

## PART 3: SCOPE OF WORK

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## C3.1: EMPLOYER’S WORKS INFORMATION

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# 1. Description of the works

## 1.1 Executive overview

Gourikwa is an Open Cycle Gas Turbine (OCGT) Power Station located in the Western Cape about 13km west of Mossel Bay, along the N2 Highway. It is situated on farmlands adjacent to the PetroSA Refinery.

The station commissioned an investigative study into the addition of a rotor enclosure (upend building) for inspection and maintenance of the Rotor-Turbine for the major OCGT inspection outages. An enclosure (building) was required and erected for the 2016 outage and was successfully constructed and utilized. However, in 2021, due to higher than anticipated wind speeds, the building was damaged and subsequently demolished. Major plant outages are performed every seven years (7) and as such a new building is required for the continued purpose of performing inspections and maintenance on the Rotor-Turbine.

This document therefore presents the requirements for the design and construction of the new permanent Rotor Upending building which is to have a design life of 50 years.

## 1.2 Employer's objectives and purpose of the works

The Employer's objective is to design and construct a new Rotor Upending building that will be permanent and fit for purpose for the remaining lifetime of the power station. Existing equipment of the previously demolished building that are structurally sound will be reused, where possible.

## 1.3 Interpretation and terminology

**Appendix A:** The following abbreviations are used:

Abbreviation	Meaning given to the abbreviation
AFC	Approved for Construction
ITP	Inspection Test Plan
Hr	Hour
km	Kilometre
OBL	Outside Battery Limits
OCGT	Open Cycle Gas Turbine
OHSA	Occupational Health and Safety Act
Rev	Revision
SANS	South African National Standards
SHEQ	Safety Health Environmental and Quality
QCP	Quality Control Plan

#### 1.4 Interpretation of incorporated documentation

Wherever the following words or phrases are used in the listed or referred documentation, they are interpreted in this contract as tabled below.

Word or Phrase	Interpretation
'Eskom Holdings' (Eskom or Electricity Supply Commission) in the context of: <ul style="list-style-type: none"> <li>• Owner</li> <li>• Insurer of the Works</li> <li>• Paymaster</li> <li>• A party to the contract</li> </ul>	The <i>Employer</i> .
'Eskom Holdings' in the context of: <ul style="list-style-type: none"> <li>• A duty or procedure to be performed by the administration of the contract</li> </ul>	The <i>Project Manager</i> or <i>Engineer</i> as determined by the conditions of the contract.
Accepted or approved by (or to the satisfaction of) the <i>Project Manager</i> , <i>Engineer</i> , <i>Employer</i> , or Architect.	Accepted by the <i>Project Manager</i> or the <i>Engineer</i> .
A duty, procedure, decision or action of the <i>Engineer</i> , <i>Employer</i> , or Architect and or the Superintendent, Eskom's Representative, Site Supervisor or Clerk of Works.	An action of the <i>Project Manager</i> or the <i>Engineer</i> depending on the context. Clause 14 of the Core Clauses determines what the actions of each are. Either may delegate in terms of Clause 14.2

#### 1.5 Documents referenced in Works Information

Numerous documents such as standards and specifications are referenced within this Works Information. All these referenced documents including the normative references within must be adhered to during the implementation of the *works*.

Where a SANS standard referenced has been replaced by a newer standard, the *Contractor* is required to adhere to the latest revision of the newer standard. Where a SANS standard referenced is composed of several parts, all applicable parts are to be adhered to.

All national and international standards referenced are not bound in this document but are obtained by the *Contractor* at his own expense. Documents developed by the *Employer* as referenced in this Works Information are provided to the *Contractor*.

## 2. Scope

The Rotor Upending building was constructed in 2015/2016 and served as a facility for the dismantling (de-stacking) of the rotor-turbine and further accommodated other activities that allowed for the successful inspection and maintenance of the rotor-turbine.

The building was damaged due to anomalous wind conditions and had to be subsequently demolished. Major inspections and maintenance work for the rotor turbines are performed every seven years (7) and as such a new Rotor Upending building is required.

The new Rotor Upending building will therefore be to replace the previously demolished building. The new building is to be designed and constructed as a permanent structure that will be fit for purpose for the remaining lifetime of the power station. Additionally, the construction of the new Rotor Upending building is to utilize the existing equipment that is still structurally sound from the previously constructed Rotor Upending building.

The scope of works therefore includes but is not limited to:

- Assess and inspect existing stub columns, baseplates, concrete floors, reinforced concrete (RC) pad foundations etc. and provide a written inspection report including all findings to the *Supervisor*. The *Contractor* also inspects and verifies the existing designs and confirms the acceptability of reuse of the existing foundations and floor slab.
- Thereafter the *Contractor* designs, manufactures and constructs the new Rotor Upending building. The design of the Rotor Upending building must be submitted to the *Engineer* for acceptance before commencement of construction.
- The building is to be designed and constructed as a minimum, according to the details below:
  - At the development of this document, the intention is to reuse the Rotor Upending building floor as well as the RC pad foundations as it is deemed to be fit for purpose unless found to be otherwise during the *Contractor's* assessments
  - Part of the existing stub columns are to be broken down and holding down bolts are to be removed
  - New holding-down bolts and concrete stub columns are to be recast and fitted with new structural steel columns for the full height of the building **OR** New concrete columns, for the full height of the building are to be constructed. The size, reinforcing details and concrete and structural steel details will be as per the *Contractor's* design which is to be accepted by the *Engineer* before construction
  - New cast-in plates are to be installed and the type and size of the plates will be dependent on the *Contractor's* design. This is only applicable to the option of new concrete columns for the full height of the building
  - Assess existing rotor upending turning device base plates and base foundations and determine whether the base plates can be reused. The inspection and assessment report and proposed plan of work for the base plates are to be submitted to the *Engineer* for acceptance before the commencement of any refurbishment
  - If base plates are not reused, the *Contractor* designs manufactures and installs new base foundation and base plates within the building for the Rotor Upend turning device. The base plate design will meet the requirements shown on drawing 23-9422-01048

(0.86/9313) and will accommodate the new Rotor Upending turning device. The *Contractor* is to make provision for a portion of the existing floor to be demolished to serve as the new position of the base foundation. The final position is to be confirmed on-site with the *Project Manager*

- The type of ventilation preferred for use in the building is louvres as opposed to whirly birds
- The *Contractor* is to design the lighting for the interior and exterior of the building and is to ensure that the building is illuminated as per the Eskom and SANS standards. Additionally, the lighting design is to take due cognisance of the rotor that will be uprighted to a height of 11.5m and adequately design the lighting to reduce shadows etc
- Main Access Doors are to be designed as sectional sliding doors (no roller shutter doors)
- Orientation and building layout to be designed with due consideration of access into the building, position of the mobile crane hardstand area as well as turning circles for access/entry and upending of the rotor
- The *Contractor* is to design and construct the new building and all components under all relevant Eskom, SANS, and regulatory standards and codes.
- The *Contractor* is to note the extreme wind conditions and ensure the design and construction of the building can withstand adverse weather conditions. The *Contractor* designs and assesses the loading designs.
- The *Contractor* is to further note that the rotor weighs approximately 60 tons, and when upended, stands at a vertical height of 11.5m therefore the *Contractor* is to design the building to be at least 13m high at the eaves. The building footprint is to be approximately 35m x 15m wide and is to be aligned to existing foundations and stub columns.
- The building is to protect the rotor from all elements including as a minimum, wind, rain, ocean breeze etc. The type of building preferred is a structural steel building (portal frame) with steel roof sheeting building by the site-specific wind loading conditions for the area as per all relevant legislatures including SANS 10160. All required wind data is to be obtained by the *Contractor* for use in the wind, with the full height of the building clad with steel sheeting. The *Contractor* is to consider this type of building as an Industrial Building and makes considerations for this when designing the building.
- The *Contractor* may propose alternate solutions such as brick infill panels to a height and then cladding for the remaining full height of the building, however, the *Contractor* is responsible for ensuring all designs are compliant.
- The *Contractor* manufactures and/or procures and installs the Rotor Upending turning device including the base plates. The details of the Rotor Upending turning device and the base plate are provided in Drawing 0.86/9301 and 23-9422-01048, respectively.
- The *Contractor* performs the detailed design of the Rotor Upending building and all ancillary infrastructures including all drawings before fabrication for acceptance by the *Engineer*. The designs include but are not limited to the following:
  - Structural Steel Portal Frame (not galvanized, building is completely enclosed, Eskom Structural Steel Painting Specifications to apply)
  - Roof Sheetting (for coastal location and extreme chemical exposure due to proximity to PetroSA)



- RC Stub Columns
- Alternatively Concrete Columns (dependent on the Contractor's design)
- Holding Down Bolts and Base Plates
- Rotor Upending Turning Device
- Power Reticulation
- Potable Water Reticulation from existing supply
- HVAC
- Lighting
- Fire Protection & Detection
- Earthing and Lightning Protection
- Ablution Facilities
- Welding Bay
- The *Contractor* takes into consideration that a truck and trailer (entry/exit) is utilised for transporting the rotor into the building. Therefore this is to be considered in the design as well as the crane hard stand areas for lifting the rotor in final position and de-stacking of rotor blades.
- The *Contractor* constructs, commissions and tests the building and all necessary components for acceptance by the *Engineer*.
- The *Contractor* submits and completes the licencing, registering, obtaining the necessary approvals and documentation of the building from the local authority on behalf of the *Employer*.

### **3. Management and start-up.**

#### **3.1 Management meetings**

##### **3.1.1 Engineering quality assurance requirements**

The *Contractor* ensures that a complete Quality Control Plan (QCP), Method Statement, Inspection and Test Plan (ITP) and temporary works calculations, if applicable, are submitted to the *Project Manager* for review and acceptance before the works can commence.

During reviews of the ITPs, the *Employer* provides the necessary intervention points.

The *Contractor* has previous relevant experience about the scope of the *works*.

The *Contractor* submits a company profile which includes a list of traceable references that adequately proves that the *Contractor* (or their Sub-Contractor) has the relevant similar (size and scope) experience as the *works*.

All Quality Management System requirements shall comply with - Supplier Quality Management: Specification 240-105658000 Category 3.

The *Contractor* shall be responsible for the quality of, and testing of materials, workmanship and production processes used in completing the *works*. Within 30 days of contract award and before the start of the work, the *Contractor* submits the Quality Plan in accordance with Supplier Quality Management Specification: 240-105658000.

The *Contractor* shall be responsible for the preparation, maintenance during the execution of the *works* and submission of all quality requirements as stipulated in Supplier Quality Management: Specification 240-105658000 (Category 3) Quality Advisor /*Engineer* for acceptance at least thirty (30) days before the execution of the project.

On completion of the project, the *Contractor* shall hand in all data books (Packs) before the Completion Certificate is issued.

Where the *Contractor* maintains an official Quality Management System, details of the level of the *Contractor's* self-certification procedures shall be adopted for supplied materials and agreed upon with the *Engineer/Project Manager* before the commencement of work.

Where no official Quality Management System exists, the *Contractor* shall plan all quality management procedures, carry out all quality control testing as required and make available records of such testing for the *Engineer's* acceptance.

The *Contractor* shall submit full details of the proposed quality management system and procedures for acceptance by the *Engineer/Project Manager*, who shall have full access to all records, site trials and tests. The *Contractor* shall ensure that monitoring and measuring equipment are calibrated and verified to confirm serviceability before usage, and records of such shall be kept on site.

