Eskom	Scope of work	Matimba Power Station

Title: **Maintenance on soot blower and Boiler fans at Matimba Power Station**

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Contents

1. Introduction

1.1 Matimba Power Station

Matimba Power Station is in Lephalale, in South Africa's Limpopo Province. Designed to generate 4000 MW, Matimba - the Tsonga word for "Power" – was once the largest direct dry-cooled Power Station in the world, with six 665MW turbo-generator units. Coal reserves guarantees Matimba a minimum lifespan of 35 years, extending to a possible 50 years at 2100 - 2130 tons of coal per hour. The annual send-out power from Matimba amounts to approximately 24,000GWh. Matimba is the holder of the world record of 80 days for six units on load.

Technical details:

- Six 665 MW units
- Installed capacity: 3 990MW
- 2001 capacity: 3 690 MW
- Design efficiency at rated turbine MCR (%): 35.60%
- Ramp rate: 28.57% per hour
- Average availability over last 3 years: 93.67%
- Average production over last 3 years: 23 789GWh

2. Supporting clauses

2.1 Purpose

The purpose of this document is to define the maintenance, inspection, testing, repair, and commissioning requirements for the Soot blowing system, boiler fans and related plant components installed at Matimba Power Station. It is imperative that each supplier aligns their organisation fully to the systems and requirements laid down in this document.

2.2 Scope

The Scope of work is the maintenance, inspection, testing, repair, and commissioning of Soot blowing system, boiler fans and related plant components at Matimba Power Station for a period of (five) 5 years as per the maintenance strategy.

2.3 Applicability

This document shall apply to soot blower and boiler fans systems from unit 1 to 6 at Matimba Power Station.

2.4 Normative/Informative References

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

The following documents contain provisions that, through reference in text, constitute requirements of this documents. These documents are subject to revision and users are responsible to ensure that the most recent edition(s) of the document(s) listed below are used /referenced.

2.5 Normative

- Occupational Health and Safety Act, 85 of 1993.
- Regulation 5 of General Safety Regulation.
- ISO 9001 Quality Management Systems.
- ISO 9001:2008: Quality management systems.
- SANS IEC 60034-1 to 30: Rotating electrical machines.
- SANS IEC 60085: Electrical insulation- Thermal classification.
- ISO 10816: Vibration severity standard.
- Eskom 240-56360387: Storage of Power Station Electric Motors Standard.
- ISO 1940-1:2003: Mechanical vibration- Balance quality requirements for rotors in a constant (rigid) state- part 1: Specification and verification of balance tolerance.
- Eskom 240-95138097: Standard Electric Motor Test Certificate.

2.6 Informative

- PS/235/001 - Control and Instrumentation management Process.
- PA/230/002 – Simulations.
- PWM/HCBAN/M/006 – The dry run inspection of long retractable Soot blower.
- PA/270/003 Health and Safety Specification for Contractors.
- PWM/HCBCT/C/001 – Soot blowers on-load inspections
- Sieva Operating and Maintenance Instruction manual volume 8.
- ABB manuals for the upgrade of the soot blowing system.

