RLM/DTIS/0120/2025/26 - APPOINTMENT OF A CONTRACTOR TO PERFORM SWITCHGEAR AND PROTECTION TESTING AND MAINTENANCE AT VARIOUS SUBSTATIONS AND ELECTRICAL NETWORK AS AND WHEN REQUIRED FOR A PERIOD OF 3 YEARS

SPECIFICATIONS AND PRICING SCHEDULE

1. PRICING INSTRUCTIONS

1.1. Measurement and payment shall be in accordance with the relevant provisions of clause 8 of each of the SABS 1200 Standardised Specifications referred to in the Scope of Work. The Preliminary and General items shall be measured in accordance with the provisions of SABS 1200-A, General.

1.2. The units of measurement described in the Bills of Quantities are metric units. Abbreviations used in these Bills of Quantities are as follows:

%	=	percent
h	=	hour
ha	=	hectare
kg	=	kilogram
kl	=	kilolitre
km	=	kilometre
km-pass	=	kilometre-pass
kW	=	kilowatt
l	=	litre
m	=	metre
mm	=	millimetre
m^2	=	square metre
m^3	=	cubic metre
m^3-km	=	cubic metre-kilometre
MN	=	meganewton
MN.m =	meganewton-metre	
MPa	=	megapascal
No.	=	number
Prov sum	=	Provisional sum
PC sum	=	Prime Cost sum
R/only=	Rate only	
Sum	=	lump sum
t	=	ton (1000 kg)
W/day=	Workday	

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

1.4. The prices and rates in these Bills of Quantities are fully inclusive prices for the work described under the items. Such prices and rates cover all costs and expenses that may be required in and for the execution of the work described in accordance with the provisions of the Scope of Work, and shall cover the cost of all general risks, liabilities, and obligations set forth or implied in the contract data, as well as additional work that may have to be carried out.

1.5. It will be assumed that prices included in these Bills of Quantities are based on Acts, Ordinances, Regulations, By-laws, International Standards and National Standards that were published 28 days before the closing date for tenders. (Refer to www.stanza.org.za or www.iso.org for information on standards).
1.6. Where the Scope of Work requires detailed drawings and designs or other information to be provided, all costs associated therewith are deemed to have been provided for and included in the unit rates and sum amount tendered such items.
1.7. An item against which no price is entered will be considered to be covered by the other prices or rates in the Bills of Quantities. A single lump sum will apply should a number of items be grouped together for pricing purposes.
1.8. The quantities set out in these Bills of Quantities are approximate and do not necessarily represent the actual amount of work to be done. The quantities of work accepted and certified for payment will be used for determining payments due and not the quantities given in the Bills of Quantities.
1.9. Reasonable compensation will be received where no pay item appears in respect of work required in the Bills of Quantities in terms of the Contract and which is not covered in any other pay item.
1.10. The short descriptions of the items of payment given in these Bills of Quantities are only for the purposes of identifying the items. More details regarding the extent of the work entailed under each item appear in the Scope of Work.
1.11. Descriptions in the Bills of Quantities are abbreviated and comply generally with those in the SABS 1200 Standardised Specifications.
1.12. All prices and rates entered in the Bills of Quantities must be excluding Value Added Tax (VAT). VAT will be added last on the summary page of the Bill of Quantities.
1.13. The unit prices offered in the Pricing Schedule must include transport, communication, staffing and technical requirements. The prices must be annually fixed for the duration of the contract.

2. BILL OF QUANTITIES

Tenderers must complete the Bills of Quantities and detail unit rate and total amount for each item. All rates and prices exclude VAT.

Any discrepancies which might occur between the specification, the Bills of Quantities and the drawings must immediately be brought to the attention of the Engineer and the tenderer should indicate at the time of tendering whether provision has been made in the tender price covering such discrepancies.

The “Total” shall constitute the tender price for adjudication.

Note:

Tenderers are advised to check their item extensions and total additions as arithmetic errors occurring in the priced Bills of Quantities cannot be considered as having an effect on the tender amount.

No alterations, erasure or addition is to be made in the text of the Bills of Quantities. Should any alteration, erasure or addition be made it will not be recognised but the original wording of the Bills of Quantities will be adhered to.

The Engineer will check the completed Bills of Quantities and reserves the right to adjust any individual price and to rectify any discrepancy whilst the total tender price as quoted remains unaltered.

The sundry materials associated with the Switchgear maintenance will not be re-measurable and the tenderer must therefore allow for the supply of all necessary sundries for the successful execution and completion of the scope.

3. SCOPE

This specification sets out and states the principle and requirements that cover electrical protection schemes-: the work involved in assessing, testing and commissioning of the following:
Medium voltage cables, switchgear and power transformers and related equipment such as
current transformers, voltage transformers, battery tripping units and protection relays, supply and installation of protection relays.
Providing test and commissioning certificates in respect of all the above, as and when required.

4. CLARIFICATION MEETING

A compulsory briefing meeting will be held on the date and time as specified in the tender document. Tenderers that arrive late for the briefing meeting will not be allowed entry and as such will be deemed to not have attended.

The Tenderer must be represented at the briefing meeting by a person who is suitably qualified and experienced to comprehend the implications of the work involved. Should a Tenderer or his representative not attend the briefing meeting; his tender offer will be disqualified.

5. GENERAL CONDITIONS OF TENDER

5.1. The Municipality will not be bound to consider alternative offers.
5.2. All other supporting documentation of the tender must be attached at the back of this document.
5.3. This tender document must not be dismembered (Do not take it apart or put documents between its pages). The tender document and all relevant specifications and attachments thereto must be bonded together in a suitable binder.
5.4. The Tenderer must be accredited for the installation and repairs of the equipment as specified in this tender. The Tenderer must submit proof in form of a letter of accreditation as well as proof of after sales support with the tender submission.
5.5. Please submit a hard copy of the completed returnable documents as well as a PDF electronic file format with tender.
5.6. Only suitable qualified contractors which successfully completed similar projects of this nature are eligible to submit bids.
5.7. All items will be evaluated in total and the tender awarded to one Tenderer.
5.8. Rustenburg Local Municipality does not bind itself to accept the lowest or any tender.
5.9. Insurance of contract risk:

The successful Contractor shall submit proof of adequate insurance with a minimum of R5 million for the duration of the contract for accidents, emergencies which may result for this works when the contract is awarded.

