Eskom	Scope of Work	Hendrina Power Station

Title:	**Scope of Work for Design, Supply, Installation and Commission of Fire Protection System for Turbine Underfloor**	Unique Identifier:	**N\A**
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1. INTRODUCTION

Fire protection systems at Hendrina Power Station are critical for safeguarding personnel, equipment, and infrastructure from fire hazards, which can lead to catastrophic failures, financial losses, and environmental damage. Hendrina Power Station contain flammable materials, high-voltage equipment, and combustible fuels, making fire risks a major concern.

This Scope of Work document outlines the specific tasks and deliverables for completion of the turbine underfloor and turbine bearings fire protection system.

2. SUPPORTING CLAUSES

2.1 SCOPE

The document covers the scope of work for the worst-case scenario fire protection system for the turbine underfloor and turbine bearings at Hendrina Power Station.

2.1.1 Purpose

The purpose of this document is to provide the scope of work for the turbine underfloor and turbine bearings fire protection at Hendrina Power Station.

2.1.2 Applicability

This document shall apply to Eskom Hendrina Power Station

2.2 NORMATIVE/INFORMATIVE REFERENCES

2.2.1 Normative

[1] ISO 9001 Quality Management Systems

[2] Occupational Health and Safety Act 85 of 1993

[3] National Building Regulations and Building Standards Act 103 of 1977

[4] EST 32-124 Eskom Fire Risk Management

[5] 240-54937654 Inspection, Testing and Maintenance of Fire Detection Systems

[6] NFPA 15 Standard for Water Spray Fixed Systems for Fire Protection

[7] 240-56355815 Field Instrument Installation Standard: Junction Boxes and Cable Termination

[8] 240-56355754 Field Instrument Installation Standard

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

[10] 240-54937450 Fire Protection and Life Safety Design Standard

[11] 240-65459834 Project Documentation Deliverable Requirement Specification

[12] 240-54179170 Technical Documentation Classification and Designation Standard

[13] 240-53114002 Engineering Change Management Procedure

2.2.2 Informative

[14] 240-54937450: Fire Protection & Life Safety Design Standard

[15] NFPA 20: 2025 - Standard for the Installation of Stationary Pumps for Fire Protection

[16] NFPA 22: 2023 - Standard for Water Tanks for Private Fire Protection

[17] 240-76992014 Project Plant Specific Technical Documents and Records Management Work Instruction

[18] 240-71432150 Plant Labelling Standard

[19] SANS 10140 Identification Colour Marking: Identification of Hazards and Equipment In Work Situations

2.3 DEFINITIONS

Definition	Description
Approve	The functional responsible person determines if the document is fit for purpose and approves the document content and therefore takes responsibility and accountability for the document content.
Authorise	The document authoriser authorises the release and application of the document and is accountable for document implementation.
Fire Pump	A device that provides the required water flow and pressure for a fire protection system. The fire pump unit itself consists of a pump, a drive, a driver coupling connecting the two, and a base plate.
Passive Fire Protection	A passive fire protection system is preferred above active fire protection. Because it is passive, it does not require any mechanical or electrical parts that can fail in the event of a fire. These systems include spatial separation from other areas, containment areas, drainage, fire separation barriers, fire breaks, fire retardant cables, etc
Pump set	A unit comprised of the driver, pump, control panel and ancillary equipment
Risk	Risk is a function of both the likelihood of a specific hazard being realised and the consequence of that realisation
Stakeholder	A stakeholder is any individual, group, or organization that has an interest, concern, or influence in a project, business, or system. Stakeholders can be internal (within an organization) or external (outside the organization) and can affect or be affected by decisions and outcomes.
System	An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures, facilities, services and services and other support facets.
Unit	It comprised of boiler, turbine and generator set and all its dedicated auxiliaries

2.4 ABBREVIATIONS

Abbreviation	Description
C&I	Control and Instrumentation
ITP	Inspection and Testing Plan
LPC	Loss Prevention Certification
MJC	Multi Jet Control
NB	Nominal Bore

Abbreviation	Description
NFPA	National Fire Protection Association
PPE	Personal Protective Equipment
PS	Power Station
SANS	South African National Standard
SAP	System Application and Products
SOW	Scope of Work
QCP	Quality Control Plan

2.5 ROLES AND RESPONSIBILITIES

- Auxiliary Engineering – Compilation of the maintenance scope of work required to ensure optimal performance and reliability of the system. Responsible for verification of spares and ensuring quality is adhered to during system construction and after commissioning of systems and rectification of defects.
- Auxiliary Maintenance – Managing and expediting the fire protection system maintenance contract. Ensuring that the scope of work is being executed by the Contractor. Ensuring that the works management process is followed during contract duration.
- Maintenance Contractor – Executing the tasks as per the maintenance contract and scope of work.

2.6 PROCESS FOR MONITORING

N/A

2.7 RELATED/SUPPORTING DOCUMENTS

N/A

3. SCOPE OF WORK

3.1 EMPLOYER'S OBJECTIVES AND PURPOSE OF THE WORKS

The purpose of this technical specification is to describe technical requirements to procure the service of the construction contractor to design, manufacture, supply, install, replace, remove and commission fire protection upgrade in turbine underfloor and turbine bearings to address worst case fire scenario.