The *Contractor* shall be responsible for submitting, before the commencement of any work on site, a method statement together with a quality control plan and/or inspection and test plan.

### 3.1.2 Quality Control Plan

Quality Control Plans will include, but are not limited to the following aspects of the *works*:

- Concrete Works.
- Structural Steel Works.
- Wet Services.
- Electrical Designs (Power & Lighting).
- Mechanical Designs (Rotor upending turning device, HVAC).
- Fire Protection and Detection.
- Ablution Facilities.

### 3.2 Training workshops and technology transfer

The *Contractor* is required to train the staff at the sites dependent on the tasks. Training will include, but is not limited to the following:

- Rotor Upending Turning Device.

### 3.3 Documentation control

- The *Contractor* implements a comprehensive document control of all documents, their revision status and the document status of the 'as built' and 'as designed' commonly known as "Approved for Construction" plant status. In this regard, the *Contractor* ensures that the documentation supplied by the *Project Manager* as tie-in information accurately reflects the Contract requirements.
- The *Contractor* submits all documentation throughout the design phases of the *works* in electronic format to the *Project Manager*.
- The *Contractor* submits the final documentation on a formal transmittal form in triplicate to the *Project Manager*. All correspondence is sequentially numbered.
- The *Contractor* adheres to the *Employers* Documents and Record Management Procedure (240-53114186) for all documents submitted.
- The documentation and drawings supplied are in South African English and SI units are used. The *Employer* does not accept scanned electronic copies of documentation or drawings; however, the original documentation with signature is scanned for electronic purposes.
- Documentation is of good quality, prepared by suitably qualified personnel and contains the general arrangement drawings, installation drawings and instructions, and operating and maintenance instructions for all components.

### 3.4 Health and safety risk management

- The *Contractor* complies with the South African Occupational Health and Safety Act No 85 of 1993 and regulations, Eskom Safety, Health, Environment and Quality (SHEQ) Policy 32-727, National Building Regulations as well as SANS 10400 for all *works*. Furthermore, the *Contractor* complies with any additional current statutory and regulatory requirements regarding health and safety and environmental health.

- The *Project Manager* instructs the *Contractor* to stop work, without penalty to the *Employer*, when the *Contractor's* personnel do not adhere to acceptable health & safety standards or contravene the health and safety sections and regulations. The *Project Manager* is immediately or before the end of a particular shift, informed of any injury or damage to property or equipment. The *Contractor* provides all the required safety and personal protective equipment to his staff for the duration of the contract.
- Gourikwa's SHE Specification, procedures, policies, guidelines and standards applicable to the *works*, used as Eskom's minimum requirements for Health and Safety, are provided to the *Contractor*.
- Only the latest version/revision of the applicable legislation acts and regulations throughout the contract is applied at Gourikwa. Not limited to the below, the legislation, acts and regulations that the *Contractor* complies with are:
  - Compensation for Occupational Injuries and Diseases Act 130 of 1993
  - National Water Act 36 of 1998
  - Occupational Health and Safety Act 85 of 1993 and Regulations
  - Disaster Management Act 57 of 2002
  - National Environmental Management Act 107 of 1998
  - Applicable South African National Standards (SANS)
  - National Road Traffic Act 93 of 1996
  - Basic Conditions of Employment Act 75 of 1997
  - National Veld and Forest Fire Act 101 of 1998 and Regulations
  - Environmental Conservation Act 73 of 1989 and Regulations
  - Committee of Land Transport Officials (COLTO)
  - Project and Construction Management Professions Act 48 of 2000
  - Hazardous Substances Act 15 of 1973
- The *Contractor* establishes and adheres to the health and safety of his employees and those of its subcontractors so that high standards of personnel health and safety are achieved and maintained. The *Contractor* exercises and adheres to all necessary care and measures to preclude exposure of personnel, labour, and nearby residents (if any) to potential health hazards and environmental pollutants.
- The *Contractor* ensures that all persons who are employed and or deployed to work on site undergo police clearance and are certified to have no criminal records. This is required before any of the *Contractor's* employees are allowed or given access to start work on site.

### 3.5 SHE FILE

The *Contractor* is required to compile a SHE File to comply with the *Employer's* specifications. The SHE file is submitted to the *Project Manager* for review and acceptance, 60 days before the commencement of the *works* on site and includes, but is not limited to the following:

- Safety, Health and Environmental Plan (SHE Plan).
- SHE organization within the Company-Responsibility & Accountability.
- OHS Incident Management Procedure.
- Planning of conduct of work activities including planning for changes and emergency work (Operational Plan).
- Management of PPE - Personal Protective Equipment (Procedure with the matrix).
- Emergency planning and fire risk management.
- Vehicle and driver behaviour safety (Competency, Traffic Management, etc.).
- Subcontractor or supplier selection and management.
- Key personnel competency, training, appointments.
- Communication and awareness plan.
- Behavioural-Based Safety Procedure.
- *Employer's* Baseline SHE Risk Assessment (BRA).
- The *Contractor's* Baseline Risk Assessment is in line with the *Employer's* BRA (Identification, assessment and management of Safety, Health and Environmental risks related to the scope of work. The methodology used for the risk assessment is provided together with the BRA.).
- Valid Letter of Good Standing (COIDA or equivalent).
- SHE policy signed by CEO/ MD - Complying to OHS Act Section 7 or ISO 45001:2018.
- Occupational hygiene and health risk assessment.
- Medical surveillance is conducted by an occupational health practitioner.
- Method Statements/ Safe Working Procedures.
- The *Contractor* complies with the health and safety requirements contained in Appendix A to this Works Information.
- In addition, reference is made to documents and policies which the *Contractor* is required to adhere to.
- No *Contractor* or supplier will be allowed access on site without a valid South African Police clearance certificate.

### 3.6 Environmental constraints and management

The *Contractor* complies with the environmental criteria and constraints stated below:

- Gourikwa is ISO 14001 compliant. All spillages (oil, grease, diesel, chemical, etc) are prevented at all times and where accidents occur in line with any spillages, immediate remedial actions are taken to clean up the affected land using the appropriate spill-cleaning chemicals/absorbents.
- It is the responsibility of the Employer to ensure that the *Contractor* obtains copies of the Environmental Policy of Gourikwa Power Station, a copy of the legal register applicable to his area of responsibility, a copy of aspect register, and Gourikwa Power Station procedures applicable to the *Contractor's* area of responsibility to assist the *Contractor* and his/her employees to prevent pollution and comply with legislative requirements, and to familiarize themselves on such procedures, within 30 days from the date of commencement of work at Gourikwa Power Station. Copies of the above-mentioned documents are obtained from the Eskom Agent and/or Environmental Officer on the first day before the commencement of work at Gourikwa Power Station.
- The *Contractor* submits proof to the Environmental Officer of Gourikwa.
- He and his employees have done all the necessary training on procedures and policies supplied to them and they do understand the contents of the procedures, registers and policies and adheres to them at all times.
- The non-adherence to the below will result in a non-conformance:

**Rules are as follows:**

- Provide sufficient storage containers, labelled depicting general or hazardous waste and store them in a designated storage area
- No hazardous waste may be stored for more than 90 days on the Gourikwa Power Station premises
- Ensure that all hazardous waste is disposed of at a licensed class H disposal site. A copy of the hazardous waste disposal certificate is submitted to the *Project Manager*
- Ensure that all other general waste is disposed of at the local municipal waste dump
- Ensure that your site complies with the general good housekeeping practices

### 3.7 Quality assurance requirements

- The Quality Plan manages the overall quality of the works' main activities/milestones. It lists detailed activities in order of execution where each activity is described and references the associated work packages or specifications with witness-, hold- and verification points.
- The QCPs make provision for signatures indicating Completion by the *Contractor* and acceptance by the *Employer* at the end of each activity.
- The *Contractor* complies with all quality requirements as set out in 240-105658000-Supplier Quality Management Specification.

- The *Contractor* complies with the latest version of the ISO 9001 Quality Management System Requirements.
- The *Contractor* defines the level of QA/QC or inspection imposed on his subcontractors and *Contractors*.
- The programming of inspections, hold and witness points are agreed between the Employer and the *Contractor* before undertaking any work or inspections.
- All technical design and implementation documentation and project quality plans (PQP) are submitted to the *Employer* for Acceptance four (4) weeks before the commencement of any works or inspections.

### 3.8 Quality Plan

QCPs to list the following minimum hold points for acceptance when completed: (The *Contractor* can also add additional points as per their format):

- Basic Design Freeze.
- Detail Design Freeze.
- Engineering Training.
- Factory Acceptance Testing.
- Implementation Approval.
- Site Acceptance and Commissioning.
- Training of Operating and Maintenance Staff.
- Take-over.
- Completion.

### 3.9 Work Packages

For all site related work, the *Contractor* is required to submit a work package before any type of work can commence on the *Employer's* plant. The required format of the work package is per template 167A/158-A and a signed copy is provided by the *Contractor* after the *Employer* has reviewed and accepted the Work Package as final before any work.

### 3.10 Programming constraints

- The *Contractor* submits a bar chart programme (in MS Project format) detailing how the *works* are executed within the stipulated dates, including weekends and public holidays.
- The *Contractor* submits the programme according to best planning practices including but not limited to the start, completion date, duration, critical path and dependencies of each activity.
- The *Contractor* notifies the *Employer* of any changes made to the updated programme.

### 3.11 Contractor's management, supervision and key people

- The *Contractor* provides an organogram depicting the resources on site and their lines of authority and communication.
- The *Contractor* does not modify any plant or materials unless accepted by the *Employer* before implementation.
- The *Contractor* notifies the *Employer* at least two (2) days in advance of a Hold or Witness point on the *works*.
- The *Contractor* does not operate any equipment on site unless specific authorisation is obtained from the *Employer*.

### 3.12 Invoicing and payment

- Within one week (1) of receiving a payment certificate from the *Project Manager* in terms of core clause 51.1, the *Contractor* submits a tax invoice to the *Employer*, showing the amount due for payment equal to that stated in the *Project Manager's* payment certificate.
- The *Project Manager* is to be copied in on all electronic invoices emailed.
- Failure to submit the invoice to the correct address could result in payment delays.
- The *Contractor's* Tax Invoices comply with the requirements as stated in clause Z7 of the Contract Data.
- Invoices are submitted electronically to:
- Local Eskom Invoices - [invoiceseskomlocal@eskom.co.za](mailto:invoiceseskomlocal@eskom.co.za).
- Foreign Eskom Invoices - [invoiceseskomforeign@eskom.co.za](mailto:invoiceseskomforeign@eskom.co.za).
- Details required when submitting invoices and additional data:
- The subject line on your email should only contain your vendor number.
  - Each invoice in PDF should be named with your invoice number only
  - All electronic invoices must be sent in PDF format only
  - Attach the proof of delivery to your invoice
  - Where applicable, supporting documents must be attached to the scanned PDF invoice as one attachment
  - A copy of the signed assessment certificate
  - Cost Price Adjustment (CPA) calculation sheet
  - Retention Certificate where it is a retention invoice
  - Any other appropriate documents, e.g.
    - For shipping invoices, please ensure the following documents are attached.
    - Invoice (this should only reflect the shipping cost).
    - Commercial invoice.
    - Delivery note.
    - Your shipping costs calculation is relevant to that invoice – not a generic calculation (The amount of the shipping costs calculation must balance on the amount on the invoice.).
    - Forwarding agent's invoice.
    - The customs document.



