.6 and 3.8	The special non-working days are public holidays, Saturdays, and Sundays

1.6	The year end break commences on 16 December until the first working Monday of January of the succeeding year.
2.3	Clause 40.3 – amend to read as follows: "…unless such instruction is in writing, duly approved by the Employer, states explicity…" Clause 41.1 – amend to read as follows: "... said performance has actually taken place and may be extended by the Employer at his discretion."
7.	Replace the word "**GUARANTEE**" with the word "**SECURITY**"
7.1	Replace in its entirety with the following: The Contractor shall deliver to the Employer within 5 days of the Commencement Date the form of security selected in the Contract Data and any expenditure incurred in doing so shall be borne by the Contractor.
7.2	Should the Contractor fail to select the security to be provided or should the Contractor fail to provide the Employer with the selected security within 5 days from the Commencement Date, it will be deemed that the Contractor has selected a security in the form of a retention of 10% of the Value of Works (excluding of VAT)
9.1	Replace in its entirety with the following: The Employer will become the owner of the information, documents, advice, recommendation and reports collected, furnished and/or compiled by the Contractor during the course of, and for the purposes of executing this Contract, all of which will be handed over to the Employer on request, but in any event on the termination and/or cancellation of this Contract for whatever reason. The Contractor relinquishes its retention or any other rights to which it may be entitled.

9.2	Add the following as 9.2: **The copyright of all documents, recommendations and reports compiled by the Contractor during the course of and for the purposes of finalising the Works will vest in the Employer, and may not be reproduced or distributed or made available to any person outside the Employer's service, or to any institution in any way, without the prior written consent of the Employer. The Employer shall have the right to use such material for any other purpose without the approval of, information or payment to the Contractor.**
9.3	Add the following as 9.3 The copyright of all electronic aids, software programmes etc. prepared or developed in terms of the Contract shall vest in the Employer, who shall have the right to use such material for any other purpose without the approval of, information or payment to the Contractor.
9.4	Add the following as 9.4 In case of the Contractor providing documents, electronic aids, software programmes or like material to the Employer, the development of which has not been at the expense of the Employer, copyright shall not vest in the Employer. The Contractor shall be required to indicate to which documents, electronic aids, software programmes or like material this provision applies.
9.5	Add the following as 9.5 The Contractor hereby indemnifies the Employer against any action, claim, damages or legal cost that may be instituted against the Employer on the grounds of an alleged infringement of any copyright or any other intellectual property right in connection with the Works outlined in this Contract.
9.6	Add the following as 9.6 All information, documents, recommendations, programmes and reports collected or compiled must be regarded as confidential and may not be communicated or made available to any person outside the Employer's service and may not be published either during the currency of this Contract or after termination thereof without the prior written consent of the Employer.

10.1	Replace with the following: The Contractor shall, save as may be otherwise provided in the Contract or be legally or physically impossible, commence executing the Works within 5 days calculated from the date the Contractor is given access to and possession of the Site in terms of Clause 11.
11.1.1	Replace the words “On the Commencement Date” with the words “Within 5 days of the Contractor submitting to the Engineer an acceptable health and safety plan required in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993)”
12.2	The Contractor shall deliver his programme of work within 5 days from date of Site hand-over.
12.3.3	Amend as follows: “Rates of progress for the various parts of the Works taking account, inter alia, of design, procurement, construction, testing, time risk, float, and any other necessary and relevant facts; and”
26.2	Replace the words “within a reasonable time” with the words “within the time period stipulated by the Engineer in such order…”
28.1	Add the following at the end thereof Such losses or damages may be recovered from the Contractor or by deducting the same from any amounts still due under this Contract or under any other contract presently or hereafter existing between the Employer and the Contractor and for this purpose all these contracts shall be considered one indivisible whole.
35	Replace in its entirety with the following: Unless otherwise stated adequate insurance is the responsibility of the Contractor. The Contractor shall submit the insurance policy to the Employer for approval, if so requested.
35.1	**Damage to the Works** (a) Without in any way limiting the Contractor’s obligations in terms of the Contract, the Contractor shall bear the full risk of damage to and/or destruction of the Works by whatever cause during construction of the

35.2	Works and hereby indemnifies and holds harmless the Employer against any such damage. The Contractor shall take such precautions and security measures and other steps for the protection and security of the Works as he may deem necessary. (b) The Contractor shall at all times proceed immediately to remove or dispose of any debris arising from damage to or destruction of the Works and to rebuild, restore, replace and/or repair the Works. (c) The Employer shall carry the risk of damage to or destruction of the Works and material paid for by the Employer that is the result, whether direct or indirect or proximate or remote, of the excepted risks as set out in Clause 35.2. (d) Where the Employer bears the risk in terms of this Contract, the Contractor shall, if requested to do so, reinstate any damage or destroyed portions of the Works and the costs of such reinstatement shall be measured and valued in terms of Clause 44 hereof. Injury to Persons or loss of or damage to Properties (a) The Contractor shall be liable for and hereby indemnifies the Employer against any liability, loss, claim or proceeding whether arising in common law or by Statute, consequent upon personal injuries to or the death of any person whomsoever arising out of or in the course of or caused by the execution of the Works unless due to any act or neglect of any person for whose actions the Employer is legally liable.
	(b) The Contractor shall be liable for and hereby indemnifies the Employer against any liability, loss, claim or proceeding consequent upon loss of or damage to any moveable, or immovable or personal property or property contiguous to the Site, whether belonging to or under the control of the Employer or any other body or person, arising out of or in the course of or by reason of the execution of the Works unless due to any act or neglect of any person for whose actions the Employer is legally liable. The Contractor shall upon receiving an Order in Writing from the Engineer cause the same to be made good in a perfect and workmanlike manner at his own cost and in default thereof the Employer shall be entitled to cause it to be made good and to recover the cost thereof from the Contractor or to deduct the same from amounts due to the Contractor as stated in Sub-Clause 53 (4) hereof. (c) The Contractor shall be responsible for the protection and safety of such portions of the premises placed under his control by the Employer for the

	purpose of executing the Works until the issue of the Certificate of Completion. (d) Where the execution of the Works involves the risk of removal of or interference with support to adjoining properties including land or structures or any structures to be altered or added to, the Contractor, shall and will remain adequately insured or insured against the death of or injury to persons or damage to such property consequent on such removal or interference with support until such portion of the Works has been completed. (e) The Contractor shall at all times proceed immediately at his own cost to remove or dispose of any debris and to rebuild, restore, replace and/or repair such property and to execute the Works.
35 (A)	**HIGH RISK INSURANCE** In the event of the project being executed in a geological area classified as a "High Risk Area", that is an area which is subject to highly unstable subsurface conditions that might result in catastrophic ground movement evident by sinkhole or do line formation the following will apply: (1) **Damage to the Works** The Contractor shall, from the Commencement Date of the Works until the date of the Certificate of Completion, bear the full risk of and hereby indemnifies and holds harmless the Employer against any damage to and/or destruction of the Works consequent upon a catastrophic ground movement as mentioned above. The Contractor shall take such precautions and security measures and other steps for the protection of the Works as he may deem necessary. When instructed to do so by the Engineer, the Contractor shall proceed immediately to remove and/or dispose of any debris arising from damage to or destruction of the Works and to rebuild, restore, replace and/or repair the Works, at the Contractor's own costs.

	(2) **Injury to Persons or Loss of or damage to Properties** The Contractor shall be liable for and hereby indemnifies and holds harmless the Employer against any liability, loss, claim or proceeding arising at any time during the Contract Period whether arising in common law or by Statute, consequent upon personal injuries to or the death of any person whomsoever resulting from, arising out of or caused by a catastrophic ground movement as mentioned above. The Contractor shall be liable for and hereby indemnifies the Employer against any and all liability, loss, claim or proceeding consequent upon loss of or damage to any moveable, or immovable or personal property or property contiguous to the Site, whether belonging to or under the control of the Employer or any other body or person whomsoever arising out of or caused by a catastrophic ground movement, as mentioned above, which occurred during the Contract Period. (3) It is the responsibility of the Contractor to ensure that he has adequate insurance to cover his risk and liability as mentioned in Clauses 35 (A) (1) and 35 (A) (2) above. Without limiting the Contractor's obligations in terms of the Contract, the Contractor shall, within 21 days of the Commencement Date but before commencement of the Works, submit to the Employer proof of such insurance policy, if requested to do so. (4) The Employer shall be entitled to recover any and all losses and/or damages of whatever nature suffered or incurred consequent upon the Contractor's default of his obligations as set out in Clauses 35 (A) (1), 35 (A) (2) and (3). Such losses or damages may be recovered from the Contractor or by deducting the same from any amounts still due under this Contract or under any other contract presently or hereafter existing between the Employer and the Contractor and for this purpose all these contracts shall be considered one indivisible whole.
37.2.2.3	The maximum percentage allowance to cover the overhead charges is 10%,
40.2	Add the following to the end of the second paragraph:

	"which costs may be deducted from any payments due to the Contractor in terms of the Contract or any other Contract, now or in the future, existing between the Employer and the Contractor and for this purpose all these contracts shall be considered one indivisible whole."
42.1	The Works shall be completed within: *8 months at a rate of R1,875,000* Or, if completion in portions is required, The Works shall be completed for the portions as set out in the Scope of Works for the different portions as follows: Portion 1: Mini Substations and Breaker – 4 months Portion 2: LV Staff/quarters and Students – 4 months Portion 3: Teaching and learning and PV Distribution – 4 months
43.1	The penalty for failing to complete the Works is R2000 per day. Or, if the completion in portions is required, The penalty for failing to complete: Portion 1 of the Works is R ***3,800*** per day Portion 2 of the Works is R ***1,200*** per day Portion 3 of the Works is R ***850*** per day

46.2	Contract Price Adjustment (CPA) will be applicable **Yes** ☐ **No** ☒ If CPA is applicable, the value of the payment certificates is to be adjusted in accordance with the Contract Price Adjustment Schedule, where: The value of "x" is 0.15 The values of the coefficients are: a= 0.25 (labour) b= 0.3 (contractor's equipment) c= 0.3 (material) d= 0.15 (fuel) The values of the coefficients for this contract is: a= 0.35 (labour) b= 0.20 (contractor's equipment) c= 0.35 (material) d= 0.10 (fuel) The urban area nearest the Site is ***N/A*** The base month is ***the month prior to the closing of the tender***
46.3	Price adjustments for variations in the costs of special materials are allowed on the following: ***N/A*** The basis for price adjustment of special materials is as follows: ***N/A***

47.5	Add the following Clause 47.5 If during the time for completion of the Works or any extension thereof abnormal rainfall or wet conditions occurs, then the formula below shall be used to calculate separately the delay for each calendar month or part thereof. It shall be calculated each month during the period referred to in Clause 42.1 as the time for the completion of the Works and any extension time in accordance with Clause 42 that may have been granted by the Employer, or until the issue date of the certificate of practical completion, whichever is the shorter period. The delay calculated for a given month shall be used to determine the interim extension of time granted for the month. At the end of the applicable period referred to above, the aggregate of the monthly delays will be taken into account for the final determination of the total extension of time for the Contract: $V = (Nw - Nn) + \frac{Rw - Rn}{X}$ If any value of V is negative and its absolute value exceeds Nn, then V shall be taken as equal to minus Nn. The delay for a part of a month shall be calculated by substituting pro-rata values for the variables in the equation.

The symbols shall have the following meanings:

V = Delays due to rain in calendar days in respect of the calendar month under consideration.

Nw = Actual number of days during the calendar month on which a rainfall of Y mm or more per day has been recorded

Rw = Actual rainfall in mm for the calendar month under consideration.

Nn = Average number of days in the relevant calendar month (as derived from existing rainfall records provided in the project specifications) on which a rainfall of Y mm or more per day has been recorded.

Rn = Average rainfall in mm for the calendar month, as derived from the rainfall records supplied in the project specifications.

X = 20, unless otherwise provided in the project specifications.

Y = 10, unless otherwise provided in the project specifications.

The total delay that will be taken into account for the determination of the total extension of time for the Contract shall be the algebraic sum of the monthly totals for the period under consideration. But if the grand total is negative, the time for completion shall not be reduced on account of abnormal rainfall. The total extension of time for any calendar month shall not exceed (Nc – Nn) calendar days, where Nc = number of days calendar days in the month under consideration

The factor (Nw – Nn) shall be considered to represent a fair allowance for variations from the average number of days during which rainfall equals or exceeds Y mm per day.

The factor (Rw – Rn) ÷ X shall be considered to represent a fair allowance for variations from the average for the number of days during which rainfall does not

	equal or exceed Y mm per day, but when wet conditions prevent or disrupt work. This formula does not take into account any flood damage, which could cause further or concurrent delays and which should be treated separately in so far as extension of time is concerned. Accurate rain gaugings shall be taken at a suitable point on the site daily at 08:00 unless otherwise agreed to by the engineer, and the Contractor shall, at his own expense, take all necessary precautions to ensure that the rain gauges cannot be interfered with by unauthorized persons. Information regarding existing rainfall records, if available from a suitable rainfall station near the site, will be supplied in the project specifications, together with calculations of rain delays for previous years in accordance with the above formula. The average of these delays will be regarded as normal rain delays which the Contractor shall accommodate in his programme, and for which no extension of time will be considered.
48.3.4	Replace the word “conclusive” with the words “prima facie”
48.3.6	Delete
48.6	Add the following Clause 48.6 “If the Employer fails to give his ruling within the period referred to in Clause 48.5, he shall be deemed to have given a ruling dismissing the claim.”
49.1.2	Replace the word “Schedule” with the word “Bill”
49.1.5	The percentage advance on materials not yet built into the Permanent Works is 85% Provided that the Contractor has either produced to the satisfaction of the Engineer documentary evidence of ownership of such materials or has delivered to the Employer an indemnity in a form acceptable to the Employer against any claim to or in respect of such materials by reason of the Contractor’s sequestration or liquidation or of any defect in the Contractor’s title to the materials

49.3	Replace with the following: Payment of the amounts referred to in Clause 49.1.1, 49.1.2, 49.1.3 and 49.1.4 shall, save to the extent otherwise provided in Clause 49.6, be subject to a retention, if applicable in terms of clause 7.1, by the Employer of an amount (herein after called the "retention money"), being the percentage, stated in Part 2 of the Contract Data of the said amounts due to the Contractor.
49.5	Replace Clause 49.5 with the following In respect of this contract where the Contractor elects a security by means of a 10% retention of the Value of the Works (excl. VAT), 50% of the retention shall be released to the Contractor when the Engineer issues the last Certificate of Completion in terms of clause 51.4. The remaining 50% of the retention shall be released in accordance with the provisions of the conditions of contract and will become due and payable within 14 days of the issue of the last Final Approval Certificate.
49.6	A Retention Money Guarantee is not permitted.
49.7.2	Replace the words "prime overdraft rate certified by the Contractor's banker" with the words "interest rate as determined by the Minister of Finance, from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No. 1 of 1999), will apply"
49.11	Add Clause 49.11 as follows: In respect of any amount owed by the Contractor to the Employer, the Contractor shall pay the Employer interest at the rate as determined by the Minister of Finance, from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No. 1 of 1999), will apply
50.	Amend the percentage from 15 per cent to 25 per cent in the title, the Clause and in the sideline comment.

52.2	Amend as follows: "…of the Contract or any part thereof, nor of the accuracy of any claim made by the Contractor, nor shall any other certificate exclude …powers of the Engineer and/or the Employer"
53.1	The Defects Liability Period is 3 months for General Building Rehabilitation and 12 months for new electrical and mechanical equipment.
55.1.10	Add Clause 55.1.10 as follows: "Has engaged in Corrupt or Fraudulent Practices in competing for or in executing the Contract,
56.2.2	Delete the following words "without prejudice to his lien on the Employer's property"
56.3	Add the following at the end After cancellation of the Contract by the Contractor, the Contractor, when requested by the Employer to do so, shall not be entitled to refuse to withdraw from the Works on the grounds of any lien or a right of retention or on the grounds of any right whatsoever.
58.1.3	Amend as follows: "… and the Engineer or Employer, as applicable, or by the Mediator's opinion to the extent that it has become binding in terms of Clause 58.2.6
58.2	Dispute resolution is to be by means of mediation.
58.4	Disputes are to be referred for final settlement to litigation.
59	Add the following Clause 59

	"No amendments of this Contract or of any provisions or terms hereof and no waiver or relaxation or suspension of any of the provisions or terms of this Contract shall be of any force or effect unless reduced to writing and signed by both the parties hereto."
	PART 2: DATA PROVIDED BY THE CONTRACTOR
1.8	The name of the Contractor is ……..…… (insert the legal name of the Contractor, as well as the Contractor's registration number, if applicable)

1.2.2	The addresses of the Contractor, where the Contractor shall receive notices, are as follows: Physical Address: _____ _____ _____ Postal Address: _____ _____ _____ Facsimile: _____ Telephone: _____
7.1	The security to be provided by the Contractor: (a) in respect of contracts up to R1 million, the security to be submitted by the Contractor to the Employer will be a retention of 5% of the Value of Works (excluding VAT) (b) in respect of contracts above R1 million, the Contractor will provide, as security, one of the following: (1) cash deposit of 10 % of the Contract Sum (excluding VAT) variable construction guarantee of 10 % of the Contract Sum (excluding VAT) (2) retention of 10% of the Value of Works (excluding VAT) (3) cash deposit of 5% of the Contract Sum (excluding. VAT) and a retention of 5% of the Value of Works (excluding. VAT) (4) fixed construction guarantee of 5% of the Contract Sum (excluding VAT) and a retention of 5% of the Value of Works (excluding VAT) within 5 days of award of contract NB. Guarantees submitted must be issued by either an insurance company duly registered in terms of the Short-Term Insurance Act, 1998 (Act 35 of 1998) or by a bank duly registered in terms of the Banks Act, 1990 (Act 94 of 1990) on the pro-forma referred to above. No alterations or amendments of the wording of the pro-forma will be accepted.

SECTION C: ELECTRICAL INSTALLATION WORKS SPECIFICATION

AT

ORBIT TVET College, Mankwe, North West Province (-25,296419 27.198479)

ELECTRICAL ENGINEERS
Name: Emzansi Consulting
Tel: (012) 345 3383
Contact Person: Aubrey Mackenzie

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SPECIFICATION FOR ELECTRICAL WORK

PART 1 - GENERAL

CONTENTS

PART 1 - GENERAL

1 TESTS

After completion of the works and before practical completion is achieved, a full test will be carried out on the installation for a period of sufficient duration to determine the satisfactory working thereof. During this period the installations will be inspected and the Contractor shall make good, to the satisfaction of the Principal Agent/Electrical Engineer or the employer, any defects which may arise.

The Contractor shall provide all instruments and equipment required for testing and any water, power and fuel required for the commissioning and testing of the installations at completion.

2 MAINTENANCE OF INSTALLATIONS

With effect from the date of the Practical completion Certificate the Contractor shall at his own expense undertake the regular servicing of the installation during the maintenance period and shall make all adjustments necessary for the correct operation thereof.

If during the said period the installations is not in working order for any reason for which the Contractor is responsible, or if the installations develops defects, he shall immediately upon being notified thereof take steps to remedy the defects and make any necessary adjustments.

Should such stoppages however be so frequent as to become troublesome, or should the installations otherwise prove unsatisfactory during the said period the Contractor shall, if called upon by the Principle Agent/Electrical Engineer or the Employer, at his own expense replace the whole of the installations or such parts thereof as the Principal Agent/Electrical Engineer or the Employer may deem necessary with apparatus specified by the Principal Agent/Electrical Engineer or the Employer.

3 REGULATIONS

The installation shall be erected and tested in accordance with the Acts and Regulations as indicated in the scope of works.

4 NOTICES AND FEES

The Contractor shall give all notices required by and pay all necessary fees, including any inspection fees, which may be due to the local Supply Authority.

On production of the official account, only the net amount of the fee charged by the Supply Authority for connection of the installation to the supply mains, will be refunded to the Contractor by the Employer.

5 QUALITY OF MATERIALS

Only materials of first-class quality shall be used and all materials shall be subject to the approval of the Employer. Specifications for various materials to be used on this Contract are attached to and form part of this specification.

Wherever applicable the material is to comply with the relevant South African Bureau of Standards, specifications, or to IEC Specifications, where no SANS Specifications exist.

Materials wherever possible, must be of South African manufacture.

6 WORKMANSHIP AND STAFF

Except in the case of electrical installations supplied by a single-phase electricity supply at the point of supply, an accredited person shall exercise general control over all electrical installation work being carried out.

The workmanship shall be of the highest grade and to the satisfaction of the Employer.

All inferior work shall, on indication by the Employer's inspecting officers, immediately be removed and rectified by and at the expense of the Contractor.

7 VERIFICATION AND CERTIFICATION OF ELECTRICAL INSTALLATION (CERTIFICATE OF COMPLIANCE AND TEST REPORT

On completion of the service, a certificate of compliance must be issued to the Principal Agent/Electrical Engineer or Employer in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) in the format as set out in SANS 10142-1 & 2.

8 EARTHING OF INSTALLATION

Main earthing

The type of main earthing must be as required by the supply authority if other than the Employer, and in any event as directed by the Principal Agent/Electrical Engineer, who may require additional earthing to meet test standards.

Where required an earth mat shall be provided, the minimum size, unless otherwise specified, being 1,0m x 1,0m and consisting of 4mm diameter hard-drawn bare copper wires at 250mm centres, brazed at all intersections.

Alternatively, or additionally earth rods or trench earths may be required as specified or directed by the Electrical Engineer.

Installations shall be effectively earthed in accordance with the "Wiring Code" and to the requirements of the supply authority. All earth conductors shall be stranded copper with or without green PVC installation.

Connection from the main earth bar on the main board must be made to the cold water main, the incoming service earth conductor, if any and the earth mat or other local electrode by means of 12mm x 1,60 mm solid copper strapping or 16 mm² stranded (not solid) bare copper wire or such conductor as the client's representative may direct. Main earth copper strapping where installed below 3m from ground level, must be run in 20 mm diameter conduit securely fixed to the walls.

All other hot and cold-water pipes shall be connected with 12mm x 0,8mm perforated for solid copper strapping (not conductors) to the nearest switchboard. The strapping shall be fixed to the pipework with brass nuts and bolts and against walls with brass screws at 150-mm centres. In all cases where metal water pipes, down pipes, flues, etc., are positioned within 1,6m of switchboards an earth connection consisting of copper strapping shall be installed between the pipework and the board. In vertical building ducts accommodating both metal water pipes and electrical cables, all the pipes shall be earthed at each distribution board.

Sub-circuits

The earth conductors of fall sub-circuits shall be connected to the earth busbar in the supply board in accordance with SANS 10142.

Ring Mains

Common earth conductors may be used where various circuits are installed in the same wire way in accordance with SANS 10142. In such instances the sizes of earth conductors shall be equivalent to that of the largest current carrying conductor installed in the wire way, alternatively the size of the conductor shall be as directed by the Engineer. Earth conductors for individual circuits branching from the ring main shall by connected to the common earth conductor with T-ferrules or soldered. The common earth shall not be broken.

PART 2: INSTALLATION DETAILS

CONTENTS

PART 2: INSTALLATION DETAILS

1 CABLE SLEEVE PIPES

Where cables cross under roadways, other services and where cables enter buildings, the cables shall be installed in earthenware or high-density polyethylene pipes.

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.

2 NOTICES

The Contractor shall issue all notices and make the necessary arrangements with Supply Authorities, the Postmaster-General, and S.A. Transport Services, Provincial or National Road Authorities and other authorities as may be required with respect to the installation.

3 ELECTRICAL EQUIPMENT

All equipment and fittings supplied must be in accordance with the attached quality specification (Part 3 of this document), suitable for the relevant supply voltage, and frequency and must be approved by the Employers Electrical Engineer.

4 DRAWINGS

The drawings generally show the scope and extent of the proposed work and shall not be held as showing every minute detail of the work to be executed.

The position of power points, switches and light points that may be influenced by built-in furniture must be established on site, prior to these items being built in.

5 BALANCING OF LOAD

The Contractor is required to balance the load as equally as possible over the multiphase supply.

6 SERVICE CONDITIONS

All plant shall be designed for the climatic conditions appertaining to the service.

7 CABLES

The Contractor shall supply and completely install all distribution cables as indicated on the drawings, and as directed in the Schedule of Equipment in Part 3 which form part of this specification and listed in the Schedule of Cables.

The storage, transportation, handling and laying of the cables shall be according to first class practice, and the contractor shall have adequate and suitable equipment and labour to ensure that no damage is done to cables during such operations.

The cable-trenches shall be excavated to a depth of 0,9m deep below ground level and shall be 450mm wide for one to three cables, and the width shall be increased where more than three cables are laid together so that the cables may be placed at least two cable diameters apart throughout the run. The bottom of the trench shall be level and clean and the bottom and sites free from rocks or stones liable to cause damage to the cable.

The Contractor must take all necessary precautions to prevent the trenching work being in any way a hazard to the personnel and public and to safeguard all structures, roads, sewage works or other property on the site from any risk of subsidence and damage.

In the trenches the cables shall be laid on a 75mm thick bed of earth and be covered with a 150-mm layer of earth before the trench is filled in.

All joints in underground cables and terminations shall be made either by means of compound filled boxes

according to the best-established practice by competent cable jointers using first class materials or by means of approved epoxy-resin pressure type jointing kits. Epoxy-resign joints must be made entirely in accordance with the manufacturer's instructions and with materials stipulated in such instructions. Low tension PVCA cables are to be made off with sealing glands and materials designed for this purpose which must be of an approved make. Where cables are cut and not immediately made off, the ends are to be sealed without delay.

The laying of cables shall not be commenced until the trenches have been inspected and approved. The cable shall be removed from the drum in such a way that no twisting, tension or mechanical damage is caused and must be adequately supported at intervals during the whole operation. Particular care must be exercised where it is necessary to draw cables through pipes and ducts to avoid abrasion, elongation or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after drawing in of the cables.

Backfilling (after bedding) of the trenches is to be carried out with a proper grading of the material to ensure settling without voids, and the material is to be tamped down after the addition of every 150mm. The surface is to be made good as required.

On each completed section of the laid and jointed cable, the insulation resistance shall be tested to approval with an approved "Megger" type instrument of not less than 500 V for low tension cables.

Earth continuity conductors are to be run with all underground cables constituting part of a low-tension distribution system. Such continuity conductors are to be stranded bare copper of a cross-sectional area equal to at least half that of one live conductor of the cable, but shall not be less than 4mm² or more than 70mm². A single earth wire may be used as earth continuity conductor for two or more cables run together, branch earth wires being brazed on where required.

8 LAYING, JOINTING AND MAKING OFF OF ELECTRICAL CABLES

[The requirements specified hereafter, are aimed essentially at high tension cable but are also valid for low tension cable, where applicable.]

1. The use of the term "Inspector", includes the engineer or inspector of the client or an empowered person of the concerned supervising consulting engineer's firm.

2. No cable is to be laid before the cable trench is approved and the soil qualification of the excavation is agreed upon by the Contractor and inspector.

3. After the cable has been laid and before the cable trench is back-filled the inspector must ensure that the cable is properly bedded and that there is no undesirable material included in the bedding layer.

4. All cable jointing and the making off of the cables must only be carried out by qualified experienced cable jointers. Helpers of the jointers may not saw, strip, cut, solder, etc. The cable and other work undertaken by them must be carried out under the strict and constant supervision of the jointer.

5. Before the Contractor allows the jointer to commence with the jointing work or making off of the cable (making off is recognized as half a joint) he must take care and ensure:

5.1 That he has adequate and suitable material available to complete the joint properly and efficiently. Special attention must be given to ensure the cable ferrules and cable lugs are of tinned copper and of sufficient size. The length of the jointing lugs must be at least six times the diameter of the conductor,

5.2 That the joint pit is dry and that all loose stones and material are removed,

5.3 That the walls and banks of the joint pit are reasonable firm and free from loose material which can fall into the pit,

5.4 That the necessary coffer-dams or retaining walls are made to stop the flow of water into the joint pit,

5.5 That the joint pit is provided with suitable groundsheets so that the jointing work is carried out in

clean conditions,

5.6 That the necessary tents or sails are installed over the joint pit to effectively avert unexpected rainfall and that sufficient light or lighting is provided,

5.7 That the necessary means are available to efficiently seal the jointing or cable end when an unexpected storm or cloudburst occurs, regardless of how far the work has progressed,

5.8 That the cables and other materials are dry, undamaged and in all respects are suitable for the joint work or making off,

5.9 That the heating of cable oil, cable compound, plumbers metal and solder is arranged that they are at the correct temperature when required so that the cable is not unnecessary exposed to the atmosphere and consequently the ingress of moisture (care must be taken of overheating)

Flow temperatures of cable oil and compound must be determined with suitable thermometers**.** Cable oil and compound must not be heated to exceed the temperatures given on the containers and precaution must be taken to ensure that the tin is not overheated in one position. The whole mass must be evenly and proportionally heated.

(Temperatures of solder and plumbers metal may be tested with brown paper (testing time: 3 seconds). The paper must colour slightly - not black or burnt).

6. Before the paper-insulated cables are joined, they must be tested for the presence of moisture by the cable jointers test. This consists of the insertion of a piece of unhandled insulated impregnated paper tape in warm cable oil heated to a temperature of 130 ± 5°C.

Froth on the surface of the oil is an indication that moisture is present in the impregnated insulation and the amount of the froth gives an indication of the moisture present.

7**.** If the cable contains moisture or is found to be otherwise unsuitable for jointing or making of the inspector is to be notified immediately and he will issue the necessary instruction to cope with the situation.

8. The joint or making off of paper insulated cables must not be commenced during rainy weather.

9. Once a joint is in progress the jointer must proceed with the joint until it is complete and before he leaves the site.

10. The jointer must ensure that the material and his tools are dry at all times, reasonably clean and absolutely free from soil.

11. Relating to the jointing of the cable the following requirements apply:

11.1 All jointing must be carried out in accordance with recognized and tried techniques and comply strictly with the instructions given by the supplier of the jointing kit.

11.2 The cables must be twisted by hand so that the cores can be joined according to the core numbers. If necessary, the cable is to be exposed for a short distance to accomplish this. Under no circumstances may the cores in a joint be crossed so as to enable cores to be joined according to the core numbers. If it is not possible to twist the cables so that the preceding requirements can be met, then cores are to be joined in the normal way without any consideration of the core numbers.

11.3 Normally the cables will have profile conductors. The conductors shall be pinched with gas pliers to form a circular section, bound with binding wire so that they do not spread, and then tinned before jointing.

11.4 Jointing ferrules, the length of which are at least 6 times the diameter of the conductors, must be slid over the conductor ends to be joined and pinched tightly. Then they are soldered by means of the ladle process whilst being pinched further closed.

Use resin only as a flux. The slot opening in the ferrule must be completely filled, including all depressions.

Remove all superfluous metal with a cloth dipped in tallow. Work during the soldering process must be from top to bottom. Rub the ferrule smooth and clean with aluminium oxide tape after it has cooled down to ensure that there are not any sharp points or edges.

NB: The spaces between the conductor strands must be completely filled by soldering process and must be carried out quick enough to prevent the paper insulation from burning or drying out unnecessarily.

11.5 After the ferrules have been rubbed smooth and clean, they and the exposed cores must be treated with hot cable oil (110°C) to remove all dust and moisture. These parts are to be thoroughly basted with the oil.

11.6 The jointer must take care that his hands are dry and clean before the joint is insulated. Also, the insulating tape which is to be used must first be immersed in warm cable oil (110°C) for a sufficient period to ensure that no moisture is present.

11.7 After the individual cores have been installed, they must be well basted with hot cable oil and again after the applicable separator and/or belt insulation tape is applied before the lead joint sleeve is placed in position.

11.8 The lead joint sleeve must be thoroughly cleaned and prepared before it is placed on the cable and must be kept clean during the whole jointing process. Seal the filling apertures of the sleeve with tape until the sleeve is ready for compound filling.

11.9 The plumbing joints employed to solder the joint sleeve to the cable sheath, must be cooled off with tallow and the joint sleeve is to be filled with compound while it is still warm. Top up continuously until the joint is completely filled to compensate for the compound shrinkage.

11.10 The outer joint box must be clean and free from corrosion. After it has been placed in position it must be slightly heated before being filled with compound. Top up until completely full.

12. As far as cable end boxes are concerned the requirements as set out above are valid where applicable.

9. LABELS AND NOTICES

The Contractor shall be responsible for the supply and installation of all type of labels as directed in the Schedule of Equipment in Part 3 which form part of this specification as well as detailed below and be approved by the Employer's Electrical Engineer.

The Contractor shall arrange for the labelling of all equipment, instruments, meters, relays, cables, etc., as indicated below.

Distribution substations, mini-substations, Kiosks, DB's, CB's, light poles, cables, etc. shall be labelled as specified in the Quality Specification (Labels and Notices) and where applicable to the standards of the Local Supply Authority.

Where identical items of equipment can be removed from their housings, e.g. HV circuit breaker carriages, plug-in relays etc., both the fixed and withdrawal portion are to be labelled identically.

All labels shall be Traffolite engraved black on white labels of the sizes indicated. They are to be located in purpose made holders or otherwise are to be screwed or riveted into position. "Dymo" tape or similar labels will not be accepted nor will labels, which are glued in position accepted.

Labels on wooden poles shall comprise an aluminium plate with the designated number. These labels shall be nailed to the pole 1,5m above ground level. Nails shall be electro-galvanized clout nails.

Prior to any equipment being labelled, the Contractor shall provide the Engineer with a complete labelling schedule for all items of equipment. Under no circumstances is equipment to be labelled in accordance with the bid drawings since any description thereon is for identification purposes during construction only and is unlikely to apply to the completed Works.

The following list indicates the general labelling requirements but does not limit the extent of labelling required, which shall encompass the full extent of the equipment supplied, or in the case of existing equipment, any such which is affected by this Contract:

50mm high lettering:
- Substation and mini sub designation;
- Outdoor switch gear designation;
- Transformer designation; and
- Distribution kiosk and fused feeder panel designation.

20mm high lettering:
- Main or sub-main board designation;
- Control panel designation; and
- Indoor switch gear designation.

5mm high lettering: -
- Mini sub feeder breakers and isolators;
- Distribution kiosk feeder breakers and isolators; and
- General distribution switchgear.

This size shall be used to designate the conductor size and number of cores of each cable installed under this Contract. In addition, all feeder cables shall be labelled at both ends indicating from where/to cables are feeding.

All kiosks and mini-subs shall be provided with a label in both official languages reading “In case of leakage or accidental contact, put off main switch immediately”.

All kiosks and mini-subs shall be provided with notices as required by the Machinery and Occupational Safety Act. All doors to such locations shall be fitted with the appropriate notices.

Where more than one similar item of equipment is fed from the same board or control panel, the item itself shall be labelled, this being fixed in a permanent position, i.e. not attached to motors, pumps, etc., but to bases or adjacent thereto. The lettering shall be 50mm high.

Each distribution board shall additionally bear a label indicating the source and size of the feeder to it. Labelling will be done as specified.

For example: DBA (Normal):
Fed from Mini-sub 5;
95mm² x 4 core cable + 70mm² BCEW.

Each new feeder and terminated cables must be labelled at both ends with “Brother Tape” and a clear heat shrink to cover the tape. This label must indicate the size of the cable and from/to where the cable is feeding.

For example: 95mm² x 4 core cable + 70mm² BCEW:
Fed from DBA to DBB

Light switches, socket outlets, multi outlets, pop out boxes and isolators must be labelled as directed in the Schedule of Equipment in Part 3 which form part of this specification.

11. SCHEDULE OF CABLES

The Contractor shall be responsible for the supply and installation of cables as directed in the Schedule of Equipment in Part 3 which form part of this specification.

10. CABLE MARKERS

The Contractor shall be responsible for the supply and installation of cable markers as directed in the Schedule of Equipment in Part 3 which form part of this specification and be approved by the Employer's Electrical Engineer.

11. CABLE ROUTE MARKERS (SAINLESS STEEL & CONCRETE)

The Contractor shall be responsible for the supply and installation of cable route markers as directed in the Schedule of Equipment in Part 3 which form part of this specification and be approved by the Employer's Electrical Engineer.

12. MANHOLES, COVERS AND FRAMES

The Contractor shall be responsible for the construction of manholes and installation of manhole covers and frames as specified and directed in the Schedule of Equipment in Part 3 which form part of this specification.

13. PLINTHS & APRONS

The Contractor shall be responsible for the construction of manholes and installation of miniature substation plinths and aprons as specified and directed in the Schedule of Equipment in Part 3 which form part of this specification.

14. MINIATURE SUBSTATIONS

The Contractor shall be responsible for the supply and installation of miniature substations as directed in the Schedule of Equipment in Part 3 which form part of this specification.

15. LUMINAIRES

The Contractor shall be responsible for the supply and installation of luminaires as directed in the Schedule of Equipment in Part 3 which form part of this specification.

PART 3: SCHEDULE OF EQUIPMENT

CONTENTS

1. MINIATURE SUB-STATIONS TYPE B (RMU)

1.1 200kVA Mini-substation (11kV /415V/ 230V) S1

MV

The MV switchgear shall be of Sf6 - filled and ratings are in accordance with SANS 1874.

TRANSFORMER COMPARTMENT:

This section can be removed for inspection without disturbing cabling to equipment in the H.V. and L.V. compartments. Standard Specification SASS 780: 2009 De!ta Star connection and ONAN cooling.

Capacity: 400kVA
No - Load Voltage Ratio: 11000/420V — Aluminium Windings
Vector Group: Dyn11 — Bolted Cover

TRANSFORMER FITTINGS

Rating & Diagram Plate	Lifting Lugs	Drain Valve
Earthing Terminal	Oil Gauges	Oil Filling Arrangement

LV switchboard equipment

Rails shall be mounted in the LV compartment to accommodate the following LV equipment with a 90% allowance for future expansion. All LV control gear, circuit breakers and wiring are included in this measured rate. Included in this rate is the following gear:

- 3xComb. Inst./M.D. Ammeters, Scaled 0 - 800A with 20% over scale
- 1xVoltmeter c/w 7 Position Selector Switch and Fuses
- 3xCurrent Transformers, Ring Type, Busbar Mounted, 1500/5A, 10VA, CL 1
- 1x600A, 50kA, 415V, three pole, main MCCB (rated for inductive loads);
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK M1/K1;
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK M1/K2;
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK M1/K3;
- 1x100A, 25kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to Unknown;
- 1x225, 25kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to Unknown;
- 1x225, 25kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to Sewer Pump Station;
- 65kA 4-Pole Surge Arrestors

Street Light Control

- 3x63A, 10kA, SP, 230/400V, MCB's (Main Circuit Breaker)
- 1x6A, 10kA, 230/514V single pole circuit breaker (Bypass switch)
- 1x6A, 10kA, 230/514V single pole circuit breaker (Control Switch)
- 1x60A, TP, AC3 230V Contactor with Shroud
- 1x16A Daylight switch
- 8x40A, 10kA, 230/415V curve 1 (slow) single pole circuit breaker to protect feed to street lights;
- 1x Set Terminal Blocks

1.2 400kVA Mini-substation (11kV /415V/ 230V) F1

MV

The MV switchgear shall be of Sf6 - filled and ratings are in accordance with SANS 1874.

TRANSFORMER COMPARTMENT:

This section can be removed for inspection without disturbing cabling to equipment in the H.V. and L.V. compartments. Standard Specification SASS 780: 2009 De!ta Star connection and ONAN cooling.

Capacity: 400kVA
No - Load Voltage Ratio: 11000/420V
Vector Group: Dyn11
Aluminium Windings
Bolted Cover

TRANSFORMER FITTINGS

Rating & Diagram Plate	Lifting Lugs	Drain Valve
Earthing Terminal	Oil Gauges	Oil Filling Arrangement

LV switchboard equipment

Rails shall be mounted in the LV compartment to accommodate the following LV equipment with a 90% allowance for future expansion. All LV control gear, circuit breakers and wiring are included in this measured rate. Included in this rate is the following gear:

- 3xComb. Inst./M.D. Ammeters, Scaled 0 - 800A with 20% over scale
- 1xVoltmeter c/w 7 Position Selector Switch and Fuses
- 3xCurrent Transformers, Ring Type, Busbar Mounted, 1500/5A, 10VA, CL 1
- 1x600A, 50kA, 415V, three pole, main MCCB (rated for inductive loads);
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK M1/K1;
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK M1/K2;
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK M1/K3;
- 1x100A, 25kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to Unknown;
- 1x225, 25kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to Unknown;
- 1x225, 25kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to Sewer Pump Station;
- 65kA 4-Pole Surge Arrestors

Street Light Control

- 3x63A, 10kA, SP, 230/400V, MCB's (Main Circuit Breaker)
- 1x6A, 10kA, 230/514V single pole circuit breaker (Bypass switch)
- 1x6A, 10kA, 230/514V single pole circuit breaker (Control Switch)
- 1x60A, TP, AC3 230V Contactor with Shroud
- 1x16A Daylight switch
- 8x40A, 10kA, 230/415V curve 1 (slow) single pole circuit breaker to protect feed to street lights;
- 1x Set Terminal Blocks

1.3 750kVA Mini-substation (11kV /415V/ 230V) E1

MV

The MV switchgear shall be of Sf6 - filled and ratings are in accordance with SANS 1874

TRANSFORMER COMPARTMENT:

This section can be removed for inspection without disturbing cabling to equipment in the H.V. and L.V. compartments. Standard Specification SASS 780: 2009 De!ta Star connection and ONAN cooling.

Capacity: 750kVA
No - Load Voltage Ratio: 11000/420V
Vector Group: Dyn11
Aluminium Windings
Bolted Cover

TRANSFORMER FITTINGS

Rating & Diagram Plate	Lifting Lugs	Drain Valve
Earthing Terminal	Oil Gauges	Oil Filling Arrangement

LV switchboard equipment

Rails shall be mounted in the LV compartment to accommodate the following LV equipment with a 90% allowance for future expansion. All LV control gear, circuit breakers and wiring are included in this measured rate. Included in this rate is the following gear:

- 3xComb. Inst./M.D. Ammeters, Scaled 0 - 800A with 20% over scale
- 1xVoltmeter c/w 7 Position Selector Switch and Fuses
- 3xCurrent Transformers, Ring Type, Busbar Mounted, 1500/5A, 10VA, CL 1
- 1x800A – 1200A Adjustable, 50kA, 415V, three pole, main MCCB (rated for inductive loads);
- 1x600A – 800A Adjustable, 30kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to SMB1;
- 1x600A – 800A Adjustable, 30kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to SMB2;
- 1x600A – 800A Adjustable, 30kA, 415V curve 1 (slow) three pole circuit breaker – Spare
- 1x450, 25kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to Unknown;
- 1x450, 25kA, 415V curve 1 (slow) three pole circuit breaker – Spare
- 65kA 4-Pole Surge Arrestors

Street Light Control

- 3x63A, 10kA, SP, 230/400V, MCB's (Main Circuit Breaker)
- 1x6A, 10kA, 230/514V single pole circuit breaker (Bypass switch)
- 1x6A, 10kA, 230/514V single pole circuit breaker (Control Switch)
- 1x60A, TP, AC3 230V Contactor with Shroud
- 1x16A Daylight switch
- 8x40A, 10kA, 230/415V curve 1 (slow) single pole circuit breaker to protect feed to street lights;
- 1x Set Terminal Blocks

1.4 600kVA Mini-substation (11kV /415V/ 230V) M1

MV

The MV switchgear shall be of Sf6 - filled and ratings are in accordance with SANS 1874

TRANSFORMER COMPARTMENT:

This section can be removed for inspection without disturbing cabling to equipment in the H.V. and L.V. compartments. Standard Specification SASS 780: 2009 De!ta Star connection and ONAN cooling.

Capacity: 600kVA
No - Load Voltage Ratio: 11000/420V
Vector Group: Dyn11
Aluminium Windings
Bolted Cover

TRANSFORMER FITTINGS

Rating & Diagram Plate	Lifting Lugs	Drain Valve
Earthing Terminal	Oil Gauges	Oil Filling Arrangement

LV switchboard equipment

Rails shall be mounted in the LV compartment to accommodate the following LV equipment with a 90% allowance for future expansion. All LV control gear, circuit breakers and wiring are included in this measured rate. Included in this rate is the following gear:

- 3xComb. Inst./M.D. Ammeters, Scaled 0 - 800A with 20% over scale
- 1xVoltmeter c/w 7 Position Selector Switch and Fuses
- 3xCurrent Transformers, Ring Type, Busbar Mounted, 1500/5A, 10VA, CL 1
- 1x600A, 50kA, 415V, three pole, main MCCB (rated for inductive loads);
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK F1/K1;
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK F1/K2;
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK F1/K3;
- 1x175A, 50kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to KIOSK F1/K4;
- 1x225, 25kA, 415V curve 1 (slow) three pole circuit breaker to protect feed to Unknown;
- 65kA 4-Pole Surge Arrestors

Street Light Control

- 3x63A, 10kA, SP, 230/400V, MCB's (Main Circuit Breaker)
- 1x6A, 10kA, 230/514V single pole circuit breaker (Bypass switch)
- 1x6A, 10kA, 230/514V single pole circuit breaker (Control Switch)
- 1x60A, TP, AC3 230V Contactor with Shroud
- 1x16A Daylight switch
- 8x40A, 10kA, 230/415V curve 1 (slow) single pole circuit breaker to protect feed to street lights;
- 1x Set Terminal Blocks

2. Schedule of Cables

FED FROM	FEEDING TO	CONDUCTORS	DESIGNATION	FIXED TO
Mini-sub S1	**Mini-sub D1**	**50mm² 3-C XLPE/SWA/XLPE CU 25mm² Copper Clad Steel EC**	**Open Field**	**Trench**
Mini-sub D1	**Mini-sub E1**	**50mm² 3-C XLPE/SWA/XLPE CU 25mm² Copper Clad Steel EC**	**Open Field**	**Trench**
Mini-sub E1	**Mini-sub F1**	**50mm² 3-C XLPE/SWA/XLPE CU 25mm² Copper Clad Steel EC**	**Open Field**	**Trench**
Mini-sub F1	**Mini-sub M1**	**50mm² 3-C XLPE/SWA/XLPE CU 25mm² Copper Clad Steel EC**	**Open Field**	**Trench**
PV Plant	**Kiosk 1**	**16mm² 4-C PVC/SWA/PVC CU 10mm² BCEW**	**Open Field**	**Trench**
PV Plant	**Kiosk 2**	**10mm² 4-C PVC/SWA/PVC CU 6mm² BCEW**	**Open Field**	**Trench**

3. MAXIMUM SPACING OF SUPPORT FOR RESTRAINED CABLES

Cross-Sectional Area of Cable Conductors (mm²)	MAXIMUM SPACING OF SUPPORTS (CLEATS) (mm) FOR RESTRAINED CABLES			
	Wire Armoured Cables		Other than Wire Armoured Cables and Unarmoured Cables	
	Horizontal Cable Routes	Vertical Cable Routes	Horizontal Cable Routes	Vertical Cable Routes
1,5	450	750	300	400
2,5	450	750	300	400
4,0	600	750	300	400
6,0	600	750	300	400
10,0	750	900	400	450
16,0	750	1000	400	550
25,0	900	1000	450	550
35,0	900	1000	450	550
Bigger than 35,0	900	1000	450	550

4. DEPTH AND WIDTH OF CABLE TRENCHES

Cable type	Depth below FGL	Width	Spacing between cables
MV/HT cables	1250 mm unless otherwise specified	Fixed at 450 mm unless otherwise specified	150 mm unless otherwise specified
LV cables	750 mm unless otherwise specified	Fixed at 450 mm unless otherwise specified	150 mm unless otherwise specified

5. CABLE MARKING AND COLOUR CODING – NEW CABLE INSTALLATIONS

Cable lengths shall be labelled at both ends (terminations), at 5m intervals and both sides of each bend. Inside shafts / ducts at 1.8m above FFL with “Brother Tape” and a clear heat shrink to cover the tape. This label must indicate the size of the cable and from/to where the cable is feeding as per example:

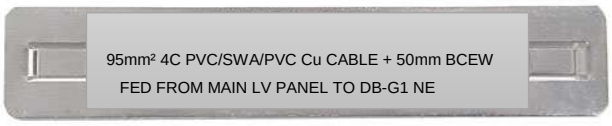
Size of Conductor: 95mm² 4C PVC/SWA/PVC CABLE + 50mm BCEW
The Route: FED FROM MAIN LV PANEL TO DBG NORTH

Label Colour Coding:
Non-Essential Power: Black lettering on white background
Essential Power: White lettering on red background
UPS Power: White lettering on blue background

Label Lettering Height:
Cable size: 16mm² and <16mm² - 6mm high
Cable size: >16mm² - 9mm high

5.1 CABLE TAGS – EXISTING CABLE INSTALLATIONS

Cable lengths shall be labelled at both ends (terminations) at 5m intervals and both sides of each bend. Inside shafts / ducts at 1.8m above FFL with tags as detailed below.

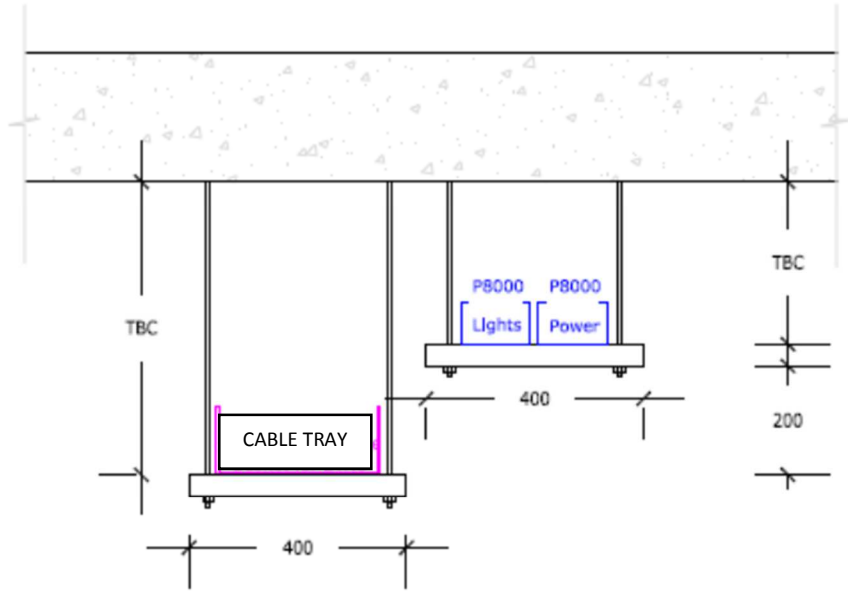


Label Colour Coding:
Non-Essential Power: Black lettering on white background
Essential Power: White lettering on red background

Label Lettering Height:
Cable size: 16mm² and <16mm² - 6mm high
Cable size: >16mm² - 9mm high

Tag Technical Specification:
Raised sections with cut outs at either end to facilitate
cable tie fixing.
Pre-printed/Embossed/Stamped.
Material – AISI 316 Stainless Steel
Fixing Material – Stainless Steel Cable Ties (304 ST)

6. CABLE TRAY & TRUNKING INSTALLATION DETAIL



DETAIL FOR CABLE TRAY AND TRUNKING INSTALLATION

7. SCHEDULE OF DISTRIBUTION BOARDS & KIOSKS

7.1 DB – TYPE A

Specification Requirement

Distribution Board – Type A (Plugs)		
Description		**Requirement**
Applicable Drawing		DB Type A & B (Plugs & Lights)
Supply Voltage		415 Vac
Current Rating		25A
Panel Short Circuit Rating		5kA
Circuit Breaker Type		CBI/Schneider/ABB or similar and equal to – pre-approved by the Engineer
Circuit Breaker Rating (Plugs)		20A, 6kA, 240 Vac, 1 Pole, C Curve QF19
Earth Leakage with built in overload protection		N/A
Earth Leakage Rating		N/A
Earth Leakage kA Rating		N/A
Wire Type		GP Wire
Wire Colour	Live	Red/White/Blue
	Neutral	Black
	Earth	Green and Yellow / BCEW
Wire Size	Socket Outlets	4mm²
	Lights	2.5mm²
Panel IP Rating		IP 42
Panel Material		Plastic
Distribution Board Make		EUROLUX 24 Way Din Rail Distribution Board, – or similar and equal to c/w neutral bar and earth bar
Labels & Signage		SANS 1042-1
Legend Card		As detailed in the specification
Locking Mechanism		N/A
Panel Access		Front
Cable Entry Location		Bottom / Top / Side
Panel Mounting Location		Surface Mounted
Panel Location		Indoor
Certification		COC

Surge Protection: Class 1+2/Type 1+2 on the kiosk(s) and class 2 surge protection devices inside the building distribution board shall be installed after the incomer.

7.2 DB – TYPE B

Specification Requirement

Distribution Board – Type B (Lights)		
Description		**Requirement**
Applicable Drawing		DB Type B (Lights)
Supply Voltage		415 Vac
Current Rating		25A
Panel Short Circuit Rating		5kA
Circuit Breaker Type		CBI/Schneider/ABB or similar and equal to – pre-approved by the Engineer
Circuit Breaker Rating (Lights)		10A, 6kA, 240 Vac, 1 Pole, C Curve QF19
Earth Leakage with built in overload protection		N/A
Earth Leakage Rating		N/A
Earth Leakage kA Rating		N/A
Wire Type		GP Wire
Wire Colour	Live	Red/White/Blue
	Neutral	Black
	Earth	Green and Yellow / BCEW
Wire Size	Socket Outlets	4mm²
	Lights	2.5mm²
Panel IP Rating		IP 42
Panel Material		Plastic
Distribution Board Make		EUROLUX 24 Way Din Rail Distribution Board, – or similar and equal to c/w neutral bar and earth bar
Labels & Signage		SANS 1042-1
Legend Card		As detailed in the specification
Locking Mechanism		N/A
Panel Access		Front
Cable Entry Location		Bottom / Top / Side
Panel Mounting Location		Surface Mount
Panel Location		Indoor
Certification		COC

Surge Protection: Class 1+2/Type 1+2 on the kiosk(s) and class 2 surge protection devices inside the building distribution board shall be installed after the incomer.

7.3 DB – TYPE C

Specification Requirement

Distribution Board – Type B Plugs & (Lights)		
Description		**Requirement**
Applicable Drawing		OTVET-E10 – DB Type C (Plugs & Lights)
Supply Voltage		415 Vac
Current Rating		25A & 20A
Panel Short Circuit Rating		5kA
Circuit Breaker Type		CBI/Schneider/ABB or similar and equal to – pre-approved by the Engineer
Circuit Breaker Rating (Lights)		10A, 6kA, 240 Vac, 1 Pole, C Curve QF19
Earth Leakage with built in overload protection		N/A
Earth Leakage Rating		N/A
Earth Leakage kA Rating		N/A
Wire Type		GP Wire
Wire Colour	Live	Red/White/Blue
	Neutral	Black
	Earth	Green and Yellow / BCEW
Wire Size	Socket Outlets	4mm²
	Lights	2.5mm²
Panel IP Rating		IP 42
Panel Material		Plastic
Distribution Board Make		EUROLUX 24 Way Din Rail Distribution Board, – or similar and equal to c/w neutral bar and earth bar
Labels & Signage		SANS 1042-1
Legend Card		As detailed in the specification
Locking Mechanism		N/A
Panel Access		Front
Cable Entry Location		Bottom / Top / Side
Panel Mounting Location		Surface Mount
Panel Location		Indoor
Certification		COC

Surge Protection: Class 1+2/Type 1+2 on the kiosk(s) and class 2 surge protection devices inside the building distribution board shall be installed after the incomer.

7.4 DB – TYPE D

Specification Requirement

Distribution Board – Type D (PV Plant)		
Description		**Requirement**
Applicable Drawing		OTVET-E05 – DB Type D (PV Plant)
Supply Voltage		415 Vac
Current Rating		25A
Panel Short Circuit Rating		5kA
Circuit Breaker Type		CBI/Schneider/ABB or similar and equal to – pre-approved by the Engineer
Circuit Breaker Rating (Lights)		10A, 6kA, 240 Vac, 1 Pole, C Curve QF19
Earth Leakage with built in overload protection		N/A
Earth Leakage Rating		N/A
Earth Leakage kA Rating		N/A
Wire Type		GP Wire
Wire Colour	Live	Red/White/Blue
	Neutral	Black
	Earth	Green and Yellow / BCEW
Wire Size	Socket Outlets	4mm²
	Lights	2.5mm²
Panel IP Rating		IP 42
Panel Material		Plastic
Distribution Board Make		EUROLUX 24 Way Din Rail Distribution Board, – or similar and equal to c/w neutral bar and earth bar
Labels & Signage		SANS 1042-1
Legend Card		As detailed in the specification
Locking Mechanism		N/A
Panel Access		Front
Cable Entry Location		Bottom / Top / Side
Panel Mounting Location		Surface Mount
Panel Location		Indoor
Certification		COC

Surge Protection: Class 1+2/Type 1+2 on the kiosk(s) and class 2 surge protection devices inside the building distribution board shall be installed after the incomer.

7.5 DB – TYPE E

Specification Requirement

Distribution Board – Type E (House DB)		
Description		**Requirement**
Applicable Drawing		OTVET-E07 – DB Type E (House DB)
Supply Voltage		415 Vac
Current Rating		70A
Panel Short Circuit Rating		5kA
Circuit Breaker Type		CBI/Schneider/ABB or similar and equal to – pre-approved by the Engineer
Circuit Breaker Rating (Lights)		10A, 6kA, 240 Vac, 1 Pole, C Curve QF19
Earth Leakage with built in overload protection		N/A
Earth Leakage Rating		N/A
Earth Leakage kA Rating		N/A
Wire Type		GP Wire
Wire Colour	Live	Red/White/Blue
	Neutral	Black
	Earth	Green and Yellow / BCEW
Wire Size	Socket Outlets	4mm²
	Lights	2.5mm²
Panel IP Rating		IP 42
Panel Material		Plastic
Distribution Board Make		EUROLUX 24 Way Din Rail Distribution Board, – or similar and equal to c/w neutral bar and earth bar
Labels & Signage		SANS 1042-1
Legend Card		As detailed in the specification
Locking Mechanism		N/A
Panel Access		Front
Cable Entry Location		Bottom / Top / Side
Panel Mounting Location		Surface Mount
Panel Location		Indoor
Certification		COC

Surge Protection: Class 1+2/Type 1+2 on the kiosk(s) and class 2 surge protection devices inside the building distribution board shall be installed after the incomer.

7.6 DB – SMB1

Specification Requirement

Distribution Board – SMB1	
Description	**Requirement**
Applicable Drawing	DB-SMB1
Supply Voltage	415 Vac
Current Rating	400A – 600A Adjustable
Panel Short Circuit Rating	6kA
Circuit Breaker Type	CBI/Schneider/ABB or similar and equal to – pre-approved by the Engineer
Panel IP Rating	IP 42
Panel Material	As detailed in the specification
Panel Painting System Details	As detailed in the specification
Labels & Signage	SANS 1042-1
Legend Card	As detailed in the specification
Locking Mechanism	Pad lockable lever locks – 6mm square drive panel locks for face panel
Panel Access	Front
Cable Entry Location	Bottom
Cable Termination	Unistrut
Panel Mounting Location	Floor Standing
Panel Location	Indoor
Certification	COC / Panel Manufacturing / QA

Surge Protection: Class 1+2/Type 1+2 on the kiosk(s) and class 2 surge protection devices inside the building distribution board shall be installed after the incomer.

