

 Eskom	Scope of Work	Camden Power Station
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Scope of Work – Camden P/S

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Compiled by	Supported by	Functional Responsibility	Authorised by
			
D Masuku	P Mthombeni	D Nyathikazi	M Mathabatha
Boiler System Engineer	Boiler Engineering Manager	Boiler Maintenance Manager	Engineering Manager
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1. Introduction

Camden Power Station (CPS) is a fossil fuel fired power station which consists of eight generating units, each capable of producing 200MWe. The boilers are front fired with a steam drum. The boiler has 5 dedicated coal milling units (A to E) each with a capability of 50MWe. During normal MCR operation, only four mills are required to be in service and the redundant one will be on standby/maintenance. The mills require to be retained in an excellent working condition to ensure complete combustion, optimum efficiency and/or to avoid partial load losses. The milling plant is a critical plant at Camden Power Station making the milling plant service and maintenance also critical as any failure may result in a 50MWe partial load loss.

Mills are required during unit light-ups, shut downs, normal operation and load changes. Availability, reliability and performance of the milling plant is essential in terms of ensuring optimum performance of the plant and hence the need for a service contract.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

The purpose of this document is to supply the scope of work required to deliver maintenance services for the Milling Plant at Camden Power Station.

2.1.2 Applicability

- Boiler Engineering
- Boiler Maintenance
- Outages
- Procurement
- Prospective contractor

2.1.3 Effective date

Authorisation date

2.2 Normative/Informative References

2.2.1 Normative

- ISO 9001 – Quality Management Systems.

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OHS Act - Occupational Health and Safety Act and Regulations (Act No.85 of 1993)

2.2.2 Informative

N/A

2.3 Definitions

N/A

2.4 Abbreviations

Abbreviation	Explanation
C&I	Control and Instrumentation
CPS	Camden Power Station
FFFR	Fossil Fuel Firing Regulations
GO	General Overhaul
HP	High Pressure
IR	Interim Repair
LP	Low Pressure
MBSA	Maintenance Basis Standardisation Application
MGO	Mini General Overhaul
PF	Pulverised Fuel
PLL	Partial Load Loss
PSR	Plant Safety Regulations
SOW	Scope of Work
SSR	Successful Start-up Rate
UCLF	Unplanned Capability Loss Factor

2.5 Roles and Responsibilities

- Boiler Engineering - Is responsible to draw up the scope of work for the milling plant service contract.
- Boiler Maintenance - Is responsible to set-up a milling plant service contract as per the terms set-out in the SOW
- Procurement - Is responsible to ensure that the procurement process is properly followed in setting-up and awarding the milling plant service contract.

2.6 Process for Monitoring

The Procurement process ensures that the milling plant service contract is set-up according to the terms stated in the SOW.

2.7 Related/Supporting Documents

N/A

3. Scope of Work

3.1 Objectives of Contract

The purpose of this contract is to provide for the maintenance, repair and complementary services for the milling at Camden Power Station.

The Employer and the Service Provider shall be committed to the following:

- a) Continuous reductions in milling plant UCLF;
- b) Continuous reductions in mill trips;
- c) Continuous cost reduction (both milling cost and mill maintenance cost);
- d) Safety (Zero Harm Policy);

The performance of the service provider shall be measured against the above criteria as well as the timely execution and quality of all planned activities. It is of critical importance that these goals are actively pursued over the long term to meet Camden's performance targets.

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3.2 Contract Pre-requisites

The service provider shall meet the following requirements and provide evidence to substantiate compliance:

- a) Level 1 Plant approval for mill maintenance on vertical spindle mills and PF piping;
- b) The following key positions must meet the following minimum criteria:
 - i. The proposed site manager to have at minimum BTech Mechanical qualification and 10 years vertical spindle milling plant experience;
 - ii. The services of an Engineer with BSc/BEng Mechanical Engineering qualification, ECSA Registered as a Professional Engineer with minimum 5 years milling plant experience will also be required on an adhoc basis.
 - iii. The proposed supervisor to have at minimum an artisan qualification and 5 years milling plant experience;
 - iv. All artisans must have recognised qualifications from a verified and accredited training institution;
 - v. Welders must be qualified as per QM 58 quality requirements;
- c) Provide a proven track record as well as detailed evidence of the following:
 - i. Work of a similar nature that were done on vertical spindle mills as well as the scope of the work that were conducted;
 - ii. Any improvements that have been on vertical spindle mills;
- d) Provide a written strategy of how the company will improve milling plant performance at Camden Power Station;

3.3 Requirements from Service Provider

The service provider must meet the following requirements:

- a) Effective planning of all maintenance works between Eskom and the Service Provider;
- b) Submit weekly maintenance plan to the contract supervisor in-line with Employer's Maintenance Schedule;
- c) Implement a system to record and maintain mill running hours and this system must be available and be able to indicate hours of the mill at any-time when required;