➤ Please do not attach unnecessary documents as this will make the file too large.

- Other requirements:
  - For foreign invoices, suppliers will still be required to physically deliver hard copies of original documents to the respective Document Management centres even though the invoices have been submitted electronically
  - Ensure compliance with the tax requirements for submitting invoices electronically
  - Each PDF should contain one credit note, one debit note or one credit note only
  - More than one invoice can be submitted per email
  - Any CPA applicable must be invoiced separately so that if there are issues with the CPA, the rest of the invoices can be paid while the CPA issues are resolved
- Include the following information on the Invoice:
  - Name and address of the *Contractor* and the *Project Manager*
  - The contract number and title
  - *Contractor's* VAT registration number
  - The *Employer's* VAT registration number is 4740101508
  - The total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT
  - *Contractor's* company registration number if applicable
  - *Contractor's* banking details
- Name and address of recipient:
  - Tax invoice number and date of issue
  - Description of goods/services provided
  - Quantity or volume of goods/services
  - Period time for which the Tax Invoice is being rendered,
  - Relevant Task Order Number (commencing with a 45 prefix)
  - Relevant line item number
  - Statement whether value added tax is included or excluded

### **3.13 Insurance provided by the *Employer***

Insurance provided by the *Employer* is managed in accordance with clause 87 of the core clauses in ECC3.

### **3.14 Contract change management**

Contract change management is managed in accordance with core clause 6 in ECC3.

### **3.15 Provision of bonds and guarantees**

The form in which a bond or guarantee required by the *conditions of the contract* (if any) is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.

The *Employer* may withhold payment of amounts due to the *Contractor* until the bond or guarantee required in terms of this contract has been received and accepted by the person notified to the

*Contractor* by the *Project Manager* to receive and accept such bond or guarantee. Such withholding of payment due to the *Contractor* does not affect the *Employer's* right to termination stated in this contract.

The *Contractor* provides the bonds and guarantees as specified in the Contract Data within two (2) weeks of the Contract Date.

### **3.16 Records of defined costs, payments & assessments of compensation events to be kept by the *Contractor***

To substantiate the defined cost of compensation events, the *Employer* requires the *Contractor* to keep records of amounts paid by him, in the following format:

<b>Type of Cost</b>	<b>Type of Record</b>
People employed by the <i>Contractor</i> (labour)	Signed timesheets
Plant	Running hours for Plant
Materials	Register of materials used
Work subcontracted by the <i>Contractor</i>	Subcontractor's costs
Equipment	Register of Equipment used

### **3.17 Training workshops and technology transfer**

Formal training is conducted as part of this contract before Completion of the *works*. The *Contractor* trains the *Employer's* personnel as detailed in section 5.2.9. The *Contractor* is responsible for providing a training register to keep as proof of training provided. The signed-off training register by all participants is also supplied to the *Project Manager*.

## 4. Engineering and the *Contractor's* design

### 4.1 *Employer's* design

The *Contractor* is responsible for full design and construction of the new Rotor Upending building including all ancillary structures and equipment. The design is to be in accordance with all relevant Eskom Standards, SANS design codes and all other regulatory codes and standards.

The *works* that are to be constructed will be in accordance with the accepted designs and drawings and only be executed once accepted by the *Engineer*.

### 4.2 Parts of the work which the *Contractor* is to design

The *Contractor* is responsible for the detailed design of all the works which have not been designed by the *Employer*. This includes but is not limited to the following:

- Structural Steel Rotor Upending building.
- Ablution Facilities.
- Welding Bay.
- Electrical.
- Fire Protection and Detection.
- Mechanical Designs.

#### 4.2.1 Structural Steel Portal Frame

The Rotor Upending building is to safely house the rotor to allow for the maintenance and inspection of the rotor turbine and other components of the plant. The rotor stands approximately 11.5m high once erected and each component of the rotor needs to be taken off vertically by the use of an overhead crane. The structure must therefore accommodate the lifting and turning of the rotor which is performed with a mobile crane, and it is recommended that the building is designed to be at least 13m high at the eaves.

The building is to ensure that the inspection and maintenance of the plant is executed within an environment (building) that protects from the natural weather elements and the *Contractor* is to take note of the strong gust winds and ocean breeze that is in the area. The *Contractor* therefore designs for adverse weather conditions including wind loads and seismic loads in accordance with SANS 10160. The *Contractor* designs the structure for the greater of the wind action, seismic and notional horizontal loads (where applicable) and the load combinations for all structures are to be designed for worst-case load combinations in accordance with SANS 10160 or the appropriate international standards where required.

The *Contractor* designs and constructs the building as per Eskom Standard 240-56364545 and all relevant regulatory codes.

The steel to be used for the building is to be in accordance with SANS 50025 and the building is to be corrosion resistant. The *Contractor* submits the corrosion protection specification to the *Engineer* for acceptance before execution. The structure is to be designed and constructed such that the joints/nodes are accessible for proper inspection, cleaning, and painting. Any pockets or depressions that could hold water are to have drain holes or are to be otherwise protected. In addition, the building construction materials are to meet the definition of non-combustible in accordance with SANS 428.

## 4.2.2 Structural Members

For open steel structures, the thickness of any parts of structural members is < 5 mm.

Gusset plates are to be designed for purpose but are to never be less than the member thickness +1mm or 6mm whichever is the greatest. Hollow section wall thicknesses are to never be less than 4mm and are to be hot rolled steel members.

The bottom flange is to be checked separately for combined stresses due to bending, shear, and torsion; and to be reinforced if required.

Purlins are to be fixed to the roof beams or trusses using angle cleats.

Only steel sizes and grades manufactured in South Africa should be specified unless otherwise accepted by the *Engineer*.

## 4.2.3 Bolting

Bolts, nuts, and threads are to comply with SANS 1700. High-strength friction-grip bolts are to be used in accordance with SANS 2001 and SANS 10094. Galvanized bolts are to be avoided as far as possible. Washers are used in all bolted connections. Plain material washers are to be provided according to SANS 1700-16-2 and through-hardened washers to SANS 1700-16-3. Certification of bolts and washers is as per SANS 1556.

### 4.2.3.1 Anchor Bolts

Anchor bolts are to be made of Grade 8.8 (preferred) and to be designed to resist tension and shear. The minimum diameter is to be not less than 16 mm. The *Contractor* may utilize chemically anchored bolts and is to ensure this is designed in accordance with the Manufacturer's Specifications.

## 4.2.4 Access and Doors

The Main Access Doors are to be designed as sectional sliding doors (no roller shutter doors) and are to be of maximum accommodated heights, on either side of the short side of the enclosure. The door designs are to allow truck access with the rotor on-board and the positioning of the doors should account for access from the existing roads to the building.

## 4.2.5 Roof and Wall Sheeting

The type of building preferred is a structural steel building (portal frame) with steel roof sheeting, with the full height of the building clad with steel sheeting. The *Contractor* is to consider this type of building as the preferred choice when designing the building.

The *Contractor* designs and constructs the roof and wall sheets and only pre-coated sheeting will be used. The coating is to provide maximum protection against the local climate and other environmental factors. The colour of the coating will be chosen and accepted by the *Engineer*. The *Contractor* is to submit samples of coating.

All hot dip galvanizing of coated carbon steel sheets shall be in accordance with the specifications as set out in SANS 3575 and SANS 4998.

## 4.2.6 Downpipes and Gutters

Rainwater downpipes and roof gutters are to be made either of 1.5mm thick steel sheet, hot dip galvanized after construction, or of rigid polyvinyl chloride (PVC) or equivalent for acceptance by the *Engineer*. The bottom 2m of exposed downpipe are to be of galvanized steel and all rainwater

downpipes and roof gutters are installed in accordance with the recommendations set out in Red Book: South African Steel Construction Handbook.

#### **4.2.7 Base Plate**

If base plates are not reused, the *Contractor* designs manufactures and installs new base plates within the building for the Rotor Upending turning device. The base plate design will meet the requirements shown on drawing 23-9422-01048 and will accommodate the new Rotor Upending turning device. The *Contractor* is to construct and design new foundations for the Rotor Upending turning device.

Base plate drawings are to be submitted and are to include all dimensions and details of the base plate including holding-down bolts. Holding down bolt details and positions are also shown on the drawings.

#### **4.2.8 Concrete Works**

The *Contractor* is required to design and construct new stub columns (alternatively concrete columns) and foundations. All designs are as per the relevant standards.

The *Contractor* is required to conduct the detailed design for the foundations and support structures also taking into account any designs done by the *Employer* or existing infrastructure which may interface with or be affected by these structures.

##### **4.2.8.1 Concrete Mix Designs**

The concrete mix design takes into account the type of foundations, structures, elements, etc. for which it is intended. The cement, aggregates, sand, and water are to comply with the requirements of SANS 2001 – CC1: 2007 and SANS 10100 Part 2. Tests for drying shrinkage of aggregates and concrete and Alkali-Aggregate Reaction (AAR)/Alkali-Silica Reaction (ASR) are to be done at all times and complied with. Furthermore, the concrete mix is determined based on durability, taking into account the environment to which it will be subjected. The concrete class is C35/19 or as per the *Contractor's* design.

#### **4.2.9 Potable Water**

The *Contractor* designs and supplies potable water for a minimum of ten (10) people. Water is supplied from existing services and the *Contractor* is responsible for the final pipe routing as well as all infrastructure crossings such as channels, roads, and paved areas.

All pipe testing is to be done in accordance with Eskom Standard 240-123801640 for Low Pressure Pipelines.

#### **4.2.10 Ablution Facility**

The ablution facility within the building is to accommodate ten (10) people working in the enclosure at any given time. The *Contractor* therefore designs an ablution facility within the building as per the relevant standards. All finishings are as per Eskom Standards and for acceptance by the *Engineer* before construction.

The sewage reticulation from the ablution block is to tie into a conservancy tank and the size and final position of the tank will be determined on site by the *Contractor*, for acceptance by the *Engineer*.

Water supply into the building will be from existing lines and the *Contractor* designs and constructs all tie-ins and routes for water supply to the building.

#### **4.2.11 Welding Bay**

The *Contractor* accommodates in the designs of the building an area for a welding bay. The welding bay is located in one corner of the building and should not restrict the maintenance activities of the rotor.

The Welding Bay requirements are:

- An area of 3m x 3m.
- Welding Table.
- 380V AC welding plug – (3P+ N+E).
- One plug point.

#### **4.2.12 Ventilation**

The *Contractor* designs and installs the ventilation system of the building. If the designs permit, the type of ventilation preferred for use in the building is louvres as opposed to whirly birds. The ventilation design ensures and maintains good indoor air quality and dust control as per the relevant codes and standards.

#### **4.2.13 Fire Protection and Detection**

##### **4.2.13.1 Requirements for Design**

The *Contractor* designs and supplies the fire protection and detection system. The designs and installation are to comply with the following:

- National Building Regulations (SANS 10400).
- Fire Protection and Life Safety Design Standard (240-54937450).
- Fire Detection and Life Safety Design Standard (240-56737448).
- Requirements for Control and Power Cables for Power Stations Standard (240-56227443).
- Occupational Health and Safety Act (OHSA No. 85 of 1993).
- National Building Regulations and Building Standards Act.
- Local Authority By-laws.
- Fire Detection and Alarm Systems for Buildings – System Design, Installation and Servicing (SANS 10139).