7.7 DB – SMB2

Specification Requirement

Distribution Board – SMB2	
Description	**Requirement**
Applicable Drawing	DB-SMB2
Supply Voltage	415 Vac
Current Rating	400A – 600A Adjustable
Panel Short Circuit Rating	6kA
Circuit Breaker Type	CBI/Schneider/ABB or similar and equal to – pre-approved by the Engineer
Panel IP Rating	IP 42
Panel Material	As detailed in the specification
Panel Painting System Details	As detailed in the specification
Labels & Signage	SANS 1042-1
Legend Card	As detailed in the specification
Locking Mechanism	Pad lockable lever locks – 6mm square drive panel locks for face panel
Panel Access	Front
Cable Entry Location	Bottom
Cable Termination	Unistrut
Panel Mounting Location	Floor Standing
Panel Location	Indoor
Certification	COC / Panel Manufacturing / QA

Surge Protection: Class 1+2/Type 1+2 on the kiosk(s) and class 2 surge protection devices inside the building distribution board shall be installed after the incomer.

7.8 KIOSK – TYPE A

Specification Requirement

Kiosk – Staff Quarters	
Description	**Requirement**
Applicable Drawing	OTVET-E08 (S1-K1, S1-K2, S1-K2.1, S1-K3 & S1-K3.1)
Supply Voltage	415 Vac
Current Rating	175A
Panel Short Circuit Rating	6KA
Circuit Breaker Type	CBI/Schneider/ABB or similar and equal to – pre-approved by the Engineer
KWH Meters	CBI – Ecolec 300 Rail Mount Energy Meters – or similar and equal to – pre-approved by the Engineer
Panel IP Rating	IP 65
Panel Material	As detailed in the specification
Panel Treatment	Blasting profile of SA 2½ on all surfaces. Edge primer of zinc phosphate of between 20 and 25 micron thick.
Panel Painting System Details	As detailed in the specification
Panel Access	Back & Front
Labels	As detailed in the specification
Legend Card	As detailed in the specification
Locking Mechanism	Vandal proof - Pad lockable lever locks with covers - coin slot locks for face panels
Cable Entry Location	Bottom
Cable Termination	Unistrut
Panel Mounting Location	Concrete plinth as detailed in the specification
Panel Location	Outdoor / Trench
Certification	COC / Panel Manufacturing / QA

Surge Protection: Class 1+2/Type 1+2 on the kiosk(s) and class 2 surge protection devices inside the building distribution board shall be installed after the incomer.

7.9 KIOSK – TYPE B

Specification Requirement

Kiosk – Male & Female Residence	
Description	**Requirement**
Applicable Drawing	OTVET-E11 – M1-K1 to M1-K3 OTVET-E12 – F1-K1 to F1-K4
Supply Voltage	415 Vac
Current Rating	200A
Panel Short Circuit Rating	6KA
Circuit Breaker Type	CBI/Schneider/ABB or similar and equal to – pre-approved by the Engineer
Panel IP Rating	IP 65
Panel Material	As detailed in the specification
Panel Treatment	Blasting profile of SA 2½ on all surfaces. Edge primer of zinc phosphate of between 20 and 25 micron thick.
Panel Painting System Details	As detailed in the specification
Panel Access	Back & Front
Labels	As detailed in the specification
Legend Card	As detailed in the specification
Locking Mechanism	Vandal proof - Pad lockable lever locks with covers - coin slot locks for face panels
Cable Entry Location	Bottom
Cable Termination	Unistrut
Panel Mounting Location	Concrete plinth as detailed in the specification
Panel Location	Outdoor / Trench
Certification	COC / Panel Manufacturing / QA

Surge Protection: Class 1+2/Type 1+2 on the kiosk(s) and class 2 surge protection devices inside the building distribution board shall be installed after the incomer.

7.10 LEGEND CARDS

Legend cards, A4 paper size, laminated and covered by removable 2.0mm transparent acrylic plastic ("PERSPEX") or equivalent shall be fitted to the inside of the door of the distribution board or aluminum framed and covered by removable 2.0mm thick transparent acrylic plastic ('PERSPEX') or similar and equal to – pre-approved by the Engineer in any other position where it can conveniently be observed.

Legend cards shall be as follows but not limited to, for example:

POWER SOURCE: NON-ESSENTIAL SUPPLY / ESSENTIAL SUPPLY / NO-BREAK SUPPLY
DB NUMBER: DB-G1 NE – FED FROM MAIN LV PANEL – 70mm² 4-C PVC/PVC/SWA/PVC CU CABLE + 35mm COPPER CLAD STEEL EC / BCEW
COC NUMBER…… DATE OF ISSUE……

Item no	Circuit	Description	Destination
1	Main	Main Switch / Local Isolator Switch	
2	L1	Lights	Office / Lab No etc.
3	P1	Plugs	Office / Lab No etc.
4	PP1	Industrial Plug	Office / Lab No etc.
5	ISO1	Isolator	Office / Lab No (Equipment ID)
6	ELU1	Earth Leakage Unit	Plug Circuits 1, 2, 3 etc.
7	ELU2	Earth Leakage Unit	Office / Lab No (Equipment ID)

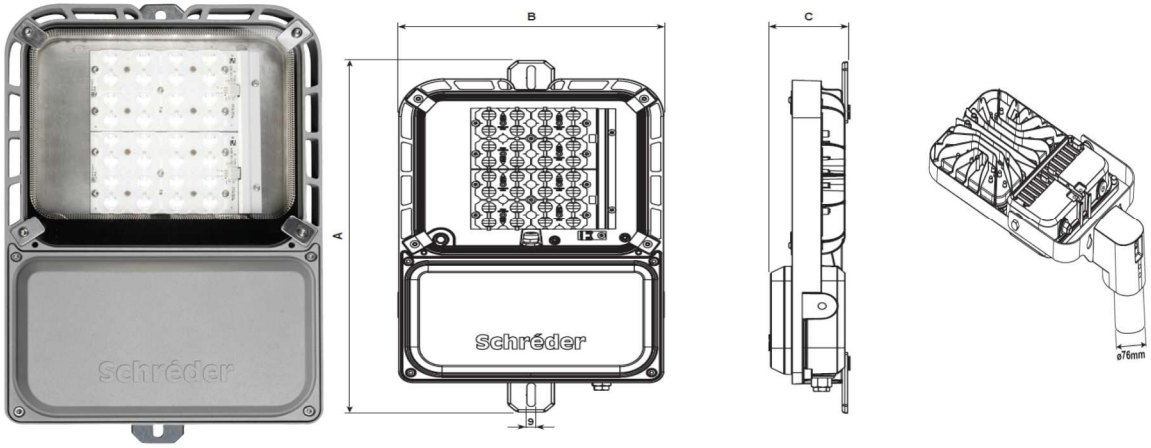
7.11 COLOUR CODING DISTRIBUTION BOARDS, KIOSKS AND LOW-TENSION SWITCHBOARDS

All distribution boards, kiosks and low-tension switchboards shall be equipped with lightning protection devices.

POWER SOURCE	COLOUR OF DISTRIBUTION BOARD, KIOSK, LOW TENSION SWITCHBOARDS	COLOUR OF FACE PLATE	LABEL TYPE	CONTENTS ON EXTERNAL LABEL	CONTENTS OF INTERNAL LABEL ON FACE PLATE	LETTER SIZE	CABLE MARKING AND COLOUR CODING
NON - ESSENTIAL	**Distribution Boards in buildings** be "LIGHT ORANGE", colour B26 of SANS 1091 **Outdoor Kiosks, and Low-Tension Switchboards** be "DARK ADMIRALTY GREY", colour G12 of SANS 1091.	**Distribution Boards in buildings** White **Outdoor Kiosks, and Low-Tension Switchboards** White	Black letters on white Traffolyte label pop riveted to cover / cover plate. DB-G1 NE	Distribution Board Number as per example DB-G1 NE	Distribution Board Number as per example. DB-G1 NON-ESSENTIAL Indication of Feeder Source, Size of Feeder Cable, Fault Level Rating of Distribution board, Phase rotation direction	Label of Distribution Board: 20 mm Label on Face Plate: 20 mm	All cables shall be labelled as detailed in the specification DETAIL
ESSENTIAL	**Distribution Boards in buildings** be "SIGNAL RED", colour A11 of SANS 1091.	**Distribution Boards in buildings** "SIGNAL RED", colour A11 of SANS 1091.	White letters on red Traffolyte label pop riveted to cover /cover plate. DB-G1E NE	Distribution Board Number as per example DB-G1E NE	Distribution Board Number as per example. DB-G1 ESSENTIAL Indication of Feeder Source, Size of Feeder Cable, Fault Level Rating of Distribution board, Phase rotation direction	Label of Distribution Board: 20 mm Label on Face Plate: 20 mm	All cables shall be labelled as detailed in the specification DETAIL
UPS / PV SOLAR	**Distribution Boards in buildings** be "DARK VIOLET", colour FO6 of SANS 1091.	**Distribution Boards in buildings** "DARK VIOLET", colour FO6 of SANS 1091.	White letters on blue Traffolyte label pop riveted to cover / cover plate. DB-G1U NE	Distribution Board Number as per example DB-G1U NE	Distribution Board Number as per example. DB-G1 UPS Indication of Feeder Source, Size of Feeder Cable, Fault Level Rating of Distribution Board, Phase Rotation direction	Label of Distribution Board: 20 mm Label on Face Plate: 20 mm	All cables shall be labelled as detailed in the specification DETAIL

8. LUMINAIRES

8.1 TYPE A - FLOOD LIGHT – 59W – Pole mounting

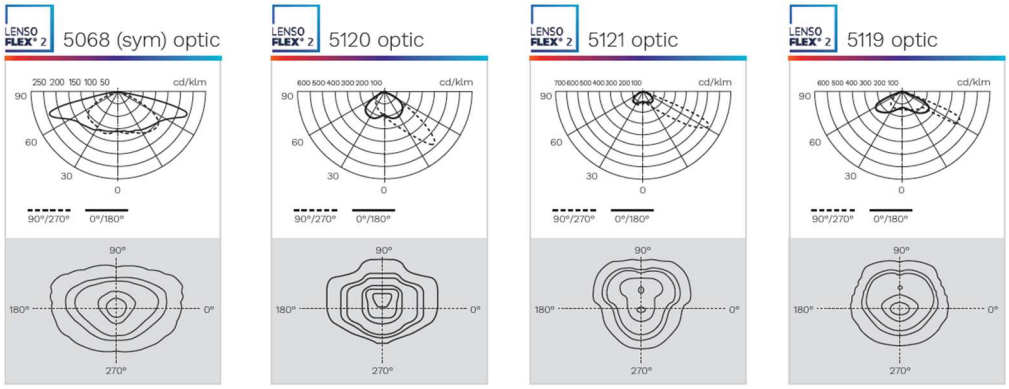


General Specification

Product Description
The slim and unique design is optimizing the thermal operating environment around the LEDs enabling the long useful lifetime (100 000hrs, L90B10) and low maintenance. This luminaire is designed to accommodate various mounting options, as well as being installed in hazardous areas (Zone 2 & 21/22) and available for emergency lighting applications (MDI). Electronic temperature monitoring prevents overheating of LEDs and power supply within the LED compartment (ThermiX®). To maximize the reliability of the LEDs, the photometric engine and control gear compartment are completely sealed to IP 66. This ensures that the photometric performance is maintained over time.
The LEDNOVA offers flexible combinations of LED arrays, combined with various photometric distributions (LensoFlex2®) and dimming control options to further maximize energy savings and reduce maintenance costs. It is designed for LED light sources between 20W and 81W. Standard finish: Unpainted Aluminum. Painted version available on request.

Photometry

Light source	LED
LED	2mm^2 LED
Light color	4000K (Neutral White 740)
Color rendering (Ra)	>70 (Neutral White 740)
Lumen	70W – 10235lm
Optics	5068 (sym), 5119, 5120, 5121

Photometry:	

Overview		**Lifetime Residual Flux @ Tq 25°C (**)**	
Number of LED's	Neutral White (4000K)	32 LED	@100.000h
LED Current: 700mA	Nominal Flux (lm)*	10235	90%
	Power Consumption (W)	70	
LED Current: 1000mA	Nominal Flux (lm)*	-	
	Power Consumption (W)	-	

Mechanics

Electronic control Gear	Constant Current Driver
Materials and finishing	Body – Marine grade high-pressure die-cast aluminum (EN 1706 AC-44300) Protector – Glass or polycarbonate Finish: Unpainted
Coating	RAL colours on request
Installation	Pole Mount
Fixing	Pole Mount – 2 x M8 grub screws
Dimensions (LxWxH) in mm	462 x 283 x 83
Weight (with gear)	4.8kg
Access	Yes

Electrical Characteristics

Line Voltage	230VAC
Mains voltage Tolerance (AC)	198 - 264V Optional: 110–277V (Midi only)
Line frequency	50Hz
Electrical Safety Class (IEC)	Class I or II
Surge protection	Yes - 10kV/10kA Optional - 20kV/20kA (Midi only)
Lighting control	Downward facing daylight switch

Power Supply

Power Factor	≥0.95
Removable	Yes
Thermal Safety	Yes

Environment

Storage temperature	-40 < T < 45
Enclosure Tightness	IP 66
Enclosure Mechanical Withstand Impact	Glass – IK 07 Polycarbonate – IK 10
Enclosure Mechanical Withstand Vibrations	Modified IEC 60068-2-6

TECHNICAL INFORMATION

The Tenderer shall include full technical particulars regarding the luminaire offered with the tender.

SABS MARKS

The luminaire bears the SANS 60598-2-5 safety mark.

INGRESS PROTECTION

IP 65 in compliance with SANS 60598. The IP rating is certified by a SABS test report.

8.2 TYPE B – Glass Reinforced Polymer (GRP) Composite Poles

(The poles are made of unsaturated polyester resins and reinforced by fiberglass rovings, mats or fabrics. The combination of glass and resin offers additional durability and sturdiness.)

The pole shall be constructed by the filament winding process to achieve optimum results for strength and rigidity. The filament winding process shall be continuously applied with uniform tension onto a rotating mandrel and shall result in a minimum mass glass to resin ratio of 70:30. The surface shall be seamless, smooth and tapered.

The material of the finishing coat shall be a gel coat that shall comply with the requirements of SANS 1749 and shall be applied to a uniform thickness of between 250 and 500 microns. It shall provide a weatherproof, UV resistant, flame resistant and impact strong surface.

A standard pole supporting a luminaire with a wind surface of 0.20m² shall not have a pole top deflection of more than 5% of its height above ground when subjected to a basic wind pressure of 500 Pa. A safety factor of 2.5 times the total maximum wind load shall be applicable.

The pole shall be manufactured in accordance with SANS 1749 under the ISO 9002 quality system.

If an access opening is required, the cut-out shall be covered by an access door cover manufactured from glass filled nylon impregnated in the same colour as that of the surface coat. It shall be secured to the pole by two stainless steel Allen head captive screws into M4 brass inserts embedded in the pole.

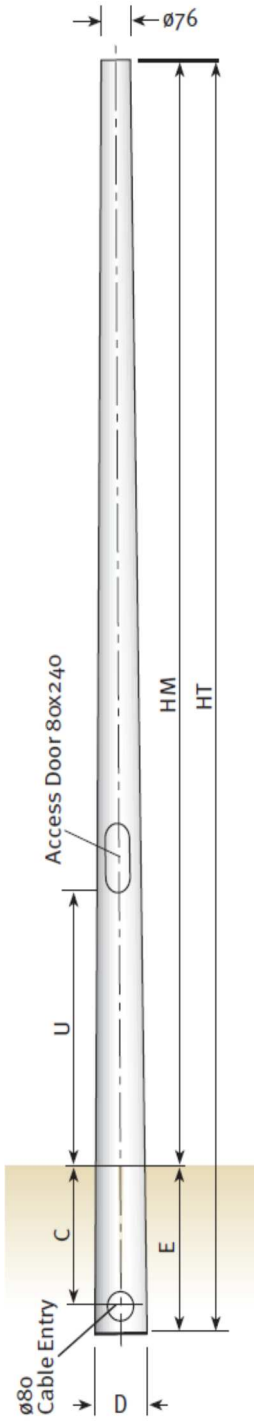
A cable entry with a minimum diameter of 34mm shall be provided at a minimum depth of 400mm below the ground surface.

A hot dipped galvanised gland plate, suitable for gland no. 0 or 1, complete with terminal block and DIN rail for a miniature circuit breaker, shall be provided and shall be mounted to a bolt provided in the access opening.

Poles for direct embedment in the ground shall be provided with a 300x300x1.6mm hot dipped galvanised baseplate complete with 2 x hot dipped galvanised steel hook bolts and nuts. Base mounted poles shall have a hot dipped galvanised flange plate that can be bolted to a foundation which shall be designed to withstand the forces the pole will experience in service.

GLANDPLATE ASSEMBLY	Gland plate assembly, Type GP/2/0/E/TB/MCB, consisting of 2 holes 20mm diameter, suitable for Gland No 0 or 1, complete with terminal block, 4-way, 30 Amp and DIN rail for MCB
MINIATURE CIRCUITBREAKER	Miniature circuit breaker, 10A/5kA, for total Line starting currents of more than 4A, but not exceeding 8 Amp
DETACHABLE BASE PLATE	Hot dipped galvanised, complete with hook bolts and nuts. Base plate assembly, 300*300*6mm
COLOUR	Mineral Grey
The method for ground installation shall be as follows:	1) Fill the hole with a 1:6 mix of cement and sifted soil to 200mm below natural ground level and compact every 200mm to 90% AASHTO. 2) Fill the rest of the hole with non-chemical active soil and compact to 90% AASHTO.

8.2.1 TYPE B – Glass Reinforced Polymer (GRP) Composite Poles



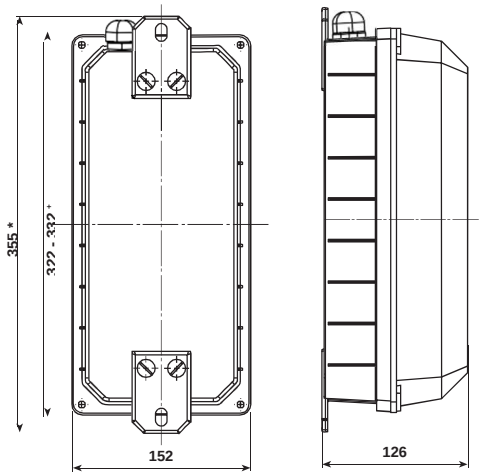
HT	Total Length
HM	Mounting Height
D	Base Diameter
C	Depth of cable entry
U	Access door height
E	Buried depth

HT mm	HM mm	D mm	C mm	U mm	E mm
4600	4000	157	400	2500	600

TECHNICAL INFORMATION

The Tenderer shall include full technical particulars regarding the GRP pole offered with the tender.

8.3 TYPE C – PHOTOCELL



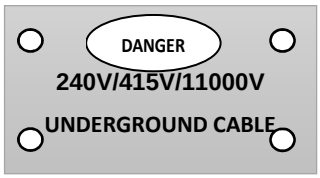
GENERAL INFORMATION	
HOUSING AND FINISH	
Housing	*Marine grade high-pressure die-cast aluminium (EN 1706 AC-44300)*
Diffusor	*Injection-moulded high-impact acrylic diffuser*
Housing finish	*Telegrey 1 (RAL 7045), Textured finish*
Tightness level	*IP 65*
Impact resistance	*IK 08*
Maintenance	*Easily accessible*

Technical Information

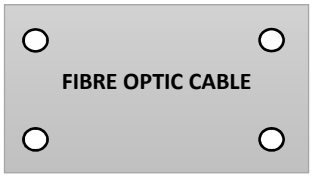
The unit must consist of a photocell, thermal starter and switch
The body of this unit must be manufactured from strong material to protect it against tampering, and it must also have good anti-weathering features; it must be capable of withstanding ultra-violet rays and long periods of exposure to the sun.
The unit must be installed in such a way that it is not activated by ambient or any other artificial light source.
The unit must be pre-set in the factory so that it will switch on at an illumination level of approximately 54 lux and switch off again at 108 Lux.
A time delay of at least 15 seconds must be provided for to prevent the switch from being activated by lightning or other brief changes in the illumination level.
Built in protection against voltage surges must be provided.
IP65 Ingress protection
ROHS compliant
Supplied with Nema rotalock socket base, wall mounting bracket & sealing gasket.
Royce Thompson photocell – similar or equal and approved

9. Stainless Steel Cable Route Markers

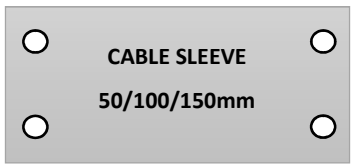
SAMPLE



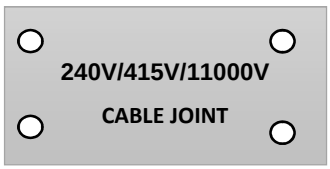
Type A



Type B

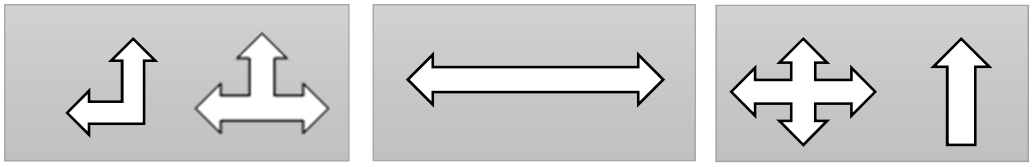


Type C



Type D

Type E



Arrow directions will be determined on site

Technical Specification

- Stainless Steel – Brushed – 2mm thick – Black Laser Engraved – Drilled Holes
- Dimensions – 80mm x 100mm

Lettering – 10mm High

- For the electric cable route marker: - DANGER - UNDERGROUND CABLE + Voltage
- For cable sleeves: - CABLE SLEEVE – (50mm, 100mm or 150mm sleeves)
- For the Information & Communication Technology cable route marker: - FIBRE OPTIC CABLE
- For cable joints: - CABLE JOINT + Voltage
- For telephone: - TELEPHONE

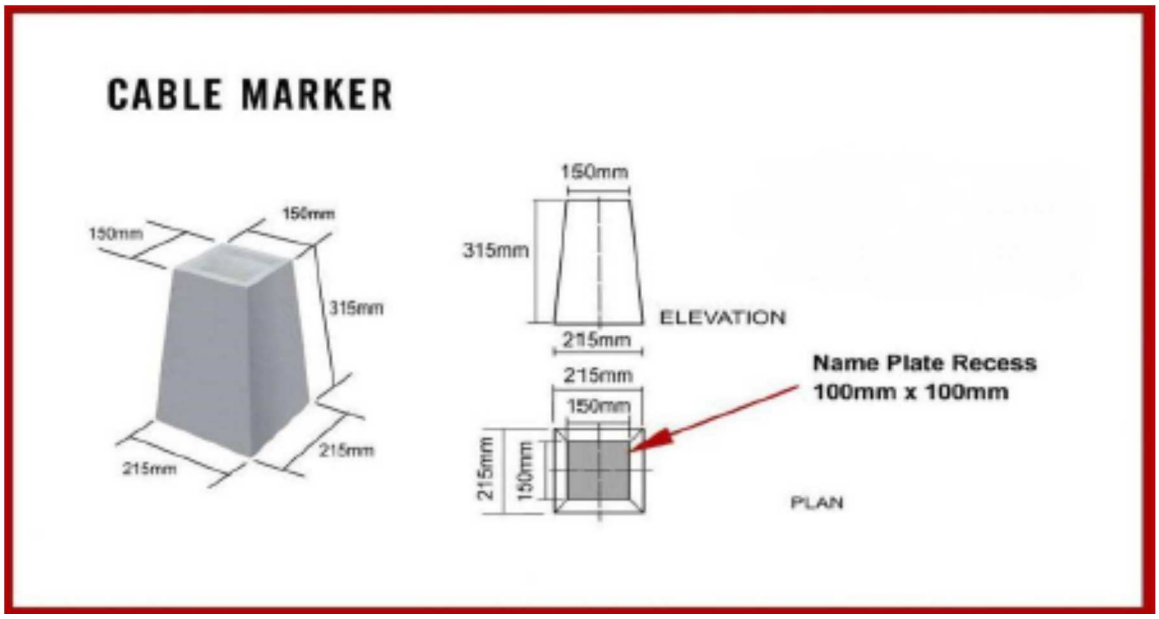
Installation

Epoxy Glued plus 4 x Pan Head Self-tapping Screws DIN 7981, Stainless Steel, Grade 18/8 – (A2) 304, M3.5 x 9.5mm and PVC Plugs

- On manholes – on plastered finishes
- On road crossings – fixed to kerb
- On road surfaces – as per example below

Cable paint kerb marker
Paint: Yellow Road Marking Paint
Circle dia: 300mm
Marker Installation: As specified

10. Concrete Cable Route Markers



Technical Specification

	➢ Concrete – 25MPA unreinforced ➢ Dimensions – 150mm x 150mm top, 215mm x 215mm bottom ➢ Height – 315mm ➢ Weight – 23kg ➢ Label Plate - 2mm aluminium, nominal size 100 x 100mm epoxied to recess in top of marker. Plate is left blank for field punching by contractor.

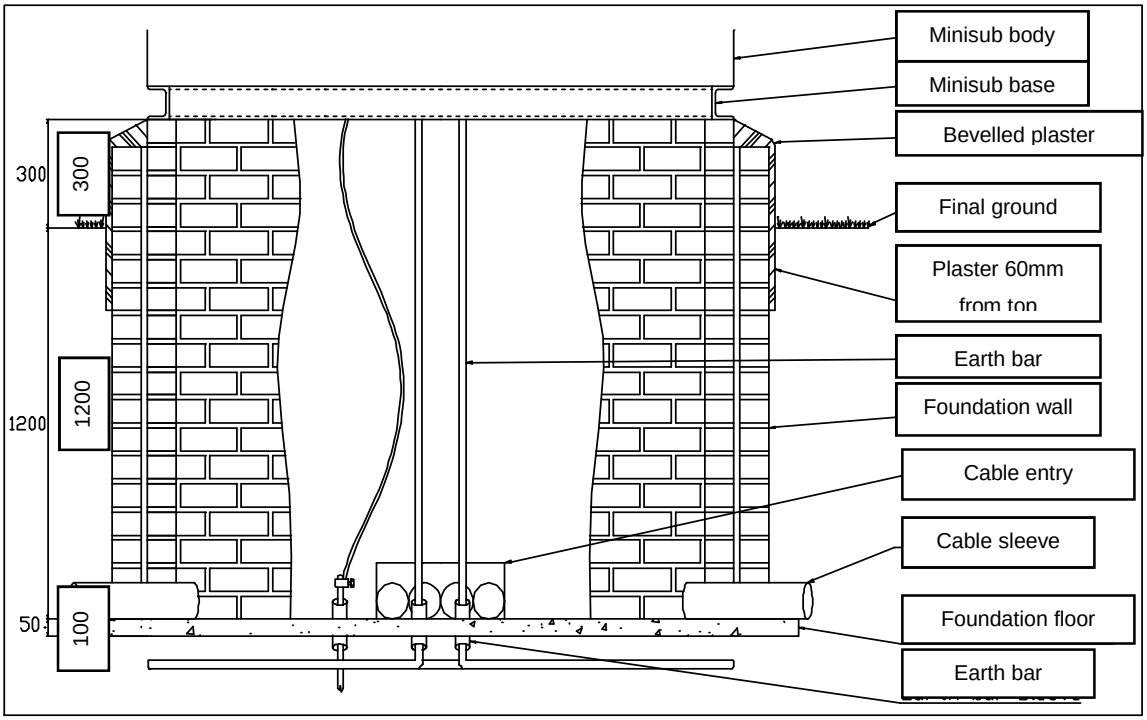
Lettering

- ➢ The lettering of the four types of markers must be as follows: -
- ➢ For the low-tension cable route marker: - LT – with direction arrows
- ➢ For the medium/high tension cable route marker: - HT – with direction arrows
- ➢ For the cable joint marker (all voltages): - JNT
- ➢ For the Information & Communication Technology cable route marker: - ICT

Installation of Cable Markers

- ➢ Plant the cable marker over the buried cable with the upper horizontal face of the marker about 30 mm to 50 mm above the levelled surrounding ground, or in the case of a hardened surface, protruding by not more than 10 mm above such hardened surface.
- ➢ Install cable route markers along all underground cable routes. Install cable markers 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 cable sleeve entries
  and exits and at intervals not exceeding 50 m along the cable route.
  Cable markers show the actual route of a buried cable, therefore, locate the cable markers at such intervals that the deviation of the actual buried position of the cable from a straight line between any two adjacent cable markers does not exceed 500 mm horizontally.
- ➢ The cable joint marker is located above the joint of a buried cable. Indicate the position of cable markers on the "as built" drawings. First delivery will not be considered until the cable markers are installed neatly in their positions.

11. Miniature Substation Plinth



Technical Specification

Mini-substations shall be installed on foundations built with bricks and 25Mpa concrete as shown. Excavate the foundation hole 1,4 m deep and large enough to allow building work inside the hole. The foundation floor must be cast after the mini-sub earth electrode has been installed and tested. The foundation floor must consist of a 100 mm thick 25Mpa concrete slab. The foundation floor slab must protrude 100 mm horizontally on all sides of the foundation walls. The 220 mm foundation walls must be built on the foundation floor slab and must protrude 300 mm vertically above the final ground level. The dimensions of the foundation walls must be confirmed with the mini-sub manufacturer so that the mini-sub base will fit on the inner skin of the 220 mm wall. At the top of the foundation wall the inner skin of the wall must be built one brick course higher than the outer skin. The top 600 mm of the foundation wall must be plastered on the outside and bevelled at the top towards the protruding inner skin of the wall. Internal walls of chambers shall be rendered with 3:1 cement plaster.

Leave openings in the bottom of the foundation walls on all four sides for cable and cable sleeve entries into the mini-sub foundation. The size of the openings must be determined by the number of cables and cable sleeves that must enter the mini-sub foundation on each side, plus 25% spare capacity for future cables. On the sides where there are no current cables, provide an opening large enough to accommodate four 110 mm cable sleeves.

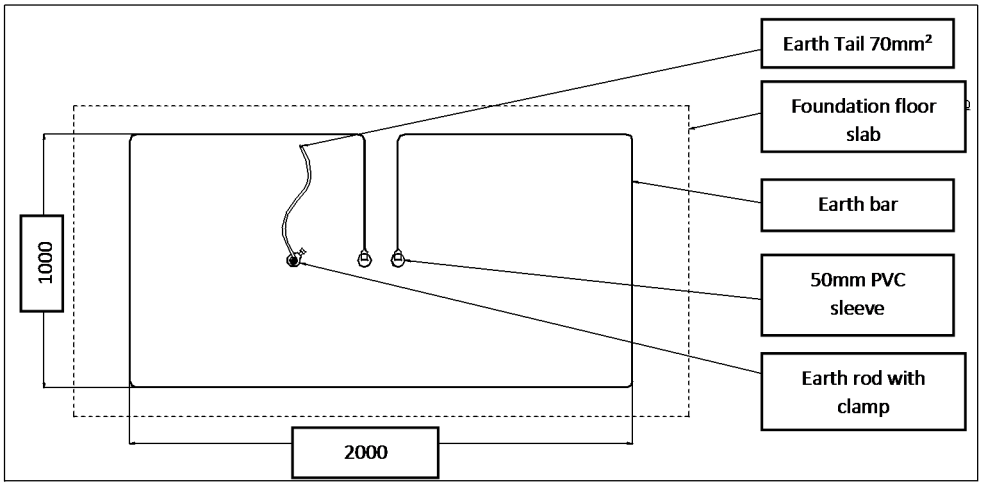
Apron around Mini-substation

Technical Specification

The Apron consist of 25Mpa 19mm concrete with expansion joints across the width of the Apron from each corner, 1500mm wide x 100mm thick with a slope away from the mini-substation

4 x 110mm x 1800mm long sleeves installed at

11.1 Miniature Substation Earthing

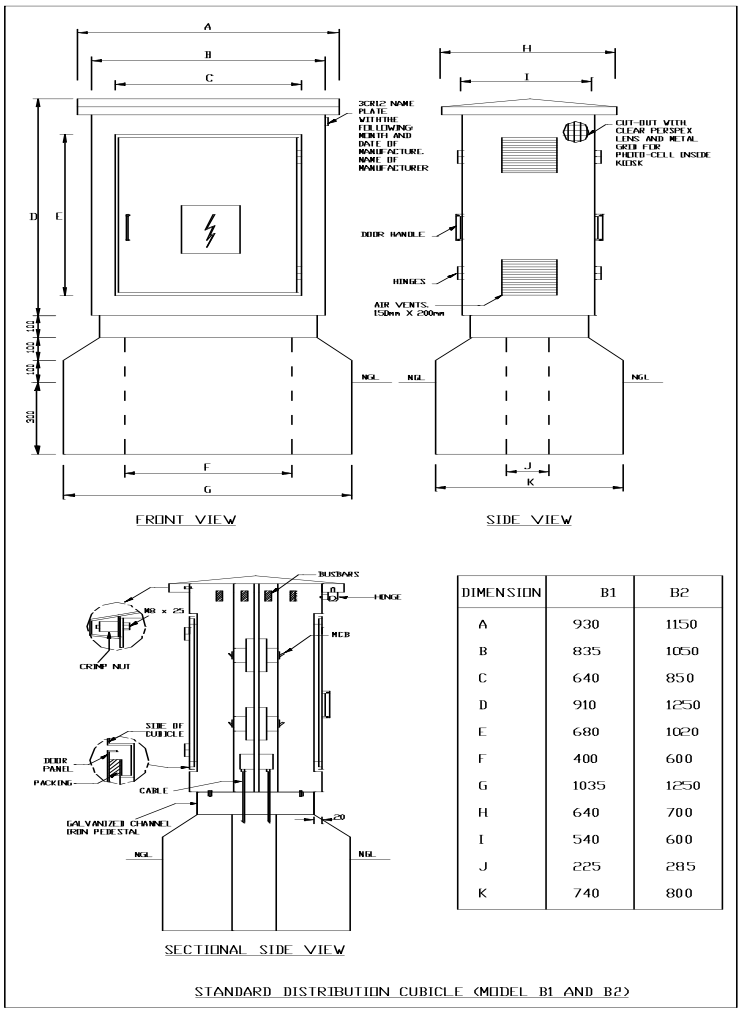


Dimensions approximately. Refer to manufacturer's layout drawings

Technical Specification

Earthing electrodes and earth bars shall be installed at the bottom of the excavation for the foundation as shown. The mini-sub earthing must consist of a 25x3 mm copper earth bar installed around the inside of the foundation floor perimeter. Install the earth bar on the thin edge, 100 mm below the foundation floor. Provide two 50 mm diameter PVC sleeves at the centre of the foundation floor for the two ends of the earth bar. Bend the ends of the earth bar vertically upward and connect it to the earth busbar in the miniature substation. Provide another 50 mm diameter PVC sleeve through the foundation floor for the earth rod. Install a 1 m copper earth rod through the PVC sleeve into the ground. Connect the earth rod with the earth busbar in the miniature substation with 70 mm² bare copper earth wire. The Engineer must inspect and approve the earthing installation before the concrete slab is poured.

12. KIOSK CONCRETE BASE – TRENCH INSTALLATION



DIMENSION	B1	B2
A	930	1150
B	835	1050
C	640	850
D	910	1250
E	680	1020
F	400	600
G	1035	1250
H	640	700
I	540	600
J	225	285
K	740	800

Technical Specification

The base must consist of a hollow foundation cast of concrete. The foundation must be at least as deep as the cable trench. Install a sufficient number of 110 mm PVC sleeves through the bottom of the foundation to provide cable access in and out of the kiosk foundation.

Finish the top of the foundation with a smooth plastered surface. The foundation must be plastered to at least 200 mm below the natural ground level. The top of the finished foundation must be 300 mm above the natural ground level.

The foundation must be at least 100 mm wider than the kiosk on each side.

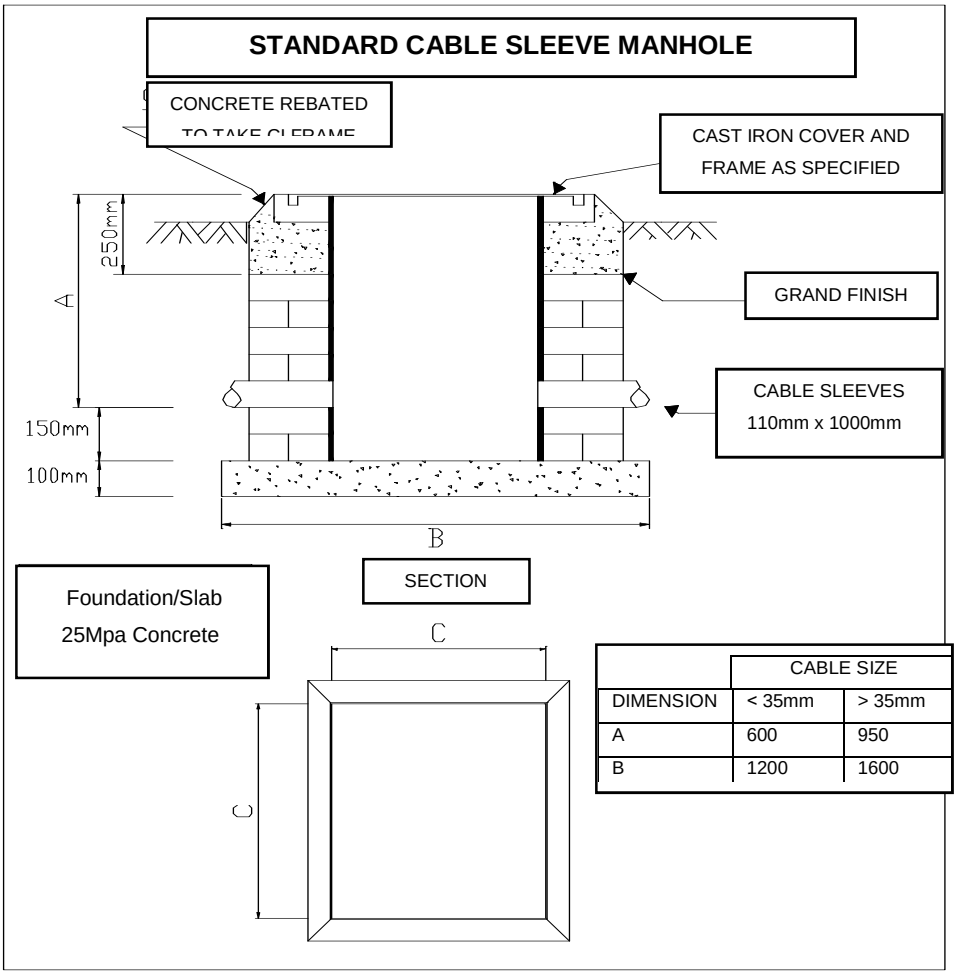
Apron around KIOSK

Technical specification

The Apron consist of 25mpa 19mm concrete with expansion joints across the width of the Apron from each corner, 1500mm wide x 100mm thick with a slope away from the KIOSK.

2 x 110mm x 1800mm long sleeves installed at

13. Manholes, Covers and Frames



	CABLE SIZE	
DIMENSION	< 35mm	> 35mm
A	600	950
B	1200	1600

Technical Information

Where cables are installed in sleeves, manholes shall be installed as directed / indicated on the drawings and sleeves be terminated inside the manholes as follows:

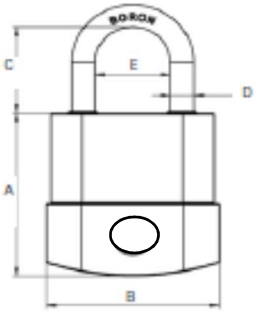
a) At the beginning and the end of cable routes
b) At all direction changes along the cable route
c) At intervals not exceeding 50m

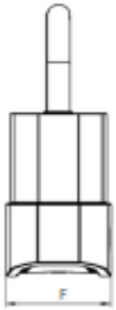
Manholes

d) Manholes to be built in accordance with the standard drawing shown here.
e) Manholes of extra hard burnt bricks in 3:1 cement mortar aid. Internal walls of chambers shall be rendered with 3:1 cement plaster
f) Change-of-direction manholes with the sleeve entries on diagonally opposite corners of the manhole to allow for the maximum bending radius of the cable inside the manhole

Heavy-duty Cast-Iron manhole cover and frame, lockable, single seal, EN 124 classification complete with locking/unlocking devise and lifting handle.

14. TYPE A - MAXIMUM SECURITY PROTECTOR WEATHERPROOF PADLOCK





Technical Specifications

	A	B	C	D	E	F
(a)	47	47	25	ø6	20	28
(b)	49	56	28	ø10	22	33

- Protector Weatherproof padlock with keyhole cover
- Shackle type Open
- Shackle material: Boron
- 5 Pins
- CEN rating: 2
- Tested to EN12320:2012
- Laminated Steel body material, Black PVC, Blister
- Three individual keys shall be provided with each lock and four master keys shall be provided for the entire installation c/w Marangue plastic key tags.

15. LEVER ARCH FILE

Technical Specifications:

- A4 – 3 Piece Construction
- Transparent Anti-reflective
- Pockets – Front, Spine & Inside
- A4 Multi punched Polypropylene A-Z Divider Set x 2 – 140 Micron
- A4 Polypropylene Pockets – 30 per file

16. 100 POSITION KEY CABINET

Technical Specification:

- Labelled Key Shelves
- 100 Colour Coded Key Hooks and Numbers
- 100 Colour Coded Key Tags with Numbers
- 0.8mm Steel Walls – powder coated finish - white
- Removable key control index card.
- Supplied with cam lock with 2 keys

PART 4: QUALITY SPECIFICATION FOR MATERIALS AND EQUIPMENT OF ELECTRICAL INSTALLATIONS

CONTENTS

PART 4: QUALITY SPECIFICATIONS

1. CONSTRUCTION PROGRAMME

The electrical installation shall be executed within the stipulated contract period.

It is the responsibility of the contractor to place his orders for material and equipment timeously. The contractor will be held responsible for any delays whatsoever.

The contract programme shall indicate critical paths/dates, sequence of events, material ordering times, main and/or other (sub) contractor's work completion dates, etc. which are relevant to the installation.

2. REGULATIONS LAWS AND BY-LAWS

The supply and installation of the work shall be in agreement with the Conditions of the Contract with special attention to the following in particular:

a) The Occupational Health and Safety Act no. 85 of 1993, as revised, whereby SANS 10142 is enclosed.

b) Government notices.

c) The local Municipal By-laws and any special requirements of the local supply authorities.

d) The local Fire Office Regulations.

e) Telkom Regulations

f) Any special conditions specified in this specification.

It must be clearly understood that, where differences in the Generals occur as stated in (a), (b), (c), (d), (e) and (f) or where additional requirements are required, the higher General requirements shall apply.

In the event of any contradiction between (a), (b), (c), (d), (e) and (f), then (f) shall be accepted above the rest.

Where any required by-law or regulation, which applies or becomes applicable during the execution of the electrical installation, is in conflict with the stipulation of the document, the former must have preference in all cases. The contractor must immediately notify the Engineer of such discrepancies.

The contractor may not make any alterations to the installation before written sanction to do so is received from the Engineer or its representative.

3. TERMINOLOGY

Labels must indicate the functions of equipment and components in the distribution boxes and/or distribution boards. The terminology on the identification labels must be in English.

4. LIAISON

The electrical contractor shall, in each case, provide the engineer, employer (principal contractor) with all necessary information, dimensions, materials, etc., as called for in the specification, in good time.

The Contractor shall familiarize himself with the existing Community Leaders and Ward Councillors where the project is to be executed, prior to the commencement thereof. Arrangements for Local labour assistance shall only be negotiated with the relevant consent and assistance of the aforementioned.

It is essential that the electrical contractor work in close collaboration with the principal contractor to ensure that where his services run in proximity with other services, there are no clashes.

Failure to comply with the above may mean that corrective measures will have to be taken to correctly position the equipment. Any abortive work resulting will be entirely to the electrical contractor's account.

Where the electrical contractor is to provide electrical supplies to control panels forming part of other contract works, it is essential that the electrical contractor liaise fully with the particular contractor who must provide the electrical contractor with all information necessary so as to ensure that the supply cable terminates in the correct position and that the phase rotation complies with the equipment installed.

Failure to do so may result in the electrical contractor being held responsible for the cost of removing and replacing not only his own but also the equipment of the main contractor and other contractors.

5. SUPERVISORY STAFF AND IDENTIFICATION

All work done on site shall at all times be under the direct and full-time supervision of a contract manager who shall be a qualified installation electrician who will sign the certificate of compliance.

Full particulars of the site organisation, complete with names of officials the Bidder proposes to allocate to this project are to be submitted with this bid. For the duration of this contract the above detailed officials will be permanently assigned to this project and may only be relieved of their duties after prior agreement by the Engineer or his representative/agent.

Whilst on the site all staff and labourers employed by the electrical contractor shall wear distinctively marked clothing bearing the name of the electrical contractor or his identification logo.

6. SETTING OUT OF WORKS

The electrical contractor shall be responsible for marking out and setting out of all equipment and plant.

The position of items of electrical equipment and plant indicated on the drawings are to be taken as approximate. The exact position for fixing shall be obtained by site measurements.

In case of doubt, decisions shall be obtained from the Engineer or his representative/agent.

7. CERTIFICATE OF COMPLIANCE BY AN ACCREDITED PERSON

On completion of the electrical installation the contractor shall complete the Certificate of Compliance for the electrical Installation in the form of Annexure 1 as described in the Occupational Health and Safety Act no. 85 of 1993, as amended, and obtainable from the Electrical Contracting Board of South Africa. This form must be handed to the Engineer or its representative.

8. ASPECTS THAT NEED SPECIAL ATTENTION

As the project progresses the Contractor must indicate on his drawings any deviation that has occurred. The exact position of equipment must be shown on the Contractor's "as built" drawings.

The completion certificates shall only be issued when the completed "as built" drawings from the Contractor are received and approved by the Engineer.

9 SAFETY REGULATIONS

Both the "Factory, Machinery and Building Work Act (Act 22 of 1941) and the "Machinery and Occupational Safety Act (Act 6 of 1983)" must, wherever they appear in the SANS 1200 standardised specifications, be submitted by the "Occupational Health and Safety Act (Act 85 of 1993)".

The Contractor shall apply suitable proven methods for construction so that his activities will not constitute a hazard to the public or any adjacent property. All excavations shall be suitable safeguarded and barricaded especially during night-time, weekends or holidays and any other day of inactivity by the Contractor. The Contractor shall also ensure that excavations are shored or otherwise made safe. No additional payment will be made to the Contractor for complying with these requirements.

10. DELIVERY AND COMPLETION

All contract materials shall be ordered timeously and delivered to site at dates suited to the agreed construction program.

The successful Bidder for the installation will be required to commence work immediately following notification of bid acceptance, and shall thereafter at all times maintain the progress required by the agreed completion program.

11. SERVICE CONDITIONS

All plant shall be designed for the climatic conditions appertaining to the service.

12. MAINTENANCE OF ELECTRICAL SUPPLY

All interruptions of the electrical supply that may be necessary for the execution of the work will be subject to prior arrangement between the Contractor, the Engineer and the relevant representative or Campus Manager.

13. SUPPLY AUTHORITY

Temporary Supply

Electricity for erection, testing and commissioning purposes shall be arranged by the Contractor, as the permanent supply will not be available during the execution of this contract.

If any temporary connections or supplies are required, every precaution must be taken by the Contractor to ensure the safety of persons and property. Special attention shall be paid to earthing and bonding.

14. LABELS AND NOTICES

The Contractor shall arrange for the labelling of all equipment, instruments, meters, relays, cables, etc., as indicated below.

Distribution substations, mini-substations, Kiosks, DB's, CB's, light poles, cables, etc. shall be labelled as specified in the Quality Specification (Labels and Notices) and where applicable to the standards of the Local Supply Authority.

Where identical items of equipment can be removed from their housings, e.g. HV circuit breaker carriages, plug-in relays etc., both the fixed and withdrawal portion are to be labelled identically.

All labels shall be ivorine or other back engraved white on black labels of the sizes indicated. They are to be located in purpose made holders or otherwise are to be screwed or riveted into position. “Dymo” tape or similar labels will not be accepted nor will labels, which are glued in position only.

Labels on poles shall comprise an aluminium plate with the designated number. These labels shall be nailed to the pole 1,5m above ground level. Nails shall be electro-galvanized clout nails.

Prior to any equipment being labelled, the Contractor shall request the Engineer to provide a complete labelling schedule for all items of equipment. Under no circumstances is equipment to be labelled in accordance with the bid drawings since any description thereon is for identification purposed during construction only and is unlikely to apply to the completed Works.

The following list indicates the general labelling requirements but does not limit the extent of labelling required, which shall encompass the full extent of the equipment supplied, or in the case of existing equipment, any such which is affected by this Contract:

50mm high lettering:
- Substation and mini sub designation;
- Outdoor switch gear designation;
- Transformer designation; and
- Distribution kiosk and fused feeder panel designation.

20mm high lettering:
- Main or sub-main board designation;
- Control panel designation; and
- Indoor switch gear designation.

5mm high lettering:-
- Mini sub feeder breakers and isolators;
- Distribution kiosk feeder breakers and isolators; and
- General distribution switchgear.

This size shall be used to designate the conductor size and number of cores of each cable installed under this Contract. In addition, all feeder cables shall be labelled at both ends indicating from where/to cables are feeding.

All kiosks and mini-subs shall be provided with a label in both official languages reading “In case of leakage or accidental contact, put off main switch immediately”.

All kiosks and mini-subs shall be provided with notices as required by the Machinery and Occupational Safety Act. All doors to such locations shall be fitted with the appropriate notices.

Where more than one similar item of equipment is fed from the same board or control panel, the item itself shall be labelled, this being fixed in a permanent position, i.e. not attached to motors, pumps, etc., but to bases or adjacent thereto. The lettering shall be 50mm high.

Each distribution board shall additionally bear a label indicating the source and size of the feeder to it. Labelling will be done with **“Brother Tape”**.

For example: DB.A (Normal):
Fed from Mini-sub 5;
95mm² x 4 core cable + 70mm² BCEW.

Each feeder must be labelled at both ends with “Brother Tape” and a clear heat shrink to cover the tape. This label must indicate the size of the cable and from/to where the cable is feeding.

For example: 95mm² x 4 core cable + 70mm² BCEW:
Fed from DB.A to DB.B

Light switches, socket outlets, multi outlets, pop out boxes and isolators must be labelled indicating from/ to which DB and circuit it is feeding.

15. DANGER SIGNS AND NOTICES

Notices as stipulated in the latest amendment of the Occupational Health and Safety Act 85/1993 shall be installed in the substation.

The notices shall be in English.

Notices shall be in accordance with SABS 872-1967 Industrial Safety Signs.

All notices shall be of the metal engraved type with a minimum metal thickness of 1 mm. The words shall be in red lettering on a white background.

The lettering shall be embossed and the colouring shall not fade in sunlight.

The following notices shall be exhibited at all designated entrances to electrical panels:

(a) A notice prohibiting unauthorised persons from entering;
(b) A notice prohibiting any unauthorised persons from handling or interfering with electrical apparatus;
(c) A notice containing directions as to procedure in case of fire;
(d) A notice containing directions as to restoration of persons suffering from the effects of electric shock.
(e) A Skull and Crossed Bones danger notice shall be installed on each door.
(f) One nameplate shall be provided and mounted on each access door, with lettering at least 100 mm in height

16. DETAILED OPERATIONAL AND MAINTENANCE MANUAL

This manual shall contain the detailed descriptions of all switchgear and control equipment in mini-substations, LV kiosks, motor control panels, distribution boards, UPS equipment, battery chargers, power factor correction equipment, light poles, luminaires, lightning protection, 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.

Five copies of 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:

1. Certificate of Compliance
2. All test results
3. “As-Built” Electrical Drawings
4. Operational and maintenance data and details of all assemblies or components of electrical equipment and material installed. 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:
    a. Technical details of all equipment installed.

b. A complete description of the operation of all equipment.
c. 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.

5. Complete equipment schematics.
6. All manufacturers' handbooks having reference to the equipment.
7. Installation test and alignment procedures.
8. All circuit diagrams.
9. All interconnection and inter cabling diagrams.
10. 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 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.

17. INSTALLATION TESTS

Tests as stipulated in the " Occupational Health and Safety Act no. 85 of 1993, as amended, and in the "Code of Practice for the Wiring of Premises" SANS 10142 (as amended), must be done. These test report forms must be filled in fully and correctly in ink, signed by the installation electrician and handed to the Engineer or its representative.

Tests must be conducted on site after the whole installation is complete, unless written the Engineer to the contrary grants permission. The tests must include a full-load test for an adequate period to ensure the satisfactory working of the installation. If negative test results are obtained, faults must be rectified and tests again done.

The contractor must supply all testing apparatus, correctly calibrated.

All tests shall be carried out in conjunction with and to the satisfaction of the Supply Authority and in the presence of the Engineer or his representative. The contractor shall make all arrangements for testing and inspection, the costs thereof being included in the Bid Price.

Each length of cable shall be tested for insulation and polarity by means of a 2000 Volt Megger for LV and 22kV low frequency tester on 11kV cables designed for that purpose. In the case of underground cables this shall be done before back filling. In addition, the earth-loop impedance of each conductor earth electrode shall be measured. The earth resistance shall be tested by means of an approved instrument.

"Danger" notices shall be displayed at remote ends of cables under test.

The contractor shall ensure that the installation is completed in every respect and that there are no major defects prior to notifying the Engineer (in writing) for a first delivery inspection. The Engineer will accept zero minor defects during the final inspection. Should the number of defects be exceeded at the final inspection then the Engineer will terminate that inspection and request that the contractor arrange an additional final inspection.

18. LEVELLING AND PLUMBING

All equipment shall be carefully levelled and plumbed, checked with a spirit level. Should any equipment be unsatisfactorily installed in this respect it shall be dismantled and reinstalled, the costs of making good to damaged structures, plaster and paint will be for the account of the contractor.

It must be noted that boxes for imported accessories must be levelled and plumbed when installed, since the inserts cannot be levelled independently of the boxes.

19. ELECTRICAL/ELECTRONIC EQUIPMENT

All the equipment must be properly protected against damage, faulty functioning or interference by any external factors such as static electricity, induced voltage, magnetizing forces, radio waves, etc., which may occur in the building.

Equipment which is sensitive to interference and interference peaks in the electrical circuit; variations in voltage and frequency such as normally occur in the electrical distribution network, and the municipal supply to the building, which are inevitable, must be fitted with the necessary stabilizers, over and under-voltage protection equipment, suppressers, etc.

Equipment must be so manufactured and installed (and provided with suppression), that it does not cause any interference to other equipment or in any way affect the functioning thereof.

20. ERECTION OF EQUIPMENT

The contractor shall be responsible for the erection and installation of all equipment supplied by him under this contract.

In addition, the contractor shall be responsible for the care and maintenance of all electrical equipment after erection is completed until the first delivery of the specific section of the works. He shall ensure that the proper enclosure of all equipment is maintained at all times, that access doors and covers are opened only when necessary to work on the equipment and replaced afterwards, that the paint finish on all items is effectively protected and that all unused cable and conduit entries are effectively sealed.

21. MATERIAL

Materials and equipment used in this installation must be of the best quality of their respective types, must meet the relative SANS or BSS specifications and must be installed to the satisfaction of the electrical Engineer or his representative.

The contractor will be informed in writing if any material or workmanship is not of the required quality. In such a case the contractor must replace the material concerned or repair the installation to the satisfaction of the Engineer or its representative.

If requested to do so, the contractor must provide samples of materials or equipment, for the approval by the electrical Engineer, before it may be installed. The samples will be kept for comparison with materials and equipment actually installed and will be returned after the contract has been satisfactorily completed.

22. ELECTRICAL EQUIPMENT & MATERIALS

All equipment and fittings supplied must be in accordance with the attached quality specification (of this document), suitable for the relevant supply voltage and frequency and must be approved by the Engineer.

23. BALANCING OF ELECTRICAL LOAD

The Contractor is required to balance the load as equally as possible over the multiphase supply.

24. EARTHING AND BONDING

General

The entire installation shall be properly and effectively earthed and bonded as prescribed in the Wiring Code and as specified, a maximum of 5 Ohm. The Contractor will be responsible for all

earthing and bonding of the installation. The earthing and bonding is to be carried out strictly as described in the SANS specifications and to the satisfaction of the Engineer.

Self-tapping screws are not acceptable as a means of securing earth conductors.

The armouring on all cables coming into switchboards shall be bonded together and bonded onto the earth bar. The armouring of cables shall not be considered as an effective earth conductor.

Any copper tapes or conductors used for bonding or earthing installed outside the building or in accessible positions shall be run in galvanised conduits with bushes from 2 000mm above ground level down to approximately 300mm below ground level. These conduits shall be securely fixed to the walls.

All earthing work must be executed before any painting commences.

All metal luminaires shall be earthed.

Iron, lead and zinc shall not be used in direct contact with copper earth bar or conductors.

The earth to all light and power points shall consist of correctly sized stranded copper conductors and shall be drawn in with the conductors and terminate at the earth terminal of the equipment being supplied.

The armouring of cables shall not be considered as an effective earth conductor.

Jointing and "tee offs" of lengths of strip conductor shall be performed by means of brazing or by tinning and bolting. An overlap of minimum three times the width of the conductor shall be allowed for longitudinal joints. The bolts used shall not have a diameter greater than one-third the width of the copper strip. Brazed joints shall be brazed on all accessible sides and be smoothly and neatly finished off. The "Cadweld" method of jointing may be used on strip copper connections/tee offs. Tinning, riveting and soldering are also permissible (copper rivets).

Stranded copper conductors shall be joined by means of tinning and then bolting with 2 line taps (of the correct size) per joint or by means of specified clamps. An overlap of minimum 300mm shall be allowed. Stranded copper shall not be joined by means of brazing.

The covering, including the insulation (if any) of an earth continuity conductor shall be green or taped green at a termination.

Except where otherwise approved, conduit or flexible conduit or cable armouring shall not be used as an earth continuity conductor.

Where lugs are used for terminating stranded earth conductors, the lugs shall be hexagonally crimped with an approved type of crimping tool. The lug stud size shall correspond to the fixing bolt and the lug is to be so positioned that the full contact area of the lug is utilised.

All bolts/screws used for earthing shall be high tensile steel, brass or cadmium plated mild steel bolts.

All earthing conductors, which are looped, shall be installed in such a manner that the earthing system shall remain continuous, should a particular connection be disconnected.

Earthing continuity in conduits shall be maintained, i.e. expansion boxes, junction boxes, etc.

The continuity of the earth conductors should be tested and recorded. In no case should the resistance from any point of the installation to the main substation or mini-sub exceed 0,09 ohms. In the event of this valued being exceeded this must be brought to the Engineer's attention.

Where earth tails cross they must be brazed together.

Brazed joints to be oxy-acetylene brazed using 3mm dia. silver alloy brazing rods as supplied by African Oxygen Ltd., or equivalent, no flux is required.

Where connection is made to painted steelwork the paint shall be removed over a minimum area to allow good contact between surfaces. Surfaces shall be coated with petroleum jelly before bolting. After bolting any scraped area not covered by the copper connection shall be made good by using the original type and colours of paints.

Where connection is made to galvanised steelwork the surfaces shall be coated with petroleum jelly prior to bolting.

Main Earth

The main earth shall consist of a series of earth electrodes interconnected by means of a 70mm^2 bare stranded hard-drawn copper conductor, or shall consist of a trench earth consisting of a 70mm^2 bare stranded hard-drawn copper conductor buried underground and connected to each earth bar of each substation or main board as specified.

Connection between substation earth bar and earth electrode shall consist of 25mm x 3mm solid copper or 70mm^2 bare stranded copper conductors.

Neutral points of each separate system shall be earthed at or adjacent to the substation only. These neutrals shall be connected to the common earth.