2.7 Definitions

Definitions	Description
Approve Inspection Authority	An Inspection Authority approved by Chief Inspector of machinery in terms of the Occupational Health and Safety Act.
Corrective Maintenance	The process of restoring assets/plant and equipment which have failed or deteriorated to a state which renders it unable to meet the acceptable criteria required for its application.
Contractor	Service provider contracted for supply specific service to Eskom Matimba power station.
Employer	Eskom or Eskom Matimba power station representative appointed in writing.
Testing	All activities required determining the actual performance or condition of an item
Isolate	Means to make safe to work on by effectively disconnecting from all possible source of dangerous energy and /or harmful substance.
Competent person	Means a person who has the knowledge, training, experience and qualifications specific to the work performed: provided that where appropriate qualifications and training are registered in terms of the provisions of the South African Qualifications Authority Act, 1995, those qualifications and that training shall be deemed to be the required qualifications and training.
Responsible Person	Means a person who has been authorise in terms of these regulation to be responsible for ensuring that the work on the plant covered by permit to work can be carried out and executed taking health and safety precaution into account and within the terms of these regulation.
Authorised Supervisor	Means a person who has been authorise in terms of these regulation to ensure that the work on the plant covered by permit to work is executed in a safe manner taking health and safety precaution into account and within the terms of these regulation.
Permit to Work	Means a written declaration on the permit to work form, signed by appointed person and issued to the responsible person in charge of the work, informing the latter that the plant to be worked on has been isolated as detailed.
Appointed Person	Means a person who has been authorise in terms of these regulation to be responsible for: Determining appropriate and effective isolation for the anticipated work to be carried out safely: Ensuring that the isolations and de- isolation on the plant covered by permit to work is effectively carried out taking health and safety precaution into account : Issuing of prepared permits once all the associated test certificated are available and the require risk assessment have been presented to the appointed person by the responsible person for review and within the terms of these regulation.
Base/ Core crew	A complement of the Contractor's personnel based on site for the duration of at least one year and detailed in the Site Addendum
Outage	A planned or unplanned shutdown project related to one or more of the Employer's Power Station units

2.8 Abbreviations

Abbreviations	Explanation
KKS	Kraftwerk Kennzeichen System
C&I	Control and Instrumentation
PM	Preventative Maintenance
PTW	Permit to work
HOD	Head of Department
HOF	Head of Function
HOS	Head of Section
PSR	Plant Safety Regulation
AS	Authorised Supervisor
RP	Responsible Person
AP	Appointed Person
USC	Unit Senior Controller
LAR	Limited Access Register
UCR	Unit Control Room
Floc	Function Location Code (KKS)
GO	General Overhaul
KPA	Key performance area
KPI	Key performance indicators
NRV	Non- return valve
IBI	Integrated Business Improvement Model
MV	Medium Voltage
MM	Material Management
SOS/SOW	Scope of service/ Scope of work
OEM	Original Equipment Manufacture
PPE	Personal protective equipment
QCP	Quality control Plan
AC	Alternative Current
OHS	Occupational Health and Safety (Act)
AIA	Approved Inspection Authority
GGP	Generation Group Procedure
GGD	Generation Group Directive

2.9 Roles and Responsibilities

2.9.1 Contractor

- Ensure that good engineering practices are always maintained.
- Comply with Construction Regulation and generally provision of the Occupational and safety act, no 85 of 1993.
- Comply with the Health and Safety Specifications for Contractors.
- Ensure that all his equipment is in good condition to prevent unnecessary spillages and injuries.
- Comply with Eskom Safety and Plant Safety Regulations.
- Execute the defined scope of work in full.
- Ensure that all (employees, equipment, and materials) comply with the statutory and environmental requirements
- The Contractor to provide technical support and advice on constant failure trends of the equipment
- Provide consistent and cost-effective maintenance strategy as part of continuous improvement
- Ensure that the application and implementation of appropriate maintenance tools and innovative techniques
- Develop Key Performance Indicators (KPIs), objectives and targets which support, and which are in line with the Employer's objectives
- The contractor to adhere to all Employer's health and safety requirements and procedures on site
- The contractor to provide relevant documentation for the employer's equipment. This will include all records of all activities and task undertaken - plant condition and quality control and safety documentation
- The contractor submits to the Employer, a fully substantiated written inspections report specifying the nature, scope and cost of repair work required including a programme for execution.

2.9.2 Contract Manager:

- Co-ordinate and manage contract budget and expenses
- Ensure that the contractor operates within the budget
- Hold monthly/weekly meetings with the contractor
- Communicate technical interface between Eskom and the contractor
- Ensure that all work performed complies with the OHS act regulation and quality requirements
- Review, verify, and approve receipt of services/deliverables from the contractor
- Manage and maintain contract records and correspondence between the employer and the contractor
- Ensure that the contractor complies with the conditions of contract.
- Resolve any deviations and breaches in relation to the agreed conditions of the contract
- Keep the original copies of all correspondences in the contract file for history purposes

2.9.3 Contract supervisor

- Assign work orders as per maintenance schedule issued by the planner at pre-determined intervals
- Assist contract manager with contract management administration
- Assess any work completed and align it to the scope of work and task order.