3.2 MANAGEMENT AND START UP

3.2.1 Management meetings

Regular meetings of a general nature may be convened and chaired by the Project Manager as follows:

Title and purpose	Approximate time & interval	Location	Attendance by:
Overall contract progress and feedback	Every second week on a day and time agreed upon by Parties. This is subject to change depending on the requirement	To be confirmed by the *Project Manager*	*Contractor/s, Supervisor, Project Manager, System Engineer, and Others*
Early Warning (Risk reduction)	As and when required	To be confirmed by the *Project Manager*	*Contractor/s, Supervisor, Project Manager, System Engineer, and Others*
Kick-off meeting	Third working day after official contract is placed.	To be confirmed by the *Project Manager*	*Contractor/s, Supervisor, Project Manager, System Engineer, and Others*
Interfacing meetings	As and when required	To be confirmed by the *Project Manager*	*Contractor/s, Supervisor, Project Manager , System Engineer, and Others*
Risk register and compensation events	As and when required	To be confirmed by the *Project Manager*	*Contractor/s, Supervisor, Project Manager , System Engineer, and Others*

Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the *works*. Records of these meetings shall be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the *conditions of contract* to carry out such actions or instructions.

3.3 DOCUMENTATION CONTROL

All-contractual communications will be in pdf format or forms attached to emails and not as a message in the email itself. Letters are typed and signed by the *Contractor* and delivered either in hardcopy or e-mailed to the *Service Manager.*

The routing of all written communications to be between the *Project Manager* and the *Contractor* only. Any agreements between the *Contractor* and any other person representing the *Employer* which has not been routed via the *Project Manager* to be unacceptable and invalid.

Any instructions written or verbal resulting in any changes to the duration, quality, and cost of the project to only be received from the *Project Manager.*

All reports are compiled in Word format, in English, and submitted electronically as pdf to *Service Manager*. Hardcopy reports (which are deemed originals) are counter signed by the *Contractor's* line of authority for authenticity and quality verification after finalisation for purposes of record keeping.

Copies of all documents relating to the works are retained by the *Contractor* in hardcopy format as well as electronic format (pdf format for signed documents) for 5 years.

3.4 HEALTH AND SAFETY RISK MANAGEMENT

The *Contractor* is to:

- Comply with the latest revision of Eskom Hendrina Power Station's Health, Safety and Environmental Specifications for Principal *Contractor's* requirements as mentioned in Section 8.
- Perform the works in a safe manner and comply with the *Employer's* Safety, Health and Environmental specifications for Principal *Contractors* (HSPHO/058).
- Maintain a protected environment around the work areas, and control access to the Generator relay room, for the full duration of the works.
- Provide a First Aid service to employees. In the event of serious injury, the *Employer's* Medical centre and facilities will be available. The *Employer* recovers the cost incurred for the use of facilities from the *contractor*.
- Provide a safety file and keep the file up to date for the duration of the Contract
- Do induction courses (given on Mondays, Wednesdays and Fridays at 09:00)
- Supply daily updated copies of: Toolbox Talks, Job Observations and Job risk Assessments
- NB: No personnel may be transported on any open vehicles. Personnel may only travel in a vehicle with SABS seating and safety belts.

3.4.1 Environmental constraints and management

All personnel involved in the implementation of the project are to abide by the SHE requirements of Hendrina PS. These include all the relevant legislations, applicable licences and permits, and

environmental procedures and shall be adhered to at all times. All the documents can be obtained from the environmental department.

- Assessment of impact on operational conditions affecting discharge to atmosphere
- Assessment of impact on operational conditions affecting waste removal and processing
- Assessment of impact of accidental release of pollutants (oils, gases, wastewater, etc.)

3.4.2 Quality assurance requirements

Contractor conforms to the following Quality Management systems:

- Quality requirements as per ISO 9001:2015
- QM 58 and Hendrina Power Station HSSPPA 006 “Quality requirements for quality related items”
- *Contractor* provides a detailed Quality Control Plan for acceptance within 3 working days of the Contract Date identifying how use of labour, machinery and equipment suffice to successfully execute the required services according to the methodology provided by the *Contractor*. Ultimately the Quality control plan shall be approved by the *Project Manager.*
- Quality control plan is compatible to the site conditions and project constraints. This aligns with the *Employer’s* Quality criteria and adheres to the Employer’s Safety, Health, and Environmental requirements.

Contractor compiles QIP according to Hendrina Power Station’s standard QIP format (reference no. HSPPA/014). QIP stipulates hold points; witness points and verification points approved and documented before the works commence

3.5 PROGRAMMING ONSTRAINTS

Contractor provides a hardcopy and an electronic copy of a pdf Gantt chart programme, identifying how the execution of the works is achieved within the specified project duration.

Programme summarizes the major work activities, estimated durations, and relationships to the other activities of the project. This includes demonstrating how quickly labour, machinery and equipment to execute the required works will arrive and be secured on site. Programme is approved by the Contract Manager before the required works commences.

Programme submitted by the Contractor shall be compatible with the site conditions and constraints of the project.

3.6 CONTRACTOR’S MANAGEMENT, SUPERVISION AND KEY PEOPLE

Contractor submits an organogram to the Project Manager with key personnel. Contractor appoints qualified and competent Site manager, supervisor, skilled people and safety officer. Resource allocation abides to their respective function. These resources are present for the duration of the works. Daily site register is signed with all the resources specified.

