	Works Instruction	Medupi Power Station
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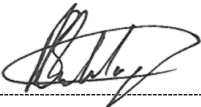

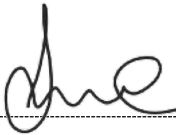
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1. Introduction

Medupi Power Station is a six (6) turbo-generator power plant with once through boiler utilising steam and water sootblowers to control internal fouling, and slagging. The sootblower system remove the insulation formed by the soot during combustion. This lowers heat transfer rate that reduces boiler efficiency and impacts heat rate, opacity, and overall power output. In order to achieve expected sootblower erosion performance;

- Sootblower erosion to be limited to less than 0.5mm per year
- Availability of the sootblower system to be greater than 92%

it is necessary to do preventative maintenance on the FFP's and associated equipment.

This document contains a generic Outage Philosophy and Scope of Work (SoW) for sootblowers.

The operation of the soot blowers is to convert the potential energy in the blowing media into kinetic energy through the venturi nozzles. In Medupi Power Station there are three types of soot blowing systems used:

a) The Furnace soot blowing system consisting of 48 motorised retractable blowers;

- Eight (8) helical soot blower (RK-SB) and,
- Forty (40) long retractable soot blowers (RK-SL)

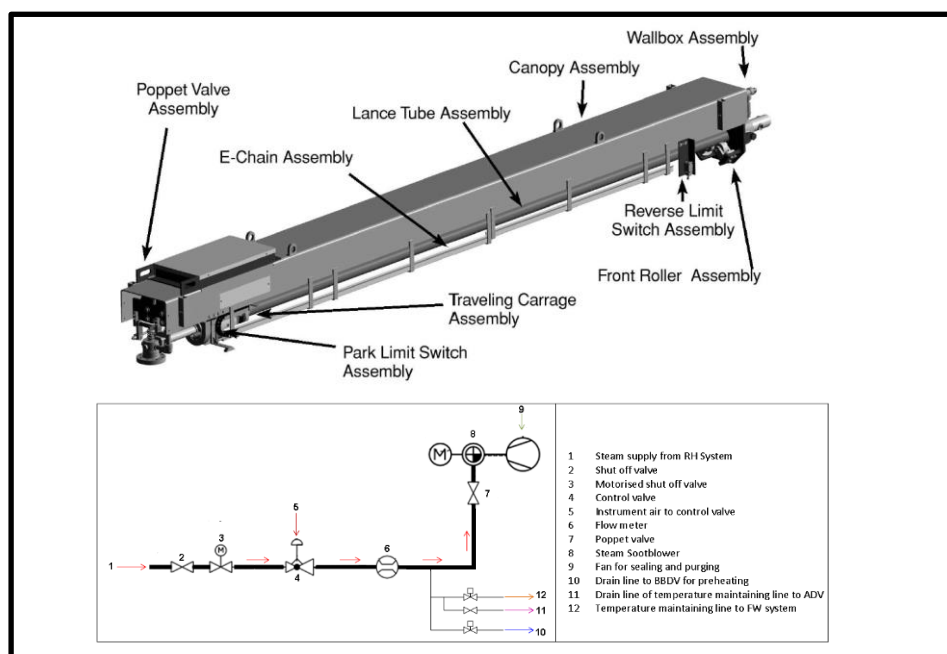


Figure 2: Long Retractable Sootblower

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b) The Air Heater soot blowing system is equipped with one soot blower each for the hot and the cold flue gas path.