2.9.4 Eskom Maintenance personnel

- Perform QC on the work done by contractors

2.9.5 Unit control room

- Shall ensure that the plant isolations are done as required and safe to commence with the work

2.10 Process for Monitoring

2.10.1 Technical KPIs

KPI	Targets
No. of PM's due	0
No. of P1-P3 Overdue	0
Manpower Utilisation	> 63%
No. of rework	0
Total hours overtime	BCEA
Safety finding	1/M
Assessment > 25th of Month	0
No. of NCR's	< 2
SD & L	100%
PSR authorisation	100%

2.10.2 SHEQ KPIs

Item	KPI	Targets
1	Incident /injury	Zero Harm

3. Site Visit

- Clarification meeting and site visit is compulsory for all contractors.
- Procurement officer to form part of the site visit team.
- Invited contractors to bring their own PPE during site visits.
- All official communication will be in the form of writing.
- A register will be signed by all in attendance and kept as record.
- Contractor who does not attend and goes to site visit won't be considered.
- List the contact information of the end users.

4 . Technical Scope

The Scope of work is not limited to normal, preventative (PM), Corrective (CM) maintenance, and emergency work in accordance with the defined specifications or requirements. The scope of service includes amongst others the maintenance, management, supervision, labour, material supply, installation, consumable supply, provision of Equipment, administration, warehousing, and storage related to the *service.* Furthermore, the service required include the following activities from unit 1 to 6:

The SOW below will apply to all soot blower and scavenger, Burner cooling and Flame detector fans,

- On load inspection
- Remove and replace damaged outer and inner lances
- Adjust soot-blower chain tension.
- Lubricate soot-blower components
- Remove and repair stuck soot-blower lance
- Replace poppet valve when required
- Replace gun and lance blower when required
- Remove and replace gearbox
- Lubricate gearbox
- Perform fan balancing and Perform laser alignment on the fan
- Maintain and repair all the abnormalities and defects on the fans as per maintenance strategy.
- Inspect motor-fan base for cracks. Also inspect the pedestal and impellor casing for cracks. Do weld repairs on all cracks.
- Inspect rubber base shock absorbers (anti-vibration mounting mason) and replace if cracked or worn out. Make use of spirit level to measure the straightness of base in all four sides. It is recommended to replace all the rubbers if two or more rubbers are damaged.
- *Inspect for base frame deformation.*
- Check if all bolts are in position, securely fastened, not eroded, corroded and threads not damaged. Replace all defective bolts.
- Open bearings, clean and inspect. Grease if in good condition. Replace if damaged.
- Open impellor casing. Clean impellor and inspect for cracks. Full dye pen or MPI is recommended to locate cracks invisible to naked eye.
- Replace impellor if cracked. Order one if spare is not available (this is a normal stock item).
- Inspection the V belts for defects and if found damaged replace them.
- Assemble impellor, secure in position, balance, check clearances and make sure that it rotates freely.
- Check wear and tear on coupling flanges bolts and replace if defective
- Inspect rubber coupling for cracks and tear and finally check alignment.
- Perform laser alignment on the fan
- Maintain and repair all the abnormalities and defects on the fans as per maintenance strategy.

4.1. Plant description

- All wall and lance soot-blowers and related field devices situated at the boiler plant.
- All soot-blowers and related field devices situated at the secondary air heater.
- All boiler fans (scavenging, burner, and flame scanner fans)

4.2. System Description

The Soot blowing system at Matimba Power Station is used for the internal cleaning of the boiler tubes and air heater using high pressure steam.

