

	SCOPE OF WORK	GROOTVLEI
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	Electrical Engineering Manager	Manager
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Content	Page
1. INTRODUCTION.....	3
2. SUPPORTING CLAUSES	3
2.2.2 Informative	4
2.7 RELATED/SUPPORTING DOCUMENTS	6
3. WORKS TO BE PERFORMED BY THE <i>CONTRACTOR</i>	6
4. ENGINEERING AND CONTRACTOR'S DESIGN.....	8
5. PLANT AND MATERIAL.....	11
6. IMPLEMENTATION PHASE	13
8 ACCEPTANCE	18
9. REVISIONS	18
10. DEVELOPMENT TEAM	18
11. ACKNOWLEDGEMENTS.....	18

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1. INTRODUCTION

Grootvlei Power station is situated in the Mpumalanga province between De Hoek toll plaza and Villiers. Grootvlei Power Station was first commissioned between 1969 and 1977 and then mothballed in 1990. In 2006, the Units were returned to service and contracted to supply 1180MW to grid. Unit 1 - 4 supplying 200MW and 5 and 6 supplying 190MW. Units are manufactured by different suppliers. The Power Station will soon be due for imminent 0MW production from fossil fuel fired technology with unit 4, 5 and 6 already on long-term preservation. Unit 1, 2 and 3 are still operational and will reach their dead stop dates in 2029/30 financial years.

This will result in a significant loss of electricity on a constrained national grid. To ease the loss of generating power, Eskom developed the Grootvlei Power Station Conversion and Repurposing project to evaluate alternative power generating mechanisms to use the existing infrastructure at Grootvlei Power Station and to sustain jobs in and around the Grootvlei area that are servicing the power station.

The Grootvlei Smart Agri-Demo Facility was developed by Eskom to reskill the community of Grootvlei and to introduce Micro grids that will power the new agriculture facilities around the station. The proposed location of the Demo facility currently has no infrastructure or electrical supply. The station is thus required to supply power to the location of the new Demo facility.

2. SUPPORTING CLAUSES

This document intends to address the following:

- Employer's objectives with regards to the works
- Description of the works.
- Employer's requirements of the works.
- The Employer's basis for design
- Performance guarantees.
- Standards, codes, and specifications applicable to the works

2.1 SCOPE

2.1.1 Purpose

The purpose of the Technical Specification is to define the scope of work and the engineering requirements for the Engineering, Procurement, Construction, Commissioning and Handover of the LV Switchgear Board, Park Homes, and Green House (including all auxiliaries) that is to be executed at Grootvlei power station Agri-Demo facility.

2.1.2 Applicability

This document is applicable to Grootvlei Power Station only.

2.2 NORMATIVE/INFORMATIVE REFERENCES

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Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] ISO 9001 Quality Management Systems.

[2] OHS Act, Operating Health, and Safety Act No. 85 of 1993

2.2.2 Informative

[1] 474-12267 Heating Ventilation and Air Conditioning (HVAC) Group Technology Strategic Report 2020 (Rev 1)

[2] ISO 9001 Quality Management Systems

[3] 240-53113685: Design Review Procedure

[4] 240-70164623: Design Guideline for HVAC in the Eskom Coal Fired Power Stations

[5] 240-56227573: Air-insulated withdrawable AC metal-enclosed switchgear 1kV to 52kV

[6] 240-56179027: General Safety Measures - Electrical Arc for Switchgear up to 15kV Standard

[7] 240-56357424: MV and LV Switchgear Protection Standard

[8] 240-56227516: LV Switchgear Control Gear Assembly Associated Equipment for Voltage 1000V AC and 1500V Standard.

[9] 240-56227443: Requirements for Control and Power Cables for Power stations Standard

[10] 240-62772907: Specification Standard for Stationary Diesel Generator Systems

[11] 240-56227589: List of Approved Electronic Devices to be Used on Eskom Power Stations Standard

[12] 240-56176852: Essential Power Supplies for Power Stations Standard

[13] 240-118870219: Standby Power Systems Topology and Autonomy for Eskom Sites

[14] 240-91190310: Sizing of DC Systems for Substation Applications

[15] 240-71432150: Plant Labelling and Equipment Description Standard.

