

	<p style="text-align: center;">Specification</p>	<p style="text-align: center;">Medupi Power Station</p>
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Title: Sandblasting Scope of Work for Outage and Maintenance at Medupi Power Station as and when Required

Document Identifier: 241-2022235

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Area of Applicability: Medupi Power Station


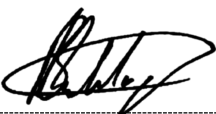
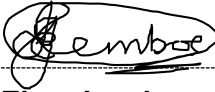
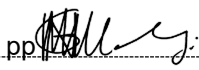
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1. Introduction

Medupi Power station requires sandblasting on certain plant components in order to conduct sufficient Non Destructive Testing (NDT) inspections and cleaning of certain components. The sandblasting will be required on an as and when required basis for a period of three (3) years

This document describes the details of the applicable plant areas, scope of work, standards, quality, requirements, specifications and terms & conditions.

2. Supporting Clauses

2.1 Scope

- a) Sandblasting and mechanical cleaning (Grinding) boiler pressure parts: elements, Tube-SOLO, lance and soot blower openings and tips, holes and specific boiler areas
- b) Sandblasting high pressure components: pipe work, headers, drains piping and valves bodies
- c) Sandblasting and mechanical cleaning (Grinding) all fans
- d) Sandblasting and mechanical cleaning (Grinding) in air heaters
- e) Sandblasting and mechanical cleaning (Grinding) of flow accelerated corrosion (FAC) components
- f) Sandblasting and mechanical cleaning (Grinding) on HP, IP turbine inlet pipes and casings
- g) Sandblasting and mechanical cleaning (Grinding) of Turbine Steam Admission Valves internals (HP & IP CVs, HP & IP SVs)
- h) Sandblasting and mechanical cleaning (Grinding) of LP Bypass Valves body and internals (Control Valves, Stop Valves, Spraywater Valves, Warm-up Valves, Spraywater rings & nozzles)
- i) Sandblasting and mechanical cleaning (Grinding) of Start-up (TAL) Valves body and internals (TAL Valve, Spraywater Valves, Warm-up Valves, Spraywater rings & nozzles)
- j) Sandblasting and mechanical cleaning (Grinding) of turbine vessels and auxiliary plants
- k) Sandblasting and mechanical cleaning (Grinding) of boiler auxiliary components identified by RBI assessments
- l) Sandblasting and mechanical cleaning (Grinding) on all other areas deemed necessary by the employer
- m) Sandblasting and mechanical cleaning (Grinding) of boiler vessels, Atmospheric Drain Vessel Tank, Atmospheric Drain Vessel Condensate Tank, Boiler Blow Down Vessel Tank and Boiler Blow Down Vessel Condensate Tank

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The cleaning, removal and disposing of sandblasting grit from plant areas to Medupi hazardous waste site after sandblasting forms part of the scope. A detailed housekeeping plan will have to be submitted by the contractor for approval by Eskom SHEQ manager.

2.1.1 Purpose

The purpose of this document is to define the specified Grit blasting for Outage and Maintenance scope of work activity requirements for Medupi Power Station.

The station is expected to perform at 92% UCF, 6% PCLF and 2% UCLF, and the specified sandblasting activities and management strategy efforts must support this requirement.

It is therefore imperative that the successful and suitably qualified Service Provider aligns his/her organisation fully to these specified scope activities and processes laid down in this document.

2.1.2 Applicability

This document shall apply throughout Eskom Medupi Power Station.

2.1.3 Effective date

Document is effective upon authorization.