Lance blowers

Item	Description	Activity						
		Strip and clean	Lubricate	Inspect/record	Inspect/ replace seal	Measure thickness	Lap seats	Adjust
1	Measure motor amps: on load – before permit issue			Record				
2	Sootblower valve	X		Spindle, Erosion			X	
3	Sootblower valve gland seal				X			
4	Valve operating linkage and bushings	X	X					
5	Stu rip				X			
6	Retaining spring tension			Record				Adjust to 300N
7	Gearbox drive chain	Clean	X	Wear / tension				Tension if required
8	Sprocket wheels	Clean	X	Wear				
9	Sprocket shaft bearings	X	X	Wear				

10	1 x guide roller on rear of carriage (carry inner tube)	X	X	Wear				
11	4 x Intermediate carriage rollers	X	X	Wear				
12	Intermediate carriage rails	Clean off ash						
13	2 x guide rollers on front of carriage (carry outer tube)	X	X	Wear				
14	Tube guide ring (sootblower rear) - 4 x guide rollers - 2 x load carriers	X X	X X	Wear Wear				
15	2 x swivel point/expansion bearings (at boiler wall)	X	X	Wear				
16	Inner tube flange gasket (copper seal)				X			
17	Gland seal (between inner and outer lance)				X			
18	Alignment/clearance on sootblower entrance			Visual inspection				
19	Sootblower nozzles			Measure and record				
20	Inlet orifice (at sootblower valve flange)			Measure and record				
21	Inner and outer tubes			Straightness		X		

22	Square drive and support flange bearing bush	Clean	X					
17	Drive chain	Clean	X	Tension				Tension if required
24	Gearbox			Oil level				
25	Motor & -coupling			Coupling condition				
26	Limit switches			Position, condition of rollers				
27	Valve operating mechanism adjustment (gap above valve spindle)							Adjust after reassembly
22	Measure motor amps when complete			Record				

Wall blowers

Item	Description	Activity						
		Strip and clean	Lubricate	Inspect/record	Inspect/ replace seal	Measure thickness	Lap seats	Adjust
1	Measure motor amps: on load – before permit issue			Record				
2	Soot blower valve gland seal				X			
3	Valve operating linkage and bushings	X	X					
4	Retaining spring tension			Record				Adjust to 300N
5	Gearbox drive chain	Clean	X	Wear / tension				Tension if required
6	Sprocket wheels	Clean	X	Wear				
7	Sprocket shaft bearings	X	X	Wear				
8	Endless screw (wormshaft) drive bearings							
9	Endless screw (wormshaft) front bearing							
10	Worm shaft nut (revolving nut)	X	X	Measure I.D				

11	4 x guide rollers (at boiler wall)	X	X	Wear				
12	Square drive	Clean	X					
13	Endless screw (wormshaft)	Clean	X	Measure O.D				
14	Gearbox			Oil level				
15	Limit switches			Position, condition of rollers				
16	Valve operating mechanism adjustment (gap above valve spindle)							Adjust after reassembly
17	Carriage wheels	X	X		Check alignment			
18	Grease nipples				Check if open			
19	Measure motor amps when complete			Record				

5. Requirements

- Appropriate specifications, procedures and work instructions are used. The manage maintenance base process is based on the best practise identified from the Equipment Reliability (AP-913), CIGRE and EPRI, existing Eskom practises and operational experiences, with input from several industry subjects matter experts.

6. Deficiencies and modifications

- No modifications shall be done on the plant without the approval of the employer.

7. Record Keeping

- The supplier shall submit the originals of the test results, quality control and any other documents to the employer after completion of the project.

8. Guarantee on workmanship

- The contractor shall provide a one (1) year guarantee workmanship on refurbished Soot blowing system and related plant components. Guarantee on workmanship shall commence after the completion and commission of the work.

9. Adherence to Eskom generic policies

- The supplier employees shall comply with Eskom's policies and site regulations, including but not limited to, use of cell phones in restricted areas, adherence to Eskom's lifesaving rules, smoking policy, zero tolerance on alcohol usage etc. These requirements will be detailed during the induction training process.