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- d) Implement a system to record all wear rates measurements that are taken on mill grinding elements. All wear rates calculations must be available on request;
- e) After the completion of a mill 1500 hour service a service report must be submitted to indicate the extent of the work that was carried out during the service as well as all measurements that were taken on wear components;
- f) The service provider will be responsible for the rigging and transportation of the mill motor, mill gearbox and mill trunion roller assemblies as well as any other milling plant spares from Eskom Stores to plant and from plant to Eskom stores as required;
- g) The service provider will be responsible for coupling positioning and alignment between mill gearbox and mill motor as well as seal air fan and lay shaft coupling;
- h) The service provider is expected to take his own permits as per the plant safety regulations and the permit to work system. It is required to have a responsible person on each shift and on standby;
- i) The Service Provider is expected to liaise on a daily basis with the maintenance supervisors to plan the day's work so as to optimize the availability of the plant;
- j) The Service Provider will provide representation in the maintenance meeting as well as in the production meeting unless otherwise instructed by the Service Manager;
- k) In terms of the new FFFR regulation the maintenance personnel will have to be FFFR authorised;
- l) All maintenance activities are carried out as per approved QCP;
- m) The Service Provider performs small modifications when required with the approval from the Service Manager and Engineering, modifications such as install raw coal chute sleeves, fit impulse lines for new pressure measurements etc;

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3.4 Scope of Work

All maintenance activities and the frequencies of the activities will be determined by MBSA Camden Power Station Milling plant Maintenance Execution Strategy for Milling Plant and 226 12296 Document. The Milling Plant Maintenance Strategy will be reviewed on a yearly basis and all SAP PMs will be developed from strategy. The Strategy is currently available from the Maintenance Basis Standardisation Application (MBSA) Tool.

Maintenance on the milling plant will be done as a combination of the following activities:

- a) Planned Maintenance activities, issued based on pre-set frequencies, such as daily or weekly;
- b) Planned activities, that will form part of the planned boiler outage scope of work during General Overhauls, Mini General Overhauls, Opportunity Outages & Interim Repairs;
- c) Planned activities, which are based on the running hours of the specific mill;
- d) Condition based activities that will be done only when flagged by condition monitoring or analysis. e.g. vibration, oil analysis & PF sampling;

The following activities will serve as the base line maintenance interventions that will be performed on the Milling Plant but may be reviewed or changed.

3.4.1 Daily inspections

3.4.1.1 PF leak identification and repairs

- a) Perform daily inspections on mills, PF pipe work and burner scrolls for PF leaks. PF leaks will have to be immediately repaired;

3.4.2 Perform daily plant walk downs and plant inspections:

- a) Leaks on mill doors;
- b) Leaks on mill reject system;
- c) Leaks on inlet ducting;
- d) Mill gearbox & feeder gearbox oil leaks;
- e) Mill cooling water leaks;
- f) Any abnormal noise from mill or mill gearbox;
- g) Seal air fan piping leaks;
- h) Seal air fan filter blockage;

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3.4.3 Ad hoc repairs / break downs

- a) PF Leak Repairs on PF pipes, VJ couplings, mill doors & PF scrolls;
- b) Mill roller seizure;
- c) Coal hang-ups;
- d) Feeder stuck;
- e) Seal air fan failures;
- f) Any failure that causes the loss of production due to mill unavailability;

3.4.4 Weekly Mill Settings

Perform weekly mill settings as per the station mill setting procedure (Work package) that may be reviewed and changed from time to time but in general the service provider inspects and carries out the following:

- a) Clean scroll duct, check and repair all access doors seals when necessary;
- b) Check roller to table gap and set according to specification;
- c) Check spring tension on all rollers and adjust to specification when required. Verify reduction in spring length from uncompressed state;
- d) Empty seal air fan drawer and clean seal air fan filter;
- e) Adjust gap of labyrinth seals and insure that the gap between table and the labyrinth seal is within specification;
- f) Inspect, adjust and repair inner reject door mechanism;
- g) Adjust outer reject doors and ensure that the doors closes and seals properly;
- h) Check trunnion assembly oil level and refill when necessary;
- i) Clean mill gearbox breather;
- j) Clean mill gearbox oil filter and oil cooler;
- k) Check mill gearbox oil level and top up when necessary;
- l) Inspect seal air system, pipe work, flanges for defects and repair;
- m) Inspect and lubricate seal air fan bearings;
- n) Unblock classifier if necessary;
- o) Remove all ash and PF build up from classifier top;
- p) Carry out house-keeping after maintenance activities have been completed;
- q) Clean mill landing after all activities has been completed;
- r) Check mill gearbox hold down bolts and tighten if required;

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3.4.5 Mill 1500 hour service

Perform mill 1500hrs service as per station procedure (work package) that may be reviewed or changed from time to time but in general the service provider inspects and repairs the following:

3.4.5.1 Coal Feeder

- a) Inspect feeder casing (Inside and outside) for coal leak;
- b) Open feeder inspection covers (top and front);
- c) Carry out thickness test on the feeder liner (floor);
- d) Inspect raw coal chute above the feeder for leaks;
- e) Inspect coal feeder slide gate and repair when required;
- f) Clean feeder inside;
- g) Inspect feeder spiral for wear;
- h) Inspect condition on spiral gearbox coupling;
- i) Check for oil leaks on feeder gearbox;
- j) Check feeder gearbox oil level and top up if necessary;