- Eight (8) rake soot blower (RK-T)

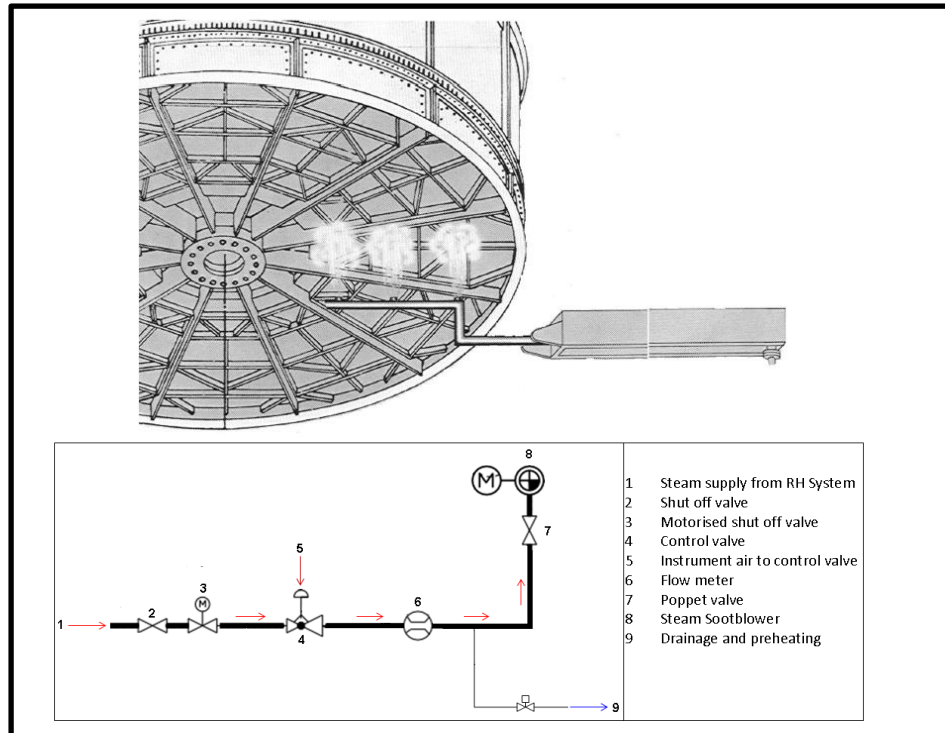


Figure 3: Gas Air Heater Sootblower

c) Water soot blowers (water cannons) are permanently installed in the boiler to clean fouled furnace walls. With their assistance, deposits can be removed while the boiler is on load. To cover the entire combustion chamber,

- 8 WC's in 2 levels are necessary.

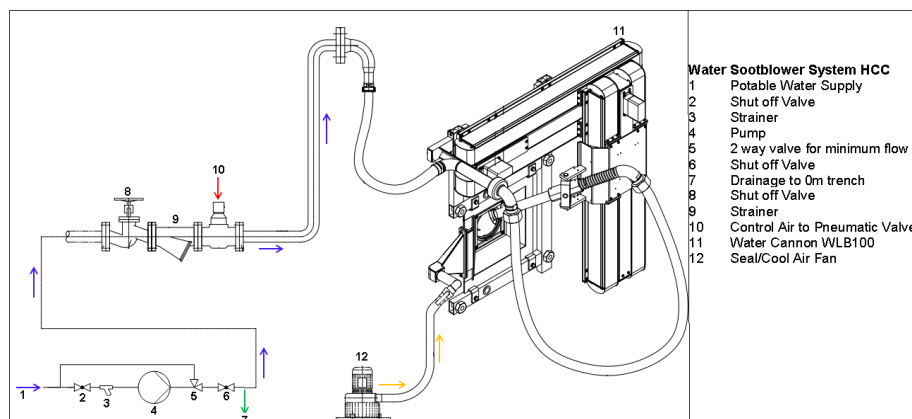


Figure 4: Water Cannon Sootblower

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2. Supporting Clauses

2.1 Scope

The works instruction for maintenance of sootblowers is stipulated in terms of:

- a) The scope of work (SOW)
- b) Defects notifications (SAP PM)
- c) The quality requirements as part of a quality control plan (QCP).