6. SPECIAL CONDITIONS OF CONTRACT

6.1. **Funds**
The work is not definite but is subject to the funds available.
Further, work shall only be carried out on instruction on an as and when required basis as requested by the Unit Manager: Electrical Engineering Services or the appointed Electrical Services representative.

6.2. **Area of Works**

The area of works shall be within the Rustenburg Local Municipal areas as defined by its electrical network.

6.3. **Performance**

This contract will be dependent on performance and market force if the contractor does not perform all duties in a professional, timeous and cost-effective manner. Non-performance will lead to termination.
Due to the specialized nature of the Contract works, tenderers are advised to complete the Price Schedule in its entirety. Tenders who complete portions of the Schedule will not be considered.
Due to the specialized nature of the contract tenders shall have all the equipment on the Schedule of Equipment attached as Annexure "B". Tenderers who do not meet this requirement will not be considered.
Proof of the said equipment shall be submitted with the tender document on the date and time of submission as per the tender Advert.

6.4. **Key Personnel**

It is a requirement of this tender that the tenderer must have the following key personnel in his permanent employment and stationed at his local office. Alternatively, the tenderer must attach a signed agreement from a specialist company that has the required expertise and personnel locally available, stating that they will undertake the specialized work on behalf of the tenderer as a subcontractor. Such a signed agreement must be attached to Item 19 of the Schedule of staff.

6.4.1. **Tenderer Experience and Qualifications**

6.4.1.1. **Tenderer experience in similar work completed successfully:**
Tenderers must include detailed copies of the qualifications of the personnel who are going to be working on this project. Please include a minimum of 3 contactable references. Evaluation shall be based on the positive response of all the references.

6.4.1.2. **Experience and qualifications of the Project Manager.**
The appointed Project Manager must have a relevant qualification in electrical engineering and a minimum of 5 years' experience in the testing, programming of relays and repairs to substation protection systems.

6.4.1.3. **Experience and qualifications of the Technicians**
The technicians who will be involved in the work specified in this tender must have a relevant qualification in electrical engineering and minimum of 5 years' experience in the testing, programming of relays and repairs to substation protection systems.

6.4.1.4. **Authorized Person.**
The successful service provider shall have a duly Authorized / Responsible person in terms of the Safety and Occupational Health and Safety Act for work in live substations on site while any work is in progress in the substation. Proof of such person in the employment of the contractor shall be submitted on the list of item 19, Schedule of staff with the tender.

6.4.1.5. **Company profile, plant and equipment.**
Please include a company profile demonstrating the company establishment, financial status and experience as well as list of major plant and equipment available for this contract.
A list of relevant major items of plant and equipment which they have immediately available, and which they will acquire for use in this contract should their tender be

successful. Failure to include this list may prejudice the Tenderers as being submitted by an insufficiently equipped Tenderer and it may be rejected for such a cause.

6.4.1.6. **Similar contracted projects successfully completed.**
Tenderers must complete the attached schedule for previous projects in this document.
Previous projects will be regarded as the installation and testing, programming of relays and repairs and maintenance of substation protection systems.
A company who has successfully completed a minimum of 5 similar projects as required in this tender will be considered.
References of the projects completed must be included in the schedule in item 1.7.2.

7. HOURS OF SERVICE

The Contractor shall ensure that his personnel declared in this tender is available five days a week, Monday to Friday, excluding public holidays that fall on these days. Normal Working hours shall be from 8:00 to 16:30 Monday to Friday.
The contractor may be required to perform work on weekends or public holidays. If work is required on a weekend and/or Public Holiday, the prescribed rates will apply.
No work is to be performed on a Saturday, Sunday and/or Public Holiday without the express authority of the Unit Manager: Electrical Engineering Services or his delegated official in writing.

7.1. **Response time**
A response time of 3 hours is required for all call outs including emergency call outs.

8. EVALUATION OF TENDER

Proof of Contactable References is required, as indicated below, and must accompany each proposal.

8.1. **Evidence of experience of Bidders**
The Bidders shall include satisfactory evidence of actual experience in the class of work being quoted for, and a complete schedule shall be included incorporating the following details:

Please complete schedules in the format indicated:

COMPLETED CONTRACTS				
EMPLOYER (Name, Tel, Fax, Email)	**Contact Person (Name, Tel, Fax, Email)**	**NATURE OF WORK**	**VALUE OF WORK (INCL.VAT)**	**DATE COMPLETED**

CURRENT CONTRACTS				
EMPLOYER	**Contact Person**	**NATURE OF WORK**	**VALUE OF**	**DATE COMPLETED**

(Name, Tel, Fax, Email)	**(Name, Tel, Fax, Email)**		**WORK (INCL.VAT)**	

SUBCONTRACTORS				
No	**Company Details**		**Items of work be undertaken**	**Estimated cost of Work (Rand)**
1	**Name of Firm**			
	Contact Person			
	Telephone No			
	Address			

9. TECHNICAL SPECIFICATION

9.1. GENERAL REQUIREMENTS

The Contract shall comprise predominantly the testing and maintenance of electrical protection systems equipment. The Contractor shall submit all required test certificates. The Contractor shall be required to carry out commissioning of new and refurbished installations of electrical protection systems and related equipment.

A test certificate shall reflect the scope of work for the commissioning activity. All the test results shall be recorded on the test certificate and signed by the authorized Test Engineer / Technician.
The Unit Manager: Electrical Engineering Services or the appointed representative shall approve the content of test certificates.

Test certificates shall be submitted to the Unit Manager: Electrical Engineering Services or the appointed representative for each portion of equipment on which the work is completed and ready for energizing.