2.2 Normative/Informative References

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

2.2.1 Normative

No	REF NO	DOCUMENT TITLE
1	240-83539994	Standard for Non-Destructive Testing (NDT) on Eskom plant
2	240-83540088	Requirements for standard NDT on Eskom plant standard
3	240-134999797	Standard for Implementation of Tube-SOLO NDT on Eskom Coal Fired Plant
4	SANS 347	Categorization and conformity assessment criteria for all Pressure equipment
5	240-56239129	High pressure pipework for Fossil Fuel Fired Power Stations
6	240-56355225	Welding of high pressure temperature tube and pipework standard

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No	REF NO	DOCUMENT TITLE
7	ISO 9001:2015	ISO 9001 Quality Management Systems
8		OHS ACT Occupational Health and Safety Act, 85 of 1993
9	240-114763317	Medupi Power Station Integrated Risk Management Work Instruction
10	PSZ 200 - 4190	Application of KKS Plant Coding
11	ISO 8501-1	ISO 8501-1: Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness
12	240-92360717	Medupi Power Station Outage Philosophy

2.2.2 Informative

1. 240 - 80138517 Medupi Power Station Issue Management Work Instruction
2. OHSACT Corrective and Preventative Action Management Work Instruction
3. Occupational and safety Act 1993 (No 85 of 1993) OHS act regulation and code

2.3 Definitions

No	Name	Definition
1	Sandblasting	Sandblasting is a general term used to describe the act of propelling very fine bits of material at high-velocity to clean or etch a surface. Due to the dangers of inhaling dust during the process, sandblasting is carefully controlled, using an alternate air supply, protective wear, and proper ventilation.
2	Grit	It is a measure of texture or particle size, is calculated by running sand through a sieve. The size of sieve is called its mesh.
3	Microgrit sandblasting	Micro- abrasive blasting is dry abrasive basting process that uses small nozzles (typically 0.25mm to 1.5mm diameter) to deliver a fine stream of abrasive accurately to either a small part (mm in size) or a small area on a larger part. Generally the area to be blasted is from about 1mm to only a few cm at most.
4	Tube-SOLO	Tube-SOLO (Tube - Steam Oxide Life Optimization) is a technology that is used to carry out creep damage analysis on boiler tubes. The very high steam temperatures found on the inside of boiler tubes can cause the formation of a specific type of hard, brittle iron oxide scale called magnetite. As the oxide scale on the inside of the tubes grows thicker the metal wall thickness becomes thinner. Periodic measurements of boiler tube internal oxide scale (magnetite) and remaining wall thickness enables engineers to estimate life of the useful life of the tubes and when tubes should be replaced. A non-destructive testing method (ultrasonic thickness gauging) is used to measure the required thickness readings.

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Nº	Name	Definition
		This qualified ultrasonic thickness testing technique is used for measuring boiler tube steam side oxide scale and the remaining metal or wall thickness simultaneously.

2.4 List of Abbreviations

Abbreviation	Description
AIA	Approved Inspection Authority
AP	Authorised Person
FAC	Flow Accelerated Corrosion
IR	Interim Repairs
ISO	International Standardisation Organisation
MT	Magnetic Testing
NDE	Non Destructive Examinations
NDT	Non-Destructive Testing
PCLF	Planned Capability Loss Factor
PCM	Process Control Manual
PSR	Plant Safety Regulation
PT	Penetrant Testing
PTW	Permit To Work
QA	Quality Assurance
RP	Responsible Person
RT	Radiographic Testing
SAP	System Applications Products
SOW	Scope of Work
SOW:	Scope of Work
SP	Service Provider or Contractor
UCF	Unit Capability Factor
UCLF	Unplanned Capability Loss Factor
UT	Ultrasonic Testing

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2.5 Roles and Responsibilities

The roles and responsibilities of the Employer is to issue a comprehensive scope of work and ensure that the Contractor meets the SHEQ requirements to fully execute the work instructions.

The roles and responsibilities of the Contractor is to ensure that the scope of work is executed by qualified and skilled personnel in line with the applicable SHEQ requirements and relevant procedures and to report/submit results and/or non-conformances on time as agreed upon with the Employer.