Distribution Substations, 11kV/400V mini-substations, LV Kiosks, Distribution Boards

Common earth conductors may be used where various circuits are installed in the same wire way in accordance with SANS 10142. In such instances the sizes of earth conductors shall be equivalent to that of the largest current carrying conductor installed in the wire way, alternatively the size of the conductor shall be as directed by the Engineer. Earth conductors for individual circuits branching from the distribution substations, 11kV/400V mini-substations, Kiosk or distribution panel shall be connected to the common earth conductor with T-ferrules or soldered. The common earth shall not be broken.

Inspection and Testing

Inspection of earthing laid in trenches shall be requested by the Contractor (in writing) at the following stages:

Placing and compacting of lower bedding material in trenches;
Pulling and jointing of earth conductor and driving of earth rods;
Placing and compacting of upper bedding material; and
Completion of backfilling, manholes and terminations.

Inspections of the complete job may be called for where interim inspection certificates cannot be produced, by excavating at the Contractor's expense, at any position along the route and checking that the correct procedure and dimensions have been adhered.

The Contractor may be called upon, at his own expense, to repeat resistance and/or continuity tests in the presence of the Engineer, if the latter did not witness the initial measurements and to open portions of the work where interim inspections were not held.

The resistance between the main earth system and the earth mass shall be measured by the Contractor in the presence of the Engineer by the method specified or approved.

The earth and bonding continuity shall be tested in accordance with the Wiring Code.

Test results must be submitted to the Engineer in writing for written approval before the system is permanently covered or handed over.

25. SLEEVES

Cable sleeves shall be provided where shown on the drawings and wherever necessitated by installation conditions. Sleeves shall be of steel water pipe when traversing railways sidings, heavy duty tarmac, loading areas, etc.; they shall be of other approved materials where traffic loading is lighter (heavy duty class 34 uPVC sleeving with a wall thickness of not less than 1,5mm thick or equivalent HDPE sleeving and a smooth finish inside).

Cable sleeves shall not be less than 100mm internal diameter unless specifically noted otherwise in PART C3; they shall be of continuously smooth bore with no snags or hitches en route and shall encompass only easy sweeping bends permitting the easy passage of the heaviest cable involved. No cable sleeve shall exceed **ten** meters without a manhole draw position, unless authorized in writing by the Engineer.

The standard colouring coding system for underground service sleeves are:

- Black – electricity (street lights and traffic control cables, etc.)
- Red - electricity - some medium-voltage and/or high-voltage cables

Cable sleeves entering a floor cable duct shall be swept gently to the level of the bottom of the trench so that cables do not kink at entry to the trench. Cable sleeves brought to switchboards or distribution boards having no associated floor cable ducts, or brought to rising cable ducts shall be swept up easily so that the cable emerges vertically from the floor. In cases where the emerging cable is exposed to view, wooden dams shall be fitted round the cable at the top of the sleeve, and the floor screeded completely round the cable. The outer ends of cable sleeves entering buildings shall, after drawing in the cables, be water proofed with cable compound of low melting point.

Sweeping bends shall be installed where sleeves enter distribution boards. Sharp sleeve bends are not acceptable.

Cables attached to external walls must be placed in a recessed galvanized pipe from 300mm below ground level into the meter box or into roof spaces complete with brass bushes at both ends.

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.

The Electrical Contractor shall ensure that all required sleeves are installed in the correct positions.

26. CORE DRILLING BY MEANS OF PIPE JACKING OR DIRECTIONAL DRILLING

The top covers of all manholes, inspection pits and junction boxes within the Road Reserve shall be level with or below the natural ground level. Where the top is below ground level, it shall be covered with soil to be level with ground level. Such shall require approval from the Engineer.

The electrical Contractor shall not at any time construct any manholes, inspection pits and junction boxes within the Carriageways of the Road Reserves without approved professional Engineer's supervision.

The preferred method of crossing shall be by means of small-bore pipe jacking or directional drilling.

All underground cables and pipes within the Road Reserve shall be laid with the top convex at least 1.5 metre below the natural ground level. Such sleeve pipes or cables shall extend across the full width of the Road Reserve.

The jacking/drilling action may be undertaken with jacking pits located outside the roadbed, not closer than 3 metres from the edge of the road. During jacking operations, the jacking pit within the Road Reserve shall be fenced when left unattended.

The electrical Contractor shall re-instate the surface of the Road Reserve damaged due to any subsidence due to the Contractor's construction/maintenance work. The electrical Contractor shall take all necessary precautions to ensure the safety of the road users. The Engineer is to report any problems encountered to the electrical Contractor in writing.

All civil work shall be carried out in accordance to FIDIC (or its successor) specifications and standards as agreed between the parties. The relevant civil engineering tests shall be carried out on the completed work, measured and recorded.

In the event of any dissatisfaction of the Employer or Engineer with, or any dispute in regard to the aforesaid standards of work and the re-instatement and in an attempt to avoid litigation proceedings, an independent engineer shall be contracted by the Contractor and approved of by the Employer to render a report in respect of said re-instatement and standards and the Party determined to be at fault by the said engineer shall be liable for his costs. In the event of the said engineer determining that the re-instatement had not been performed up to the original level as referred to in the aforesaid paragraphs or the standards referred to have not been reached, the position will be remedied within 10 (TEN) business days or mutually agreed upon time periods from date of the said engineer's determination.

This approval shall not exempt the electrical Contractor from the provisions of any laws.

27. FEEDER CABLES

27.1 General

The Contractor shall ensure that all Certificate of Compliances are done prior to commissioning of the connection.

27.2 HV and LV Cable Work

27.2.1 General

The sizes and routes of high voltage and low voltage cables are indicated on the drawings and in these documents.

Medium Voltage cables shall be 3-core Copper Paper Insulated and Lead Covered double steel tape armoured PVC insulated 11kV cable manufactured to SANS 97.

Intermediate Voltage cables shall have electrical and physical properties of 3 core XLPE insulated PVC bedded SWA PVC sheathed 1,9 / 3,3 kV cables with copper conductors and manufactured to SANS 1507-4.

Low voltage cables shall be PVC SWA PVC type with Copper conductors which shall comply with the requirements of SANS 150, SANS 1507 and those of the Quality Specification in all respects.

All new cables shall be provided with enhanced armouring suitable for E.C.C. use and cable glands are to be provided complete with E.C.C. connection washers to allow for correct earthing techniques to be followed, as specified.

Bidders must base their cost for trenching in earth. Payment for cable trenching having a greater volume than that specified for the purpose will not be considered except where extra excavations are necessary to by-pass obstacles such as water pipes, drains, large boulders etc. In all such instances the amount of the extra excavations must be agreed upon on site between the Engineer or his representative/agent and the Contractor.

Earth continuity conductors are to be run with all cables constituting part of the low tension distribution system. Such continuity conductors are to be stranded bare copper of a cross-sectional area equal to at least half that of one live conductors of the cable, but shall not be less than 4mm² or more than 70mm².

Cables shall be labelled, cable routes marked and terminated as per the requirements of the Quality Specification (Labels and Notices).

The installation of cables in cable ladders/trays shall comply with the requirements of the Quality Specification.

The electrical Contractor shall determine the present cable routes of all existing underground cables as and when required for the contract work and shall allow for this requirement as part of his bid sum.

The dielectric shall consist of PVC suitable for MV, LV and Intermediate Voltage use. It shall be distinctly coloured as detailed in Table I of SANS 150/1970 so as to identify the phase, neutral and earth conductors with the phase conductors being coloured red, white or blue, the neutral conductor black and the earth conductor green/yellow or green.

The whole of the dielectric shall be coloured - surface painting or a longitudinal coloured stripe is not acceptable.

27.2.2 Cable Markers

The necessary number of cable markers must be installed so as to indicate the route of underground cables, as on the drawings. Where the direction of cables changes, this must be indicated on the surface by means of cable markers. Cable markers must be concrete pyramids, with measurements of 150mm x 150mm on the top and 250mm x 250mm at the bottom. Their height must be 300mm.

Brass plates must be cast into the tops of these pyramids in such a way that they cannot be removed easily. The words “ELECTRIC CABLE” must be punched onto these plates as well as the voltage of the cable and an arrow indicating the direction of the cable routes. The cable must be linked to the cable marker by a galvanized wire cast in the cable marker.

Cable markers must be placed on the surface above all underground cables and must stand out 35mm above ground level, unless they are a danger to pedestrians or traffic, in which case the tops of the markers must be flush with the level of the ground. Cable markers must be placed at the beginning and end of each cable route (e.g. where a cable goes into a cable kiosk or a building); at changes of direction; at all joints; above cable sleeve inlets and outlets, and along the whole cable route at distances not exceeding 50 meters.

27.2.3 Danger Tape above Cable

For all cables, a coloured plastic-marking tape shall be installed 200mm above the cable. The tape shall be yellow, with red skull and crossbones with the words "ELECTRIC CABLE ". These markings shall not be more than 1m apart from centre to centre.

Low voltage cables, cable terminations and cable joints shall comply with the requirements of the Quality and Particular Specification.

NOTE: ALL CABLE ROUTES SHALL BE DETERMINED ON SITE WITH THE ENGINEER AND THEN MEASURED BEFORE ANY CABLES ARE ORDERED.

27.3 Excavation

The Contractor shall be responsible for all trenching excavations unless specified to the contrary.

Low voltage cables shall be laid at a depth of 1000mm under final ground level.

Intermediate voltage cables shall be laid at a depth of 1100mm under final ground level.

Medium voltage cables shall be laid at a depth of 1200mm under final ground level.

28. UNDERGROUND CABLE NETWORKS

28.1 Scope

This specification covers the laying and joining of cables for underground high-voltage and low voltage systems.

28.2 Interpretation

28.2.1 Supporting Specification

The following specifications are part of this specification.

a) SANS 97 : Electrical cables with impregnated paper insulation;
b) SANS 1507 : Electrical cables and flexible cords with poly-vinyl chloride (PVC) insulation;
c) SANS 61442 : Electric cables: Test methods for accessories for power cables with rated voltages from 6 kV (Urn – 7.2 kV) up to 30 kV (Urn = 36 kV);
d) SANS 10198 : The choice, handling and installation of electrical power cables with a rating not exceeding 33 kV;
e) SABS 60502-4 : Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Urn = 1.2 kV) up to 30 kV (Urn = 36 kV) - Part 4: Test requirements on accessories for cables with rated voltages from 6 kV (Urn = 7.2 kV) up to 30 kV (Urn = 36 kV);
f) NRS 012 : Cable terminations and live conductors within air insulated enclosures (insulation co-ordination) for rated A.C. voltages of 7.2 and up to and including 36 kV;
g) NRS 013 : Medium Voltage Cables;
h) NRS 028 : Specification for crimped lugs and ferrules;
i) NRS 053 : Accessories for medium voltage power cables (3.8/6.6 kV to 19/33 kV);
j) NRS 075 : Specification for mechanical torque shears connectors;
k) SANS 9001 : Quality Systems: Requirements;
l) SANS 1200 C : The clean-up of the site;
m) SANS 1200 DA : Ground works (small jobs);
n) SANS 1200 DB : Ground works (pipe trenches);
o) SANS 1200 LB : Scatting (pipes);
p) SANS 1200 LC : Cable ducts;
q) SANS 1339 : Electrical cables with insulation of cross-linked polyethylene (XLPE) Insulated Electric Cables;
r) SANS 1411-2 : Materials of insulated electric cables and flexible cords – Part 2: Polyvinyl Chloride (PVC);
s) SANS 1411-7 : Materials of insulated electric cables and flexible cords – Part 7: Polyethylene (PE);
t) COUNCIL SPEC : THE SUPPLY, DELIVERY AND OFF-LOADING OF MEDIUM VOLTAGE CABLES; and
u) COUNCIL SPEC : SUPPLY, DELIVERY AND OFF-LOADING OF MEDIUM VOLTAGE CABLES ACCESSORIES.

28.2.2 Implementation

This specification includes clauses which is in general applicable to underground network systems for electrical power supply. The interpretation of, and variations to this specification is explained in Section 2 of the project specification.

28.2.3 Terminology

The terminology in the applicable supporting specifications, as given in 2.1 and the following terminology applies to this specification.

Core

A single insulated conductor without any protective housing.

Screened cable

A cable in which every core is separately encased by a conducting layer to ensure that the conductor is surrounded by a radial electric field when it is energised.

Belted cable

It is a multi-core cable where a part of the insulation covers each conductor and the rest of the insulation covers the combined cores.

Pilot cable

A cable which is normally used for measuring (control) or safety or communication circuits or all three.

Phase sequence

The sequence in which the phase voltages of a multiphase system reach its maximum values.

High voltage (HV)

Voltages with RMS value higher than 1 000V.

Cable

A length of core (or a length of 2 or more cores, laid up) which, in total, can be provided with a mechanical housing.

Low voltage (LV)

Voltages with RMS value of 1 000 V or lower.

Mass impregnated non-draining cable (MIND)

A cable of which the surplus impregnated-agent was not removed during production because the cable is non-migrating at the conductor's working temperature.

Ambient temperature

The temperature of the air 400mm above ground level at the bottom of the ditch, where applicable.

Thermal resistivity

The resistance against the flow of heat in a dielectric (Unit: K.m/W).

Consumer distribution unit (CDU)

A switch-box for LV service connections connecting the network and one or more consumer supply points.

28.2.4 Abbreviations

The abbreviations in the applicable part of the specification given in 2.1 and the following abbreviations apply to this specification.

Al	:	Aluminium
Cu	:	Copper
CNE	:	Combined neutral and earth
CDU	:	Consumer distribution unit (LV – distribution connecting box) (see def. in 2.3)
HV	:	High voltage (see definition in 2.3)
LV	:	Low voltage (see definition in 2.3)
MIND	:	Mass impregnated non-draining cable
PME	:	Protective multiple earthing
PI	:	Plasticity index
PILC	:	Paper insulated, lead covered
PVC	:	Poly-vinyl chloride
SWA	:	Steel Wire Armour
XPLE	:	Cross-linked polyethylene cables

28.3 Material

28.3.1 Graded Backfill material

Graded backfill material must be used to cover the cable(s) and to ensure good embedding. The material must be earth with low clay content, with a maximum PI of 6 and a maximum resistivity of 1,2 K.m/W and must be free of all plant materials, clots and stones with diameter bigger than 15mm, except in situations where other limits are specified in the project specifications. Sea or river sand is not acceptable because of its high thermal resistivity.

28.3.2 Grading

The Contractor may not waste excavated material that complies with 3.1 by removing it. The Contractor is not compelled to use selective methods of excavation. He is allowed, (but not forced) to sift the excavated material, treat or process the material in any other way to make it suitable to cover the cable(s) and to prevent material that is suitable for fill material or main fill material to become buried or contaminated.

If suitable material for graded backfill material is not freely obtainable form excavations, the Contractor must obtain material from other excavations on site or by opening quarries or by importing suitable material from commercial or other approved sources.

28.3.3 Cable Route Markers

Cable route markers must be provided if required and according to the project specifications.

28.3.4 Cable Joints and Cable Terminations

Cable joints and cable terminations must be of an approved type, e.g. heat shrink or mechanical sealing type. All cable ends must be insulated via heat shrink.

All high voltage cable joints must be done by an approved artisan. Paper insulated cable joints may be done with heat shrink joints else will be encased by a cast-iron joint box, designed for this purpose. The fill material must comply with BS 1858. XPLE cables must be jointed with heat shrink joints. The electrical continuity, screening and armouring may in no way be negatively influenced by the joint.

All heat shrink terminations must be supplied as a unit, including all necessary parts. The termination must be designed for the specific cable and application. Outdoor terminations must be designed to prevent arcing under any pollution and weather conditions to which it may be subjected. The joints to be used must adhere to the local supply authority specifications and requirements.

Cable glands shall be used according to the manufacturer's recommendations. All cable glands shall be manufactured from brass.

Cable shoes must be "Hex" crimped onto the cable ends with a purpose made tool. Cable shoes must be encased with a heat shrink sleeve of which the colour corresponds with the phase of each cable core.

28.3.5 Protective Concrete Slab – Not applicable to this contract

Where protective concrete slabs are required in the project specifications, it must have the following nominal measurements:

Length	:	1m;
Width	:	230mm; and
Depth	:	50mm.

The slabs must be manufactured of 20 MPa concrete. Each slab must have one armament rod along the length and 3 across the width. The rods must be manufactured using mild steel with a nominal diameter of 8mm. If not, the slabs must be manufactured as specified in the project specifications.

28.3.6 Plastic Warning Tape

Plastic warning tape must consist of a strip of polyethylene, at least 0,04mm thick and with a nominal width of 150mm or 230mm (as specified in the project specifications). The warning tape must be totally impregnated with pigment so that it corresponds with colour no B26 (light orange) of SANS 1091 in a reasonable way. A black triangle and the flash symbol for electricity, which corresponds with sign WW7 of SANS 1186 as well as the words “DANGER, GEVAAR, INGOZI” must be printed on the full length of the tape with maximum intervals of 1 meter.

28.4 Construction Equipment

28.4.1 Compaction Equipment

Sufficient manual compaction equipment must be supplied for the compacting of the graded backfill material around and above the cables, sleeves and in trenches.

28.5 Installations

28.5.1 General

Trench excavations must comply with the requirements of SANS 1200 LC and SANS 1200 DA. No cables may be laid before the site is cleaned and the mass earthworks, which is done by others, is completed.

Every trench must be kept as straight as possible and must be dug to approved levels and measurements. The bottom must have an even contour.

Trenches dug close to railway lines, walls, roads, drains, pipes, cables, structures and on similar places where the danger of sagging exists, must be secured against such dangers and it must be done in such a way as to prevent possible injuries to construction personnel and the public. All these excavations must be done to the satisfaction of the Engineer and the public authorities concerned.

Bedding materials may not be laid until the trench has been approved by the Engineer. The Engineer might expect proof from the Contractor that the minimum depth of bedding material is provided before giving authority for the cables to be laid.

28.5.2 Guarding, Barricades, Lighting and Traffic Intersections

The Contractor must arrange guarding, barricades, lighting and traffic intersections for work in public roads. This arrangement must comply with the applicable Road Traffic Ordinance, the requirements of the Occupational Health and Safety Act (Act 85: 1993), the project specification and the applicable requirements of sub clause 5.0 of SANS 1200 DA.

28.5.3 Protection of Structures

In cases where work has to be done in the vicinity of buildings, bridges, tanks or other structures, the Contractor must take all the necessary precautions as required by the Occupational Health and Safety Act (Act 85: 1993) and the Mines and Industries Act of 1956, (Act 27: 1956). These

precautions shall include shoring where necessary, to ensure the safety of structures which is subject to danger during installation.

28.5.4 Protection of Surface and Underground Services

The Contractor must take all the necessary precautions to protect all existing services (meaning services on the site, which is shown on the drawings) and he will be held responsible for all damages to these services, caused by his activities. All works and protection arrangements are subject to approval and it must only be done after consulting the owner(s) of the various services. Should a service be damaged, the Contractor must immediately inform the Engineer and the authorities concerned. The Contractor may not repair the damaged service, unless he is instructed to do so.

In cases where no underground services are shown on the drawings or recorded, but the possible presence thereof cannot be discarded, the Contractor must, in conjunction with the Engineer, establish if any such services exist within the applicable site area. The Contractor must in good time complete such investigation before construction may start on the area concerned. A report must be issued to the Engineer whom will make the necessary arrangements for the protection, removal or relaying of the services prior to the commencement of any construction work.

Upon the discovery an underground service previously not indicated on the drawings, this service will be classified as ‘n known service and the Contractor will be held responsible for any damages thereof during all further works. In cases where such service is damaged with the initial discovery, the Employer will cover the costs of repairing the service, except if the Employer can prove that the Contractor did not take the necessary precautions and that the damage could have been prevented. Should the authorities concerned prefer to make the changes or arrangement for protection of services on their own expenses, the Contractor must co-operate with such authorities, and give reasonable access, working area and time to complete the necessary work. Permanent changes to or permanent relaying of services which is necessary to complete the work and which is authorised, will be compensated for, there will be no compensation for work carried out and not previously investigated by the Engineer and for which no written instructions were issued.

28.5.5 Conduct with Respect to Water on Site

The Contractor must give proper attention to water and remove it to ensure that the works are kept dry enough so the work can be properly executed. For this purpose he must provide, use and keep in order, pump equipment, water sand pens, pipes and other equipment that might be needed. He must also provide fresh drains, trenches, coffer-dams and other temporary works that might be necessary to keep damages, inconveniences and disturbances at a minimum.

28.5.6 Pollution

The Contractor must take all reasonable precautions to the satisfaction of the Engineer to keep dust disturbance, pollution of streams and inconveniences or annoyances to the public (or others) because of the execution of the work, at a minimum.

28.5.7 Safety

The Contractor must at all times provide proper and adequate precaution and safety arrangements on site. Should the Contractor fail to comply with this requirement, the Engineer will take the necessary steps to ensure that this requirement is met and any costs incurred will be for the Contractor’s account. Complying with this requirement does not exonerate the Contractor of his responsibilities and duties in accordance with the Occupational Health and Safety Act

(Act 85: 1993) and mines and Industries Act of 1956, (Act 27: 1956). Symbolic safety signs must comply with the applicable requirements of SANS 1186.

28.5.8 Minimum Base Width of Trenches

The minimum base width of each trench must be wide enough for the cable spacing which is specified in the project specifications. Each trench must be excavated in a way that half the specified width will be left on both sides of the designated centre line of the cable or group of cables. The trench width must be adequate for the proper compacting of the fill materials when backfilling is done. (In the case of trenches for cable sleeves or –ducts, see sub clause 5.1.1 of SANS 1200 LC).

28.5.9 Cleaning of Route

The Contractor must clean an area wide enough to ensure that his inspection is not obstructed along the cable trench as specified in SANS 1200 C. In cases where the cable trench falls within a servitude or passage-way of specified width, the damage to the vegetation of the named servitude or passage-way must be limited.

28.6 Backfilling

28.6.1 LV Cables

In trenches containing one or more low voltage cables, the approved fill material must be cautiously placed, in layers of 100mm un-compacted depth, throughout the width of the trench and then compacted to a minimum compacted depth of 150mm as specified in PI.5.10.3.

28.6.2 HV Cables

In trenches containing one or more high voltage cables the approved fill material must be placed in the trench as specified in PI.5.10.3. Should the project specification require a layer of protective concrete slabs or plastic warning tape, this must cautiously be centred over the high voltage cable after the first layer of approved uncompressed fill material.

28.6.3 Compaction

In areas subjected to road traffic and any other such area which is specified in the project specifications the trenches must be refilled in layers of maximum 150mm depth (after compaction) and in case of soil sticking together (clay material) it must be compacted up to 93% of the modified AASHTO-density or in the case of non-sticky soil (sandy material) up to 98% of the modified AASHTO-density.

Machine compaction will not be permitted directly above the cable(s) or sleeve(s) before a layer of 300mm depth fill material has been placed on top of the cable(s) or sleeve(s). The machine compaction must be conducted in such a way that the forces superimposed on the cable(s) or sleeve(s) does not exceed that superimposed by ordinary pedestrians or light vehicle traffic when the cover is already 1 m deep. If road traffic is involved, the cable(s) must be protected by a cable-way or –sleeve of at least 100mm in diameter, through which the cable(s) can be drawn at any time. Cable-ways beneath subways must be cast in concrete in a suitable way, if it is required by the project specifications.

28.6.4 Cables at Different Depths

In situations where cables are laid at different depths in a common trench, the same procedure for placing and compaction of the approved fill material beneath and on top of the upper cable applies as for the lower cable.

In situations where cables have to be laid on top of each other the high voltage cables must be laid under the low voltage cables. (See drawing LC-1 in SANS 1200 LC).

28.6.5 Conduct with Respect to Obstructions

In cases where obstructions are encountered during excavation that demands changes to the trench or a special kind of trench, the Contractor must have the Engineer's approval to implement such changes before laying the cable(s).

28.7 Excavated Material

28.7.1 Stacking

The excavated material must be placed along the trench in such a way that it does not obstruct or damage adjacent fences, trees, drains, gate openings and other properties and must be heaped up in such a way that traffic is not obstructed. Should this not be possible, the material must be removed from site, with the Engineer's approval and brought back later to backfill the trench after the cable(s) has been laid.

Surplus material must be removed by the Contractor and on the contractor's own expense.

28.7.2 Removal of Surplus Material

Surplus material excavated from trenches must be removed from the trenches side or the servitude to a scheduled area within 0,5 km of the source, as nominated.

28.8 Admittance to Properties on Cable Routes

Unless otherwise specified in the project specifications, the Contractor must (on his own expense) provide owners, inhabitant and their vehicles with reasonable access to their properties which may be situated adjacent or near the cable route(s).

28.9 Jointing Chambers

Jointing chambers must be of approved size in order to make it possible for the cable jointer to work efficient and expeditiously. Every chamber must be adequately covered to as far as possible to prevent dust and moisture from penetrating and must be equipped with sufficient lighting, draining and ventilation for use during cable jointing.

28.10 Transport of Cable Drums

Cable drums must be carefully transported to prevent damage to the cables and to prevent disturbing the cables. Damaged cables will be rejected. Drums may not be off-loaded by simply allowing them to roll off the back of the truck onto the ground. Drums may only be rolled in the direction as indicated by the arrow painted on the drum by the manufacturer. (This will ensure that the correct tension is maintained and prevent the cable from damage later). Every drum may only have one cable length on it. Proper attention must be given to where the drums are to be off-loaded in order to prevent unnecessary moving thereof, e.g. at joint locations.

28.11 Handling of Drums on Site

Note: It is recommended that a correctly designed spreader must be used to load and unload the drums with a crane.

Every drum must be mounted on jacks or on a cable-drum trailer with a horizontal supporting beam of suitable size and strength to handle the width and weight of the drum. The drum may not be allowed to rotate freely when the cable is rolled off. (Free rotation causes the cable to twist and loosen the windings, which can cause the inside armouring/insulation of the cable to be stretched). The cable must enter the trench from the top of the reel. All cables ends including that left on the drum or in a trench must be sealed to prevent the penetration of moisture into the cable. The free cable end on the drum must be fastened to the side of the drum.

28.12 Rollers

Rollers must be used when each cable is layed and must be carefully placed in the trenches to make sure the cable only lies on the rollers when it is pulled in.

28.13 Communication

The Contractor must ensure good communication between the operators at the pulling end and at the reel end of the cable while laying the cable(s).

28.14 Pulling Cable

The cable may be pulled by hand or by a wrench, but the maximum tension in the cable as specified by the manufacturer, may not be exceeded. A cable grip must be used to pull the cable, but if specified by the project specification, a loop connected to the cable cores and sheathing must be used. A twist connection must be used between the loop and the rope used to pull the cable. In cases where cables have to be drawn around corners, well lubricated skid-plates or special corner rollers must be used. Skid-plates and rollers must be firmly secured and must be inspected regularly throughout the cable laying process to ensure that they work properly.

28.15 Ambient Temperature During Cable Laying

In accordance with the stipulations of 5.19.2, a cable may not be installed at an ambient temperature that:

a) In the case of paper insulated cables, is lower than 10°C; or
b) In the case of PVC-insulated cables, is lower than 0°C.

In situation where the ambient temperature is continuously at a low a temperature, the cable may be installed, with the written approval of the Engineer. Special arrangements are made to keep the cable temperature above the minimum temperature specified in 5.19.1 for at least 24 hours before installation.

28.16 Cable Bends

No cable bend may have a smaller radius than the minimum radius specified by the cable manufacturer. This radius shall never be less than the radius prescribed by the relevant SANS specification.

28.17 Cables Layed in Sleeves, Cable Ways, etc.

Cables laid under roads or railway lines, must be laid through sleeves or cable-ways that are strong enough to withstand the expected shock loads applied by traffic. The laying of cable-ways and sleeves must comply with the applicable requirements of SANS 1200 LB and SANS 1200 LC. After the cable-ways and sleeves had been laid, they must be cleaned thoroughly to remove roughness and sharp edges that can damage the cable. The ends of spare sleeves and cable-ways must be properly sealed and if the project specification requires a pull wire, this must be installed. The position of these sleeves and cable-ways must be identified in the project specifications.

28.18 Spacing Between Cables and Other Services

The minimum spacing between electrical cables and other services must be in accordance with the project specifications.

In case of trenches used for a number of electrical cables the minimum horizontal free space required to prevent de-rating of the cables, are as follows:

a) In the case of cables with a conductor size of not more than 70mm^2 : 150mm;
b) In the case of cables with a conductor size of at least 70mm^2 : 250mm.

28.19 LV Cable Joints

No joints are `allowed in distribution cables, accept where it is specifically authorised. The low voltage cable in a continuous cable run must be of one size, except where a change in cable size is necessary, in which case the change must be approved by the Engineer.

28.20 Marking of Cables

An approved identification plate or label, on which the following information is given, must be attached to every high voltage and low voltage cable in every substation, miniature substation and CDU:

a) The size of the conductors; and
b) The number of phases; and
c) The route (“from” or “to”); and
d) The system voltages.

28.21 Reinstatement

The reinstatement of areas over cable- and pipe trench excavations must be executed as specified in sub clause 5.9 of SANS 1200 DB.

28.22 The Marking and Recording of Cable Routes

If required by the Engineer the cable run must be marked in such a way that the underground position thereof can be traced at any time.

In case of straight runs, the cable route markers may be placed at intervals not exceeding 50 m or as specified by the Engineer.

The Contractor must measure and indicate on plan all the detail of the installed cable, the position of each cable run, the depth of each cable, as well as all the joints and cable-ways which are installed. The name of the cable jointer and the date on which the joint was made must be indicated on the plans and, if specified by the project specifications, on the cables as well. Drawings of the cable routes "as built" must be supplied immediately by the Contractor to the Engineer after the Contractor has finished the work covered by the contract.

28.23 Tolerances

Degree of accuracy II applies to approved backfill material and the placing thereof.

28.24 Tests

28.24.1 Density of Bedding and Back Fill Material

The Engineer may demand a density test to determine the grade of density at the bottom layer of the trench and of the approved back fill material.

If the density is lower than specified (see 5.10.3) the Engineer may demand the removal of the material, replacing of the bottom layer or the back fill material with the same or other material, and the re-compaction, on the Contractor's own expense.

The Contractor is responsible for all tests done as a result of the removing and replacing of material.

28.24.2 Electrical Tests

Every part of the cable network between CDU's and substations must be tested for electrical continuity and for insulation resistance. Acceptance tests must consist of the following.

a) Phase identification test

A test must be done to determine if the connections between the end points are correct. All cables must be phased out before connected to the switchgear.

b) Insulation resistance test (Low voltage cables)

The resistance of the insulation of every core to earth and to every other core must be determined. These tests must be done with a 2 000V insulation resistance tester on paper and PVC insulated cables.

29. INSTALLATION OF CABLES

29.1 General

All cable sleeves manholes and cable markers are to be provided by the contractor unless otherwise specified. Others will provide cable ducts in the floors of buildings unless otherwise specified.

Cable run indoors shall be supported on cable trays or cable rack, secured thereto by heavy duty plastic strapping. The cables shall be fixed at intervals not greater than those stipulated in SANS 10142 and shall be spaced sufficiently to avoid de-rating in terms of SANS 10142 – 1. Cables shall be individually fixed so that any one may be removed from a group without disturbing the others.

Cables installed in trenches shall be installed at a depth of 1000mm below final ground level for LV cables, 1200mm for Intermediate Voltage cables and 1200mm for MV cables. 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 contractor may only deviate from the above depth provided prior authority in writing has been obtained from the Engineer.

A yellow PVC cable warning tape with the wording "DANGER" shall be installed above all cables installed in cable trenches.

Every run of cable shall be a single length without joints. Say that where a run exceeds the general drum length of where the length of a run is increased after the cable is delivered on site, a through box will be permitted. Such through boxes shall be so placed as to afford easy access for maintenance and repair; when they are required in underground cable runs the contractor shall provide special cable markers to locate them.

All cable tails shall be provided with either cable lugs or ferrules as may be appropriate. At each sealing end straps-on cable markers shall be fixed, showing clearly and indelibly the number and size of cable cores and the destination of the cable.

29.2 Cable routes

Cables shall follow the routes shown on the drawings; the routes shall only be varied with the written permission of the Engineer. Where no routes are defined on the drawings the contractor may select routes to his reasonable preference but shall obtain written approval of them before installing the cables.

The contractor shall, before trenching commences, familiarizes him 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 the Engineer's representative, the local municipal authority and any other authority which may be involved, in writing.

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.

29.3 Trenching

Trenching shall be programmed in advance and the approved program shall not be departed from except with the consent of the Engineer.

The Contractor will be held responsible for damage to any existing services brought to his attention by the relevant authorities and shall be responsible for the cost of repairs.

The Contractor shall take all the necessary precautions and provide the necessary barriers, 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.

Trenches shall connect the points shown on the drawings in a straight line. The Engineer beforehand shall approve any deviations due to obstructions or existing services.

Trenches shall be as straight as possible and shall be excavated to a depth of 1150mm x 450mm wide for LV cables, to a depth of 1250mm x 450mm wide for Intermediate Voltage cables and to a depth of 1350mm x 450mm wide for MV cables.

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 back filling.

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 back filling on completion of cable lying.

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 lying 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. The Engineer will advise on the course of action to be taken.

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, a person qualified to do so shall replace them.

29.4 Bedding

HV Cables: The bottom of the trench shall be filled across the full width with a 150mm layer of river sand. After cable laying a further layer of 150mm river sand shall be provided to extend to 150mm above the cables.

29.5 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 all cables, a coloured plastic-marking tape shall be installed 200mm above the cable. The tape shall be yellow, with red skull and crossbones with the words “ELECTRIC CABLE”. These markings shall not be more than 1m apart from centre to centre.

Back filling shall be undertaken with soil suitable to ensure settling without voids. The maximum allowable diameter of stones present in the back fill material is 75mm.

The Contractor shall have allowed in his bid for the importation of suitable backfill material if required.

The backfill shall be compacted in layers of 150mm 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.

29.6 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.

30. ELECTRICAL LV SUPPLY CABLES

30.1 General

All low voltage underground cables shall be stranded copper-core, 600/1000 Volt grade, multi-cored, PVC insulated, PVC covered, wire armoured and PVC encased (PVC/SWA/PVC).

All cables shall comply with SANS 150 and 1507 as amended, where applicable. Cables shall be of new stock and must still be sealed when brought on site. If these conditions are not met it may lead to the cables being removed from the site and their being replaced with the correct type all at the Contractor's expense.

The Contractor must do all measuring on site himself in respect of lengths of cable, earth wires and ditches required. The lengths given in the schedules are only allowed for bid purposes. Payments will only be made for the lengths of cable actually installed and at the bidded tariffs. In their bids, Bidders must allow for cut-off lengths of cables and bends.

The storage, transport, handling and lying of cables must conform to approved and acceptable practice and must meet the requirements of SANS 10198 as amended. Cables which are cut and left open for a period of time before being coupled must be sealed in the prescribed manner. When such cable ends are flooded by water they must be subjected to the tests prescribed by the Engineer.

The Contractor shall have adequate suitable equipment and labour available to prevent damage to cables.

Before the cable is installed, the cable trenches must be carefully inspected and any objects, which may damage the cable during or after installation, must be removed.

30.2 Sealing glands for PVC insulated cables

The sealing glands must consist of a sleeve in which a conical bush screws into one side and a nickel-brass or galvanized steel lock nut is situated on the other side. The galvanizing must meet SANS 763 as amended standards. The sleeve must have a hollow groove on the side on which the cable enters the sleeve to house the top ring of the waterproofing mantle.

The waterproofing mantle must be manufactured from non-weathering neoprene or other synthetic rubber and must be proof against water, oil and sunlight. These mantles must fit snugly over the sealing glands and the cables.

Sealing glands must have a 150 screw thread and must be suitable for the specified cable sizes.

30.3 Cable joints

Cable joints are not permissible except where specifically approved. No joints will be allowed where the specified length of cable appears on a drum.

31. CONDUCTORS

Cables used for wiring the installation must be 1000V grade PVC insulated cables for LV installations, Contractor so confirm voltage grades for other voltages. Heat resistant cables must be heatproof PCP insulated (e.g. B.I.C.C. or other approved type). Cables must not be old stock and must be delivered on site with their seals unbroken. PVC insulated conductors must meet SANS 150 and 1507 as amended standards and bear the SANS mark. Conductors for light circuits must be 1,5mm² and those for outlet socket circuits 2,5mm², unless specified otherwise.

Because of the distortion of insulating materials at temperatures above 57°C, PVC cables must not be directly attached to the terminal clamps of equipment such as stoves, geysers, built-in electrical heaters and any other electrical apparatus or equipment (including light accessories) of which the temperature exceeds 57°C.

32. DISTRIBUTION SUBSTATION – NOT APPLICABLE TO THIS CONTRACT

Unless specified otherwise, the 11kV distribution substation will be designed, approved, constructed, commissioned and brought to completeness and operation according to the standards and specifications of the local supply authority.

The Contractor shall, to be included in the pricing, then provide all necessary drawings and documentation for approval deliver the installation, including all electrical systems, in such a manner that it complies with the Supply Authority's requirements and other applicable codes, standards and regulations regarding voltage, current, fault level, phase rotation and frequency and with any other requirements which may be imposed by these authorities and the specification.

33. MINI-SUBSTATION AND LV DISTRIBUTION KIOSKS

All mini-substations or distribution kiosks and equipment shall comply with the requirements of the Quality Specification and Local Supply Authority Specifications.

Before the commencement of manufacture, detailed drawings of the proposed panels and boards are to be submitted to the Engineer or his representative/ agent for approval. Full schematic details of the layout and wiring of the boards are to be provided with these drawings.

Mini-substations or LV Kiosks, shall be manufactured from 3CR12 sheet metal, pickled and passivated and painted by spray painting or powder coating to withstand the detrimental effects of UV radiation, abrasion, heavy rain and prolonged exposure to moisture, for a period of at least 15 years without any visible sign of corrosion. Sheet metal shall be of the rust resistant type 3CR12 with minimum thickness of 3,0mm. Welding materials shall be of the same quality as the base metal.

After machining and before painting, all fat and grease shall be removed by using a suitable solvent.

All boards shall be completely vermin proofed. No holes other than those required for cable or conduit entry shall be allowed. Should extra holes be required for temporary installations, these holes shall be suitably blocked off on the removal of these temporary installations. Where doors or removable covers are situated and are required to be dust proofed, they shall be dust proofed by means of a minimum of 10mm thick non-perishable gasket, resistant to deterioration from heat, chemicals and moisture and capable of being compressed to half its original thickness. Where doors are flush fitting, gaskets shall be glued to the fixed flange. In the case of projecting doors, gaskets shall be glued to the door and not the associated framework. Similarly suitable gaskets shall be used wherever push-buttons, indicator lights, isolator handles, etc. pass through a door or panel.

Switchgear shall be vermin proof both in the service and isolated positions.

Equipment shall be in accordance with the applicable SABS Specifications and Codes and with this Specification. Selection of materials, finishes, equipment, etc. shall also be based on the conditions where the boards and equipment are to be installed, e.g. corrosive, hot, wet, damp, dusty, etc. Boards, equipment and materials which are exposed to sunlight and are susceptible to damage or accelerated deterioration due to the UV, shall be protected:

- **By means of a housing, covering or canopy from direct sunlight, or**
- **Shall be treated with a protective surface coating.**

Doors shall open 180° and access to the mini-substation or kiosk from the back shall be possible through doors. Doors shall also be adequately earthed.

The gland plate shall be manufactured of hot dipped, galvanised steel of 3mm minimum thickness. Sufficient holes shall be pre-punched for the number and sizes of cables specified.

The boards shall be extendible and have an initial spare cubicle capacity of 90% for mini-substations and 20% for kiosks or as specified on the drawings.

Sufficient removable panels shall be provided to afford access to all equipment for maintenance, service and replacement purposes.

The back panels shall be of similar construction to the front panels.

The paint finish of all mini-substations or kiosks on the interior and exterior and on the panels on which switch gear is to be mounted shall be of a high quality and shall be suitable for exterior use. Paint shall be applied to surfaces prepared in accordance with SANS 630 grade 1 paint. The total thickness of the dried paint shall be a minimum of 0,1mm. Care must be taken that all the sides are properly covered with paint.

A solid copper bus bar shall be provided for each phase and neutral and shall be mounted on appropriately coloured ceramic or similar insulators. The colours of insulators shall correspond with the phase colours that are red, yellow, blue and black for the neutral. Bus bars shall be easily reachable. Except where otherwise prescribed, the minimum dimensions of the Bus bars shall be 6mm x 25mm x 300mm long. A minimum clearance space of 100mm shall be maintained between bus bars.

Connection to bus bars shall be by using lugs, cadmium plated high tensile steel bolts, washers and nuts.

A 6mm x 25mm x 330mm solid copper-earthed bus bar shall be installed with a minimum of ten, 8mm bolts, complete with spring washers, brass washers and nuts. The bus bar shall be provided with internal thread and the heads of the bolts shall be soldered in position at the back.

The gland plate shall be bonded to the earth bar through a 70mm² stranded copper conductor.

The mini-substation or kiosk earthing shall consist of 3 lengths 70mm² stranded copper conductors of 7m each, installed in such a way to form 120° angles between the conductors (Crow foot). At the centre of the 120° angle all wires shall be Exo-welded together with a 70mm² earth conductor to the main earth bar of the mini-substation or kiosk. All earth wires shall enter the mini-substation or kiosk via the normal cable opening of the mini-substation or kiosk. Additional earthing is to be installed to achieve the required earthing level specified.

The LV cables shall rise into the unit from below through a plinth opening and shall be fitted to the gland plate with suitable glands. The individual cores of the cables shall be equipped with lugs and connected to the bus bars.

Services shall be connected to the three phases to provide a balanced load as far as possible.

All internal wiring to the boards shall be carried out in PVC insulated to SANS 150 having a minimum of 3 strands per conductor. All wiring shall be neatly bundled with nylon ties and shall be arranged in horizontal and vertical directions only. All wiring shall be neatly grouped and laced. Wiring shall not be run at random but shall follow board construction features as far as is possible.

Only wires of the same phase shall be grouped or bunched together.

No excessive bunching of wiring, which will impair the current carrying capacity, will be accepted.

All wiring is to be kept free and away from any exposed terminals or other un-insulated current carrying parts.

No joints will be allowed in internal wiring, and all connections to busbars or earth bars shall be made with tinned copper cable lugs soldered or crimped to the ends of the conductors and bolted to busbars by means of cadmium-plated high tensile steel bolts and nuts provided with spring washers.

Connections to terminals shall suit the connectors used, but in any case, terminal clamp screws shall not bear directly on the conductor. Hexagonally crimped lugs or ferrules shall be used on all conductors exceeding 4mm^2.

Wiring of any one cubicle shall not run through other cubicles unless the wiring is run in conduit or ducting.

Wires shall be clearly marked at all termination points in accordance with the numbering of the wiring diagram, by means of numbered ferrules, or other approved method.

When the board main switch is switched off, no live incoming or other wiring shall be accessible. The incoming terminals must be screened. Where connections are taken from the incoming side of the main switch, a screen marked 'Isolate Feeder before removing Screen' shall cover them. If any circuits are energised from other sources, clear warning notices to that effect shall be fitted and such terminals shall be clearly marked.

Removable links shall be provided in each contactor and control circuit for connecting future interlock connections.

All meters and circuit breakers shall be labelled with engraved plastic labels at least 1mm thick with 12mm letter size labels and shall be fitted to slide in frames.

All mini-substations or kiosks shall be clearly marked to indicate the name and/or number of the mini-substation or kiosk and from where the mini-substation or kiosk is fed and the size of the feeder cable.

Danger notices type WS7 to SANS 1186/1987 manufactured from plate aluminium, measuring approximately 150mm x 150mm, shall be fitted to each door in a central easily visible position.

All safety warning notices shall be in English. All boards shall be labelled in the sequence shown on the drawings and as specified or approved. The Contractor shall obtain final information and approval before labelling any board. Black letters on white background shall be used for all normal labels and red letters on white or yellow background for danger notices. All labels used shall be engraved trafolite. The main isolating switch or switches shall be clearly labelled in accordance with the regulations. Size and origin of supply cables and busbars shall be clearly labelled on all boards. All grouped single, double and three pole circuit breakers on distribution boards shall be properly labelled, indicating number of circuit controlled. All equipment situated inside the board, e.g. contactors, relays, fused, timers and time switches shall be clearly marked, indicating function, circuit controlled and fuse rating. The main designation label shall be fitted at the top centre of the board and shall be in English. Individual labels are to be fitted to each compartment door and corresponding fixed portion of rear panel (if accessible). All circuit labels shall be the same size for boards or similar equipment supplied under this Contract. These labels shall be white/black/white composition engraved trafolite labels secured by self-tapping screws or channelling.

Letter size: Main label - 20mm, other labels - 6mm.

The following labels shall be installed in English:

- **NOTICE/LABEL warning to switch off in case of accidental contact, etc.**
- **NOTICES in all places as required by the Occupational Health and Safety Act of procedures prescribed in case of fire and/or electric shock.**
- **NOTICES on doors together with warning sign prohibiting unauthorised entry.**

Labels on power cables shall be attached with approved type plastic adjustable grip clips. The labels for power cables shall be provided with holes for the clips to pass through for fastening. Each power cable label shall be fastened with at least two clips. A legend card, covered by removable 2mm thick transparent acrylic plastic ('PERSPEX') or equivalent panel, shall be installed on the inside of the door of the boards or cubicles and circuits shall be designated on this board.

All MV (3,3kV and 11kV) isolators shall be of the "load break, fault make" type and have a handle forming and integral part of the panel door so that the isolator cannot be closed without the door being fully shut; conversely the door cannot be opened unless the isolator is opened first. Isolator handles shall have an integral key lock or padlocking facility.

Brass bolts and nuts shall be used to mount all ancillaries.

Bidders may not present mini-substations or kiosks manufactured from fibreglass instead of materials as specified.

The Contractor shall arrange for an inspection of the mini-substations / kiosks by the Engineer before delivery.

33.1 Mini-substations

Scope

This contract is for the supply, delivery and off-loading of miniature substations for the TVET College at Mankwe.

Normative References

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

NRS 004:2010	Miniature substations for rated a.c. voltages up to and including 24 kV.
SANS 1029:2010	Miniature substations for rated a.c. voltages up to and including 24 kV.

Definitions and Abbreviations

The terms, definitions and abbreviations of NRS 004 shall apply to this specification.

Requirements

Ratings

MV equipment ratings:

- The MV switchgear shall be of Sf6 – filled and ratings are in accordance with SANS 1874.
- The rated insulation levels of all MV equipment shall be in accordance with SANS 876.
- The transformer ratings shall be in accordance with SANS 780.
- The nominal MV voltage rating of the mini-sub shall be 11 / 6,6 kV
- The rated lightning impulse withstands voltage level for all MV equipment (i.e. list 2 or list 3 in table 1 in SANS 876:2009) shall be List 3. See SANS 876 2009: Table 1.

LV equipment ratings:

- The LV equipment ratings shall be in accordance with the requirements of NRS 004.

Rated maximum power:

- The rated maximum power of the mini-sub/s shall be the following:
  a) 200 kVA;
  b) 400 kVA;
  c) 600 kVA;
  d) 750 kVA.

Rated frequency and number of phases:

The rated frequency of the mini-sub shall be 50 Hz.
The number of phases shall be 3.

Design and construction requirements:

- General
  Mini-subs shall comply with the requirements of SANS 62271-202 and the following additional specific requirements:
- A mini-sub shall comprise the following:
  a) One or more medium-voltage compartments for housing any of the following items of equipment:
     1) Sf6 filled ring main units in accordance with SANS 1874 (with MV interconnections);
     2) Cable terminations;
     3) Off-load dead-break isolating equipment with associated interconnecting conductors;
  b) a transformer compartment that has a transformer of power rating not exceeding 1000 kVA and a rated voltage not exceeding 24 kV; and
  c) One or more low-voltage compartments with a rated voltage of up to and including 1000 V.
- A mini-sub is intended to be used under normal service conditions in accordance with SANS 62271-202, and the following additional requirements apply:

a) An altitude not exceeding 1 800 m;
b) A relative humidity of 75 %;
c) The ambient air pollution level “very heavy” in accordance with SANS 60815-1;

NOTE: For the purpose of this specification, “medium” and “very heavy” ambient air pollution levels correspond to “low corrosive” and “corrosive” environments respectively.

d) A minimum ambient air temperature of -10 °C (class “minus 10 outdoors”).

NOTE: In the case of any special service conditions that differ from the normal conditions defined in above requirements, agreement should be reached between the purchaser and the supplier on the conditions for use of the equipment.

Design and construction

Type and dimensions

The general arrangement of a mini-sub shall be in accordance with the Type B layout.

The overall dimensions for all Type B mini-subs shall be in accordance with the requirements of NRS 004.

NOTE: In the type B arrangement, the LV compartments are located on the end and front of the transformer, and the MV and LV compartments appear to be side by side when the mini-sub is viewed from the front.

A mini-sub shall be of the modular design.

Base

The mini-sub shall have a steel base.

The steel base shall be sufficiently rigid to allow the mini-sub to be lifted and clamped to its plinth without being permanently deformed or damaged.

The base shall not be of a removable section adjacent to the MV compartment door.

The steel base shall be at least 75 mm high.

In the case of internal arc rated mini-subs, the steel base shall make provision for fixing the mini-sub onto the concrete plinth in accordance with NRS 004.

Miniature Substation Enclosure Specification

The enclosure shall be of 3CR12 with a minimum thickness of 3mm in accordance with the requirements of NRS 004.

The 3CR12 shall be treated for corrosion as follows:

- Blasting profile of SA 2½ on all surfaces.
- Edge primer of zinc phosphate of between 20 and 25 micron thick.

The colour of the enclosure shall be “AVOCADO GREEN” to SANS 1091.

The enclosure shall house the entire miniature substation with the transformer cooling fins exposed.

Reinforced doors must be mounted and recessed inward by no less than 3mm.

There shall be no external hinges or holes, hinges shall be robust and vandal proof.

Doors shall be fitted with an internal tamper proof locking arrangement system.

The tamper proof locking arrangement must be designed in order to allow remote opening and closing from a control room as well as on site by an operator. Only one door on the MV side and one door on the LV side of the enclosure shall be remotely opened all other doors shall be opened manually from the inside after the opening of the remote controlled doors.

The tamper proof locking arrangement shall be a three-point locking system operated by an encoded remote control and device. All mechanical parts are to be manufactured from stainless steel or other corrosion proof material as the Employer may approve. The locking mechanism shall incorporate a rotating centre spindle piece that when turned through 90º, will engage a tag onto a lip on the kiosk body and also two rods of at least 8mm diameter into slots on a lip at the top and bottom of the kiosk. The locking mechanism shall de designed to offer a very high degree of security without the use of padlocks. It shall not be possible to remove the remote unless the locking mechanism is in the FULLY LOCKED position. The locking mechanism shall have a spring activated latch that holds the mechanism when locked in that position until operated remotely.

Nothing must obstruct the operator from operating the switchgear when doors are opened.

The enclosure shall be weather proof and safe to operate in any weather condition.

The roof of the enclosure shall be sloping and shall be in accordance with the requirements of NRS 004.
The facilities for lifting shall be in accordance with the requirements of NRS 004.

Provision should be made on the enclosure in order to lift it with a crane truck.

Each door of enclosure shall be fitted with an electrical danger notice made from chromadek with a minimum measurement of 300mm (W) x 300mm (L). Labelling shall be done with UV and Weather resistance material.

Danger notices shall be secured to the doors by means that it cannot be removed without the assistance of tools, **no stickers**.

Danger notices shall be weather proof and UV resistant and shall be as prescribed by SANS 0142 and the “Occupational, Health and Safety Act”.

The enclosure shall have a pleasing and safe appearance.

Enclosures shall be fitted with the necessary electronics as specified under this section, (SCADA requirements).

The enclosure shall be robust enough to prevent tampering.

At least one MV and one LV door should be marked in the inside as well; the marking should be permanent and include the stand, street number of installation.

Bottom entrance prevention mild steel plates shall be inserted between the enclosure and plinth on the LV side of the enclosure. The purpose of the plates is to prevent access to circuit breakers, meters and any other installed equipment should somebody dig a hole underneath the plinth to obtain entrance to the equipment. The plates should at least be 3mm thick.

Enclosures should be properly earthed both on the MV & LV sides as per specification. If an open trench earth is not available then the contractor should install a separate earth by means of a suitable earth spike and bare copper earth wire minimum 70mm². An earth resistance test must be conducted and the reading must be recorded on the inspection / handover certificates. An acceptable reading is less than 5 Ohm.

Miniature Substation Enclosure Concrete Plinth Specification. **Not required for this contract. Refer to Part 3 item 11 & 11.1**

The plinth must be steel reinforced (grid of not less than 8mm steel).

Concrete strength must be at least 30MPA.

The plinth must have a height of at least 600mm and a thickness of minimum 150mm from the top to the bottom.
The enclosure must fit and be secured exactly onto the plinth with no parts of the enclosure hanging over the edges of the plinth.

Provision should be made on the plinth in order to lift it with a crane truck.

The plinth shall have an incoming cable entry area, and an outgoing cable entry area.

A weather and corrosion protected steel plate of minimum 3mm shall be fitted inside the 4 wall sides of the plinth to ensure when the plinth is broken / vandalized that the steel plate will be a barrier to prevent access to the inside of the enclosure.

4 x 12mm threaded bars (M12 fixing studs), 300mm long, must be cast inside and correspond with the inner flange corners on the miniature substation enclosure.

The planting depth of the plinth will be a minimum of 400mm.

Materials

Enclosure

The roof, walls and doors of the compartments shall be of 3CR12 minimum 3mm thick.

LV ASSEMBLY structural parts (framework)

The LV ASSEMBLY structural parts (framework) shall be of mild steel.

Fittings

Door hinges, door locking devices and materials for vermin proofing ventilation openings shall be of a corrosion-resistant metal.

Gaskets

Gaskets shall be installed at all interfaces, e.g. adjacent to compartments, between the enclosure and the base, and around the doors.

The minimum thickness of a gasket shall be 3 mm before compression.

The width of a gasket shall be in accordance with the corresponding interface dimension.

NOTE: The purpose of the gaskets is to seal the interface in order to reduce corrosion and the ingress of moisture. It also serves to reduce noise levels due to resonance or vibrations.

Compartments

The compartments shall be in accordance with the requirements of NRS 004.

Transformer

Compliance

The transformer shall comply with the requirements of SANS 780. Transformers shall carry valid product certification in terms of compliance with SANS 780, by an independent third party product certification body which possesses the necessary international accreditation. Such certification shall be issued in terms of the relevant certification body's mark scheme.

NOTE: A copy of the relevant mark scheme permit and accompanying schedules shall be submitted as proof of compliance.

Transformer tank

The transformer shall be hermetically sealed. The method of sealing the cover shall be welded. The transformer shall not have a drain valve, or a pressure release device, or a breather. A flat plate (e.g. glass, clear polycarbonate) oil level indicator shall be fitted in accordance with SANS 780. Perspex oil level indicators are not acceptable.

MV bushings and clearances

The transformer bushings and their associated clearances shall be in accordance with SANS 876. The bushings shall be positioned horizontally, in a straight line.

Accessibility

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

Radiators

The radiators shall be in accordance with the requirements of NRS 004.

Transformer lifting lugs

The transformer shall have lifting lugs by which it can be lifted after removal of the roof and disconnection of the cables and fastenings.

Protection against corrosion

Transformer

All surfaces of the transformer tank (excepting the contact surfaces of earth terminals) shall be coated against corrosion as specified in SANS 780.

Steel base

The steel base shall be hot-dip galvanized in accordance with the relevant requirements of SANS 121 and, the steel base shall, in addition, be coated with black epoxy tar paint.

Enclosure and LV ASSEMBLY framework

The enclosure and LV ASSEMBLY framework shall be in accordance with the requirements of NRS 004.

Colour

All external surfaces of the enclosure (including protruding parts of the transformer, but excluding the base), shall be finished in the following preferred colour:
a) Avocado (C12);

Electrical requirements

Earthing

The earthing shall be in accordance with the requirements of NRS 004.

MV Compartment

Barriers

All live unscreened MV equipment shall have flame retardant rigid barriers to prevent inadvertent contact by authorized persons. The barriers shall be metallic.

Equipment

An RMU shall be mounted in the MV compartment.

The ring main units' circuit-breaker tee-off, shall have the protection requirements in accordance to the following.

- The protection tripping of the circuit-breaker shall be through a self-powered protection relay.
- Suitably rated CTs shall be provided and fitted based on the rating of the transformer being supplied. The CT ratios shall be stated in Schedule A.

  NOTE: Current sensor technology around the circuit-breaker bushings is acceptable.

- The protection CT type and class shall be stated in schedule A.
- The protection relay shall provide:
  a) An overcurrent function with normal inverse, very inverse, extremely inverse (IDMTL); definite time (DTL); and high-set instantaneous protection elements; and
  b) An earth fault function with definite time (DTL) protection elements.

- In order to assist operating personnel in identifying the cause of a circuit-breaker trip, a clearly visible indicator shall be provided to identify when a relay-initiated circuit-breaker trip has occurred.
- The protection relay, current sensors or current transformers shall be installed and wired complete for service.
- The protection relay settings and test requirements shall be subject to agreement between the manufacturer and the Engineer.
- Once the relay has been set, it shall be sealed to indicate evidence of tampering. The relay shall have a transparent front cover in order to view the relay settings.

The insulation requirements for all MV equipment in air shall be in accordance with SANS 876.

Termination of MV cables

All air-filled enclosures and MV cable terminations shall be in accordance with SANS 876 and NRS 053, respectively.

The MV cable termination enclosure shall be suitable for the 185mm² PILC/XLPE size and type of MV cables.

The cable support clamp and gland plate (if applicable) shall be positioned above the bottom of the mini-sub base (i.e. above the top surface of the plinth).

Internal MV connections and terminations

Internal connections from the ring main unit to the transformer shall be unarmoured, screened, XLPE single-core cables in accordance with SANS 1339 or an alternative screened polymeric insulated cable (e.g. EPR) in accordance with IEC 60502-2. The metallic core screen shall consist of copper tapes or copper wires in accordance with the relevant standard.

Where the ring main unit tee-off is equipped with Type A bushings, the internal MV connection shall be a screened cable terminated with screened separable connectors at the Type A bushings.

Where the transformer or the ring main unit is equipped with outside cone plug-in type bushings with interface type C, the internal MV connection shall be as follows:

a) For mini-subs rated at up to 12 kV, the screened cables shall be terminated using screened separable connectors or unscreened separable connectors with single-core indoor terminations; and
b) For mini-subs rated at 24 kV, the screened cables shall be terminated using screened separable connectors.

The screened single-core cables shall be earthed at the RMU end only.

Lugs shall comply with SANS 61238-1 (class A) and shall be fitted using the type tested method. Where outside cone plug-in type bushings with an interface Type C are used, the lugs shall have an M16 fixing hole.

When tested in accordance with the requirement of NRS 004, there shall be no insulation breakdown in the MV interconnections and terminations.

When tested in accordance with the requirement of NRS 004, the measured partial discharge in the MV interconnections and terminations shall not exceed 10 pC.

Earth fault indicators (EFIs)

EFIs shall be provided.

The EFI control unit shall be positioned in the MV compartment and the current sensor shall be fitted to the left-side ring cable enclosure. It shall be possible to move the CT if necessary to the right side ring cable enclosure. If applicable, the remote indicating unit shall be mounted on the outside of the mini-sub enclosure in such a manner that it can be clearly viewed from the front of the mini-sub (street front).

NOTE: The type of EFI and the design details shall be submitted for approval at the bid stage.

The LV supply for the EFI shall be fitted with the following:
a) A suitably rated HRC fuse; and
b) A neutral fuse link.

Internal arc classification

The internal arc classification (IAC) of a mini-sub shall be IAC-AB in accordance with SANS 62271-202.