[16] 240-132533107: Generating Unit Electrical Protection Standard - Coal Fired

[17] 240-64636794: Standard for Wiring and Cable Marking in Substations

[18] SANS 61850: Communication networks and systems for power utility automation

[19] 240-56536505: Hazardous Locations Standard

[20] 240-170000103 Lithium Iron Phosphate Batteries Standard

[21] SANS 10142-1, The wiring of premises -Part 1: Low Voltage Installation

[22] 240-56356396, Earthing and Lighting Protection Standard

2.3 DEFINITIONS

The definitions of IEC 60694, IEC 62271, 240-56227573 and the standards referred to in this Technical Specification apply, as well as the ones listed below. Some of the definitions are repeated for ease of reference.

Definition	Description
Acceptance	The Employer accept the condition or design but does not take responsibility from the Contractor
Contractor	The Service provider contracted to provide a specific service to Eskom, Grootvlei Power Station.

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Definition	Description
<i>Employer</i>	The Owner of the Power Station at which Agri-Demo facility is located. Normally the <i>Power Station or Plant Engineer will represent Employer</i>
ESKOM Standards	Means all Eskom standard documents referred to, expressly or impliedly, in the Contract
Exhaust duct	The duct that is used to evacuate gasses generated during an internal arc to a separate environment (e.g. to the outside of the room). This duct is found at the top of the enclosure and connected to the explosion vent.
Plant	ALL equipment forming part of the works including Medium Voltage switchgear and control gear, protection schemes, substation automation system, essential supplies (DC and UPS), control and instrumentation interface, as well as heating, ventilation, and air conditioning.
Power Station	Grootvlei Power Station
Project	Agri-Demo facility
Specialised tools	Any purpose-built tools that are necessary to carry out major (or specialised) maintenance on a circuit-breaker and its components.
Specification	The document/s forming part of the contract in which the methods of executing the various items of work to be done is described, as well as the nature and quality of the materials to be supplied and it includes technical schedules and drawings attached thereto as well as all samples and patterns.
Switchgear	Refers to the switchgear and control gear assembly for LV

2.4 ABBREVIATIONS

Abbreviation	Explanation
AC	Alternating Current
DC	Direct Current
ECM	Engineering Change Management
HVAC	Heating Ventilation and Air Conditioning
LV	Low Voltage
PVC	Polyvinyl Chloride
SANS	South African National Standards
V	Volts

2.5 ROLES AND RESPONSIBILITIES

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Compiler: Responsible to compile the document and to ensure that the content is integrated to reflect the requirements of every stakeholder forming part of this project.

Functional Responsibility: The functional responsible person is responsible to approve the content of the document and assure its correctness before the document is submitted for authorisation.

Authoriser: The document authoriser is responsible to ensure that the correct processes were followed in developing this document and that the relevant stakeholders have been involved. The authoriser also reviews the document for alignment to business strategy, policy, objectives, and requirements. He/she shall authorise the release and application of the document.

Contractor: Compilation of Detail Design Report based on the Works Information.

2.6 PROCESS FOR MONITORING

The primary process for monitoring will be governed by 240-53113685 Design Review Procedure, which entails assuring that the design achieves the requirements set out in this document. Any changes to this document will be performed as per 240-53114026 Project Engineering Change Management (ECM) Procedure.

2.7 RELATED/SUPPORTING DOCUMENTS

Refer to Section 2.2 Normative/Informative References of this document.

