

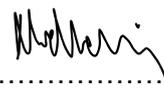
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Compiled by**D.B Naude****Senior Advisor:****Substation Engineering**

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Functional Responsibility**A. Maneli****Civil Engineering manager:****Substation Engineering**

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Authorised by**S. Maharaj****Manager:****Substation Engineering**

Date: 26/7/2022

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EXECUTIVE SUMMARY

This document has been developed with the aim at setting standards and specifications in order to design a suitable building to house the gas insulated switchgear together with all the related facilities as part of it.

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1. INTRODUCTION

Eskom will be constructing a new Generation Transformer (GT) House as part of the 400/132 kV extension. The Gas Insulated Switchgear (GIS) will be housed within a building and a Gas Insulated Line (GIL) will form a connection between the cables and GT House via GIL Ducts. This specification sets out the requirements for the design and construction of the GT House, GIL Ducts and associated equipment.[8] [9] [10]

2. SUPPORTING CLAUSES

2.1 SCOPE

2.1.1 Purpose

The purpose of the document is to specify Eskom's requirements for the design and construction of the new GT House and the GIL Ducts between the building and the cable connection chamber at Koeberg Nuclear Power Station (NPS). It gives a clear description of what is required from the professional team and the building design.

2.1.2 Applicability

This document is applicable to the project team involved in the detail design of the building and services.

2.2 NORMATIVE / INFORMATIVE REFERENCES

Normative

- [1] SANS 1200: Standardized Specification for Civil Engineering Construction
- [2] SANS 2042011: Energy efficiency in buildings.
- [3] SANS 10400-XA 2011: Energy usage in buildings.
- [4] SANS 10114-1: Interior lighting Part 1 Artificial lighting of interiors.
- [5] SANS 10114-2: Interior lighting Part 2, Emergency lighting.
- [6] SANS 10142-1: The wiring of premises – Part 1: Low-voltage installations.
- [7] 240-82172806: Air conditioning in transmission substation buildings and telecommunication sites
- [8] Wkoe11P01-SE-D54: Gen-1 GIL to Cable Connection(Option 1B&C)
- [9] Wkoe11P01-SE-D55: Gen-2 GIL to Cable Connection(Option 1A)
- [10] Wkoe11P01-SE-D56: Gen-1 & Gen-2 GIL to Cable Connection(Option 2&3)

2.3 DEFINITIONS

2.3.1 Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

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2.4 ABBREVIATIONS

Abbreviation	Description
GIS	Gas Insulated Switchgear
GIL	Gas Insulated Line
GT	Generation Transformer Building/House
NPS	Nuclear Power Station
SANS	South African National Standard
SACAP	South African Council for the Architectural Profession

2.5 ROLES AND RESPONSIBILITIES

Not applicable

2.6 PROCESS FOR MONITORING

None

2.7 RELATED / SUPPORTING DOCUMENTS

240-56177186 - Standard for Battery room design.

Wkoe11P01-SE-D10: Detail Design Report Weskusfluer Substation

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3. DESIGN INFORMATION

THIS INFORMATION IS RELEVANT FOR A FUNCTION SPECIFICATION. IT WILL BE INCLUDED AS PART OF CONTRACTING UPON CONTRACT AWARD.

3.1 RESPONSIBILITY OF CONTRACTOR

The contractor shall render professional services by providing functional, cost effective and architecturally acceptable design solution in accordance with the scope of work and technical requirements. The contractor is responsible for the entire design, documentation and execution of the project. This responsibility includes, amongst others the following:

1. Obtaining complete and correct site information.
2. Compliance with the functional requirements of the Client.
3. Compliance with the Eskom policies, standards and other requirements of Eskom by studying the full range of manuals and guides of Eskom and by liaising with the Project Manager.
4. Compliance with the SANS standards and requirements of Local Authorities and other statutory requirements.
5. Execution of the project within the stated space norms and cost limits including the certification of compliance with these. This responsibility includes the redesign and re-documentation at own cost if required to bring the project within the stated space norms and cost limits.
6. Full responsibility for the timeous and complete exchange of information between the contractor and Eskom's appointed representatives during all stages of the project. Regular co-ordination meetings with the Professional Team are required.
7. Setting up of a detailed program for design and documentation of the project and the strict adherence to the target dates set for all stages of design and documentation. The programme to include the work of all disciplines.
8. Monthly reports on progress during design and documentation.
9. Presentation of designs for review by Eskom.
10. Submission of complete design package to Eskom. Documentation will not be checked by Eskom. Documentation may be spot checked by the Eskom, but the final responsibility of the documentation is still the appointed consultant's responsibility.