The classification test value (in kA) shall be of one of the values given in column 2 of Table 2 in SANS 1874:2009, with a duration of 0,5 s.

LV Compartment

Barriers

All bare live LV equipment shall have a flame retardant barrier to prevent inadvertent contact by authorized persons. Any barrier that obstructs viewing of necessary information (e.g. the off-circuit tapping switch, the rating plate), or position (e.g. the LV end compartment barrier) shall be made of transparent material (e.g. clear polycarbonate).

NOTE: The term “barrier” implies that a person would have to use a full forearm length to reach any live equipment.

For Type B mini-subs, a barrier shall separate the LV end compartment from the front LV compartment.

Internal LV connections and terminations

The connections between the transformer LV bushings, the LV busbars and the feeder circuit-breakers (if applicable) shall comprise 600/1 000 V, single-core, PVC-insulated flexible cables with stranded copper conductors that comply with SANS 1574-3. The number and size of the cables shall be selected to suit the continuous current and fault ratings of the transformer. The same configuration of cables as is used for each phase shall be used for the neutral. Appropriate derating factors shall be used where more than one cable is installed in parallel (bundled together). The cables from the LV bushing of the transformer to the LV busbars shall be flame retardant.

Where a crimping method is to be used for terminating the ends of internal LV connections, long barrel-type lugs shall be crimped with a correctly matched crimping tool that only releases after full compression has been employed. Each lug shall be crimped in at least two adjacent points on the barrel, and the type tested crimping method in SANS 61238-1 shall be used. The lugs shall comply with SANS 61238-1 (Class A). Tinned copper lugs may be used.

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

The cabling shall be colour coded. Colour coding may be done by using the colour of the

PVC cable itself or by a coloured sleeve that is fitted over the cable or lug barrel (after crimping, if applicable). The required colours are:
a) RED, YELLOW, BLUE, for live phases; and
b) BLACK for neutral.

LV ASSEMBLY

General

The LV ASSEMBLY shall comply with the requirements of SANS 1973-1 and the requirements below.

Phase and neutral busbars:

The LV ASSEMBLY shall be fitted with LV phase and neutral busbars in accordance with the requirements of NRS 004.

Busbars (one per phase and a LV neutral) shall be made of hard-drawn copper and shall comply with the requirements of SANS 1195, where relevant. They shall extend the full length of the LV ASSEMBLY and be mounted on post insulators supported on a steel angle frame. All busbars shall be tinned or silverized in accordance with SANS 4521 using the coating classification Cu/Ag (0,95).

Busbar supports, spacers and insulation systems shall be manufactured from materials the characteristics of which, for the purpose, have been established by tests to an appropriate SANS or IEC standard.

The neutral busbar shall have the same cross-sectional area as that of the phase busbars.

Busbars shall be permanently colour-coded according to the preferred colours given in this specification. Stickers shall not be used. Colour-coded busbar supports are acceptable.

Clearance to earthed metallic framework shall be at least 20 mm, and spacing between phase centres, shall be 185 mm. The spacing between the lowest (blue) phase busbar and neutral busbar centres shall be 300 mm in accidence to the requirements of NRS 004.

The busbars shall be arranged from top to bottom in the following sequence:
a) RED,
b) YELLOW,
c) BLUE, and
d) BLACK (neutral).

The LV phase and neutral busbars shall be drilled (centrally located 14 mm diameter holes) to accommodate the minimum number of specified outgoing LV feeder bays. These holes shall be horizontally spaced at intervals of 110 mm. The positions and alignment of the holes shall correspond to the LV outgoing feeder cable bays. No connections (e.g. earth jumpers or auxiliary equipment) shall be made to these feeder bay predrilled holes as they are dedicated for the LV feeder cables. The distance between adjacent feeder bay centre lines shall be 110 mm. The gland plate centre-line spacing shall therefore co-ordinate with the busbar hole spacing.

NOTE: This arrangement allows for the installation (as and when required) of paralleled fuse pillar units with a horizontal distance between axes (mounting holes) of 110 mm.

An additional separate hole of diameter 14 mm shall be provided in the LV neutral busbar or neutral-earth busbar for all jumper connections from the LV or the MV earth bars.

Holes required for auxiliary circuits may be sized to accommodate lugs and bolts appropriate for the current that flows through the connection.

Corrosion-resistant (e.g. electro galvanized, zinc-coated, stainless steel with copper compound) M12 set screws, nuts, washers and spring washers shall be provided for each of the 14 mm holes drilled on the LV phase and neutral busbars.

LV earth busbar and gland plates

A separate dedicated LV earth busbar shall be provided.

The LV earth or neutral-earth busbar shall be bonded to the MV earth busbar using a 70 mm2 copper jumper.

When provided, the LV earth busbar shall consist of a rectangular section busbar of bare hard-drawn copper of cross-sectional area in accordance with the applicable value in table 1 in SANS 1973-1:2007. The busbar shall be at least 25 mm wide and insulated from the LV busbar support structure in accordance with the requirements of the phase and neutral busbars. The busbar shall have centrally located 14 mm diameter holes to clear M12 bolts at intervals of 110 mm along the entire length.

When provided, the LV earth busbar shall be bonded to the LV neutral busbar using a copper jumper of cross-sectional area in accordance with the applicable value in table 1 in SANS 1973-1:2007 (only applicable if a separate LV earth busbar is provided).

A gland plate arrangement shall be provided in accordance to NRS 004.

When no LV gland plate arrangement is provided, a cable support rail (e.g. uni-strut) shall be provided and fitted for LV cable support.

The distance from the gland plate or cable support rail to the top of the plinth shall be at least 100 mm, and there shall be at least 200 mm between the gland plate or cable support rail and the nearest LV busbar (either the LV earth or neutral-earth busbar).

The gland plates and associated support structure or cable support rail shall be made of corrosion-resistant steel (i.e. galvanized steel, zinc-sprayed steel or 3CR12 steel) of thickness at least 3 mm. Galvanizing or zinc-spraying shall be carried out after drilling or machining (or both) of holes. To ensure good electrical contact between the cable glands and the gland plate structure, the gland plates and associated support structure shall not be coated or painted.

When an LV gland plate arrangement is provided, the cross-sectional area of the steel gland plate support structure shall have an electrical conductivity equivalent to that of a copper cross-sectional area in accordance with the values in table 1 in SANS 1973-1:2007.

When provided, each individual gland plate shall be secured to the steel support structure using 4 x M8 corrosion-resistant bolts. Two standard size holes (gland holes) shall be provided (punched) per feeder bay (gland plate) in accidence to NRS 004. The gland holes shall be ø 65 mm and ø 52 mm with clearances for the glands of ø 98 mm and ø 65 mm respectively. The distance between adjacent feeder bay centre lines shall be 110 mm.

NOTE: With the use of mechanical adjustable glands, the ø 52 mm gland hole can generally accommodate cable sizes up to 120 mm2 four-core cable (i.e. up to a No. 5 gland) and the ø 65 mm gland hole can accommodate cable sizes up to 185 mm2 four-core cable (i.e. up to a No. 6 gland). Where smaller glands are used, an appropriate gland reducer is required. Cable dimensions are based upon 600/1 000 V cables in accordance with SANS 1507-2.

Feeder Circuit

The size of the cable used between the busbars and the feeder circuit-breaker shall be selected to suit the current rating of the circuit and the fault rating of the transformer.

All connections to the busbars shall be made using corrosion-resistant steel set screws, washers, spring washers and nuts.

The LV ASSEMBLY shall make provision for the mounting of the MCCBs and shall provide metallic rigid barricading panels for the live terminals (i.e. line and load side) of the MCCBs. The MCCB mounting equipment shall be positioned in such a way as to ensure that the minimum arc venting distances or clearance specified by the MCCB manufacturer are maintained in order to ensure that ionized gases released during a fault interruption (i.e. arc extinguishing) do not unduly affect the performance of the LV ASSEMBLY.

MCCBs shall be fitted with individual inter-phase flash barriers on both the line and load side where possible. The spacing between the outer live terminals (metal) of adjacent MCCBs shall be not less than 20 mm. This is to ensure that the risk of a flashover that occurs between adjacent MCCBs (i.e. between the blue and red phases) is minimized during a short-circuit interruption event. The lug barrel and any exposed conductor of the single-core flexible jumpers shall be adequately insulated.

A strip channel shall be provided and fitted to the LV ASSEMBLY for the purpose of labelling the individual feeder circuits. The position and length of the strip channel shall correspond to the number of LV feeder circuits for which provision is made. The strip channel shall be fitted with blank sandwich-board (white-black-white) labels. The number of labels to be provided shall be equal to the number of feeder circuits. It shall be possible to slide the labels out of the strip channel for engraving purposes.

LV equipment

LV ammeters shall be provided for all three phases. The ammeters shall be phase-identified (e.g. colour-coded), thermal, maximum demand ammeters, that integrate over a 15 min period. The individual current transformers shall be of accuracy class 1 (or better), busbar mounted, and securely fitted.

One voltmeter shall be provided with a selector switch to enable any one of the phase voltages to be read. The LV supply to the voltmeter shall be fitted with the following:
a) Three suitably rated HRC fuses; and
b) A neutral fuse link.

The meters shall be the standard 96 mm × 96 mm type, mounted as high as is practicable.

Metering for outgoing circuits shall not be provided.

A main LV circuit-breaker shall be provided in the LV compartment between the transformer and the LV busbars. The circuit-breaker shall comply with the requirements of SANS 60947-2 and shall be fitted with phase (flash) barriers at the line and load side terminals. The circuit-breaker shall be positioned in such a way as to ensure that the minimum arc venting distances or clearance specified by the circuit-breaker manufacturer are maintained in order to ensure that ionized gases released during a fault interruption (i.e. arc extinguishing) do not unduly affect the performance of the LV ASSEMBLY.

If specified, a single-phase 16 A three-pin socket-outlet in accordance with SANS 60884-1 shall be provided and fitted with the following protection equipment:

a) An instantaneous trip earth leakage unit that complies with SANS 767-1 and that has
    1) A 20 A load capacity,

2) A 5 kA rupturing capacity, and
3) 30 mA sensitivity;

b) A 20 A HRC fuse; and
c) A neutral fuse link.

NOTE: The socket-outlet earth should be connected to the LV earth or neutral-earth busbar and not to the MV earth busbar or any steelwork of the mini-sub. If the socket housing is metallic, care should be taken to ensure that an electrical connection between the socket housing and the mini-sub steelwork is not made.

LV compartment lamp holder in accordance with SANS 61184 with a transparent removable cover shall be provided and fitted.

A street lighting panel shall be provided in accordance to NRS 004.

The transformer unit shall not be fitted with a top-oil thermoelectric temperature-sensing element.

Auxiliary circuits

The auxiliary circuits shall be in accordance with the requirements of NRS 004.

Transformer

The transformer shall be in accordance with the requirements of NRS 004.

Tests

The tests shall comply with the requirements of NRS 004.

Additional to the requirements of NRS 004, bidder/s shall provide proof of compliance to SANS 1029. Failure to comply may render the bid to be non-responsive.

Marking, labelling and documentation

The marking, labelling and documentation shall comply with the requirements of NRS 004.

Item	Sub clause of NRS 004	Description			Schedule A
1	4.1.1.4	Nominal MV voltage		kV	11 / 6,6
2	4.1.1.5	Rated lightning impulse withstand voltage level (MV equipment)			List 3
3	4.1.2.8	Rated supply voltage of closing and opening devices and auxiliary and control circuits		V	415
4	4.1.3.2	Rated maximum power of the mini-sub		kVA	200 400 600 750
5	4.2.1.3	Service conditions			
			a) humidity	%	75
			b) ambient air pollution		Severe
6	4.2.2.1.1	Mini-sub type			type B

Item	Sub clause of NRS 004	Description		Schedule A
7	4.2.2.1.4	Mini-sub design		Modular
8	4.2.2.2.1	Base type (if not steel)		Steel
9	4.2.2.2.3	Is a base with a removable section required?		No
10	4.2.2.4.2	Are roof lifting lugs required?		Yes
11	4.3.1	Enclosure material		3CR12
12	4.3.2	LV ASSEMBLY, material of structural parts		3CR12
13	4.4.2.3	Is a lock protection facility required?		Yes
14	4.4.2.4	Is a 10 mm allen cap screw required?		Yes
15	4.5.2	Method of sealing the cover (i.e., welded or bolted).		Welded
16	4.5.2	Flat plate (e.g., glass, clear polycarbonate) oil level indicator fitted in accordance with SANS 780.		Yes
17	4.5.3	Positioning of transformer bushings		Horizontal in a straight line
18	4.6.2	Is black epoxy tar paint required?		Yes
19	4.6.3.1	Suitable paint or coating system used to protect against corrosion		Required
20	4.6.3.2	Corrosion protection for mild steel		Required
21	4.6.3.3	Corrosion protection for 3CR12 steel		Required
22	4.6.4	Paint colour		Avocado (C12)
23	6.1.4	LV earth busbar, if required		Required
24	6.1.5	Is a separate earthing configuration required?		No
25	6.2.1	Barriers to be metallic		Yes
26	6.2.2.1	Equipment required in MV compartment		Sf6-Filled RMU
27	6.2.2.4	CT ratios		As per LSA
28	6.2.2.5	Protection CT type and class		As per LSA
29	6.2.3.2	Type of MV cables to be terminated		PILC/XLPE
30	6.2.3.2	Number of cores of MV cables to be terminated		One-core/ three-core
31	6.2.3.2	Size of MV cable to be terminated	mm^2	Variable
32	6.2.3.2	Type of MV cable to be terminated		One-4core/ three-core
33	6.2.5.1	Are earth fault indicators required?		Yes
34	6.3.2.1	Cables from the LV bushing of the transformer to the LV busbars to be flame retardant.		Yes
35	6.3.3.2.2	State finishing method.		Yes
36	6.3.3.2.5	Method of busbar colour coding		Yes
37	6.3.3.2.8	Number of outgoing LV feeder bays		As per the order
38	6.3.3.3.1	Provide a separate LV earth busbar?		Required
39	6.3.3.3.5	Gland plate arrangement as indicated in NRS 004?		Required
40	6.3.3.3.10	Gland hole diameters, if not Ø 65 mm and Ø 52 mm		Required

Item	Sub clause of NRS 004	Description	Schedule A
41	6.3.3.4.3	Are MCCBs to be used?	Yes
42	6.3.3.4.4	Number and rating of each MCCB	As per the order
43	6.3.3.4.5	Are vertical fuse pillars to be used?	No
44	6.3.3.4.6	Number of fuse pillars and the fuse rating of each fuse pillar?	N/A
45	6.3.3.5.1	Provide LV ammeters for all three phases?	Yes
46	6.3.3.5.2	Provide one voltmeter with a selector switch to enable any one of the phase voltages to be read?	Yes
47	6.3.3.5.4	Provide metering for outgoing circuits?	No
48	6.3.3.5.5	Provide main LV switch-disconnector in the LV compartment in order to isolate the LV busbars from the transformer?	No
49	6.3.3.5.6	Provide main LV circuit-breaker in the LV compartment between the transformer and the LV busbars?	Yes
50	6.3.3.5.7	Provide a single-phase 16 A three-pin socket-outlet in accordance with SANS 60884-1?	Yes
51	6.3.3.5.8	Provide an LV compartment 220V 20A LED luminaire c/w switch in accordance with SANS 61184?	Yes
52	6.3.3.5.9	Standardized street lighting panel to be provided?	As per the order
53	6.3.3.5.10	Transformer unit shall be fitted with a top-oil thermoelectric temperature-sensing element?	No
54	6.3.3.5.10	The maximum allowable temperature	N/A
55	6.3.3.6.1	Auxiliary circuit wiring details	Required
56	6.4.4	Transformer vector group	Dny11
57	7.5.2	Paint thickness to be verified to SANS 2808	Yes
58	8.1.1	Method for attaching labels	Required
59	8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	Yes
60	8.4.4	Stock number stencilled on the side or rear of the mini-sub.	No
61	8.4.7	Colour of main circuit designation labels	Required
62	8.4.7	Method for fixing and removal of main circuit designation labels	Required
63	8.5	Any other notices, nameplates or labels required?	Minisub ID's 1-5
64	8.6.1	Documentation to be supplied with the bid (Certificates)	Type Test, Routine Test and SANS 1029 compliance
65	8.6.5	Any other diagrams	Drawings
66	9.1	Method used to attach and detach the supports	Required

34. Additional Specification – As-built Drawing Requirements

HARD COPY FORMAT

a. ALL DRAWINGS TO BE PRINTED ON **PAPER**
b. STANDARD "**A" SIZE** FORMAT PAPER DRAWINGS MUST BE USED WHEN CREATING DRAWINGS.
c. PROVIDE A COMPREHENSIVE **DRAWING LIST** INCLUDE DRAWING TITLE, DRAWING NUMBER. FACILITY NAME, SERVICE/ PROJECT NAME & No, CONSULTANT FIRM NAME, TELL. No, ADDRESS AND CONTACT PERSON NAME, Project and/or REFERENCE NUMBER, THE TYPE OF DISCIPLINE e.g., ARCHITECTURAL, CIVIL etc
d. DRAWINGS ARE TO BE **TO SCALE**.
e. INFORMATION IS TO BE **CLEAR AND LEGABLE**.
f. EACH SHEET TO BE CLEARLY **MARKED "AS BUILT"**
g. EACH SHEET TO BE **SIGNED AND DATED** BY THE RESPECTIVE PROFESSIONAL WITH THE BUILT ENVIRONMENT COUNCIL **REGISTRATION NUMBER** CLEARLY INDICATED THEREON.
h. ALL RELEVANT INFORMATION ON TITLE BLOCKS TO BE FULLY AND CORRECTLEY COMPLETED e.g., DATE, WCS No, TITLE, SERVICE NAME AND FULL CONTACT DETAILS OF CONSULTANT etc.
i. INCLUDE A SITE **LOCALITY PLAN** WITH THE FOLLOWING INFO: -
    - Project Name and No.
    - Stand No.
    - Street Name and No.
    - Suburb
    - Magisterial District
    - North Point
    - Facility e.g., Pretoria Magistrate's Court (NB start with magisterial district)

ELECTRONIC COPY FORMAT

a. ALL DRAWINGS ARE TO BE SAVED ON **STANDARD SIZE COMPACT DISKS**.
b. DRAWINGS ARE TO BE **SAVED IN THE ORIGINAL C.A.D. FORMAT** THAT THE DRAWINGS WERE CREATED IN.
c. IN ADDITION, IT IS REQUIRED THAT THE DRAWINGS ARE TO BE **SAVED IN DXF/DWG AND PDF (PDF/ A)** FORMATS. SEPARATE DISKS ARE REQUIRED FOR THIS. ANY OTHER FORMAT USED IS TO BE DONE WITH PRIOR APPROVAL OF THE CLIENT.
d. THE FOLLOWING INFORMATION IS TO BE **CLEARLY PRINTED ON THE PRINTABLE SIDE OF THE COMPACT DISKS** IN STRICT ACCORDANCE WITH COMPACT DISKS MANUFACTURE'S SPECIFICATIONS (AVOID "STICK ONS", "PRITT", "TIPPEX" etc)
    - FACILITY NAME
    - SERVICE/ PROJECT NAME
    - CONSULTANT FIRM NAME, TELL. No, ADDRESS AND CONTACT PERSON NAME
    - WCS and/or REFERENCENUMBER
    - THE NUMBER OF THE DISK (e.g., DISK 01 OF02)
    - THE TYPE OF DISCIPLINE e.g., ARCHITECTURAL, CIVIL etc
    - THE NAME AND VERSION OF THE C.A.D. PROGRAMME USED TO PRODUCE THE DRAWINGS e.g., CADDIE 10, AUTOCAD, DXF, PDF/A etc.
e. THE DISK IS TO BE PRESENTED IN A **STANDARD SIZE** SUITABLE COMPACT DISK COVER.
f. THE COMPACT DISK COVER TO CONTAIN A COMPLETE **PRINTED DRAWING LIST (SAME AS PER ITEM C FOR HARD COPY FORMAT)** AS SAVED ON THE RESPECTIVE COMPACT DISK INDICATING THE CAD, DXF OR PDF/A FORMAT AS THE CASE MAY BE.
g. THE COVERS ARE TO BE **APPROPRIATLEY NUMBERED** EG. DISK ONE OF TWO.

NB: ALL DRAWINGS ARE TO BE SUBMITTED IN BOTH HARD COPY AND ELECTRONIC FORMAT.

35. Operating and Maintenance Manuals

SCOPE

The Contractor shall be responsible for the compilation of complete sets of Operating and Maintenance Manuals as specified. A separate Operating and Maintenance Manual shall be supplied for each installation where required and as defined in General Maintenance.

DETAILED OPERATIONAL AND MAINTENANCE MANUALS

This manual shall contain the detailed descriptions of all switchgear and control equipment in mini-substations, LV kiosks, motor control panels, distribution boards, UPS equipment, power factor correction equipment, light poles, luminaires, lightning protection, 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.
Five copies of the manuals as specified 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:

11. Certificate of Compliance
12. All test results
13. “As-Built” Electrical Drawings
14. Operational and maintenance data and details of all assemblies or components of electrical equipment and material installed. 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:
    a. Technical details of all equipment installed.
    b. A complete description of the operation of all equipment.
    c. 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.
15. Complete equipment schematics.
16. All manufacturers’ handbooks having reference to the equipment.
17. Installation test and alignment procedures.
18. All circuit diagrams.
19. All interconnection and inter cabling diagrams.
20. 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 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.

PROCEDURE FOR SUBMISSION OF MANUALS

SUBMISSION OF DRAFT MANUALS

A draft copy of each Operating and Maintenance Manual shall be submitted to the Engineer prior to safety inspection of the installation. Approval of the draft Operating and Maintenance Manuals

shall be a prerequisite for commencement of the safety inspection in terms of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)

Where and installation has an existing Operating and Maintenance Manual, the Contractor shall check whether its contents are still applicable and accurate. When drawing up his own Operating and Maintenance Manual for the installation, the Contractor shall incorporate there in all such existing applicable data. The existing Operating and Maintenance Manual shall then be disposed of provided written permission to do so has been obtained from the Engineer.

The manuals will be reviewed and checked by the Engineer and returned to the Contractor with comments, where necessary. The Contractor shall make the necessary changes and amendments to the manuals to incorporate the Engineer's comments.

DEVELOPMENT OF FINAL MANUALS

A final draft copy of each Operating and Maintenance Manual shall be submitted to the Engineer at least one week prior to commencement of Day 1 tests on commissioning. This set of manuals will not be accepted without the Contractor's verification of the information contained in the manuals and the professional language editing thereof. The Engineer shall return the manuals to the Contractor, who shall make the final corrections. The Engineer will, however, not be responsible for the quality control on manuals. Approval of final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Practical Completion for repair of the installation.

After the Engineer has approved the final Operating and Maintenance Manuals, the Contractor shall provide the Engineer with five (5) sets of the manuals as specified. Approval of the final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Completion.

FORMAT OF OPERATING AND MAINTENANCE MANUALS

(a) Manuals shall be bound in hardcover lever-arch files with plastic coatings as specified. The files shall be clearly labelled on the front cover, as well as on the back band, with the following information:
    (i) The title "Operating and Maintenance Manuals"
    (ii) Name of the installation (as defined in General Maintenance)
    (iii) Name of the contract and contract number
    (iv) The Contractor's name, address and contact telephone number and fax (logo optional)
    (v) Month and year in which the manuals are finally handed over to the Employer
    (vi) Name of the User Client
(b) Pamphlets and bound leaflets/booklets from suppliers or manufacturers shall be placed in plastic pockets.
(c) Drawings and diagrams larger than A3 shall be folded and placed in plastic pockets to be easily removed or stored.
(d) The sections of the manuals specified below shall be clearly partitioned.
(e) Cross-referencing between drawings/diagrams and text shall be in a clear and consequent format.
(f) The Operating and Maintenance Manuals shall be supplied in English.
(g) An electronic copy of the final manual shall be handed to the engineer upon approval of the operation and maintenance manual.

CONTENTS

TABLE OF CONTENTS

The table of contents shall appear on the second page and shall consist of the headings of the various sections in the manual and the relevant page numbers.

The table of contents shall essentially contain at least the following:

1. Introduction

1.1 Scope of the manual
1.2 General arrangement of the manual
1.3 Description of installation
1.4 Specifications
2. List of drawings and diagrams
3. Parts and components
4. Operating procedures
5. Maintenance
5.1 Purpose of maintenance
5.2 Preventative maintenance
5.3 Trouble-shooting
6. Breakdown maintenance and repair
7. List of Appendices.

INTRODUCTION

The introduction shall contain at least the following:

Scope of the manual

A summary shall explain the scope of the contents.

General arrangement of the manual

A brief description shall explain the way in which the manual is arranged.

Description of installation

This section shall give a functional description of the complete installation covered by the manual, including all systems and/or functional units deemed to form part thereof, as defined in Additional Specification SA: General Maintenance.

Specifications

A summary shall be given of the specifications applicable to the particular part of the Contract.

35. General Decommissioning, Testing and Commissioning Procedures

SCOPE
PHASED REPAIRS AND UPGRADING OF THE INSTALLATION
DETAILED COMMISSIONING PROGRAMME
COMMISSIONING COMMUNICATION CHANNELS
COMMISSIONING RISK CONTROL AND PENALTIES
DELAYS TO SCHEDULED SHUTDOWNS
MATERIAL AND EQUIPMENT PROCUREMENT AND PROTECTION
TESTING OF EQUIPMENT PRIOR TO RECOMMISSIONING
TESTING OF MATERIAL AND EQUIPMENT SPECIFICATIONS AND WORKMANSHIP
DECOMMISSIONING
RECOMMISSIONING, COMMISSIONING AND COMPLETION OF INSTALLATIONS
MEASUREMENT AND PAYMENT

SCOPE

This specification encompasses all aspects of the repairs of systems and services that form part of an installation, including the factory and on-site testing, decommissioning, installation and commissioning of all equipment, instrumentation and materials reconditioned, supplied and installed as part of an installation as defined in Additional Specification SA: General Maintenance.

The specified procedures are the minimum requirements to be supplemented by various technical and particular specifications in this document. These requirements shall apply to all commissioning work scheduled as part of the initial repair work on installations, as well as commissioning work that is part of the routine preventative and corrective maintenance.

PHASED REPAIRS AND UPGRADING OF THE INSTALLATION

When an installation consists of parallel systems or components, the complete installation and all its components shall be repaired without taking the complete installation out of commission at any time, unless otherwise specified in the Technical Specifications.

In order to schedule the repairs of an installation, all work shall be done in phases as specified in the Technical Specifications and illustrated in detail on the Drawings. Repairs of each part shall terminate with the successful reconditioning of that part.
Each part of the system shall be decommissioned and recommissioned in the sequence specified in the Technical Specifications and on the Drawings.

The Contractor shall install all the necessary temporary specials, spool pieces, supporting frames and brackets to provide a functional link between each repaired and upgraded part of the system and the part of the installation that has not yet been repaired and upgraded during recommissioning. Electrical and instrumentation Contractors and subcontractors shall ensure that the system remains operational as specified, using either existing or newly installed instruments, cables and controls.

Payment is based on the successful recommissioning of a specific part/phase of an installation.

DETAILED COMMISSIONING PROGRAMME

No work of any kind on any part of the existing installation shall take place prior to the Engineer's approval of a detailed commissioning programme. This programme shall be submitted in addition to the general programme for planning and monitoring contract progress, at least two weeks prior to any programmed shutdown. The programme shall be the coordinated product of the Engineer and the User Client. Commissioning programmes shall take all process requirements into account. The detailed commissioning programme shall indicate all actions necessary for:

(a) Decommissioning

(b) Recommissioning of parts of the installation

(c) Commissioning of the installation as a whole.

All work deemed necessary for practical completion of the installation shall be indicated on the commissioning programme.

The programme shall indicate the milestones to be achieved before shutdown and decommissioning as activities of zero duration, all of which shall be prerequisites linked to the "start" of decommissioning.

The following specific actions shall be included in the programme, clearly indicating the time allowed for:

(a) Communication, including the time for confirmation of the official shutdown;

(b) Draining parts of the installation to sumps, where available, or to other storage facilities provided by the Contractor;

(c) Installation of temporary blanked flanges or other means of isolation where necessary;

(d) Partial decommissioning and removal of existing material and equipment to perform work, including protection of pipework against hot work, cutting into pipework, loosening bolts, flanges and all other work necessary for recommissioning;

(e) Installation of temporary functional links (pipe specials) between any two parts of the installation;

(f) Each individual field weld, subject to the Engineer's approval;

(g) Non-destructive testing of materials, for manufacturing/construction quality and for producing test results;

(h) Installation of all instruments and their connection to SCADA systems;

(i) Installation and connection of all power cables;

(j) De-aeration of all pipe sections;

(k) Communication between the Contractor, the Engineer, the Employer and the User Client;

(l) Start-up of the complete system, indicating start-up procedures.

Inspection of the prefabricated installation, testing of all equipment prior to final commissioning, pressure testing and non-destructive testing shall be clearly scheduled in the project progress programme.

Day 30 tests and instruction/training sessions with the User Client shall be scheduled in the project progress programme.

COMMISSIONING COMMUNICATION CHANNELS

The Contractor shall communicate with the Employer's Electrical Engineer to finalise start-up after decommissioning in accordance with the specified procedures.

The following key parties shall be involved before and during shutdown and decommissioning of any part of the system:

Contractor:	Site Agent
Engineer:	Electrical Engineer
Employer:	Representative or Campus Manager

COMMISSIONING RISK CONTROL AND PENALTIES

(a) The safety instructions stipulated by the Occupational Health and Safety Act, 1993 (Act 85 of 1993) shall be adhered to at all times.

(b) The Contractor shall not be allowed to work on any part of the installation without obtaining an approved Access to an Installation Certificate on the day of shutdown. A typical example of a commissioning check permit is included in this document,

referring to the minimum required milestones to be achieved prior to decommissioning.

DELAYS OF SCHEDULED SHUTDOWNS

Specific dates on which an installation shall be shut down for decommissioning shall be finalised during coordination meetings of all the parties involved, including the Employer's Electrical Engineer, the Employer, the User Client and the Contractor.

Although a date for each shutdown will be scheduled at the coordination meetings, the actual date of the shutdown shall be determined by the process requirements and user demands, allowing for a window of seven (7) calendar days from the date of the planned shutdown.

Prospective bidders shall make allowances in their bid rates for the shutdown to occur at any time during this seven-day period. No additional payment shall be due if the shutdown occurs within this seven-day period.

If the Contractor fails to commence with the shutdown and decommissioning of the installation within the scheduled period, all additional costs arising from the shutdown at a later stage shall be for the Contractor's account.

MATERIAL AND EQUIPMENT PROCUREMENT AND PROTECTION

It is the responsibility of the Contractor to ensure the functionality of all units of new equipment prior to decommissioning, before installation of any specific part of the system. If the equipment, whether free-issued or not, does not conform to the functionality specifications during pre-installation testing, the Contractor shall notify the Engineer in writing without delay.

TESTING OF EQUIPMENT PRIOR TO RECOMMISSIONING

The equipment shall be tested for functionality after pre-installation of equipment in parts of the installation.

(a) The Contractor shall inform the Engineer well in advance of his intention to perform the first tests and start-up of equipment in order to allow a representative of the Engineer to witness the tests. The extent of all pre commissioning tests and checks shall be agreed with the Engineer prior to commencement.

(b) The Contractor shall first conduct his own tests of the equipment. When he is satisfied that the equipment complies with the specifications, he shall notify the Engineer that he is ready for the official tests on completion. The Contractor shall not conduct an official test without the Engineer's presence or approval. All equipment shall conform to the specified requirements.

(c) Before starting up any part of the installation or filling the tanks and sumps with liquid, the Contractor shall clean out the tanks, pipes, fittings, equipment or structures and, if necessary, make arrangements with other Contractors to remove their building rubble form the structures, check that all safety devices and alarms have been set and activated, all nuts have been tightened correctly, that all the equipment is complete and ready for start-up, that the plant has been installed correctly, and that copies of the operating manuals have been handed to the Engineer.

(d) The Contractor shall start up each section of equipment after ensuring that oil fillings, lubrication, vibration monitoring, cable termination and so on have been correctly completed. He is also responsible for the first refilling of all lubricating oils and for adjusting the plant to operate according to the specifications. Before any equipment is started or energised, the Contractor shall ensure that it is safe in terms of the personnel and equipment on the site to do so. The Contractor's tendered rates and sums shall allow for these costs.

All equipment shall be tested according to the relevant specifications that form part of this document.

No shutdown or decommissioning of any part of the system shall take place unless all the equipment to be installed have been tested by the Contractor and approved by the Engineer.

TESTING OF MATERIAL AND EQUIPMENT SPECIFICATIONS AND WORKMANSHIP

All results of the required non-destructive, pre commissioning and manufacturing testing shall be submitted to the Engineer well in advance of testing the equipment on recommissioning. All such test results shall be submitted before Day 1 commissioning tests and no certificate of practical completion shall be issued prior to receipt of the required test results.

DECOMMISSIONING

The decommissioning period shall commence on the instant of the entire system shutdown. The recommissioning period shall start in parallel with decommissioning.

Shutdown and decommissioning shall not proceed without compliance with all the milestones in the detailed commissioning programme. The list of milestones in this document is not complete but indicates the minimum requirements. Milestones to be achieved prior to shut down and decommissioning may be added to the programme at the Engineer's discretion.

The Contractor is responsible for the safe decommissioning of all material, equipment, components and instrumentation to avoid damage to parts or components of the installation.

RECOMMISSIONING, COMMISSIONING AND COMPLETION OF INSTALLATIONS

RECOMMISSIONING

Recommissioning means the commissioning of all sections or systems that form part of the installation to meet the required functional specifications for the individual section or system prior to commissioning of the repaired and upgraded installation.

The Contractor is responsible for the recommissioning of all parts of the system and he shall perform the tasks listed below.

(a) Prior notice shall be given to and proper arrangements shall be made for recommissioning with the Employer, the Engineer, the User Client and the suppliers of equipment that is affected by recommissioning and testing.

(b) If plant and equipment supplied by others are to be commissioned, the supplier's specific permission together with all requirements related to commissioning shall be obtained prior to recommissioning without in any way altering the General Conditions of Contract and the Contract Data with reference to the Contractor's liability in terms of defects.

(c) The new and reconditioned parts of the installation shall be thoroughly inspected by a responsible representative of the Contractor to ensure that manufacture/construction and installation work have been completed according to the specifications.

COMMISSIONING AND COMPLETION OF REPAIRS AND UPGRADING WORK

Commissioning means commissioning of the repaired and upgraded installation as a whole to perform in perfect working order.

(a) The commissioning period for each installation as a whole:

(i) Commences with the Day 1 tests of the complete repaired and upgraded installation;
(ii) Includes commissioning of all sections and systems that have been recommissioned prior to the Day 1 tests;
(iii) Includes training of the User Client's operating personnel and the maintenance teams;
(iv) Terminates with a Day 30 test in compliance with the commissioning report.

(b) The purpose of the Day 1 tests is to ensure that:

(i) The electronic, electrical and mechanical equipment and materials are functional and in perfect working order with respect to each other and the installation as a whole;
(ii) The commissioning period, including training, commences on successful completion of the Day 1 tests;
(iii) The Contractor is entitled to a certificate of practical completion for the repairs and upgrading of the installation on successful completion of the Day 1 tests;
(iv) The Contractor becomes responsible for maintenance of the installation and is entitled to performance-based payments in compliance with Additional Specification SA: General Maintenance.

(c) Commissioning shall be undertaken over a trouble-free period up to Day 30. During this period the Contractor shall train the User Client's operators and his maintenance team for operating and maintaining the installation. This training shall allow for all possible operational conditions, including emergency conditions, the correct servicing of every part, the type of oil or grease to be used, and similar tasks. The training shall take place by means of demonstrations, and the operating and maintenance manuals shall be referred to for this purpose.

(d) Day 30 commissioning tests shall be performed thirty calendar days after the successful completion of the Day 1 tests. The commissioning period of the installation terminates upon the successful completion of the Day 30 tests.

(e) The Contractor shall conduct all the tests required to satisfy the Engineer that the installation is performing according to specification, and shall make allowance for these tests in his bid rates and prices. These tests shall be conducted to certify that the installation, as repaired, upgraded and installed, is in perfect working order in terms of the specified functional requirements. The Contractor shall note that all equipment is to be tested as part of an installation, where appropriate, and will not be passed if all protection devices, interlocking with other equipment, etc, are not fully functional.

(f) The Engineer shall provide commissioning sheets to the Contractor at least three weeks before the commissioning period commences, for all the equipment supplied, reconditioned and installed by the Contractor. The Contractor shall complete the commissioning sheets during the commissioning period and all items listed shall be entered. No completion certificate will be issued for an installation of which the equipment has incomplete commissioning reports. Information that is not available or applicable, or instances where certain tests have not been carried out, are subject to the Engineer's decision.

(g) Commissioning of the plant (which includes the thirty days between the Day 1 and Day 30 tests) includes operating under conditions that adequately prove that all the specifications have been met. All safety devices, automatic controls and protection devices shall be adequately tested for reliability and correct functioning. The Contractor may be called upon to repeat testing during the maintenance period if the performance of the equipment is suspected to be substandard. Costs related to such tests shall be for the Contractor's account and shall comply with the specified

requirements. Copies of updated commissioning reports shall be provided to the Engineer within two days after a test has been performed.

(h) The Contractor is responsible for providing all labour and materials (including testing equipment) during the commissioning period and shall carry out all the servicing and adjustments to ensure that the installation operates as specified. Valid calibration certificates shall be available for all testing equipment on the site during the commissioning period.

(i) Programmes for the Day 1 tests, Day 30 tests and instruction/training sessions with the User Client's operators and maintenance team shall be prepared by the Contractor and submitted to the Engineer at least two weeks before the commissioning period commences. The Contractor shall provide weekly updates of these schedules for the duration of the commissioning period.

(j) The Contractor shall note that if any equipment fails during the commissioning period, the equipment shall be repaired or replaced by the Contractor, and testing and commissioning shall commence from scratch.

(k) Successful commissioning of an installation entitles the Contractor to a certificate of completion for the installation.

PART 6: CONDITIONS FOR COMPLETING BID DOCUMENTS.

If any of the following bid forms are not completed and signed or not handed in with your proposal on closing date and time, your proposal will be immediately disqualified.

6.1. SBD 1 – Part 12: Invitation to bid (make sure it is signed)
6.2. SBD 3 – Part 14: Pricing Schedule - if not filled please refer to Annexure or Addendum where price is mentioned.
6.3. SBD 4 – Part 15: Declaration of interest, ensure that it signed
6.4. SBD 6.1 – Part 16: (Preferential Claim Form) must be signed regardless of if points claimed or not ensure that it is signed.

PART 7: SPECIAL TERMS & CONDITIONS

7.1. It is expected that the appointed bidders must be able to deliver the goods within 30 DAYS from the day of the tender awarded and complete the project within 90 DAYS.
7.2. The service provider must clearly demonstrate the capacity to procure and deliver the items for which they are bidding.
7.3. ORBIT TVET College reserve the right to ask for documentation to prove financial capacity of the bidder.
7.4. Deregistering and blacklisted companies including directors/owners/individuals linked to the company, will not be considered
7.5. Counteroffer by service providers shall not be considered and shall therefore nullify the offer to the company.
7.6. ORBIT TVET College reserve the right to amend the specification before the closing date of the bid or to award the whole or part of the bid to one or more service provider or to cancel the bid in the whole, as well as to adjust the quantities before the financial award is made.
7.7. No Email will be accepted for submission.
7.8. Any means of attempting to influence adjudication process or outcome of adjudication process will result in immediate disqualification of the entire bid
7.9. Enquires should be made in writing.
7.10. All bid submissions must be done in hard copy.
7.11. Delivery of the goods and performance of services shall be made by the supplier in accordance with the time schedule prescribed by the purchaser in the contract.

Note: Blacklisted companies appearing on the national treasury database are prohibited from conducting business with public entities and will be disqualified.

PART 8: STATUTORY NON-TECHNICAL MANDATORY REQUIREMENTS

8.1. Certified CIPC Registration Documentation.

8.2. CSD Report

8.3. Valid TAX COMPLIANCE STATUS Certificate with **PIN.**

8.4. Valid Letter of Good standing with Compensation for Occupational and Injuries Diseases Act (COIDA) Registration Certificate (Sole Proprietor's without employees are expected to submit from the DOL a Tender Letter for a Sole Proprietor).

8.5. **CIDB Grading 5EB PE or 6EB; 5EP PE or 6EP**

8.6. Valid Certified B-BBEE / Sworn Affidavit Certificate (**to qualify for preference points**) on condition that you confirm by completing **SDB 6.1 (Part 16)**.

8.7. Valid proof of business address (**Lease Agreement or Municipal Account).**

8.8. Financial Credibility / bank rating

8.9. Priced Financial Proposal (Bill of Quantities) – Part 22 - fully completed and signed

8.10. Confirmation of Receipt of Addenda to Bid Document. (if applicable)

8.11. Valid Certified copies of the directors' identity document.

8.12. Joint Venture Agreement or Consortium Agreement (if applicable) – Part 21

8.13. Company profile

8.14. Reference letters and/or completion certificates indicating experience in similar projects

8.15. Curriculum Vitae indicating Qualifications and experience

8.16. Plant and Equipment asset register

PART 9:EVALUATION ON FUNCTIONALITY

NB: SHOULD YOU FAIL TO SCORE A MINIMUM OF 60 POINTS AND SUBMIT THE BELOW MENTIONED DOCUMENTS ON THE CLOSING DATE YOUR TENDER WILL BE DISQUALIFIED.

Table 2. Functionality Criteria
Note: No bid will be considered unless 60 points has been achieved for functionality

Item	Functionality		Points
1	**Company Experience and Track Record:** Provide project experience demonstrating capability and technical know-how in carrying out works of **similar nature and size.** The bidder must submit Proof or previous experience and performance on comparable or similar projects. Bidder to submit completion certificate or appointment letter from the client with contactable references. A sliding scale of 5 points **per project** of a similar nature will be used to award points.		30
2	**Health and Safety:**		10
	Qualifications and CV of SHE Officer	5 Points	
	Health and Safety Plan	5 points	
	Indicate number of years of experience 1 Point will be awarded per year post registration with statutory body.		
3	**Key staff experience and capabilities in the Construction Industry (not less than 5 years' experience):**		35
	Project Manager / Foreman – qualifications and experience in years. Minimum 5 years' experience post registration	25 points	
	Artisans – qualifications and experience in years Minimum of 5 years' experience	5 points	
	Electrician – provide qualifications and experience in years **(must be registered with ECB or Department of Labour)** Minimum of 5 years' experience post registration	5 points	

4	**Financial Credibility** Provide bank rating/code from a banking institution to justify bank risk: 1. Bank rating of E 1 Point 2. Bank rating of D 2 Points 3. Bank rating of C 3 Points 4. Bank rating of B 4 Points 5. Bank rating of A 5 Points	5 points	5
5	**Locality**		15
	Bojanala District Municipality	15 points	
	Within Northwest Province	10 points	
	Other provinces	5 points	
6	**Plant and Equipment:** Contractor to provide an asset register for plant and equipment to indicate the ratio between owned and leased plant for the project.		5
Total Points			**100**

EVALUATION CRITERIA AND METHODOLOGY

1. ADMINISTRATIVE COMPLIANCE REQUIREMENTS

Mandatory Returnable documents

(NOTE: Failure to provide the below listed documents *WILL* lead to disqualification)

1. Proof of Attendance of Compulsory Briefing session.	**Comply**	**Do Not Comply**
Substantiation: The bidder is to indicate whether they have attended the Compulsory Briefing session.		

1.1 Essential Returnable documents

(NOTE: Failure to provide the below listed documents *MAY* lead to disqualification)

2. Fully completed and signed Bidder's Disclosure SBD 4	**Comply**	**Do Not Comply**
Substantiation: The bidder must submit and attach to the bid response the signed Bidder's Disclosure`		

3. The Service Providers to have to agree with General Conditions of Contract	**Comply**	**Do Not Comply**
Substantiation: The bidder must submit and attach to the bid response the signed and accepted General Conditions of Contract from National Treasury		

4. Preferential Procurement Claim form and copy of the B-BBEE Verification Certificate(s) issued by an authorised body or person or a sworn affidavit prescribed by the B-BBEE Codes of Good Practice.	**Comply**	**Do Not Comply**
Substantiation: The bidder must submit and attach to the bid response a copy of a valid BBBEE certificate or Sworn Affidavit		

5. Submission of original valid Tax Clearance Certificate, a Tax Compliance Status letter (with pin) issued by the South African Revenue Services	**Comply**	**Do Not Comply**
Substantiation: The bidder must submit and attach to the bid response a copy of a valid certificate or Tax Pin Certificate		

1.2 TECHNICAL SUITABILITY: MANDATORY REQUIREMENTS

Failure to provide the below required information will lead to disqualification

1. Technical Suitability: Mandatory Requirements

Bidders must provide details and registration confirmation with CIDB in terms of the CIDB Act 38 of 2000. Provide proof of grading level **5EB PE or 6EB; 5EP PE or 6EP (as appears on the bid document.**	**Comply**	**Do Not Comply**
Substantiation: The bidder must provide a proof of CIDB grading level. Failure to provide information will lead to disqualification.		

2. Technical Suitability: Mandatory Requirements

Bidders must provide at least **three (3) references for a similar project (project value should be at least R2000 000.00 or above)** not older than 6 years. Bidder must provide proof: a). Three (3) copies of completion certificate OR three (3) reference letters for a similar project **(in details of the company letterhead, physical address, contactable person name, company contact number and email address).**	**Comply**	**Do Not Comply**
Substantiation: The bidder must provide a proof of at least three (3) copies of completion certificates indicating the amongst others the value of the project or at least three (3) reference letters for similar project completed (in details of the company letterhead, physical address, contactable person name, company contact number and email address). Failure to provide information will lead to disqualification.		

3. Technical Suitability: Mandatory Requirements

The bidder must provide a wireman's licence certificate of the Electrician in your organisation or subcontractor to issue an electrical COC (certificate of compliance	**Comply**	**Do Not Comply**
Substantiation: The bidder must provide **a proof of wiremen's licence certificate**. Failure to provide information will lead to disqualification.		

4. Technical Suitability: Mandatory Requirements

The Project Manager/ Coordinator must be registered with the relevant professional body	**Comply**	**Do Not Comply**
Substantiation: The bidder must provide **a proof of valid certified certificate from the professional body**. Failure to provide information will lead to disqualification.		

UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS

FORMS TO BE COMPLETED BY THE TENDERER

CONTENTS

1. LIST OF SUBCONTRACTORS

The Tenderer shall list below the intended subcontractors to be employed by the Tenderer for the various installations listed in this document.

ITEM	SUBCONTRACTOR'S COMPANY DETAILS	SUBCONTRACTOR'S RESPONSIBILITY	TEL NO FAX NO E-MAIL ADDRESS

SIGNED ON BEHALF OF TENDERER : .....

2 SCHEDULE OF WORK CARRIED OUT BY TENDERER

The Tenderer shall list below the last ten contracts of a similar nature awarded to him. This information is material to the award of the Contract.

EMPLOYER (NAME, TEL NO AND FAX NO)	CONSULTING ENGINEER (NAME, TEL NO AND FAX NO)	NATURE OF WORK	VALUE OF WORK	YEAR COM-PLETED

SIGNED ON BEHALF OF TENDERER : .....

TVET COLLEGE

UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS

3 AUTHORITY FOR SIGNATORY

Signatories for close corporations and companies shall confirm their authority by attaching to this form a duly signed and dated copy of the relevant resolution of their members or their board of directors, as the case may be.

An example for a company is shown below:

"By resolution of the board of directors passed on ..... 20 .....

Mr .....

has been duly authorised to sign all documents in connection with the Tender for Contract No ..... and any Contract which may arise therefrom on behalf of

(BLOCK CAPITALS) .....

.....

.....

SIGNED ON BEHALF OF THE COMPANY :.....

IN HIS CAPACITY AS :.....

DATE :.....

SIGNATURE OF SIGNATORY :.....

AS WITNESSES : 1.....

2..... "

4 ADDITIONAL PARTICULARS OF TENDERER

1. PARTICULARS OF SURETIES

Since I/we propose to furnish two sureties as security, the following particulars are provided:

1.1 Name of surety……..

Address of surety……..

……Code:……

Banker of surety……

Branch……Tel:……..

1.2 Name of surety……..

Address of surety……..

……Code:……

Banker of surety……

Branch……Tel:……..

2. BRIDGING FINANCE

I/we supply the following details on the availability of bridging finance on Tender No……

Name of Bank/Financial Institution…… ….Branch:……...Tel:……

Bridging finance available from Bank/Financial Institution: R……..

3. PARTICULARS OF COMPANIES

If the tenderer is a company, a certified copy of the resolution of the board of directors (personally signed by the chairman of the board) authorising the person who signs this tender to do so, as well as to sign any contract resulting from this tender and any other documents and correspondence in connection with this tender and/or contract on behalf of the company, must be submitted with this tender.

4. PARTICULARS OF THE CLOSED CORPORATION

If the tenderer is a Close Corporation, certified copies of the founding statement and/or the association agreement must be submitted with the tender.

We, the undersigned members in the Closed Corporation who are dealing as:……

……..

……..

Name of members……

Hereby authorise……

to sign this tender as well as any contract resulting from the tender and any other documents and correspondence in connection with this tender and/or contract on our behalf.
If there are more than four members, please attach the details on a separate page.

Full name of member	Residential address	Signature

SIGNATURE…….. DATE……

5. PARTICULARS OF THE PARTNERSHIP

We, the undersigned partners in the business trading as:

……

hereby authorise……
to sign this tender as well as any contract resulting from the tender and any other documents and correspondence in connection with this tender and/or contract on our behalf.
If there are more than four members, please attach the details on a separate page.

Full name of member	Residential address	Signature

SIGNATURE…… DATE……

6. PARTICULARS OF THE JOINT VENTURE

We, the undersigned partners to the Joint Venture, having tendered as ……Joint Venture.

……..

hereby authorise……
to sign this tender as well as any contract resulting from the tender and any other documents and correspondence in connection with this tender and/or contract on our behalf.
If there are more than four members, please attach the details on a separate page.

Full name of JV member	Residential address	Signature

SIGNATURE…….. DATE…….

NOTE:

Please include the following statements / proof of registration in respect of each individual member to the Joint Venture where such entities are closed corporations or registered companies. Resolutions authorising the nominated representative of the Joint Venture to sign tender / contract documentation must also be submitted.

7. PARTICULARS OF THE ONE-MAN BUSINESS

I, the undersigned……..

hereby confirm that I am the sole owner of the business trading as:……

SIGNATURE…….. DATE……..

8. WORK CAPACITY

8.1The tenderer is requested to furnish the following particulars. Failure to do so may result in the tender being disregarded.

A.. Skilled artisans employed

Categories of artisans	Number

B

Unskilled employees employed	
Categories of employees	Number

8.2 Give full particulars of:

Machinery	Plant	Workshops

8.3 Particulars of commitments which the tenderer is at present engaged with: Date of completion / Expected date of completion (Complete applicable blocks A & B).

A. STATE INSTITUTIONS

	Project	Place	Client	Contact Tel. No.	Contract amount	Contract period	Date of commencement	Expected date of completion	Date of completion
1									
2									
3									
4									
5									
6									
7									
8									

B. PRIVATE SECTOR

	Project	Place	Client	Contact Tel No.	Contract amount	Contract period	Date of commencement	Expected date of completion	Date of completion
1									
2									
3									
4									
5									
6									
7									
8									

SIGNATURE…… DATE……..

THE ORBIT TVET COLLEGE - MANKWE CAMPUS

5. PARTICULARS OF ELECTRICAL CONTRACTOR

TENDER NO: _____ REFERENCE: _____

SERVICE: _____

NAME OF ELECTRICAL CONTRACTOR: _____

ADDRESS: _____

_____

ELECTRICAL CONTRACTOR'S REGISTRATION NUMBER AT THE ELECTRICAL CONTRACTING BOARD OF SA _____

_____ _____

DATE SIGNATURE OF TENDERER

6. RECORD OF ADDENDA TO TENDER DOCUMENTS

Project title:			
Tender no:		**Reference no:**	

1. I / We confirm that the following communications received before the submission of this tender offer, amending the tender documents, have been taken into account in this tender offer: *(Attach additional pages if more space is required)*

	Date	**Title or Details**
1.		
2.		
3.		
4.		
5.		
6.		

Name of Tenderer	Signature	Date

2. I / We confirm that no communications were received before the submission of this tender offer, amending the tender documents.

Name of Tenderer	Signature	Date

PART 10: PROPER CERTIFICATION OF DOCUMENTS MEANS

10.1. A copy of the original document must be certified with an original certification stamp.

10.2. No certified copies of copies will be accepted

10.3. Certification must be dated, and the date must not be older than three months.

PART 11: PRICE AND PREFERENTIAL PROCUREMENT

11.1. The tender will be evaluated on an 80/20 basis, where 80 points will be assigned for the lowest price and the 20 points based on the Preferential Procurement Status Level Certificates.

11.2. ORBIT TVET College applies the provision of the Preferential Procurement Policy Framework Act, no 5 of 2000 and Preferential Procurement Regulations, 2017.

11.3. The evaluation of 80/20 for Price and BBBEE shall be as follows:

EVALUATION CRITERIA		**POINTS**
1.	Price	80
2.	Black Economic Empowerment	10
3.	Specific Goals	10
4.	Total	100

PART 12: INVITATION TO BID FORM

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE (*NAME OF DEPARTMENT/ PUBLIC ENTITY*)					
BID NUMBER:	**M01/2023**	CLOSING DATE: **15-08-2023**		CLOSING TIME:	**11H00am**
DESCRIPTION	**UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS**				
BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT *(STREET ADDRESS)*					
ORBIT TVET COLLEGE – MANKWE CAMPUS					
Mankwe, Mabele-a-Podi,					
0354					

BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO		**TECHNICAL ENQUIRIES MAY BE DIRECTED TO:**	
CONTACT PERSON	**Mr C Chaauke**	CONTACT PERSON	**Mr A Mackenzie**
TELEPHONE NUMBER	**014 597 5524**	TELEPHONE NUMBER	**012 345 3383**
FACSIMILE NUMBER	**N/A**	FACSIMILE NUMBER	**N/A**
E-MAIL ADDRESS	**cchaauke@orbitcollege.co.za**	E-MAIL ADDRESS	**aubrey@emzansi.com**

SUPPLIER INFORMATION				
NAME OF BIDDER				
POSTAL ADDRESS				
STREET ADDRESS				
TELEPHONE NUMBER	CODE		NUMBER	
CELLPHONE NUMBER				
FACSIMILE NUMBER	CODE		NUMBER	
E-MAIL ADDRESS				
VAT REGISTRATION NUMBER				

SUPPLIER COMPLIANCE STATUS	TAX COMPLIANCE SYSTEM PIN:		**OR**	CENTRAL SUPPLIER DATABASE No:	MAAA

B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE	TICK APPLICABLE BOX]	B-BBEE STATUS LEVEL SWORN AFFIDAVIT	[TICK APPLICABLE BOX]
	☐ Yes ☐ No		☐ 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 THE QUESTIONNAIRE BELOW]

QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?	☐ YES ☐ NO
DOES THE ENTITY HAVE A BRANCH IN THE RSA?	☐ YES ☐ NO
DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?	☐ YES ☐ NO
DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?	☐ YES ☐ NO
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 BELOW.

PART 13: 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 IN THE MANNER PRESCRIBED IN THE BID DOCUMENT.**
1.3.	THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.
1.4.	**THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (SBD7).**
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 VERIFY THE TAXPAYER'S PROFILE AND TAX STATUS.
2.3	APPLICATION FOR TAX COMPLIANCE STATUS (TCS) PIN MAY BE MADE VIA E-FILING THROUGH THE SARS WEBSITE WWW.SARS.GOV.ZA.
2.4	BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
2.5	IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
2.6	WHERE NO TCS PIN IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.
2.7	NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE."

NB: FAILURE TO PROVIDE / OR COMPLY WITH ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

Bidder's Name: ……...

Capacity under which this bid is signed: ……..……

(Proof of authority must be submitted e.g., company resolution)

Bidder's Signature: ……..…….

Date: ……..……..…….

PART 14: SBD 3.1: PRICING SCHEDULE – FIRM PRICES

14.1. NOTE: ONLY FIRM PRICES WILL BE ACCEPTED. NON-FIRM PRICES (INCLUDING PRICES SUBJECT TO RATES OF EXCHANGE VARIATIONS) WILL NOT BE CONSIDERED

14.2. IN CASES WHERE DIFFERENT DELIVERY POINTS INFLUENCE THE PRICING, A SEPARATE PRICING SCHEDULE MUST BE SUBMITTED FOR EACH DELIVERY POINT

Name of Bidder: …… Bid Number: ……..

Closing Time: …… Closing Date: ……..……...

OFFER TO BE VALID FOR ……. DAYS FROM THE CLOSING DATE OF BID.

ITEM NO.	**DESCRIPTION**	**TOTAL BID PRICE IN RSA CURRENCY INCLUSIVE OF VALUE ADDED TAX**
1	UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS	
1.1	**TOTAL Excluding VAT**	R
1.2	**VAT (@ 15%)**	R
1.3	**TOTAL Including VAT ***	R

NB * Price quoted must include delivery costs and etc.

Bidder's Name: ……...

Position: …… Bidder's Signature: ……

Date: ……...……

PART 15: SBD 4: BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest1 in the enterprise, employed by the state? **YES/NO**

2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	Identity Number	Name of State institution

2.2 Do you, or any person connected with the bidder, have a relationship

1 the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

with any person who is employed by the procuring institution? **YES/NO**

2.2.1 If so, furnish particulars:
……
……

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract? **YES/NO**

2.3.1 If so, furnish particulars:
……
……

3 DECLARATION

I, the undersigned, (name)…… in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

3.1 I have read and I understand the contents of this disclosure;
3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;
3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium2 will not be construed as collusive bidding.
3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.
3.4 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring

2 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.

institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.

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

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.
I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

…… ……
Signature Date

…… ……
Position Name of bidder

PART 16: SBD 6.1: PREFERENCE POINTS CLAIM FORM

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2017

This preference form must form part of all bids invited. It contains general information and serves as a claim form for preference points for Broad-Based Black Economic Empowerment (B-BBEE) Status Level of Contribution

NB: BEFORE COMPLETING THIS FORM, BIDDERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF B-BBEE, AS PRESCRIBED IN THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017.

---

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to all bids:

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

1.2 Either the 80/20 or 90/10 preference point system will be applicable to this tender (*delete whichever is not applicable for this tender*).

1.3 Pricing Points – will be allocated 80 points
Certificate – 10 points

Specific Goals – 10 points

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 points system is applicable, corresponding points must also be indicated as such.

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

The specific goals allocated points in terms of this tender	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (80/20 system) (To be completed by the tenderer)
a) Historically Disadvantaged Individuals (Means a South African citizen who, due to the apartheid policy that had been in place, had no franchise in national elections prior to the introduction of the Constitution of the Republic of South Africa, 1983 (Act No. 110 of 1983) or the Constitution of the Republic of South Africa, 1993 (Act No. 200 of 1993) ("The Interim Constitution	10	
Women	**2**	
Disabled	**1**	
Youth	**2**	
b) Location: • Anywhere in North West Province • The bidder to provide proof of residence in a form of electricity bill from any Local Municipality within North West Province	**5**	

1.4 on the part of a bidder to submit proof of B-BBEE Status level of contributor together with the bid, will be interpreted to mean that preference points for B-BBEE status level of contribution are not claimed.