2.1.1 Purpose

The purpose of this document is to describe to the PJFF contractors the specifications for maintenance of the plant

2.1.2 Applicability

This document is intended for, and shall be applicable to, Medupi Power Station.

2.1.3 Effective date

This document shall be effective from the date of authorisation.

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] | 240-105658000 | Supplier Quality Management Specification |
| [3] | 240-127549136 | Boiler Tube Reduction Program Standard. |
| [4] | 240-48929482 | Tender Technical Evaluation Procedure. |
| [5] | SABS ISO 14001 | Framework of control to ensure that all SHE risks are considered along an auditable tract to ensure a successful outcome and continuous improvement. |
| [6] | 32-391 | Eskom Integrated Risk Management Procedure. |
| [7] | 240-56247788 | Welding Defects Classification and Reporting |
| [8] | 240-44974011 | Routine Work Management Procedure |
| [9] | 240-44948953 | Work Prioritisation Procedure |
| [10] | 240-105453648 | Fossil-Fuel Firing Regulations (FFFR) |

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2.2.2 Informative

[10]240-96283433	Medupi Power Station Outage Scope of Work
[11]240-99537828	Medupi Power Station Boiler Tube Leak Repair Management Guide
[12]240-89222375	Medupi Power Station Soot Blower Maintenance Strategy
[13]240-56244749	Medupi PJFF Plant Operational Instruction

2.3 Definitions

2.3.1 Contractor

The contractor who would be the appointed service provider.

2.3.2 Controlled Disclosure

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

2.3.3 Eskom

An Eskom employee who is the appointed representative at Medupi Power Station.

2.4 Abbreviations

Abbreviation	Explanation
QCP	Quality Control Plan
SOW	Scope of Work
TES	Technical Evaluation Specifications

2.5 Roles and Responsibilities

2.5.1 Contractor

Perform the stipulated SOW in accordance to the stipulated requirements and submit the relevant information/documentation pertaining to maintenance of Sootblowers.

2.5.2 System Engineer (Eskom)

Provide the formalised SOW and Technical Evaluation Specifications (TES) for the maintenance of Sootblowers, issue the works information for procurement of the services, execute the tender evaluation in accordance to the TES, participate in the intervention points allocated to Eskom on the QCP and review sign-off submitted reports and documentation.

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2.6 Process for Monitoring

The maintenance of Sootblowers shall be monitored according to the intervention points stipulated in the QCP.

2.7 Related/Supporting Documents

Not Applicable.

3. Sootblower Plant Maintenance

The submission of a service quotation from a service contractor must be based on the requirements highlighted in the subsequent sections.

3.1 Sootblower Plant Daily Maintenance

3.1.1 Scope of Work

The maintenance strategy consists of three different strategies namely corrective maintenance, predictive maintenance and time based maintenance.