Test sheets and results are to be handed to the Unit Manager: Electrical Engineering Services or the appointed representative for approval 24 hours prior to energizing.

9.2. SCHEDULE OF WORK – MEDIUM VOLTAGE

9.2.1. Circuit Breaker Mechanical Test: Per Switch Panel

The Contractor shall carry out the following checks:

- Torque-testing all primary conductor bolts and nuts and recording results.
- Ascertaining that all bolts and nuts used were new and comply with the manufacturer's specification.
- Checking the circuit breaker for any defects or damage due to manhandling.
- Checking circuit breaker alignment and ease of racking in and out.
- Checking bus bar shutter operations for smooth operation and adjustment thereof, if necessary.
- Checking operation of circuit breaker manually.
- Testing earth continuity of earthing bus bars and connection to station earth mat.
- Ensuring that all covers are fitted and explosion vents functional.

- Testing earth continuity of earthing bus bars and connection to station earth mat.
- Ensuring that all covers are fitted and explosion vents functional.
- Checking that the panel complies with IP ratings.
- Measuring and recording of the circuit breaker no load tripping time and the no load closing time for each phase.
- Production of test certificates for all tests carried out.

9.2.2. **Circuit Breaker Electrical Test: Per Switch Panel**

The Contractor shall carry out the following tests:

- Measurement and recording of the contact resistance of the closed-circuit breaker using min 100 A D.C. Wheatstone Bridge method; (Ductor tester)
- Testing of HV insulation resistance of panel and circuit breaker to manufacturer's specifications for new or used equipment, whichever is applicable. The test is to be carried out with circuit breakers closed between phases and across the open contact of each phase.
- Testing of trip and close coil minimum operation voltage levels.
- Testing of the trip and close coil resistance and recording thereof.
- Checking that spring charge motor rating corresponds with D.C. available.
- Production of test certificates for all tests carried out.

9.2.3. **Current Transformer Test**

The Contractor shall carry out the following tests per secondary connection:

- Ratio test: Ratio shall be tested at rated current.
- Magnetization curve test: Magnetization curve shall be tested and comparison curves plotted for all sets of current transformers including metering.
- Polarity shall be tested by means of D.C. flick test.
- The insulation resistance of the current transformers shall be measured and the CT earth tested on the secondary wiring.
- The loop resistance shall be measured for CT, wiring and relays, and be recorded.
- Test certificates for all tests carried out shall be produced.

9.2.4. **Voltage Transformer Test**

The Contractor shall carry out the following tests per secondary connection:

- Ratio test
- Polarity shall be tested by means of D.C. flick test
- The insulation resistance of the voltage transformers shall be measured and the neutral earth tested on the secondary wiring
- Test certificates for all tests carried out shall be produced.

9.2.5. **Routine Checks**

The Contractor shall carry out the following tests & annual checks as and when required:

- Primary and Secondary substations

- Battery maintenance, ammeter readings on all panels
- D.C. checks in panels
- Trip counter readings on all breakers
- Substation checks on buildings, doors, ceilings, signs etc. Cleaning out of protection panels & switch house.
- Logging of any protection flags.
- Distribution board checks including earth leakage checks.
- Testing of operation of building alarm and signal to the Control centre.
- Transformer – Checking of oil leaks, insulators, silica gel. Logging of oil temperature, winding temperature, tap change counter, tap change bandwidth (Minimum & maximum), circuit breaker trip counter.

9.3. **Protection schemes**

The Contractor shall carry out tests per relay using primary and secondary current injection on electro-mechanical, solid-state and multifunctional microprocessor type relays, where relevant. The contractor shall ensure that the functional operation of the relays where relevant.
The following functions shall be covered:

9.3.1. **Over-Current and Earth Fault Protection.**

- Over-current and earth fault
- Directional over-current and earth fault
- Sensitive earth fault relay
- Breaker Fail Logic

The Contractor shall prove the operation of the protection scheme, i.e. secondary wiring between the CT's and the relay element and between the relay contacts and the trip circuit.

NB. The tender provides for the supply and replacement of protection relays as and when required.
Rates shall provide for the installation of free issued relays.

9.3.2. **Standby Earth Fault Function**

The Contractor shall prove the operation of the protection scheme, i.e. secondary wiring between the CTs and the relay element and between the relay contacts and the trip circuit.

9.3.3. **Feeder Differential Protection Relays**

The Contractor shall test the feeder differential relay by injecting current through the primary circuit between substations.
Separate rates are allowed for secondary injection tests where the primary impedances are too great, or induction causes dangerous conditions for the application of primary tests to be conducted.

The Contractor shall allow for comprehensive pilot tests to be carried out and recorded. This shall cover loop impedance and insulation resistance measurements.

9.3.4. **Feeders Fitted with Inter-Tripping Relays**

The Contractor shall allow for comprehensive pilot tests to be carried out and recorded per relay. This shall cover loop impedance and insulation resistance measurements. Comprehensive pilot tests are to be carried out and recorded.
The Contractor shall allow for the cost of relay operation values and minimum operation voltage value to be recorded.

9.3.5. **Master Trip and Auxiliary Relays: Per Element or Trip Function**

The Contractor shall include the cost of proving the operation of the relay within the scheme, i.e. Secondary wiring between the primary relay element and between the relay contacts and the trip circuit.
With the introduction of numerical relays additional auxiliary functions are programmed into a standard relay. These output functions are used to drive the protection scheme's and need to be proven.

9.3.6. **Bus bar Protection**

Bus Zone Protection: per zone of a complete board per substation.

The Contractor shall prove the operation of the relay within the scheme, i.e. secondary wiring between CT's and the relay element and between the relay contacts and the trip circuit.
Current transformer tests are covered under a separate item in the schedule.

9.3.7. **Timers: Per Unit**

The Contractor shall prove the operations of the timer within the scheme, i.e. secondary wiring between timer and relay element.