1.5 The purchaser reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the purchaser.

2. DEFINITIONS

(a) **"B-BBEE"** means broad-based black economic empowerment as defined in

section 1 of the Broad-Based Black Economic Empowerment Act;

(b) "**B-BBEE status level of contributor"** means the B-BBEE status of an entity in terms of a code of good practice on black economic empowerment, issued in terms of section 9(1) of the Broad-Based Black Economic Empowerment Act;

(c) **"bid"** means a written offer in a prescribed or stipulated form in response to an invitation by an organ of state for the provision of goods or services, through price quotations, advertised competitive bidding processes or proposals;

(d) **"Broad-Based Black Economic Empowerment Act"** means the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);

(e) **"EME"** means an Exempted Micro Enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9 (1) of the Broad-Based Black Economic Empowerment Act;

(f) **"functionality"** means the ability of a tenderer to provide goods or services in accordance with specifications as set out in the tender documents.

(g) **"prices"** includes all applicable taxes less all unconditional discounts;

(h) **"proof of B-BBEE status level of contributor"** means:

1) B-BBEE Status level certificate issued by an authorized body or person;

2) A sworn affidavit as prescribed by the B-BBEE Codes of Good Practice;

3) Any other requirement prescribed in terms of the B-BBEE Act;

(i) **"QSE"** means a qualifying small business enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9 (1) of the Broad-Based Black Economic Empowerment Act;

16.1.

(j) **"rand value"** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;

3. BID DECLARATION

3.1 Bidders who claim points in respect of B-BBEE Status Level of Contribution must complete the following:

4. B-BBEE STATUS LEVEL OF CONTRIBUTOR CLAIMED IN TERMS OF PARAGRAPHS 1.4 AND 4.1

4.1 B-BBEE Status Level of Contributor: . = ……(maximum of 10 or 20 points)

(Points claimed in respect of paragraph 7.1 must be in accordance with the table reflected in paragraph 4.1 and must be substantiated by relevant proof of B-BBEE status level of contributor.

5. SUB-CONTRACTING

5.1 Will any portion of the contract be sub-contracted?

(***Tick applicable box***)

YES		NO	

5.1.1 If yes, indicate:

i) What percentage of the contract will be Subcontracted ……%
ii) The name of the sub-contractor ……..……..
iii) The B-BBEE status level of the sub-contractor .....……..
iv) Whether the sub-contractor is an EME or QSE ***(Tick applicable box***)

YES		NO	

v) **Specify, by ticking the appropriate box, if subcontracting with an enterprise in terms of Preferential Procurement Regulations,2017:**

Designated Group: An EME or QSE which is at last 51% owned by:	**EME** √	**QSE** √
Black people		
Black people who are youth		
Black people who are women		
Black people with disabilities		
Black people living in rural or underdeveloped areas or townships		
Cooperative owned by black people		
Black people who are military veterans		
OR		
Any EME		
Any QSE		

6. DECLARATION WITH REGARD TO COMPANY/FIRM

6.1 Name of Company/firm: ……

6.2 VAT registration number: ……

6.3 Company registration number: ……

6.4 TYPE OF COMPANY/ FIRM

Partnership/Joint Venture / Consortium

One-person business/sole propriety

Close corporation

Company

(Pty) Limited

[TICK APPLICABLE BOX]

6.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

……
……
……
……
……..

6.6 COMPANY CLASSIFICATION

Manufacturer

Supplier

Professional service provider

Other service providers, e.g. transporter, etc.

[*TICK APPLICABLE BOX*]

6.7 Total number of years the company/firm has been in business: ……

6.8 I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the B-BBE status level of contributor indicated in paragraphs 1.4 and 6.1 of the foregoing certificate, qualifies the company/ firm for the preference(s) shown and I / we 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 6.1, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct;

iv) If the B-BBEE status level of contributor has been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have –

(a) disqualify the person from the bidding 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 bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and

(e) forward the matter for criminal prosecution.

WITNESSES 1 (Full Name / Signature)	WITNESSES 2 (Full Name / Signature)
……	……
SIGNATURE(S) OF BIDDERS(S)	SIGNATURE(S) OF BIDDERS(S)
……	……
……	……
Date: ……	

ADDRESS: ……..

……

PART 17: GENERAL CONDITIONS OF CONTRACT.

1. Definitions

The following terms shall be interpreted as indicated:
1.1 “Closing time” means the date and hour specified in the bidding documents for the receipt of bids.

1.2 “Contract” means the written agreement entered into between the purchaser and the supplier, as recorded in the contract form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

1.3 “Contract price” means the price payable to the supplier under the contract for the full and proper performance of his contractual obligations.

1.4 “Corrupt practice” means the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.
1.5 "Countervailing duties" are imposed in cases where an enterprise abroad is subsidized by its government and encouraged to market its products internationally.

1.6 “Country of origin” means the place where the goods were mined, grown or produced or from which the services are supplied. Goods are produced when, through manufacturing, processing or substantial and major assembly of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility from its components.

1.7 “Day” means calendar day.

1.8 “Delivery” means delivery in compliance of the conditions of the contract or order.

1.9 “Delivery ex stock” means immediate delivery directly from stock actually on hand.

1.10 “Delivery into consignees store or to his site” means delivered and unloaded in the specified store or depot or on the specified site in compliance with the conditions of the contract or order, the supplier bearing all risks and charges involved until the supplies are so Delivered and a valid receipt is obtained.

1.11 "Dumping" occurs when a private enterprise abroad market its goods on own initiative in the RSA at lower prices than that of the country of origin and which have the potential to harm the local industries in the RSA.

1.12" Force majeure" means an event beyond the control of the supplier and not involving the supplier's fault or negligence and not foreseeable. Such events may include, but is not restricted to, acts of the purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.

1.13 "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any bidder, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the bidder of the Benefits of free and open competition.

1.14 "GCC" means the General Conditions of Contract.

1.15 "Goods" means all of the equipment, machinery, and/or other materials that the supplier is required to supply to the purchaser under the contract.

1.16 "Imported content" means that portion of the bidding price represented by the cost of components, parts or materials which have been or are still to be imported (whether by the supplier or his subcontractors) and which costs are inclusive of the costs abroad, plus freight and other direct importation costs such as landing costs, dock dues, import duty, sales duty or other similar tax or duty at the South African place of entry as well as transportation and handling charges to the factory in the Republic where the supplies covered by the bid will be Manufactured.

1.17 "Local content" means that portion of the bidding price which is not included in the imported content provided that local manufacture does take place.

1.18 "Manufacture" means the production of products in a factory using Labour, materials, components and machinery and includes other related value-adding activities.

1.19 "Order" means an official written order issued for the supply of goods or works or the rendering of a service.

1.20 "Project site," where applicable, means the place indicated in bidding Documents.

1.21 "Purchaser" means the organization purchasing the goods.

1.22 "Republic" means the Republic of South Africa.

1.23 "SCC" means the Special Conditions of Contract.

1.24 "Services" means those functional services ancillary to the supply of the goods, such as transportation and any other incidental services, such as installation,

commissioning, provision of technical assistance, training, catering, gardening, security, maintenance and other such obligations of the supplier covered under the contract.

1.25 “Written” or “in writing” means handwritten in ink or any form of electronic or mechanical writing.

2. Application

2.1 These general conditions are applicable to all bids, contracts and orders including bids for functional and professional services, sales, hiring, letting and the granting or acquiring of rights, but excluding immovable property, unless otherwise indicated in the bidding documents.
2.2 Where applicable, special conditions of contract are also laid down to cover specific supplies, services or works.

2.3 Where such special conditions of contract are in conflict with these general conditions, the special conditions shall apply.

3. General

3.1 Unless otherwise indicated in the bidding documents, the purchaser Shall not be liable for any expense incurred in the preparation and Submission of a bid. Where applicable a non-refundable fee for Documents may be charged.

3.2 With certain exceptions, invitations to bid are only published in the Government Tender Bulletin. The Government Tender Bulletin may be obtained directly from the Government Printer, Private Bag X85,Pretoria 0001, or accessed electronically from www.treasury.gov.za

4. Standards

4.1 The goods supplied shall conform to the standards mentioned in the Bidding documents and specifications.

5. Use of contract documents and Information Inspection.

5.1 The supplier shall not, without the purchaser’s prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the purchaser in connection therewith, to any person other than a person employed by the supplier in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.

5.2 The supplier shall not, without the purchaser's prior written consent, make use of any document or information mentioned in GCC clause

5.1 Except for purposes of performing the contract.

5.3 Any document, other than the contract itself mentioned in GCC clause

5.1 shall remain the property of the purchaser and shall be returned (all copies) to the purchaser on completion of the supplier's performance under the contract if so required by the purchaser.

5.4 The supplier shall permit the purchaser to inspect the supplier's records relating to the performance of the supplier and to have them audited by auditors appointed by the purchaser, if so required by the purchaser.

6. Patent rights

6.1 The supplier shall indemnify the purchaser against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the goods or any part thereof by the purchaser.

7. Performance Security.

7.1 Within thirty (30) days of receipt of the notification of contract award, the successful bidder shall furnish to the purchaser the performance security of the amount specified in SCC.

7.2 The proceeds of the performance security shall be payable to the purchaser as compensation for any loss resulting from the supplier's failure to complete his obligations under the contract.

7.3 The performance security shall be denominated in the currency of the contract or in a freely convertible currency acceptable to the purchaser and shall be in one of the following forms:
(a) a bank guarantee or an irrevocable letter of credit issued by reputable bank located in the purchaser's country or abroad, acceptable to the purchaser, in the form provided in the
bidding documents or another form acceptable to the purchaser; or
(b) a cashier's or certified cheque

7.4 The performance security will be discharged by the purchaser and returned to the supplier not later than thirty (30) days following the date of completion of the supplier's

performance obligations under the contract, including any warranty obligations, unless otherwise specified in SCC.

8. Inspections, tests and analyses

8.1 All pre-bidding testing will be for the account of the bidder.

8.2 If it is a bid condition that supplies to be produced or services to be rendered should at any stage during production or execution or on completion be subject to inspection, the premises of the bidder or contractor shall be open, at all reasonable hours, for inspection by a representative of the Department or an organization acting on behalf of the Department.

8.3 If there are no inspection requirements indicated in the bidding documents and no mention is made in the contract, but during the contract period it is decided that inspections shall be carried out, the purchaser shall itself make the necessary arrangements, including payment arrangements with the testing authority concerned.

8.4 If the inspections, tests and analyses referred to in clauses 8.2 and 8.3 show the supplies to be in accordance with the contract requirements, the cost of the inspections, tests and analyses shall be defrayed by the purchaser.

8.5 Where the supplies or services referred to in clauses 8.2 and 8.3 do not comply with the contract requirements, irrespective of whether such supplies or services are accepted or not, the cost in connection with these inspections, tests or analyses shall be defrayed by the supplier.

8.6 Supplies and services which are referred to in clauses 8.2 and 8.3 and which do not comply with the contract requirements may be rejected.

8.7 Any contract supplies may on or after delivery be inspected, tested or analysed and may be rejected if found not to comply with the requirements of the contract. Such rejected supplies shall be held at the cost and risk of the supplier who shall, when called upon, remove them immediately at his own cost and forthwith substitute them with supplies which do comply with the requirements of the contract. Failing such removal, the rejected supplies shall be returned at the suppliers cost and risk. Should the supplier fail to provide the substitute supplies forthwith, the purchaser may, without giving the supplier further opportunity to substitute the rejected supplies, purchase such supplies as may be necessary at the expense of the supplier.

8.8 The provisions of clauses 8.4 to 8.7 shall not prejudice the right of the purchaser to cancel the contract on account of a breach of the conditions thereof, or to act in terms of Clause 23 of GCC

9. Packing

9.1 The supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the contract. The packing shall be sufficient to withstand, without limitation, rough handling during Transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packing, case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.

9.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the contract, including additional requirements, if any, specified in SCC, and in any subsequent
Instructions ordered by the purchaser.

10. Delivery and documents

10.1 Delivery of the goods shall be made by the supplier in accordance with the terms specified in the contract. The details of shipping and/or other documents to be furnished by the supplier are specified in SCC.

10.2 Documents to be submitted by the supplier are specified in SCC.

11. Insurance

11.1 The goods supplied under the contract shall be fully insured in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in the manner specified in the SCC.

12. Transportation

12.1 Should a price other than an all-inclusive delivered price be required, this shall be specified in the SCC.

13. Incidental Service.

13.1 The supplier may be required to provide any or all of the following services, including additional services, if any, specified in SCC:
(a) Performance or supervision of on-site assembly and/or commissioning of the supplied goods;

(b) Furnishing of tools required for assembly and/or maintenance of the supplied goods;
(c) Furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied goods;
(d) performance or supervision or maintenance and/or repair of the supplied goods, for a period of time agreed by the parties, provided that this service shall not relieve the supplier of any warranty obligations under this contract; and
(e) Training of the purchaser's personnel, at the supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied goods.

13.2 Prices charged by the supplier for incidental services, if not included in the contract price for the goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the supplier for similar services.

14. Spare parts

14.1 As specified in SCC, the supplier may be required to provide any or all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the supplier:
(a) Such spare parts as the purchaser may elect to purchase from the supplier, provided that this election shall not relieve the supplier of any warranty obligations under the contract; and
(b) in the event of termination of production of the spare parts:
(i) Advance notification to the purchaser of the pending
Termination, in sufficient time to permit the purchaser to procure needed requirements; and

(ii) Following such termination, furnishing at no cost to the purchaser, the blueprints, drawings, and specifications of the spare parts, if requested.

15. Warranty

15.1 The supplier warrants that the goods supplied under the contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the contract. The supplier further warrants that all goods supplied under this contract shall have no defect, arising from design, materials, or workmanship (except when the design and/or material is required by the purchaser's specifications) or from any act or omission of the supplier, that may develop under normal use of the supplied goods in the conditions prevailing in the country of final destination.

15.2 This warranty shall remain valid for twelve (12) months after the goods, or any portion thereof as the case may be, have been delivered to and accepted at the final

destination indicated in the contract, or for eighteen (18) months after the date of shipment from the port or place of loading in the source country, whichever period concludes earlier, unless specified otherwise in SCC.

15.3 The purchaser shall promptly notify the supplier in writing of any claims arising under this warranty.

15.4 Upon receipt of such notice, the supplier shall, within the period specified in SCC and with all reasonable speed, repair or replace the defective goods or parts thereof, without costs to the purchaser.

15.5 If the supplier, having been notified, fails to remedy the defect(s) within the period specified in SCC, the purchaser may proceed to take such remedial action as may be necessary, at the supplier's risk and expense and without prejudice to any other rights which the purchaser may have against the supplier under the contract.

16. Payment

16.1 The method and conditions of payment to be made to the supplier under this contract shall be specified in SCC.

16.2 The supplier shall furnish the purchaser with an invoice accompanied by a copy of the delivery note and upon fulfilment of other obligations stipulated in the contract.

16.3 Payments shall be made promptly by the purchaser, but in no case later Than thirty (30) days after submission of an invoice or claim by the supplier.

16.4 Payment will be made in Rand unless otherwise stipulated in SCC.

17. Prices

17.1 Prices charged by the supplier for goods delivered and services performed under the contract shall not vary from the prices quoted by the supplier in his bid, with the exception of any price adjustments authorized in SCC or in the purchaser's request for bid validity Extension, as the case may be.

18. Contract Amendments

18.1 No variation in or modification of the terms of the contract shall be made except by written amendment signed by the parties concerned.

19. Assignment

19.1 The supplier shall not assign, in whole or in part, its obligations to perform under the contract, except with the purchaser's prior written consent.

20. Subcontracts

20.1 The supplier shall notify the purchaser in writing of all subcontracts Awarded under these contracts if not already specified in the bid. Such notification, in the original bid or later, shall not relieve the supplier from any liability or obligation under the contract.

21. Delays in the supplier's Performance.

21.1 Delivery of the goods and performance of services shall be made by the supplier in accordance with the time schedule prescribed by the purchaser in the contract.

21.2 If at any time during performance of the contract, the supplier or its subcontractor(s) should encounter conditions impeding timely delivery of the goods and performance of services, the supplier shall promptly notify the purchaser in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the supplier's notice, the purchaser shall evaluate the situation and may at his discretion extend the supplier's time for performance, with or without the imposition of penalties, in which case the extension shall be ratified by the parties by amendment of contract.

21.3 No provision in a contract shall be deemed to prohibit the obtaining of supplies or services from a national department, provincial department, or a local authority.

21.4 The right is reserved to procure outside of the contract small quantities or to have minor essential services executed if an emergency arises, the supplier's point of supply is not situated at or near the place where the supplies are required, or the supplier's services are not readily available.
21.5 Except as provided under GCC Clause 25, a delay by the supplier in the performance of its delivery obligations shall render the supplier liable to the imposition of penalties, pursuant to GCC Clause 22, unless an extension of time is agreed upon pursuant to GCC Clause 21.2 Without the application of penalties.

21.6 Upon any delay beyond the delivery period in the case of supplies contract, the purchaser shall, without cancelling the contract, be entitled to purchase supplies of a similar quality and up to the same quantity in substitution of the goods not supplied in conformity with the contract and to return any goods delivered later at the supplier's expense and risk, or to cancel the contract and buy such goods as may be required to complete the contract and without prejudice to his other rights, be entitled to claim damages from the supplier.

22. Penalties

22.1 Subject to GCC Clause 25, if the supplier fails to deliver any or all of the goods or to perform the services within the period(s) specified in the contract, the purchaser shall, without prejudice to its other remedies under the contract, deduct from the contract price, as a penalty, a sum calculated on the delivered price of the delayed goods or unperformed services using the current prime interest rate calculated for each day of the delay until actual delivery or performance. The purchaser may also consider termination of the contract pursuant to GCC Clause 23.

23. Termination for default

23.1 The purchaser, without prejudice to any other remedy for breach of contract, by written notice of default sent to the supplier, may terminate this contract in whole or in part:
(a) if the supplier fails to deliver any or all of the goods within the period(s) specified in the contract, or within any extension thereof granted by the purchaser pursuant to GCC
Clause 21.2;
(b) If the Supplier fails to perform any other obligation(s) under the contract; or
(c) If the supplier, in the judgment of the purchaser, has engaged in corrupt or fraudulent practices in competing for or in executing the contract.

23.2 In the event the purchaser terminates the contract in whole or in part, the purchaser may procure, upon such terms and in such manner as it deems appropriate, goods, works or services similar to those undelivered, and the supplier shall be liable to the purchaser for any excess costs for such similar goods, works or services. However, the supplier shall Continue performance of the contract to the extent not terminated.

23.3 Where the purchaser terminates the contract in whole or in part, the purchaser may decide to impose a restriction penalty on the supplier by prohibiting such supplier from doing business with the public sector for a period not exceeding 10 years.

23.4 If a purchaser intends imposing a restriction on a supplier or any person associated with the supplier, the supplier will be allowed a time Period of not more than fourteen (14) days to provide reasons why the Envisaged restriction should not be imposed. Should the supplier fail to respond within the stipulated fourteen (14) days the purchaser may regard the intended penalty as not objected against and may impose it on the Supplier?

23.5 Any restriction imposed on any person by the Accounting Officer / Authority will, at the discretion of the Accounting Officer / Authority, also be applicable to any other enterprise or any partner, manager, Director or other person who wholly or partly exercises or exercised or

May exercise control over the enterprise of the first-mentioned person, and with which enterprise or person the first-mentioned person, is or was in the opinion of the Accounting Officer / Authority actively associated.

23.6 If a restriction is imposed, the purchaser must, within five (5) working Days of such imposition, furnish the National Treasury, with the Following information:
(i) The name and address of the supplier and / or person restricted by the Purchaser;
(ii) The date of commencement of the restriction
(iii) The period of restriction; and
(iv) The reasons for the restriction.
These details will be loaded in the National Treasury's central database Of suppliers or persons prohibited from doing business with the public Sector.

23.7 If a court of law convicts a person of an offence as contemplated in Sections 12 or 13 of the Prevention and Combating of Corrupt Activities Act, No. 12 of 2004, the court may also rule that such person's name be Endorsed on the Register for Tender Defaulters. When a person's name has been endorsed on the Register, the person will be prohibited from doing business with the public sector for a period not less than five years and not more than 10 years. The National Treasury is empowered to determine the period of restriction and each case will be dealt with on its own merits. According to section 32 of the Act the Register must be Opening to the public. The Register can be perused on the National Treasury Website.

24. Anti-dumping and countervailing duties and rights

24.1 When, after the date of bid, provisional payments are required, or antidumping or countervailing duties are imposed, or the amount of a provisional payment or anti-dumping or countervailing right is increased in respect of any dumped or subsidized import, the State is Not liable for any amount so required or imposed or for the amount of any such increase. When, after the said date, such a provisional payment is no longer required or any such anti-dumping or countervailing right is abolished, or where the amount of such provisional payment or any such right is reduced, any such favourable difference shall on demand be paid forthwith by the contractor to the State or the State may deduct such amounts from moneys (if any) which may otherwise be due to the contractor in regard to supplies or services which he delivered or rendered, or is to deliver or render in terms of the contract or any other contract or any other amount which may be due to him

25. Force Majeure

25.1 Notwithstanding the provisions of GCC Clauses 22 and 23, the Supplier shall not be liable for forfeiture of its performance security, Damages, or termination for default if and to the extent that his delay in Performance or other failure to perform his obligations under the
Contract is the result of an event of force majeure.
25.2 If a force majeure situation arises, the supplier shall promptly notify The purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the purchaser in writing, the supplier shall continue to perform its obligations under the contract as far as is
Reasonably practical, and shall seek all reasonable alternative means for Performance not prevented by the force majeure event.

26. Termination for insolvency

26.1 The purchaser may at any time terminate the contract by giving written notice to the supplier if the supplier becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the supplier, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the purchaser.

27. Settlement of Disputes

27.1 If any dispute or difference of any kind whatsoever arises between the Purchaser and the supplier in connection with or arising out of the Contract, the parties shall make every effort to resolve amicably such Dispute or difference by mutual consultation.
27.2 If, after thirty (30) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the purchaser or the supplier may give notice to the other party of his intention to commence with mediation. No mediation in respect of this matter may be commenced unless such notice is given to the other party.

27.3 Should it not be possible to settle a dispute by means of mediation, it may be settled in a South African court of law.

27.4 Mediation proceedings shall be conducted in accordance with the rules of procedure specified in the SCC.

27.5 Notwithstanding any reference to mediation and/or court proceedings herein,
(a) The parties shall continue to perform their respective obligations under the contract unless they otherwise agree; and
(b) The purchaser shall pay the supplier any monies due the supplier.

28. Limitation of Liability

28.1 Except in cases of criminal negligence or wilful misconduct, and in the case of infringement pursuant to Clause 6;
(a) the supplier shall not be liable to the purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the supplier to pay penalties and/or damages to the purchaser; and

(b) The aggregate liability of the supplier to the purchaser, whether under the contract, in tort or otherwise, shall not exceed the total contract price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment.

29. Governing Language.

29.1 The contract shall be written in English. All correspondence and other documents pertaining to the contract that is exchanged by the parties shall also be written in English.

30. Applicable law

30.1 The contract shall be interpreted in accordance with South African Laws, unless otherwise specified in SCC.

31. Notices

31.1 Every written acceptance of a bid shall be posted to the supplier Concerned by registered or certified mail and any other notice to him Shall be posted by ordinary mail to the address furnished in his bid or To the address notified later by him in writing and such posting shall be Deemed to be proper service of such notice
31.2 The time mentioned in the contract documents for performing any act After such aforesaid notice has been given, shall be reckoned from the Date of posting of such notice.

32. Taxes and Duties.

32.1 A foreign supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the purchaser’s country.
32.2 A local supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted goods to the purchaser.
32.3 No contract shall be concluded with any bidder whose tax matters are not in order. Prior to the award of a bid the Department must be in possession of a tax clearance certificate, submitted by the bidder. This certificate must be an original issued by the South African Revenue Services.

33. National Industrial Participation (NIP) Programme

33.1 The NIP Programme administered by the Department of Trade and Industry shall be applicable to all contracts that are subject to the NIP obligation.

34 Prohibition of Restrictive practices

34.1 In terms of section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, an agreement between, or concerted practice by, firms, or a decision by an association of firms, is prohibited if it is between parties in a horizontal relationship and if a bidder (s) is / are
or a contractor(s) was / were involved in collusive bidding (or bid rigging).

34.2 If a bidder(s) or contractor(s), based on reasonable grounds or evidence obtained by the purchaser, has / have engaged in the restrictive practice referred to above, the purchaser may refer the matter to the Competition Commission for investigation and possible
Imposition of administrative penalties as contemplated in the Competition Act No. 89 of 1998.

34.3 If a bidder(s) or contractor(s), has / have been found guilty by the Competition Commission of the restrictive practice referred to above, the purchaser may, in addition and without prejudice to any other remedy provided for, invalidate the bid(s) for such item(s)
Offered, and / or terminate the contract in whole or part, and / or restrict the bidder(s) or contractor(s) from conducting business with the public sector for a period not exceeding ten (10) years and / or claim damages from the bidder(s) or contractor(s) concerned.

PART 18: SPECIAL CONDITIONS FOR CONTRACT (INFORMATION FOR TENDERERS)

SPECIAL CONDITIONS OF CONTRACT

1. GENERAL

- SEALED TENDERS will be received by the Supply Chain Management Unit for:
- **Project: UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS**
  TENDER No. M01/2023
- Tenders shall be submitted in an envelope provided by the service provider not later than 11:00 am (local time) on **15-08-2023**
- Envelopes containing Tenders should be sealed and plainly marked on the outside as to their contents.
- All index and reference numbers in the Tender Documents are given for the convenience of the Contractor and such must be taken only as a general guide to the items referred.
- It must not be assumed that such numbering is the only reference to each item, but the tender documents must be read in detail for each item.
- Tenders received by the Supply Chain Management Division later than the specified closing time will not be accepted and will be returned unopened to the tenderer.

2. TENDERERS MAY OBTAIN INTERPRETATION OF TENDER DOCUMENTS

- Should any person contemplating submitting a tender for the proposed Contract require additional information concerning the scope of the work or the manner in which it must be carried out, or should he be in doubt as to the meaning of the Specifications, he may submit a written request to the Supply Chain Management for such additional information or for such interpretation.
- INFORMATION FOR TENDERERS submitting the request will be responsible for its prompt delivery.

- Any information or interpretation for all tenders will not be permitted within 48 hours of closing.
- The Supply Chain Management reserves the right to issue any additional Addenda.
- All Addenda issued during the time of tendering shall be taken into account in preparing the Tender, and in closing the Tender; they shall become a part thereof.
- The College will not be responsible for any verbal instruction given to the service provider during the tendering period.

3. PRICES SUBMITTED

- The tender price or prices quoted in the tender shall be in full compensation for all labour, equipment and materials and utility and transportation services necessary to perform and complete all work under the Contract, including all miscellaneous work, whether specifically included in the tender documents or not.
- Any items omitted therefrom which are clearly necessary for the completion of the work shall be considered part of the work, though not directly specified in the Tender Documents.

4. INSURANCE

- Insurance requirements shall be in accordance with Provincial Section INSURANCE, PROTECTION AND DAMAGE, as amended in General Conditions of Contract (GCC).

5. REQUIREMENTS AT TIME OF TENDERING

- Failure of the tenderer to comply with any of the following shall result in the tender being rejected
    - The tenderer shall submit an original signed and sealed tender documents.

- The tenderer shall submit the Pricing Schedule issued with the tender document.

- The name and the signature of the person authorized to bind the tenderer shall be inserted in the space provided in the tender document.

6. TENDER OPEN FOR ACCEPTANCE

- The tenderer shall keep his tender open for acceptance and irrevocable until 90 days have elapsed from the closing date of the tender or a formal contract is executed based on a tender other than this one.

7. NOTIFICATION OF CONTRACT AWARD

- The awarding of the Contract, based on this tender, shall constitute and be an acceptance of this tender, and the College shall notify the successful tenderer of the contract award.

8. INFORMAL OR UNBALANCED TENDERS

- In addition to those errors in the tender that shall result in the tender being rejected, as indicated in Clause 9 of the General Conditions of Contract "REQUIREMENTS AT TIME OF TENDERING", tenders which are incomplete, illegible or obscure, or that contain additions not called for, erasures, alterations, errors or irregularities of any kind, or contain prices which appear to be unbalanced as to be likely to adversely affect the College, may be rejected as informal.
- Tenderers who have submitted tenders which have been rejected by the College because of informalities will be notified of the reasons for rejection. When checking tenders, the following procedures shall be used:
  - If the amount tendered for a unit price item does not agree with the extension of the estimated quantity and the tendered unit price, or if the extension has not been made, the unit price shall govern and the total price shall be corrected accordingly.

- If both the unit price and the total price are left blank, then both shall be considered as zero.
- If the unit price is left blank but a total price is shown for the item, the unit price shall be established by dividing the total price by the estimated quantity.
- If the total price is left blank for a lump sum item, it shall be considered as zero.
- If the tender contains an error in addition and/or subtraction and/or transcription, the error shall be corrected and the corrected total contract price shall be governed.

9. WITHDRAWAL OF TENDERS

- A tenderer may withdraw his tender at any time up to the official closing time by letter bearing the signature of any person authorized by the tenderer.
- All withdrawn or superseded tenders will be returned unopened.

10. ABILITY AND EXPERIENCE OF TENDERERS

- In order to help the College in determining the ability of any tenderer, the tenderer shall, within 48 hours after being requested in writing by the Supply Chain Management, furnish evidence satisfactory to the College of the tenderer's experience and familiarity with work of the character specified and his financial ability to prosecute the proposed work properly to completion within the specified time.
- The evidence requested may, without being limited thereto, include the following:
    - The tenderer's performance record with listing of work of a similar character and proportions which he has constructed, giving the name of the owner, date built and construction cost.
    - A tabulation of other work now under contract, giving the location, type, size, required date of completion and the percent of completion to date of each job.
    - An itemized list of the tenderer's equipment available for use on the proposed Contract.

- A listing of the major parts of the work which are proposed to be sublet.
- The tenderer's latest financial statement.

11. EXCLUSION OF TENDERERS DUE TO POOR PERFORMANCE

- The Unit Manager shall document evidence and advice Supply Chain Management in writing where the performance of a supplier has been unsatisfactory in terms of failure to meet contract specifications, terms and conditions or for Health and Safety violations.

12. SINGLE TENDER

- A single tender may be opened and the College reserves the right to accept or reject it.

13. WARRANTY

- Warranties shall remain valid for 12 months after the goods have been delivered. Refer to paragraph 15 of GCC.
- The supplier warrants that the goods supplied under this tender are new, unused, of the most recent or current models and that they incorporate all recent improvements in design and materials.
- The supplier further warrants that the goods supplied shall have no defect arising from design, materials, or workmanship or from any act or omission of the supplier that may develop under normal use of the supplied goods.

14. PAYMENT

All payments will be effected within 30 days of receipt of an original invoice from the supplier or in the case of progress payments within 30 days after the payment certificate is signed by the project manager.

PART 19: JOINT VENTURE AGREEMENT

UPGRADE OF THE MAIN ELECTRICAL RETICULATION AT THE ORBIT TVET COLLEGE - MANKWE CAMPUS

STANDARD JOINT VENTURE AGREEMENT (25 pages)

JOINT VENTURE AGREEMENT

Between

_____

and

_____

(herein collectively referred to as the PARTIES)

WHEREAS

A. _____ and _____ are desirous of forming a Joint Venture for purposes of joining their resources in order to carry out the

_____

_____

NOW THEREFORE THE PARTNERS AGREE AS FOLLOWS:

1. INTERPRETATION

In this agreement :

1.1 Clause headings have been inserted for convenience and shall not be used as an aid to its construction.

1.2 Unless the context clearly indicates a contrary intention:

1.2.1 an expression which includes:

1.2.1.1 any gender shall include the other genders;

1.2.1.2 a natural person shall include an artificial person and vice versa.

1.3 The following expressions shall have the meanings shown against each and cognate expressions shall bear corresponding meanings.

1.3.1 "CONTRACT"
means the erection of _____

1.3.2 "DEFAULTING PARTY"
means a party to which a notice has been given specifying breach which is to be remedied within seven (7) days and which does not remedy such breach;

1.3.3 "EFFECTIVE DATE"
means the date of signature by _____ of this agreement;

1.3.4 "EXECUTIVE COMMITTEE"
means that body of persons acting collectively comprising of _____ of _____ and _____ of _____ or their duly appointed representative.

1.3.5 "MANAGEMENT COMMITTEE"
means that body of persons acting collectively comprising one representative from each party.

1.3.6 "PROJECT MANAGER"
means _____ who shall supervise all activities of the Contract and be the responsible person in respect of this Contract.

1.3.7 "QUORUM"
means two persons being one representative of each party.

1.3.8 "SPONSOR"
means _____

1.3.9 "PRINCIPAL / EMPLOYER"
Means THE ORBIT TVET COLLEGE - MANKWE CAMPUS

2. CONSTITUTION OF THE JOINT VENTURE

2.1 The PARTNERS hereby constitute a Joint Venture which, notwithstanding its composition, shall conduct all business under the style "_____" (the "Joint Venture"), which shall commence on the effective date and shall continue in existence until determined as in hereinafter provided.

2.2 The object of the Joint Venture is to jointly execute and complete the Contract, which has been awarded to the _____.

2.3 Nothing herein contained shall be construed as constituting a general partnership or limiting the right of power of a party to carry on its separate business for its sole benefit.

2.4 The parties herein shall be jointly and severally liable towards the Principal and third parties specifically and solely for the obligations of the Joint Venture deriving from and in any way connected with the present agreement and the Contract.

In this regard the legal domicilium of the Joint Venture will be:

_____

_____

2.5 The interest of each party and its liability to contribute to and its respective share in any loss, including capital loss or liability or profit which may result from the operations of the Joint Venture and its interest in all the property acquired and monies received arising out of or in connection with the execution and completion of the Contract shall be:-

2.5.1 _____ ___%

2.5.2 _____ ___%

2.6 The place of business of the Joint Venture shall be at the site of the Contract or such other place as the Management Committee shall decide.

2.7 Save for such powers as the Sponsor necessarily requires to perform its functions in the Management of the Joint Venture, this agreement shall not constitute or be construed as the agent of another.

3. DURATION OF THE JOINT VENTURE

3.1 The duration of the Joint Venture shall extend until such time as all the obligations of the Joint Venture in respect of the Contract, if successfully secured, and this agreement have been discharged.

4. MANAGEMENT OF THE JOINT VENTURE

4.1 The Management Committee shall be responsible to the Joint Venture for the management of the Contract. It shall decide all questions of principle in the administration of the Contract and shall have all such powers as are normally invested in a Board of Directors, without limiting the generality of the expressions “power”, the function and authority of the Management Committee shall be as set out in Clauses 5 and 6.

4.2 The sponsor shall be responsible for the administration of the Joint Venture. The administration entails accounting, bookkeeping, wages and salaries, including the responsibilities detailed in Clause 4.3 below.

4.3 The Sponsor shall be responsible for the cost control system as agreed, all accounting and administrative processes and records including the payment of VAT and R S C levies on behalf of the Joint Venture and the preparation of monthly and quarterly financial reports in respect of the Joint Venture. All such systems, records and reports shall be subject to the approval of the Management Committee.

4.3.1 The Sponsor shall be paid for the above-mentioned tasks a fee of ___% of the contract value.

The fee shall be paid monthly to the Sponsor as and when the Joint Venture is paid by the Principal.

4.3.2 The fee paid to the Sponsor for the aforementioned tasks shall cover all off site costs incurred by the Sponsor in respect of such tasks with the specific exception of printing and stationery costs and data processing costs specifically related to the Contract, which costs shall be reimbursed by the Joint Venture.

4.4 The auditors and/or financial representative of each of the PARTNERS shall be _____ at all reasonable times, access to the records referred to in 4.3 to enable them to verify the monthly, quarterly and annual financial reports.

4.5 The financial year end of the Joint Venture shall be _____.

5. CONSTITUTION AND FUNCTION OF THE MANAGEMENT COMMITTEE

5.1 The PARTNERS shall procure the appointment of a Management Committee comprising two (2) members being one representative from each party.

5.2 The Management Committee shall meet at such times as they shall decide being not less than once per calendar month.

5.3 Unless the PARTNERS agree unanimously to some other period, each member of the Management Committee shall receive not less than three (3) days notice of all meetings and of the matters to be discussed there at.

The time and place for meetings shall be determined by the Project Manager, who shall send out notices for the meeting.

5.4 A Quorum for each meeting shall be one representative, or his alternate, of each party. No decision of the Management Committee shall be valid in the absence of a Quorum if no Quorum is present at a meeting of which due notice has been given to all members of the Management Committee, the following provisions shall apply.

5.4.1 The meeting shall stand adjourned to the same place and the same time on the same day of the next week (or if that day is not a business day the first day thereafter)

5.4.2 At such adjourned meeting if the member of the Management Committee previously absent is not present, those present shall be entitled to make valid decisions provided that

5.4.2.1 All members of the Management Committee shall have received prior notice of the adjourned meeting of the Management Committee.

5.4.2.2 The decisions relate only to matters which were set out in the agenda for the first meeting.

5.4.2.3 All members of the Management Committee are immediately notified of any decision taken in terms of this sub-clause.

5.5 The Management Committee shall be presided over by a Chairman who shall be appointed by the Sponsor. At any meeting of the Management Committee the Chairman shall have a deliberative but not a casting vote.

5.6 All decisions of the management committee shall be unanimous by those members attending and entitled to vote.

5.7 Should the Management Committee be unable to reach unanimous agreement at any meeting on any matter on which it deliberates the meeting of the Management Committee shall be adjourned and the matter shall be referred for decision to the Executive Committee.

If the said Executive Committee is unable to resolve the dispute the matter shall be referred to the final decision of any arbitrator to be appointed by the PARTNERS.

5.7.1 If the issue in dispute is primarily a matter of an accounting or financial nature, the dispute shall be referred to the decision of any independent accountant of not less than ten (10) years standing agreed by the PARTNERS and in the absence of agreement appointed by the President for the time being of the Cape Society of Chartered Accountants.

5.7.2 If the matter in issue is primarily a construction matter, it shall be referred to the decision of an arbitrator of not less than ten (10) years standing agreed by the PARTNERS and in the absence of agreement appointed by the President for the time being of the Institute of South African Architects.

5.7.3 If the matter in issue does not fall within the ambit of 5.7.2, the dispute shall be referred to the decision of an advocate of not less than ten (10) years standing agreed by the PARTNERS and in the absence of agreement appointed by the Chairman for the time being of the Cape Bar Council.

5.7.4 The provisions of Clause 19 shall apply to any such reference to arbitration.

5.8 Notwithstanding any reference to arbitration if the subject matter of the dispute is of an urgent and important nature which cannot reasonably await the decision of an arbitrator the reference to arbitration shall not delay or interfere with the progress of the Contract and the Sponsor shall be entitled to decide whether any steps would be taken in regard thereto prior to the decision of the arbitrator.

5.9 All business transacted at the meeting of the Management Committee shall be recorded in a suitable minute book to be kept at such place as the PARTNERS may decide and such minute book shall be at all times available for the inspection of the PARTNERS representatives or their duly authorised agents who shall have the right to take copies thereof or extracts there from. Copies of minutes of meetings shall be circulated to the members of the Management Committee within seven (7) days of the meetings.

6. POWERS AND DUTIES OF THE MANAGEMENT COMMITTEE

Without derogating from the generality of the provisions of Clause 4.1 the Management Committee shall have the following powers and duties:

6.1 To appoint a Project Manager to oversee the Contract.

6.2 To decide upon all matters for the submission of claims.

6.3 To determine the manner in which any disputes concerning the Joint Venture and third parties shall be dealt with.

6.4 To decide upon the banking accounts to be opened by the Sponsor in the name of the Joint Venture and the methods of operation of such banking accounts.

6.5 To approve and allocate any additional expenditure not allowed for in the Contract price.

6.6 To receive and consider reports by the Project Manager on the progress of the Contract.

6.7 To approve the form and amount of any bonds or guarantees which the Joint Venture may have to provide.

6.8 To approve the policy relating to conditions of employment of staff.

6.9 To decide all matters in relation to the acquisition, hiring and disposal of plant and equipment.

6.10 To determine the manner in which invoicing to the Joint Venture by the PARTNERS shall be done.

6.11 To give the necessary powers to the Sponsor for the administration and accounts of the Joint Venture.

6.12 To call for Monthly, Quarterly and Annual Financial Statements of the affairs of the Joint Venture.

6.13 Receive and decide upon recommendation of the Sponsor as to the sum or sums to be paid from time to time by the PARTNERS to provide working capital for the Joint Venture.

6.14 To appoint the Auditors.

6.15 To determine the policy to the adopted in respect of major sub-contractors and suppliers.

6.16 To determine the level or resources required and which of the PARTNERS shall provide same.

6.17 To obtain all requisite insurance including but not limited to public liability insurance. Each PARTNER shall be obliged to demonstrate that it is adequately ensured in relation to the Joint Venture, Annexure "A" hereto shall be completed by the PARTNERS and said Annexure shall form part of and be integral to this agreement.

7. THE PROJECT MANAGER

7.1 The Management Committee shall appoint a Project Manager who shall be responsible for overseeing the exception of the Contract in accordance with the directives of the Management Committee and in terms of the Contract.

7.2 The Project Manager shall report to the Management Committee and shall represent the Joint Venture in its dealings with the Principal or the agents of the Principal. The Project Manager shall advise the Management Committee on all the matters concerning the Contract.

8. JOINT VENTURE PROFITS

8.1 The profits earned by the Joint Venture shall be distributed in accordance with decisions taken by the Executive Committee from time to time. The Executive Committee shall have no power to re-adjust the share of the profits to which a party may be entitled.

8.2 The Executive Committee may in its absolute discretion distribute, advance or loan any surplus funds which may be available at any time to the PARTNERS in proportion to their share in the Joint Venture.

9. OTHER PROFITS

9.1 No party shall derive or attempt to derive any profits or financial benefit, either directly or through any legal person in which they have a direct or indirect interest arising from any business transacted by or with the Joint Venture as provided for in Clause 9.2. The PARTNERS agree, however, that a party and its associated or subsidiary companies shall be entitled to enter into sub-contract or supply Contract with the Joint Venture.

9.2 Prior to obtaining the written approval of the management committee referred to in Clause 9.1, which approval shall not be unreasonably withheld, the interest of a party shall be disclosed to the Management Committee which shall thereafter have the right to receive from such party a full disclosure of the nature and extent of such interest.

10. CHARGES AND REMUNERATION OF EMPLOYEES

10.1 The cost of employing the Project Manager and all full time employees of the Joint Venture will be a charge to the Joint Venture.

10.2 The cost of Seconded Staff referred to in Clause 14 shall be charged to the Joint Venture and such cost shall include :

10.2.1 The gross remuneration payable to the employee, and

10.2.2 The amount paid in respect of the employer's portion of his pension fund, medical aid society contributions and social security payments, if any, and

10.2.3 That portion of the paid leave to which his service agreement entitles him which his period of secondment to the Joint Venture bears to a calendar year, and

10.2.4 The portion of his annual bonus, if any, which his period of secondment to the Joint Venture in a calendar year bears to a calendar, and

10.2.5 The amount paid to him in respect of his car allowance.

10.3 No charge shall be made by a party in respect of the time spent by its representative (or alternate) on the Management Committee.

11. WORKING CAPITAL AND GUARANTEES

11.1 The amount of working capital required by the Joint Venture shall be determined by the Management Committee from time to time.

11.2 (a) It is recorded that the objective of the Joint Venture in respect of working capital is that it shall as far as is possible, be self financing and that any proposals submitted shall bear that objective in mind. To the extent that the Joint Venture is not self financing the PARTNERS will provide any shortfall in working capital in equal shares.

(b) In the event of any of the PARTNERS being unable or unwilling to provide the requisite shortfall, the PARTNER providing the finance at its sole discretion shall be entitled to recover from the other PARTNER the cost of financing the shortfall portion based on the then prevailing prime overdraft interest of financing the shortfall portion based on the then prevailing prime overdraft interest charged by the First National Bank of SA Limited plus __%. A PARTNER's inability or unwillingness to provide working capital shall constitute a material breach of this agreement.

11.3 _____ undertakes to procure from a registered bank or other financial institution all performance, retention or any other guarantees which are required by the Principal. The cost of procuring the aforesaid performance retention and other guarantees shall be done by the Joint Venture.

11.4 All payment claims shall be compiled and submitted to the Joint Venture and all payments due shall be paid to the Joint Venture.

11.5 In the event of the Joint Venture's cashflow being negative, each PARTNER shall provide the Joint Venture with the cash required in order to ensure a positive cashflow. In the event of either of the PARTNERS being unable or unwilling to provide the necessary cash, then the provision of Clause 11.2 (b) shall apply mutatis mutandis.

12. PLANT AND EQUIPMENT

12.1 All equipment and plant required by the Joint Venture shall be purchased or hired by the Joint Venture in its own name or in the name of one of the PARTNERS. Plant and equipment hired or purchased shall receive the approval of the Management Committee prior to its acquisition.

12.2 Should plant or equipment be purchased from a party, the purchase price of such plant and equipment shall be agreed between the Management Committee of the Joint Venture and such party prior to the dispatch thereof to the site.

12.3 Should a party hire plant to the Joint Venture, the Management Committee shall agree upon a rate therefore so far as possible which is consistent with prevailing market rates.

12.4 Save in so far as a party may have suitable plant and equipment available for purchase or hire by the Joint Venture upon which the Management Committee has reached agreement on the price or rents thereof, all plant and equipment shall be purchased new or second-hand or hired from third parties.

12.5 On completion of the Contract or as and when any plant and equipment shall no longer be required for the purposes thereof, valuation thereof shall be made by the Management Committee and the PARTNERS shall be advised that such plant and equipment is no longer required, together with the valuation thereof.

The PARTNERS shall be entitled, if they wish, to submit offers for any such plant and equipment. The Management Committee shall at a predetermined time open all such offers. The party which has submitted the highest offer exceeding the valuation placed thereon by the Management Committee shall be entitled to purchase such plant and equipment. If the highest offer shall be less than such valuation, the Management Committee may in its discretion accept the highest of any such offer provided that a party which has sold plant and equipment to the Joint Venture shall, for a period of thirty (30) days after the opening of the offers, have the right to purchase from the Joint Venture such plant and equipment at an amount equivalent to the highest offer to the Management Committee.

12.6 If any plant and equipment no longer required for the purposes of the Contract shall not be disposed of in the manner set out in Clause 12.5, such plant and equipment shall be disposed of in the open market in such manner and at such price and on such terms as the Management Committee shall decide, provided that the PARTNERS shall as far as is practicable, be accorded a priority over third parties in the purchase of such plant and equipment.

12.7 If the manner of disposal decided upon by the Management Committee shall be public auction, the PARTNERS shall not be precluded from attending and bidding at any such public auction.

13. STAFF

The PARTNERS agree not to attempt during the currency of this agreement, to entice or influence any person seconded to or employed by or associated with the Joint Venture as the case may be for one (1) year after the termination of this agreement without the written consent of the other parties knowingly to employ any persons previously employed by the party and who has been engaged on or was associated with the Contract.

14. SECONDED STAFF AND LABOURERS

14.1 Each party undertakes to make monthly paid staff available to the Joint Venture from time to time for the executing of the Contract. Such staff is hereinafter referred to as Seconded Staff.

14.2 Insofar as is reasonably practicable, the members of Seconded Staff shall be maintained in such a way that each party from time to time be making approximately the same proportionate contribution to the provision of the Seconded Staff as it proportionate participation in the profits of the Joint Venture from time to time.

14.3 The Project Manager, with the approval of the Management Committee and the Management Committee, in its own right, shall have the right to terminate the services of Seconded Staff. Seconded Staff whose services are so terminated shall be removed from the Contract and shall not again be permitted to take part in the execution of the Contract.

14.4 No bonus shall be payable in respect of the Contract without the prior approval of the Management Committee.

14.5 All labour requirements shall be obtained on a sub-contract basis, unless agreed otherwise between the parties.

15. DISSOLUTION OF THE JOINT VENTURE

15.1 Should a party be placed in provisional or final liquidation or pass a resolution for voluntary winding up or take steps to be wound up on the grounds of its inability to pay its debts, or compound any of its creditors, or be placed under Judicial Management, Provisional or Final, then – save in those cases where by operation of the law the Joint Venture is automatically dissolved either of the parties shall be entitled without prejudices to any other right of action or claim for damages or for specific performance, to terminate this agreement and to dissolve the Joint Venture upon thirty (30) days notice in writing to the other party and to the employer / principal.

15.2 Whether the Joint Venture is terminated in such circumstances by automatic operation of law, or by notice, the following provisions shall apply:

15.2.1 The interest of the party in default shall be determined by the Auditors.

15.2.2 In determining the value of the interest of the party in default, the auditors shall adopt such methods of valuation as it in its sole discretion considers to be equitable, but subject to the following guidelines:

15.2.2.1 A balance sheet and income statement shall be prepared as at the date of determination by a person nominated for its purpose by the parties not in default and shall thereafter be audited by the Auditors.

15.2.2.2 The net assets revealed in such financial statements shall provide the basis of the valuation of the interest in the Joint Venture of the party in default, provided that the profit and loss account shall take into account the valuation of work in progress at the date of preparation of the financial statement.

15.2.3 The parties not in default shall be obliged to prepare and render an account to the party in default which shall share in all profits accrued to and losses borne by the Joint Venture as at the date of termination in proportion to that party's participation therein as set out in Clause 2.5.

15.2.3.1 The party in default shall and does hereby indemnify the parties not in any default for any losses which it may have sustained or may in the future sustain which arises out of or in connection with the termination of the Joint Venture.

15.2.3.2 The party in default shall not be released from any of its obligations to third persons given in terms of this agreement.

15.2.4 Upon the finalisation of the account referred to in 15.2.3 the party in default shall be liable on demand to pay its proportionate share of any loss sustained by the Joint Venture as at the date of such termination.

15.3 Breach

15.3.1 If a party is of the opinion that another has committed a material breach of the provision of this agreement which shall include but not be limited to poor performance, it shall give written notice thereof to that other party and to the employer / principal. The date of such notice is hereinafter referred to as the "Notice Date". The matter shall thereafter forthwith be referred to the Executive Committee for a decision as to whether such a breach exists.

15.3.2 Should the Executive Committee not be able to reach a decision as to whether a material breach exists, the matter shall be dealt with as a formal dispute between the PARTNERS and shall be referred to arbitration in terms of Clause 19.

15.3.3 If the said Executive Committee or the arbitrator, as the case may be finds that a material breach has been committed, the defaulting party shall remedy such breach within seven (7) days of such finding, failing which the other parties shall have the right, without prejudice to any other remedy that they may have to declare the Joint Venture terminated with the effect from the Notice Date and the provision of Clause 15.2 shall then apply.

16. SUB-CONTRACT AND SUPPLY CONTRACT

Any information or knowledge gained by any party shall remain secret and confidential and shall not be disclosed to any prospective or actual sub-contractor or supplier.

17. ASSIGNMENT / CESSION

No party shall without prior written consent of the others and of the Employer / Principal cede any of its rights or assign any of its obligations under this agreement to the Contract.

18. DISSOLUTION

Upon substantial completion of the Contract the Joint Venture shall

18.1 Cause all plant Equipment material and other property belonging to the Joint Venture to be disposed of as provided in Clause 15 and the proceeds thereof credited to the account of the Joint Venture.

18.2 Cause the final account of accounts to be prepared showing the total net profit earned or the loss incurred by the Joint Venture in connection with the Contract and upon such account or accounts being agreed by the PARTNERS, such total net profit (if any) shall be divided between them in proportion to their respective participation in the Joint Venture and the said bank account or accounts shall thereafter be closed after any outstanding balance therein due to any of the partners has been paid. Nothing herein contained shall prevent interim distribution of profits by agreement between the PARTNERS.

19. ARBITRATION PROVISIONS

19.1 Should any dispute or difference arise between the PARTNERS the following procedures shall apply:

19.1.1 A party shall be entitled to give written notice to the other PARTNERS and to the EMPLOYER / PRINCIPAL stating that in its view a dispute or difference or deadlock exists and that it requires the provision of this clause to be put into operation, and the matter shall

be referred to arbitration and the further provision hereof shall apply.

19.1.2 The arbitrator shall be an independent suitably qualified person agreed upon between the PARTNERS and appointed in terms of Clause 5.7, and failing agreement shall be a practicing Advocate of not less than ten (10) years standing as such, nominated by the Chairman for the time being of the Cape Bar council.

19.1.3 The arbitration shall be held in _____. In a summary manner, that is on the basis that it shall not be necessary to observe or carry out the usual formalities or procedure (e.g there shall not be any pleadings or discovery) or the strict rules of evidence but otherwise subject to the foregoing under the Provisions of the Arbitration Act No 42 of 1965 of the Republic of South Africa, with the intent that arbitration shall be held immediately with a view to it being completed within twenty one (21) business days after it has been demanded.

19.1.4 The arbitrator shall decide the matter submitted to him according to what he considers just and equitable in the circumstances and therefore the strict rules of law shall not be observed or taken into account by him in arriving at his decision.

19.1.5 Any decision given by the arbitrator shall be final and binding upon the PARTNERS, shall be carried into effect by the PARTNERS and may be made an order of any Court of competent jurisdiction if so desired.

19.2 This clause is separable from the rest of the agreement and shall remain in effect notwithstanding its termination.

20. WHOLE AGREEMENT

This document contains all of the terms and conditions of this agreement and no alteration or variation thereof shall be of any effect unless reduced into writing and signed by the PARTNERS.

21. ADVERTISEMENTS / CORRESPONDENCE

When the subject matter of any advertisement involves another party or the Joint Venture, such advertisements and publications shall make due reference to and acknowledge the work performed by and the interest of the other PARTNERS in the Contract.

All correspondence and other forms of written communication must reflect the name of all PARTNERS albeit in an abbreviated form.

22. DOMICILIA CITANDI EXECUTANDI

22.1 For all purposes concerning this agreement and for the fulfilment thereof, the PARTNERS hereby choose domicilium citandi et executandi which shall be in the Republic of South Africa as follows:-

_____

22.2 All instructions, directions and notices which may be required to be given by a party to any other party shall be addressed to that party's domicilium and shall be deemed to have been received if dispatched by prepaid registered post four (4) days after posing or if delivered by hand on the date of delivery.

THUS DONE AND SIGNED AT _____ ON THIS _____ DAY OF _____ 2023.

AS WITNESSES For and on behalf of

1. _____ _____

2. _____ _____

THUS DONE AND SIGNED AT _____ ON THIS _____ DAY OF _____ 2023.

AS WITNESSES For and on behalf of

1. _____ _____

2. _____ _____

POWER OF ATTORNEY

_____

REGISTRATION NO. _____

A WRITTEN RESOLUTION PASSED BY THE DIRECTORS OF THE COMPANY

ON _____ (date)

_____

RESOLVED THAT

_____ in his capacity as a _____ of the Company be and is hereby authorised to enter into a Joint Venture Agreement with _____ for the construction of _____ Tender No. _____.

It is further noted that _____ will be jointly and severally liable with _____ for the execution of the contract.

SPECIAL POWER OF ATTORNEY

_____

REGISTRATION NO. _____

_____

REGISTRATION NO. _____

A WRITTEN RESOLUTION PASSED BY THE DIRECTORS OF THE JOINT-VENTURE COMPANY ON _____ (date)

_____

RESOLVED THAT

_____ in his capacity as a **MEMBER** of the Joint Venture be and is hereby authorised to sign all contract documents for the _____ _____ Tender No. _____ to the value of R_____ on behalf of the Joint Venture company.

_____

PART 20: BILL OF QUANTITIES

ORBIT TVET COLLEGE - MANKWE

PREAMBLES

ITEM NO		DESCRIPTION
SP1.1		**ELECTRICAL WORK**
		PREAMBLES
		For preambles refer to the following Specifications:
	1	Section C: Electrical Installation Works Specification
	2	Specification for Supply, Delivery, Installation, Testing and Commissioning of Type B miniature sub-stations
SP1.2		**SUPPLEMENTARY PREAMBLES**
		Meaning of words
	1	Wherever the words "user client" or "government" are used in the preambles it shall be deemed to mean "employer"
	2	Wherever the words "main contractor", "building contractor", "sub-contractor", "electrical contractor" or "civil, structural, electrical and building contractor" are used in the preambles it shall be deemed to mean "contractor"
	3	Wherever the word "department" is used in the preambles it shall be deemed to mean "Electrical Engineer"
	4	Wherever the words "engineer", "consultant", "consulting engineer" or "chief electrical engineer" are used in the preambles it shall be deemed to mean "Electrical Engineer"
	5	All associated costs involved in bringing each miniature substaion to full operational status
	6	Wherever the words "tender documents" are used in the preambles it shall be deemed to mean "procurement documents"
	7	Wherever the words "contract documents" are used in the preambles it shall be deemed to mean "agreement"

	8	Wherever the words "contract works" are used in the preambles it shall be deemed to mean "works" The word “approve” means approval by the Departments Electrical engineer or representative
	9	Specifications, drawings, etc Bidders are referred to the abovementioned specifications and the drawings hereafter referred to, prepared by Emzansi Consulting Engineers and issued with these bills of quantities, for the full descriptions of the following items which are to be read and priced in conjunction with the said specifications and drawings Should any part of the drawing not be clearly intelligible to the bidder he shall, before submitting his bid, obtain clarification in writing from the Electrical Engineer
	10	Firm of specialists All the work described in this section shall be executed by a firm of specialists. The installation shall be carried out entirely by this approved firm's own personnel and shall not in any way be sub-let
	11	Descriptions and pricing Unless otherwise stated the description of each item shall be deemed to include manufacturing, conveying and delivering, unloading, storing, unpacking, hoisting, rigging, setting, fitting and fixing in position, cutting, waste, patterns, templates, plant, temporary works, return of packings, connecting, testing, commissioning, establishment charges, profit and other obligations arising out of the agreement The amount priced in the rate column is to be divided into the two categories provided namely Supply and Install Unless otherwise stated, all measurements are net, in accordance with the drawings, and no allowance has been made for wastage. commissions to third parties, etc, where applicable. The foregoing items, as well as the Contractor's handling, financing and profit mark-up is not to be separately detailed, and must be included in the rates.