The *Contractor* is responsible for ensuring that all dimensions are coordinated with the site requirements and that provision is made to interface with the existing site fire water supply system where required.

##### **4.2.13.2 Fire Risk Assessment**

The *Contractor* uses a Registered Fire Consultant/*Engineer* to perform a fire risk assessment and hazard analysis to produce a fire design philosophy that ties in with the existing site fire protection philosophy. The fire risk assessment is done in accordance with the Eskom Standards, particularly 240-54937439 Fire Protection/Detection Assessment Standard.

The fire assessment lists the recommended fire protection and fire detection measures required and

is to be based on passive, active and manual fire protection, and detection measures. The evaluation is dependent on *acceptance* from the *Engineer* before detailed design of the fire protection and fire detection can commence.

On acceptance of the fire risk evaluation, the *Contractor* develops the detailed design for the building's fire protection system. The fire protection system is to be designed in accordance with Eskom, SANS and NFPA fire codes and standards. The detailed design is to be reviewed and accepted by the *Engineer* before it can be implemented.

A Rationale Fire Engineered Design approach may be incorporated to achieve alternative building solutions where prescriptive methods are inappropriate or excessively onerous.

#### **4.2.13.3 System Requirements**

The interface point for the fire water is at any of the fire hydrant zones along line 01SGA40 on drawing 0.87/1039. The material of the connection pipe is galvanized steel and sizes are indicated on drawing 0.87/1039.

The *Contractor* is to route all piping, except crossings (road or paved areas), above ground. And all piping must be mild steel and hot dipped galvanized. Where underground routing is required, all piping will be high density poly ethylene (HDPE) in accordance with SANS 4427.

Pipe connections and valves are as follows:

- All piping from 0 to 50NB must be screw jointed.
- All piping 65NB and above must be flange jointed.

All piping, pipe connections, fittings and valves are required to comply with requirements as per Eskom Standard: 240-54937450 for Fire Protection and Life Safety Design.

All welding is required to comply with 240-106628253 - Standard for welding requirements on Eskom plant.

The building is situated at a suitable position that is far enough away from any other hazards that could pose exposure fire risk to this building. The area is around grid areas L12, L13, and L14 on drawing 0.87/01.

#### **4.2.13.4 Fire Protection**

Fire hydrants, isolation valves and fire extinguishers are of the same type as the existing on-site equipment.

The hydrants proposed are 65mm right-angle fire hydrants with a flow rate of 20l/s as per SANS 10400.

Fire hose reels are to be located in accordance with SANS 10400 requirements at a rate of 1 per 500 m<sup>2</sup> of floor area. Fire extinguishers are to be located at positions close to potential fire risks and generally at a rate of 1 per 100 m<sup>2</sup> or 1 per 200 m<sup>2</sup> based on the level of risk. 9kg dry chemical powder (DCP) fire extinguishers are used in most parts of the plant and thus are recommended.

The type and quantity of fire protection required will be determined by the *Contractor's* design for acceptance by the *Engineer*.

#### **4.2.13.5 Fire Detection**

The fire detection devices for the new building are to be added to the existing Ziton ZP3 Fire Alarm System. Manual call points are required for this building and the interface points can be identified

using the existing fire detection layout drawings.

The *Contractor* provides the following as a minimum:

- Floor diagrams of buildings indicating the position of manual call points, fire detectors and fire alarm devices.
- Types of sensors used with datasheets for each type.
- Detector installation and fastening methods.
- Cable specifications.
- Type, sizes, and actual routes of cables with a cable installation methodology.
- Certificates of system certification.
- Installer and designer certification.
- System architecture (Network diagram of the envisaged system) indicating all panels and loops.
- Power supply methodology.
- Battery standby time calculations (standby time and alarm time).
- System power consumption calculations.
- Recommendations to prevent false alarms.
- A record of any agreed variations from the original design specification.

#### **4.2.13.6 Design Documentation**

The following documentation, as a minimum, are to be submitted by the *Contractor* for acceptance by the *Engineer*.

- For Concept (Process) Designs:
  - Layout drawings indicating the position of all fire protection equipment, pipe routes, fire detection equipment, escape routes, etc.
  - Piping and Instrumentation Diagrams
  - Label List
  - Mechanical Equipment List
  - Electrical Load List Template
  - Control & Instrumentation Instrument Schedule
  - Interface detail
- For Detail Designs:
  - Arrangement Drawings
  - Equipment Data Sheets
  - Control Panel Diagram
  - Detail Drawings of the Control Panel
  - Confirmation that the design of the facility complies with the National Building



Regulations concerning fire protection.

- On Completion of Testing and Commissioning:
  - Operating Manuals (including test procedures).
  - Maintenance Manuals
  - As-built Drawings (KKS will have to be done for the additional piping and components)
  - Test Certificates

#### **4.2.14 Electrical Designs**

The *Contractor* develops the detailed design and adheres to 36-681 – Generation Plant Safety Regulations for all Electrical *works*.

The *Contractor* designs, procures, installs, commissions and hands over all electrical system requirements from the supply points up to and including all equipment required for the building. Any existing infrastructure must be utilised where possible, where accepted by the *Engineer*. The *Contractor* ensures adherence to Eskom standards as a priority and then SANS must be ensured. The *Contractor* adheres to Eskom specification for medium voltage miniature substations for systems of voltages of 3.3kV, 6.6kV, 11kV and 22kV Standard (240-56062752) and SANS 1973-1 and 1973 as a minimum.

The *Contractor* is to design the following systems, including but not limited to:

- Power Supply.
- Small Power and Lighting.
- Earthing and Lightning Protection.

##### **4.2.14.1 Power Supply**

The *Contractor* is to design the building such that there are plug points on each column. The previous building had eight (8) columns and as such the *Contractor* is to use this as a guide in his designs. Plug points are to be 220V AC single-phase socket outlets.

The Distribution Board is to be at an accessible position fulfilling the requirements of the Eskom standards. The electrical connection point is from a supply cable with a 380V AC board/transformer from sub-station E as per drawing (6063-2 Gourikwa Plant Layout). The distribution board/switchgear in the building requires an isolator for the incomer and further accommodates a 380V AC Extraction Fan for welding work inside the building and a PA system.

All design and construction *works* are to comply with SANS 10142 and OHS Act requirements.

##### **4.2.14.2 Lighting**

The *Contractor* designs the lighting for the interior and exterior of the building and is to ensure that the building is illuminated as per the Eskom and SANS standards. Additionally, the lighting design is to take due cognisance of the rotor that will be uprighted to a height of 11.5m and adequately design the lighting to reduce shadows etc.

As a minimum, lighting is required in the building to a minimum of 200 lux levels and energy efficiency is incorporated with the designs.

#### **4.2.14.3 Earthing and Lightning Protection**

The *Contractor* designs the Earthing and lightning protection systems.

For the earthing and lightning protection *works*, the *Contractor* is required to:

- Perform earth resistance and earth continuity tests of the existing earthing system to determine the status of the earthing point used.
- Construct new earthing tied into the existing earth mat.
- Propose and implement lightning protection interventions.
- Perform detailed designs, manufacture/procure, transport, supply, install, test, and commission the earthing and lightning protection system and its components, in line with the relevant SANS standards.
- Provide all equipment and components required.
- Ensure that interfacing with all the other system requirements of the plant/installation.
- Produce all documentation and drawings as per the As-Built design.

#### **4.2.14.4 General**

- The *Contractor* provides and terminates all power cable(s) from the identified source on the available spare circuits to supply points of the new building and associated auxiliaries.
- The *Contractor* makes an acknowledgement of interfaces to existing distribution boards to standardise equipment with readily available spares, accommodating modifications/extensions required.
- The *Contractor* adheres to the standards 240-53114248, Thyristor and Switch Mode Chargers, AC/DC To DC/AC Converters and Inverter Uninterruptible Power Supplies Standard
- Spares Philosophy: The *Contractor* is required to include the spares philosophy in all relevant design handover packs if applicable.
- Certificate of Compliance: All relevant COC's to be issued including electrical work completed
- Labels: All electrical circuits and equipment are to be labelled according to the KKS standard.
- Factory Acceptance Testing: The *Contractor* is required to include Factory Acceptance Test results in all relevant design handover packs if applicable.
- Functional Testing of Other Circuits: The *Contractor* is required to include the functional testing of other circuits in all relevant design handover packs if applicable.

#### **4.2.15 Rotor Upending Turning Device**

The *Contractor* procures and/or manufactures and installs the Rotor Upending turning device. The details of the Rotor Upending turning device are provided in Drawing 0.86/9301.

#### **4.2.16 Responsibility for Design and Construction**

Where the *Contractor* is required to execute design work, the following applies:

- The *Contractor* is to note that he is responsible for the design of all works which have not been designed by the *Employer* and is not limited to the above.
- The *Contractor* takes full professional accountability and liability for all designs done by the

*Contractor.* The *Contractor* is responsible for the design of all temporary *works* required for the execution of the *works*. The *Contractor* takes full professional accountability and liability for all designs of all temporary *works* required for execution done by the *Contractor*.

- The *Contractor* is required to design in accordance with the required SANS, National and Eskom Codes. Where international design codes are to be adhered to, the *Contractor* ensures that he does so. All designs, design reports and construction drawings prepared by the *Contractor* are signed off by an Engineering Council of South Africa (ECSA) Engineering Practitioner as a Professional *Engineer* or a Professional Engineering Technologist in good standing who takes full professional accountability for the designs.
- The *Contractor* is further mandated in terms of the Construction Regulations 2014: Duties of Designer 6(1)g to fulfil the duties described therein for the detailed designs by the *Contractor*. Any risk associated with the *Contractor's* design is to be highlighted to the *Employer* together with mitigation measures.
- The *Contractor* is to discuss and agree with the *Engineer* on the requirements for the designs and will submit his design & drawings, for acceptance before the start of execution. All such material becomes the property of the *Employer*.

### **4.3 Procedure for submission and acceptance of *Contractor's* design**

Acceptance of drawings, designs and calculations by the *Project Manager* will imply that:

- General arrangement and layout drawings, and (where appropriate) calculations and key diagrams have been examined and appear to be in accordance with the relevant SANS (national and international regulatory codes) and Eskom codes and standards and meet the requirements of the Works Information (WI).
- Calculations appear to substantiate the design, rating, and performance of the design in accordance with the specified requirements.
- Other drawings of the Plant and associated items of supply have only been examined about compatibility of the Plant etc. with the specification and in respect of the interconnections with other Plant.
- Acceptance of drawings, calculations or samples does not relieve the *Contractor* from his total liability to complete the *works* in accordance with the Works Information, Schedules, and the conditions of contract or exonerate him from any of his guarantees.
- All correspondence and submittals are to be prominently identified as relating to the *works* and are submitted under the cover of appropriate letters or transmittal notes in accordance with the correspondence procedures which will be advised by the *Project Manager* after the signing of the Contract. All documentation supplied by the *Contractor* to the *Project Manager* in hard copy is supplied in electronic format.

#### **4.3.1 Time Required for Acceptance of Designs & Calculations by the *Project Manager***

Not later than thirty (30) days after receipt, the *Project Manager* will return one (1) copy of the drawing marked "Accepted"; "Accepted as Noted" or "Not Accepted", as may be appropriate. The notations "Accepted" and "Accepted as Noted" authorize the *Contractor* to proceed with the manufacture of the Plant covered by such drawings subject to the corrections, if any, indicated thereon. Where prints or drawings have been "Not Accepted" the *Contractor* shall make the necessary revisions on

the drawings and submit further copies for acceptance in the same procedure as for the original submission of drawings. Every revision shall be shown by number, date, and subject in the revision block on the drawing.