3. Requirements

3.1.1 The Employers Requirements

The responsibilities of the Employer include the following:

- a) Inform the SP if there is a need for Sandblasting to be done in the plant.
- b) Make all necessary arrangements for the SP to access site and perform the work required.
- c) Will provide station air and electricity supply points
- d) Provide scaffolding erections and removal of insulation for the SP
- e) Employer will ensure the SOW is issued to the SP on time to allow planning for the Outage.
- f) Performance is measured by the Employer against those areas which contribute to the Employer's business, and it will serve to determine the continuous improvement.
- g) Employer to determine what should be repaired on site and what should be sent away for repairs.
- h) All works will be subject to anytime inspection by the Employer.
- i) The Employer and SP in this SOW is committed towards the following:
 - Retention of critical skills
 - i. Continuous cost reduction
 - ii. Health & Environment Safety
 - iii. Transfer of operational experience and skills

3.1.2 The Contractors Requirements

- 1) The SP shall comply with the Employer's SHEQ standards, policies and procedures.
- 2) In executing the services, the SP must fully comply with ISO 9001 quality management systems.

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- 3) The SP shall compile improvement programmes to enhance plant performance and achieve cost reductions and the Employer will approve such programmes.
- 4) The SP shall be responsible to dispose the end product to a designated disposal site, before disposal, the SP must consult the Employer's SHEQ Representative.
- 5) All tools, consumables, labour, storage, and any other item, either normal or otherwise deemed necessary by the employer for proper execution of SOW shall be supplied by the SP
- 6) The SP will use appropriate corrosion protection material to paint the sandblasted components whenever requested by the employer
- 7) The SP must comply with ISO 8501-1 Sa3 cleanliness
- 8) The SP must adhere to 240-56247788 Weld defect classification and reporting procedure.
- 9) Report must be produced by the SP on completion of the sandblasting
- 10) The SP shall take cognisance of the fact that the contract start date can deviate.
- 11) The SP will execute the SOW even if it was not catered in the contract as and when required by the Employer.
- 12) The SP to provide resources required to execute this scope and any changes to the crew must be negotiated and agreed upon with the Employer.
- 13) This contract is for Maintenance and Outage activities.
- 14) The SP shall ensure the integrity of plant labelling and that deficiency with regards to KKS labelling is reported immediately. All KKS removed during repairs to be put back in correct position.
- 15) The SP must ensure that they have responsible persons in terms of PSR requirements for any work performed on plant.
- 16) The SP must ensure that before work commences, there is PTW
- 17) The SP to provide PPE, equipment and tools required for the works.
- 18) The SP shall produce a final report within 7 working days after the date of completion of the of the works or any date agreed on as per Task Order
- 19) SP's vehicles to comply with Eskom Vehicle Standards and Procedures.
- 20) SP will provide on-site representation as and when required for the time period of the task order.
- 21) Be able to make use of Primavera or any project software agreed with the Employer for project tracking and reporting purposes.
- 22) Unless otherwise stated on the task order, the SP shall use the blasting sand grade with the following minimum specification:

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Table 1: Blasting Sand Technical Specification

Generic Names	Microblast, Limestone, Gypsum, Garnet - Iron Aluminium Silicate, Ferrochrome slag
Particle Size Range	0,3 - 0,7
Cleanliness or Surface Roughness after Blasting	ISO 8501 Sa3 Grade 1 / NACE 1/ SP5
Hardness (Moh)	~6
Ph Value of the Sand	8 > Ph > 5
Sand Conductivity (uS/cm)	60 - 75
Sulphates (mg/l)	~15
Nitrates (mg/l)	~2
Chlorides (mg/l)	~2
Oil Content	Nil
Moisture Content	< 0,5%
Specific Gravity (Kg/m3)	3000 - 3500
Weight loss on ignition	0,50 - 0,70%
The product contains no free silica	

A test certificate of the blasting sand to be produced and submitted to the Employer with the QCP for verification and acceptance before any task commences.