	12	Proprietary items Prices are to be based on the specific products/articles specified. The bidders attention is drawn to the fact that any other product of equal quality may be used subject to the written approval of the engineer being obtained prior to the closing date for submission of tenders Items, materials or methods to be used specified by trade names or catalogue numbers are only an indication of the quality required. Items, materials or methods of similar quality may be used with prior approval from the engineer Where equipment is specified by name, the tenderer must price on this basis. Alternatives may be offered by tenderers but the use of which is subject to written approval by the Engineer
	13	Old Materials Old materials resulting from the alterations and demolitions are to be removed from the site unless otherwise specified Old materials become the property of the Contractor unless otherwise specified.
	13	Temporary Coverings, Screens etc. The Contractor will be held responsible for any damage to property or goods in the existing buildings due to his not having taken adequate precautions and all damage caused is to be made good at his own expense. He must allow for providing all necessary plastic or wood framed screens, partitions, tarpaulins, barriers, etc. to protect the work and prevent any nuisance from dust as may be required or directed
	14	Setting Out All dimensions affecting work in the existing buildings are to be taken on the site and the Contractor will be responsible for taking the correct sizes of all new work, these sizes given in this Bill are approximate.
	15	Notices Special care is to be exercised not to interfere unnecessarily with any electrical or telephone installations that may be met with and due notice is to be given to the engineer when any disconnections or removal of wires, fittings, etc., are necessary and the Contractor is to afford every facility to the electricians carrying out this work

SP1.3		**GENERAL NOTES**
	1	This Bill of Quantities forms part of, and must be read in conjunction with the complete specifications and must be submitted, duly completed, on the closing date of tenders.
	2	Tenderers must complete the Bill of Quantities and detail the unit rate and total amount of each item The "Total" shall constitute the tender price for adjudication. Tenderers are advised to check their item extension and total additions as arithmetical errors occurring in the priced Bill of Quantities cannot be concidered as having an effect on the tender amount.
	3	No alteration, erasure or addition is to be made in the text of the Bill of Quantities. Should any altrations, erasure or addition be made it wiil not be recognised but the original wording of the Bill of Quantities will be adhered to. The Engineer will check the completed Bill of Quantities and reserves the right to adjust any individual price and to rectify any discrepancy whilst the total tender price remains unaltered.
	4	The quantities given in the Bill for cable, cable markers, earth wire laid with cable, and excavations cannot be regarded as exact and are subject to re-measurement on site after completion of the service and ajustments will be made according to the unit rates given in the Bill. In the event of discrepancies between the drawings, specifications and Bill of Quantities the Engineer shall decide whether the work executed shall be re-measured on site or whether re-measureme shall be effected from the working drawings only.
	5	The Bill of Quantities is to be used for pricing and financial purposes only. The drawings take precedence over particular (project) specification but should be used in conjunction with these specifications. The Project Specification take precedence over quility specifications and the Bill of Quantities. **Note** Checking of Cable and Overhead Conductor Lengths. Not withstanding the fact that lengths of cables and overhead conductors, as given in the Bill of Quantities, have been measured from scaled drawings, the Contractor shall check such lengths on site before ordering the cable as he will not be paid for excess cable after the completion of the service. Any allowance for off-cuts shall be made in the unit rates. The final measurements shall be based on the nett route length of the cables and overhead lines concerned. installed in accordance with the specification. However, the onus is on the Contractor to prove compliance with the specification.

	6	The BOQ is to be regarded as fixed and will not be adjusted for variations in the final contract value or contract period.
	7	Unit prices for the same items in different Bills shall in all cases be the same, and in the case of differences, the Engineer reserves the right to change such unit prices when the completed list is checked, without adjusting the tender price.
	8	The total for each page of each Bill is to be carried forward to the collection page at the end of each Bill.
	9	P.C., Provisional and Contingency allowances, items and sums shall be expended as directed by the Engineer, and any balance remaining shall be deducted from the amount of the contract sum. Tenderers may not regard any unspent monies as forming part of the final contact value.
	10	Variation work, as well as the items described above, shall be measured as executed, and paid for according to unit prices in the Bill of Quantities. Where unit prices are not available, the work shall be priced, in conjunction with the Engineer, at current rates.
	11	Unless otherwise specified in the Bill of Quantities, all items are to be priced on the basis of supply, delivery, offload, installation, connection, rigging, testing and commissioning. All prices are to be EXCLUSIVE OF V.A.T but inclusive of import duties, surcharges, commissions to third parties, etc., where applicable. The foregoing items, as well as the Contractor's handling, financing and profit mark-up, is not to be separately detailed, and must be included in the cost rates.
	12	Unless otherwise stated, all measurements are net, in accordance with the drawings, and no allowance has been made for wastage.
	13	The Employer reserves the right to increase or decrease the extent of the contract works, without restraint, on total value of variations issued relavant to any particular itemn the Bill of Quantities, by issuing written variation instructions to omit or add, as may be required, the supply and/or installation of any item of equipment or work, whether in the Bill of Quantities or not, and without affecting the unit rates indicated in the Bill of Quantities or Preliminary and General items.
	14	In the event that Tenderers disagree with the measured quantities the tender should be qualified accordingly, listing the items and quantities in question.
	15	The unit prices quoted in the Bill of Quantities must include for small installation materials such as nuts, bolts, nails, saddles, screws etc. as are required for the satisfactory complete installation in accordance with the specification.

	16	Unless otherwise stated in the Bill, the unit cost rates shall be based on the following: The rate for luminaires and accessories shall include for connection of the wiring thereto.
	17	All measurements are based on the most economical route lengths without any allowance for wastage, threading, jointing or slack.
	18	It should be noted that, notwithstanding anything to the contrary, any items completed or listed in the Bill of Quantities by the Tenderer will be taken into account, and will be subject to re-measurement, and will be regarded as a Bill of Quantities item.
	19	Items, materials or methods to be used specified by trade names or catalogue numbers are only an indication of the quality required. Items, materials or methods of similar quality may be used with prior approval from the Engineer
	20	Where equipment is specified by name, the tenderer must price on this basis. Alternatives may be offered by tenderers but the use of which is subject to written approval by the Engineer.
	21	Where demolition work is to be carried out, the removal of powerskirting, coduits, cable trays, conductors, luminaires etc. is deemed to be part thereof.
	22	The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHS Act), which is administered by the Chief Inspector of Occupational Health and Safety of the Department of Labour, requires that electrical installations comply with the requirements of SANS 10142-1. It also requires that a registered person, as defined (master installation electrician, installation electrician or electrical tester for single phase), will issue a Certificate of Compliance for an electrical installation in line with the requirements set out in SANS 10142-1
	23	The Contractor shall have at least one installation electrician in full time employment assigned permanently to this project.

SP1.4		MEASURING AND PAYMENT PRINCIPLES
	1	The basic principles of measurement and payment for cable trench excavations is that the rate bidded for excavations covers the cost of excavations, the re-use of excavated material for back filling and the removal of all surplus material along the trench routes to the nearest dumping site
	2	The rate for the laying of the cable covers the cost of the handling and placing of the cable in the approved trench, as well as any other costs concerning the laying of the cables.
	3	Trench excavations for cables, etc. is measured volume wise, but can be measured according to length. Except when differently stated in the project specification or differently demanded, the depth will be measured from the ground level, along the centre line of the trench, down to the bottom of the specified bottom layer. The ground level is that which was formed after mass ground works was completed, measuring the excavated level or the backfilled level, except where another execution sequence is demanded.
	4	The source of the approved back fill material and the bottom layer is the contractors own responsibility. He is free to use approved material excavated from the side of the trench or other excavations on site, providing such material meats the applicable requirements. He is also free to buy one or both the materials from commercial sources or to excavate along the cable route at his own cost. Additional and separate payment for the backfill of over-excavations and the removal of surplus materials or any other unforeseen works will only be made if such works was specified by the Engineer.
	5	All rates shall allow for fault finding and commissioning procedures as well as include making, aiming, conveying, importing, delivering, unloading, storing, unpacking, hoisting, setting, fitting and fixing in position, cutting and waste, plant, temporary works and profit. All equipment and materials shall be new.
	6	The rates shall include all permanent labelling and numbering on all switchgear, cables and equipment. The labelling shall be made from Trafolite (black writing on white background) as detailed in the general technical specification. All ends of cables shall be labelled.
	7	The Contractor shall be responsible for obtaining the Engineer's signature accepting any measurements and payment claims by no later than one week before the payment claim is to be submitted for payment.

SP 1.5		INTERIM PAYMENT
	1	Material **OFF** Site The inclusion of materials and goods stored off site in the amount authorised for payment shall be at the sole discretion of the principal agent and such inclusion shall only be considered upon the provision, by the contractor, of an approved guarantee issued by a registered commercial bank.
	2	Material **ON** Site Payment for Materials **on** Site (MOS), with written Engineer approval, may be claimed for billed items purchased by the contractor and stored securely on site, provided the contractor submit delivery notes of material on site and invoices for the materials supplied by the suppliers. The contractor may only claim 80% of the full invoiced amount of MOS submitted by the supplier, provided that the total claimed MOS for each billed item does not exceed 80% of the full amount allowed for each billed item in the pricing schedule. Although MOS may be claimed, the MOS will remain the contractor's responsibility until project completion and hand-over to the Employer, thereafter the defect liability period is effective, thus any damage, vandalism, theft, etc. of materials will be the contractor's responsibility to replace and repair at the contractor's own expense. The Contractor must also provide the following: 1) Proof of insurance 2) Proof of security measures taken Storage 1) Items should be stored in a separate container that is demarked, 'property of TVET'

ORBIT TVET COLLEGE - MANKWE

ELECTRICAL INSTALLATIONS - SCHEDULE OF REMEASURABLE QUANTITIES

SCHEDULE NO PG: ELECTRICAL INSTALLATIONS - PRELIMINARY AND GENERAL

ITEM NO		DESCRIPTION	UNIT	QUAN-TITY	PRELIMINARY AND GENERAL	
					RATE	AMOUNT
PG 1		**PRELIMINARY AND GENERAL - SANS 1200 A & B**				
PG1.1		**FIXED-CHARGE ITEMS**				
	1	Contractual Requirements	Sum	1		
PG1.2		**SITE ESTABLISHMENT**				
	1	Camp and fencing	Sum	1		
	2	Offices and storage sheds	Sum	1		
	3	Office Equipment	Sum	1		
	4	Ablution and latrine facilities	Sum	1		
	5	Remove site establishment on completion and remove all rubbish, foundations, concrete bases, dirt oil spillage, etc, and leave site in condition as found.	Item	Included		
	6	Tools, equipment, plant hire and testing gear/meters as necessary.	Sum	1		
	7	Water supplies, electric power and communications	Sum	1		
	8	Contract nameboard (One only) (Refer to PS AB 5.1)	Sum	1		
PG1.3		**Other Fixed-Charged Items**				
	1	Provision for OH&S requirements as specified, such as, but not limited to: Safety officer payment, safety training, HIV awareness, medicals, health and safety plan, administration, etc.	Sum	1		
	2	Provision for Environmental Management Plan requirements	Sum	1		
	3	Site Instruction Book: Instructions issued on site are to be recorded in triplicate in a site instruction book which is to be maintained on site by the contractor	Sum	1		
	4	Cost for compliance with Main Contractor's preliminary and general items	Item	Included		
	5	Contractual requirements as specified, i.e guarantees, insurance, sureties, company overheads, financing of retention, etc.	Sum	1		
	6	Contract Engineer, administration, supervision, running costs, programming and management.	Sum	1		
	7	Maintain and operate site establishment.	Item	Included		
	8	Maintenance and guarantee of the complete installation including fitting, material and workmanship for a period of twelve months from date of practical completion and handover	Sum	1		
	9	Other items not included in the foregoing and required by the Contractor are to be listed and priced below.	Sum	1	included	
PG1.4		**Provision of Community Liaison Officer**				
	1	Remuneration of CLO (based on R 6000/month incl. cellphone allowance of R150) month	Prov Sum	1		
	2	Charges for profit on 1 above	%			
		PG - P&G'S - Carried Forward				

		PG - P&G'S - Brought Forward				
PG1.5 PG1.5.1		**TIME-RELATED ITEMS** **Temporary works and plant**				
	1	The contractor will, throughout the entire contract period be responsible for the proper and adequate protection of all workers and visitors on the site from injury and damage resulting from the works and for the proper security of the site at all times. Furthermore, the contractor must allow for all necessary temporary hoardings, hoardings with gantries, fans, safety screens, barriers, access gates, covered gangways, walkways, overhead protection against falling objects and materials, security fences, etc. for the enclosure of the works and elements thereof for the protection of the public and others as required by prevailing bylaws, the Construction Regulations 2014 issued in terms of Occupational Health and Safety Act 1993, any other Laws and Regulations and/or demanded by his own site requirements. Allowance must furthermore be made for periodic adjustment of any enclosure or protection and for their eventual removal.	Sum	1		
	2	All site establishment, offices and storage of materials will be strictly limited to the area demarcated which must be suitably fenced with 1,8m high 'Bonnox' fencing covered with shade cloth to the satisfaction of the Principal Agent. The contractor shall be responsible for keeping such areas in a clean, sanitary and orderly condition.	Item	1		
	3	The office accommodation for meetings is to be adequately sized and equipped with a sound working table and chairs to accommodate at least eight (8) people for site meetings. The room is to be well vented with air-conditioning and fitted with two large white boards and pin boards with markers and erasers. Two plug points to be provided within the room. The access area around the offices and the toilets shall be surfaced with clean crushed stone, which shall be well drained, kept free from mud and maintained throughout the contract period. The office accommodation shall be located within Contractors Site Area.	Sum	1		
	4	The contractor shall allow for the proper maintenance and regular cleaning of the meeting room and offices during the contract period to ensure clean usable facilities at all times and shall clear away and make good on completion.	Sum	1		
	5	The contractor shall re-instate/ rehabilitate the area used for site establishment the Contractors dedicated site/yard area as well as the access road from the entrance to the Contractors dedicated site/ yard area	Sum	1		
PG1.6		**Operate and maintain facilities on site:**				
	1	Facilities for Engineer	Sum	1		
PG1.7		**Facilities for Contractor for duration of construction.**				
	1	Offices and storage sheds	Sum	1		
	2	Ablution and latrine facilities	Sum	1		
	3	Tools and equipment	Sum	1		
	4	Water supplies, electric power and communications	Sum	1		
		PG - P&G'S - Carried Forward				

		PG - P&G'S - Brought Forward				
PG1.8		**INSTALLATION / SHOP DRAWINGS AND SAMPLES - for the complete installation as detailed in the specification**	Sum	1		
		The term 'shop drawings' shall mean drawings, layout drawings, diagrams, illustrations, schedules, performance charts, brochures, operating manuals and other data which are prepared by the Contractor or any Sub-Contractor, manufacturer, supplier or distributor and which illustrate the specified portion of the work. The Contractor shall ensure that all shop drawings required for the Works in terms of this Contract, all Selected/Nominated Sub-Contracts and/or any Electrical Engineers instruction, are prepared and submitted timeously in accordance with the following procedure: A) Three prints of shop drawings of all fabricated work, working or setting out drawings, shop details and schedules shall be submitted to the Principal Agent, for approval. Such work shall not be carried out until such approval has been given. B) Shop drawings shall be submitted to the Electrical Engineer for approval at least two weeks prior to the date on which such approval is required in order to comply with the Contract Programme. C) All submissions shall be prepared in accordance with the Contract drawings and specifications and/or any Electrical EngineerS instructions and any deviation shall be specifically highlighted in writing, with a detailed explanation of the reason for such deviation, together with any cost and/or time implications. Delays in approval of shop drawings due to non-compliance with drawings, specifications and/or Principal Agents instructions shall not constitute grounds for any claims for delay, extension of time and the like. D) When the Electrical Engineer advises that shop drawings have been approved, the original transparencies of such drawings shall immediately be submitted to the Electrical Engineer so that the Electrical Engineers signature of approval may be appended thereto. Thereafter, four prints of the approved shop drawings, setting out drawings and schedules shall be furnished to the electrical Engineer and the contractor shall transfer the same to 3 sets of CDs or DVDs in PDF and/or DWG format. The manuals shall be neatly prepared, in type written 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 drawings will be filed using 70mm Lever Arch Files (x 3) as detailed in the specification. As many prints of the approved shop drawings and schedules as required shall also be furnished to the Works. No work shall be performed in accordance with drawings and/or catalogues not signed with the Electrical Engineers approval. E) The Contractor, Sub-Contractor or Supplier, as the case may be, shall be responsible for ensuring that all dimensions affecting shop drawings conform to the dimensions of built work. F) The Electrical Engineers approval of shop drawings or samples is limited to checking conformity with specification and shall not relieve the Contractor, Sub-Contractor or Supplier of his responsibility for design, erection or installation fit, nor does it vary his contractual or delictual obligations and liabilities G) Should the Contractor, Sub-Contractor or Supplier be of the opinion that corrections to shop drawings made by the Electrical Engineer constitute a change to the scope of work, then he shall immediately advise the Electrical Engineer in writing of this, together with the cost and/or programme implications thereof. H) The Contractor/Manufacturer/Supplier will be required to supply equipment layout and detailed drawings for all mechanical, electrical and instrumentation equipment as well as pictures of serial plates where applicable. I) If special foundations/plinths are required for equipment, detail foundation drawings must be provided by the Contractor. Foundation drawings shall show the concrete strength and reinforcing requirements together with any holding down bolt details. J) All equipment shall be fully dimensioned showing all fixing details, cable entry positions and other details and dimensions that may be required for designing the building or foundations. K) Electrical and instrumentation drawings shall consist of detail circuit and wiring diagrams, overall schematic diagrams, and equipment layout and equipment details. L) The drawings should also contain the voltage, power, current, resistance and other component values.				
		PG - P&G'S - Carried Forward				

		PG - P&G'S - Brought Forward				
PG1.9		**"UP-TO-DATE AS-BUILT DRAWINGS" for the complete electrical installation as detailed in the specification**	Sum	1		
		A suitable CAD package shall be used for the drawings. Exact positions of cables and all electrical services installed shall be clearly shown. As-built drawings must be submitted for the complete electrical installation and of all workshop drawings submitted during the contract period, unless written that the Engineer has granted exemption. After approval of the draft drawings, the contractor shall issue 3 paper sets A1 size of final approved drawings and shall transfer the same to 3 sets of CDs or DVDs in PDF and DWG format. The manuals shall be neatly prepared, in type written 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 drawings will be filed using 70mm Lever Arch Files (x 3) as detailed in the specification. ***Submission and approval of submitted as-built drawings is a prerequisite for issuing of a Certificate of Practical / Partial Practical Completion of the installation (handover of the installation).*** **Drawing Requirements and Standards** All drawings shall be suitable for microfilming and comply with the following standards: 1) SANS Code of Practice 0111; 2) BS 308; and 3) All drawings shall be in English. Drawing symbols used shall be clearly defined and consistently used. Symbols shall be standardised and generally used such as BS, DIN or IEC symbols. The Contractor's own concoction of symbols, where standardised symbols exist, will not be accepted				
PG1.10		**CERTIFICATE OF COMPLIANCE, TEST REPORT FOR ALL ELECTRICAL INSTALLATIONS AND MV INSTALLATION SAFETY REPORTS TO SANS 10142-1-2 (LATEST ADDITION) BY AN ACCREDITED PERSON for the complete electrical Installation as per scope of work**	Sum	1		
		CERTIFICATE OF COMPLIANCE: On completion of an electrical installation, the contractor shall complete the Certificate of Compliance for each electrical Installation in the form of Annexure 1 as described in the in the latest addition of the Occupational Health and Safety Act, Act no. 85 of 1993, and obtainable from the Electrical Conformance Board of SA. **No installation (electrical / mechanical) can be commissioned without a valid COC.** This form must be handed to the Engineer or its representative. CoC Numbers and dates of issue shall be attached to distribution boards (DB's) by means of "BROTHER TAPE". Each DB will be issued with it's own COC. **TEST REPORT FOR ALL ELECTRICAL INSTALLATIONS:** On completion of an electrical installation, the contractor shall complete the Test Report for all Electrical Installations in the form as described in the latest addition of SANS 10142-1 and obtainable from the Electrical Conformance Board of SA. - Main Building per floor - other buildings per building. Test reports should be accompanied by annex pages for circuits, earth continuity, wiring diagrams and photographs. Medical and hazardous user locations require additional test reports. **MV SAFETY REPORT:** On completion of an MV electrical installation, the contractor shall complete the MV Safety Report in the form as described in the latest addition of SANS 10142-2 and obtainable from the Electrical Conformance Board of SA. After approval of the COC's, the contractor shall issue the original plus 3 paper sets of final approved COC's and shall transfer the same to 3 sets of CDs or DVDs in PDF format. The manuals shall be neatly prepared, in type written 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 manuals will be filed using 70mm Lever Arch Files (x 8) as detailed in the specification. ***Submission and approval of submitted Certificates of Compliance, Test Certificates and MV Safety Reports is a prerequisite for issuing of a Certificate of Practical / Partial Practical Completion of the installation (handover of the installation).***				
		PG - P&G'S - Carried Forward				

		PG - P&G'S - Brought Forward				
PG1.11		**INSTALLATION TESTS for the complete electrical Installation as per scope of work as detailed in the specification**	Sum	1		
		Tests as stipulated in the " Occupational Health and Safety Act no. 85 of 1993, as amended, and in the "Code of Practice for the Wiring of Premises" SANS 10142 (as amended), must be done. These test report forms must be filled in fully and correctly in ink, signed by the installation electrician and handed to the Engineer or its representative. Tests must be conducted on site per phase / installation complete, unless written the Engineer to the contrary grants permission. The tests must include a full-load test for an adequate period to ensure the satisfactory working of the installation. If negative test results are obtained, faults must be rectified and tests again done. All tests shall be carried out in conjunction with and to the satisfaction of the Supply Authority and in the presence of the Engineer or his representative. The contractor shall make all arrangements for testing and inspection, the costs thereof being included in the Bid Price. Each length of cable shall be tested for insulation and polarity by means of a 2000 Volt Megger for LV and 22kV low frequency tester on 11kV cables designed for that purpose. In the case of underground cables this shall be done before back filling. In addition, the earth-loop impedance of each conductor earth electrode shall be measured. The earth resistance shall be tested by means of an approved instrument. "Danger" notices shall be displayed at remote ends of cables under test. The contractor shall ensure that the installation is completed in every respect and that there are no major defects prior to notifying the Engineer (in writing) for a first delivery inspection. The Engineer will accept zero minor defects during the final inspection. Should the number of defects be exceeded at the final inspection then the Engineer will terminate that inspection and request that the contractor arrange an additional final inspection. The Contractor is required to balance the load as equally as possible over the multiphase supply. After approval of the reports, the contractor shall issue the original plus 3 paper sets of final approved reports and shall transfer the same to 3 sets of CDs or DVDs in PDF format. The manuals shall be neatly prepared, in type written 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 manuals will be filed using 70mm Lever Arch Files (x 3) as detailed in the specification. ***Submission and approval of submitted Installation Test Certificates is a prerequisite for issuing of a Certificate of Practical / Partial Practical Completion of the installation (handover of the installation).***				
		PG - P&G'S - Carried Forward				

		PG - P&G'S - Brought Forward				
PG1.12		**COMPILATION OF MAINTENANCE, OPERATIONAL AND TECHNICAL MANUALS for the complete electrical installation as detailed in the specification**	Sum	1		
		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. Three hard and three soft copies each including filing using white 70mm Lever Arch type files as specified. 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/s 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. After approval of the draft manuals the contractor shall issue 3 paper sets of final approved operating and maintenance manuals and shall transfer the same to 3 sets of CDs or DVDs in PDF and/or DWG format. The manuals shall be neatly prepared, in type written 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 manuals will be filed using 70mm Lever Arch Files (x 3) as detailed in the specification. One set of manuals for each installation shall be printed in A4 hard copy format, ring bounded with a transparent clear front and back cover and placed inside the logbook holders provided inside each plantroom. COC's, Test reports, Safety reports, etc. shall form part of these manuals Operating and Maintenance Manuals shall be submitted to the Engineer for approval and to demonstrate compliance with the Contract Documents. ***Submission and approval of submitted Maintenance, Operational and technical Manuals is a prerequisite for issuing of a Certificate of Practical / Partial Practical Completion of the installation (handover of the installation).***				
PG1.13		**WARRANTEES FOR MATERIAL AND WORKMANSHIP for the complete electrical in stallion as detailed in the specifications**	Sum	1		
		The warranty shall state that workmanship, materials and installation are warranted for a specific period from the date of practical / partial practical completion and that any defects that may arise during the specified period shall be made good at the expense of the entity supplying the materials and / or doing Original plus three copies of certificates shall be submitted to the Engineer for approval and to demonstrate compliance with the Contract Documents. The certificates will be filed using 70mm Lever Arch Files (x 3) as detailed in the specification. ***Submission and approval of Warrantees for Material and Workmanship certificates shall be a prerequisite for issuing of a Certificate of Practical / Partial Practical Completion of the installation (handover of the installation).***				
		PG - P&G'S - Carried Forward				

		PG - P&G'S - Brought Forward				
PG1.14		**STAFF TRAINING for the complete electrical installation as detailed in the specification**	Sum	1		
		The warranty shall state that workmanship, materials and installation are warranted for a specific period from the date of practical / partial practical completion and that any defects that may arise during the specified period shall be made good at the expense of the entity supplying the materials and / or doing the work, upon written notice to do so. Training / familiarization regarding operation & maintenance of the equipment / systems at site shall be given by the contractor to the end users staff. The Contractor shall be responsible for the training of the Client's site staff after the commissioning has been completed. The site staff shall receive enough instruction to ensure that they are fully conversant with the equipment concerned. The operating manuals shall be used during training. Upon completion of the training exercise the contractor is to obtain the client's representative's written acceptance of this handover tuition, thus acknowledging his complete understanding of the operational procedures for this installation. Site staff shall be instructed on: a) The general operating method of the plant; b) Starting and stopping instructions; c) Stopping the plant in an emergency and warning against restarting after an emergency; d) Positions and normal setting of control equipment; e) Safety measures; f) Operational checks on gauges, indicator lights, etc. g) Name, address and telephone number of competent person responsible for the maintenance of the plant. Training sessions shall be documented and the original plus three sets of documents shall be submitted with the handover documents for reference. 2 x Separate training sessions shall be conducted on instruction from the Engineer and documented for each portion of works ***Staff Training shall be a prerequisite for issuing of a Certificate of Practical / Partial Practical Completion of the installation (handover of the installation).***				
		PG - P&G's - Total Carried to Summary Page				

ORBIT TVET COLLEGE - MANKWE

ELECTRICAL INSTALLATIONS - SCHEDULE OF REMEASURABLE QUANTITIES

SCHEDULE NO E1: ELECTRICAL INSTALLATIONS - MV RETICULATION, MINIATURE SUBSTATIONS & PV SOLAR

ITEM NO		DESCRIPTION	UNIT	QUAN-TITY	SUPPLY		INSTALL		TOTAL (R)
					RATE	AMOUNT	RATE	AMOUNT	
E1		**MV RETICULATION** PREAMBLES NOTE: Tenderers are advised to study SECTION C: ELECTRICAL INSTALLATION WORKS SPECIFICATION before pricing this portion SUPPLEMENTARY PREAMBLES All interruptions of the electrical supply that may be necessary for the execution of the work will be subject to prior arrangement (signed Access to an Installation Certificate) between the Contractor, the Engineer and the User Client. The selection of plant / material / equipment should be submitted with relevant manufactures data to the Engineer for approval before any installation takes place. The cost of replacing any plant / material / equipment ordered prior to approval obtained shall be borne by the contractor. The removal and replacement of materials and/or workmanship that does not conform to specification or drawings shall not constitute grounds for an extension of the construction period nor for an adjustment to the contract sum Any reference to trade names in the Bills of Quantities shall deem to mean "or similar and equal to" - pre-approved by the Engineer. Before pricing this section, the Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper installation work. The Price Schedules shall not be used for ordering purposes. The Contractor shall check the lengths of cables on site before ordering any of the cables. Prices shall be deemed to include: Installation / shop drawings Factory Acceptance Testing Packaging and transport of all equipment to site, offloading and rigging at site, spreader beams, lifting slings, etc. Temporary site works, dismantling, demolition, damage prevention measures, repairs and making good Tooling of all description Integral earthing mechanism, CT's, overload protection, infrared testing prior to commissioning, commissioning of goods, test reports (COC's, Test Reports, MV Installation Safety Reports), preparation of detailed O&M manuals, handing over of documents, etc. Warning notices and signage (no stick-on notices/signage will be allowed) as per SANS and OHS specifications Everything necessary for the execution and complete installation of the work in accordance with the description. All associated costs involved in bringing the minisubs, etc. to full operational status							

E1.1		**Miniature Substations - 11kV/415V/230V - Type B** **Replace Miniature Substations complete with plinths, aprons etc. as detailed in the specifications**							
	1	200kVA	No	1					
	2	400kVA	No	1					
	3	600kVA	No	1					
	4	750kVA	No	1					
E1.2		**Removal of existing Minisubs** SUPPLEMENTARY PREAMBLES Before pricing this section, the Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper dismantling and removal work. Prices shall be deemed to include: The unit rate for each item in the Price Schedules shall include for de-commissioning and termination of all goods, all materials, tooling of all description, spreader beams, lifting slings, labour, loading and rigging, removal from site, etc. - Rate to include removal of all old cabling and wiring that will not be re-used							
	1	Miniature substations	No	4					
E1.3		**TESTS AND INSPECTIONS OF EXISTING PLANT AND EQUIPMENT - MINISUB D1** **Comprehensive reports** SUPPLEMENTARY PREAMBLES Descriptions Descriptions of comprehensive reports shall be deemed to include for testing, inspecting and reporting on the complete MV and LV Reticulation installation as per scope of work, including earth test results, load tests, phase balance, insulation levels, polarity, condition of equipment, etc, including handing over of							
E1.3.1		**Tests and inspections on commencement of the contract.** **MINI-SUB D1 - 500kVA** **Testing / Report for scope definition**							
	1	Test, inspect and provide a comprehensive report on MINISUB D1 including load tests to establish the total load of the building, phase balancing, etc..	Item	1					
	2	Full service as per manufacturers specification including testing, COC, legend cards, cleaning, fill of oil, repairs to loose terminations, oil leaks, etc. including travelling	Lot	1					
	3	Concrete apron as detailed in the specification	No	1					
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.3.2		**Decommissioning testing and commissioning of the complete MV, LV & PV installation as specified** SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: that are energised with electrical circuit installations fully completed and tested and all necessary test results and test certificates submitted. In addition, all testing is to be included in the rate, which will include cable pressure and insulation testing, voltage drop, full load, fault level, loop impedance and earth testing.							
	1	Decommissioning, testing and commissioning	Lot	1					
E1.4		**INFRARED (SCANNING) THERMOGRAPHY SURVEYS of the complete electrical installation**							
E1.4.1		**Carry out surveys on each piece of MV and LV equipment for initial inspection and submit a comprehensive report to the Engineer - Minisub D1, DB-SMB1 & DB-SMB2**							
	1	Normal supply (cables, switchgear, transformers, etc.) for connection, overloading and misbalancing issues	No	1					
E1.4.2		**Carry out surveys on each piece of MV and LV equipment for final inspection and submit a comprehensive report to the Engineer - Minisubs 1 to 5, DB-SMB1 & DB-SMB2**							
	1	Normal supply (cables, switchgear, transformers,etc.) for connection, overloading and misbalancing issues	No	5					
E1.4.3		**Castel Key System**							
	1	Castel Interlocking System for ring main, normally open and normally closed interlock.	Lot						
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.5		**ELECTRICAL LV SUPPLY CABLES - SANS 150 & 1507**							
		SUPPLEMENTARY PREAMBLES							
		All MV, HT & LV underground / surface cables shall be stranded copper-core, 600/1000 Volt grade, multi-cored, PVC insulated, PVC covered, wire armoured and PVC encased (PVC/SWA/PVC) unless otherwise specified							
		No joints are allowed in distribution cables, accept where it is specifically authorised. The low voltage cable in a continuous cable run must be of one size, except where a change in cable size is necessary, in which case the change must be approved by the Engineer.							
		Mounting positions shall be verified on site and/or as per layout as shown in the documents							
		Prices shall be deemed to include							
		Conductors supplied & installed in any of the following positions							
		a) Laid in trenches, trench boxes b) Drawn into ducts / shafts, sleeves, conduits, etc.							
		c) Surface mount horizontal / vertical on cable ladders / trays, etc							
		The conductor length, any type & size in meters supplied & installed c/w suitable clamps (cleats / Q clamps) consisting of adjustable metal wings spaced at intervals as detailed in the specification, draw wires / ropes, holes and finishes through structures, labelling as detailed in the specification, etc.							
		Termination of cable ends (of armoured copper cable) onto switchgear or distribution boards. The rate shall include all labour and material for making off of cable ends, c/w non-corrodible metal compression glands. Glands shall be complete with earthing ferrules, locknuts, bushes and shrouds.							
		BCEW Terminations shall include all the lugs and insulating material needed to complete the termination, including exothermic welding, glands/clamps for securing the cable.							
		Cable marking and colour coding as detailed in the specification							
		All associated costs involved in bringing each conductor length installed to full operational status							
		All associated costs for the dismantling, removal from site and safe disposal of any type / size conductor & associated materials no longer required							
E1.5.1		**PVC insulated PVC bedded SWA PVC CU sheathed cables. SANS 1507-3.**							
E1.5.1.1		**95mm² 4-core PVC/SWA/PVC Cu**							
	1	95mm² 4-core PVC/SWA/PVC Cu	m	80					
	2	95mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	95mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	50mm² CCS 'CAMO' Earth Conductor	m	80					
	5	50mm² CCS 'CAMO' Earth Conductor terminations	No	1					
	6	50mm² CCS 'CAMO' Earth Conductor joints	No	1					
E1.5.1.2		**70mm² 4-core PVC/SWA/PVC Cu**							
	1	70mm² 4-core PVC/SWA/PVC Cu	m	60					
	2	70mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	70mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	35mm² CCS 'CAMO' Earth Conductor	m	60					
	5	35mm² CCS 'CAMO' Earth Conductor terminations	No	4					
	6	35mm² CCS 'CAMO' Earth Conductor joints	No	2					
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.5.1.3		**50mm² 4-core PVC/SWA/PVC Cu**							
	1	50mm² 4-core PVC/SWA/PVC Cu	m	60					
	2	50mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	50mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	35mm² CCS 'CAMO' Earth Conductor	m	60					
	5	35mm² CCS 'CAMO' Earth Conductor terminations	No	2					
	6	35mm² CCS 'CAMO' Earth Conductor joints	No	2					
E1.5.1.4		**35mm² 4-core PVC/SWA/PVC Cu**							
	1	35mm² 4-core PVC/SWA/PVC Cu	m	80					
	2	35mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	35mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	16mm² CCS 'CAMO' Earth Conductor	m	80					
	5	16mm² CCS 'CAMO' Earth Conductor terminations	No	2					
	6	16mm² CCS 'CAMO' Earth Conductor joints	No	2					
E1.5.1.5		**25mm² 4-core PVC/SWA/PVC Cu**							
	1	25mm² 4-core PVC/SWA/PVC Cu	m	80					
	2	25mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	25mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	16mm² CCS 'CAMO' Earth Conductor	m	80					
	5	16mm² CCS 'CAMO' Earth Conductor terminations	No	2					
	6	16mm² CCS 'CAMO' Earth Conductor joints	No	2					
E1.5.1.6		**16mm² 4-core PVC/SWA/PVC Cu**							
	1	16mm² 4-core PVC/SWA/PVC Cu	m	90					
	2	16mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	16mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	10mm² BCEW	m	90					
	5	10mm² BCEW terminations	No	2					
E1.5.1.7		**10mm² 4-core PVC/SWA/PVC Cu**							
	1	10mm² 4-core PVC/SWA/PVC Cu	m	60					
	2	10mm² 4-core PVC/SWA/PVC Cu terminations	No	8					
	3	6mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	6mm² BCEW	m	60					
	5	6mm² BCEW terminations	No	8					
E1.5.1.8		**6mm² 4-core PVC/SWA/PVC Cu**							
	1	6mm² 4-core PVC/SWA/PVC Cu	m	80					
	2	6mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	6mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	4mm² BCEW	m	80					
	5	4mm² BCEW terminations	No	4					
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.5.2 E1.5.2.1		**HT Voltage Electric Cable 6.6kV to 33kV** **50mm² Cu SWA XLPE - 11KV**							
	1	50mm² x 3-core Cu SWA XLPE	m	1,650					
	3	50mm² x 3-core Cu SWA XLPE terminations	No	20					
	5	50mm² x 3-core Cu SWA XLPE cable joint kits	No	2					
	7	35mm² CCS 'CAMO' Earth Conductor	m	1,650					
	8	35mm² CCS 'CAMO' Earth Conductor terminations	No	20					
	9	35mm² CCS 'CAMO' Earth Conductor joints	No	16					
E1.5.3		**Bare Copper Earth Wire Cable - SANS 1411-1**							
	1	4mm² BCEW	m	30					
	2	6mm² BCEW	m	80					
	3	10mm² BCEW	m	80					
	1	16mm² BCEW	m	65					
	2	25mm² BCEW	m	60					
	3	50mm² BCEW	m	80					
E1.5.4		**MV/LV Cable Joint Kits - 2, 3 or 4 Core Armoured Cables c/w crimping ferrules, etc.** Cable joints are not permissible except where specifically approved. No joints will be allowed where the specified length of cable appears on a drum.							
	1	4 - 10mm²	No	6					
	2	10 - 16mm²	No	8					
	3	16 - 35mm²	No	8					
	4	35 - 50mm²	No	6					
	5	50 - 95mm²	No	8					
	6	95 - 150mm²	No	1					
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.5.5 E1.5.5.1		**High conductivity annealed stranded copper conductors to SANS 1411 Part 1. Insulated with PVC and skin coloured in plain colours to SANS 1411 Part 2. Cable is manufactured to SANS 1507 Part 2. 600 / 1000V** **Single Core Low Friction General Purpose Cable** The loop-in system shall be followed throughout, and no joints of any description will be permitted. SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: The conductor length, any type / size in meters drawn into conduit, trunking, power skirting, surface mounted, under plaster, in hollow walls, in open roof spaces, etc. c/w terminations, draw wires, etc. BCEW Terminations shall include all the lugs and insulating material needed to complete the termination, including exothermic welding, glands/clamps for securing the cable. The dismantling, removal from site and safe disposal of any type / size conductor & associated materials no longer required							
	1	2.5mm² PVC	m	100					
	2	2.5 mm² Stranded BCEW	m	100					
	3	4mm² PVC	m	150					
	4	2.5 mm² Stranded BCEW	m	150					
	5	6mm² PVC	m	150					
	6	4mm² Stranded BCEW	m	150					
	7	10mm² PVC	m	100					
	8	6mm² Stranded BCEW	m	100					
E1.5.6 E1.5.6.1		**Surfix Cable** **SANS 1411 Part 1, PVC insulated to SANS 1411 Part 2 , laid up with a bare tinned copper earth wire in contact with a longitudinal aluminium/polyethylene laminate, UV stable PVC sheathed to SANS 1411 Part 2. SANS 1507-2 c/w terminations, etc.** SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: The conductor length, any type / size in meters drawn into conduit, trunking, power skirting, surface mounted, under plaster, in hollow walls, in open roof spaces, strapped on wire ways, c/w terminations, draw wires, etc. BCEW Terminations shall include all the lugs and insulating material needed to complete the termination, including exothermic welding, glands/clamps for securing the cable. The dismantling, removal from site and safe disposal of any type / size conductor & associated materials no longer required							
	1	2.5mm² x 3-core	m	100					
	2	4mm² x 3-core	m	100					
	3	6mm² x 3-core	m	100					
	4	4mm² x 4-core	m	100					
	5	6mm² x 4-core	m	100					
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.6		**TRENCHING AND EARTHWORKS** **Excavation of all material for trenches, backfill, compaction and removal of excess material.** SUPPLEMENTARY PREAMBLES Existing services: There are a number of existing services within the site boundaries, none of these are shown on the drawings. The contractor is not relieved of the responsibility of locating all existing services prior to construction. There are existing water, storm water, telephone, communications and electrical services on the site. Work is to be carried out without any disruption to existing services, this includes instances where newly constructed services are to be connected to existing 'live' services. Nature of ground The nature of the ground is assumed to be gravel, therefor "earth", but possibly interspersed with "soft rock" or "hard rock" Excavations No claim for "soft" or "hard rock" excavations will be entertained unless the contractor has timeously notified the Engineer thereof prior to backfilling General The contractor will be held responsible for damage to any existing services brought to his attention by the relevant authorities and shall be responsible for the cost of repairs. The Contractor must take all necessary precautions to prevent the trenching work being in any way a hazard to the personnel and students and to safeguard all structures, roads, sewage works or other property on the site from any risk of subsidence and damage. The contractor shall not commence with backfilling of trenches without prior notification of the Electrical 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. Foundations and excavations should be kept water free and the contractor must supply all pumps etc. that may be necessary for clearing out water. On completion, the surface shall be made good to match the surrounding area. In cases of roadways or paved areas the excavations shall be consolidated to the original density of the surrounding material and the surface finish reinstated No cable is to be laid before the cable trench is approved and the soil qualification of the excavation is agreed upon by the Contractor and Engineer. Prices are deemed to include: The volumes of the cable sleeves, cable ways and cable trench excavations calculated according to the length and depth as shown on the drawings or to the bottom of the specified bedding, whichever is the largest and to the minimum base width specified The basic principles of measurement and payment for cable trench excavations is that the rate bidded for excavations covers the cost of surveying and setting out of the works, marking of cable routes using white lime , excavations, the re-use of excavated material for back filling, sifting of local soil for bedding of the cables (a 6mm grid shall be used during the sifting process), compaction and the removal of all surplus material along the trench routes and dumped off site. All excavations performed by the Contractor must be barricaded at all times in accordance with Part 11 of the Construction Regulations. All open cable trenches will be marked & protected as prescribed in the OSH Act. No trees will be removed. Plants and rubbish which are found on the cable route shall be removed by the Contractor and shall be dumped at an approved dumping site.							
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.6.1		**Hand pickable soil (soft soil)**							
	1	MV trenching to be 1200mm deep. The maximum width of a trench shall be fixed at 450mm.	m³	985					
	1	LV trenching to be 750mm deep. The maximum width of a trench shall be fixed at 450mm.	m³	0					
E1.6.2		**Machine excavation (soft rock)**							
	1	MV trenching to be 1200 mm deep. The maximum width of a trench shall be fixed at 450mm.	m³	30					
E1.6.3		**Hard rock (blasting)**							
	1	LV trenching to be 1200 mm deep. The maximum width of a trench shall be fixed at 450mm.	m³	1					
E1.6.4		**Back filling and compacting**							
	1	Backfilling every 150mm compacted to 90% AASHTO.	m³	985					
E1.6.5		**Import soil for bedding of cables**							
	1	Bedding 150mm above and below the cable as well as cover the width of the trench (maximum of 450mm).	m³	80					
E1.7		**BREAKING UP EXISTING PAVEMENT LAYERS**							
E1.7.1		**Sawing or cutting asphalt or cemented pavement**							
	1	Sawing Cemented layers	m	60					
	2	Cemented crushed stone (150mm thick)	m	30					
E1.7.2		**Excavating and spoiling material from an existing pavement and/or the underlying**							
	1	Non-cemented material	m³	0					
	2	Cemented crush stone	m³	0					
	3	Cemented material	m³	12					
E1.7.3		**Backfilling and compacting**							
		Using excavated material	m³	30					
		Using imported material including haulage	m³	10					
E1.7.4		**Unreinforced Concrete**							
	1	25Mpa/19mm concrete	m³	10					
E1.8		**Lift and reinstate existing block paving** Prices hall be deemed to include The unit of measurement shall be the area in square meters of block paving lifted All costs associated with carefully breaking/cutting out and lifting existing block paving intact, storing and maintaining the block pavers and replacing them in the same position with backing to the original lines and levels. The reinstatement of existing block pavers shall be to the satisfaction of the Engineer and must conform to the requirements of SANS 1200MJ and PSMJ If any breakage of the block pavers occur, or if they are damaged or stolen, the block pavers shall be replaced at a cost to the Contractor							
	1	Lift and reinstate existing block paving	m²	120					
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.9		**Danger Tape above Cable** SUPPLEMENTARY PREAMBLES General notes: For all cables, a coloured plastic-marking tape shall be installed 200mm above the cable. The tape shall be yellow, with red skull and crossbones with the words "ELECTRIC CABLE ". These markings shall not be more than 1m apart from centre to centre. Prices shall be deemed to include: The number of metres supplied and installed.							
	1	Coloured plastic marking tape	m	1,600					
E1.10		**SLEEVES FOR ELECTRICAL, FIBRE OPTIC AND TELEPHONE** SUPPLEMENTARY PREAMBLES Where cables cross the road, other services and where cables enter building, the cables shall be installed in Polyethylene (6mm thickness) Pipes shall be joined in accordance with the manufacture's instructions. Sleeves shall cross roads at right angles. All sleeves shall be graded 1:400 for water drainage Prices shall be deemed to include: Prices for cable sleeves is average for installation in any of the following situations a) Building into brick/concrete work b) Surface mounted against walls, concrete work c) Inside ceiling voids d) Laid in trenches etc. The number of metres of 50 / 110 / 150mm sleeves supplied & installed c/w sockets, elbows, bends, draw wires / ropes, holes and finishes through structures, etc. The sealing of all ends of all sleeves with a non-hardening watertight compound after installations of cables. All sleeves intended for future use shall likewise be sealed For the dismantling, removal from site and safe disposal of any type of sleeve & associated materials no longer required							
E1.10.1		**Engineer**							
	1	50mm diameter KABELFLEX sleeve pipes	m	42					
	2	75mm diameter KABELFLEX sleeve pipes	m	60					
	3	110mm diameter KABELFLEX sleeve pipes	m	120					
	4	75mm 90º Long radius bend	No	2					
	5	110mm 90º Long radius bend	No	2					
	6	Cable sleeve seal	No	4					
E1.10.2		**Cable Sleeves - Polyethylene (6mm Thickness)**							
	1	110mm Ø	m	60					
	2	150mm Ø	m	12					
E1.10.3		**Cable Sleeves - PVC**							
	1	50 mm Ø	m	60					
	2	110 mm Ø	m	90					
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.11 E1.11.1		**MANHOLES** **Manholes as detailed in the specifications** Prices shall be deemed to include: Excavations, backfilling, compacting & carting away surplus material, etc. Positions shall be verified on site and/or as per layout as shown in the documents.							
	1	For cable size 35mm and <35mm²	No	2					
	2	For cable size >35mm²	No	2					
E1.11.2		**Manhole Covers and Frames - SANS 558 (EN124) - as detailed in the specification - SAVRA Castings - or similar and equal to - pre-approved by the Engineer** Heavy duty cast iron as specified and coated with an approved preservative solution after installation.							
	1	Suitable for manholes of cable size 35mm and <35mm²	No	2					
	2	Suitable for manholes of cable size >35mm²	No	2					
E1.12 E1.12.1		**Cable Route Markers** **Cable Route Markers - Stainless Steel as detailed in the specifications** SUPPLEMENTARY PREAMBLES Mounting positions shall be verified on site and/or as per layout as shown in the documents.							
	1	Type A	No	30					
	2	Type B	No	4					
	3	Type C	No	30					
	4	Type D	No	4					
	5	Type E	No	4					
E1.12.2		**Cable Route Markers - Concrete - as detailed in the specifications - Vanstone - P2-1620 - or similar and equal to - pe-approved by the Engineer** SUPPLEMENTARY PREAMBLES Mounting positions shall be verified on site and/or as per layout as shown in the documents.							
	1	Cable route marker - MV	No	60					
	2	Cable route marker - JNT	No	6					
		E1 - MV Reticulation - Carried Forward							

		E1 - MV Reticulation - Brought Forward							
E1.13 E1.13.1		**Plinths & Aprons Complete with Earthing - as detailed in the specifications** Positions shall be verified on site and/or as per layout as shown in the documents. The contractor should use the measurements from the the suppliers outline drawings to price for the plinths & aprons Price shall deemed to include: Excavations, backfilling, compacting & carting away surplus material, etc. Finish raking top surface of concrete slabs, etc. to a smooth and even wood floated surface including additional dry sand/cement mixture added as necessary whilst the concrete is still wet, smooth / rough form work to sides, etc. **Plinths as specified of extra hard burnt bricks in 3:1 cement mortar aid. Internal walls of chambers shall be rendered with 3:1 cement plaster. Brick force every second layer.**							
	1	Plinth & aprons suitable for a 200kVA mini-sub	No	1					
	2	Plinth & aprons suitable for a 300kVA mini-sub	No	1					
	3	Plinth & apron suitable for a 650kVA mini-sub	No	1					
	4	Plinth & apron suitable for a 600kVA mini-sub	No	1					
	5	22mm Ply wood to safe guard plinth top openings	m²	40					
		E1 - MV Reticulation - Carried Forward							
		E1 - MV Reticulation - Brought Forward							
E1.14 E1.14.1		**PADLOCKS - as detailed in the specifications - Yale / Union - or similar and equal to - pre-approved by the Engineer** **Padlocks - Tested to SANS 12320:2012** SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: The dismantling, removal from site and safe disposal of any type of lock no longer required							
	1	Type A (a) Padlocks	No	25					
E1.15 E1.15.1		**Existing MV Network** **Tracing, detecting and marking of existing underground MV & LV cable installations**							
	1	Tracing of all underground cables including all the equipment necessary to locate cables, GPS all points (concrete / s/steel markers, road crossings, cable joints, minisubs, substations etc.) and produce Reticulation, Schematic Line Diagrams. Reticulation, Schematic Line Diagrams (A3 size) shall be framed in aluminium frames behind clear "PERSPEX" and mounted on the inside of each Minisub RMU door / brick built plantrooms etc.	Lot	1					
E.16		**MV Switchgear**							
	1	Breaker c/w protection relay and busbar extension - Make: TGOOD (SN. 2003TGS238); Type: TGS-24-20/6eVVVe, 20 kA / 3s as detailed in the specification	No	1					
	2	Full protecting relay with full reverse current protection	No	2					
E1.17		**Ancillary items - on instruction from the Engineer**							
	1	Repairs to existing external lights (Provisional amount)	Item	1	20,000	20,000.00			20,000.00
	2	Handling fee + Profit and Attendance (Item E1.23.1)	%						
		E1 - MV Reticulation - Carried to summary Page							

ORBIT TVET COLLEGE - MANKWE

ELECTRICAL INSTALLATIONS - SCHEDULE OF REMEASURABLE QUANTITIES

SCHEDULE NO E2: ELECTRICAL INSTALLATIONS - LV RETICULATION - KIOSKS AND DISTRIBUTION BOARDS

ITEM NO		DESCRIPTION	UNIT	QUAN-TITY	SUPPLY		INSTALL		TOTAL (R)
					RATE	AMOUNT	RATE	AMOUNT	
E2		**LV RETICULATION** PREAMBLES NOTE: Tenderers are advised to study SECTION C: ELECTRICAL INSTALLATION WORKS SPECIFICATION before pricing this portion SUPPLEMENTARY PREAMBLES All interruptions of the electrical supply that may be necessary for the execution of the work will be subject to prior arrangement (signed Access to an Installation Certificate) between the Contractor, the Engineer and the User Client. The selection of plant / material / equipment should be submitted with relevant manufactures data to the Engineer for approval before any installation takes place. The cost of replacing any plant / material / equipment ordered prior to approval obtained shall be borne by the contractor. The removal and replacement of materials and/or workmanship that does not conform to specification or drawings shall not constitute grounds for an extension of the construction period nor for an adjustment to the contract sum Any reference to trade names in the Bills of Quantities shall deem to mean "or similar and equal to" - pre-approved by the Engineer. Before pricing this section, the Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper installation work. The Price Schedules shall not be used for ordering purposes. The Contractor shall check the lengths of cables on site before ordering any of the cables. Prices shall be deemed to include: Installation / shop drawings Factory Acceptance Testing Packaging and transport of all equipment to site, offloading and rigging at site, spreader beams, lifting slings, etc. Temporary site works, dismantling, demolition, damage prevention measures, repairs and making good Tooling of all description Integral earthing mechanism, CT's, overload protection, infrared testing prior to commissioning, commissioning of goods, test reports (COC's, Test Reports, MV Installation Safety Reports), preparation of detailed O&M manuals, handing over of documents, etc. Warning notices and signage (no stick-on notices/signage will be allowed) as per SANS and OHS specifications Everything necessary for the execution and complete installation of the work in accordance with the description. All associated costs involved in bringing the minisubs, etc. to full operational status							