10. Quality and control standards:

- Quality control plan shall be produced, maintained, and implemented per task as agreed by the employer. The QCP must be discussed with the employer for approval. This QCP shall comply with ISO 9001:2008 standards. Any amendments to the QCP shall be discussed with the employer for approval.
- The supplier shall provide a complete Quality Control Plan in accordance with the requirements of ISO 9001:2008 to the Employer for approval before work can commence this plan must ensure an integrated quality service as part of the contract. All quality hold point, and witness point must be done in the presence of an Eskom employee. Quality documents to be handed over to the Employer.

11. Tests

- The supplier will perform special tests, investigations, and recordings of all findings. The findings shall be shared with the Employer.

12. Industrial Relation

- Any industrial relations issues from the supplier should be discussed with the contract manager.

13. Program

- A detailed program should be drafted by the contractor in the form of bar chart or any software that will specify the plan and progress of repairs and be submitted to the contract manager together with the quotation. Contract manager and System Engineer must have opportunity to influence the bar chart for holding points. Employer can send any personnel to witness holding points and if it happens that the witness cannot be done, the supplier will only proceed after approval from the Employer.

14 Deviations

- Non-compliance from the agreement will result in NCR being issued to the supplier and when the third NCR is issued, the supplier will be referred to the supplier reconciliation committee

15. Inspections

- Damaged spares should be inspected by Eskom representative and reflect on the report.
- Do visual inspection in all plant areas governed by this scope.
- Record all defects found during inspection.

16 Continuous Improvement

- The Contractor shall implement continuous improvement program to optimize performance and reduce failure rates.
- The Contractor will be responsible for participating in root cause failure investigations as required by the Client representative.
- Develop failure trends, record, and submit reports.
- Ensure that the plant is running effectively and efficiently.
- Assist with recommendations to better the reliability of plant and system.

Note: Contractor Performance Target: **100% reliability** and is **non-negotiable**, specifically because of the safety risk involved in use of the equipment.

17 Non-Exclusive Scope

17.1 Contract performance

- Optimisation of the system and equipment to reduce costs, maintain and enhance the condition of the equipment
- Maintain the equipment according to best practice and Eskom Computerised Maintenance Management System
- Conduct inspection and testing of all equipment to assess and monitor equipment condition.
- Perform maintenance work in accordance with specified standard procedures and check sheet as agreed between the contractor and employer.
- All work performed within the parameter of the scope of work and act
- To keep all instructions/ procedures on hand and supply Eskom power station with reference to be included in this document and supply record and history requirements.
- Ensure that the work is performed to the highest standard and safety standards and regulations

17.2 Critical spares and Equipment

- The contractor will be required to provide all non-stock items spares for the replacement and maintenance as per when required (the request must be from Eskom representative).
- The contractor will only use spares that are approved by Eskom.
- The management and safe keeping of the critical spares reside with the contractor.
- The contractor will be required to hire equipment at the market rate as when required.
- No spares/material/equipment should be purchase by a contractor without the employer's approval.
- The contractor shall timeously identify delays and adjust plans accordingly
- The Contractor will be required to supply spares in which all claims will be supported by substantiating documentation.

17.3 Warrantee, insurance, and guarantee on repairs

- The employer requires twelve months guarantee on work done.
- The contractor shall take fully cost responsibility of any damage that occurs during transportation of Eskom equipment.

17.4 SHEQ

Each location where the *service* is carried out has a health and safety specification or procedure and safety risk management requirements relevant to that location (the *Employer*'s site Health and Safety Plan). The CSM shall ensure that he is a registered recipient of such documentation at each location where work is carried out and is always in possession of the current version of such documentation before any work in this contract is undertaken at that location.

The *Contractor* shall comply with the requirements imposed on a contractor / Contractor stated in the current version of such documentation at each location where work in this contract is carried out and shall identify to the relevant SM the name of the *Contractor*'s person responsible for monitoring such compliance.

The *Contractor* shall ensure that he is in possession of documentation relevant to protection of the environment at each location where work in this contract is carried out and shall comply with the requirements imposed on a contractor / Contractor stated therein. The Contractor shall keep records which demonstrate compliance with all health, safety and environmental requirements whether statutory or otherwise and shall allow the SM or relevant SM to inspect them at any time within working hours Employer's Health and Safety Requirements.