9.3.8. **Transformer Commissioning Tests and Checks**

The following tests and checks assume that the transformer has either been factory tested and commissioned or has been previously in use and that oil quality tests have been carried out by the installation contractor.
Over-current and earth fault relay testing rates are not repeated here as a separate item covers these. The rates shall be based on the tests being carried out on a free-standing panel and therefore no E.O. item has been allowed in respect of tests being conducted from a free-standing panel.

9.3.9. **Buchholz Relay and Auxiliary Relay Element**

The Contractor shall check the surge and gas operation of each Buchholz relay and proving the trip and alarm circuit between each Buchholz relay and auxiliary relay element and the functioning of each relay. The auxiliary relay contacts in the trip and alarm circuits shall be proved.

9.3.10. **Oil Temperature Sensor Relay and Auxiliary Relay Element**

The Contractor shall check the calibration and set point operation of the thermometer and proving the trip and alarm circuit between each oil temperature sensor and auxiliary relay element and the functioning of each relay. The auxiliary relay contacts in the trip and alarm circuits shall be proved.

9.3.11. **Winding Temp Relay and Auxiliary Relay Element**

The Contractor shall prove the trip and alarm circuit between each winding temperature sensor and auxiliary relay element and the functioning of each relay. The auxiliary relay contacts in the trip and alarm circuit shall also be proved.

9.3.12. **Pressure Relief**

The Contractor shall price the trip and auxiliary relay element and the functional of basic relay.

9.3.13. **Restricted Earth Fault Relay**

The Contractor shall prove the operation of the relay within the scheme, i.e. secondary wiring between the phase and neutral CTs and the relay element and between the relay contacts and the trip circuit. Current transformer tests are covered under a separate item in the schedule.

9.3.14. **Differential Protection Scheme**

The Contractor shall prove the operation of the relay within the scheme, i.e. secondary wiring between the primary and secondary phase CTs and the relay element and between the relay contacts and the trip circuit. Current transformer tests are covered under a separate item in the schedule. A separate rate is included in the schedule to allow for a transformer with a tertiary winding.

9.3.15. **Neutral Earthing Resistor**

The Contractor shall include the measurement and recording of the resistance of the neutral earthing resistor for comparison with the specified value. These tests are to be carried out with the use of a computer aided test set.

9.3.16. **Transformer Tap-Changer Mechanism**

The Contractor shall check the operation of the tap-change mechanism and record any malfunction observed. The rate shall not include rectifying defects or carrying out repairs on the mechanism.

9.3.17. **Transformer Tap-Change Panel**

The Contractor shall check the operation of the tap-changer and recording any malfunction observed.

9.3.18. **Transformer Short Circuit Tests**

The Contractor shall carry out short circuit tests on Minimum, Nominal & Maximum Tap Positions. These tests are to be carried out with the use of a computer aided test set.

9.3.19. **Transformer Ratio Tests**

The Contractor shall carry out Ratio tests on all Tap Positions. These tests are to be carried out with the use of a computer aided test set.

9.3.20. **Transformer Vector Group Tests**

The Contractor shall carry out vector group tests on Nominal Tap Position. This test is to be carried out with the use of a computer aided test set.

9.3.21. **Transformer Zero Sequence Tests**

The Contractor shall carry out zero sequence tests on Minimum, Nominal & Maximum Tap Positions. These tests are to be carried out with the use of computer aided test set.

9.3.22. **Transformer Vector Group Tests**

The Contractor shall carry out vector group tests on Nominal Tap Position. This test is to be carried out with the use of a computer aided test set.

9.3.23. **Transformer Sweep Frequency Tests**

The Contractor shall carry out sweep frequency tests on Nominal Tap Position. This test is to be carried out with the use of a computer aided test set.

9.3.24. **Transformer OLTC Contact Resistance Tests**

The Contractor shall carry out Resistance & continuity of OLTC tests on All Tap Positions. This test is to be carried out with the use of a computer aided test set.

9.4. REQUIREMENTS FOR THE ON-SITE TESTING OF PROTECTIVE EQUIPMENT

Site testing and commissioning may only commence after the following work has been completed:

9.4.1. All equipment has been erected and the relevant bus bar connected to and between the switchboards / relay control panels.
9.4.2. All high voltage and low voltage cables have been connected to the switchgear and related equipment.
9.4.3. All the bus wires between switchboards / relay control panels have been connected.
9.4.4. All the relevant equipment has been labelled correctly.
9.4.5. The D.C. auxiliary supply has been connected to the equipment.
9.4.6. All the necessary safety equipment (i.e. danger notices, fire-fighting equipment and first aid equipment) has been fitted to the substation.
9.4.7. The relevant high voltage pressure tests have been performed.

9.5. PRELIMINARY SITE CHECKS

Prior to commencing any functional testing, the following preliminary checks shall be carried out:

9.5.1. All new wiring done on site (i.e. Bus-wiring, D.C. auxiliary supply wiring, connection to CTs on VTs and outdoor switchgear, marshalling kiosks, etc.) shall be checked against the drawing using a continuity tester.
9.5.2. All new lead numbers and all new lugs shall be checked for secure crimping and proper electrical contact.
9.5.3. All terminal strips shall be checked for tightness and proper electrical contact.
9.5.4. The D.C. auxiliary supply voltage shall be checked to ensure that the voltage is within the range of the protection relays and related equipment.
9.5.5. All new wiring, as well as CT and VT circuits, shall be tested at 500V D.C. with respect to earth, and the correct earthing of CT and VT circuits shall also be checked.
9.5.6. The loop resistance of pilot wire cables (where applicable) shall be measured and noted in the site commissioning report.

9.5.7. All pilot cable cores shall be tested at 500V D.C. with respect to earth and tests shall be done to ensure correct polarity of all pilot cores.

9.5.8. All indication instruments shall be checked for damage and their pointers adjusted to zero.

9.6. FUNCTIONAL TESTS

Functional tests shall be carried out to ensure that all combinations of operation of the protection and control switching / selection result in the correct operation of circuit breakers, either by tripping or closing.