E2.1		**TESTS AND INSPECTIONS OF EXISTING PLANT AND EQUIPMENT - MINISUB D1** **Comprehensive reports** SUPPLEMENTARY PREAMBLES Descriptions Descriptions of comprehensive reports shall be deemed to include for testing, inspecting and reporting on the complete LV Reticulation installation as per scope of work, including earth test results, load tests, phase balance, insulation levels, polarity, condition of equipment, etc, including handing over of documents							
E2.1.1		**Tests and inspections on commencement of the contract. Complete LV Reticulation installation** **Testing / Report for scope definition**							
	1	Test, inspect and provide a comprehensive report on the complete LV reticulation installation including load tests to establish the total load of the buildings, phase balancing, etc..	Item	1					
E2.1.2		**Decommissioning testing and commissioning of the complete LV installation as specified** SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: The number of electrical installations (from local point of supply) that are energised with electrical circuit installations fully completed and tested and all necessary test results and test certificates submitted. In addition, all testing is to be included in the rate, which will include cable pressure and insulation testing, voltage drop, full load, fault level, loop impedance and earth testing.							
	1	Decommissioning, testing and commissioning	Lot	1					
E2.2		**INFRARED (SCANNING) THERMOGRAPHY SURVEYS of the complete electrical installation**							
E2.2.1		**Carry out surveys on each piece of LV equipment for initial inspection and submit a comprehensive report to the Engineer - DB's and Kiosks**							
	1	Normal supply (cables, switchgear, transformers, etc.) for connection, overloading and misbalancing issues	Lot	1					
E2.2.2		**Carry out surveys on each piece of LV equipment for final inspection and submit a comprehensive report to the Engineer - DB's and Kiosks**							
	1	Normal supply (cables, switchgear, transformers,etc.) for connection, overloading and misbalancing issues	Lot	1					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.3		**LABELLING OF ALL TYPES OF EXISTING DISTRIBUTION BOARDS - as detailed in the specification** SUPPLEMENTARY PREAMBLES Provision of labels Labels shall be provided as specified identifying each switchboard and each outgoing circuit, including all equipment on inside and outside of the switchboards indicating functions and ratings All equipment on switchboards shall be identified with the necessary labels. 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 (A4) as detailed in the specification, laminated and covered by removable 2.0mm thick transparent acrylic plastic ('PERSPEX') or equivalent and shall be installed on the inside of the door/s of the boards or cubicles or in any other position, pre-approved by the Engineer where it can conveniently be observed. Prices are deemed to include: For labels and the fixing thereof For the dismantling, removal from site and safe disposal of any type of label/s no longer required							
E2.3.1		**Labelling**							
	1	MV & LV Panels - Normal, Emergency & UPS	Lot	1					
E2.4		**CONDUCTORS - complete electrical installation - as detailed in the specification** SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: The tracing and marking of the entire existing MV / LV cable installation from main MV & LV panels / switchgear to other switchboards / sub-switchboards etc. c/w cable tags as detailed in the specification on which the following is given a) The size of the conductors; and b) The number of phases; and c) The route (“from” or “to”); and d) The system voltages							
	1	Tracing and marking of the entire existing MV & LV cable installation	Lot	1					
	2	Reticulation, Schematic Line Diagrams (A3) laminated and framed in aluminium frames behind clear 2mm thick transparent acrylic plastic ('PERSPEX') or equivalent and shall be installed on the inside of each DB door or in any other position, pre-approved by the Engineer where it can conveniently be observed indicating DB positions	Lot	1					
E2.5		**SERVICE OF EXISTING PLANT AND EQUIPMENT of the complete electrical installation as per scope of work.** SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: The servicing of plant and equipment includes, cleaning of switchgear and panels, replacing blank covers, replacing missing panel bolts and nuts, locking mechanisms, replacing of panel covers, repairing / replacing of faulty terminations, etc.							
	1	LV equipment - Normal, UPS & Emergency supply equipment (cables, switchgear, panels etc.)	Lot	1					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.6		**LV DISTRIBUTION BOARDS & POWER DISTRIBUTION CUBICLES (KIOSKS) - as detailed in the specification / Single Line Diagrams (SLD's)** SUPPLEMENTARY PREAMBLES Descriptions The contractor is to verify the sizes of Distribution Boards on site prior of placing an order Prices shall be deemed to include: Descriptions of LV distribution panels shall be deemed to include busbars, jumpers, neutral bars, internal wiring and connections, space for future equipment, blanking and the like, circuit identification markers, control gear labels, circuit legend cards, working drawings, signage as detailed in the specification, etc. All associated costs involved in bringing each panel to full operational status For the dismantling, removal from site and safe disposal of any type of distribution board no longer required							
E2.6.1		**LOW VOLTAGE DISTRIBUTION BOARDS - as detailed in the specifications**							
	1	Type A (Plugs)	No	20					
	2	Type B (Lights)	No	10					
	3	Type C (Plugs and Lights)	No	14					
	4	Type D (PV Plant)	No	8					
	5	Type E (House DB)	No	1					
	6	DB SMB-1	No	1					
	7	DB SMB 2	No	1					
E2.6.2		**LOW VOLTSGE CUBICLES (KIOSKS) c/w a hollow foundation cast of concrete, apron, etc. - as detailed in the specifications** Prices shall be deemed to include: Descriptions of LV distribution panels shall be deemed to include busbars, jumpers, neutral bars, internal wiring and connections, space for future equipment, blanking and the like, circuit identification markers, control gear labels, circuit legend cards, working drawings, signage as detailed in the specification, etc. Excavations, backfilling, compacting & carting away surplus material, etc. All associated costs involved in bringing each panel to full operational status For the dismantling, removal from site and safe disposal of any type of distributtion Kiosk no longer required							
	1	Type A - Staff Quarters	No	5					
	2	Type B - Residences	No	7					
E2.6.3		**Removal of existing Kiosks, DB's, etc.** SUPPLEMENTARY PREAMBLES Before pricing this section, the Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper dismantling and removal work. Prices shall be deemed to include: The unit rate for each item in the Price Schedules shall include for de-commissioning and termination of all goods, all materials, tooling of all description, spreader beams, lifting slings, labour, loading and rigging, removal from site, etc. - Rate to include removal of all old cabling and wiring that will not be re-used Demolishing of existing plinths, back filling and compaction, removal of surplus material and dump off site, etc.							
	1	LV Kiosks	No	12					
	2	LV Distribution Boards	No	2					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.7		**Distribution** SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: Re-arrangement of existing circuit breakers, installation of new breakers c/w bridge pieces, etc. Each piece of equipment supplied, installed, tested & commissioned c/w labels as detailed in the specification.							
E2.7.1		**Miniature Circuit Breakers (MCB's) - SANS 556-1 - IEC 60947-2 ; c/w standard accessories, bridge bars (Copper Nickel Plated), din rails, etc.**							
	1	10A - 6kA - 240 Vac curve 1 (slow) single pole to protect lighting circuits	No	40					
	2	20A - 6kA - 240 Vac curve 1 (slow) single pole to protect lighting circuits	No	12					
	3	20A - 6kA - 240 Vac curve 1 (slow) single pole to protect electrical circuits	No	60					
	4	30A - 6kA - 240 Vac curve 1 (slow) single pole to protect electrical circuits	No	13					
	5	40A - 6KA - 240 Vac curve 1 (slow) single pole to protect electrical circuits	No	6					
	6	60A - 6kA - 240 Vac curve 1 (slow) single pole to protect electrical circuits	No	3					
	7	80A - 6kA - 240 Vac curve 1 (slow) single pole to protect electrical circuits	No	6					
	8	20A - 6kA - 415 Vac curve 1 (slow) two pole to protect electrical circuits	No	12					
	9	30A - 6kA - 415 Vac curve 1 (slow) two pole to protect electrical circuits	No	6					
	10	40A - 6kA - 415 Vac curve 1 (slow) two pole to protect electrical circuits	No	3					
	11	63A - 6kA - 415 Vac curve 1 (slow) two pole to protect electrical circuits	No	6					
	12	20A - 6kA - 415 Vac curve 1 (slow) three pole to protect electrical circuits	No	6					
	13	30A - 6kA - 415 Vac curve 1 (slow) three pole to protect electrical circuits	No	8					
	14	40A - 6kA - 415 Vac curve 1 (slow) three pole to protect electrical circuits	No	6					
	15	50A - 6kA - 415 V AC curve 1 (slow) three pole to protect electrical circuits	No	6					
	16	60A - 6kA - 415 Vac curve 1 (slow) three pole to protect electrical circuits / DB control gear	No	4					
	17	80A - 6kA - 415 Vac curve 1 (slow) three pole to protect electrical circuits / DB control gear	No	3					
	18	100A - 6kA - 415 Vac curve 1 (slow) three pole to protect electrical circuits / DB control gear	No	3					
	19	125A - 6kA - 415 Vac curve 1 (slow) three pole to protect electrical circuits / DB control gear	No	3					
	20	Din / mini Rail	m	4					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.7.2		**EARTH LEAKAGE RELAY - DIN MOUNT - TYPE A - SANS 767 c/w accessories, etc.**							
	1	63A 1-pole+N-30mA - 240 Vac - 50Hz with overload protection	No	30					
	2	63A 3-pole+N-30mA - 400 Vac - 50Hz with overload protection	No	4					
E2.7.3		**SURGE ARRESTOR - DIN MOUNT - SANS 61643-1 c/w accessories, etc.**							
	1	1-pole+N (8/20µs) 10kA 275 Vac with remote indicator	No	160					
	2	3-pole+N (8/20µs) 10kA 275 Vac with remote indicator	No	48					
E2.7.4		**CONTACTOR - DIN Mount - SANS 60947 - 240V / 415V for low voltage power systems c/w accessories, etc**							
	1	18A - 7.5KW - 240 Vac	No	2					
	2	25A -11KW - 240 Vac	No	2					
	3	32A - 15KW - 240 Vac	No	2					
	4	38A - 18.5KW - 240 Vac	No	2					
	5	25A - 11KW - 415 Vac	No	2					
	6	32A - 15KW - 415 Vac	No	2					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.8		**ELECTRICAL LV SUPPLY CABLES - SANS 150 & 1507** SUPPLEMENTARY PREAMBLES All MV, HT & LV underground / surface cables shall be stranded copper-core, 600/1000 Volt grade, multi-cored, PVC insulated, PVC covered, wire armoured and PVC encased (PVC/SWA/PVC) unless otherwise specified No joints are allowed in distribution cables, accept where it is specifically authorised. The low voltage cable in a continuous cable run must be of one size, except where a change in cable size is necessary, in which case the change must be approved by the Engineer. Mounting positions shall be verified on site and/or as per layout as shown in the documents Prices shall be deemed to include Conductors supplied & installed in any of the following positions a) Laid in trenches, trench boxes b) Drawn into ducts / shafts, sleeves, conduits, etc. c) Surface mount horizontal / vertical on cable ladders / trays, etc The conductor length, any type & size in meters supplied & installed c/w suitable clamps (cleats / Q clamps) consisting of adjustable metal wings spaced at intervals as detailed in the specification, draw wires / ropes, holes and finishes through structures, labelling as detailed in the specification, etc. Termination of cable ends (of armoured copper cable) onto switchgear or distribution boards. The rate shall include all labour and material for making off of cable ends, c/w non-corrodible metal compression glands. Glands shall be complete with earthing ferrules, locknuts, bushes and shrouds. BCEW Terminations shall include all the lugs and insulating material needed to complete the termination, including exothermic welding, glands/clamps for securing the cable. Cable marking and colour coding as detailed in the specification All associated costs involved in bringing each conductor length installed to full operational status All associated costs for the dismantling, removal from site and safe disposal of any type / size conductor & associated materials no longer required							
E2.8.1		**PVC insulated PVC bedded SWA PVC CU sheathed cables. SANS 1507-3.**							
E2.8.1.1		**95mm² 4-core PVC/SWA/PVC Cu**							
	1	95mm² 4-core PVC/SWA/PVC Cu	m	40					
	2	95mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	95mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	50mm² CCS 'CAMO' Earth Conductor	m	40					
	5	50mm² CCS 'CAMO' Earth Conductor terminations	No	1					
	6	50mm² CCS 'CAMO' Earth Conductor joints	No	1					
E2.8.1.2		**70mm² 4-core PVC/SWA/PVC Cu**							
	1	70mm² 4-core PVC/SWA/PVC Cu	m	60					
	2	70mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	70mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	35mm² CCS 'CAMO' Earth Conductor	m	60					
	5	35mm² CCS 'CAMO' Earth Conductor terminations	No	4					
	6	35mm² CCS 'CAMO' Earth Conductor joints	No	2					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.8.1.3		**50mm² 4-core PVC/SWA/PVC Cu**							
	1	50mm² 4-core PVC/SWA/PVC Cu	m	90					
	2	50mm² 4-core PVC/SWA/PVC Cu terminations	No	18					
	3	50mm² 4-core PVC/SWA/PVC Cu cable joints	No	8					
	4	35mm² CCS 'CAMO' Earth Conductor	m	90					
	5	35mm² CCS 'CAMO' Earth Conductor terminations	No	18					
	6	35mm² CCS 'CAMO' Earth Conductor joints	No	8					
E2.8.1.4		**35mm² 4-core PVC/SWA/PVC Cu**							
	1	35mm² 4-core PVC/SWA/PVC Cu	m	80					
	2	35mm² 4-core PVC/SWA/PVC Cu terminations	No	4					
	3	35mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	16mm² CCS 'CAMO' Earth Conductor	m	80					
	5	16mm² CCS 'CAMO' Earth Conductor terminations	No	2					
	6	16mm² CCS 'CAMO' Earth Conductor joints	No	2					
E2.8.1.5		**25mm² 4-core PVC/SWA/PVC Cu**							
	1	25mm² 4-core PVC/SWA/PVC Cu	m	160					
	2	25mm² 4-core PVC/SWA/PVC Cu terminations	No	14					
	3	25mm² 4-core PVC/SWA/PVC Cu cable joints	No	1					
	4	16mm² CCS 'CAMO' Earth Conductor	m	160					
	5	16mm² CCS 'CAMO' Earth Conductor terminations	No	14					
	6	16mm² CCS 'CAMO' Earth Conductor joints	No	2					
E2.8.1.6		**16mm² 4-core PVC/SWA/PVC Cu**							
	1	16mm² 4-core PVC/SWA/PVC Cu	m	165					
	2	16mm² 4-core PVC/SWA/PVC Cu terminations	No	22					
	3	16mm² 4-core PVC/SWA/PVC Cu cable joints	No	12					
	4	10mm² BCEW	m	165					
	5	10mm² BCEW terminations	No	22					
E2.8.1.7		**10mm² 4-core PVC/SWA/PVC Cu**							
	1	10mm² 4-core PVC/SWA/PVC Cu	m	140					
	2	10mm² 4-core PVC/SWA/PVC Cu terminations	No	22					
	3	6mm² 4-core PVC/SWA/PVC Cu cable joints	No	14					
	4	6mm² BCEW	m	140					
	5	6mm² BCEW terminations	No	22					
E2.8.1.8		**6mm² 4-core PVC/SWA/PVC Cu**							
	1	6mm² 4-core PVC/SWA/PVC Cu	m	90					
	2	6mm² 4-core PVC/SWA/PVC Cu terminations	No	12					
	3	6mm² 4-core PVC/SWA/PVC Cu cable joints	No	4					
	4	4mm² BCEW	m	90					
	5	4mm² BCEW terminations	No	12					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.8.1.9		**Bare Copper Earth Wire Cable - SANS 1411-1**							
	1	4mm² BCEW	m	150					
	2	6mm² BCEW	m	80					
	3	10mm² BCEW	m	80					
	1	16mm² BCEW	m	65					
	2	25mm² BCEW	m	60					
	3	50mm² BCEW	m	100					
E2.8.1.10		**MV/LV Cable Joint Kits - 2, 3 or 4 Core Armoured Cables c/w crimping ferrules, etc.** Cable joints are not permissible except where specifically approved. No joints will be allowed where the specified length of cable appears on a drum.							
	1	4 - 10mm²	No	1					
	2	10 - 16mm²	No	1					
	3	16 - 35mm²	No	1					
	4	35 - 50mm²	No	1					
	5	50 - 95mm²	No	1					
	6	95 - 150mm²	No	1					
E2.9 E2.9.1		**High conductivity annealed stranded copper conductors to SANS 1411 Part 1. Insulated with PVC and skin coloured in plain colours to SANS 1411 Part 2. Cable is manufactured to SANS 1507 Part 2. 600 / 1000V** **Single Core Low Friction General Purpose Cable** The loop-in system shall be followed throughout, and no joints of any description will be permitted. SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: The conductor length, any type / size in meters drawn into conduit, trunking, power skirting, surface mounted, under plaster, in hollow walls, in open roof spaces, etc. c/w terminations, draw wires, etc. BCEW Terminations shall include all the lugs and insulating material needed to complete the termination, including exothermic welding, glands/clamps for securing the cable. The dismantling, removal from site and safe disposal of any type / size conductor & associated materials no longer required							
	1	2.5mm² PVC	m	25					
	2	2.5 mm² Stranded BCEW	m	25					
	3	4mm² PVC	m	25					
	4	2.5 mm² Stranded BCEW	m	25					
	5	6mm² PVC	m	25					
	6	4mm² Stranded BCEW	m	25					
	7	10mm² PVC	m	25					
	8	6mm² Stranded BCEW	m	25					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.10		**TRENCHING AND EARTHWORKS** **Excavation of all material for trenches, backfill, compaction and removal of excess material.** SUPPLEMENTARY PREAMBLES Existing services: There are a number of existing services within the site boundaries, none of these are shown on the drawings. The contractor is not relieved of the responsibility of locating all existing services prior to construction. There are existing water, storm water, telephone, communications and electrical services on the site. Work is to be carried out without any disruption to existing services, this includes instances where newly constructed services are to be connected to existing 'live' services. Nature of ground The nature of the ground is assumed to be gravel, therefor "earth", but possibly interspersed with "soft rock" or "hard rock" Excavations No claim for "soft" or "hard rock" excavations will be entertained unless the contractor has timeously notified the Engineer thereof prior to backfilling General The contractor will be held responsible for damage to any existing services brought to his attention by the relevant authorities and shall be responsible for the cost of repairs. The Contractor must take all necessary precautions to prevent the trenching work being in any way a hazard to the personnel and students and to safeguard all structures, roads, sewage works or other property on the site from any risk of subsidence and damage. The contractor shall not commence with backfilling of trenches without prior notification of the Electrical 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. Foundations and excavations should be kept water free and the contractor must supply all pumps etc. that may be necessary for clearing out water. On completion, the surface shall be made good to match the surrounding area. In cases of roadways or paved areas the excavations shall be consolidated to the original density of the surrounding material and the surface finish reinstated No cable is to be laid before the cable trench is approved and the soil qualification of the excavation is agreed upon by the Contractor and Engineer. Prices are deemed to include: The volumes of the cable sleeves, cable ways and cable trench excavations calculated according to the length and depth as shown on the drawings or to the bottom of the specified bedding, whichever is the largest and to the minimum base width specified The basic principles of measurement and payment for cable trench excavations is that the rate bidded for excavations covers the cost of excavations, the re-use of excavated material for back filling, sifting of local soil for bedding of the cables (a 6mm grid shall be used during the sifting process,) compaction and the removal of all surplus material along the trench routes and dumped off site. All excavations performed by the Contractor must be barricaded at all times, in accordance with the OHS Act (Act 85 of 1993). The barricading shall be approved by the clients Electrical Engineer for each project site. All trees, plants, rubbish and structures which are found on the cable route shall be removed by the Contractor and shall be dumped at the approved dumping site. The rate for the laying of the cable covers the cost of the handling and placing of the cable in the approved trench, as well as any other costs concerning the laying of the cables.							
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.10.1		**Hand pickable soil (soft soil)**							
	1	LV trenching to be 750mm deep. The maximum width of a trench shall be fixed at 450mm.	m³	60					
E2.10.2		**Machine excavation (soft rock)**							
	1	LV trenching to be 750 mm deep. The maximum width of a trench shall be fixed at 450mm.	m³	5					
E2.10.3		**Hard rock (blasting)**							
	1	LV trenching to be 750 mm deep. The maximum width of a trench shall be fixed at 450mm.	m³	1					
E2.10.4		**Back filling and compacting**							
	1	Backfilling every 150mm compacted to 90% AASHTO.	m³	60					
E2.10.5		**Import soil for bedding of cables**							
	1	Bedding 150mm above and below the cable as well as cover the width of the trench (maximum of 450mm).	m³	20					
E2.11		**BREAKING UP EXISTING PAVEMENT LAYERS**							
E2.11.1		**Sawing or cutting asphalt or cemented pavement**							
	1	Sawing Cemented layers	m	80					
	2	Cemented crushed stone (150mm thick)	m	50					
E2.11.2		**Excavating and spoiling material from an existing pavement and/or the underlying**							
	1	Non-cemented material	m³	5					
	2	Cemented crush stone	m³	5					
	3	Cemented material	m³	12					
E2.11.3		**Backfilling and compacting**							
	1	Using excavated material	m³	20					
	2	Using imported material including haulage	m³	5					
E2.11.4		**Unreinforced Concrete**							
	1	25Mpa/19mm concrete	m³	5					
E2.11.5		**Lift and reinstate existing block paving** Prices hall be deemed to include The unit of measurement shall be the area in square meters of block paving lifted All costs associated with carefully breaking/cutting out and lifting existing block paving intact, storing and maintaining the block pavers and replacing them in the same position with backing to the original lines and levels. The reinstatement of existing block pavers shall be to the satisfaction of the Engineer and must conform to the requirements of SANS 1200MJ and PSMJ If any breakage of the block pavers occur, or if they are damaged or stolen, the block pavers shall be replaced at a cost to the Contractor							
	1	Lift and reinstate existing block paving	m²	120					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.12		**Danger Tape above Cable** SUPPLEMENTARY PREAMBLES General notes: For all cables, a coloured plastic-marking tape shall be installed 200mm above the cable. The tape shall be yellow, with red skull and crossbones with the words "ELECTRIC CABLE ". These markings shall not be more than 1m apart from centre to centre. Prices shall be deemed to include: The number of metres supplied and installed.							
	1	Coloured plastic marking tape	m	500					
E2.13		**SLEEVES FOR ELECTRICAL, FIBRE OPTIC AND TELEPHONE** SUPPLEMENTARY PREAMBLES Where cables cross the road, other services and where cables enter building, the cables shall be installed in Polyethylene (6mm thickness) Pipes shall be joined in accordance with the manufacture's instructions. Sleeves shall cross roads at right angles. All sleeves shall be graded 1:400 for water drainage Prices shall be deemed to include: Prices for cable sleeves is average for installation in any of the following situations a) Building into brick/concrete work b) Surface mounted against walls, concrete work c) Inside ceiling voids d) Laid in trenches etc. The number of metres of 50 / 110 / 150mm sleeves supplied & installed c/w sockets, elbows, bends, draw wires / ropes, holes and finishes through structures, etc. The sealing of all ends of all sleeves with a non-hardening watertight compound after installations of cables. All sleeves intended for future use shall likewise be sealed For the dismantling, removal from site and safe disposal of any type of sleeve & associated materials no longer required							
E2.13.1		**Engineer**							
	1	50mm diameter KABELFLEX sleeve pipes	m	30					
	2	75mm diameter KABELFLEX sleeve pipes	m	65					
	3	110mm diameter KABELFLEX sleeve pipes	m	120					
	4	75mm 90º Long radius bend	No	1					
	5	110mm 90º Long radius bend	No	2					
	6	Cable sleeve seal	No	4					
E2.13.2		**Cable Sleeves - PVC**							
	1	50 mm Ø	m	20					
	2	110 mm Ø	m	60					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.14		**INSTALLATION AND TERMINATION OF CONDUITS AND CONDUIT ACCESSORIES - as detailed in the specifications** SUPPLEMENTARY PREAMBLES Mounting positions shall be verified on site and / or as per layout as shown in the documents **CONDUIT IN ROOF SPACES** Where non-metallic conduit has been specified for a particular service, the conduit shall be supported and fixed with saddles with a maximum spacing of 450 mm. The Contractor shall supply and install all additional supporting timbers in the roof space as required. Conduits Conduits shall be of the "Looping System" Prices shall be deemed to include: The unit of measure shall be the length of conduit supplied and installed; inclusive in the rate is draw wire in the conduit, testing of the conduit for blockages and all necessary accessories, slow 90° bends, couplings, adaptors, connectors, lock nuts, joints, elbow-joints, heavy duty conduit hospital saddles, anchor bolts, threading, conduit terminations, round boxes, PVC bonding fluid, holes and finishes through structures, etc. Fixing shall be in any of the following positions: a) In open roof spaces b) Surface mounted against walls, concrete slabs etc c) in wall chases d) cast in concrete e) In power skirting The dismantling, removal from site and safe disposal of any type of conduit & associated materials no longer required							
E2.14.1		**Galvanised Steel Conduit - SANS ISO 1461:1999**							
	1	20mm	m	100					
	2	20mm - Type KEU (KOPEX) flexible metallic	m	6					
	3	60mm Ø round box Galv 20mm entries (1/2/3/4 way)	No	8					
	4	25mm	m	40					
	5	25mm - Type KEU (KOPEX) flexible metallic	m	5					
	6	60mm Ø round box Galv 25mm entries (1/2/3/4 way)	No	6					
E2.14.2		**PVC Conduit - SANS 61386-2**							
	1	20mm	m	60					
	2	20mm - flexible	m	10					
	3	60mm Ø round box PVC 20mm entries (1/2/3/4 way)	No	12					
	4	Socket class conduit box - round - 50mm - white	No	2					
	5	25mm	m	30					
	6	25mm - flexible	m	6					
	7	60mm Ø round box PVC 25mm entries (1/2/3/4 way)	No	8					
	8	Socket class conduit box - round - 50mm - white	No	4					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
E2.14.3		**Utility Junction Box**							
	1	Suitable for 4 Way connections - 80mm	No	2					
E2.14.4		**Boxes complete with smooth walls, plain screwed lids etc. IP 55**							
	1	100 x 100 x 50mm	No	1					
	2	150 x 110 x 70mm	No	1					
	3	120 x 80 x 50 mm	No	1					
E2.15		**GALVANISED CHANNELS AND CABLE LADDERS / TRAYS** SUPPLEMENTARY PREAMBLES Mounting positions shall be verified on and / or as per layout shown in the documents Prices shall be deemed to include: All additional supporting timbers in the roof spaces as required. The unit of measure shall be the length of cable trays supplied and installed. Fixing shall be in any of the following positions: a) in open roof spaces suspended from soffits/trusses b) surface mounted against brick/concrete walls/soffits Standard accessories, fixing, M10 threaded rods and drop in anchors, splice sets, fasteners, couplers, hangers, holes and finishes through structures, shield anchors, Q clamps, P1000 Unistrut cable tray supports (supports spaced at 1000mm apart), strut nuts, coated with cold galvanising at all joints, sections that have been cut and at places where the galvanising has been damaged etc. For the dismantling, removal from site and safe disposal of any type of cable tray, ladder, duct & associated material no longer required							
E2.15.1		**MCT Medium Duty Perforated Cable Trays & Accessories Material: Mild Steel to BS 1449-1:1991: Hot Dipped Galvanised to SANS 121:2011/ISO 1461:2009 - Trapeze installation - as detailed in the specification**							
	1	MCT 229mm Cable Tray Straight	m	60					
	1	MCT 229mm 90° Horizontal Bend - (R450)	No	4					
	2	MCT 229mm 90° Internal Bend (R450)	No	4					
	3	MCT 229mm 90° External Bend (R450)	No	2					
	4	MCT 229mm Equal Tee (R450)	No	1					
	5	MCT 229 Equal 4Way (R450)	No	1					
E2.15.2		**Wiring Duct and Accessories - Galv Steel - SANS 3537:1996 Grade Z275 - as detailed in the specification**							
	1	P8000 (76 x 76 x 0.8mm x 3m) straight duct c/w covers	m	30					
	2	P8000 Std splice	No	0					
	3	4.0mm x 10mm Alum/Steel Blind Rivets	Lot	1					
	4	P8000 End cap	No	4					
		E2 - LV Reticulation - Carried Forward							

		E2 - LV Reticulation - Brought Forward							
	5	P8000 STD 90° Horizontal, Internal, External Elbow	No	4					
	6	P8000 STD Tee piece	No	1					
	7	P8000 STD 4Way piece	No	1					
	9	P8335 (P8000) Channel Hanger c/w Bolts & Nuts	No	30					
E1.16		**Core Drilling** SUPPLEMENTARY PREAMBLES Drilling positions shall be verified on site and/or as per lay out shown in the documents Prices for core drilling is average for installation in any of the following positions including water supply, finishes through structures, etc. a) through brick walls - 110 to 230mm thickness b) through re-enforced concrete - 110 to 330mm thickness							
	1	75mm Ø holes	No	4					
	2	100mm Ø holes	No	4					
	3	150mm Ø holes	No	1					
E2.14 E2.14.1		**Cable Route Markers** **Cable Route Markers - Stainless Steel as detailed in the specifications** SUPPLEMENTARY PREAMBLES Mounting positions shall be verified on site and/or as per layout as shown in the documents.							
	1	Type A	No	12					
	2	Type B	No	2					
	3	Type C	No	12					
	4	Type D	No	1					
	5	Type E	No	1					
E2.14.2		**Cable Route Markers - Concrete - as detailed in the specifications - Vanstone - P2-1620 - or similar and equal to - pe-approved by the Engineer** SUPPLEMENTARY PREAMBLES Mounting positions shall be verified on site and/or as per layout as shown in the documents.							
	1	Cable route marker - MV	No	24					
	2	Cable route marker - JNT	No	6					
		E2 - LV Reticulation - Carried Forward							

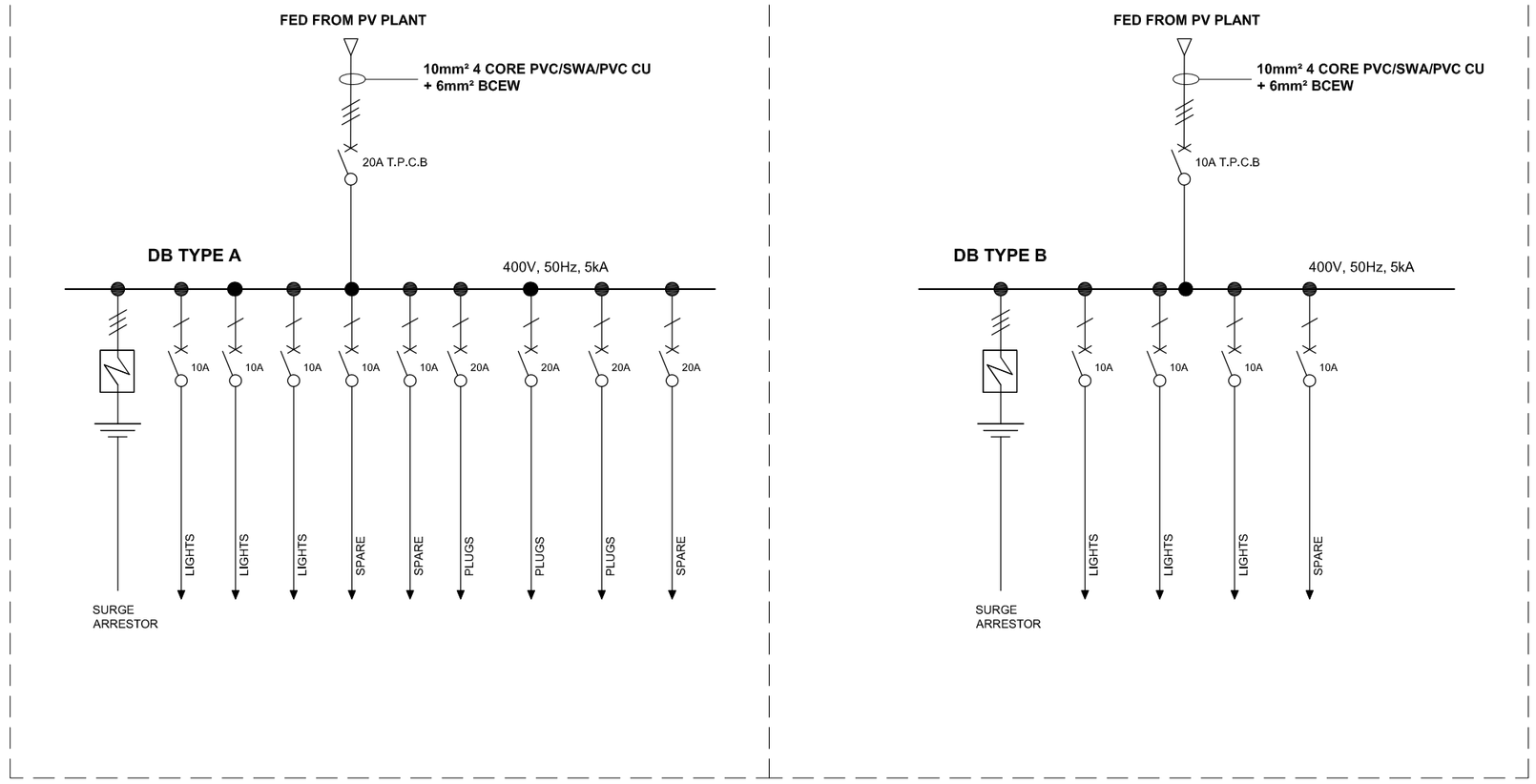
		E2 - LV Reticulation - Brought Forward							
E2.15 E2.15.1		**PADLOCKS - as detailed in the specifications - Yale / Union - or similar and equal to - pre-approved by the Engineer** **Padlocks - Tested to SANS 12320:2012** SUPPLEMENTARY PREAMBLES Prices shall be deemed to include: The dismantling, removal from site and safe disposal of any type of lock no longer required							
	1	Type A (a) Padlocks	No	28					
E2.16 E2.16.1		**Existing LV Network** **Tracing, detecting and marking of existing underground LV cable installations**							
	1	Tracing of all underground cables including all the equipment necessary to locate cables, GPS all points (concrete / s/steel markers, road crossings, cable joints, minisubs, substations etc.) and produce Reticulation, Schematic Line Diagrams. Reticulation, Schematic Line Diagrams (A3 size) shall be framed in aluminium frames behind clear "PERSPEX" and mounted on the inside of each Minisub RMU door / brick built plantrooms etc.	Lot	1					
		E2 - LV Reticulation - Carried to Summary Page							

ORBIT TVET COLLEGE - MANKWE - MV & LV RETICULATION

SUMMARY OF SCHEDULE OF REMEASURABLE QUANTITIES

SCHEDULE NO PG	INSTALLATION: PRELIMINARIES	
SCHEDULE NO E1	INSTALLATIONS: MV RETICULATION & MINIATURE SUBSTATIONS	
SCHEDULE NO E2	INSTALLATION: LV ELECTRICAL	
	SUB- TOTAL	
	CONTINGENCIES @ 2.5%	
TOTAL OF SCHEDULE OF REMEASURABLE QUANTITIES CARRIED TO TENDER FORM		

PART 21: DRAWINGS



INSTALLATION AND MANUFACTURERS NOTES

1. EARTH LEAKAGE UNITS: ALL EARTH LEAKAGE UNITS WITH OVERLOAD PROTECTION
2. MCB's: ALL MINIATURE CIRCUIT BREAKERS QF 19 (CURVE 1)
3. ALL DIMENSIONS AND LEVELS ARE TO BE VERIFIED ON SITE PRIOR COMMENCING SETTING OUT, WORKSHOP DRAWINGS OR CONSTRUCTION THEREOF
4. DISCREPANCIES , ERRORS AND OMISSIONS ARE TO BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY THEY BECOME EVIDENT
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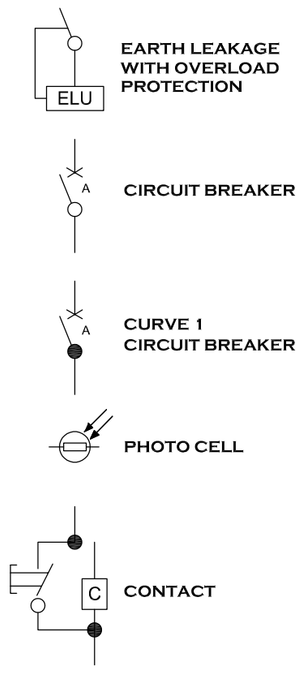
9. SPECIFICATION REQUIREMENTS: AS DETAILED IN THE SPECIFICATION
10. ALLOW FOR MINIMUM 25% SPARE SPACE
11. ALLOW FOR CASCADING

RESPONSIBLE PROFESSIONAL			
DATE	NAME	SIGNATURE	PR NUMBER
19/07/2023	A.MACKENZIE,Pr.Eng		950495

No.	DATE	DESCRIPTION	SIGN

LEGEND



EARTH LEAKAGE WITH OVERLOAD PROTECTION

CIRCUIT BREAKER

CURVE 1 CIRCUIT BREAKER

PHOTO CELL

CONTACT

client

ORBIT TVET COLLEGE

consultant

emzansi CONSULTING

Tel: (012) 345 3383 Fax: (012) 345 4583

discipline

ELECTRICAL

service

MANKWE

WCS number

.

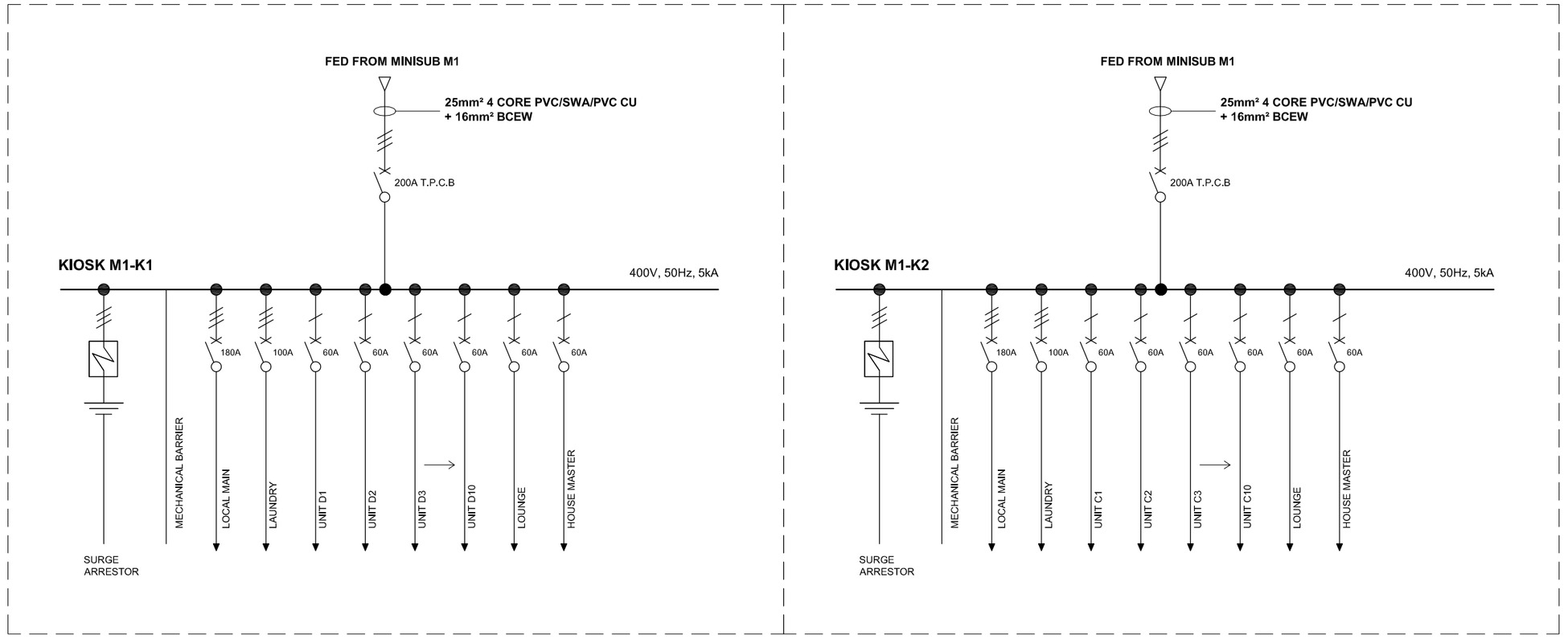
drawing title

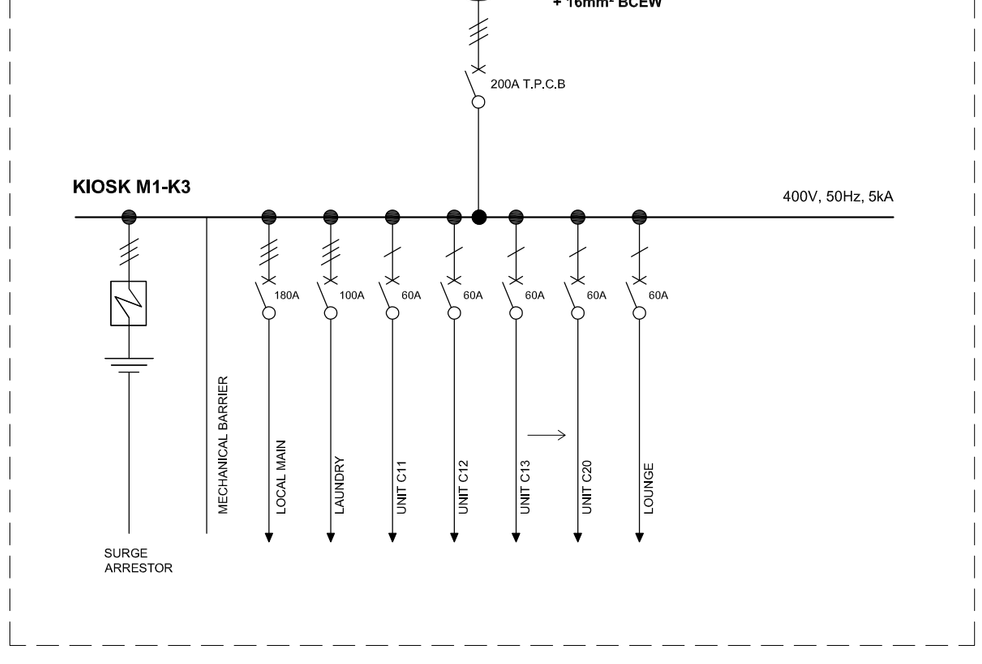
SINGLE LINE DIAGRAM
LAYOUT: DB Type A and DB Type B

ref.no. .	designed B.E
scale N.T.S	drawn K.N
date 2023-07-19	checked A.M

Drawing number

OTVET - E04





INSTALLATION AND MANUFACTURERS NOTES

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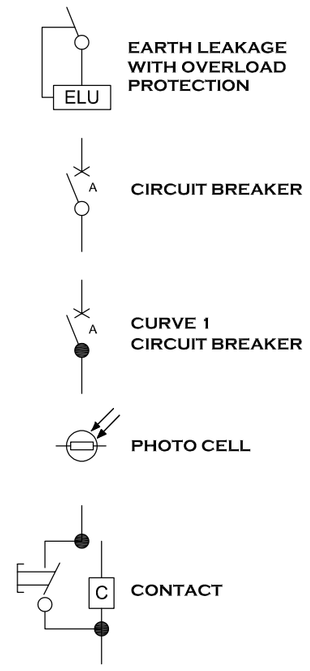
RESPONSIBLE PROFESSIONAL

DATE	NAME	SIGNATURE	PR NUMBER
19/07/2023	A.MACKENZIE,Pr.Eng		950495

No.	DATE	DESCRIPTION	SIGN

LEGEND



client

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discipline

ELECTRICAL

service

MANKWE

WCS number

.

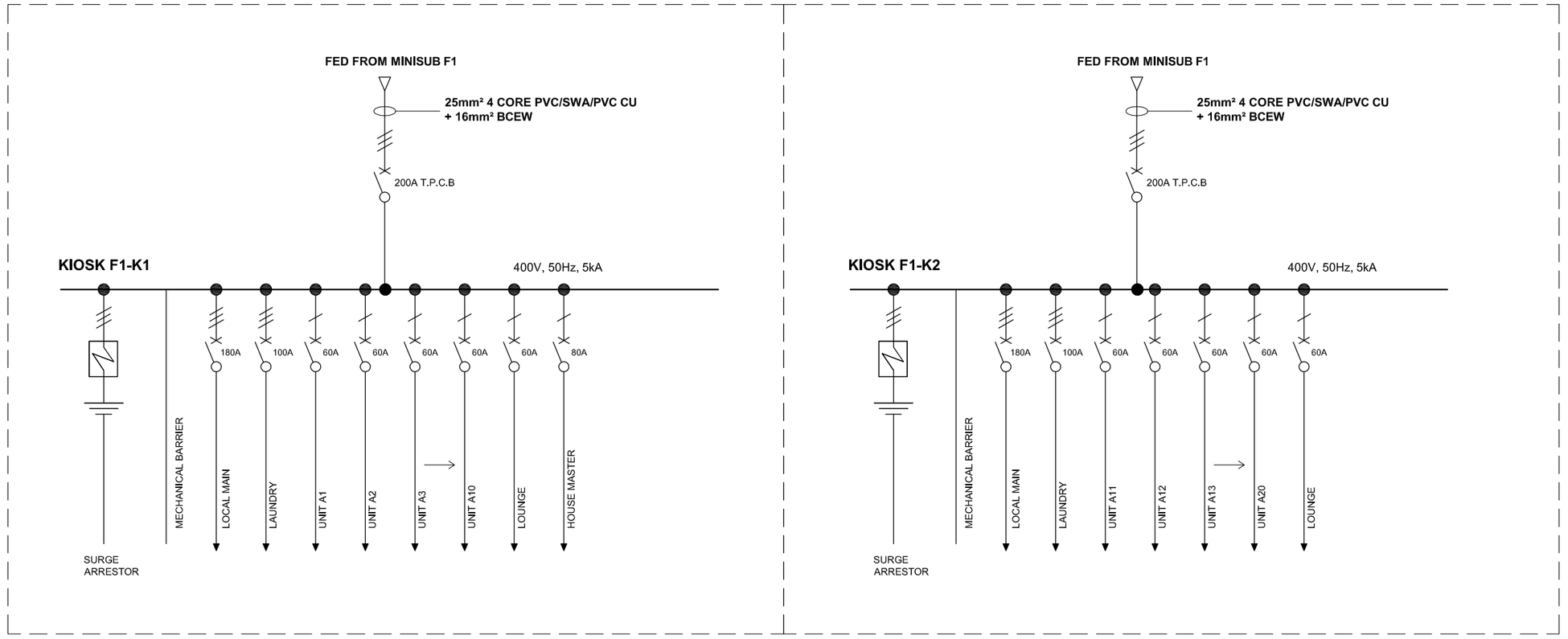
drawing title

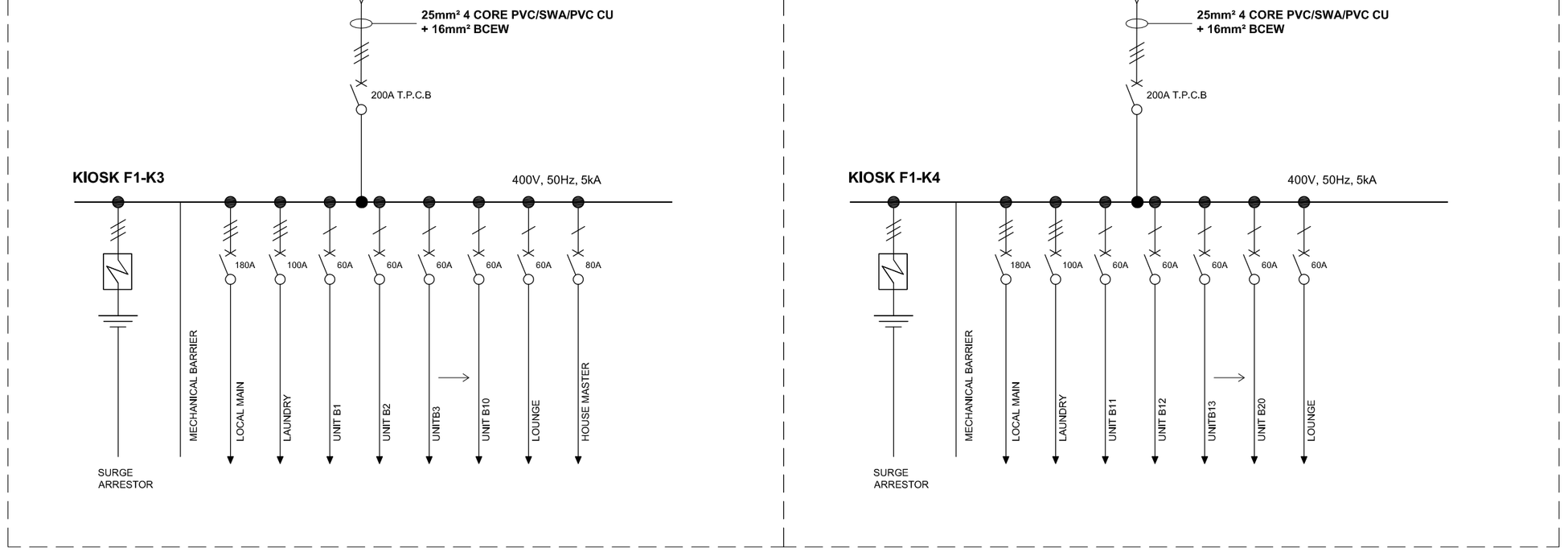
SINGLE LINE DIAGRAM
LAYOUT: KIOSK FEMALE
RESIDENCE

ref.no. .	designed B.E
scale N.T.S	drawn K.N
date 2023-07-19	checked A.M

Drawing number

OTVET - E11





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RESPONSIBLE PROFESSIONAL

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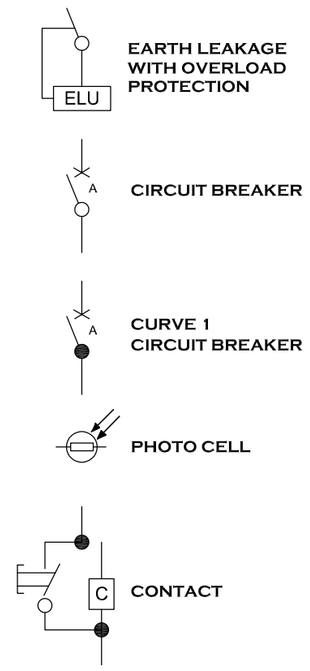

client

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consultant

emzansi CONSULTING

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discipline

ELECTRICAL

service

MANKWE

WCS number

.

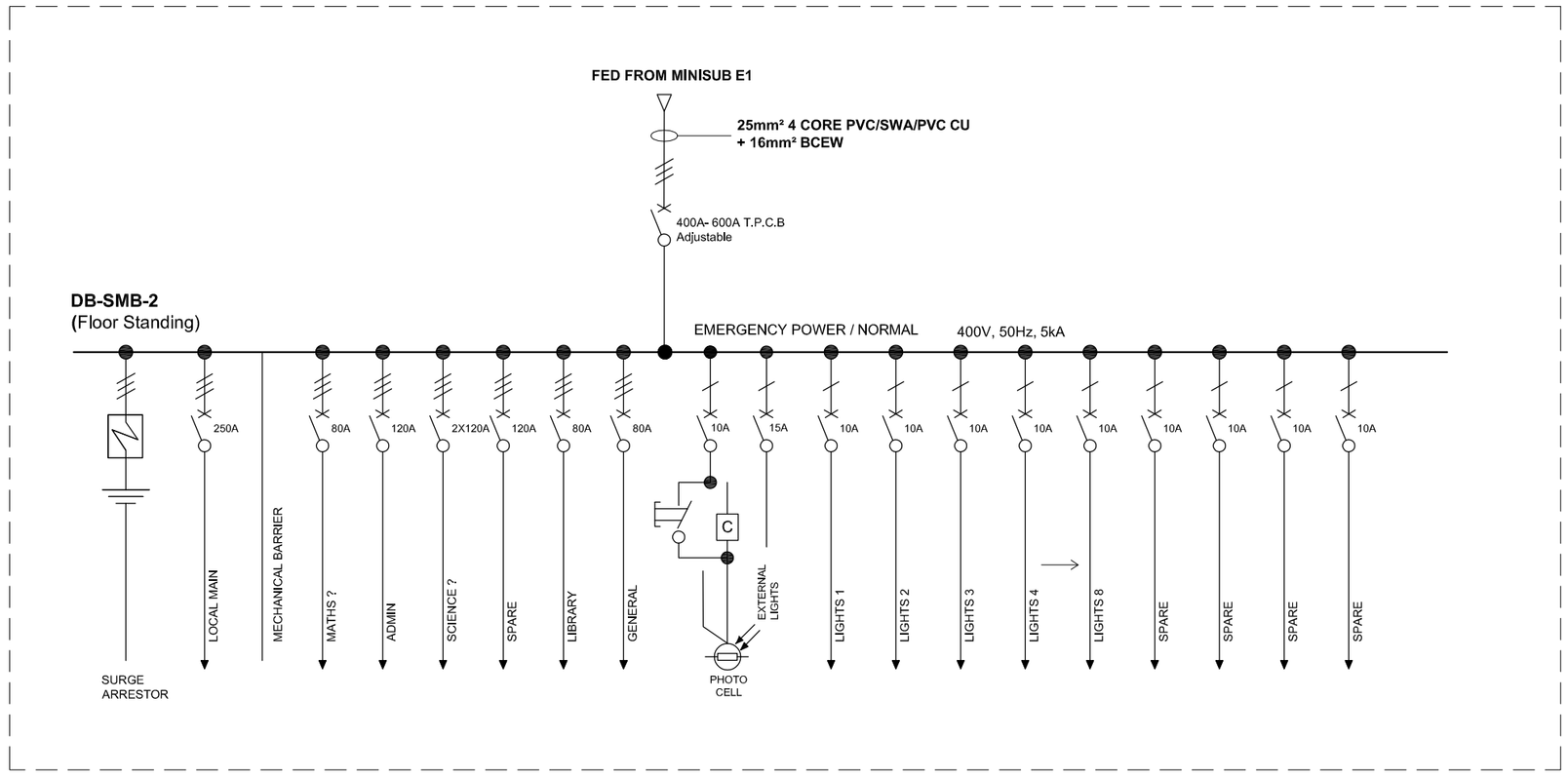
drawing title

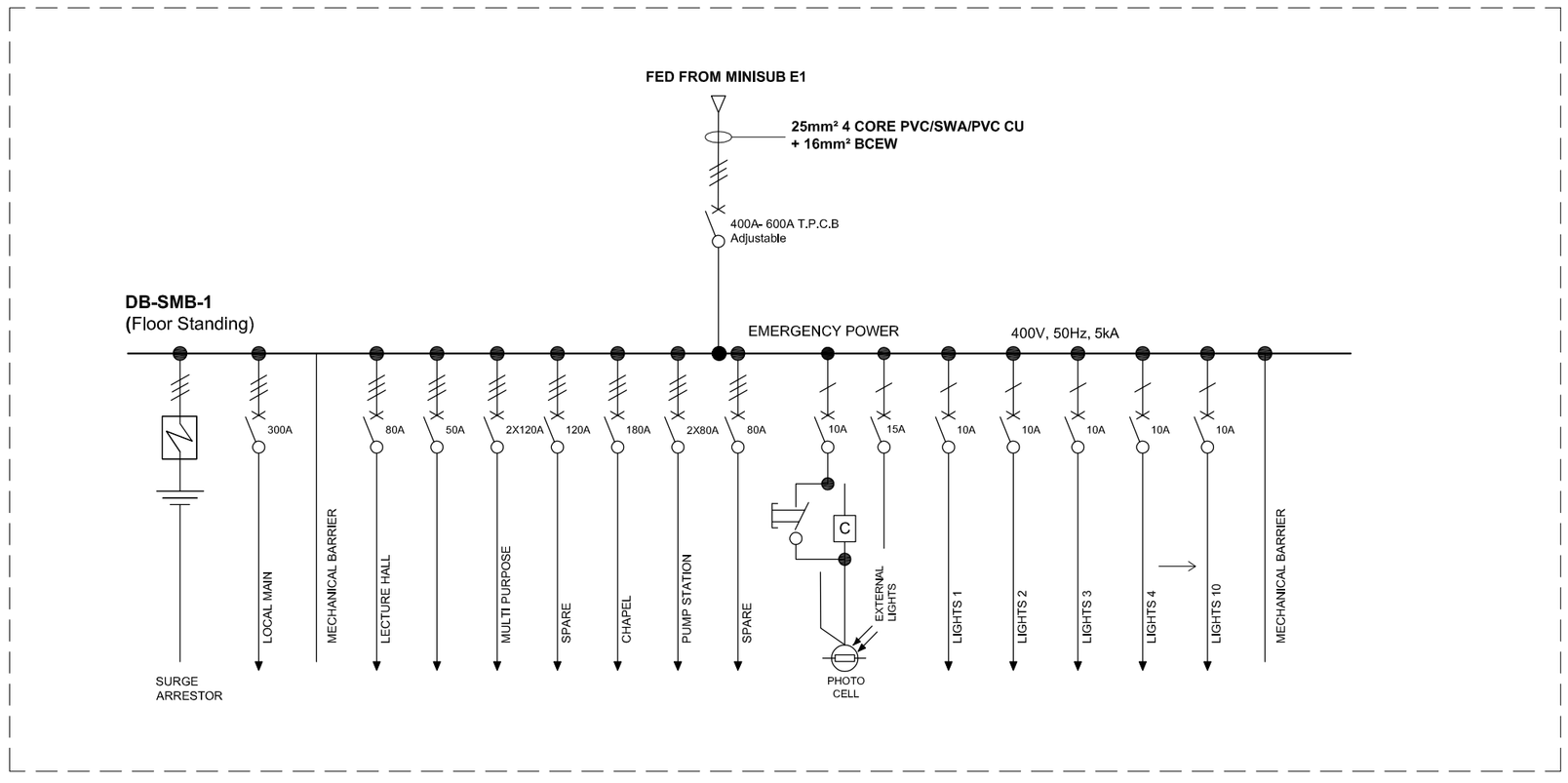
SINGLE LINE DIAGRAM LAYOUT: KIOSK MALE RESIDENCE

ref.no. .	designed B.E
scale N.T.S	drawn K.N
date 2023-07-19	checked A.M

Drawing number

OTVET - E12





INSTALLATION AND MANUFACTURERS NOTES

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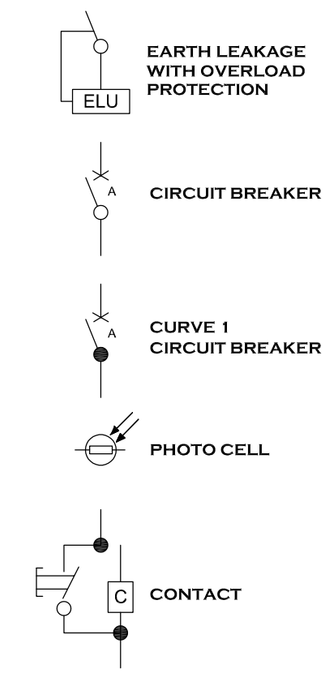
RESPONSIBLE PROFESSIONAL			
DATE	NAME	SIGNATURE	PR NUMBER
19/07/2023	A.MACKENZIE,Pr.Eng		950495

No.	DATE	DESCRIPTION	SIGN

LEGEND



client

consultant

Emzansi CONSULTING

Tel: (012) 345 3383 Fax: (012) 345 4583

discipline ELECTRICAL

service

MANKWE

WCS number .

drawing title

SINGLE LINE DIAGRAM LAYOUT: DB-SMB1 AND DB-SMB2

ref.no. .

scale N.T.S

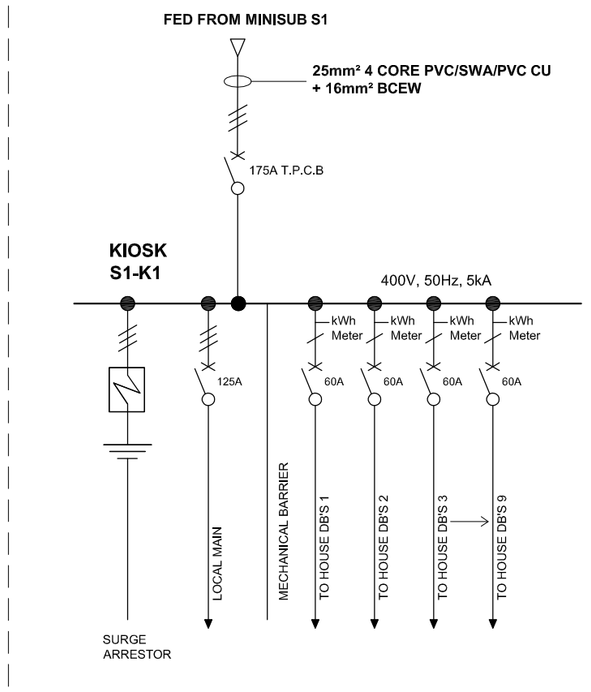
date 2023-07-19

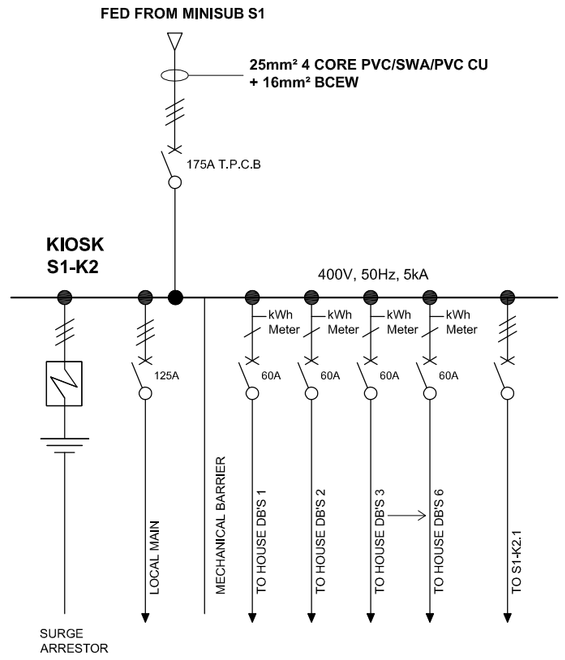
designed B.E

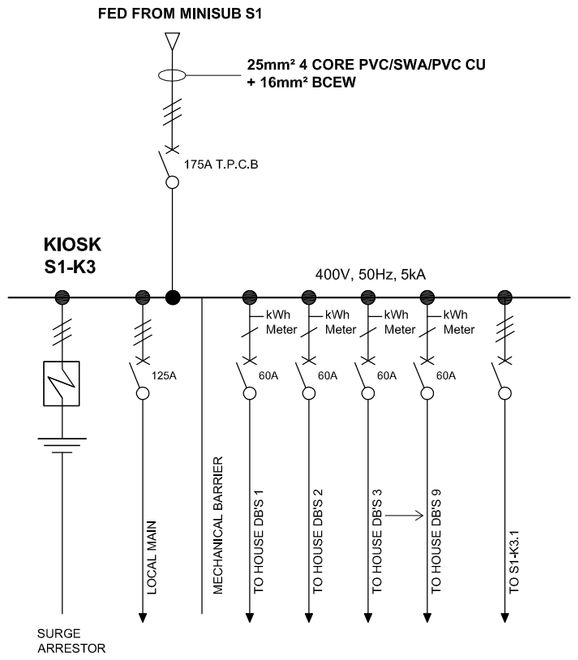
drawn K.N

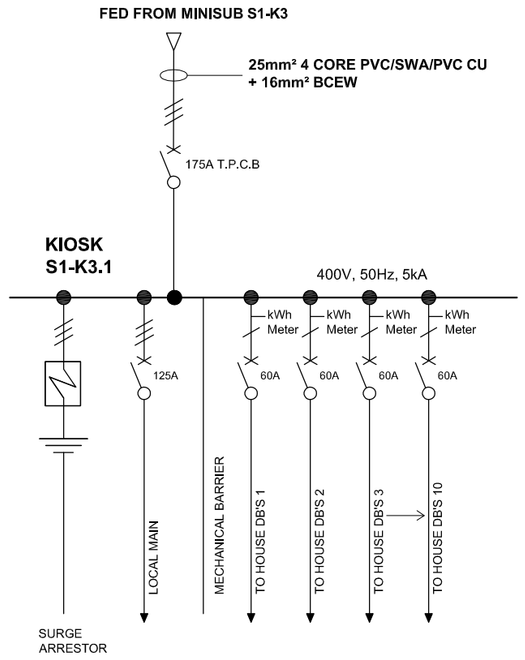
checked A.M

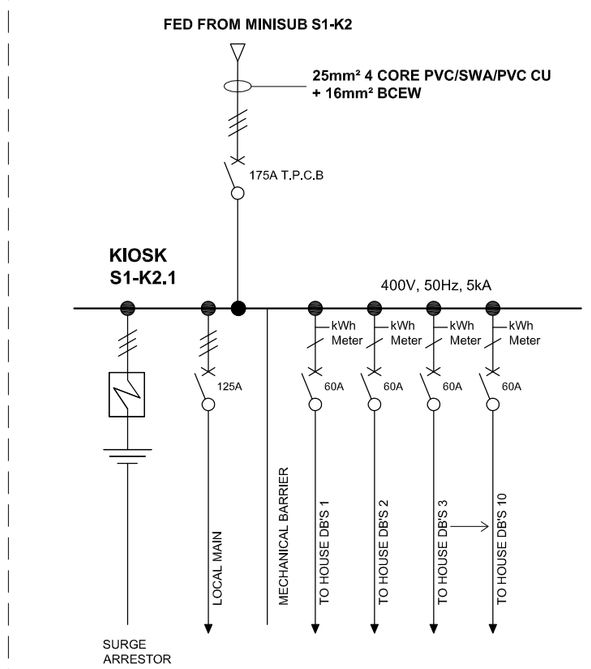
DPW drawing number .