Note: Further requirements can be obtained from the NEC3 TSC

3.1.3 Management and Reporting

- a) The type of reports, level of detail and frequency of reporting will be mutually agreed by the Employer and the SP during the contract negotiation phase of this agreement. These may change from time to time on request by the Employer.
- b) The SP to be represented at all outage and maintenance related meeting which may be daily, weekly or monthly.
- c) The SP to be represented at all Employer safety meetings.
- d) The SP to be represented at any ad-hoc meetings that may arise in order to address any outage planning, execution, finalisation or safety related matters.

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3.1.4 SP's Management Meetings and Key People

- a) Before work starts on site, a Kick off meeting is held with the SP and the Employer, to explain in detail all requirements of the Site Regulations.
- b) The SP must ensure that there is a suitably trained RP on duty for all work that is being performed in the plant.
- c) The SP must ensure that all personnel operating mobile equipment and vehicles are authorised, this includes but not limited to:
 - i. Forklifts
 - ii. Mobile Cranes
 - iii. Cherry Pickers
 - iv. Sky Jacks
 - v. Compressors
- d) The SP shall be responsible for the regular inspections and daily equipment checks of the mobile equipment and vehicles including record keeping while onsite.
- e) The SP must ensure that all personnel performing work on the plant are authorised, this includes but not limited to:
 - i. Confined space locations
 - ii. Working at heights
 - iii. Heat stress areas
 - iv. Scaffolding Compliance
 - v. Hazardous substances

3.1.5 Communication and Correspondence

- a) All correspondence includes but not limited to:
 - i. Medupi Power Station
 - ii. Employer's Contract number
 - iii. Contract description
 - iv. Correspondence subject matter
 - v. Employer's name and contact details
 - vi. SP contact details
 - vii. Date
- b) Where appropriate the correspondence includes the Employer's reference and is delivered as a single package or as per the agreed contract terms.
- c) All communications from the SP are numbered sequentially with a prefix as advised by the Employer. The Employer responds in a like manner. The prefix and numbering system are decided upon at the Kick Off meeting.
- d) The SP shall communicate with the Employer telephonically and writing.

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3.1.6 Quality and Documentation Control

- a) The SP to compile a specific outage and maintenance quality management plan for specific SOW and will be approved by the Employer's delegated person, usually the System Engineer.
- b) The SP shall ensure that any witness, hold and inspection points are strictly adhered to.
- c) The SP to ensure that all measuring and test equipment is calibrated at all times & proof thereof must be readily available.
- d) All Quality References and Standards as stipulated in this document will be adhered to.
- e) The SP to comply with the Employer's quality documentation management system and processes.

3.1.7 Project Implementation

- a) The SP shall supply outage and maintenance execution plan per SOW including in a form of the following in Primavera or any project software agreed with the Employer. The following must be included in the plan:
 - i. Site establishment
 - ii. Activities
 - iii. Manpower plan (Resource loaded)
 - iv. Organogram
 - v. Skills required and associated cost per skill (e.g. artisan, site manager, etc.)

3.1.8 Manpower Requirements

- a) The number of personnel required to execute the works is to be proposed by the SP after his/her assessment of the scope of work and submitted to the Employer for approval.
- b) The successful SP shall utilise/provide skilled and suitably qualified staff with experience in the technical aspects of this SOW and supporting teams.
- c) Key staff brought onto site in connection with this scope of work should be able to fluently speak, understand and write in English.
- d) Proof of qualification is to be supplied on request by the Employer for specific key resources.
- e) The SP ensures that all staff being brought onto Medupi site has a valid fitness certificate based on the specified plant man-job specification.
- f) Provide daily supervision of all related plant through trained and competent personnel to ensure that inspections & work activities are conducted daily during execution of the outage.

3.2 Process for Monitoring

Process for monitoring will be agreed by both parties per purchase order and in line with the applicable procedures.