#### **4.4 Other requirements of the Contractor's design**

The *Contractor* is to discuss and agree with the *Engineer* the requirements for the designs and submit his drawings, for acceptance before the start of manufacturing. All intellectual property (IP) and material becomes the property of the *Employer*.

All fabrication and installation are as per the accepted drawings.

All correspondence and submittals shall be prominently identified as relating to the works and shall be submitted under the cover of appropriate letters or transmittal notes in accordance with the correspondence procedures which will be advised by the *Project Manager* after the signing of the Contract. All documentation supplied by the *Contractor* to the *Project Manager* in hard copy shall also be supplied in electronic format.

The *Employer* has the right at all reasonable times to inspect at the factory of the *Contractor* or sub-contractors, or elsewhere, and all drawings of any portion of the *works*.

Where the *Contractor* is to supply the design of designated parts of the permanent *works* or temporary *works*, he is to supply full working drawings supported by an *Engineer's* design certificate.

The procedures as detailed above, equally apply in this section for submission and acceptance.

The *Contractor* timeously notifies the *Engineer* where part of his design requires him to interface with the existing plant and structures, i.e. to complete his design for acceptance.

The *Contractor* is required to provide KKS coding and labels for the plant and will utilise the power station's KKS coding system to fulfil these requirements.

#### **4.5 Use of Contractor's design**

The *Employer* may use the *Contractor's* design for any purpose about the protection scheme at the *Employer's* installations.

#### **4.6 Other requirements of the Contractor's design**

The *Employer* may use the *Contractor's* design for any purpose concerning the Upending building at the *Employer's* installations.

Refer to core clause 22.1 of the Works Information.

The design applies to Gourikwa Power Station and all *works* shall become the property of the *Employer*.

#### **4.7 Design of Equipment**

There is no design of equipment.

#### **4.8 Equipment required to be included in the works**

The *Contractor* designs, if required, manufactures, and installs the Rotor Upending turning device.

The *Contractor* is to provide all equipment needed for the work.

#### **4.9 As-built drawings, operating manuals and maintenance schedules**

##### **4.9.1.1 Drawings**

- All drawings are created electronically and 100% compatible with MicroStation V8 software in

a \*DGN file format.

- In conjunction with the electronic DGN copies the *Contractor* also provides a merged set of \*pdf electronic copies upon first issue and each time drawing updates are required. All drawings are signed and the revisions are noted as per *Employer's* specifications.
- The basic design is also submitted in this format to evaluate both the design and the electronic format.
- The electronic files are provided in A3 size and conform to the requirements of Standard 240-86973501.
- All detailed design drawings have the pre-approved title blocks and borders as provided by the *Employer*. The *Employer* provides samples of the pre-approved title blocks to be used by the *Contractor*. The *Contractor* completes the title block information as per the drawing standard listed.
- Graphical symbols are used in accordance with the NRS002 standard.
- All drawings are submitted to the *Project Manager* for his acceptance.
- The *Contractor* produces the following types of drawings:
  - o Cover sheet
  - o Index sheet
  - o List of symbols
  - o List of components with values, tolerances, ratings, type numbers, purchasing specification numbers, manufacturer and circuit reference numbers
  - o General layout drawing of the proposed panels
  - o Single line diagram
  - o Panel internal wiring drawings, including cross referencing and wire numbers
  - o Cable block diagrams with termination points

The *Contractor* is liable for updating drawings till after the final commissioning of the last unit when the *Employer* has signed off and approved the final "As Built" state of the drawings. After the commissioning of each unit, the *Contractor* supplies two sets of drawing hardcopies within two separate files and in A3 format.

#### **4.9.1.2 As-built Drawings**

At least one (1) month before notification of Completion of the *works*, the *Contractor* shall revise drawings where necessary to show the Plant as installed and send two (2) copies for acceptance. Drawings shall also be submitted in an electronic format compatible with Micro Station Ver.8 supplied by Bentley Systems Inc., DWG, one PDF and two (2) hard copies, in paper size A2. After acceptance, prints shall be provided as required of the type and in such quantities as shall be determined by the *Project Manager*. Drawings shall include those drawings necessary for the efficient maintenance of the plant. The specific KKS code of each plant, equipment and component shall appear on all drawings.

The prints and electronic files shall be deemed to form part of the works for the Defects Liability Certificate.

As-built drawings shall have the next revision number applicable to that drawing with the status “As-built” on the title block.

Before a Certificate of Completion will be issued all “as-built” data must be provided to the *Project Manager* on completion of the permanent *works*. The data must be provided in electronic form or where appropriate marked up on a set of drawings. Any information in the possession of the *Contractor* which is necessary for the *Engineer* to check the “as built” drawings shall be supplied to the *Engineer* regularly and all information must be delivered before a Certificate of Completion will be issued.

Shop drawings, general arrangement drawings, and designs that are required for any installation or structure shall be sent to the *Project Manager* for acceptance at least eight (8) weeks before construction starts.

Before a Certificate of Completion is issued, all as-built data and drawings (e.g. final surface levels and drainage structure levels) must be provided to the *Engineer* on completion of the permanent *works*. The data shall be provided both in electronic and hard copy format and shall be delivered for acceptance before a Certificate of Completion is issued.

Any information in the possession of the *Contractor* which is required under this contract shall be supplied timeously to the *Engineer* regularly.

#### **4.9.1.3 Document Tracking System**

The *Contractor* shall establish a document tracking system to record the dates for the supply and receipt of all design drawings, calculations, and requests for information.

#### **4.9.1.4 Project Drawing Numbers & Drawing List**

The *Contractor* will be issued with a series of project drawing numbers which shall apply to all drawings including those from Subcontractors. These numbers will then be used for reference throughout the project.

### **4.9.2 O&M Manuals**

The *Contractor* shall formulate an operation and maintenance program as well as the control philosophy for the complete system. This shall be handed to the *Engineer* for approval before Construction commences.

Six (6) weeks before the commencement of commissioning, the *Contractor* shall supply a draft of the manual for approval. Two (2) weeks after commissioning, the *Contractor* shall supply three (3) additional manuals which have been updated and include all commissioning data and “as built” drawings.

#### **4.9.2.1 O&M Manual Layout**

The manuals shall contain the following information and below is an overview of the content to be included as a minimum:

#### *INDEX*

#### *SECTION 1: SYSTEM DESCRIPTION*

*A comprehensive description of the installation and the system's operation at various room requirements, with cross-reference to other sections of this manual and manufacturer's brochures and pamphlets.*

## SECTION 2: OPERATING INSTRUCTIONS

- 2.1 *Plant instructions.*
- 2.2 *Equipment running checks.*
- 2.3 *Maintenance period checklist(s) with acceptable levels of operation.*
- 2.4 *Detailed explanation of setting and “programming” for each system.*

## SECTION 3: MECHANICAL EQUIPMENT

*The following information shall be provided in full for each new item of equipment:*

- 3.1 *General information: Description, make, model number, name and address of supplier, manufacturer, etc.*
- 3.2 *Design information:*
  - 3.2.1 *Design data sheet containing all design and selection parameters, calculations, selection curves, etc.*
  - 3.2.2 *Flow diagrams that indicate the flow rates, temperatures, pressures, and pressure drops amongst others in the system.*
- 3.3 *Manufacturer's brochures and pamphlets including performance curves/tables for all individual items of equipment.*
- 3.4 *Maintenance data and schedules:*
  - The lapse of time between services and the description of the service required for each part, lubrication requirements, etc.*
- 3.5 *Schedule of all spares: Mechanical, electrical, instrumentation and control.*

## SECTION 4: ELECTRICAL EQUIPMENT

*The following information shall be provided for all new electrical equipment whether in a switchboard or field mounted:*

- 4.1 *A complete electrical equipment schedule:*
  - Description, make, model number, rating and other design criteria, commissioned setting, name, and address of the supplier.*
- 4.2 *Maintenance information.*
- 4.3 *Manufacturers brochures and pamphlets.*
- 4.4 *Electrical and instrumentation wiring diagrams(s).*
- 4.5 *Electrical and instrumentation wiring diagram(s) shall be displayed in each control panel.*

## SECTION 5: INSTRUMENTATION AND CONTROL

- 5.1 *Detail description of the operation of the electrical and control systems.*
- 5.2 *Design information.*
- 5.3 *Manufacturers brochures and pamphlets.*
- 5.4 *Settings and values recorded during commissioning.*

5.5 *Maintenance data and schedules.*

## **SECTION 6: TESTING, BALANCING AND COMMISSIONING**

6.1 *Comparison of equipment design information against settings and values recorded during commissioning, with an explanation of differences.*

6.2 *Chart recorded temperature recordings during testing of the system.*

## **SECTION 7: CIVIL INFRASTRUCTURE**

7.1 *Detailed description of the operation and use of Civil Infrastructures for Rotor Upending Building.*

7.2 *Design Information.*

7.3 *Maintenance Data and Schedules.*

## **SECTION 8: ROTOR UPENDING TURNING DEVICE**

8.1 *Detailed description of the operation and use Turning Device.*

8.2 *Design Information.*

8.3 *Maintenance Data and Schedules.*

## **SECTION 9: DRAWINGS**

*The Contractor shall be required to produce the following detailed “as built” design drawings for inclusion in the manual:*

### **4.9.2.2 Other Information to be included in O&M Manuals**

The *Contractor* shall supply where necessary and after approval by the *Engineer*, two (2) bound sets of operating instructions, parts lists, maintenance manuals, data books and updated as-built drawings including the following details and information where new equipment has been installed:

- *Contractor’s* and *Supplier’s* details (name, address, email address and contact numbers).
- *Contractor’s* emergency (after-hours) contact details.
- A General Description of the Reticulation, Key Control Features, Alarm Response Procedures and Fault-Finding Tables.
- Cable Layouts, including Feeder and Control Cable Marking Numbers and Details.
- Motor Control Centre.
- Programmable Logic Controller (PLC) and associated software, configuration files and licences.
- As built printed hard copies and soft copies of the software program.
- Meters and Meter Information (including multiplication factors and programming details as applicable).
- Subcontractors/Suppliers Documents.
- Test Certificates.
- Certificates of Compliance.
- Thermal Survey.



- Guarantees and Warranties.

The *Contractor* shall mark up one (1) full set of the *Engineer's* drawings with relevant as-built changes and information and submit them to the *Engineer* for his approval 30 days before completion.

All documentation supplied is to be in the English language of medium.

The contract shall not be accepted as complete until these have been supplied, complete and to the satisfaction of the *Engineer*.

## 5. Procurement

### 5.1 People

#### 5.1.1 Minimum requirements of people employed on the Site

- All personnel working on the site need to have the applicable required work permits.
- All personnel have completed the relevant training about their specific job output.
- At the end of each month, the *Contractor* provides the Employer details:
  - o Names and identity numbers/passport numbers of the *Contractor's* working on site for the contract
  - o Number of hours each *Contractor* has worked per day
  - o Start and end times of *Contractor's* per day

#### 5.1.2 B-BBEE and preferencing scheme

- The *Contractor* complies with and fulfils the *Contractor's* obligations in respect of the Broad-Based Black Economic Empowerment (as per clause Z3 of ECC3).
- The *Contractor* provides valid B-BBEE certificates to the *Project Manager* on an annual basis of himself as well as his subcontractors.