3. WORKS TO BE PERFORMED BY THE CONTRACTOR

3.1 EXECUTIVE OVERVIEW

The Grootvlei Agriculture facility was developed to reskill the community and repropose the land around Grootvlei power station. The identified area for the project needs to be supplied with electrical power. A stepdown transformer will be utilized to obtain power from distribution to power the facility. The transformer will be the property of Grootvlei Power station. A 400V board needs to be installed to provide power to different areas of the facility. The 400V switch gear board will be housed in a switch gear room as per Eskom standards. Diesel Generators serve as a back-up power to the 400V Main Board in the event of total loss of AC supplies to the board. Critical essential loads that are supplied from the 400V Main Board include Greenhouse DB, Park homes and workshop. The above stated system is required to safely operate the Agri -Demo facility in the event of power failure, its required to be kept operational till the main AC supply is restored. The Contractor shall comply with the requirements stipulated in the Specification for Diesel Generators (240-62772907), as well as all standards and specifications referenced.

3.1.1 Scope of Work

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The Agri-Demo facility at Grootvlei Power Station scope of works, as detailed in these specifications' documents, bill of quantities and accompanying drawings, comprise of the engineering change, the provision of all labour including materials and contractors' equipment, manufacturing, supply, delivery, off-loading, erection, testing and commissioning to serve, guarantee and maintenance after final completion of lighting Installation.

The engineering, quality control, inspections, plant and material selection, preparation of installation drawings, testing, commissioning, and preparation of operating and maintenance manuals, shall be managed and executed by the contractor in a systematic manner as follows:

- Provide the detailed design specifications for implementation.
- Plant and material selection
- Installation drawings
- Plant Installation
- Testing and commissioning documentation
- Quality Control
- Operating instruction and maintenance manuals
- Inspection Record /checklist and final hand over

3.2 EMPLOYER'S OBJECTIVES AND PURPOSE OF THE WORKS

3.2.1 Objectives

One of the *Employer's* objectives of the works is to provide Electrical power to the agriculture facility project .The *Employer* will also oversee the installation of all the electrical equipment and associated interfacing systems and equipment.

3.2.1 Purpose

To mitigate the identified financial and economic impacts of shutting down its Power Stations, Eskom has developed repowering and repurposing strategies, which calls for the establishment of initiatives for diversifying the economy around the stations and providing sustainable alternate economic activities independent of station operations. One of these opportunities for economic diversification is in the agriculture sector. Eskom has partnered with the Embassy of the Kingdom of the Netherlands to establish agriculture around Grootvlei area. The plan is to develop greenhouses and open field agriculture around Grootvlei in a phased approach. The first phase is the combination of climate-smart agriculture demonstration facility and commercial agriculture facility within a 20ha Eskom vacant land, which has been leased to an independent legal entity to establish the agriculture facility. The aim of the climate-smart agriculture is to provide training, applied research and demonstrations for knowledge and for horticulture investors to demonstrate the opportunities in Grootvlei for sustainable horticultural development. The commercial agriculture will be key to the sustainability of the demonstration facility and employment of communities around Grootvlei. The process to establish the demonstration is currently underway, and it is expected that it will be completed before the end of 2024.

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4. ENGINEERING AND CONTRACTOR'S DESIGN

4.1 EMPLOYER'S DESIGN

- [1] 240-53114026 Project Engineering Change Management Procedure
- [2] 240-53459028 Perform Power Plant Electrical Engineering
- [3] 240-144177358 Perform Electrical Power System Studies within Gx Plant Work Instruction
- [4] 240-56357424: MV and LV Switchgear Protection Standard
- [5] 240-62772907: Specification Standard for Stationary Diesel Generator Systems

4.2 PARTS OF THE WORKS WHICH THE CONTRACTOR IS TO DESIGN

The contractor's design is to comprise detailed design package which will be reviewed and approved in accordance with Employer's design review procedure 240-53113685.

The design data specified in this Specification are intended for tendering purposes only. The Contractor is required to take the actual measurements onsite before proceeding with design & manufacture of the complete Works as dimension accuracy remains the responsibility of the Contractor.

The Contractor is to design, produce required drawings and select plant & material which satisfies:

- The overall plant performance and efficiency specification.
- The specified reliability; and keep maintenance costs to a minimum.
- Space constraints.