3.2 APPROVAL OF DESIGNS

3.2.1 Official approval

Until formal approval of sketch plans has been given by Eskom in writing, Eskom may require you to effect any amendments thereto at any stage in the preparation thereof, or in its sole discretion may require you to prepare new sketch plans without any obligation for additional payment except in case of a major amendment to the brief.

Should the contractor wish to use any proprietary and/or imported articles, finishes, materials or building elements whose use it considers unavoidable, it shall submit such a list thereof before working drawing stage together with written motivation for approval by Eskom.

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If the use of proprietary articles, finishes, materials or building elements is approved by Eskom, they shall be clearly specified by name and the suffix "or equal approved" be used. All possible acceptable alternatives should also be specified.

3.2.2 Substitution of uneconomical elements

Where components, materials and/or finishes or other design or constructional elements not specifically indicated on the approved sketch plans, but incorporated in your working drawings, are considered by Eskom to be unnecessary, whether the agreed cost limit is thereby exceeded or not, Eskom reserves the right to require the contractor to amend the documents to substitute with less costly elements without payment of any additional remuneration.

3.3 THE SITE

3.3.1 Location and boundaries

Eskom is responsible for supplying the contractor with relevant documentation for the Site and for setting out purposes. The contractor is responsible for obtaining all other site particulars which are necessary to enable him to design and document the project and for the accuracy and completeness thereof. This includes doing thorough scan of the area for possible existing services.

3.3.2 Site particulars required

The particulars which the contractor must obtain and verify are:-

1. Levels and dimensions.
2. Physical features and their sizes and positions.
3. Means of access.
4. Adjoining roads and buildings.
5. Services available with sizes, positions, capacities and depths.
6. Servitudes and encroachments, if any.
7. Regulations of Local Authorities.
8. Local availability of materials including material restrictions
9. Floor space ratios - wind direction
10. Height restrictions - access restrictions
11. Coverage

3.4 THE DESIGN

3.4.1 SCOPE OF WORK (See point 3.9)

Design and construct a GT House, GIL Ducts and related structures and services for the Weskusfluer Transmission Substation as specified in this and other related documents.

The contractor shall perform architectural designs for Stages 1 to 6 as stipulated below according to South African Council for the Architectural Profession.

Stage – 1. Inception – Full

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- Stage – 2. Concept and viability (concept design) – Full
- Stage – 3. Design Development – full
- Stage – 4. Documentation – 4.1 only
- Stage – 5. Construction Documentation and Inspection of the work. Completion Certificates.
- Stage – 6. Close out – facilitate the project close-out with documentation, certificates and as-built drawings.

The appointed Architect shall act as the Principal Agent for the Employer and therefore the Consultant shall work under the Architect.

3.5 DESIGN REQUIREMENTS

The GT House and GIL Ducts envelope will be an economical but durable building of concrete, steel and masonry, taking into account marine environments and must consist of the following for the successful operating of the plant.

3.5.1 GT House and GIL Ducts

3.5.1.1 Height of GT House and GIL Ducts

The height will be determined by the contractor taking into account electrical layout of the substation, working clearances, constructability, maintainability and accessibility for the successful operating of the overhead crane over the plant.

3.5.1.2 Width of GT House

- a) The width of the GT House shall be determined by the layout of the plant.
- b) Adequate space shall be provided on either side of the GT House for maintenance scaffolding to be erected, trenches and entrance doors
- c) Main off-loading access door for the GT House shall be situated to be easy accessible from the road.
- d) The access door of suitable size shall be purpose-made steel galvanized sliding door which is electrical operated.
- e) The door installations shall be dust proof.
- f) The design shall make provision for additional single entrance doors.

3.5.1.3 GIL Ducts

- a) GIL Ducts shall be made of reinforced concrete with designs taking into account marine environments.
- b) GIL Ducts shall be waterproof to prevent the ingress of any water taking into account a high water table.
- c) The floor shall be screeded to drain any possible water to a sump or manhole linked to the stormwater system.
- d) GIL Ducts shall be wide enough to provide 600mm wide “O-Line” or similar purpose made cable racking to the one side with enough working space inside next to it.