### 5.2 Subcontracting

#### 5.2.1 Preferred subcontractors

There are no preferred subcontractors.

#### 5.2.2 Subcontract documentation, and assessment of subcontract tenders

The *Contractor* submits the proposed conditions of contract for each subcontract to the *Project Manager* for acceptance unless:

- an NEC contract is proposed or
- the *Project Manager* has agreed that no submission is required.

The *Contractor* does not appoint a subcontractor on the proposed subcontract conditions submitted until the *Project Manager* has accepted them. A reason for not accepting them is that they will not allow the *Contractor* to provide the *works* or they do not include a statement that the parties to the subcontract will act in a spirit of mutual trust and co-operation.

#### 5.2.3 Limitations on sub-contracting

There are no limitations of sub-contracting.

#### 5.2.4 Attendance on subcontractors

Any subcontractor is required to work under the direct supervision of the *Contractor*.

The *Contractor's* organograms indicate the lines of authority and communication of all the *Contractor's* site employees, including subcontractors.

### 5.3 Plant and Materials

The *Contractor* provides all labour, gear, tools, vehicles, temporary *works/ scaffolding*, consumables, bulk mixing plant, equipment and cleaning materials required to provide the works. The *Contractor* supplies/ procures all plant and material, fabrication, manufacturing, handling, storage, testing, delivery, off-loading and erection/construction, disposal of debris and finishing in every detail of works. The *Contractor* constructs any works that can be reasonably inferred from this *Employer's* specifications.

During the erection period, the *Contractor* as a builder and/or user of machinery performs 'building work' in terms of the OHS Act. The *Contractor*, before taking occupation on a site, obtains a permit to work from the *Project Manager*. No unauthorised person(s) enters into any prohibited/restricted area. Daily diaries/logs/data books are kept and signed by the *Contractor* and are also signed off daily by the *Engineer*.

The following is to be recorded (as a minimum) in the daily diaries:

- Manpower and Equipment used.
- Weather conditions.
- Description of any unique occurrences, incidents, or accidents.
- Delays and reasons for the delays.
- Industrial relations abnormalities.
- Description of activities to be performed.
- Recording of on-site tests, for example, slump tests.
- In addition to the aforementioned, the *Contractor* adheres to the following:
  - The *Contractor* is restricted to the Site
  - The *Contractor* is not to enter any other areas and ensures that his employees abide by the regulations
  - The *Contractor's* Equipment does not impair the operation or access to the plant
  - The *Contractor* provides any temporary or expendable materials required for the storage of material
  - The *Contractor* safeguards and secures all items whilst in the *Contractor's* custody and control, until completion of the works
  - The adjacent plant and equipment are not modified without written permission from the *Project Manager*.

Modification in this sense includes, but is not limited to the following:

- Welding onto existing plant.
- Drilling into structural steel or concrete.
- Cutting or removing.
- Loading adjacent structures.

### 5.3.1 Quality

Proof of compliance with materials specifications and samples of materials are required.

This also applies to the subcontractors. All materials and plant which are procured for the works are subject to the provision of proof of payment by the *Contractor* or his Subcontractors at least 30 days after delivery to the site; ownership will then transfer to the *Employer* once evaluated, accepted, and paid for by the *Employer*.

### 5.3.2 Guarantee Inspection

Latent Defects Period as per the ECC3 Contract.

### 5.3.3 Product Support

The *Contractor* provides product support for the provided solution for the entire life cycle of the system.

### 5.3.4 Defects Correction

All new equipment, materials and systems shall be furnished with a written guarantee with a defects liability period as per the ECC3 Contract from the date of completion of work. These guarantees shall be furnished in favour of the *Employer*. On Completion of the required and specified work the systems, installations and equipment shall be commissioned and handed over to the *Engineer* for acceptance.

### 5.3.5 Plant & Materials provided “free issue” by the *Employer*

No plant & materials provided “free issue” by the *Employer*.

### 5.3.6 *Contractor's* procurement of Plant and Materials

The *Contractor* registers all the plant and materials with Eskom and for materials, it must be in the form of a delivery note. This ensures that when the *Contractor* needs to take something out of site, there is proof that the *Contractor* owns that particular item. All vehicles utilised for this contract must be roadworthy and certified in terms of the National Road Traffic Regulations. The *Contractor* is responsible for ensuring that all his/her belongings are stored safely at all times and are not obstructing other operations in the power station.

The *Contractor* is to ensure that he stores materials in a dry area, protected from freezing, staining and damage.

- To enable the *works* to be executed timeously and to minimize risks once on site, a checklist needs to be completed to ensure all prerequisites have been complied with for the equipment to be transported to the site. This forms part of quality and risk assessment and a number of these can be prepared well in advance. The *Project Manager* signs off on the checklist before the equipment is transported to the site.
- This includes the type of packaging and wrapping.
- Type of transport to be used (road, air etc.).

- If by road, are vehicles with special shock absorbent load beds required etc.
- The *Contractor* also provides proof of ownership of any plant and materials that are procured from other suppliers.

### 5.3.7 Spares and consumables

The *Contractor* supplies all spares and consumables necessary to provide the *works*.

The *Contractor* is required to provide the following spares as a minimum:

Mechanical Equipment:

The following spares list relates to the equipment that is installed as per the final accepted design and should be supplied before completion.

- One (1) of each valve type and size to be supplied as a spare.
- One (1) of each type and rating of pressure relief valve to be supplied as spare.
- One (1) of each type and size of non-return valves to be supplied as spare.

Electrical Equipment:

- At least two (2) Spare globes/LED of each type.

## 5.4 Tests and inspections before delivery

### 5.4.1 Factory Acceptance Testing (FAT)

The *Contractor* shall provide a testing/ commissioning program and procedure to be accepted by the *Project Manager*. All tests will be witnessed by the *Engineer* and/or Supervisor and therefore the *Contractor* ensures that the *Project Manager* is timeously informed of when and where the tests and inspections will occur.

All tests and commissioning are to be as per National and Eskom Standards.

The *Contractor* is required to perform the following tests aligned with the QCP e.g. Concrete Cube Tests, Workshop Drawings for review and acceptance by the *Engineer*.

As a minimum, before delivery of the works, the *Contractor* provides:

- The respective testing procedures to the Employer for his review and acceptance before conducting testing at the *Contractors* facilities.
- Site acceptance testing and commissioning of the integrated system with all associated equipment. The *Contractor* is to submit the respective testing procedures to the *Employer* for his review and acceptance before conducting testing.

## 5.5 Marking Plant and Materials outside the Working Areas

All equipment and materials must be marked as follows: Gourikwa Power Station, *Contractor's* name.

## **5.6 Contractor's Equipment (including temporary works).**

The *Contractor* supplies, installs, maintains and removes all temporary construction facilities and utilities necessary to provide the *works*.

Additionally, the *Contractor's* Equipment does not impair the operation or access to the plant.

The *Contractor* designs, manufactures and/or supplies and installs the Rotor Upending turning device. The device is to be as per the requirements indicated in Drawing 0.86/9301.

The *Contractor* bears full responsibility for the supply and installation of the Rotor Upending turning device. The Rotor Upending turning device is to be tested and shown fit for purpose before completion of the *works*.

## **5.7 Cataloguing requirements by the Contractor**

There will be no cataloguing requirement by the *Contractor*.

### **5.7.1 Investigation, survey and Site clearance**

The *Contractor* is responsible for surveying the current protection scheme, layout and positioning of the panels and needs to specify any additional requirements.

## 6. Construction

### 6.1.1 Temporary works, site services & construction constraints

Temporary works for this contract shall be any work or infrastructure and or establishment which the *Contractor* requires to provide the *works*, which includes inter alia his facilities, laboratories for control and acceptance testing, connection to existing water, sewer, electricity, etc. All such temporary works shall be adequately decommissioned, restoration to the natural environment and the area made good on completion of the works; all to the acceptance of the *Project Manager*.

Method statements shall be prepared before the commencement of any work for the acceptance of the *Engineer*. All costs relative to this aspect shall be on account of the *Contractor*.

### 6.1.2 Employer's site entry and security control, permits, and site regulations

- General access to the power station is controlled and site induction has to be completed before work will be allowed to start.
- Before work starts on site, a site inaugural meeting is held between the *Contractor* and the *Employer*, where details of the *works* are discussed and clarified.
- The *Contractor's* Site supervisor is on site for the entire duration of the *work*.
- The *Contractor* must adhere to all security regulations in force during the period of the contract.
- Before entry to the site will be allowed, everyone will undergo an alcohol breathalyser test which needs to be 0.00mg/l. This is one of the five Cardinal Rules to which the *Contractor* is required to adhere to at all times.

### 6.1.3 Restrictions to access on site, roads, walkways and barricades

- The *Contractor* satisfies himself and complies with the site conditions presented during the induction.
- The *Contractor* is required to comply with all site restrictions about the site's roads, walkways and barricades.

### 6.1.4 People restrictions on site; hours of work, conduct and records

- Normal working hours:
  - Monday to Thursday: 07h00 – 16h15
  - Fridays: 07h00 – 12h00

### 6.1.5 Health and safety facilities on site

The health and safety facilities on site is discussed in detail during the site induction.

### **6.1.6 Cooperating with and obtaining acceptance from others**

All activities are performed according to the accepted programme.

### **6.1.7 Publicity and progress photographs**

No notice boards, advertising rights, media relations, photography and progress photographs are allowed without appropriate authorisation.

### **6.1.8 Contractor's equipment**

- The *Contractor* provides the *Employer* with a complete list of materials, tools, equipment and or machinery before bringing it onto the site.
- The *Contractor* will keep comprehensive records of all of the *Contractor's* equipment brought on and removed from the site.
- The *Contractor* is to comply with the health and safety and site access procedures.

### **6.1.9 Equipment provided by the Employer**

- There will be no equipment provided by the *Employer*.

### **6.1.10 Site services and facilities**

- **Electricity supply**
  - All points of supply are provided in terms of availability and location
  - The *Employer* indicates which supply points may be used
  - 220V electrical supply is generally available in the power station complex – the *Contractor* is to ensure they have the correct matching plugs
  - The *Contractor* verifies extension lead requirements
- **Water supply**
  - All points of supply are provided in terms of availability and location
  - The *Employer* indicates which supply points may be used
- The *Contractor* ensures that the pressure at the tap-off point is regulated to the correct operating pressure to ensure that the pressure and flow supplied to the end-user are within the specified range as per SANS 10252 for specific applications.
- **Area for site establishment and storage**
  - A storage area is indicated to the *Contractor*
  - An area for Site Establishment is indicated to the *Contractor*
  - Security of the *Contractor's* storage is the responsibility of the *Contractor*



- The area allocated to the *Contractor* is reinstated to their former condition on Takeover of the *works*.

- **Ablutions facilities**

- The *Contractor* makes provisions for the abluion facilities during the *works*

#### **6.1.11 Facilities provided by the *Contractor***

- The *Contractor* makes provision for accommodation, vehicles, kitchen - and office space (mobile container) Equipment etc.
- The *Contractor* removes all this equipment and waste which was generated during construction and commissioning within 24 hours after completion.
- The *Employer* is not able to offer office space to *Contractors* for the period of work on site.
- An area will be allocated on site by the *Employer* for the *Contractor* to utilise for temporary office space.