Contractor produces self-explanatory operating and maintenance manuals suitable for staff training. The

Operating and maintenance manuals are to include the following however not limited to:

- Description of Works
- Operation
- Maintenance
- As Built drawings & Commissioning Results

The contract shall execute the following:

- Plant and material acceptance testing
- Testing and commissioning
- Training of operators
- Troubleshooting
- Implementation of an overall quality assurance plan

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The Contractor is responsible for the design of certain parts of the works below and that such designs are submitted to the Employer for approval prior to purchase and manufacture of any plant and material.

4.2.1 LV Switchgear Design

The Contractor's Electrical discipline is responsible for the detailed design; plant and material selection; installation and as built drawings; testing, and commissioning documentation; operating instruction and maintenance manuals of the complete LV Switchgear related electrical works.

The Contractor will submit the detail design for the electrical scope for acceptance. Eskom's electrical department to review the designs submitted by the Contractor and sign it off for acceptance.

The Contractor is responsible for the design of the electrical scope and provides the following, as a minimum:

- 700Amp Incomer circuit and control (500 kVA Transformer)
- 100Amp MCCB Feeder circuit (Greenhouse 64.3 kVA)
- 100Amp MCCB Feeder circuit, (Park home 1)
- 100Amp MCCB Feeder circuit, (Park home 2)
- 100Amp MCCB Feeder circuit, (Workshop)
- MCB Feeder circuit (Septic Tank. Use loads provided by EGA or any other septic tank supplier).
- Feeder circuit, (Unequipped cubicle in the DB-main
- Unequipped cubicle
- Automatic Transfer Switch, ATS (750 kVA diesel standby generator)
- Unequipped cubicle

4.2.2 Diesel Generator Design

The Contractor's Electrical discipline is responsible for the detailed design; plant and material selection; installation and as built drawings; testing, and commissioning documentation; operating instruction and maintenance manuals of the complete Diesel Generator related electrical works.

The Contractor will submit the detail design for the electrical scope for acceptance. Eskom's electrical department to review the designs submitted by the Contractor and sign it off for acceptance.

The Contractor is responsible for the design of the electrical scope and provides the following, as a minimum:

- Detail design, manufacturing, construction, factory acceptance testing, transporting, offloading, installation, site acceptance testing and commissioning a new Diesel Generators 400V (750kVA,1000A). The Diesel Generator must comply with the requirements stipulated in the Specification for Diesel Generators (240-62772907).

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- The diesel generators prime mover, alternator, engine management system, diesel generator system protection devices, auxiliaries and monitoring and alarm systems to comply with the technical requirement's stipulated in the Standard 240-62772907,
- The control system shall comply with the requirements of SANS 8528-4 and shall be electrically fail-safe.
- The control system shall be powered from Direct Current (DC) available from the engine cranking batteries.
- The control system shall be capable of operating on an alarm-only basis or alarm and shut down, if so required. It is the Contractor's responsibility to design the control and mimic panel according to Section 3.6.3 of 240-62772907.

4.3 PROCEDURE FOR SUBMISSION AND ACCEPTANCE OF CONTACTOR'S DESIGN

The Contractor is the Design Authority for Electrical related works of the contract as defined in the Design Review Procedure 240-53113685. The Contractor is responsible for following this design procedure and conducts all the design reviews as specified in this procedure.

The Contractor is responsible for conducting the following reviews:

- System Integrated Design Review
- Pre- Commissioning Review
- Acceptance Testing Review
- Handover Review

The following process will be followed during submission of documents:

- a) The Contractor submits the documents/drawings to the Employer's representative.
- b) The Employer's Document Controller registers the documents.
- c) The Employer's Document Controller will supply the documents/drawings to all relevant parties within the Employer's project team.
- d) The Employer's project team reviews the documents/drawings and will submit all comments or inputs to the Employer's representative and the Employer's representative submits to the Contractor for consideration.