Contractor provides the key people required to successfully provide the works. The allocation of the key people is clearly reflected on the activity programme, with the required activities to execute and duration stipulated. During the execution of the works, registers or time sheets of the Contractor’s employees is kept for contract records.

Management as indicated on the Contractor's organogram avail themselves immediately when required to resolve matters that may impact on the accomplishment of the works.

Reference is to be made to the technical evaluation criteria for further requirements documenting the control measures to mitigate technical risks.

3.7 INVOICING AND PAYMENT

Within one week of receiving a payment certificate from the *Project Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice showing the amount due for payment equal to that stated in the *Project Manager's* payment certificate.

The *Contractor* shall address the tax invoice to Eskom Holdings SOC Ltd and include on each invoice the following information:

- 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 4740101508;
- Description of service provided for each item invoiced based on the Price List;
- Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT; (add other as required)

Add procedures for invoice submission and payment (e. g. electronic payment instructions)

3.8 INSURANCE PROVIDED BY THE EMPLOYER

As per ECC3 Core Clause 87.1.

3.9 CONTRACT CHANGE MANAGEMENT

Contractor provides daily site register/diaries of planned working versus work completed to the Service Manager. Following information is stipulated on the daily site diary:

- Task based risk assessments and Toolbox Talks
- Signed time sheets
- Weather conditions
- Site conditions
- Locations where work was being undertaken together with resources being utilised
- Any delays noted (for whatever reason), any notification by people employed by the Contractor regarding difficulties encountered
- Complaints by third parties
- Any work done by Others at the site

No standing time claims will be accepted without relevant proof of presence and activity in the form of these records and the early warning process to be followed

3.10 PROVISION OF BONDS AND GUARANTEES

The form in which a bond or guarantee required by the conditions of 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.

3.11 RECORDS OF DEFINED COST, PAYMENTS & ASSESSMENTS OF COMPENSATION EVENTS TO BE KEPT BY THE CONTRACTOR

Not applicable to this contract.

3.12 TRAINING WORKSHOPS AND TECHNOLOGY TRANSFER

The contractor appoints one person to attend Authorised Supervisors and one person to attend Responsible Person Plant Safety Regulation Course. No work will commence without an Accredited Authorised Supervisor and Authorised Responsible Person on site.

4. ENGINEERING AND THE CONTRACTOR'S DESIGN

4.1 SYSTEM DESCRIPTION

The fire protection system at Hendrina Power Station consist of two diesel emulsifier pumps each rated for 3666.67ℓ/min at 1200kPa and both taking suction from the 480m3 storage tank with suction head of ±50kPa. The diesel pumps discharge at the common manifold of 200mm bore.

The system pressure is maintained the emulsifier system pressure at 1000kPa with a jockey pump. The jockey pump to maintain the system pressure at ±830kPa and ±1000kPa respectively. This system of diesel pumps is automated but can be operated manually.

4.2 TURBINE AND CONDENSER UNDERFLOOR FIRE PROTECTION SYSTEM

The *Contractor* will have to do the conceptual designs, modifications, manufacturing, supply, installation and commissioning of a fully functional fire protection system in accordance with the current South African Regulations on fire prevention and fighting services, according to SANS and NFPA specifications.

Scope of Work is to Design, Supply, Installation and Commission of Fire Protection System for Turbine Underfloor

a) The *Contractor* must complete the fire protection systems for the turbine and condenser underfloor.

b) The *Contracto*r designs in detail a complete fire protection for Hendrina Power Station that will cover the turbine and condenser underfloor areas. The *Contractor* complies a design package which includes but not limited to:

- Hydraulic study and calculations to determine pipe mains and water flow rate to achieve the required spray density for each subsystem and hydrants flow.

- Pipe and Instrumentation Diagrams (Consult for existing systems P&IDs to complete the new)
- Pipeline layout to achieve the optimum routing of the end user,
- Pipe hangers and supports,
- Valve positioning and valve types to achieve the optimum activation, regulation and isolation of fire water flow through the systems
- Sprinkler and sprayers head types and positioning to achieve favourable activation
- Specifications on plant and materials required to perform the works
- The integration between original systems and new installations
- A write up of the detailed design which includes all the above requirements

The *Contractor* submits the design package for all designs to Project Manager and System Engineer for final review and acceptance prior to the execution of the designs.

- The contractor supplies all the materials and equipment required for executing the works.
- Provide active fire protection
- Provide passive fire protection
- Optimises the fire water supply system to activate immediately and operate reliably during emergency situations
- Ensures that the design capacity of the system allows for the worst case that may be encountered at the site
- Designs the system to have a minimum life of 25 years
- Provide an appropriate design that meets all the functional user, legal and statutory requirements
- Ensure design that the design does not conflict with other system functions and objectives
- The detail designs and commissioning needs to checked and certified by Automatic Sprinkler Inspection Bureau (ASIB)
- The contractor takes cognisance that the existing fire protection systems are currently live
- The contractor designs a complete and integrated fire protection system (new systems integrate with the current systems) based on the approved design

The objective of the works is to provide Hendrina Power Station with fixed suppression systems and passive fire protection to the following area:

Turbine underfloor and bearings (Unit 1-10)