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- e) The contractor shall provide chequered mild steel cover plates or concrete covers over.

3.5.1.4 GT House Walls

The internal walls shall be smooth-plastered and painted with a special durable CES 16U Acrylic coating system or similar to prevent the need to paint regularly. The paint need to last 10 years.

3.5.1.5 Building Floor

The floor shall have a non-slip industrial hard wearing epoxy coating.

3.5.1.6 Building roof

1. Flat roofs

A flat concrete roof is possibly required due to the GIL connection at the top. The roof shall support all additional loads due to the GIL. Built up waterproofing membranes generally fail due to a variety of causes and subsequently leak. The contractor needs to apply a high quality, low maintenance waterproof design for the roof.

2. Elimination of box gutters

Box gutters are defined as gutters which are so designed that rainwater cannot freely overflow the outer edge for the full length of the gutter, so enabling the water to fall on to the ground outside the building, thus preventing any leakage to the inside.

Box gutters, regardless of material, including those of reinforced concrete lined with a waterproofing membrane, are not acceptable and shall therefor not be used.

3.5.1.7 Doors

The access off-loading door shall be solid insulated steel hinged or sliding door in two leafes to suit requirements. The door must be dust proof.

1. Contractor to determine size and design.
2. Dust proof - Neoprene seals of suitable thickness
3. Suitable cylinder locks and pull bars.
4. Solid brass hasp & staple.

Provide an additional single escape door with the same specifications. This door must be situated on the opposite side of the entrance.

The doors shall be galvanised and painted with Hammerite paint.

3.5.1.8 Ablution

No ablution required

3.5.1.9 Office

No office required

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3.5.1.10 Porch

It is preferred that the entrances to the building be part of an undercover porch and not exposed to the elements from outside.

The contractor shall design and construct a porch to provide covered access to the GT House.

The porch area shall be designed such to provide cover from wind driven rain.

Min. distance between floor and ceiling is 2,625m

3.5.2 PARKING

No parking required.

3.5.3 REPAIRS AND MAINTENANCE

An area within the GT House is to be available for repairs and maintenance.

The way the parts will be transported to the maintenance area must be taken into consideration.

The size of the area must be large enough to comfortably carry out such work necessary on any part of the plant.

The area should be provided with suitable workbenches and electrical points.

Provide powder coated steel wall mounted racking.

3.5.4 ENERGY EFFICIENCY DESIGN

- a) The building and related services shall be designed to be energy efficient.
- b) The contractor shall provide an energy efficiency report that complies with the SANS 10400 and SANS 204:2011.
- c) The contractor shall provide a fenestration calculation diagram. The aggregate conductance and solar heat gain of the glazing and frame must be calculated and not to exceed the limit.

3.5.5 CONSULTATION WITH LOCAL AUTHORITY

It is the responsibility of the contractor to contact the Local Authority in order to clarify any statutory town planning regulations, building lines, height restrictions, coverage, floor space ratios, safety, fire management and other requirements and approvals.

You must and should consult the Local Authority and Eskom in respect of service connections, such as water, electrical power, sewage and stormwater and comply with their requirements.

3.5.6 STATUTORY REQUIREMENTS

3.5.6.1 Submission of plans to Local Authority

The contractor shall submit the sketch plans to the Local Authority for information and comments. A copy of the submission letter shall be sent to the Eskom representative.

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3.5.6.2 The National Building Regulations

The contractor shall comply with all the National Building Regulations as stipulated in the following standards:

SANS 10400

SANS 204:2011

SANS 10400 – XA

3.5.6.3 Occupational Health and Safety Act

You must ensure that the finished building complies with the Act in all respects. If on inspection

by the Department of Labour the building is found not to comply you may be held responsible.

3.5.7 BUILDING ECONOMY

3.5.7.1 Preference to South African Materials

Imported products may only be used with the prior approval by Eskom. Applications for such approval shall be submitted in writing. The contractor shall then provide written proof to Eskom that no South African product or alternative local material/product is available.

3.5.7.2 Economy in design

The contractor is required to devote special attention to economy of design in respect of planning, simplicity of form and regularity of structure.