INSTALLATION AND MANUFACTURERS NOTES

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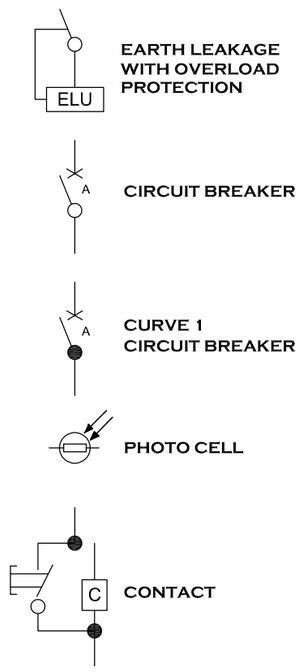
RESPONSIBLE PROFESSIONAL			
DATE	NAME	SIGNATURE	PR NUMBER
19/07/2023	A.MACKENZIE,Pr.Eng		950495

No.	DATE	DESCRIPTION	SIGN

LEGEND



client

ORBIT TVET COLLEGE

consultant

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Tel: (012) 345 3383 Fax: (012) 345 4583

discipline
ELECTRICAL

service

MANKWE

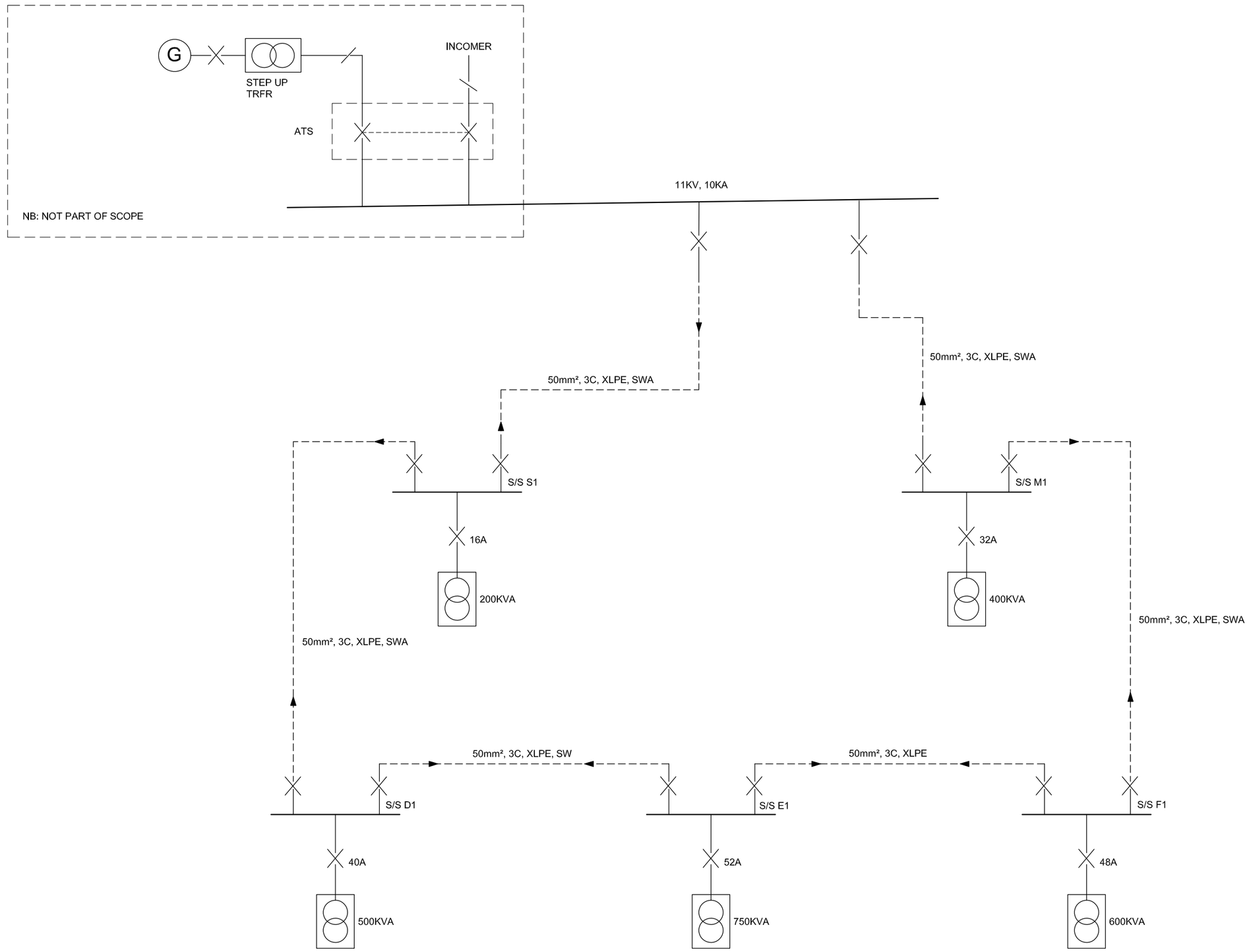
WCS number
.

drawing title
SINGLE LINE DIAGRAM
LAYOUT: Kiosk-Staff Quarters

ref.no. .	designed B.E
scale N.T.S	drawn K.N
date 2023-07-19	checked A.M

Drawing number

OTVET - E08



LEGEND

- Fuse Switch
- Isolator
- Transformer
- SF6 Breaker
- Mini Substation
- Copper Cable, 11KV

No.	DATE	DESCRIPTION	SIGN

CLIENT

ORBIT TVET COLLEGE

consultant

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Tel: (012) 345 3383 Fax: (012) 345 4583

discipline: ELECTRICAL

service

Mankwe

WCS number

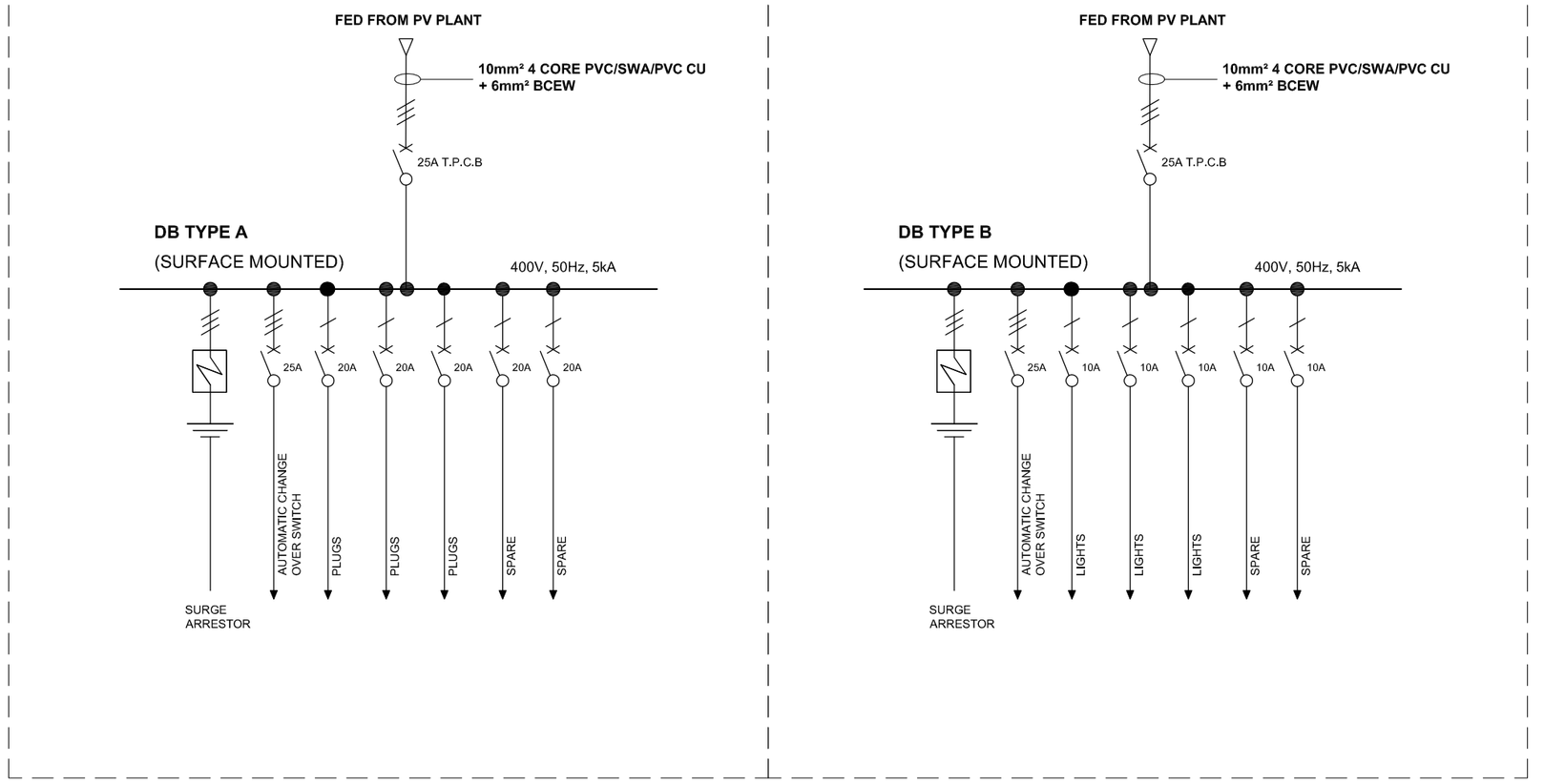
drawing title

NK SINGLE LINE DIAGRAM

ref.no. .	designed A.M
scale N.T.S	drawn K.N
date 2023-07-09	checked A.M

Drawing number

OTVET - E01



INSTALLATION AND MANUFACTURERS NOTES

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RESPONSIBLE PROFESSIONAL			
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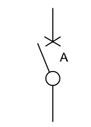
19/07/2023	A.MACKENZIE,Pr.Eng		950495

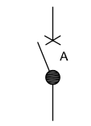
No.	DATE	DESCRIPTION	SIGN

LEGEND

EARTH LEAKAGE WITH OVERLOAD PROTECTION

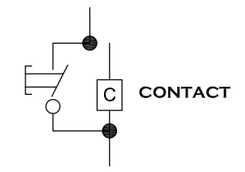


CIRCUIT BREAKER



CURVE 1 CIRCUIT BREAKER

PHOTO CELL



CONTACT

client

ORBIT TVET COLLEGE

consultant

emzansi CONSULTING

Tel: (012) 345 3383 Fax: (012) 345 4583

discipline: ELECTRICAL

service

MANKWE

WCS number: .

drawing title

SINGLE LINE DIAGRAM
LAYOUT: PV DB'S

ref.no. . | designed B.E

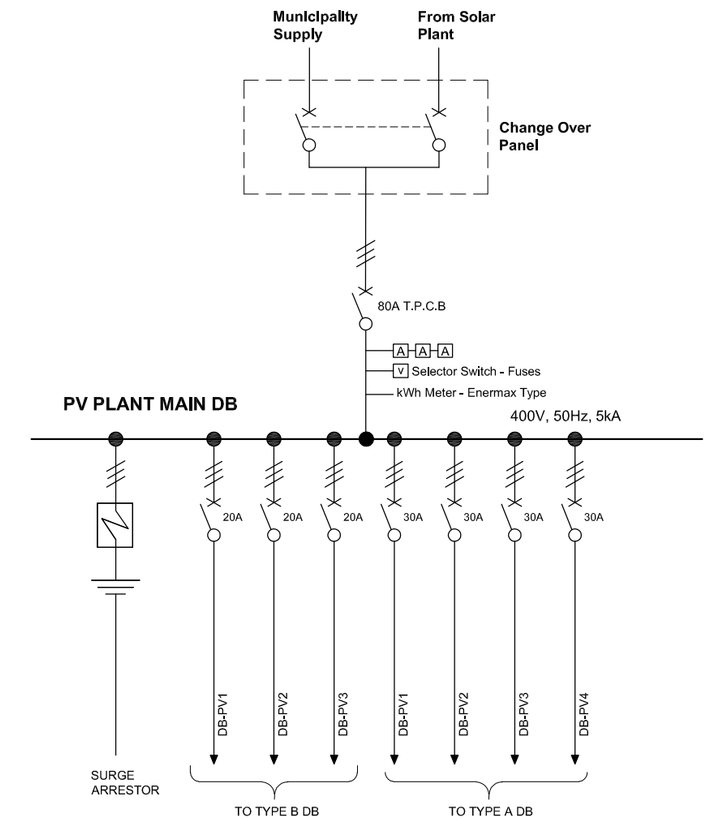
scale N.T.S | drawn K.N

date 2023-07-19 | checked A.M

Drawing number

OTVET - E10

NB : NOT INCLUDED IN SCOPE



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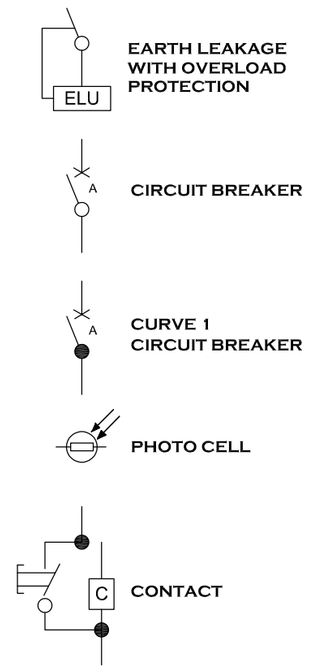
6. SHOP DRAWINGS TO SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE AND INSTALLATION
7. LABELING AND COLOUR CODING: AS DETAILED IN THE SPECIFICATION
8. LEGEND CARDS: AS DETAILED IN THE SPECIFICATION
9. SPECIFICATION REQUIREMENTS: AS DETAILED IN THE SPECIFICATION
10. ALLOW FOR MINIMUM 25% SPARE SPACE
11. ALLOW FOR CASCADING

RESPONSIBLE PROFESSIONAL			
DATE	NAME	SIGNATURE	PR NUMBER
19/07/2023	A.MACKENZIE,Pr.Eng		950495

No.	DATE	DESCRIPTION	SIGN

LEGEND



client

ORBIT TVET COLLEGE

consultant

emzansi CONSULTING

Tel: (012) 345 3383 Fax: (012) 345 4583

discipline

ELECTRICAL

service

MANKWE

WCS number

.

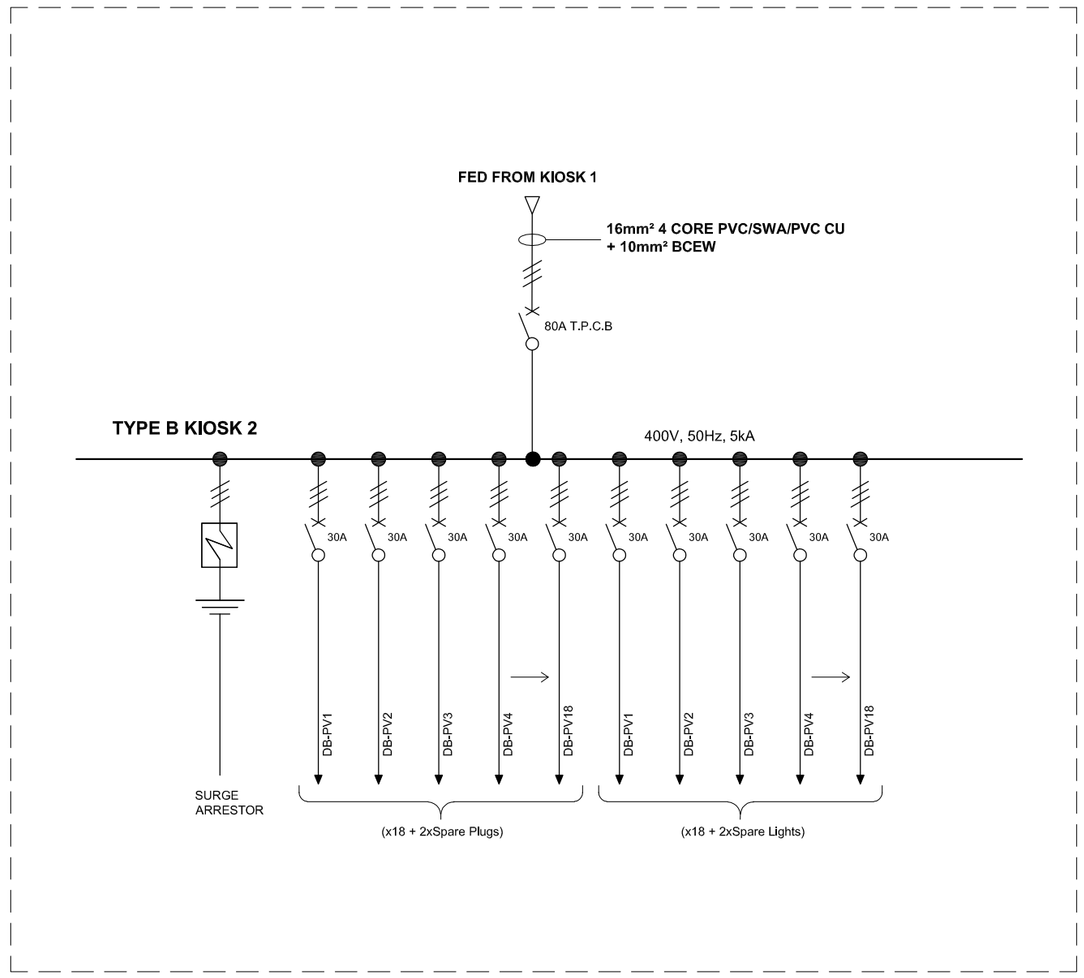
drawing title

SINGLE LINE DIAGRAM
LAYOUT: PV PLANT MAIN DB

ref.no. .	designed B.E
scale N.T.S	drawn K.N
date 2023-07-19	checked A.M

Drawing number

OTVET - E05



INSTALLATION AND MANUFACTURERS NOTES

1. EARTH LEAKAGE UNITS: ALL EARTH LEAKAGE UNITS WITH OVERLOAD PROTECTION
2. MCB's: ALL MINIATURE CIRCUIT BREAKERS QF 19 (CURVE 1)
3. ALL DIMENSIONS AND LEVELS ARE TO BE VERIFIED ON SITE PRIOR COMMENCING SETTING OUT, WORKSHOP DRAWINGS OR CONSTRUCTION THEREOF
4. DISCREPANCIES , ERRORS AND OMISSIONS ARE TO BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY THEY BECOME EVIDENT
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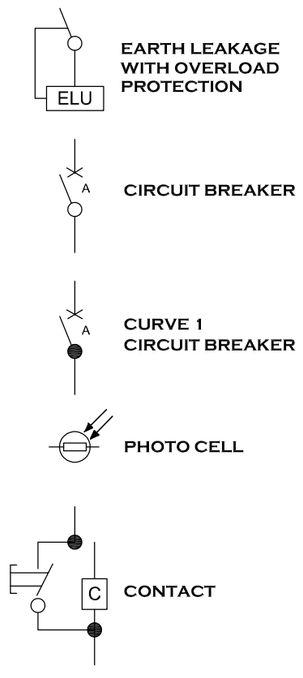
RESPONSIBLE PROFESSIONAL			
DATE	NAME	SIGNATURE	PR NUMBER
19/07/2023	A.MACKENZIE,Pr.Eng		950495

No.	DATE	DESCRIPTION	SIGN

LEGEND



EARTH LEAKAGE WITH OVERLOAD PROTECTION

CIRCUIT BREAKER

CURVE 1 CIRCUIT BREAKER

PHOTO CELL

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discipline

ELECTRICAL

service

MANKWE

WCS number

.

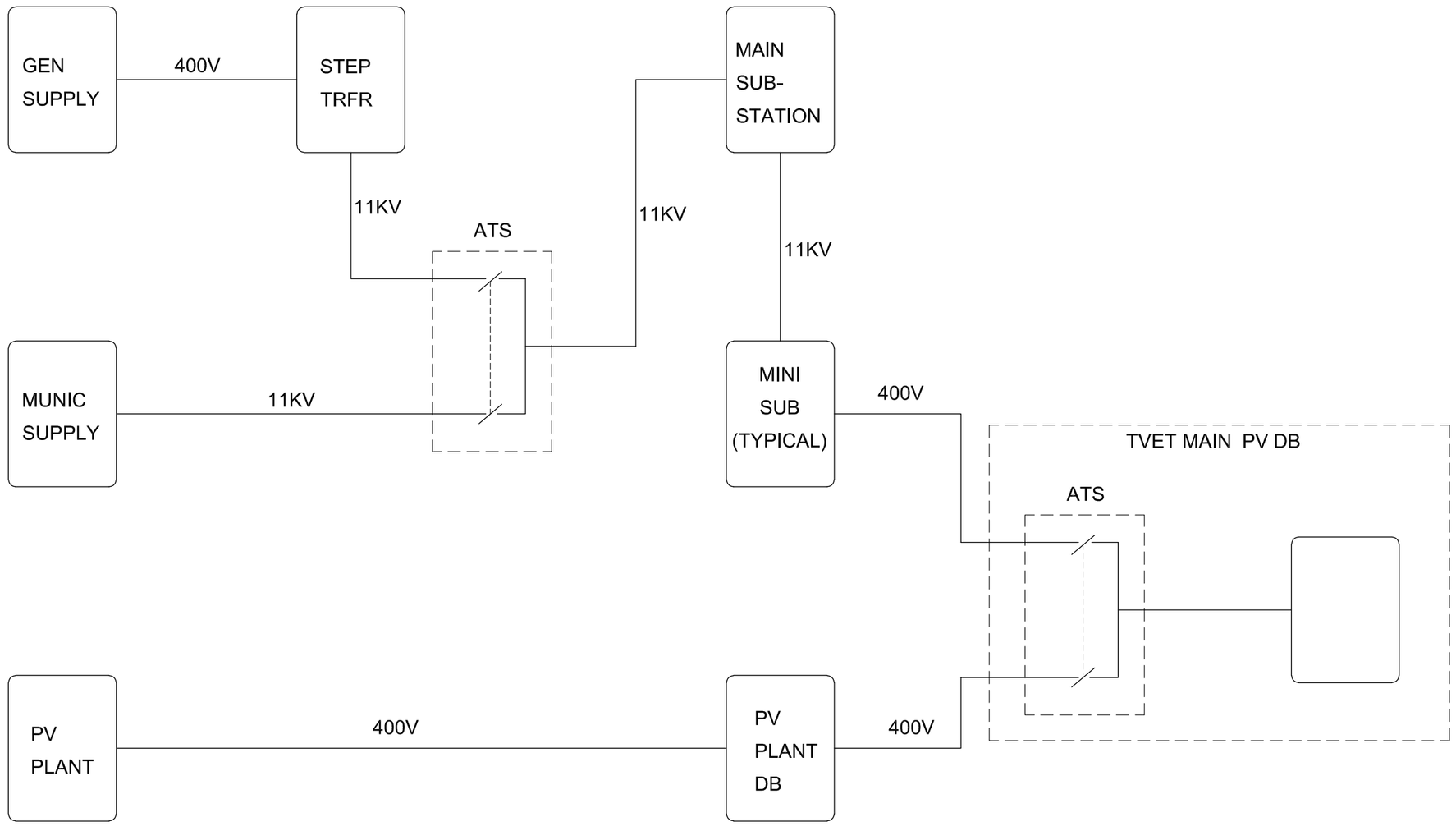
drawing title

SINGLE LINE DIAGRAM
LAYOUT: Type B Kiosk 2

ref.no.	.	designed	B.E
scale	N.T.S	drawn	K.N
date	2023-07-19	checked	A.M

Drawing number

OTVET - E06



No.	DATE	DESCRIPTION	SIGN

LEGEND

CLIENT

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discipline

ELECTRICAL

service

Mankwe

WCS number

.

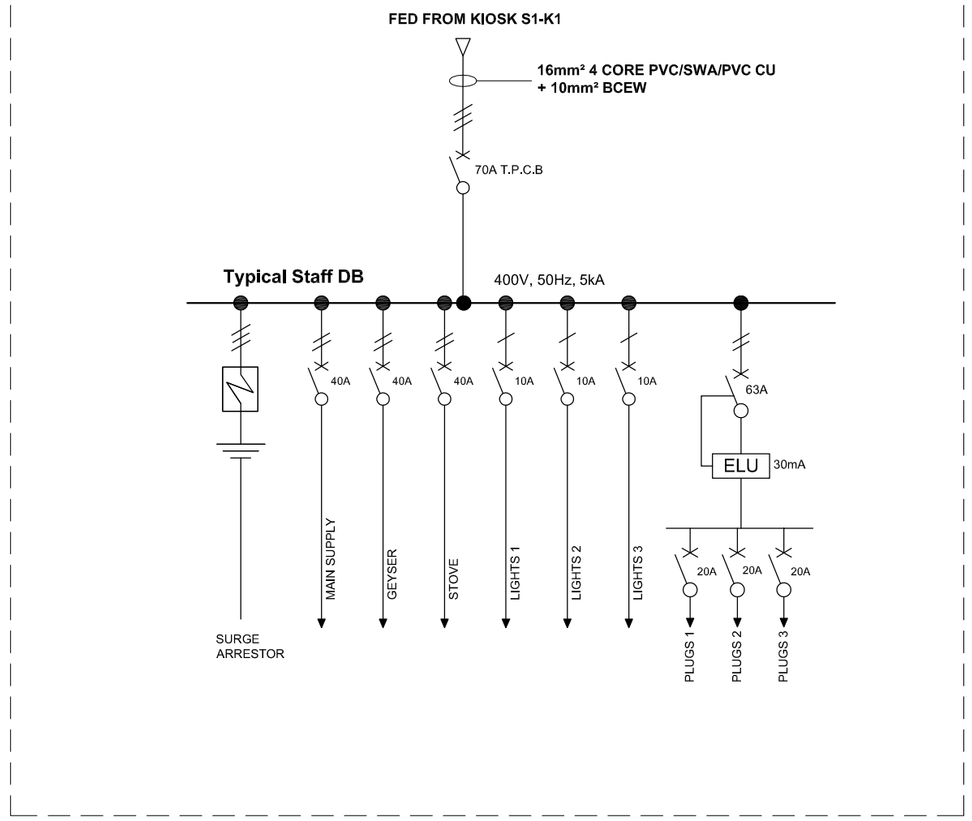
drawing title

TYPICAL SCHEMATIC OF MV + PV + GEN SUPPLY

ref.no. .	designed A.M
scale N.T.S	drawn K.N
date 2023-07-09	checked A.M

Drawing number

OTVET - E03



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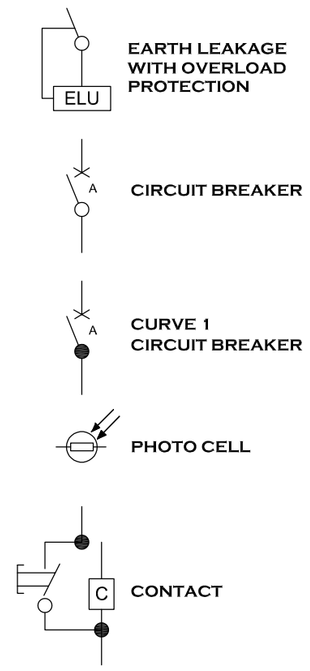
RESPONSIBLE PROFESSIONAL			
DATE	NAME	SIGNATURE	PR NUMBER
19/07/2023	A.MACKENZIE,Pr.Eng		950495

No.	DATE	DESCRIPTION	SIGN

LEGEND



client

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consultant

emzansi CONSULTING

Tel: (012) 345 3383 Fax: (012) 345 4583

discipline

ELECTRICAL

service

MANKWE

WCS number

.

drawing title

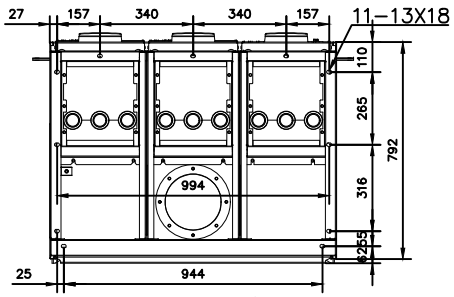
SINGLE LINE DIAGRAM
LAYOUT: Typical Staff DB

ref.no. .	designed B.E
scale N.T.S	drawn K.N
date 2023-07-19	checked A.M

Drawing number

OTVET - E07

Software Type: AutoCAD



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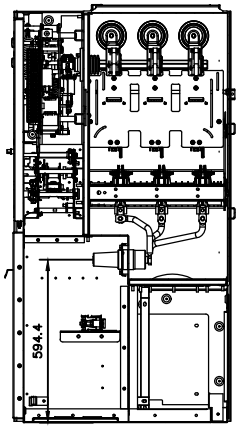

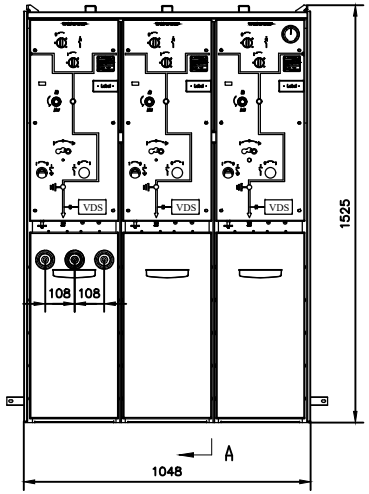

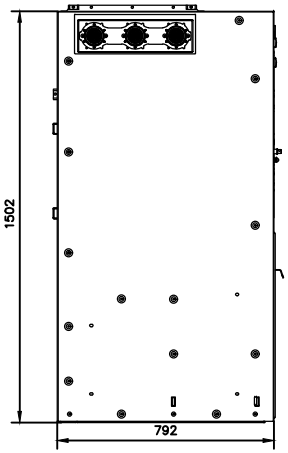

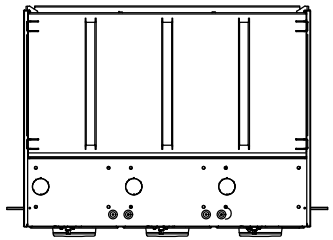

C ☐						
B ☐						
A ☑						
	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN	

MANUFACTURED BY:
TGOOD
QING DAO TGOOD ELECTRIC Co., Ltd.
www.tgood.com

CLIENT:

PROJECT TITLE:
DRAWING TITLE: VVV unit

SCALE:	PROJECT NO.:	DRAWING NO.:	REV No:	SHEET:
	N/A			

1 2 3 4 5 6

A B C D E

PART 22: EXISTING RMU SPECIFICATIONS (TGOOD)

TGOOD	**TGS RMU Inspection & Test Certificate.**

TGS Type: TGS-24-20/6 eVVVe	Serial no. 2003TGS236/237/238
Date: 26/10/2020	Customer: EZY SWITCHGEAR
System voltage in kV: 24	RMU kA rating: 20kA/3 sec
RMU Rating : 630/630A	IAC: 20kA 1Sec AFLR

IDMT/DMT relay		
Make: Kries	Model: IKI 35	Self-powered
Aux power: n/a	Password: 1234	
Over current setting: dmt - norminal inveres - In = 50A- plug setting 1.1xIn- time multi= 1		
Serial number**:** 0032001435/1356/1383		
Test results:		
okay		
VDS/VPIS: Capdis S1	Setting 16800pf pick voltage 3.9kV out put voltage 14,4v	
21452022141/22139/22235		
Power frequency test:	Over all: 28kV	Across Isolation: 30kV
Inspection & verification		
Sf6 leakage: none	SF6 level: √	Mimic: √
Paint works: √	Operating handle: √	Main label: √
Aux labels: √	Cable box: 1 cover	Cable clamp: 3 singal cores
Electrical functionality: √	Mechanical functionality: √	Aux Switches: √
Limit Switches: √	Interlocks: √	Cable T/F:
Condition of wire: good	Continuity: √	Test Terminals closed: √
Terminals tight: yes	Doors: good	Covers: √
Vents: √	Arc shoots: √	General Appearance: √
Lock outs: not requested	Operation: correct	Bushing bolts: n/a
Connectors: n/a	Trifurcating kits: n/a	Lugs: n/a
Comments		
Manual switching		
400MM BASE ADDED ON THE UNIT		
Customer Signature		TGOOD rep: moonlight khupane

MV Gas Insulated Switchgear

TGS

Technical Data

TGOOD
2019-5-29

TGS

Operating environmental conditions	
Place of installation	Indoor
Ambient temperature	-5°C (-25°C optional) ~ +40°C (+55°C optional)
Altitude	1000m (no limitation for specially ordered products)
Average value over 24 hours (max.)	+35°C
Air humidity	Daily average ⩾95%; Monthly average ⩾90% (25°C)
Type of insulating gas	Sulphur hexafluoride (SF_6)
Rated pressure at +20°C	0.14 MPa

This product shall be placed in a site without risk of fire hazard, explosion, chemical corrosion and sharp vibration.

Standard compliance	
Switchboard	IEC 62271-200, IEC 62271-1
Behavior in the event of internal faults	IEC 62271-200
Earthing switch (in C, F, V, De, I)	IEC 62271-102
Disconnector (in V, I)	IEC 62271-102
General use switch (in C)	IEC 62271-103
Switch-disconnector fuse combination (in F)	IEC 62271-105
Circuit-breaker (in V, I)	IEC 62271-100
Current transformer	IEC 61869-2
Voltage transformer	IEC 61869-3
Voltage presence indicators	IEC 62271-206
Voltage detection systems	IEC 61243-5
IP class	IEC 60529

TGS		
Accessibility type	A (F, L, R)	AFLR (IEC 62271-200)
Arc test current	kA	20
Arc test current duration	s	1
Arc pressure release duct		Optional
Insulation medium		SF6 Gas
Rated filling level for insulation	Pa	40,000
Alarm level for insulation	Pa	30,000
Minimum functional level for insulation	Pa	10,000
Insulating fluid and mass	kg	5 (CCF)
Degree of protection – compartment	IP	3X
Thickness of gas tank material	mm	3, stainless steel
Design pressure	Bar	1.4
Rated filling pressure	Bar	1.4
Minimum functional pressure	Bar	1.3
Busbar material		Red copper / T2Y
Busbar cross section	mm	40 × 8
Width of major functions (incomer/feeder/CB/fuse)	mm	368 / 368 / 368 / 368
Cable connection height (incomer/feeder/CB/fuse)	mm	595 / 595 / 595 / 595
Busbar insulation medium		SF6 gas
Support insulator material		Epoxy resin
Support insulator creepage distance	mm	135
Earth bar material		Red copper / T2Y
Earth bar cross section	mm	25 x 8
Limit of temperature rise - main circuits	^{0}C / K	75
Limit of temperature rise - contacts	^{0}C / K	65
Limit of temperature rise – connections	^{0}C / K	75
Limit of temperature rise – terminals	^{0}C / K	75
Limit of temperature rise - accessible parts	^{0}C / K	30
Switchgear overall surface finish and color		RAL7035
Typical panel dimensions (W x D x H)	mm	CCV: 1048*800*1500

Typical panel weight	kg	CCV: 360
Padlock		Optional
Position indication		Yes
VPIS		DXN2-T
Low voltage control box		Optional
Gas pressure manometer		Yes, without auxiliary contacts
LV cable and wiring		IEC 60227 compliance
Panel extension		No / single side / both sides

General electrical characteristics		
No. of phases		3
Rated voltage	kV	12/24
Rated frequency	Hz	50/60
Type of neutral earthing		Effectively earthed
Rated lightning impulse withstand voltage to earth	kV	95/125
Rated lightning impulse withstand voltage across isolation	kV	110/145
Rated power frequency withstand voltage to earth	kV	28/50
Rated power frequency withstand voltage across isolation	kV	32/60
Rated busbar normal current	A	630
Rated short-time withstand current	kA	25 / 1s, 20 /3 s
Rated peak withstand current	kA	65
Rated duration of short circuit	s	3/1
Mainly active load breaking current	A	630
Closed-circuit breaking current	A	630
Earth fault breaking current	A	30/200
Rated auxiliary voltage for operation	V	24-220 DC 110-220 AC
Rated auxiliary voltage frequency	Hz	50
Partial discharge guarantee @ 1.1 Ur	pC	10

Circuit-breaker

Type		TGS-V
Standard compliance		IEC 62271-200
Circuit-breaker interrupting medium		Vacuum
Type of circuit-breaker		Fixed
Reset method of trip		Manual / automatic
Rated current	A	630
Rated short-circuit breaking current	kA	20 / 25
Rated duration of short-circuit	s	3/1
DC component of rated short-circuit breaking current	%	53
Rated out of phase recovery voltage	kV	13.8/27.6
Rated line charging breaking current	A	10
Rated cable charging breaking current	A	25/31.5
Rated filling pressure for operation	MPa	0.04
Rated filling pressure for interruption	MPa	0.03
Rated operating sequence		O-0.3s-CO-180-CO
Maximum opening time	ms	50
Maximum closing time	ms	60
Electrical endurance class		2000 operating cycles at rated current, 50 times at rated short-circuit breaking current, Class E2
Capacitive restrike probability class		Class C2
Mechanical endurance class		10000 operating cycles, Class M2
Switching class		S1
Circuit-breaker operating mechanism		Spring
Drive motor operating voltage	V	24-220 DC 110-220 AC
Drive motor power consumption	W	120
Spring motor charging time	s	15
Method of tripping		Shunt trip
Low energy tripping		Available
Number of trip coil		1-2
Trip coil operating voltage	V	24-220 DC 110-220 AC
Trip coil current at rated voltage	A	15.6

Trip coil power consumption	W	374
Method of closing		Shunt closing
Number of close coil		One
Close coil operating voltage	V	24-220 DC 110-220 AC
Close coil power consumption	W	374
No. of NO/NC auxiliary contact		Up to 4NO 4NC
Two covers mechanical interlocking		Optional
Protection relay category		Self-powered/power supply
Operating counter		Available

Load switch		
Type		TGS-C
Standard compliance		IEC 62271-102
Rated current	A	630
Rated short-time withstand current	kA	20/25
Peak withstand current	kA	65
Rated duration of short-circuit	s	3/1
Electrical endurance		E3 for disconnector, E2 for earthing switch
Mechanical endurance		5000 operating cycles, Class M2
Capacitive switching		C2
Minimum isolating distance (live parts to earth)	mm	60
Minimum isolating distance (clearance between open contacts)	mm	60
Motor operation availability		Optional
No. of NO/NC auxiliary contact		Up to 2NO 2NC

Earthing switch		
Type		TGS-E
Standard compliance		IEC 62271-102
Rated short-time withstand current	kA	20/25
Rated duration of short-circuit	s	3/1
Short-circuit making capability		E2
Mechanical endurance		2000 operating cycles, Class M1
Minimum isolating distance (live parts to earth)	mm	60
Motor operation availability		Optional
No. of NO/NC auxiliary contact		2NO 2NC

Disconnector		
Type		TGS-D
Standard compliance		IEC62271-102
Rated current	A	630
Rated short-time withstand current	kA	20/25
Rated duration of short-circuit	s	3 / 1
Mechanical endurance		2000 operating cycles, Class M1
Minimum isolating distance (live parts to earth)	mm	60
Minimum isolating distance (clearance between open contacts)	mm	60
No. of NO/NC auxiliary contact		Up to 2NO 2NC

Switch-fuse combination		
Type		TGS-F
Applicable standard		IEC62271-105
Rated current	A	630
Max. fuse current	A	125
Rated short-time withstand current	kA	20 / 25
Rated duration of short-circuit	s	3 / 1
Short-circuit making current	kA	52
Short-circuit breaking current	kA	20
Rated transfer current	A	1300
Prospective current at the maximum breaking energy	kA	20
Mechanical endurance		2000 operating cycles, Class M1
Minimum isolating distance (live parts to earth)	mm	60
Minimum isolating distance (clearance between open contacts)	mm	60
Motor operation availability		Optional
No. of NO/NC auxiliary contact		2NO 2NC

Voltage transformer	
Standard compliance	IEC61869-3
Type	3 phase dry type
Primary and secondary ratios	Specified by project
Secondary winding classes	Specified by project
VT type and location	Specified by project

MV cable compartment		
Cable compartment accessibility		Front
Cable box insulation		Air
Tool-free cable testing facility		Optional
Maximum cable size per phase	mm^2	300
Maximum cable quantity per phase		2
Cable connector rating	A	250 / 630
Surge arrestor		Optional
Cable clamp		Yes
Cable bushing		Optional

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Technique Museum, Building 8, Office 411,
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TECHNICAL
STANDARD SPECIFICATION (IEC)

ELECTRICAL

Gas-Insulated Medium Voltage Switchgear Up to 24 kV

Table of Contents

1 GENERAL

1.1 Scope

This IEC specification shall be applied to works carried out for the ORBIT TVET COLLEGE-MANKWE CAMPUS. It describes the technical requirements for design, manufacturing, testing and supply of indoor gas-insulated medium voltage switchgear up to 24 kV.

In addition to this technical specification the enclosed project single line diagrams, block diagrams and data sheets are describing the detailed tender scope and have to be fully covered. Any deviations from the specified requirements shall be mentioned in a deviation list and submitted together with the offer.

1.2 Introduction

The gas-insulated medium voltage switchgear up to 24 kV shall comply with the requirements outlined in this specification due to the important nature of the switchgear items for the project, today's advanced switchgear manufacturing technology and commercial benefits for the manufacturing processes. Only IEC type tested switchgear shall be considered.

1.3 Documentation

Any documentation shall be made available in English language.

Manufacturer shall provide following documents electronically and in hardcopy (optional on customer request) for delivery.

- Quality conformance certificate
- Outgoing inspection report
- As built drawings
- Data sheet of the equipment and components used in the e-house
- Inspection report from the key suppliers – specially for electrical items
- Dimensional and final check report
- Mechanical functional test report
- Electrical test report

1.4 Operating Instructions

Operating instructions cover the documentation for transport, installation, connection and commissioning, maintenance and disposal of the switchgear. This kind of documentation shall be part of the scope of supply for the switchgear.

1.5 Quality Assurance

Manufacturers are to be vendors regularly engaged in manufacturing of switchboards, whose products are to be in satisfactory use under similar service conditions for not less than 5 years and shall have an independently certified quality management system to ISO 9001 and a certified environmental management system according to ISO 14001.

Quality procedure, quality plan as well as ISO 9001and ISO 14001 certificates shall be submitted with the offer.

1.6 Type Test Report

The manufacturer of the switchgear assembly shall supply the documentation of the latest status of the type test documentation summary list. This summary shall include the listing of all Type Test report in accordance with sub-clause 6 of IEC 62271-200 as appropriate for the air-insulated medium voltage switchgear applied in the project:

a) sub-clause 6.2: Dielectric tests
b) sub-clause 6.5: Temperature-rise tests
c) sub-clause 6.4: Measurement of the resistance of circuits
d) sub-clause 6.6: Short-time withstand current and peak withstand current tests
e) sub-clause 6.101: Verification of making and breaking capacities
f) sub-clause 6.102: Mechanical operation tests
g) sub-clause 6.7: Verification of the degree of protection (IP coding)
h) sub-clause 6.106: Internal arcing tests for classification IAC
i) sub-clause 6.9: Electromagnetic compatibility tests (EMC)

The air-insulated switchgear has to comply with these standards as stipulated in the above listed particular test documents.

Option 1: On specific customer request a copy of the relevant type test report cover sheets shall be supplied after receipt of the order.

Option 2: On specific customer request a copy of the full set of the relevant type test report shall be supplied after receipt of the order.

The electrical components to be used in the construction and assembly shall be identical to those used in the type tests. The type of devices and method statement of testing shall be clearly stated. The type tests report shall be from an independent type testing laboratory.

2 PRODUCTS

2.1 Applicable Standards

The switchgear has to comply with the latest issues of the following IEC publications:

IEC 62271-1	High-voltage switchgear and controlgear – Part 1: Common specifications

IEC 62271-200	High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
IEC 62271-100	High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers
IEC 62271-102	High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches
IEC 62271-105	High-voltage switchgear and controlgear – Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV
IEC 62271-106	High-voltage switchgear and controlgear – Part 106: Alternating current contactors, contactor-based controllers and motor-starters
IEC 62271-107	High-voltage switchgear and controlgear – Part 107: Alternating current fused circuit-switchers for rated voltages above 1 kV up to and including 52 kV (applicable for 17.5 kV switchgear)
IEC 61243-5	Voltage detecting systems (VDS)
IEC 60282-1	HV HRC fuses – Part 1: current limiting fuses
IEC 60529	Degrees of protection (IP code)
IEC 60071	Insulation co-ordination – Part 1: Definitions, principles and rules
IEC 61869-1	Instrument transformers – Part 1: General requirements
IEC 61869-2	Instrument transformers – Part 2: Additional requirements for current transformers
IEC 61869-3	Instrument transformers – Part 3: Additional requirements for inductive voltage transformers
IEC 61936-1	Power installations exceeding 1 kV AC. – Part 1: Common rules

2.2 Design and Construction Requirement

The ring main unit shall be indoor or outdoor (as specified in the tender documents), ground / skid mounted and SF6 insulated type. It shall be constructed for operation in service conditions

and the degree of protection as given in the specification. Additionally, the indoor unit shall be provided with adequate protection for entry of dust to the operating mechanism.

Ring main unit complete with all fittings and attachments shall be capable of withstanding the effects of direct solar radiation at its installed location. The temperature of metal surfaces exposed to direct solar radiation shall be regarded as 75^{o}C, plus the effect of any internal heating.

Indoor designed ring main unit if provided with enclosure for outdoor application shall have adequate atmospheric protection. Manufacturer may use special design louvers / double-roof / double-walls or combination of these or any other proven means in order to make their design withstand severe service conditions.

The ring main unit shall consist of one of the following configurations as specified in the tender documents:

- Two (2) ring switches for through feed at the sides and one (1) fuse switch or circuit breaker for tee-off according to manufacturer's type-tested configuration.

- Three (3) ring switches for through feed and one (1) fuse switch or circuit-breaker for tee-off according to manufacturer's type-tested configuration.

- Two (2) ring switches for through feed and two (2) fuse switches or circuit-breakers for tee-off according to manufacturer's type-tested configuration.

The terminals of the switches and circuit-breaker units shall be at the same height for cable installation, the cable sizes shall be given in the specification.

The units of ring switches, fuse switch and circuit breaker for tee-off shall have the same footprint for retrofitting.

All live parts of the switchgear and busbars assembly shall be grouped together and SF6 gas insulated in a gas-tight stainless-steel chamber with thickness of 3mm, and sealed for life.

2.3 System Characteristics

The ring main unit shall be suitable to operate under system parameters given in the specification.

Electrical and mechanical strength of ring main unit shall be designed to operate in a system to withstand a short circuit current of 20 kA for 3 second at 24kV nominal voltage.

2.4 Current Rating

The continuous current rating of the unit at an ambient temperature given in specification shall be:

- Ring switches 400 A
- Fuse switch / Circuit-breaker 200 A

2.5 Ring Switch (Load Break Switch)

Ring switch shall be load breaking and fault-making type. Ring switches shall be designed for interrupting full rated current as stated in clause 4.3 above, small inductive or capacitive currents involved in disconnecting of unloaded transformers and cables or overhead lines. It shall be suitable for full fault-making current.

Ring switch shall consist of a moving contact assembly with three positions; 'ON', 'OFF', and 'Earth'. Two independent manual operating mechanisms for ring and earth switches are also acceptable. The design shall prevent simultaneous closing of the main switch contacts and the earth switch contacts. The earth switch contacts shall be designed to close into a fault and shall have the same short circuit capacity as the main contacts.

The switching operation shall be manual by means of an operating handle and independent fast acting operating mechanism. Closing and opening speeds of the switch shall be independent of the speed with which the operating handle is moved.

Ring switch operating mechanism shall have provision for on-site installation (retrofitting) of geared motor mechanism and associated closing and opening coils with necessary contactors for remote and future tele-control operations in the distribution network.

2.6 Tee-Off Circuit Protection

Tee-off circuit protection shall be either by fuse switch or circuit-breaker.

2.6.1 Fuse Switch

Fuse switch shall be designed for interrupting full rated current as stated in clause 4.3, by blowing of a fuse(s) or by actuating a push button, which shall cause simultaneous tripping of all phases.

The switch shall be manually closed by means of an operating handle and independent fast acting operating mechanism. Closing movement charges the opening mechanism, for opening by 'trip' push button operation.

Closing speed of the switch shall be independent of the speed with which the operating handle is moved.

Tee-off switch shall consist of a moving contact assembly with three positions; 'ON', 'OFF', and 'Earth'. Two independent manual operating mechanisms for tee-off switch and earth switch are also acceptable. Design shall prevent simultaneous closing of the main switch contacts and the earth switch contacts. The earth switch contacts shall be designed to close into a fault and shall have the same short circuit capacity as the main contacts.

Closing of earth switch shall earth both ends of the fuse. Tee-off switch shall also be suitable to equip with shunt trip coil, rated for 220 V AC, 50Hz (60Hz option) and shall be provided if specified in the tender / data schedule.

Tee-off switch operating mechanism shall have provision for on-site installation (retrofitting) of geared motor mechanism and associated closing and opening coils with necessary contactors for remote and future telecontrol operations in the distribution network.

2.6.2 Fuses

The ring main unit shall be suitable to accommodate three HRC fuses, in individually sealed chambers. Fuses shall be with striker pin and fuse link length of 442 mm as per specification, following fuse standard ratings shall be used in the distribution system:

- Rated voltage: 24 kV
- Interrupting capacity: 31.5 kA (minimum) for 1 sec.
- Fuse ratings (A) 31.5 50 80 125 for transformer (KVA) 300 500 1000 1500
- Ring main unit shall be supplied without fuses.

2.6.3 Circuit-Breaker

The circuit-breaker shall be of fixed type and designed for interrupting full rated fault current (20 kA for 3 second), and full fault making current. The insulation medium shall be SF6 gas and the interruption medium can be vacuum. Opening of the circuit breaker shall be by local manual trip button, by protective relay circuit and by remote tripping signal. Closing movement charges the opening mechanism, of the circuit-breaker. Earthing of tee-off circuit shall be by an off-load isolator switch having the same fault make capacity as the ring switches. Operating mechanism shall be trip free, fast acting and independent of the operator action and shall provide three positions; circuit breaker ‘ON’, circuit-breaker and isolator ‘OFF’ and earthing switch ‘Earth’ circuit-breaker operating mechanism shall have geared motor and associated closing and opening coils with necessary contactors for remote and future telecontrol operations in the distribution network.

2.6.4 Protective Relay

Self-powered protective relay with over-current and earth fault protection shall be used on tee-off circuits. General requirements of protective relay are listed in the appendix at the end of this specification.

2.7 Operations

All operating positions shall be on the front of the unit and position of each of the switches shall be displayed on a mimic diagram. Clear indicators showing ‘ON’, OFF’ and ‘Earth’ positions shall be provided on polycarbonate or metal painted labels not less than 15 mm in height and 1.5 mm thick (sticker type labels are not acceptable). Indicator windows shall not be less than 15 mm in diameter.

Indication color

- ON - Red
- OFF- Black
- Earth- Green

The mechanisms for operating the switches shall be accessible by removing the front plate. The operating handle shall have anti-reflex action and shall be stored at the front of the unit. Common operating handle shall be used for all operations of both ring and tee-off switches. Operating handle inserts shall have marking as appropriate to avoid inserting the wrong end during switching operations. Physical effort required for operating any mechanism shall not exceed 400 N.

In order to prevent unauthorized access for the operation of ring main unit, operating handle entries for ring & tee-off switches and trip push button shall have padlocking provision. It shall be suitable for padlocks having 6 mm shackle. The padlocking provision material shall be adequately strong and compatible with the life of ring main unit.

2.8 Cable Testing Facility

Ring main unit shall have a test bushings or test plug/probe insertion facility to carry out high voltage tests and current injection tests for the cables terminated on ring switches. Disconnection of cables for testing purposes is not acceptable.

2.9 Interlocks

Interlocks shall be provided to make the following operations impossible:

a) The operation of a ring switch or fuse switch / circuit breaker directly from ‘ON’ to ‘Earth’ or from ‘Earth’ to ‘ON’.

The following additional requirements apply if the unit offered has two independent manual operating mechanisms for ring and earth switches:

• Operation of the ‘Earth ON / Earth OFF’ mechanism of earth switch unless the ‘ON/OFF’ mechanism of ring switch is in the ‘OFF’ position.

• Operation of the ‘ON/OFF’ mechanism of ring switch unless the ‘Earth ON / Earth OFF’ mechanism of earth switch is in the ‘Earth OFF’ position.

b) Opening of the cable test cover without the associated ring switch or fuse switch / circuit breaker being in the ‘Earth’ position.

c) Closing ring switch (Load Break Switch) to ‘ON’ with the test plug / probe inserted and /or the test cover open.

d) Insertion or withdrawal of the test plugs / probes with the associated switch in any position other than ‘Earth’ position.

e) Fuse changing or accessing the fuse chamber in any position other than ‘Earth’ position.

f) Closing fuse switch to ‘ON’ when:
- The fuse access cover not properly closed.
- Fuse switch in ‘Earth’ position.
- Fuse holder not correctly in position.

• Any fuse blown.

g) Opening cable termination box without the associated ring switch / tee off in the 'Earth' position.

h) Switching the ring switch / tee off to ON position without the associated cable termination box cover is properly closed.

2.10 Terminations / Cable Boxes

a) Termination in the ring switches shall be suitable for accepting three core aluminum or copper, XLPE insulated cables of outside diameter of 70-110 mm. Each cable box shall have a bottom plate and cable clamp. Bottom plate shall be in two halves with cable entry hole of 110 mm diameter. Cable clamp shall be detachable semi-circular halves suitable to hold the cable inside the cable box without cable glands.

b) Termination in the fuse switch /circuit breaker shall be suitable for accepting three core or three single core copper / aluminum, XLPE insulated cables of outside diameter of 30-80 mm. The cable box shall have a bottom plate and cable clamp. Bottom plate shall be in two halves with three cable entry holes with rubber bushings.

c) Cable shall be terminated using single hole cable lugs suitable for bolt size of M16 for ring switches and M12 for tee-off. All necessary bolts, nuts and washers for fixing the cable on the bushings shall be provided with each unit.

d) Bushings for ring and tee-off switches shall be suitable for cable termination by means of bolted type connection with heat/cold shrinkable or screened pre-molded separable right angle/straight boots.

e) The clearances in the ring and tee-off cable boxes shall be sufficient for cable termination by heat shrink application.

f) Vertical distance from the top of cable clamp to the centerline of cable bushings shall be suitable for all type of terminations mentioned above, the cable connection height shall be the same for all ring and tee-off units for connection convenience.

g) The design of the cable boxes shall be such that the cable box shall allow full access during cable termination. Removal and installation of cable box cover shall be with minimum number of bolts.

2.11 Terminal Block

Terminal blocks for current injection test facility for protective relay shall be provided in the tee-off circuit-breaker, identified and clearly marked.

2.12 Enclosure

Outdoor type ring main unit shall have a tamperproof and weatherproof steel enclosure. Enclosure shall be provided with lockable doors, door handles, doorstoppers, hasp for padlocking, ventilation louvers and lifting hooks. The degree of protection shall be IP 54 or better as specified in IEC 60529. All panel bolts of enclosure shall be accessible from outside. All nuts, bolts and washers shall be stainless steel or hot dipped galvanized.

The enclosure shall be adequately protected against corrosion and painted as per relevant clauses of manufacturer's specification. Finish color shall be RAL 7035.

Vendor / manufacturer may consider alternative methods of protection against corrosion. Vendor / manufacturer shall submit details with quotation.

2.13 Dimensions

Overall maximum size of the ring main unit shall be:

Type 3-Way

Usage Indoor/outdoor

Height (H) 1500/1700 mm

Width (W) 1148 mm / 1548 mm

Depth (D) 840 mm / 1100 mm

Type 4-Way

Usage Indoor/outdoor

Height (H) 1500/1700 mm

Width (W) 1488 mm / 1888mm

Depth (D) 840 mm / 1100 mm

Operating mechanism height (maximum) 1300 mm

2.14 Earthing

A ground bar of not less than 25 x 5 mm copper strip shall be provided bolted to the frame. It shall be located so as to facilitate earthing of cable sheaths and earthing devices. In addition, a terminal having M12 stud and nut shall be provided in the back of the panel with clear grounding mark.

2.15 Voltage Indicator Lamps / Phase Comparators

Built-in or Push-button type neon voltage indicators shall be provided together with low voltage hot phasing facility on ring switches. The lamps shall be powered by bushing type capacitive dividers.

Internal wiring in cable boxes shall be protected with heat resistant tape/tube, against flame temperatures of gas torch during the cable termination.

2.16 Fault Indicator (option)

Fault indicator (manufacturer approved type) with automatic resetting, single-phase AC supply, split core type sensor as per manufacturer's specification shall be supplied with each unit.

Fault indicator shall be installed on the front control plate of ring main unit.

The fault indicator device may be required to supply in an outdoor box with 10 meters of control cable for installation on masonry wall.

2.17 SF6 Gas Pressure Indicator & Refilling Provision

Temperature independent gas pressure gauge marked with green (safe) and red (not safe) zones shall be provided. The safe operating zone shall correspond to a temperature range of –10 ^{o}C to 50^{o}C.

The unit shall continue to work safely even if the gas pressure inside the tank goes down to the atmospheric pressure.

Refilling/re-pressurizing inlet valve if provided shall be easily accessible for field refilling.

2.18 Over-pressure Release

In order to ensure maximum personal safety, Ring main unit shall be designed to withstand any overpressure due to an internal fault by rupture of a gas escape membrane located at the rear or bottom of the enclosure. The gas shall be led out in the rear panel to the bottom of the enclosure.

2.19 Nameplate

Ring main unit shall be provided with aluminum /stainless steel / brass nameplate showing the following information indelibly marked in English:

- Manufacturer's Name
- Country of Origin
- Type/Model
- Vendor's Name
- Reference of Manufacturer specification
- Manufacturer's Serial Number
- Purchase Order Number
- Item Number

• Year of Manufacture
• Voltage Rating kV
• Current Rating Amps
• BIL kV
• Short Circuit Rating / Duration kA / Sec
• Rated Frequency 50Hz (or 60Hz option)
• Rated Making Current kA
• Rated Breaking Current kA
• Gross Weight kg

2.20 Circuit Labels

Ring and T-off switches shall be provided with circuit labels of dimension 90x40 mm without inscription.

2.21 Logo and Danger Plates

Danger plate and manufacturer logo shall be provided at the front of the ring main unit without opening the door / front cover.

Location and samples of danger & manufacturer logo shall be approved prior to manufacture.

3 TESTING AND INSPECTION

3.1 Type Test

All equipment shall be type tested at an independent laboratory in accordance with the latest standards and as specified in part 1.6 and test report shall be submitted for review and approval.

3.2 Routine Test

The switchgear offered shall meet the routine test requirements of the standards listed below:

3.2.1 Fuse-switch Combination

a) Mechanical Operating Tests
b) Power Frequency Dry Tests

3.2.2 High-voltage Switches

a) Power Frequency Voltage Tests
b) Voltage Tests on Auxiliary Circuits
c) Measurement of Resistance of Main Circuit
d) Operation Tests
e) Operation and Mechanical Endurance Tests

3.2.3 Circuit- breaker

a) Power Frequency Voltage Tests
b) Voltage Withstand Tests on Control and Auxiliary Circuits
c) Measurement of Resistance of Main Circuit
d) Mechanical Operating Tests

3.3 Factory Acceptance Test

The manufacturer shall notify the engineer 4 weeks in advance of the factory acceptance tests (FAT) of the switchgear. The engineer will be entitled to witness all or any parts of the FAT. The factory acceptance tests shall include mechanical and electrical function tests as outlined below:

- Visual inspection for defects and damages
- Primary components verification
- Busbar connections and joint quality
- Creepage and clearance verification
- Earthing verification
- Secondary wiring check
- Verification of protection against dust and water ingress as per the specifications
- Verification of electrical equipment as per applicable test procedures
- Power frequency test
- Electric resistance test
- Main circuit ON / OFF test
- Verification of protection relay
- Mechanical operation test
- Verification of interlocks
- Environmental tests – Temperature control, humidity, Light and Power

A copy of the IEC type test report and routine test results shall be available.

4 PACKING AND SHIPMENT

Ring main unit shall be delivered ready for installation.

Ring main unit shall be individually packed in non-returnable cases as per packing/shipping requirements.

For container shipment, ring main unit bolted on wood pallet is acceptable.

Ring main unit shall be delivered without fuses.

Ring main unit shall be delivered with handles, fixing bolts, earthing nuts, leaflet pocket with installation & operating manuals, test plugs and bill of materials for all loose items.

5 GUARANTEE

The vendor shall guarantee the ring main unit against all defects arising out of faulty design or workmanship or defective material for a period of two years from the date of delivery.

Warranty period for gas tightness shall conform clause 5.15.3 of IEC 60694. Vendor/ manufacturer shall assume full responsibility for no gas leakage during the service life.

In case of gas leak during the service life, all expenses for repairs and replacements shall be borne by vendor / manufacturer.

If no exception to this specification and no list of deviations are submitted, it shall be deemed that, in every respect, ring main unit offered shall conform to this specification. Vendor / manufacturer interpretation of this specification shall be accepted.

6 SUBMITTALS

Vendor shall complete and return one copy of the attached Technical Data Schedule.

Vendor shall provide the following with the Quotation:

• Clause by clause compliance with this specification.

• Drawing showing the full constructional detail with dimensions of rings main unit and all associated accessories.

• Drawing of mounting details (for outdoor unit) with respect to the unified concrete foundation and the positions of cables.

• Drawings of cable boxes.

• Installation and maintenance instructions of the ring main unit.

• Comprehensive list of manufacturer's recommended spare parts. The quantities offered should be adequate for the initial 5 years of operation. Firm price and delivery period shall be quoted for each item.

• Copy of type test report.

• Descriptive leaflet and literature of ring main unit offered.

• Checklist of quotation request.

• List of customers in case of new manufacture / vendor.

Vendor shall provide the following after signing of purchase order:

• Details of manufacturing and testing schedules.

• Routine test reports.

7 SCOPE OF SUPPLY

The specific product list shall be provided in a separate file while refer to below attached documents:

- Single line diagram
- Technical data