- Supply and install sprinkler system on the AC and DC lube oil pumps
- A medium velocity fixed sealed bulb fire protection system will need to be installed to the generator set bearings of a double knock/pre-action type
- Sprinkler system to be installed to all the mezzanine floors and oil run off
- Sprinkler system to be installed underneath the condenser

- A high velocity deluge system to be installed over the condenser pumps
- Sprinkler system to be installed on the operating floor skirt as well as vibration gaps

4.2.1 Earthing and Lighting Protection

The Contractor designs, procures, transports, supplies, installs, tests and commissions the earthing and lightning protection system and its components, these must be in line with Earthing and Lighting Protection.
Earth resistance and earth continuity tests of the existing earthing system to determine the status of the earthing point must be performed by the Contractor.
The Contractor shall propose and implement lightning protection interventions

4.2.2 Cabling, Racking and Routing

Cable design, manufacturing/procurement, transport, installation, testing and commissioning must be performed by the Contractor. The Contractor provides Test certificates.
The design and implementation of the optimised cable routing must be performed by the Contractor. This must cater for cable servitudes and as well as cable racking.
The cables for the electrical pump, welding sockets, plugs and small power requirements including cables needed for the 220V AC supply to C&I field panels as well as cables needed for earthing requirements must be catered for by the Contractor.
Adhere to the Requirements for Control and Power Cables for Power stations Standard.

4.2.3 Procedure for Submission and Acceptance for Contractor's Design

The Contractor shall establish a document tracking system to record the dates for the supply and receipt of all design drawings, calculations, requests for information and design documentation.
The Contractor shall supply the following documentation as the minimum requirements of this specification in the design package before any manufacturing, construction or commissioning commences:

- Document submittal schedule indicating when all documents shall be submitted
- Drawing Register indicating when drawings shall be submitted
- Complete detailed design file
- Functional Specifications
- Line Sizing Calculations and Material Selection (critical for suction and discharge piping for pumps)
- Final isometric and general arrangements illustrating pipe dimensions, pipeline layouts and showing pipe supports
- General Arrangement Drawing of System and boundaries
- Piping and Instrument Diagrams
- Component material datasheets
- Quality Control Procedures
- Quality Control Plan and Inspection and Test Plan
- Method Statements
- Hydraulic calculations - with design point
- Hydraulic calculations - without design point (utilizing the site input pressure)
- Commissioning procedures

- Assembly procedures
- Technical, Operation and Maintenance Manuals of all plant equipment
- Operating and Control Philosophies
- Maintenance Philosophy
- Maintenance Schedules
- Pipeline Schedules
- Mechanical Hook-up diagrams
- Critical Spares List
- Welding Procedure Specifications
- Welding Procedure Qualification Record
- Operating, Maintenance and Engineering Training Manuals

The Contractor shall seek acceptance of the detailed designs from the Employer. The detailed design is reviewed internally by Eskom utilizing the Eskom Design Review Procedure. This process can take up to 14 days. Only drawings and designs accepted by the Employer shall be used for construction.

4.3 OTHER REQUIREMENTS OF THE CONTRACTOR'S DESIGN

4.3.1 Physical Characteristics Requirements

The Contractor shall ensure that the design of the system is consistent throughout. All equipment shall be protected from external ingress, corrosion and explosion proof where applicable.

4.3.2 Corrosion Protection

Plant and Materials are adequately protected from physical damage and corrosion during storage and erection.

4.3.3 Testing and Commissioning

Testing and commissioning shall include as a minimum:

The services of skilled Engineers to supervise the testing and commissioning and making ready for the operation of the works as required for partial and full duty operation as

The Contractor shall provide a method for testing the integrity of the piping system for acceptance by the Project Manager. The Contractor shall make provision for any equipment required to perform the necessary testing

The Contractor's preliminary trials and commissioning of the works shall be carried out by the Contractor's representatives, who shall remain in attendance until such time as the works are working to the Employer's satisfaction. A requirement of these trials is 2-hours test period to determine that all activities as laid down in the operating manuals are correct and are carried out in the correct sequence and to determine that all the plants have been provided as required in the scope of work.

The Contractor shall supply all data books with signed (Inspection and Testing Plan) ITPs and as built drawings of the works

Commissioning of the system shall be done by the Contractor's staff with the Employer's dedicated operations/commissioning staff

The Contractor shall submit a commissioning schedule and program for acceptance to the Project Manager by the contract date

Before plant and equipment is placed in service the Contractor shall certify that it is in a suitable and safe condition.

Prior to the time when commissioning is to commence, the Project Manager shall appoint a representative who shall co-ordinate the commissioning of all plant and equipment forming an integral part of the system being commissioned. The Contractor shall be responsible for the commissioning of all the plant and materials he/she shall supply to the requirements of this specification to the satisfaction of the Project Manager and the Employer's representatives. Where various components are already in place, or are supplied by the Employer to form an integrated system, the Contractor at the time of commissioning, shall carry the responsibility for the correct functioning of the whole system

In the event of incorrect functioning, the Contractor shall determine the cause and shall correct the defect if the defect is within plant and equipment of his/her own supply. The Contractor, at the time of commissioning, has the agreement, or alternatively, the attendance of the Project Manager involved in a particular phase, before proceeding with commissioning. Consequently, the Contractor shall assure himself/herself as to the safety of his/her own plant and equipment in respect of any particular commissioning test and in the event of damage accept responsibility for such plant and equipment

The Contractor shall commission the works and ensures conformance to the Employer's performance requirements for the works. The Employer takes over sections of the system as required once the system performance requirements have been verified by the Contractor

4.3.4 User of Contractor’s design

The completed design shall become property of the Employer.