3.5.7.3 Height of rooms

For economy, room height should be kept to the practical minimum. This will depend on the shape, size and use of the room, due allowance being made for necessary clearance below lighting, other ceiling fittings and lintels.

3.5.8 OTHER GENERAL REQUIREMENTS

3.5.8.1 Schedule of finishes

The contractor shall provide a list of a schedule of the main internal and external finishes, either on the plans, sections and elevations or in the right hand column of the relevant design drawings.

3.5.8.2 Use of trade names

In describing materials, components and finishes the contractor may use descriptive terms. The use of trade names is allowed to describe a product.

3.5.8.3 Insulation of ceilings

In all buildings the ceilings are to be thermally insulated as stipulated in SANS 204:2011.

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3.5.8.4 Downpipes

In all cases rainwater downpipes must be on the outside of the buildings, not encased in the walls or structure. No downpipes smaller than 100 mm diameter may be employed.

3.5.9 MECHANICAL REQUIREMENTS

3.5.9.1 Noise and pollution

- a) The contractor shall plan the position of mechanical plant, such as air-conditioning, compressors and ventilation, where it will create the least disturbance, but within practical and economic constraints. The contractor shall not place such plant immediately above or below offices, nor near office rooms.
- b) Adequate access to mechanical equipment (for maintenance or replacement) must be provided.

3.5.9.2 Planning of air-conditioned spaces

- a) Under no circumstances shall the plan for air-conditioning be finalised without the prior written approval by Eskom.
- b) Fenestration design must be in accordance with SANS 204 and orientated such as to minimize the use of air conditioning.
- c) Windows are not to be double glazed, but where exposed to excessive direct sunlight external protection is to be provided.
- d) Where air-conditioning plants are to be provided, the floors shall be waterproofed. An adequate water overflow shall be provided.

3.5.9.3 Forced ventilation requirements

- a) Forced ventilation by means of extractor fans shall be provided for the extraction of build-up heat and for the extraction of leaked gasses with in the GT House.
- b) In the event of a fire, the extractor fans shall automatically shut down when the fire alarm is triggered.

3.5.10 LIGHTING AND POWER REQUIREMENTS

3.5.10.1 Indoor lighting

- a) The lighting shall conform to the SANS 10114-1.
- b) The general lighting shall consist of high bays or an equivalent type luminaire.
- c) Task lighting shall consist of luminaires installed against the walls, at a height of 3 meters.
- d) Emergency lighting shall comply with the requirements of SANS 10114-2.
- e) The emergency lighting shall be positioned against the wall, and it shall be of a Self-contained, maintained mode.

3.5.10.2 Outdoor lighting

Adequate outdoor lighting shall be provided for save access around the GT House.

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3.5.10.3 Power requirements

Adequate power points shall be provided within the GT House.

3.5.11 FIRE PROTECTION REQUIREMENTS

3.5.11.1 Determination of planning requirements

The planning requirements for fire protection shall be in accordance with the National Building Regulations and requirements of the Local Authority and the local Fire Chief.

3.5.12 FACILITIES FOR DISABLED PERSONS

3.5.12.1 Minimum provision

Provision for disabled persons shall be made in accordance with Part S of the National Building Regulations.

3.5.13 SUBMISSION PROCEDURE OF DESIGN DOCUMENTS

3.5.13.1 General procedure

- a) Concept drawings shall be submitted to Eskom for review comment and acceptance.
- b) The contractor shall submit a schedule of submission of design documents.
- c) The contractor may be required to present designs in person at the relevant Eskom design review teams.
- d) In case of presentations at the design review teams, the presentation, in the prescribed format, together with the design package (including drawings, calculations and design reports) shall be submitted at least three (3) weeks before the scheduled review date.
- e) For design reviews, the contractor must prepare presentations.
- f) Design review acceptance shall serve as design freeze and the design will thereafter be base-lined.

3.5.14 AMENDMENTS TO DESIGN DRAWINGS

3.5.14.1 Notification of amendments

- a) The contractor will be advised of any amendments required by the Eskom Project Manager and whether these are to be made on the design drawings and resubmitted, or incorporated in the working drawings.
- b) Comments, deviations and corrections shall be communicated to the contractor in writing, together with the decision of the review.

3.5.14.2 Amended design drawings

- a) Where the contractor is required to amend or redraw designs, the first amended set is to be renumbered with the suffix B and C, D etc., in case of subsequent amendments.
- b) Designs that are not accepted shall be corrected and resubmitted for review and acceptance again.