The following checks shall be carried out:

- All relays shall be operated in turn to trip, no initiation of auto-reclosing of circuit breakers applicable.
- All types of indication and alarms shall be checked for correct operation.
- The correct latching and resetting of master trip relays and other seal-in circuits shall be checked.
- Panel switches shall be checked for correct function and selection in all positions.
- Transformer temperature instruments shall be checked for calibration and set point operation and the results noted in the site commissioning report.
- Buchholz relays on transformers shall be checked for surge and gas operation and the results noted in the site commissioning report.

9.6.1. Secondary Current / Voltage Injection Tests

9.6.1.1. All measuring type protection relays, particularly those using multiple inputs, shall be tested for operation at various points (not less than 5) on their operating characteristics by means of secondary injection tests.

9.6.1.2. The total circuit from the tests block, up to and including the relay, shall be tested by means of secondary injection and the results shall be noted in the site commissioning report.

9.6.1.3. Only the characteristics of the required final relay settings should be checked and noted during commissioning tests.

9.6.1.4. Secondary injection of Ammeter and Volt Meters to prove Operation & Calibration. The thermal function of ammeters to be proved. If selector switches are being used, then wiring prior to selector switch to be used to prove functionality of selector switch.

9.6.2. Primary Current Injection Tests

Primary current injection tests shall be done to prove the following:

9.6.2.1. CT secondary currents reach the protection relays correctly.

9.6.2.2. That metering CTs saturate at the correct current levels.

9.6.2.3. That CT ratios and polarity are correct and that CTs were not damaged during transit and installation.

9.6.2.4. Stability of differential protection for through-faults and correct operation for internal faults.

The results of the above tests shall be noted in the site commissioning test report.

9.6.3. Circuit Breaker Trip Test

9.6.3.1. All circuit breakers shall be tested for correct mechanical and electrical operation.

9.6.3.2. Comprehensive tests shall be done to prove all interlocking mechanisms, safety locks, auxiliary contacts, switching and latching devices, the anti-pump timer circuits, trip circuit supervision, racking devices, SF6 gas alarm circuits, trip-testing circuits, etc.

9.6.3.3. The resistance of the trip coils (main and back-up) shall be measured and noted in the site commissioning report.

9.6.3.4. The circuit breaker no load tripping time for each phase shall be measured at least three times and the results noted in the site commissioning report.

9.6.3.5. The circuit breaker no load closing time for each phase shall also be measured at least three times and the results noted in the site commissioning report.

9.7. PHASING OF PRIMARY SUPPLIES

Only when the protection and control equipment has been tested as above can the equipment be energized at high voltage. However, to cover the possibility of
incorrect primary connections, especially in relation to the existing HV network,
phasing tests shall be carried out on all new equipment with respect to the existing system to which it is being connected as and when required.

9.8. ON - LOAD CHECKS

Only after the phasing tests have been completed can loads be supplied via the newly installed equipment. Load currents shall be used to carry out final checks on the polarity of voltage and current compared to power flow for multiple input relays.

The following tests (where applicable) shall be conducted and the results noted in the site commissioning test report:

9.8.1. Pilot wire differential protection stability tests.
9.8.2. Phase angle tests of current and voltage to prove correct relay operation.
9.8.3. Comparison of current magnitudes as a further check on CT ratios.
9.8.4. VT ratio checks when the system voltage is close to 100%.

Only when all load tests have been completed will new equipment be placed in full-time operation.

9.9. Correction of Drawings

All alterations made on site to the equipment shall be marked up on the drawings. The marked-up drawings shall be returned to the original drawing office for correction of their master copies and thereafter be re-issued as “as commissioned drawings”.

9.10. Witnessing Commissioning Tests

The contractor shall inform the Electrical Operations Manager, or duly appointed
representative, 14 days in advance of these tests so that a representative may be present to witness the site commissioning tests.

It should be noted that inspections and witnessing of the above tests will not relieve the contractor of his responsibility for meeting all the requirements of the specification.

10. PROTECTION SETTINGS

Only settings approved by the Distribution Engineer, Electrical Engineering Services are to be applied to the protection relays. Stickers indicating the date that the settings were changed to be attached to the protection relay, these stickers are to reflect a signature as well as a date.

10.1. Electromechanical Relays – Change Plug setting and time multiplier.
10.2. Solid State – Relay with Dip Switches, Plug Setting, Time Multiplier as well as curves.
10.3. Numerical – Application of settings for primary function of relay.
10.4. Logics – Numerical relays have additional functions over and above the primary function of the relay. Additional logic application to be claimed here.
10.5. Settings - Numerical relays have additional settings over and above the primary function of the relay. Additional setting application to be claimed here.

11. SITE COMMISSIONING TEST REPORT

11.1. A comprehensive site commissioning test report containing all the relevant test results shall be submitted to the Unit Manager, Electrical Engineering Services after final commissioning has taken place.
11.2. The above site commissioning test report shall be submitted irrespective of whether a representative of the Unit Manager, Electrical Engineering Services was present during the tests or not.

12. CALIBRATION OF TEST EQUIPMENT

All testing equipment instruments, and injection test sets used during site commissioning tests shall carry a calibration stamp or sticker issued by a recognized calibration centre (i.e. Eskom, CSIR, Bureau of Standards, etc.).

12.1. The date on the calibration stamp or sticker shall not be older than one year.
12.2. Tests performed with test equipment that does not comply with the above shall be rejected and the Unit Manager, Electrical Engineering Services.

13. BATTERY CHARGER

13.1. The Contractor must test nominal supply voltage and current test operation of indication lamps, switches, relays and miniature circuit breakers.
- Test Float voltage and current
- Test boost voltage and current
- Test equalizer voltage and current
- Test ripple voltage
- Check alarm settings
- Carry out visual inspection

13.2. Should the Contractor be required to carry out the installation of the Battery Charger and Battery Cabinet, the A.C. supply to the charger is to be connected to a dedicated supply that is not on an Earth Leakage. The Battery Charger is to be connected to an isolator and not a wall plug/socket. The cabling is to be secured to the wall by means of steel conduit. The D.C. Supply is to be on its own circuit and is to be installed in steel conduit.