#### **6.1.12 Telephone/ Internet facilities**

The *Contractor* is responsible for arranging his own telephone/internet facilities.

#### **6.1.13 Security of *works***

The *Contractor* is entirely responsible for the security of all the *works*, materials, equipment lighting and other precautions as necessary to ensure security against theft, loss, or damage. The *Contractor* is advised to visit the site to familiarize with the nature and position of the site.

#### **6.1.14 Existing premises, inspection of adjoining properties and checking work of others**

Within the locality of the *works*, there are existing services (water pipes and electrical cables etc.) which the *Contractor* shall take extreme care to prevent any damages during the execution of the *works*.

The *Contractor* shall liaise with the Supervisor before work commences.

The *Contractor* shall be responsible to expose and protect all existing services where directed. (Contractor to make ground scanning techniques)

#### **6.1.15 Survey control and setting out of the *works***

Quality Inspection Plan (QIP) of the *Employer* must be adhered to at all times, to ensure the job is performed to the *Employer's* satisfaction.

The *Contractor* shall carry out a land survey to determine all existing levels.

### **6.1.16 Excavations and associated water control**

The *Contractor* ensures that excavations are done safely and workers hook up heights of more than 1.5m. The *Contractor* ensures that cable detection is conducted for areas where excavation is taking place to avoid breaking of live cables and water pipe bursts.

### **6.1.17 Underground services, other existing services, cable and pipe trenches and covers**

Within the locality of the *works*, there are existing services (water pipes and electrical cables) which the *Contractor* shall take extreme care to prevent any damages during the execution of the works.

The *Contractor* shall liaise with the *Engineer* before work commences.

The *Contractor* shall be responsible to expose and protect all existing services where directed. The *Contractor* ensures that all trenches, holes, and any other areas where there is a danger of falling, physical barricading is implemented and prohibitory signs are hung.

### **6.1.18 Sequences of construction or installation**

The *Contractor's* programme shall clearly show and sequence the activities of all the project work to be done by the *Contractor* and the other work covered by the contract that is being done by the sub-contractors.

The following activities are to be included, as a minimum, in the programme:

- Preconstruction documentation submission:
  - Final SHE file submission to the *Employer* for review and acceptance
  - Site establishment method statement submission to the *Employer* for review and acceptance
  - Quality Control Plan (QCP) submission to the *Employer* for review and acceptance
  - All activity method statements submission to the *Employer* for review and acceptance
- Construction Activities:
  - Site Establishment
  - Inspection & Assessment of Existing Infrastructure:
    - Assessment of the existing floor and stub columns
    - Assessment of the existing base plates and base for the rotor upend turning device
    - Assessment of the existing services
  - Design Works
  - Construction and/or Refurbishment Works:
    - Bases and Stub Columns or Concrete Columns
    - Structural Steel Portal Frame
    - Ablutions
    - Base Plates

- Rotor Upend Turning Device
- HVAC
- Potable Water
- Electrical Reticulation
- Small Power & Lighting
- Fire Detection and Protection
- o Testing and Commissioning:
  - Commissioning/ Testing Works
- Post-Construction Documentation Submission:
  - o SHE File Submission to the Employer for review and closure
  - o Data Books Submission to the Employer for review and acceptance

The *Contractor* is to further note that all quality documents and method statements require a 14-day review period.

#### **6.1.19 Control of noise, dust, water and waste**

Signage will indicate any noise, dust, water and waste.

#### **6.1.20 Sequences of construction or installation**

All activities are performed according to the accepted programme.

#### **6.1.21 Giving notice of work to be covered up**

All notices and warnings follow the ECC3 requirements.

#### **6.1.22 Hook-ups to existing works**

Hooking at heights is one of Eskom's cardinal rules and it is to be adhered to at all times. Failure to follow this rule and other Eskom rules is prohibited and will lead to the *Contractor* being penalized and removed from the power station. The *Contractor* ensures that all lifelines are made available for hooking up purposes at all times where required.

### **6.2 Completion, testing, commissioning and correction of defects**

#### **6.2.1 Work to be done by the Completion Date**

On or before the completion date the *Contractor* is to have done everything required to provide the *works*. The *Project Manager* cannot certify completion until all the work has been done and is also free of defects which would have, in his opinion, prevented the *Employer* from using the *works* and others from doing their work.

Items of work	To be completed by
As built drawings of all works	Within 21 days after completion
Performance testing of the <i>works</i> in use as specified in this works information and relevant national and international codes and standard.	See performance testing requirements.

### 6.2.2 Use of the *works* before completion has been certified

All roads are currently being used by Eskom and other *Contractors*. The *Contractor* shall ensure unrestricted access of all road users at all times. Failure to do so will result in all third-party claims being passed onto the *Contractor*.

### 6.2.3 Materials facilities and samples for tests and inspections

The *Contractor* shall arrange facilities where appropriate, to allow for the provision of samples, to the acceptance of the *Engineer*.

The *Engineer* will carry out routine site inspections of finished work as well as of work in progress. The *Contractor* shall allow access to the *works* for such routine inspections.

### 6.2.4 Commissioning

The *Contractor* commissions the Upending turning device and the *Employer* accepts.

### 6.2.5 Start-up procedures required to put the *works* into operation

There are no start-up procedures required to put the *works* into operation.

### 6.2.6 Take over procedures

Acceptance of the system by the *Employer* will be based on the system being able to perform its function as per the quality requirements and a handover certificate is issued to the *Project Manager*.

### 6.2.7 Access is given by the *Employer* for the correction of defects

Access is granted to the *Contractor* for defects correction as per Core Clause 43.4 in ECC3.

### 6.2.8 Performance tests after completion

Tests to be completed include but are not limited to the following:

- Pressure testing, sterilizing & bacteriological test of water pipes.
- System functionality testing.

- Rotor Upending turning device.

### **6.2.9 Operational maintenance after completion**

The *Contractor* is required to provide operation and maintenance manuals for all of the *works*, for acceptance by the *Engineer*.

## 7. PLANT AND MATERIALS STANDARDS AND WORKMANSHIP

### 7.1 WORKS SPECIFICATION

#### 7.1.1 Applicable Standard Specifications

The standard general and technical specifications for the construction and design of the Rotor Upending building shall be the applicable SANS standards. The *Contractor* is responsible for ensuring that he is thoroughly familiar with all the amendments and corrections before submitting his tender.

In addition to the national and statutory applicable standards, the relevant *Employer's* standards are applicable in this contract.

#### 7.1.2 Applicable Statutory Requirements

The *Contractor* shall comply with all the relevant South African statutory requirements in terms of the employment of people on site. Site specific requirements shall not take precedence over any statutory requirement.

These include but are not limited to the following:

Code	Title
SANS 1200	SANS Series Standardized Specifications for Civil Engineering
SANS 10162	The Structural Use of Steel
SANS 10400	The application of the National Building Regulations
SANS 10400A	General principles and requirements
SANS 10400B	Structural design
SANS 10400C	Dimensions
SANS 10400D	Public safety
SANS 10400F	Site operations
SANS 10400G	Excavations
SANS 10400H	Foundations
SANS 10400J	Floors
SANS 10400K	Walls
SANS 10400L	Roofs
SANS 10400O	Lighting and ventilation
SANS 10400P	Drainage
SANS 10400-T	Fire Protection
SANS 10400V	Space heating
SANS 10400-W	Fire Installation
SANS 10142-1	The Wiring of Premises
SANS 1128	Hydrant Systems
SANS 1123	Pipe Flanges
SANS 1910	Portable Refillable Fire Extinguishers
SANS 543	Fire hose reels (with semi-rigid hose)
SANS 428	Fire performance classification of thermal insulated building
SANS 10375	The inspection, testing and examination of overhead cranes
SANS 14520-1	Gaseous Fire Extinguishing Systems–Physical Properties and System Design
NFPA 30	Flammable and Combustible Liquids Code
NFPA 850	Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
NFPA 2001	Standard on Clean Agent Fire Extinguishing Systems

FMG 7-79	Fire Protection for Gas Turbine Installations
ASME B31.3-2002	Process Piping
SANS 10161	Design of foundations for building
SANS 10109	Concrete Floors
SANS 10145	Concrete Masonry Construction
SANS 12482-1	Cranes: Condition Monitoring
SANS 12488-1	Cranes – Tolerances for wheels and travel and traversing tracks Part 1: General
SANS 12478-1	Cranes Maintenance Manual Part 1: General
SANS 12480-1	Cranes – Safe Use part 1: General
SANS 11630	Measurement of Wheel Alignment
SANS 11660-1	Cranes: Access, Guards and Restraints Part 1: General
SANS 11660-2	Cranes: Access, Guards and Restraints Part 2: Mobile Cranes
SANS 10973	Cranes: Spare Parts Manual
SANS 10307	Cranes, Lifting and Suspended Equipment – Support Documentation and Training
SANS 10296	Hand signals used with Cranes and with Lifting and Suspended Equipment
SANS 4301-5	Cranes – Classification – Part 5: Overhead Travelling and Portal Bridge Cranes
SANS 4308-1	Cranes and Lifting Appliances – Selection of Wire Ropes Part 1: General
SANS 4309	Cranes – Wire Ropes – Care, Maintenance, Installation, Examination and Discard
SANS 4310	Cranes – Test Code and Procedures
SANS 10252	1 Water Supply and Drainage for Buildings (Part 1: Water Supply Installations for Buildings)
SANS 1123	Pipe Flanges
SANS 719	Electric-Welded Low Carbon Steel Pipes for Aqueous Fluids (Large Bore)
SANS 62 (Parts 1 & 2)	Steel pipes suitable for threading (and screwed) and of nominal size not exceeding 150mm NB
R1010	Construction Regulations
OHSA No 85 of 1993	Occupational Health and Safety Act
NEMA	National Environmental Management Act 107 of 1998
	National Building Regulations and Building Standards Act 103 of 1977
	Local Authority By-laws
SANS 10100	Structural Use of Concrete
SANS 10162	Design of Structural Steel
SANS 10160	Basis of Structural Design

### 7.1.3 Applicable Eskom Standards

The *Contractor* shall comply with all the relevant South African statutory requirements in terms of the employment of people on site. Site specific requirements shall not take precedence over any statutory requirement.

In addition to statutory requirements, the *Contractor* is to comply with the relevant Eskom Standards, and these include but are not limited to the following:

Code	Title
QM 58	Supplier Contract Quality Requirements Specification
240-150642762	Generation Plant Safety Regulations
240-71432150	Plant Labelling and Equipment Description Standard
167A/49	Drawing and documentation standards for <i>Contractors</i>
167A/143	Drawing Office Standard
167A/49	Documentation Process Procedure
32-136	Contractor Health and Safety Requirements
240-62196227	Eskom Life-Saving Rules

240-54937439	Fire Protection/Detection Assessment Standard
240-54937454	Inspection, Testing and Maintenance of Fire Protection Systems
240-56364535	Architectural Standard for Structures and Other Buildings
240-56364542	Standard for Reinforced Concrete Foundations and Structures
240-56364545	Structural Design and Engineering Standard
240-56737654	Inspection, Testing and Maintenance of Fire Detection Systems
240-56737448	Fire Detection and Life Safety Design Standard
240-54937450	Fire Protection and Life Safety Design Standard
240-43156827	Introduction to The Welding Rulebook
240-101712128	Specification for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings
240-106365693	Standard for the External Corrosion Protection of Plan, Equipment and Associated Piping with Coatings
240-75655504	Corrosion Protection Standard for New Indoor and Outdoor Eskom Equipment, Components, Materials AND Structures Manufactured from Steel Standard

## 7.2 INVESTIGATION, SURVEY AND SITE CLEARANCE

No investigation, survey and site clearance required.