In carrying out its obligations to the *Employer* in terms of this contract; in providing the Services; in using Plant, Materials and Equipment; and while at the Site for any reason, the *Contractor* complies and procures and ensures the compliance by its employees, agents, Subcontractors, and mandatories with:

The provisions of the Occupational Health and Safety Act 85 of 1993 (as amended) and all regulations in force from time to time in terms of that Act ("the Occupational Health and Safety Act, ACT 85, OF 1993"); and The Eskom "Safety, Health and Environmental Requirements for Contractors" document (as amended from time to time) and such other Eskom Safety Regulations as are applicable to the Services and are provided in writing to the *Contractor* (collectively "the Eskom Regulations"). The Eskom Regulations may be amended from time to time by the *Employer* and all amendments will be provided in writing to the *Contractor*. The *Contractor* complies with the provisions of the latest written version of the Eskom Regulations with which it has been provided; and the health and safety plan prepared by the *Contractor* in accordance with the SHEQ Requirements.

The *Contractor,* always, considers itself to be the "Employer" for the purposes of the Health and Safety Act, Act 85, OF 1993 and shall not consider itself under the supervision or management of the *Employer* regarding compliance with the SHEQ Requirements, the *Contractor* shall furthermore not consider itself to be a subordinate or under the supervision of the *Employer* in respect of these matters. The *Contractor* is always responsible for the supervision of its employees, agents, Subcontractors, and mandatories and takes full responsibility and accountability for ensuring they are competent, aware of the SHEQ Requirements and execute the Services in accordance with the SHEQ Requirements

The contractor shall follow all Eskom's safety requirements including all lifesaving rules and regulations required to perform the work. No work will be performed without a permit to work being issued; therefore, the contractor must be authorised to take permit within six months from the award of the contract or contract start.

17.5 Data Pack

After failure, an investigation must be conducted. The following shall be submitted to the employer:

- Failure analysis report with pictures
- Detailed service report specifying the work to be done
- All reports to be signed and submitted to the contract manager within 1 week after service

17.6 Quality control standards:

Quality control plan shall be produced, maintained, and implemented per task as agreed by the employer. The QCP must be discussed with the employer for approval. This QCP shall comply with ISO 9001:2015 standards. Any amendments to the QCP shall be discussed with the employer for approval.

17.7 Eskom Policies

The contractor's employees shall comply with Eskom's policies and site regulations, including but not limited to the use of cell phone while driving, in restricted areas, adherence to Eskom's lifesaving rules, smoking policy, zero tolerance on alcohol usage, etc. these requirements will be discussed in detail during induction training process.

17.8 Emergency

The contractor will be required to attend to emergencies.

17.9 Pricing/Cost Breakdown

As per scope

17.10 Technical evaluation

- Technical evaluation will be based on the technical evaluation criteria
- Valuation report should be signed by Maintenance Manager
- Commercial documents should be signed by Commercial Manager.

18 Records

- Every official meeting will have an attendance register and meeting minutes recorded and kept in a file.
- Minutes of the meeting shall be signed by all parties
- All communications must be recorded in an email and kept in a file.

19 General:

- Housekeeping must always be good and follow proper stacking standards
- Contractor will provide own PPE, branded with contractor's name.
- No contractor is allowed to use Eskom's PPE.
- Ensure that the plant is running effectively and efficiently.
- Develop failure trends, record, and submit report.

20 Acceptance

This document has been seen and accepted by:

Name & Surname	**Designation**
Kenny Kabe	Senior Supervisor
Sitsi Mogoai	System Engineer
Kenneth Maboko	System Engineer
N Thangavhuelelo	Acting Mechanical Maintenance Manager
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21 Revisions

Rev.	Date	Compiler	Remarks
0	2023/01/24	Kenny Kabe	New Documentation format

22 Development Team

Sitsi Mogoai - System Engineer

Kenneth Maboko - System Engineer

23 Acknowledgements

N/A