The contractor shall implement the following activities for approval:

- a) The Contractor reviews, stamps, dates, and signs to signify his approval and submit in the manner required by the Employer in orderly sequence to cause no delay in the work, all Contractor's drawings, equipment selections and/or samples required by the Works or subsequently by the Employer. Contractor's drawings, equipment selections and samples are to be properly identified as specified or as the Employer may require.

The following documents are supplied to the Employer by the Contractor as a minimum:

- a) Documents including equipment data sheets and specification for selected equipment, electrical cabling, and other associated equipment.

4.4 OTHER REQUIREMENTS OF THE CONTRACTOR'S DESIGN

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The Contractor shall comply with all legislated safety requirements as well as Eskom's health and safety standards.

4.5 DESIGN OF EQUIPMENT

The minimum general equipment design criterion that is to be met is as follows:

- a) The equipment is to be designed to facilitate efficient manufacture, inspection, transportation, installation, maintenance, cleaning, and repairs.
- b) The equipment is to be designed to ensure safe and satisfactory operation for at least 5 years under the conditions prevailing at Grootvlei Power Station in the Mpumalanga Province.
- c) The equipment is to be designed to keep maintenance costs to a minimum.
- d) The equipment is to be designed to comply with all the legal requirements in respect of safety.
- e) The equipment is to be designed to satisfy any specific requirements contained in the relevant statutory codes and standards.
- f) The equipment is to be designed for operation of 365 days per annum, 24hrs per day.

4.6 EQUIPMENT REQUIRED TO BE INCLUDED IN THE WORKS

Special tools for maintenance and testing shall be provided by the Contractor as part of the commissioning phase.

4.7 AS-BUILT DRAWINGS, OPERATING MANUALS AND MAINTENANCE SCHEDULES

The importance of managing the "as-built", "operate-to" and the "maintain-to" operation and maintenance manuals including maintenance schedules for each piece of equipment is critical to the life of the plant. The operating & maintenance manuals are to be detailed enough to operate, maintain, adjust, and repair plant & equipment.

4.7.1 As-built Drawings

The Contractor is to provide "As Built" drawings based on the shop drawings embodying all modifications made during construction. The "As Built" drawings are to include general arrangement and sections of all plant and equipment including isometrics and PFD's.

The As Built drawing will indicate all relevant plant coding and labelling. The determination of these codes and labels will be done in accordance the documents listed in Works Information.

4.7.2 Operating Manuals and Maintenance schedules

The Operating & Maintenance Manual must describe how the facility is to be operated and by whom, as well as the desired level of training and orientation required for the building occupants.

5. PLANT AND MATERIAL

5.1.1 QUALITY

The Contractor will not use Plant or Materials which are generally recognised as being unsuitable or otherwise to be avoided for the purpose for which they are intended. Only components of high reliability will be utilised, with a proven operating history, to enable the Plant to achieve required reliability and availability.

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The Project Manager is free to specify hold and witness points during the installation and on-site testing stages of the project. The Contractor issues preliminary notification of such hold and witness points by fifteen working days advance notice to the Project Manager and confirms such hold and witness points at least seven working days prior to the activity.

Typical hold points are listed below:

- a) Design Review
- b) Factory Acceptance Test
- c) Delivery to Site
- d) Site Acceptance Test
- e) All manuals and drawings (in the specified format)
- f) Commissioning

5.1.2 Contractor's procurement of Plant and Materials

The Contractor must take all necessary steps to ensure that all Plants and Materials are adequately protected against damage during shipping, transport, and storage.

5.1.3 Spares and consumables.

In essence, a completely new spares list shall be provided by the *Contractor* after completion of the project.

The *Employer* will be responsible for allocating of spares within the Grootvlei Power Station Stores. Each recommended spare part is to be uniquely identified with a part number, which can be cross referenced to a part list and associated drawing. The Employer prefers that support from the OEM is available locally in South Africa.