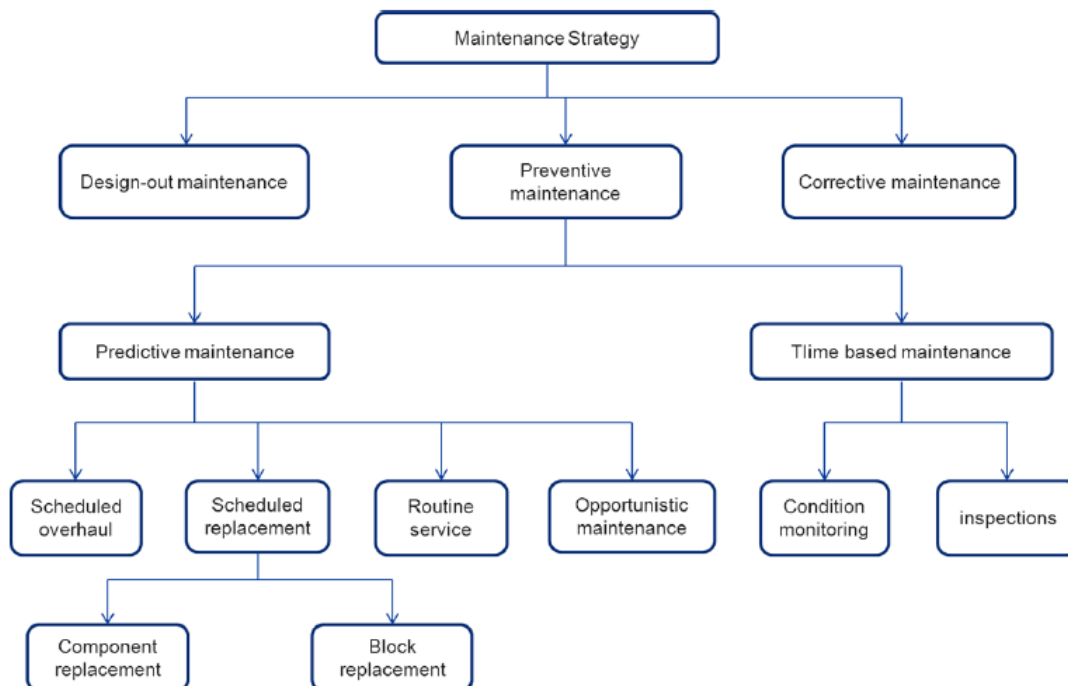


Figure 5: Maintenance Strategy Flow Diagram

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3.1.2 Steam sootblowers

Routine maintenance of the sootblower should include:

- Packing adjustment
- Lubrication checks
- Cleaning the sootblower assembly
- Walkdown and visual checks
- Periodic inspection of the lance for retracts

#	Components	SAP PM Task	Frequency
1	Gear rack and front support rollers	a) Clean carriage rails b) Lubrication of gear rack	a) Every 6 months b) Every 6 months
2	Gearbox with motor gear	Filling gearbox	Refill to proper level if drained through leaks
3	Lance and feed tube	a) Inspect and tighten feed tube packing b) Lance tube alignment	a) Every 6 months b) Every week
4	Valve stem packing	Tighten	Every 3 months
5	Valve seat cone	Leak	Every 12 months
6	Trailing cable device	Chain free movement	Every 6 months
7	Chain, sprockets and shaft	a) Lubrication b) Check wear, missing key and looseness of the shaft c) Chain tension inspection d) Correct adjustment, wear, corrosion, lack of flexibility and lubrication	a) Every 3 months b) Every 3 months c) Every week d) Every month
8	Traveling carriage gear drive	a) Check oil level b) Drain and Replace c) Blower functional test d) Check mounting and hanger support tightness e) Check blowing pressure	a) Every month b) Every 12 months c) Every 12 months d) Every 12 months e) Every week

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3.1.3 Water Sootblowers

#	Components	SAP PM Task	Frequency
1	Water Lance Pump	<ul style="list-style-type: none"> a) Bearing lubrication b) Check pump oil c) Pump internal inspection d) Pump impeller inspection e) Pump performance curve 	<ul style="list-style-type: none"> a) Every 6 months b) Every 6 months c) Every 24 months d) Every 12 months e) Every 12 months
2	Water Lance Guide Modules	<ul style="list-style-type: none"> a) Visual inspection b) Lubrication 	<ul style="list-style-type: none"> a) Every week b) Every 3 months
3	Blower tube with blower tube guide, terminal box and hose connection.	<ul style="list-style-type: none"> a) Nozzle check list <ul style="list-style-type: none"> (i) Nozzle outlet free from slag (ii) Nozzle outlet must a sharp edge (iii) Edge must not be de-burred or rounded (iv) Nozzle inside must be smooth and without rough layers b) Tube swivel tightness inspection c) Tube swivel tightness lubrication d) Ball joint integrity and mobility check e) Flexible hose physical integrity check 	<ul style="list-style-type: none"> a) Every 6 months b) Every 6 months c) Every month d) Every 6 months e) Every 3 months
4	Valve group	<ul style="list-style-type: none"> a) Cleaning of the Y-strainer and Dirt trap b) Solenoid valve cleaning c) Valve packing adjustment 	<ul style="list-style-type: none"> a) Every 3 months b) Every 6 months c) Every 6 months
5	Seal Air Fan	<ul style="list-style-type: none"> a) Intake nozzle screen/filter check 	<ul style="list-style-type: none"> a) Every week