14. BATTERIES

- Carry out visual inspection on cells
- Test and check electrolyte levels
- Check and clean corrosion on post and links
- Check torque bolts and nuts
- Carry out cell readings, voltage and SG (Lead Acid), voltage (NiCad)
- Clean cells
- Check battery environment

15. PRESSURE TESTING

The Contractor shall carry out Tan Delta Measurements for evaluating the dielectric condition of cables and transformers. When carried out at fixed intervals Tan Delta Testing (TD) will be the basis of predictive maintenance program. The contractor is to carry out approved TD Testing of Cables and Transformers as per the instruction of the Electrical Services as and when required.

16. IR SCANNING

- The Contractor to carry out IR scanning on Municipal equipment. The Contractors operator must be trained to a level 1 thermograph.
- The Contractor must have a camera that operates at 50 hertz (real time).
- Have telescopic lens to work in HV yards and have an anemometer required for wind speed and humidity. An infrared thermography shall be used to detect abnormal heating connections on the control panels and distribution boards and other related equipment.
- Complete detailed reports shall be submitted for each substation indicating each point scanned as well as the seriousness thereof. When the fault has been located, it shall be reported urgently to the responsible representative of the Electrical Department.

17. TESTING / COMMISIONING 11 KV PANELS / RMU'S

17.1. Ductor testing of bus bar connection shall be carried out with Micro OHM meter that is able to induce a minimum of 600 amps. Independent tests are to be carried out on the Red, White and Blue phase (panel to panel and not the whole board on one test).

17.2. Connection of bus wiring between panels:

- ensure correct side or wire is being used
- all grommets are fitter per panel
- all connection is tight and secure
- continuity to be tested

18. EARTH MAT TEST

- The instrument used must determine the earth resistance measurement using the “fall of potential method”.
- For any Switch House, Substation or Mini-Sub, the Earth Reading is to be below 1 Ohm.
- If structures in a Substation are to be tested, then a common point is to be chosen, and all the other points are to be tested to that point by means of Ductor testing.

19. DATA SHEET

Contractor to create a data sheet with the minimum following information but not limited to:

SUBSTATION EQUIPMENT DATA SHEET	
EQUIPMENT	**DATA**
Panel	Substation
	Panel Designation
	Panel Number
	Date Tested
Circuit Breaker	Make
	Serial Number
	Type
	Current Rating
	Short circuit rating
	Trip counter
	Spring charge
	Close function
	Earth facilities
	Last maintenance
Protection Relays	Function
	Make
	Serial Number
	Current / Voltage Rating
	Pickups
	Time multiplier
	High set
	CT ration selected
Current Transformer	Make
	Serial number
	Function
	Type
	Class
	VA
	Ratio
	Knee point
	Earthing
Voltage Transformer	Make
	Type
	Serial number
	Voltage

	Rating
	Voltage factor
	Class
Battery Charger	Make
	Serial Number
	Type
Batteries	Make
	Type
	Cell voltage rating
	Cell A/H rating

20. PROTECTION GRADING

A simulation for the HV and MV network model should be created on Dig Silent or equivalent software. All models created for protection grading are to be handed to the Distribution Engineer in electronic format as part of this contract.

The model should include load flow analysis and fault level calculations.

It would be required to carry out a network analysis and collect relevant data as and

when needed.

It is required to carry out a protection grading and coordination study for the HV

and MV feeders.

Compiling of a report and implementing settings of the relays as per coordination calculation. The contractor is to maintain a model of the municipal medium and high voltage network to upgrade protection setting for changes in the network for the duration of this contract.

21. REPLACEMENT OF PROTECTION EQUIPMENT

The cost of major materials is to be excluded from the costing of the work. Minor material includes wire, lugs, identification numbers/tags, bolts, jigsaw blades, spray paint & masking tape.
Allowance must be made for an approved blanking plate to be supplied when and where required.

21.1. (on the pricing schedule) When protection relays are to be installed an allowance must be made for additional wiring due to the upgrade from Electromechanical to Numerical Relays.
21.2. (on the pricing schedule) for umbilical cord installations, modifications need to be made on most panels for the inclusion of remote closing on the panels. This may include the Auxiliary wiring of the breakers.
21.3. (on the pricing schedule) Panel labels are to be of an engraved type (Black on a white background).

22. CLOSE OUT REPORT

After each section of the works completed the contractor will supply an overall report which shall include but in not limited to the following:

- Data Sheet

- Drawing
- Cost
- Condition Report
- Asset Register Report

23. SAFETY PLAN: OCCUPATIONAL HEALTH AND SAFETY PLAN

This Schedule shall be completed, signed and returned with bid documents of which it forms part.

It is a requirement of this contract, that a Safety Plan, in accordance with Rustenburg Local Municipality's Safety Rules and Occupational Health and Safety Act 1993 as amended, be submitted. The safety plan must provide for the procedures and equipment necessary to undertake the scope of work specified in this tender document, in all aspects.

The safety plan must be submitted by the successful contractor no later than 14 days after the awarding of the tender and before any work on the Stellenbosch network will commence.

Bidders to take special note of the known security risks in certain areas where special arrangements may be needed to work at specific premises.

24. SCHEDULE OF EQUIPMENT

Items 1 to 11 of the equipment list below are pre-requisites; Proof of said specialized equipment is to be submitted for the Implementation of this contract, contractors without the equipment will not be considered. Failure to submit proof of equipment availability shall result in the offer being deemed non-responsive. Bidders are to submit ownership in the form of photographs, calibration certificates and equipment information, such as serial numbers, models and make of the listed specialized equipment.

