Eskom	Scope of Work	Kriel Power Station

Title: **Supply of Spares and Maintenance As and When Required of the H_2 dryer, H_2 skid, CO_2 evaporator, Stator Head Tank Panel and Gas Analysers Scope of Work**

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1. INTRODUCTION

Kriel Power Station generators are hydrogen cooled which means that the hydrogen gas must be readily available in a clean dry state and at a temperature below that of the H_2 cooler outlet. The H_2 dryer are utilized to keep the hydrogen dry and at temperature below that of the cold gas temperature. During extended shutdown periods the hydrogen gas must be safely removed from the generator without mixing with air, this is achieved by displacing the hydrogen gas with CO_2 supplied via the purging station. The H_2 skid is a series of pipework that allows operating personnel to easily fill the generator with H_2 and purge the generator. The H_2 dryer, skid and CO_2 purging station are essential auxiliary systems that ensure continued operation of the generators.

This document will outline the scope of work for the procurement of spares and maintenance As and When Required for Kriel Power Station generator of H_2 dryer, H_2 skid, CO_2 evaporator, Stator Head Tank Panel and Gas Analyzers for a period of about 5 years. This will include, but not limited to, the scope for supplying spares technical information and supply of spares.

2. SUPPORTING CLAUSES

2.1 Scope

This document specifies the required spares, quantities of spares to be supplied by the *Contractor*/OEM and maintenance of the gas system for 5 years. The scope included here does not substitute procurement procedures that will be followed during the procurement process.

2.1.1 Purpose

The purpose of this document is to formally request the *Contractor* to supply spares and maintain the H_2 dryer, H_2 skid, CO_2 evaporator, Stator Head Tank Panel and Gas Analyzers As and When Required.

2.1.2 Applicability

This scope is only applicable to Kriel Power Station generator gas station components or sub-components.

2.1.3 Effective date

This document shall be effective from the authorisation date.

2.2 Normative/Informative References

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

2.2.1 Normative

[1] ISO 9001 Quality Management Systems

[2] 240-76960420 Guideline for Spares Procurement Technical Evaluation and Quality Inspection.

[3] 32-1033 Eskom Procurement and Supply Chain Management Policy.

[4] 32-1034 Eskom Procurement and Supply Chain Management Procedure.

2.2.2 Informative

Not Applicable

2.3 Definitions

2.3.1 Classification

Definition	Description
Controlled disclosure	Controlled disclosure to external parties (either enforced by law, or discretionary).
Purge	Process used to remove or displace gases. Note for example, before admitting hydrogen to a system, the air in the system is removed to avoid the formation of a combustible mixture within the system.
Standard	Generally agreed-upon set of criteria specifically designed to define a safe product, practice, mechanism, arrangement, process, or environment based on currently available scientific and experimental knowledge concerning the relevant subject or scope.

2.4 Abbreviations

Abbreviation	Explanation
A&M	Assert & Management
CoC	Certificate of Conformity
DCF	Date Capturing Form
OEM	Original Equipment Manufacturer
OVF	Oil Vapour Filter
PTM	Protection, Testing and Metering
RFx	Request for Proposal, Information, Quotation
RFQ	Request for Quotation
QC	Quality Control
QCP	Quality Control Plan
SHEQ	Safety, Health, Environment and Quality

2.5 Roles and Responsibilities

2.5.1 Contractor

- Supply spares as requested by the *Employer.*
- Performs all the maintenance activities as described in this scope of work.
- Confirm correctness of the supplied spares information