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3.3 Related/Supporting Documents.

N/A

3.4 Outage Philosophy

The scope of work is applicable to Sandblasting for Outage and Maintenance at Medupi power station as and when required as per scope of work.

The system is also aligned to Medupi Power Station Outage Philosophy depicted as follows and gets reviewed yearly.

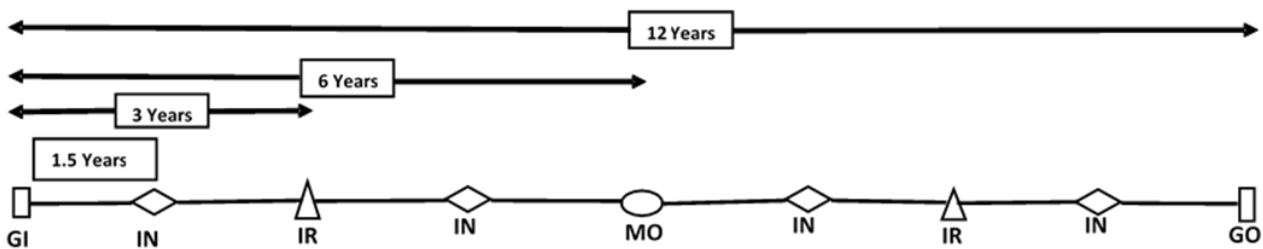


Table 2: Medupi Outage Philosophy

Symbol	Outage type	Interval Years	Interval Hours	Duration (days)	Main activities
□	GO	12	100 000	90	a) Full Turbine Centre-line HP, IP, LP Cylinders and Generator Overhauled b) Generator and Unit Transformers c) RBI Scope of work execution d) Boiler Statutory Inspection and Tests includes Safety Valves e) High Pressure Pipework Inspection and Tests f) PF and Oil burner replacement g) PF Pipework Inspection and Repairs h) Ducting and Damper Inspection and Repairs i) Draught Group Inspection and Repairs j) Boiler Acid cleaning k) Maintenance service of Boiler and Turbine Boards

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Symbol	Outage type	Interval Years	Interval Hours	Duration (days)	Main activities
					<ul style="list-style-type: none"> l) Maintenance service of C & I Equipment m) Air heater element pack replacement n) All SAP notification of defects for off load repairs
◇	IN	1,5	12 500	36	<ul style="list-style-type: none"> a) This covers Ducting and Damper Inspection and temporary repairs that will not impact the duration of the outage b) Draught Group Inspection and temporary repairs that will not impact the duration of the outage c) Boiler Pressure parts Inspection and temporary repairs that will not impact the duration of the outage d) All SAP notification of defects for off load repairs e) FAC testing selective components
△	IR	3	25 000	42	<ul style="list-style-type: none"> a) Ducting and Damper Inspection and Repairs b) Draught Group Inspection and Repairs c) Boiler Inspection and Repairs d) High Pressure Pipe work Inspection and tests e) Endoscopic inspections on HP and IP Turbine f) Visual inspections on LP last blades g) Some RBI scope execution (not impacting critical path) h) Turbine Auxiliary components Inspections i) Valve inspection and repairs

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Symbol	Outage type	Interval Years	Interval Hours	Duration (days)	Main activities
					j) FFP Bays replacement k) All SAP notification of defects for off load repairs l) FAC testing selective components m) Turbine steam admission valve inspections and repairs
○	MO	6	50 000	56	a) LP turbine rotor inspections and refurbishment b) Turbine steam admission valve inspections and repairs c) Boiler pressure parts inspections and repairs d) RBI Scope of work execution e) PF and Oil burner replacement f) Ducting and Damper Inspection and Repairs g) Draught Group Inspection and Repairs h) All SAP notification of defects for off load repairs i) Review the scope to cater for boiler auxiliaries on all outages