5.2 TESTS AND INSPECTION BEFORE DELIVERY

The *Employer* carries out quality inspections at own discretion. The Employer will inspect and approve stages of manufacture of all equipment necessary to ensure the correct quality of equipment as prescribed in the approved project quality plan.

All inspections and testing to be performed in accordance with the Quality Control Procedure (QCP) developed by the Contractor after approval by the Employer.

The *Contractor* must provide facilities for inspection of all items of equipment at the place of the manufacture and this requirement must extend to all Sub-contractors and suppliers. The Employer reserves the right to reject items that do not conform to the Employer's requirements.

The following tests are conducted by the *Contractor* and are to be witnessed by the *Employer* at the manufacturer's works or *Contractor's* premises for both the **LV switchgear design** and **Diesel Generator Design** as a minimum requirement:

- a) Visual inspection of the equipment
- b) Review of the certification requirements
- c) Functional tests of the systems
- d) Verification that components installed is correct.
- e) Verification that all labels are correct.

The functional tests form part of the Factory Acceptance Test (FAT) supporting documents shall be submitted testament to the fact that the design was tested and meets all criteria set out in the technical evaluation. The site integration test is to include the checking of all lux levels as measured from a specified

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platform. A Site Acceptance Test (SAT) shall be completed at the end of the project and shall include the following:

- On the completion of the works, a full testing shall be carried out on the installation during the commissioning to ensure compliance to all relevant standards.

5.3 PLANT CODIFICATION (MARKING PLANT)

Grootvlei Power Station uses the KKS numbering system which is based on the latest revision of 240-93576498 KKS Coding standard.

Since this project is focus on the new area where there are no KKS for that area, the new codes that will be required for plant identification will be high.

For the areas where new codes will be required, plant codification will be conducted internally by the Grootvlei Design and Specification department. Therefore, it is critical that the design documentation be of such quality that the KKS codes can be prepared timeously.

6. IMPLEMENTATION PHASE

Once the design has been submitted and approved by Eskom SCCC (Site Change Control Committee), the implementation phase can commence.

6.1 COMPLETION, TESTING, COMMISSIONING AND CORRECTION OF FAULTS

6.1.1 Work to be done by the Completion Date

The contract is deemed to be complete when the following have been completed in accordance with the relevant specifications:

- a) The Plant is erected and commissioned.
- b) Signed erection and safety clearance certificates.
- c) The final drawings have been submitted.
- d) All documentation has been submitted including testing reports and the associated certificates received. All Quality Control Plan (QCP) documentation received. Final Draft of the Technical, Operating, Maintenance manuals delivered.
- e) The Plant and all documentation/ drawings are coded and labelled.
- f) All special tools have been supplied.

7. PLANT AND MATERIAL STANDARDS AND WORKMANSHIP

7.1 INVESTIGATION, SURVEY AND SITE CLEARANCE

The design data specified in this Works Information is intended for tendering purposes only. The Contractor is required to take the actual measurements onsite before proceeding with design & manufacture of the LV Switchgear design and Diesel Generator Works as dimension accuracy remains the responsibility of the contractor.

7.2 LV SWITCHGEAR SYSTEM

7.2.1 LV Switchgear System Scope of Works

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The LV switchgear scope of works is as detailed below:

7.2.1 Cabling

The control and power cabling for the switchgear is provided by the *Contractor*. The core drilling for cables, sealing the cable slots on the new switchgear is the responsibility of the *Contractor*.

The *Contractor* provides the cabling from the Greenhouse Board to all associated loads. The *Power station* will be responsible for providing and termination of the supply cable from the Main Board 400V board to the Greenhouse Board.

The *Contractor* installs all power and instrument cables from the Greenhouse Board LV Switchgear to the green house and all the loads on the Greenhouse board.