- Provide spares technical information in accordance with this scope of work
- Timeously inform the *Employer* of any delays or when outstanding or additional information from the *Employer* is required
- Responsible to ensure that a quality product is delivered
- Responsible to ensure that every effort is made to keep to the agreed program and plan
- Provide all required technical datasheets and/or product brochures for all the spares supplied
- Conform to all the other requirements stipulated in this document
- Supply all the necessary test sheets/results, where applicable
- Compiles and submit a quality control plan (QCP) when requested by the outage coordinator.
- Participate in all outage meetings.
- Timeously informs the employer of any risk that might lead to additional work which is not part of the outage scope of work.
- Provides maintenance, operating, engineering training for gas system if required.
- Invite the *Employer* or representative thereof three (3) working days in advance for witness/hold points, if applicable, as agreed on the QCP

2.5.2 Engineer

- Provide input and compile this Scope of work
- Liaise with all relevant stakeholders for any input
- Ensure that the Scope of work is in accordance with Eskom policies and procedures
- Provide all necessary information to assist in spares procurement
- Participate in technical evaluation of the tender documents
- Assist with the preparation of all the reports to different tender committees, where applicable
- Provide technical assistance to Outage and Procurement Departments during the execution of this Scope of work
- Perform Quality Checks on procured spares and accompanying documentation
- Provide Materials Management with fully populated DCFs for cataloguing of spares and record keeping where information is available
- Verification and acceptance of all supplied documentation
- Responsible for QC at delivery of procured spares

2.5.3 Materials Management

- Catalogue the spares after completion of DCFs
- Confirm that the information supplied by the engineer is enough for cataloguing
- Perform QC on all submitted DCFs
- Make provision for storage of procured spares
- Work together with engineering/maintenance when accepting spares into stores.

2.5.4 Procurement

- Perform all procurement processes outlined in this Scope of work
- Issue RFQ's and/or RFI's for the procurement of spares
- Supply engineering with *Contractor* information for sole source justifications, where applicable.
- Set up clarification meetings between *Contractor* and *Employer*
- Act as communication link between *Contractor* and *Employer*
- Ensure all necessary payments are effected timeously and keep record thereof
- Arrange technical evaluation sessions
- Compile and present mandate to negotiate and arrange negotiation meetings when required and give feedback to relevant tender committee.
- Keep record of all tender documentation

2.5.5 Maintenance

- Perform inspections and QC on spares upon delivery.
- Ensure spare items are stored properly by Materials Management as per relevant storage recommendations by the specific manufacturers.

2.5.6 Engineering Manager

- Shall be accountable for overall technical integrity of this document.

2.5.7 Electrical Plant Engineering Manager

- Shall ensure that the contents of this document are accurate and include all requirements.

2.5.8 Outage Coordinator

- Shall provide resources to meet the scope requirements, manage interfaces, manage all scope related documents as well as arrange meetings.

2.5.9 Senior Consultant

- Shall provide technical oversight by ensuring that the technical details are correct, sound, and applicable to the plant.

2.6 Process for Monitoring

Not Applicable

2.7 Related/Supporting Documents

This document supersedes *EEP999-1: Maintenance of Hydrogen Dryer, Skid and Carbon Dioxide Purging Station Scope of Work*.

3. SUPPLY OF SPARES

The following are the *Contractor*'s requirement:

- The *Contractor* will ensure that the correct spare is supplied and will replace or be liable for damage at his/her cost if the incorrect or defective spare/s is supplied. The costs may include, but not limited to, repairs and/or replacement because of a defective or incorrect spare.
- The *Employer*'s (i.e., Eskom Holdings SOC) acceptance of delivered spare/s does not absolve the *Contractors* of the liability to supply the correct and/or defect free spare.
- The *Contractor* may, at the *Employer*'s discretion, be given access to the plant to verify the information of the installed spare.
- The spare must be the same (i.e., same Part Number) as specified on this scope of work and the part number will also be used to perform quality control checks. ***Notwithstanding the stipulated condition that the Contractor is responsible for verifying the correctness of the spare information provided by the Employer in relation to the existing installed spare. This may include the Contractor consulting the original Contractor of the spare to ensure correctness of information provided by the Employer.***
- The *Employer* may at his/her discretion make the *Employer*'s Engineer or employees or *others* available to the *Contractor* for the purpose of soliciting additional information or verifying information as the need arises.
- The *Contractor* will supply any additional information such as brochure, general arrangement drawing, certificates, detailed specification, etc.
- The *Contractor* provides the *Employer* with additional spares information and verifies information required in the data capturing forms (DCF) if provided at least three months after order placement or conclusion of the contract or (where lead time is less than three months) a week before delivery of respective spare.
- The *Contractor* shall supply preservation and storage procedure/s, where applicable.
- The Spares Procurement maximum limit indicated by the Employer in the attached table as one of the subheadings is the maximum number of spares the *Employer* may require at any given time during the five-year period of the contract. However, the *Contractor* may only supply the quantity as specified by the *Employer* in the individual order instruction and does not imply that the Contractor is entitled to supply the total number indicated in the Spares Procurement maximum limit.
- The *Employer* reserves the right to exclude the supply of some spare items included in the contract with the Contractor should the *Employer* become aware that National Supply Contract exists or is placed by the *Employer* with Others in respect to those specific spare items.
- If deemed necessary, the *Employer* may subject the *Contractor* to a quality assurance assessment at the *Contractor*'s or *sub-Contractor*'s premises as part of the technical evaluation or before the contract placement or at any time during the contract period.
- Where the spare requires testing, the *Contractor* will inform the *Employer* to invite or make available the *Employer*'s representatives to witness the tests.
- Should the *Employer* be dissatisfied with all or certain aspects relating to a specific spare test (including but not limited to suspected inferior quality or non-compliance) the *Contractor* will make good, rectify the faults, or supply a new spare at his/her cost.
- Complete price breakdown must be supplied with the quotation and must include the cost of transport to Kriel Power Station. However, the *Employer* reserves the right to use the *Employer*'s own transport.
- Spares will be opened for inspection, counting and quality control check at the *Employer*'s stores.

- The *Employer* has provided the Bill of Material table with part numbers in order to assist the *Contractor* to meet the requirements of the Work to be performed by the *Contractor*.
- The *Employer* may make clarification sessions available to either prospective *Contractor*/s in order to further assist the prospective *Contractor*'s to meet the requirements of the Work to be performed by the *Contractor*.

3.1 SPARES IDENTIFICATION

Section 9 lists all the spares to be procured under this scope of work. If DCFs exist they will be provided to assist the Contractor with information for all spares to be procured. Each spare is identifiable by means of component/part description, OEM and/or OEM part number. Where the information available on the spares list in Section 9 or that supplied by materials management as catalogued is not sufficient to positively identify the applicable spare, the *Contractor* shall notify the *Employer* such that the *Employer* can assist the *Contractor* in identifying the correct spare.

The spares to be provided to be the same as the original component, in all technical respects, as those utilised on the equipment it is intended for. This includes, but is not limited to, design (including dimensions and material specifications) and manufacturing (including manufacturing processes, standards, and acceptance testing).

The *Contractor* shall be liable to replace a supplied spare that is found to be defective and/or wrong.

3.2 INFORMATION TO BE PROVIDED

If DCF's exist, they will be provided to the *Contractor* by Materials Management; the information contained in the forms can assist the *Contractor* to procure the correct spares. The DCF is required by the *Employer*'s Material Management System to be able to book the item in the stores and the information should be sufficient to procure the goods in future. Where a field is populated, the *Contractor* needs to review and verify/correct the information against the OEM part number for correctness.

The following information to be provided with the spares:

- Documentation detailing the technical characteristics of the procured spare item. This may be in the form of data sheet or brochure. The *Employer* reserves the right to reject the documentation if it is not deemed sufficient
- Any other additional information that has not been specified on the DCF / scope but necessary for storage, installation, and utilisation of spares where applicable.
- Supply preservation and storage procedures of goods, where applicable
- Any spares information which has been omitted which is deemed relevant for spares identification, storage, maintenance, etc.
- In instances where the *Contractor* uses another company, other than the item OEM, to provide required information, this to be declared in advance to the *Employer.*

3.3 SPARES QUANTITIES

The spares quantities to be provided as stipulated in Section 9.