4.3.5 Equipment required to be included in the works

The Contractor shall prepare and submit a project ITP for the affected system and materials included in the scope. The project ITP shall detail all elements of the plant and shall itemize the required quality levels for each of these components.

The Contractor shall indicate in the project ITP which items are of a proprietary nature where the level of certification is limited to standard documentation and certificates of conformity.

The Contractor shall use only ISO 9001 accredited suppliers for these products. Evidence of ISO 9001 certification shall be supplied with the delivery documentation. Failure to include this certification at the time of delivery shall result in rejection of the plant and materials by the Employer

4.4 AS-BUILT DRAWINGS, OPERATING MANUALS AND MAINTENANCE SCHEDULES

All as-built drawings shall be available to the Employer as soon as the plant is ready for commissioning. All drawings and reports compiled for the works are to become the property of the Employer on completion of the works.

The Contractor shall ensure the following:

- Makes use of a system compatible with the *Employer's* Microstation (Version 7/8 SE 2D) CAD for all drawings supplied to the Employer in electronic medium (e.g. disks) in addition to prints. Additionally, all drawings shall be supplied in Adobe PDF format.

- All drawings shall be originally created in the required format which is Microstation version 7/8 SE 2D, according to the specified drawing format and standards 36-945, 36-945, 36-946 available from DO on request.
- No conversion from other format will be accepted. Accompanying the new drawings will be the item list with full component descriptions.
- Implements and maintains an updated drawing register, the format of which shall be submitted to the Project Manager for acceptance. Updates are submitted on a regular basis or when significant changes are made.

The *Contractor* shall submit detailed drawings of all the separate items of the *works* included in the specification for acceptance once the general arrangement drawings have been accepted. If *works* or materials are supplied before such acceptance has been given, the *Contractor* shall modify or replaces such *works* or material at his own expense if called upon by the *Project Manager* to do so.

Submit four prints of all "as built" drawings with approval signatures at completion by the ECSA registered professional engineer accountable for the design, backed up on the electronic medium, without delay on request by the *Project Manager.*

4.4.1 TECHNICAL, OPERATING AND MAINTENANCE MANUALS

The Contractor shall provide good quality operating and maintenance manuals prepared by suitably experienced personnel. The maintenance manuals shall state explicitly the maintenance requirements for each piece of equipment. Copies of the first draft manuals as well as all "as built" drawings are submitted to the Project Manager for review and acceptance. Manuals are in English, and each manual is complete with the Power Station's name, contract number and index. The Contractor shall also provide an electronic copy of these documents.

The manuals should indicate the level of responsibility of the operating personnel for each action in the procedures. Included in these manuals are the following:

a) Design data including descriptions of control philosophy with alarms, set-points, interlocks and logics clearly explained.

b) Range, calibration factors, calibrations certificates, data sheets, etc., for all control and instrumentation equipment.

c) General arrangement and installation drawings and instructions.

d) Operating procedures and instructions for normal and emergency conditions, including flow diagrams.

e) Maintenance procedures and instructions for specific plant and equipment.

f) All drawings required for component location, dismantling and re-assembly for maintenance.

g) Equipment details such as make, model, type, specifications, etc

h) Detailed parts lists and ordering instructions pertaining to storage of spare parts or to their shelf life.

i) Exploded view type drawings clearly detailing the part and uniquely identifying it, technical descriptions of the equipment and component parts.

j) Catalogues, schedules and other product support documents.

k) Troubleshooting and fault-finding guide.

l) Safety procedures and instructions.

m) All special tools and equipment required for maintaining and operating the works.

The technical manuals shall include fully detailed descriptions, as-built drawings, diagrams, illustrations, schedules and data for use by Eskom technical staff to evaluate performance, trace faults, adjust, maintain and fully understand the plant and to allow satisfactory training of junior staff in conjunction with the operating manuals.

The operating manuals shall be set out in simple terms in ordinal, tabular or pictorial form to provide factual and concise descriptions of:

i How to carry out start-up, shutdown, and service operation of the plants by automatic, semiautomatic and by manual control.

ii What happens when the plants are operated, e.g. where does the water, etc. flow when a sequence is initiated, or a valve is operated.

iii What an alarm condition implies and how it is corrected.

iv What problems can occur and how they are overcome.

v A routine visual plants inspection procedure.

The operating manuals are intended for daily use and therefore shall be separated from the technical and maintenance manuals. Bold print, diagrams, illustrations, etc. shall be used.

The maintenance instruction manuals shall include schedules to cover plant inspection procedures, fully detailed maintenance programs for plant and plant equipment services at daily, monthly, three monthly, six monthly, yearly and any other necessary intervals, and contain manufacturer's and supplier's detailed maintenance and lubrication instructions, diagrams, sectional drawings giving part numbers, descriptions etc. Where spare parts have been provided these should be coloured in, scheduled, and their filling procedure described. The manual shall also include minimum surveillance requirements for the plant.