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3.2 Sootblower Plant Outage Maintenance

3.2.1 Sootblower Plant Outage Strategy

The Outage requirements of the sootblower system are included in the Reliability Basis Optimisation Analysis. The frequencies of the outage requirements are in line with the outage frequencies as defined in the Medupi Outage Philosophy (237-0406). The high level outage philosophy is also summarised in the table below. The outage strategy specifics are included in the section on maintenance strategies, with the routine maintenance requirements, as it is essentially 'maintenance' conducted during outages.

The outage strategy serves to inspect, replace or repair components during an outage. If components or parts are found to be worn or damaged during an inspection, it will be replaced or repaired. The following components must be inspected, repaired or replaced:

3.2.2 Steam Sootblowers

#	Components	Scope of Work	Frequency
1	Steam supply pipe work and hangers	a) Hot and Cold survey b) Wall thickness test	a) Every 6 years b) Every 6 years
2	Lance and feed tube	a) Lance tube wall thickness measurement	a) Every 18 months

3.2.3 Water Sootblowers

#	Components	Scope of Work	Frequency
1	Steam supply pipe work and hangers	a) Hot and Cold survey b) Wall thickness test	c) Every 6 years d) Every 6 years

3.2.4 Quality Control Requirements

3.2.4.1 Quality Control Plan

The inspection of the Sootblower Plant shall be accompanied by the prior submission and approval of a check sheet and a QCP containing the following intervention points for Eskom:

- a) Pre Permit to Work (PTW)
- b) Steam/Water Sootblower
 - i. per sootblower KKS (e.g. HCB11 AT010)

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- ii. per scheduled period (e.g. weekly)
- iii. per SAP PM task (e.g. lubrication)
- iv. per component (e.g. gear rack and front support rollers)

Note: a check sheet for every sootblower task per frequency with a list of all tasks required during that time (e.g. weekly)

- c) Testing Witness, with results report signed off by Eskom.

3.2.4.2 Reports

The following reports are to be submitted:

- a) Defect report
- b) Visual inspection report
- c) Scheduled maintenance report
- d) Wall thickness report (Eskom to provide NDT contractor)
- e) Housekeeping report

3.3 Cost Breakdown

Costing details/breakdown is to be provided for the following aspects of the repair for each of the main scope-detailed components:

- a) Stuck sootblower removal.
- b) Scheduled maintenance.
- c) Repair components.
- d) Functional Testing.

Note: Testing is conducted through the use of temporary or existing equipment, adapted for fit and purpose, and through company innovation, in order to minimise costing.

- e) Preservation and delivery.

3.4 Warranty

The contractor provides Eskom with a one year and functional operation warranty, providing that the individual components are installed for use within 6 months from the service date.

4. Acceptance

This document has been seen and accepted by:

Name	Designation
Pamela Pretorius	Maintenance Manager: Sustainability & Resilience
Mbongeni Mqadi	Maintenance Manager: Execution
Joshua Lekoloane	Mechanical Maintenance Manager (Boiler)

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Name	Designation
Senesh Pillay	Materials Management Manager
Jan Victor	Outage Manager: Execution
Phuti Mashita	Maintenance Senior Technician
Kgaladi Maleka	Outage Coordinator

5. Revisions

Date	Rev.	Compiler	Remarks
August 2021	1	M Langa	Works Instruction developed for maintenance of Sootblower plant

6. Development Team

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

- Benji Rahlogo

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