3.4 REPLACEMENT PARTS UPGRADED/MODIFIED

Where equipment or spares, including the whole assembly, have been upgraded / modified the *Contractor* shall indicate this to the *Employer* as part of the tender. The *Employer* shall be made aware immediately where the upgrade/modification to the component is only identified after the tender being issued. The

detailed compatibility to the existing component shall be indicated. If the components to be supplied will be obsolete, or envisaged to be obsolete, in the 3 years after tender being issued, the *Contractor* shall indicate this to the *Employer* and indicate viable alternatives thereof.

3.5 PACKAGING

All supplied spares shall be packaged in such a manner that they may be transported and stored for an extended period without resulting in damage to the packaged components. This includes preventing damage due to moisture ingress, especially for electronic components. Where possible, silica gel/desiccant may be included to ensure protection against moisture for at least 3 months. However, this inclusion should not lead to damage to the component.

Different spare types shall be packaged separately such that each spare type can be stored separately. Packaging shall be such that the spare can be identified without opening the packaging. Packaging shall be of material that will not be damaged, to an extent possible, by harsh weather conditions during transportation. If that is not possible, then the packaging shall be protected against such conditions.

Where possible, packaging to be such that procured spares can be positively identified through the packaging. Where this is not possible, the packaging to be such that it allows opening and closing of packaging and still maintain the packaging integrity thereafter.

Delivery packaging to have the following details on it:

- Order number
- Physical address of Kriel Power Station
- Delivery notes number
- Spare’s part number and quantity

3.6 EXCLUSIONS

The following shall be noted as exclusions as per this scope of work:

- The *Contractor* shall not supply offloading facilities during delivery of spares.
- The *Contractor* shall not be responsible for the storage of spares after acceptance at delivery by *Employer.*
- Subcontracting shall not be permitted, unless declared and accepted prior to contract placement.

3.7 ACCEPTANCE OF SPARES

- No incorrect, damaged, or faulty spares will be accepted.
- All the spares will be inspected before payment could be processed.
- Data capturing forms information must be supplied and must meet an acceptable level.
- Where applicable; test certificates, material certificate, manuals, data sheet and signature shall be provided as required.
- The *Contractor* must provide references of the companies that they have supplied similar spares to, and include the respective supply order/contract value, the contact’s name, physical address, and telephone number.

3.8 CONSTRAINTS ON HOW THE *CONTRACTOR* PROVIDES THE GOODS

3.8.1 WORK TO BE DONE BY THE DELIVERY DATE

A clarification meeting to be held 3 weeks after the issuing of the enquiry to confirm the scope of the Works and to confirm spares identification. All questions can be forwarded to the *Employer* during this meeting. Where more than one *Contractor* is available, all responses from the *Employer* will be forwarded to all *Contractor*s, regardless of which *Contractor* required the clarification.

All required spares to be delivered to the *Employer* 4 weeks from the day the purchase order is placed by the *Employer*. In instances where design reviews are necessitated, the 4 weeks will be from the day of design freeze. The *Employer* may request, in writing, that a spare be expedited quicker if its delivery in 4 weeks may lead to a delay that may result in undesirable consequences (loss of production, loss of revenue and/or safety to personnel or environment) to the *Employer*.

3.8.2 DOCUMENTATION CONTROL

The information for spares to be provided will either be in electronic format or hard copy. Other information provided with each spare to be either in electronic format or hard copy. Information provided to be documented in such a manner that the information for each spare will be easily identifiable. All documentation supplied shall bear the OEM's official name and logo.

3.8.3 QUALITY ASSURANCE REQUIREMENTS

The spares to be provided shall conform to all quality assurance requirements that will be defined at contracting phase.