Item	Equipment	Range
1	Computer Aided Primary Injection Equipment	Omicron CPC100 or Equivalent
2	Secondary Injection Equipment	100 Amps, 1 000 Volts
3	Computer Aided Secondary Test Set	Omicron CMC356 or Equivalent
4	Breaker Speed Tester	Speed Testing, Minimum Coil
5	Ductor Tester	600 Amps
6	Insulation Resistance Tester	5/10 kV.
7	VLF Tester, Include Tan Delta Function	46 kV, 0.1 Hertz
	Meters & Hand Tools	Multimeters, Clip on Ammeters, Phase Rotation Meter, Hand Tools, 1000V Insulation

		tester, Torque Wrench, Flash to test ARC Sensor
	Phasing Sticks	12 kV
	Live Tester	Up to 66 kV
	Infrared Camera	50 Hertz & Telescopic Lens
	Dig silent Power Factory (Preferred)	Load Flow Studies & Protection Grading

25. COMPETENCY OF BIDDER'S STAFF

25.1. SCHEDULE OF STAFF

No	FUNCTION	QUALIFICATION
1	Project Manager – Meet with Manager or Representative, Facilitate Protection Design, Attend to Equipment Inspections.	Test Engineer – B Tech (6 Years' Experience).
2	Protection Testing Team (Testing & Grading) Qualified in testing of substation protection systems.	Two Test Technician -5 Years' relevant experience; Engineering Assistant
3	Cable Testing, IR Scan.	Field Technician/Electrician. Engineering Assistant
4	Substation Maintenance Team – Battery maintenance, Live Current Readings, Ammeter Replacement, Relay Replacement	Field Technician – Electrician 3 Years' experience. Engineering Assistant

NOTE: The above Qualifications are a pre-requisite, Proof of which must be submitted at the time of Tender submission. Without this proof the submission will be considered non-responsive and will not be considered further.

1. Details of the tenderer's previous proven competency and experience in the execution of work of an identical nature to that described in this document.
2. Brief Curriculum Vitae of all electricians and supervisory staff the Tenderer intends to use on this contract, who are in the employ of the bidder and deemed competent at the time of bidding, detailing the following:

    2.1. Experience in the execution of work of an identical nature to that described in this contract.
    2.2. Employees of the tenderer, deemed competent at the time of bidding, detailing the following:
        2.2.1. Qualifications
        2.2.2. Details of Competency

3. All new appointees / trainees working on the Municipal system in terms of this tender must be authorized by the manager: Operations and Maintenance or duly appointed representative.

26. CODES OF PRACTICE

CODES OF PRACTICE AND SAFETY RULES

- Rustenburg Local Municipality directive - Underground cables
- Rustenburg Local Municipality directive - Substations
- Rustenburg Local Municipality directive - Overhead lines
- Rustenburg Local Municipality directive – Operating rules and regulations and relevant Safety rules
- Occupational Health and Safety Act of 1993 as amended
- Code of Practice for Wiring of Premises SANS 0142 -2
- OEM manufacturer's manuals for the testing and programming of equipment, IEC standards for testing of power systems.

27. MARK UP FOR THE SUPPLY OF MATERIAL

This Schedule must be completed, signed and returned with bid documents of which it forms part.
Please state the percentage to be added to proven net cost for extra materials authorized by the Contract Manager:
Material: _____ per cent to be added to **proven materials** costs.
* The contractor will produce all correspondence, quotations, invoices, vouchers, and receipted bills, and other particulars necessary to enable the Contract Manager to certify the correctness of claims for payment made.

Signature		Name (Print)	
Date		Capacity	
Name of Firm			

BID: RLM/DTIS/0120/2025/2026: APPOINTMENT OF A SERVIC PROVIDER FOR SUBSTATION PROTECTION MAINTENANCE AT VARIOUS SUBSTATIONS AND ELECTRICAL NETWORK AS AND WHEN REQUIRED FOR A PERIOD OF THREE (3) YEARS

28. PRICING SCHEDULE

This pricing schedule must be completed in accordance with the scope and specification of this document. Bidders must quote on the unit price. The estimated quantities are just an indication. This bid will be awarded to one tenderer. This tender will be evaluated on the Total price of all units. (From item 1 to 20.7)

All unit prices must be completed.

DAYWORKS – PRICING SCHEDULE must be completed, but will not form part of the Total price, if not the bid will be non-responsive.

"All Unit Prices to be exclusive of Value Added Tax"

Contract price adjustment will be based on CPI or SIEFSA indices on the second- and third-year anniversary of the contract.

No	Description	Unit	Rate per unit	
			Year 1	Total
1	**Circuit Breaker Testing**			
1.1	Circuit Breaker Mechanical Test	Per Panel		
1.2	Circuit Breaker Electrical Test	Per Panel		
2	**Current Transformer**			
2.1	Verify ratios per core	Set		
2.2	Record mag curve per core	Set		
2.3	Verify polarity per core	Set		
2.4	Measure insulation resistance per core	Set		
2.5	Measure loop resistance per core	Set		
3	**Voltage Transformer**			
3.1	Verify ratios per core	Set		
3.2	Verify polarity per core	Set		
3.3	Measure insulation resistance per core	Set		
4	**Protection Relays**			

4.1	Overcurrent & Earth Fault Protection, Test Overcurrent and Earth Fault Relay Function (Electromechanical Relay)	Per Relay		
4.2	Overcurrent & Earth Fault Protection, Test Overcurrent and Earth Fault Relay Function (Numerical Relay)	Per Relay		
4.3	Test Directional Overcurrent and Earth Fault Relay Function (Electromechanical Relay)	Per Relay		
4.4	Test Directional Overcurrent and Earth Fault Relay Function (Numerical Relay)	Per Relay		
4.5	Test Sensitive Earth Fault Relay Function	Per Relay		
	Test Breaker Fail Function	Per Breaker		
	Feeder Differential Protection (Pilot Wire) – using primary injection test	Per Relay		
	Feeder Differential Protection (Pilot Wire) – using secondary injection test	Per Relay		
	Master Trip and Auxiliary Relay	Per Relay		
	Logic Function	Per Relay		
	Aux Function	Per Relay		
5	**Bus bar Protection / ARC Protection**			
	ARC Sensors	Per Unit		
	Master Relay, Light & Current	Per Unit		
	Master Relay, Light only	Per Unit		
	Cable Chamber Relay			
6	**Timers**			
	Timers	Per Unit		
7	**Transformer Commissioning Test and Checks**			
7.1	Main Buchholz relay and auxiliary relay Elements	Per Unit		
7.2	Tap Change Buchholz relay and auxiliary relay Elements	Per Unit		
7.3	NEC/R Buchholz relay and auxiliary relay Elements	Per Unit		
7.4	Main Oil temperature sensor relay and auxiliary relay element	Per Unit		
7.5	NEC/R Oil temperature sensor relay and auxiliary relay element	Per Unit		