Detailed maintenance procedures covering removal, dismantling, replacement of parts, re-erection, checking, and reassembly and re-commissioning shall be included for all equipment. The recommissioning shall be included for all equipment. The maintenance manual shall be fully comprehensive and cover all plant and materials installed. As the manuals shall be frequently used for training and maintenance, they shall be prepared similarly to those described for the operating instruction manuals for use by operating personnel.

4.5 PROCURMENT

4.5.1 People

4.5.1.1 Minimum requirements of people employed on the Site

The *Contractor* provides sufficient personnel with the required experience, expertise and skills to provide the Works.

The *Employer* considers the provision of sufficient supervisory staff to be an essential part of the responsibilities of the *Contractor* and requires the *Contractor* to appoint a suitably qualified Site Supervisor who is also authorised as a Responsible Person (appointed in term of the Plant Safety Regulations), to permanently manage all aspects of the Contractor’s activities and responsibilities on site for the duration of the contract.

4.5.1.2 BBBEE and preferencing scheme

AS PER SDL & I requirements

4.5.1.3 Accelerated Shared Growth Initiative – South Africa

The Contractor shall keep accurate records and provide the Project Manager with reports on the Contractor's actual delivery against the above stated ASGI-SA criteria. [Elaborate on access to and format of records and frequency of submission etc.]

The Contractor's failure to comply with his ASGI-SA obligations constitutes substantial failure on the part of the Contractor to comply with his obligations under this contract.

4.6 SUBCONTRACTING

4.6.1 Preferred subcontractors

Contractor submits conditions of subcontracting contract of the Project Manager for approval.

4.6.2 Subcontract documentation, and assessment of subcontract tenders

The use of NEC document is compulsory. Specified constraints on how the Contractor prepares subcontract documentation and how subcontract tenders are to be issued, received, assessed (using joint report) and awarded.

4.6.3 Limitations on subcontracting

Contractor obtains approval from the *Project Manager. Employer* permits *Contractor* to subcontract other works, but not more than a specialised proportion of the whole contract. *Contractor* provides the majority of the works with own resources and all the necessary documentation for the works carried out by subcontracting is submitted to the *Project Manager* for approval

4.6.4 Attendance on subcontractors

The main Contractor is responsible for the management of the duties and performance of the Subcontractor.

4.7 PLANT AND MATERIALS

4.7.1 Quality

The Employer places emphasis on the provision of a comprehensive Quality Management System (QMS) for all phases of the project in accordance with 240-1105658000. Supplier Quality Management Specification. The QMS shall comply with the requirements of ISO 9001.

The Contractor and all of the Contractors' suppliers shall hold a valid certificate of compliance for their QMS to the requirements of ISO 9001:2008. The Employer may at his sole discretion carry out an audit any supplier or sub-supplier QMS for compliance.

Documents shall be submitted for review and acceptance by the Project Manager prior to the commencement of work.

No work is allowed on Site unless the Employer accepts the Quality Control Plan.

The Contractor shall utilize the Employer's quality documentation forms for requesting access, erection checks etc. These request forms are to be submitted to the Supervisor at least one week prior to the requested activity. or as agreed to by the Project Manager.

Apart from any statutory data packages required, the Contractor shall also compile a data package of the relevant drawings, test certificates etc. for each section of work which is to be reviewed and signed off by the Supervisor at erection stage prior to the commencement of the commissioning phase.

4.7.2 Plant & Materials provided “free issue” by the Employer

No "free issue" items shall be supplied. All Plant and Materials are to be provided by the *Contractor.*

4.7.3 Contractor’s procurement of Plant and Materials

The Contractor shall procure all Plant and Materials required for constructing, installing and commissioning the works.

The Contractor shall:

- Advise the Project Manager in advance of all major shipments of Plant and Material and coordinates with the Employer the arrival, off-loading and release of such. The Contractor shall promptly unload shipments and promptly releases carrier equipment.
- Notifies the Project Manager of being unable to promptly unload any shipment not less than 5 (five) days prior to arrival. The Project Manager, at his/her option, off-loads or makes arrangements for others to off-load such shipments for the account and risk of the Contractor. Costs incurred in respect of off-loading shall be for the Contractor's account.
- Ensures that all the Plant and Materials are inspected. The Contractor shall notify the Project Manager who instructs designated Employer's representatives to inspect the Plant and Materials at the factory, or the Contractor's premises, before it is transported to the Site.
- Ensures that all relevant factory tests are witnessed and accepted by the designated Employer's representatives. Any deviations from accepted drawings, standards or specifications are noted and reported to the Contractor by the above-mentioned representatives. A copy of the deviations is forwarded to the Project Manager for record keeping. The Project Manager follows up with the Contractor to ensure that deviations are successfully corrected.

4.7.4 Spares and consumables

The Contractor shall supply, on acceptance by the Project Manager, a set of spares considered to be essential as part of the works.

The Contractor shall submit, on completion of the design, a detailed listing of the recommended spares and prices for the Project Manager's acceptance to comply with the aforementioned requirement. The prices quoted shall include for packing, delivery to and off-loading at site, inspection and testing and adequate protection against corrosion, damage and weathering during transit and storage.

4.8 TESTS AND INSPECTIONS BEFORE DELIVERY

The Employer carries out quality inspections at his discretion.