3.8.4 PROGRAM CONSTRAINTS

The following shall be included in the *Contractor*'s program:

- The delivery date as stipulated to be provisional. This date may change prior to delivery. The *Contractor* to indicate standing time and storage costs should the *Employer* delay the delivery date. Proof of actual costs to be provided.
- Provision to be made for delays that may be caused owing to items being sourced from outside The Republic of South Africa.

3.8.5 INSURANCE OF THE GOODS

The Insurance of spare components is the responsibility of the *Contractor* until delivery and acceptance by the *Employer*.

3.9 SHEQ

The *Employer* reserves the right to request certification from the *Contractor* that proves compliance to relevant SHEQ legislations, standards, and procedures. If, during procurement, the *Contractor* is found guilty of contravention of any SHEQ legislations, the *Employer* shall, at *Employer*'s discretion, cancel the contract and the *Contractor* shall be liable to all the costs incurred therein.

4. MAINTENANCE WORK AS AND WHEN REQUIRED

The following activities are to be performed by the Contractor/Contractor during an outage.

4.1 H_2 DRYER

- Test blower motors and replace if damaged.
- Test heater functionality.
- Check and clean water traps.
- Replace dryer desiccant.
- Replace media filter in the OVF.
- Calibrate the safety valve and provide certificate; the safety valves must be sealed after calibration.
- Perform a pressure tests the dryer and issue a gas test certificate.
- Perform a leak test at rated pressure and repair all identified leaks.
- Check if the dew point readings observed on the dryer are like those seen on the DCS. Any deviations must be corrected on the dryer meters or on the DCS instruments.
- Perform dryer functional tests.
- Clean the dryer and area around it after the maintenance.
- Dispose of all the waste in designated bins
- Issue CoC after work is completed.

4.2 H_2 SKID

- Replace H_2 pressure regulator as and when required.
- Check the condition of the H_2 gas flow meter and replace if required.
- Check and calibrate pressure regulator.
- Calibrate the safety valves and provide certificate; the safety valves must be sealed after calibration.
- Check all isolation valves for leaks, replace seals if necessary.
- Check all flanges for leaks.
- Repair all gas leaks found on the system.
- Check all screwed connections.
- Check and calibrate all measuring transmitters and gauges.
- Check the functionality of the flow indicators and correct if defective.
- Replace all diaphragms on valves.
- Perform fire prevention interlock modification on the LLD lines.
- Test the activation of the LLDs and confirm that the signal is received at the DCS.
- Issue CoC after work is completed.

4.3 CO_2 EVAPORATOR

- Install CO_2 purging station as and when required; including all cables and accessories required to bring the station into operation.
- Check and calibrate pressure regulators.
- Check all isolation valves for leaks, replace seals if necessary.
- Check all flanges for leaks.
- Check all screwed connections.
- Check and calibrate all measuring transmitters, pressure, temperature & flow transmitters.
- Check and calibrate all gauges.
- Replace all diaphragms on valves.
- Calibrate the safety valves and provide certificate; the safety valves must be sealed after calibration.
- Perform a pressure test the CO_2 evaporator and issue a gas test certificate.
- Perform a leak test at rated pressure and repair all identified leaks.
- Perform purging station functional tests.
- Replace defective temperature switches, pressure switches and controllers.
- Issue CoC s after work is completed.
- Retraining of Operating personnel on how to use the new system.

4.4 Gas analysers

- Install CO_2, O_2, H_2 analysers as and when required.
- Calibrate the CO_2 analyser cell.
- Calibrate the O_2 analyser cell.
- Calibrate the H_2 analyser cell.
- Set regulators and flow meters.
- Check and calibrate all gauges.
- Clean the analyser panel.
- Check all valves, pipes, and pipe connection for any leaks.
- Repair all leaks identified.
- Replace defective analysers or analyser sub-components including valves and regulators.
- Provide functional location labels and paste them next to the panel components.
- Issue CoC after work is completed.