3.5 Applicable Plant Area

Sandblasting and Mechanical (Grinding) cleaning will be conducted on the plants listed below and any other plants as and when required by the Employer

- a) Boiler Circulation Pump & Boiler Condensate
- b) Boiler Pressure Parts
- c) HP Pipework
- d) Auxiliary plants
- e) Boiler Area Valves
- f) Turbine Area Valves
- g) Auxiliary Boiler

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- h) Turbine
- i) Condensate and LP System
- j) Feed water and HP System
- k) Burners
- l) BFP's
- m) PF Pipes
- n) Pipes
- o) Coal Bunkers
- p) Milling Plant
- q) C&I components/instruments
- r) Flue Gas Dustings & Dampers
- s) PJFF
- t) Dust Handling Plant & BOP
- u) Steam Air heaters
- v) Soot blowers
- w) Chimneys
- x) SSC
- y) Generator
- z) Turbine Auxiliaries
- aa) ACC Fans
- bb) Vessels
- cc) Shafts
- dd) Gearboxes
- ee) Tanks
- ff) Bellows
- gg) Nozzles
- hh) Ducts
- ii) Coal Silos
- jj) Bunkers

On every shift the SP will be required to have an RP and AS. The SP will be required to conduct plant walk down on a regular basis.

3.5.1 Applicable SOW

- a) Sandblasting boiler pressure parts: elements, tube solo, lance and soot blower openings and tips, holes and boiler comers
- b) Sandblasting high pressure components: pipe work, headers, drains piping and valves bodies
- c) Sandblasting all fans
- d) Sandblasting of milling plant, PF pipes and all areas associated with milling plant

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- e) Sandblasting of air heaters and associated components
- f) Sandblasting of all flow accelerated corrosion(FAC) components
- n) Sandblasting of HP, IP turbine inlet pipes and casings
- o) Sandblasting and mechanical cleaning (Grinding) of Turbine Steam Admission Valves internals (HP & IP CVs, HP & IP SVs)
- p) Sandblasting and mechanical cleaning (Grinding) of LP Bypass Valves body and internals (Control Valves, Stop Valves, Spraywater Valves, Warm-up Valves, Spraywater rings & nozzles)
- q) Sandblasting and mechanical cleaning (Grinding) of Start-up (TAL) Valves body and internals (TAL Valve, Spraywater Valves, Warm-up Valves, Spraywater rings & nozzles)
- g) Sandblasting of turbine vessels, boiler condensate vessels and all auxiliary plants
- h) Sandblasting of boiler auxiliary components identified by RBI assessments

Note: All components must be inspected for damages, corrosion, proper protection, marking and certification before work commences. After sandblasting, the detailed report must be issued to the Employer.

3.5.2 Exclusions

- a) Scaffolding and Insulation
- b) Condition Monitoring
- c) NDT Inspections excluding visual inspections which shall be performed every time before work commences, during work execution and after completion.
- d) Lubrications
- e) C&I
- f) Electrical
- g) Local air supply

4. Acceptance

This document has been seen and accepted by:

Name	Designation
Sithokozile Hlongwa	Boiler Engineering Manager
Bernard Matanda	Senior Advisor Boiler Engineering
Rulani Masingi	Senior Advisor Outage Execution
Mbongeni Mqadi	Middle Manager Maintenance
Katlego Ntlhoro	Senior Engineer Turbine Engineering
Kenneth Ndumo	Boiler Engineer
Malose Langa	Senior Technologist Boiler Engineering

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5. Revisions

Date	Rev.	Compiler	Remarks
August 2022	0	Mpho Sekhuto	
August 2022	0.1	Mpho Sekhuto	Included specific turbine plant components in the SOW as per review comments from Katlego Ntlhoru. Included review comments from Elton Lemboe
September 2022	1	Mpho Sekhuto	Final Draft

6. Development Team

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

- a) Mpho Sekhuto
- b) Benji Rahlogo
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Not Applicable

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