## 7.3 BUILDING WORKS

During the construction of the *works*, there are numerous standards and specifications to which the *Contractor* must adhere to. The documents listed below, including normative references within, are not bound in this document but are obtained by the *Contractor* at his own expense and must be adhered to during the implementation of the *works*.

Where a SANS standard referenced has been replaced by a newer standard, the *Contractor* is required to adhere to the latest revision of the newer standard. Where a SANS standard referenced is composed of several parts, all applicable parts are to be adhered to.

The following specifications as a minimum are required to be complied to:

- SANS 10400 - The Application of the National Building Regulations.
- SANS 1200 - Standardized specification for Civil Engineering construction section HA: Structural steelwork (sundry items).

### 7.3.1 Materials and workmanship

Only new and undamaged materials are to be used in the works. Materials to be permanently installed in the works are not to be used for any temporary purposes on site. Work is required for the acceptance of the *Engineer* and is executed following the relevant manufacturer's written recommendations and instructions.

### 7.3.2 Proprietary products

For submission of tenders, rates for items described in the bills of quantities by trade names, catalogue references, etc., are for the particular type and manufacture specified.



Once the Contract has been signed the acceptance of the *Project Manager* is required to be obtained before any substitution and where products or materials, etc., other than those specified are used.

## 7.4 CIVIL ENGINEERING AND STRUCTURAL WORKS

### 7.4.1 List of standardised specifications

During the construction of the *works*, there are numerous standards and specifications to which the *Contractor* must adhere to. The documents listed below, and indicated on the drawings, including normative references within, are not bound in this document but are obtained by the *Contractor* at his own expense and must be adhered to during the implementation of the *works*.

Where a SANS standard referenced has been replaced by a newer standard, the *Contractor* is required to adhere to the latest revision of the newer standard. Where a SANS standard referenced is composed of several parts, all applicable parts are to be adhered to.

The following specifications are required to be complied to:

- SANS 10400- The Application of the National Building Regulations
- SANS 2001-BS1- Construction works Part BS1: Site clearance
- SANS 2001-CC1- Construction works Part CC1: Concrete *works* (structural)
- SANS 2001-CC2- Construction works Part CC2: Concrete *works* (minor works)
- SANS 2001-CM1- Construction works Part CM1: Masonry walling
- SANS 2001-CS1- Construction works Part CS1: Structural steelwork
- SANS 2001-DP3- Construction works Part DP3: Cable ducts
- SANS 2001-DP5- Construction works Part DP5: Stormwater drainage
- SANS 1200 A- Standardized specification for civil engineering construction Section A: General
- SANS 1200 HA- Standardized specification for Civil Engineering construction Section HA: Structural steelwork (sundry items)
- SANS 1200 HB- Standardized specification for Civil Engineering construction Section HB: Cladding and sheeting
- SANS 1200 HC- Standardized specification for Civil Engineering construction Section HC: Corrosion protection of structural steelwork
- SANS 10109-2- Concrete floors Part 2: Finishes to concrete floors

### 7.4.2 Structural Steelwork

The following codes are required to be complied to:

- SANS 2001 CS1: Structural Steelwork
- SANS 1200 H: Structural Steelwork (Only Clause 8 – Measurement and Payment)
- AWS D1.1: Structural welding code – steel
- SANS 1921-3: Construction and management requirements for works contracts, Part 3:

Structural steelwork

- SANS 50025-2: Hot rolled products of structural steels – Part 2- Technical delivery conditions for non-alloy structural steels
- SANS 1700: Fasteners
- SANS 10162: The structural use of steel

The table below indicates particular specifications about SANS 2001-CS1 and must be read in conjunction with the code.

Clause	Particular Specification
<b>4.1</b>	<b>Materials</b>
4.1.1	Add the following: <ul style="list-style-type: none"> <li>• All structural steelwork is required to be grade S355JR.</li> </ul>
4.1.4.1	<ul style="list-style-type: none"> <li>• Electrodes for electric welding are required to be E7018.</li> </ul>
4.1.5.1	<ul style="list-style-type: none"> <li>• Ordinary bolts are to be grade 8.8 with class 8 nuts, as a minimum.</li> </ul>
<b>4.2</b>	<b>Drawings</b>
4.2.4	Fabrication drawings (shop detailing)
4.2.4	The following clause is added: “Fabrication drawings are to be prepared by the <i>Contractor</i> . These are issued to the <i>Project Manager</i> for acceptance in the form of two paper prints and in “PDF” electronic format. The <i>Contractor</i> may not commence with fabrication until written acceptance from the <i>Project Manager</i> is received.”
4.2.4.2	Attachments to facilitate erections may not remain as part of the permanent structure.
4.2.4.7	Connections to allow movements are as shown on the Drawings.
<b>4.3</b>	<b>Workmanship (General)</b>
4.3.6	Holing
4.3.6	The following clause is added: “Flame cutting of holes is not permitted.”
<b>4.6</b>	<b>Workmanship – Erection</b>
4.6.5	On-site welding is not permitted unless authorised by the <i>Employer</i>
<b>5.3</b>	<b>Non-destructive testing of welds</b>
5.3.3	<ul style="list-style-type: none"> <li>• Fillet welds are required to undergo magnetic particle inspection (20% of welds)</li> </ul>
5.3.4	All butt welds and full penetration welds are required to undergo ultrasonic non-destructive testing (100% of welds).
<b>Variations</b>	
CI 5.2	Add the following:
	Properly documented evidence of qualification of welders is acceptable.
<b>Additional Clauses</b>	

1	All materials are to be new and as specified in this document and on the relevant Drawings.
2	Materials not listed in this specification or on the relevant Drawings are not permitted.
3	In the event of any specified steel not being available, the <i>Contractor</i> advises the <i>Project Manager</i> in writing. The <i>Project Manager</i> is to reply in writing on alternative materials and/or sections.

#### 7.4.2.1 Additional Requirements and Specifications

- *The Contractor* is responsible for the stability of the entire structure and all structural elements during all the erection stages.
- All dimensions are required to be verified on site by the *Contractor* before any fabrication of steelwork commences.
- All welding is required to be conducted by coded welders. Supporting documentation is also required to be submitted to the *Project Manager* for acceptance. All welding is required to comply with AWS D1.1.
- All welds are required to be inspected using visual aids and relevant tests as listed above.
- The *Contractor* is required to supply all bolts, washers, nuts etc. for the structural steelwork.
- Welded connections are required to be welded all around with a minimum of 6mm fillet welds unless otherwise stated on the *Contractor's* Drawings. Butt welds are required to be full penetration welds.
- The minimum thickness of gusset plates is to be 10mm.

#### 7.4.3 Structural Steelwork (Sundry Items)

The following codes are required to be complied with:

- SANS 1200 HA: Structural steelwork (sundry items).

#### 7.4.4 Cladding and Sheeting

The following codes are required to be complied with:

- SANS 1200 HB: Cladding and Sheeting.

The table below indicates particular specifications about SANS 1200 HB and must be read in conjunction with the code.

Clause	Particular Specification
<b>Variations</b>	
CI 3.2.1	Add the following: In the event that galvanized steel sheeting is used, it is to be coated with a minimum of 275g zinc per m <sup>2</sup> and is free from white rust.
CI 5.1.4	Add the following: The <i>Contractor</i> is solely responsible for ensuring that the materials and method of installation comply with the details set out on the Drawings. Any further modifications and additional details are to be accepted by the <i>Project Manager</i> .

<b>Additional Clauses</b>	
1	<p>Where the use of nails and screws is required:</p> <ul style="list-style-type: none"><li>• Galvanised iron nails and screws are to be used for galvanized sheet iron and sheet zinc.</li><li>• Copper and copper alloy nails and screws are to be used for sheet copper and sheet lead.</li><li>• Aluminium alloy or stainless-steel nails and screws are to be used for aluminium sheet.</li></ul>

### 7.4.5 Corrosion Protection of Structural Steel

The following codes are required to be complied with:

- SANS 1200 HC: Corrosion protection of structural steel
- SANS 10064: The preparation of steel surfaces for coating
- SANS 121: Hot dip galvanized coatings on fabricated iron and steel articles

The table below indicates particular specifications about SANS 1200 HC and must be read in conjunction with the code.

Clause	Particular Specification
<b>Variations</b>	
CI 5.3	<p>Add the following:</p> <p>All burrs and sharp areas are to be removed by:</p> <ul style="list-style-type: none"> <li>• Chamfering or</li> <li>• Ground to a smooth radius of at least 1mm.</li> </ul>
CI 5.4.1	<p>Add the following:</p> <p>The method of cleaning and preparing the substrate of steelwork before the application of the coating system is to be per the applicable provisions of SANS 10064</p>
CI 5.4.3.1. b)	<p>Add the following:</p> <p>Dry abrasive blast cleaning:</p> <ul style="list-style-type: none"> <li>• Blast cleaning media is not recycled.</li> </ul> <p>Wet abrasive blast cleaning</p> <ul style="list-style-type: none"> <li>• Wet abrasive blast cleaning is to be carried out as indicated on the Drawing.</li> </ul>
CI 5.7	<p>Add the following:</p> <p>The coating system is to be hot-dip galvanising which is carried out by SANS 121:2011, if used.</p>

### 7.4.6 Concrete Works (Structural)

The following codes are required to be complied with:

- SANS 2001 CC1: Concrete works (Structural).
- SANS 1200 G: Concrete (Structural) (Only Clause 8 – Measurement and Payment).

### 7.4.7 Masonry Walling

The following codes are required to be complied with:

- SANS 2001 CM1: Masonry walling
- SANS 227: Burnt clay masonry units
- SANS 1090: Sand for plaster and mortar
- SANS 1504: Prestressed concrete lintels
- SANS 28: Metal ties for cavity walls
- SANS 50413-1: Masonry cement
- SANS 10145: Concrete masonry construction
- SANS 10164: The structural use of masonry
- SANS 10249: Masonry walling

The table below indicates particular specifications about SANS 2001-CM1 and must be read in conjunction with the code.

Clause	Particular Specification
4.16	Anchoring of roofs
4.16	Roof anchors are to be in accordance with the requirements of SANS 10400

## 8. LIST OF DRAWINGS

### 8.1 DRAWINGS ISSUED BY THE EMPLOYER

This is the list of drawings issued by the *Employer* at or before the Contract Date and which apply to this contract.

Note: Some drawings may contain both works information and site information.

Drawing Number	Revision	Title
	0	Layout drawing showing the proposed site
0.87/1039	2	Open cycle gas turbine fire protection system main ring
0.87/1102	A	Gourikwa BOP Gas 1 – Piping General Arrangement Plant Layout
0.86/9301	A	Turning Device
0.85/3	0	Geometric Setout Plan
0.85/1	0	Surface Finishes & Services Layout
0.85/4	0	Saw Cut and Construction Joint Layouts
0.85/95	1	Sewers Reticulation Layout Plan
0.82/833	2	Sewer Layout – Gas 1
0.85/843	1	Sewers Typical Sewer Details – Gas 1
18.87/6063	0	Sewage Layout (Combined)
0.86/9313	A	Base for Turning Device