4.5 Stator head tank panel

- Check and calibrate pressure regulators.
- Functional Testing and settings of the back pressure regulators.
  - Test valve functionality and set to 60 kPa.
  - Test valve functionality and set to 70 kPa.
- Check all valves, pipes, and pipe connection for any leaks.
- Repair all leaks identified.
- Check and calibrate all measuring instruments for the stator head tank panel, pressure gauges and transmitters, as well as the flow meter.
- Replace all damaged components.
- Calibrate the safety valve and provide certificate; the safety valves must be sealed after calibration.
- Return the head tank to its nominal pressure after the repair.
- Issue CoC after work is completed.
- Operator training on the upgraded head tank panel.

4.6 Modification

To enhance the safety and efficiency of the generator gas system, it is necessary to implement the following modifications across all units:

- The rewiring of the CO_2 evaporator control circuit is required to enable automatic system restart during a purge cycle once the CO_2 gas supply is replenished. Currently, an operator needs to manually reset the system to continue the purge process.
- The wiring panel at the basement for the H_2 gas dryer, skid, and CO_2 skid system requires rewiring. Additionally, an updated drawing of the panel that clearly shows all terminations, following the latest revision of 240-86973501 Engineering Drawing Common Requirements Standard needs to be provided.

The following modifications are specific to Unit 4:

- Alterations to the gas analyser panel are needed to facilitate the installation of an H_2 gas analyser, which will be supplied by the employer. The contractor is responsible for providing all other necessary equipment and accessories for the gas analyser panel.
- Updated Process & Instrumentation Diagram (P&ID) drawings for the panel should be provided. All Engineering Drawings will be in accordance with the latest revision of 240-86973501 Engineering Drawing Common Requirements Standard.

4.7 Documentation

- A detailed field service report must be compiled for all work conducted, outlining the key findings and the methods used for repairs. This report should be provided in both printed and electronic formats.

- A data pack listing all spares used, calibrations certificates & technical specification of the components replaced shall be provided after completing the service in both printed and electronic formats.
- All Engineering Drawings will be in accordance with the latest revision of 240-86973501 Engineering Drawing Common Requirements Standard.

4.8 Commissioning

- The contractor must be on-site during the return to service, purging and pressure testing of the generator to address any defects found during these processes.

5. ACCEPTANCE

This document has been seen and accepted by:

Name	Designation
Rofhiwa Nelwamondo	Engineering Manager
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6. REVISIONS

Date	Rev.	Compiler	Remarks
February 2025	2	GT Dlamini	Scope revised to be performed as and when required.
April 2024	1	GT Dlamini	First signed revision
March 2024	0.1	GT Dlamini	Draft under review
February 2024	0	GT Dlamini	New document to supersede EEP999-1

7. DEVELOPMENT TEAM

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

- GT Dlamini

8. ACKNOWLEDGEMENTS

The author would like to thank all parties involved for their contribution and especially the following individuals:

- Lindinkosi Ntshangase (the developer of this scope of work template

9. BILL OF MATERIALS

Sub-System	Description	PART NUMBER	Stock No.	Minimum Stock Holding	Maximum Stock Holding
H2 DRYER &SKID	Electrical Heater element, 110V, 1064 W	D53251	0711376	2	4
H2 DRYER &SKID	Operator Interface Display, Preprogrammed (compatible with MicroLogix 1400 PLC & MicroLogix 1100)	D36946	0711406	2	4
H2 DRYER &SKID	Programmable Controller (PLC), Preprogrammed (MicroLogix 1400 & MicroLogix 1100)	D36945	0711408	2	4
H2 DRYER &SKID	Flow meter	To be provide by Contractor	Still to be catalogued	1	2
H2 DRYER &SKID	Feed through glands for the motor & heater cables	To be provide by Contractor	Still to be catalogued	2	4