All new cables, racks, joints, and terminations will be designed and installed to operate continuously under the following conditions:

- The voltage ratings, terminations, and joints for MV and LV cables shall be in accordance with 240-56227443 Generation Requirements for Control and Power Cables for Power Stations Standard (Rev 2).
- All cable design requirements regarding fault level, cable thermal rating, voltage drop and details concerning the pulling of, and termination of cables are specified in 240-56227443 Generation Requirements for Control and Power Cables for Power Stations Standard (Rev 2).
- The *Contractor* shall perform a site visit for the design of racks for new cables. All cable racks from the Greenhouse board to the Greenhouse and associated loads will be installed and supplied by the Contractor.
- Electrical and instrumentation cables ways will be kept separate, and installation will be done as per ESKOM specification 240-56227443 Generation Requirements for Control and Power Cables for Power Stations Standard (Rev 2).
-

7.2.2 Cable laying

- The cable laying and segregation shall be in accordance with 240-56227443 Generation Requirements for Control and Power Cables for Power Stations Standard (Rev 2).
- All cable installations that are susceptible to mechanical damage will be armoured with steel wire. The wires must be PVC insulated, with a flame-retardant PVC outer sheath and bedding that emits no more than 15% halogen.
- This cable range shall be round steel wire armoured for burial in ground and for installations where mechanical pressures are expected. It shall be used for control cables (DC: 220 V, AC: 230 V) and power cables (230 V, 400 V AC). The cables must be produced in accordance with SANS 1507 and SANS 1411 Parts 1, 2, & 6.

7.2.3 Testing Requirements

The *Contractor* uses test equipment with valid calibration certificates. The calibration certificates (and new ones as required) are handed over to the *Project Manager* before testing on site starts.

All cable testing shall be in accordance with the requirements stipulated the *Requirements for Control and Power Cables for Power Stations Standard -240-56227443*.

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These tests are carried out with an approved Earth Continuity Tester. The tests are carried out in accordance with SANS 10142 – 1. The test results are recorded on a test sheet accepted by the *Project Manager*. The *Engineer* witnesses all tests, with the *Contractor*, records and countersigns the results. Where the earth continuity test results indicate that the earthing is not adequate additional earthing rods must be installed, tested, and connected to the system to obtain results within the requirements of SANS 10142-1.

7.2.4 Earthing

The earthing scope covers the earthing of cables, cable racks, plant equipment and replace visually removed earthing. Earthing tests are done per system. After switching off the system the earthing continuity is tested. These results are handed over to the *Project Manager* for evaluation.

After completion of the cabling and earthing per system the earth continuity is tested before any power is switched on. The test results are handed over to the *Project Manager* for evaluation.

The *Contractor* earths all new equipment and ensures the integrity of the earthing is in accordance with the following:

- 240-56227443: Requirements for Control and Power Cables for Power Stations.
- SANS 10142-1: The wiring for premises Part 1: Low-voltage installations.
- 240-56356396: Earthing and Lightning Protection Standard.

7.2.5 Contractor's Design Documentation to be Submitted for Acceptance

The *Contractor* provides the following for the Greenhouse:

- All technical details of cables and cable accessories (terminations and joints).
- Cable and accessories type test certificates.
- Cable megger readings.
- Cable test after installation certificate.
- List of all drawings applicable to the *Works*.

7.2.6 Components Acceptance

All active components of the offered equipment that do not form part of the OEM's original design are subject to acceptance by the *Project Manager*. The component complies with the relevant requirements of this Technical Specification as a minimum and shall be components that are supported by OEM for security of spares and technical support.

Where required, the *Contractor* provides calculations to prove the component application, design, and compliance to the requirements. The relevant schematic drawings are used for the acceptance of component application. Should the requirements not meet the component application design requirement, the additional cost is borne by the *Contractor*.

The *Contractor* provides original copies of the technical documentation of each component in a file complete with contents list as well as all calculations or justification per component. The *Contractor* submits two copies of files labelled Components Acceptance Application in this regard.

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7.2.7 Design Freeze

After the contract is awarded, the *Contractor* performs Detail Design in accordance to Employer's Works Information. The designs are agreed with the *Project Manager* to achieve Design Freeze status.