All inspections and testing to be performed in accordance with the Quality Control Procedure developed by the Contractor.

The Employer shall be provided access to the Contractor's premises for the purpose of:

- Establishing compliance with the contractual requirements by means of inspections, surveillance and audits.
- Witnessing the performance of any tests.

The Contractor shall obtain clearance from the Employer or the Employer's agent before dispatching of the equipment. This factory release inspection does not release the Contractor of any of his obligations under the contract.

No Plant shall be released for dispatch without the AS MANUFACTURED documentation and drawings accompanying them.

4.9 MARKING PLANT AND MATERIALS OUTSIDE THE WORKING AREAS

All equipment to be safely stored as per the OHS Act.

All plant and equipment to be removed from the designated area can only be removed with the permission of the Contractor and Project Manager.

4.10 CONTRACTORS EQUIPMENT (INCLUDING TEMPORARY WORKS)

The Contractor shall be liable for all plant and equipment in the designated area under his control.

The Employer shall not take any responsibility for any loss or damage to the equipment.

4.11 CATALOGUING REQUIREMENTS BY THE CONTRACTOR

The Contractor to provide a list of all material and component used in the project with full description or specification.

4.12 COMPLETION, TESTING, COMMISSIONING AND CORRECTION OF DEFECTS

4.12.1 Work to be done by the Completion Date

The entire works shall be completed by the agreed upon completion date including commissioning and testing.

4.12.2 Use of the works before Completion has been certified

Take-over is after Completion through QIP/QCP assessment and authorization of every task, final approval and authorization of reports.

4.12.3 Materials facilities and samples for tests and inspections

The Contractor to provide material facilities and samples for tests as stipulated in the scope of work.

4.12.4 Commissioning

Take-over and/or commissioning is after Completion through QIP/QCP assessment and authorization of every task, final approval and authorization of reports.

4.12.5 Start-up procedures required to put the works into operation

The plant shall be put in operation after safety clearance of certain parts of the plant and systems

Sign off shall be scheduled as per the project schedule on completion of each activity

4.12.6 Take over procedures

Take-over or hand over shall be scheduled as per completion

4.12.7 Access given by the Employer for correction of Defects

The defects period is 52 weeks from completion of the entire works. Any defects shall be rectified within this period at the expense of the Contractor and at the convenience of the Project Manager.

4.12.8 Performance tests after Completion

Acceptance tests shall be carried out to prove all the plant guarantee figures provided by the Contractor in the technical schedules. The Contractor shall provide his own testing equipment.

- Pipework shall be fully flushed to ensure no debris is left inside the pipework.
- Newly installed pipework shall be hydraulically tested in accordance with NFPA 15 Standard for Water Spray Fixed Systems for Fire Protection
- If any fault, such as permanent distortion, rupture or leakage, is disclosed by the hydraulic test, the fault shall be corrected, and the test shall be repeated.
- A commissioning certificate is to be issued to Eskom for acceptance once the commissioning of a system is completed.
- The contractor is to supply commissioning procedure, pipe flush and pressure test procedure for acceptance when QCPs are submitted.

Where the results of the performance tests performed don't correlate with expected results (flow rates, pressures etc.) and/or the control functions as per the operating philosophy do not meet the specifications guaranteed, then the Contractor, at his own expense, shall carry out all necessary adjustments and modifications to the works required to obtain the stated tolerances. Fully detailed proposals are submitted in writing to the Project Manager for acceptance before any adjustments and modifications are made and work in this respect is carried out when convenient to the Project Manager. All adjustments and modifications are subject to inspection and approval by the Project Manager.

When adjustments and modifications are completed, the Contractor shall advise the Project Manager in writing to this effect and applies for a further acceptance test. From the results obtained, and provided that the Employer is satisfied that it shall be lasting, the works shall be finally accepted by Project Manager.

4.12.9 Training and technology transfer

The Contractor shall provide training to the operating, maintenance and engineering departments of the Employer. All Operating and Maintenance requirements must be included in the training manuals

4.12.10 Operational maintenance after Completion

The contractor shall provide Eskom with the maintenance and operating procedure for the fire protection systems. The procedure shall include the recommended maintenance intervals and maintenance to be carried out on the fire system and components, test procedure and list of recommended spares to ensure reliable operation of the fire protection system.

4.13 CIVIL ENGINEERING AND STRUCTURAL WORKS

All works shall be performed in accordance with the Contractor's accepted Quality Control Plan. All construction and erection work conducted on the site shall be subject to inspection by the Supervisor.

The construction and erection of the works shall be performed under the supervision of the Supervisor. An acceptance/test schedule shall be compiled by the Contractor and approved by the Supervisor.

All equipment required for the erection and completion of the works shall be supplied by the Contractor. This Equipment shall be in good condition and subject to the Employer's safety requirements.

The Contractor shall supply all Plant and Materials where new Plant and Materials are required for the completion of the works.

All Plant and Materials used shall comply with the requirements regarding quality, method of manufacturing, testing and performance specification as given in the relevant SASS/SANS specification, or where such a specification does not exist, the requirements of the relevant British or ISO standard. All plant and materials shall be suitable for use or operation under the operating conditions applicable to the system.