7.6	Winding temperature relay and auxiliary relay element	Per Unit		
7.7	Pressure relief valve relay & aux relay elements	Per Unit		
7.8	HV Restricted Earth Fault Relay (Secondary Injection)	Per Unit		
7.9	HV Restricted Earth Fault Relay (Primary Injection)	Per Unit		
7.10	LV Restricted Earth Fault Relay (Secondary Injection)	Per Unit		
7.11	LV Restricted Earth Fault Relay (Primary Injection)	Per Unit		
7.12	Differential Protection Scheme (Electromechanical Relay)	Per Scheme		
7.13	Differential Protection Scheme (Numerical Relay)	Per Scheme		
7.14	Differential Protection Scheme (Primary Injection)	Per Scheme		
7.15	Neutral Earthing Resistor, Computer Aided Test Set Used	Per Unit		
7.16	Transformer Tap Changer Mechanism and Controller	Per Unit		
7.17	Transformer tap change panel single unit	Per Scheme		
7.18	Transformer tap change master follower scheme	Per Scheme		
7.19	Transformer Short Circuit (Taps, Min-Nominal-Max), Computer Aided Test Set Used	Per Unit		
7.20	Transformer Ratio Test (Taps, All), Computer Aided Test Set Used	Per Unit		
7.21	Transformer Open Circuit Test (Taps, All), Computer Aided Test Set Used	Per Unit		
7.22	Transformer Zero Sequence Test (Taps, Min-Nominal- Max), Computer Aided Test Set Used	Per Unit		
7.23	Transformer Vector Group (Taps, Nominal), Computer Aided Test Set Used	Per Unit		
7.24	Transformer Sweep Frequency (Taps, Nominal), Computer Aided Test Set Used	Per Unit		
7.25	Transformer – Resistance & continuity of OLTC (Taps, All), Computer Aided Test Set Used	Per Unit		
8	**Requirements for On-site Testing**			

8.1	New panel, Verify Wiring According to drawings, Continuity & Insulation testing	Per Panel		
8.2	Loop Resistance of Pilot Wire Cables	Per Scheme		
8.3	Pilot Cable Cores Insulation testing	Per Scheme		
8.4	Function Testing of Panel	Per Panel		
8.5	Secondary Injection of Ammeter / Voltmeter	Per Unit		
8.6	On-Load Checks	Per Panel		
8.7	Correction of Drawings	Per Panel		
9	**Protection Settings**			
9.1	Electromechanical	Per Relay		
9.2	Solid State – Apply settings	Per Relay		
9.3	Numerical – Apply settings and Logics	Per Relay		
9.4	Additional Logic per Numerical Relay	Per Relay		
9.5	Additional Setting per Numerical Relay	Per Relay		
10	**Battery Charger**			
10.1	110v (Visual Inspection, Float & Boost Voltage, Equalize Voltage, Clean unit, Current limits, Alarm card)	Per Unit		
10.2	30v (Visual Inspection, Float & Boost Voltage, Equalize Voltage, Clean unit, Current limits, Alarm card)	Per Unit		
11	**Batteries per Bank**			
11.2	NiCad (5 yearly test – load test, discharge test, retorque terminals – 3 cycles of charging and discharging required)	Per Bank		
11.2	Lead Acid ((5 yearly test – load test, discharge test, retorque terminals)	Per Bank		
12	**Pressure Testing VLF, Tan Delta Testing of Equipment**			
	11kV switchgear	Per Panel		
	11/33kV cable	Per Feeder		

	11/33/88kV Bushings	Per Unit		
	88/11kV, 2 winding Transformer	Per Unit		
	88/33kV, 2 winding Transformer	Per Unit		
	33/11kV, 2 winding Transformer	Per Unit		
13	**IR Scanning**			
13.1	Scanning	Per Hour		
13.2	Reporting	Per Hour		
14	**Panel Installation**			
14.1	Ductor testing of Bus bar Connections	Per Node		
14.2	Connection of Bus wiring	Per Panel		
15	**Earth Mat test**			
	Earth mat tests	Per Mat		
16	**Data Sheet**			
16.1	Create Data Sheet, Breaker, Relay, CT, VT, Settings, Battery Charger, Function Testing, Ductor, Megger, etc.	Per Panel		
17	**Protection Grading**			
	Gather Data, CT Ratio, Relay Details, network analysis	Per Hour		
18	**Replacement of Protection Equipment**			
18.1	Relay Replacement, Including Blanking Plate & Wiring	Per Unit		
18.2	Ammeter / Voltmeter, Including Blanking Plate & Wiring	Per Unit		
18.3	Umbilical Cord, Installation of Plug for Remote Trip /Close	Per Unit		
18.4	Umbilical Cord, Remote Cord Including Wall Installation	Per Unit		
18.5	Trip / Close Coils Replacement, Installation	Per Unit		
18.6	Panel Labels, Supply & Install	Per Unit		
18.7	MCB / Transducer Replacement	Per Unit		
19	**Additional Day Works**			
19.1	Engineer	Per Hour		
19.2	Technician	Per Hour		
19.3	Authorized Person	Per Hour		

19.4	Draftsman	Per Hour		
19.5	Skilled Worker	Per Hour		
19.6	General Worker	Per Hour		
19.7	Transport to Electrical Workshop	Per Trip		
19.8	Transport (Additional)	Per Km		
	Total bid price (excl. VAT)			
	15% VAT			
	Total bid price (incl. VAT)			

Tender Number: _____

Tenderer's Authorized Signatory: _____ _____

Name and Surname Signature

Name of Company: _____