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3.5.14.3 APPROVAL OF DESIGN DOCUMENTS

Upon acceptance of the contractor's designs, the contractor will be notified by the Eskom project manager in writing.

3.6 DOCUMENTATION STAGE

3.6.1 GENERAL WORKING DRAWINGS REQUIRED

3.6.1.1 Compliance with departmental requirements

Since the full detail design of a project is approved at sketch plan stage by Eskom, you are required to comply strictly with the approved sketch plans and any amendments thereto during the preparation of the working drawings.

3.6.1.2 Compliance with National Building Regulations

- a) Construction drawings shall comply with the National Building Regulations.
- b) The contractor is required to submit a certificate stating compliance of designs with the National Building Regulations to Eskom.
- c) The contractor shall submit drawings to the Local Authority as was done with sketch plans.

3.6.1.3 Responsibility for inspection

The contractor is required to provide full inspection services to ensure that the Works conforms to the provisions of the contract.

3.7 QUALITY ASSURANCE

3.7.1 Site inspections

The contractor is required to provide full inspection services to ensure that the Works conforms to the provisions of the contract. Supervision of engineering matters in a building service is the responsibility of the relevant contractor.

3.7.2 Quality control

- a) The contractor shall provide technical assurance during construction to ensure that constructed works is also in accordance with the design.
- b) The contractor is responsible for exercising and correlating quality control of all workmanship, materials, components and finishes.
- c) No deviations from design shall be implemented during construction without prior notification, updating, review and acceptance by Eskom.

3.8 AS- BUILT DRAWINGS

3.8.1 Preparation of drawings

The contractor shall be responsible for the preparation of accurate as-built drawings on plan and detail section of all foundations.

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3.8.2 Submission of drawings

The contractor shall be required to submit copies of all marked-up as-built drawings to Eskom.

3.9 APPROPRIATION (AS-BUILT) DRAWINGS

3.9.1 Drawings required

The contractor shall be required, within three months after first delivery, to furnish the Project Manager with a set of as-built drawings in the form of full size paper prints as well as PDF version.

- a) Drawings shall be correct and clearly marked or stamped with the words "As Built" and signed and dated.
- b) Where applicable, the contractor shall also submit correct quantities of installation, operational, maintenance and any other relevant manuals to Eskom.

3.10 SITING

3.10.1 Site Characteristics

- a) The area where the building will be situated will be on a constructed flat terrace with a maximum fall of 1:100.
- b) Geotechnical information of the site will NOT be provided by Eskom. The contractor shall be responsible to conduct his own geotechnical investigation if needed.

3.10.2 Site Layout

The site layout will indicate all the infrastructure of the GT House and GIL Ducts.

3.11 UTILITIES REQUIREMENTS

- a) Eskom will provide the water supply to the required connection point.
- b) Eskom will provide the electrical connection point for construction supply.

3.12 DESIGN CONFORMANCE ASSESSMENT

3.12.1 Environmental Assessment

The design and construction of the building and related services shall conform to all the applicable technical, legal, regulatory, safety and environmental requirements.

3.12.2 Reliability, Maintainability Assessment

The building design shall be durable with reliable mechanical equipment. The building must have a low maintenance profile. Life-Cycle Cost Assessment shall be provided at tendering.

3.12.3 Safety Assessment

- a) Safety-in-design assessments shall be done to prove that the designs are safe to construct, operate and maintain. A safety assessment report shall be submitted for the major components of the design.

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- b) A constructability analysis report shall be submitted at tender stage.
- c) The contractor shall submit detailed construction method statements.

3.12.4 Fire Safety Assessment

A fire- assessment report shall be performed by a fire engineer to satisfy the requirements of the National Building Regulations SANS10400 Part T.

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4. AUTHORISATION

This document has been seen and accepted by:

Name	Designation

5. REVISIONS

Date	Rev.	Compiler	Remarks
19-07-2017	1	Dawie Naude	
25-07-2022	2	Dawie Naude	Title changed to read Weskusfleur

6. DEVELOPMENT TEAM

Dawie Naude – Prof Architectural Technologist - SACAP

Civil Engineering Technician – ECSA

Anton Naude – Prof. Eng. Technologist. ECSA

7. ACKNOWLEDGEMENTS

None

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