4.14 DOCUMENTATION MANAGEMENT

4.14.1 Document Management

All documents supplied by the Contractor shall be subject to Eskom's approval. The language of all documentation shall be in English. The Contractor shall include the Employer's drawing number in the drawing title block. This requirement only applies to design drawings developed by the Contractor and his Sub-contractors. Drawing numbers will be assigned by the Employer as drawings are developed. All documentation shall be controlled and managed in accordance with Document and Records Management Procedure (32-6).

4.14.2 Document Identification

The Contractor is required to submit the Vendor Document Submission Schedule (VDSS) as per agreed dates to the delegated Eskom Representative. Eskom will pre-allocate document numbers on the VDSS and send back to the Contractor through the delegated Eskom Representative. The VDSS is revisable and changes· must be discussed and agreed upon by all parties. Changes in the VDSS can be additional documentation to be submitted, changes in submission dates or corrections in documentation descriptions, document numbers, etc. The Contractor's VDSS shall indicate the format of documents to be submitted.

4.14.3 Document Submission

All project documents must be submitted to the delegated Eskom Representative with transmittal note according to Project I Plant Specific Technical Documents and Records Management Work Instruction (240-76992014 Project Plant Specific Technical Documents and Records Management Work Instruction). In order to portray a consistent image, it is important that all documents used within the project follow the same standards of layout, style and formatting as described in the Work Instruction. The Contractor is required to submit documents as electronic and hard copies and both copies must be delivered to the Eskom Representative with a transmittal note.

4.14.4 Email Subject

The Contractor shall submit all documentation to the Eskom Representative as well as the Project's Documentation Centre in the following media:

Electronic copies shall be submitted to Eskom Representative through the email that will be specified. The email subject shall as a minimum have the following: (Project Name, Discipline and Subject). Electronic copies that are too large for email will be delivered on CD/DVD, large file transfer protocol and/or hard drives to the Project Documentation Centre. A notification email, with the transmittal note attached, shall be sent to the Eskom Representative. Hard copies shall be submitted to the Eskom Representative accompanied by the Transmittal Note.

4.14.5 Drawings Format and Layout

The creation, issuing and control of all Engineering Drawings will be in accordance to the latest revision of Engineering Drawing Standard 240-86973501. Drawings issued to Eskom will be a minimum of one hardcopy and an electronic copy that is editable. All Contractors are required to submit electronic drawings in Micro Station (DGN) format, and scanned drawings in "PDF" format. No drawings in TIFF, AUTOCAD or any other electronic format will be accepted. Drawings issued to Eskom may not be "Right Protected" or encrypted. The Employer reserves the right to use these drawings to meet other contractual obligations.

4.15 CONFIGURATION MANAGEMENT

4.15.1 General Requirement

The Contractor includes the Employer's drawing number in the drawing title block. This requirement only applies to design drawings developed by the Contractor and his Subcontractors. It does not apply to drawings developed by manufacturers for equipment and material such as valves, instruments, etc. Drawing numbers will be assigned by the Employer as drawings are developed.

The project name shall be listed on all drawings, including manufacturers' drawings. Tag numbers and equipment names shall be listed on all manufacturers' drawings. A separate sheet may be attached to the submittal if needed to adequately list all tag. numbers associated with the drawings such as valves which may have numerous tag numbers associated with it.

The language of all documentation shall be in the English language. The units of measure shall be metric.

The Contractor retains project design calculations and information for the entire life cycle of the plant and provides these to the Employer on prior written notice at any time notwithstanding the expiry or termination of the contract.

4.15.2 Configuration Management

The Contractor supplies a comprehensive configuration management program according to ISO 10007 (2nd Edition) to ensure that plant structures, components and computer software conform to approved design requirements. However, a project specific Configuration Management Plan document will be developed which will be aligned to ISO 10007. In addition, the Works as-built physical and functional characteristics shall be accurately reflected in selected documents and databases, including those for design, procurement, construction, operation, testing and training. The configuration program shall · be applicable for use throughout all phases of the project life cycle, including management of spare parts, replacement parts and product upgrades, and shall form part of deliverables for hand-over to the Employer for use during the operation and maintenance phases of the plant.

4.15.3 Change Management

All Design change management shall be performed in in line with the Eskom Project Change Management Procedure 240-53114002. and the Employer ensures that Contractor is provided with latest revisions of this procedure. Any uncertainty regarding this procedure should be clarified with the Employer and clarification updates should be reflected in updated versions of this procedure.

4.15.4 Design Review Documentation

The Contractor conducts design reviews as per the Contractors official design review procedure. Contractor further takes note of the Employers Design Review Procedure 240-53113685. and participates in all design reviews as specified by the Employer. The Employer may "Accepted"; "Accept with Comments" or "Rejected". If required, the Contractor makes the necessary revisions on the documentation and ensures acceptance is obtained from Employer. The Contractor includes these design reviews as part of the schedule and suggests appropriate timing for such reviews.

4.16 QUALITY ASSURANCE REQUIREMENTS

The contractor is to be responsible to record and archive all off-site, factory tests and on-site tests for plant, equipment and materials.

5. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation

6. REVISIONS

Date	Rev.	Compiler	Remarks
May 2024	0	R Tsotetsi	First Draft

7. DEVELOPMENT TEAM

The following people were involved in the development of this document:

8. ACKNOWLEDGEMENTS

N/A