To achieve Design Freeze, as a minimum; the *Contractor* submits the following design documents to the *Project Manager* for acceptance:

- a) Technical Schedules A and B for the equipment
- b) Compliance Schedules
- c) Engineering Change Register
- d) Single Line Diagrams for switchgear
- e) General Arrangement Drawings
- f) Substations layouts
- g) Protection Functional and Interface Block Diagrams
- h) Component Schedules
- i) Technical Manuals
- j) Schematic Diagrams for Protection and Control Systems

The *Employer* will accept the following set of drawings, per board, before any manufacturing can take place:

- a) General arrangement drawings for the switchgear
- b) Schematic diagrams for each circuit (this must include all the wire numbers, termination numbers, termination strip numbers, fuse sizes and spare contacts)
- c) Component schedule for each circuit on the assembly

For non-standard circuits i.e., incomer, chop-over, the *Contractor* will discuss the requirements with the *Project Manager* and work out a suitable design which the *Contractor* will submit for acceptance. The *Project Manager* accepts the documents to declare the design 'frozen'.

7.3 DIESEL GENERATOR SYSTEM

7.3.1 Diesel Generator System Scope of Works

The diesel Generator scope of works is as detailed below:

7.3.1.1 Design Acceptance and Type Testing of Diesel Generator Control System

The *Employer* reserves the right to witness any of the tests set out in section 4 of the 240-62772907 standard. The tests specified are a minimum requirement and serves to highlight some of the tests to be performed. For a complete list of tests to be done, please see the Annex B of 240-62772907 standard of for complete checklists.

- The supplier shall be responsible for all tests.
- Test shall be performed and certified in accordance with SANS 8528-6 and this section of the standard.

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- As a minimum, the International Organization for Standardization (ISO) standard functional tests (as specified in

a) Type Testing

- The type tests and special tests for Diesel Generator Control System, are carried out on all types of functional units in accordance with section 4 of 240-62772907.
- Type tests shall either be performed after the first unit has been completed, or type test certificates for the offered equipment shall be submitted with the tender documents for evaluation.
- If type test certificates are not available, it is the responsibility of the Contractor to perform these tests at their own cost and supply the relevant type test certificates.
- It is the responsibility of the Contractor to prove compliance with the required specifications in cases where type tests have previously been performed.

b) Insulation Resistance Testing

An insulation resistance test shall be applied to all circuits that do not contain components such as semiconductor devices, electronic modules, and printed-circuit cards. Tests shall be carried in accordance with section 4.3 of 240-62772907

c) Factory acceptance tests

As a minimum, the Factory Acceptance Tests (FATs) shall be carried in accordance to section 4.4 of 240-62772907

d) Site acceptance tests

On completion of the installation, the Site Acceptance Tests (SATs) as stipulated on section 5.5 of 240-62772907 shall be performed as a minimum.

e) Spares holding and availability.

Spares availability shall be guaranteed to be locally available for a period of at least 10 years after delivery within a turn-around time of 48 hours.

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8 ACCEPTANCE

This document has been seen and accepted by:

Name	Designation
Mzayifane Mzebetshana	Middle Manager Project En
Lerato Thindeka	Chief Advisor Monitoring
Thabiso Mtsweni	Electrical Engineering Manager GVL
Sihle Tembe	System Engineer Electrical Engineering GVL
Moddy Mashiloane	Documentation centre
Nomonde Sithole	Manager Project Services

In the preceding table, list the subject matter experts in Groups/Division or Manager/s of the Groups/Divisions that will be affected by the content of this document and who will influence the document.

9. REVISIONS

Date	Rev.	Compiler	Remarks
December 2024	1	DTT Mazeka.	Electrical SOW for Agri Demo facility

10. DEVELOPMENT TEAM

- Doctor Mazeka
- Sihle Tembe

11. ACKNOWLEDGEMENTS

Grootvlei Electrical Engineering.

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