3.4.5.2 Classifier

- a) Lower Chinese hat and Inspect inner raw coal chute;
- b) Inspect and repair vortex finder if damaged;
- c) Inspect and repair classifier blades;
- d) Inspect and repair Chinese hat;
- e) Insure that all “flaps” on the Chinese hat are in place. Missing “flaps” must be fabricated and replaced;
- f) Inspect for wear on the inner raw coal pipe. Holed inner raw pipes must be repaired or replaced when necessary;
- g) Inspect classifier top (mill top) for high wear (repair if necessary);
- h) Inspect mill outlet temp thermocouple pocket and repair when required;
- i) Inspect for missing tiles and if required have tiles replaced by tiling contractor;

3.4.5.3 Rotating Throat

- a) Inspect the mill rotating throat wear;
- b) Inspect and replace worn dam ring segments;

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- c) Record dam ring height;
- d) Check the clearance gap between the throat and mill body (3mm). Repair when gap exceeds allowable tolerance;

3.4.5.4 Mill Table

- a) Inspect the labyrinth seal for wear and re-adjust so that gap between table and labyrinth seal is less than 1mm;
- b) Inspect mill table for damage.
- c) Inspect mill track segments and take profile measurements;
- d) Inspect and replace worn or torn seal air pipes on the trunnion assemblies;

3.4.5.5 Mill Doors 1-3

- a) Mill body to be rehabilitated by method of tilling and epoxy necessary;
- b) Inspect tension springs for damage;
- c) Check bolt holes on the mill body, stripped threads must be re-tapped;
- d) Inspect mill doors for wear;
- e) Check the condition of the cowl wear liners and replace when necessary;
- f) Check the condition of the trunnion wear liners and replace when necessary;
- g) Take mill grinding tyre profile measurements;
- h) Record mill grinding tyre serial number;
- i) Clean mill inside;
- j) Check the trunnion assemblies oil level and top up if necessary;

3.4.5.6 Ducting

- a) Repair / Patch duct leaks;
- b) Unblock blocked impulse lines;

3.4.5.7 Mill Landing

- a) Remove mill landing and inspect flange joints for air leaks and worn/burnt packing. Replace and repair defects found;
- b) Inspect flanges for air leaks and repack torn packing with new rope packing;
- c) Remove mill inlet flange to replace packing;

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3.4.5.8 Classifier top

- a) All ash and PF build up are to be removed from classifier top;
- b) Slew ring assembly to be tested and greased;

3.4.5.9 Mill Gearbox

- a) Inspection for oil leaks on the gearbox;
- b) Check hold down bolts for tightness (Torque) and record findings;
- c) Inspect, repair and / replace gearbox breather;

3.4.5.10 Lube oil system

- a) Inspect lube oil pipes for oil leaks and repair;
- b) Inspect and clean lube oil filters;
- c) Flush oil cooler, oil and water side;

3.4.5.11 CW System

- a) Inspect CW system for leaks and repair if necessary;
- b) Inspect the cooler for leaks and tighten all joints if necessary;
- c) Compare the cooling water return line to other mills on the same unit on the boiler tundish, if flow rate is lower there might be restriction in flow on the CW line.

3.4.5.12 Mill Reject System

- a) Clean out reject boxes and plenum chamber;
- b) Check inner reject doors for free operation;
- c) Inspect the scrapper bars for wear and replace if necessary;
- d) Inspect the plenum chamber liner plates and replace damaged liner plates;
- e) Check the spindle, repack glands and install;
- f) Inspect inner reject doors guides for wear and replace worn guide brackets;
- g) Inspect inner reject doors springs and replace damaged springs;
- h) Adjust inner reject door for tight seal air;
- i) Inspect gland packing on outer reject doors and scroll duct doors and replace if necessary;

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3.4.5.13 Seal Air System

- a) Inspect seal air fan filters and empty the seal air fan filter drawer;
- b) Inspect the seal air fan pipes;
- c) Inspect the seal air system for leaks at the flanges;
- d) Inspect the rubber seal air pipes going to the trunnion assemblies (internal and external);
- e) Verify and record the seal air fan motor and plumber blocks bolts tightness (Torque);
- f) Inspect plumber block internals and housing.

3.4.5.14 Scrapers

- a) The Service Provider inspects during mill setting and mill 1500hrs maintenance the condition of the scraper bars and replace or adjust as necessary;

3.4.5.15 Clear blockage on PF Pipe

- a) Remove bolts on of blocked PF pipe;
- b) Remove PF accumulation inside the pipes by means of vacuuming the PF from the pipes;
- c) Clean Debris from the Chinese hat

3.4.6 Unit GO, MGO & IR

- a) Execution of the Milling Plant outage SOW;

3.4.7 Milling Plant Limits (Boundaries)

The Service Provider will be expected to perform routine mechanical repairs and inspection in accordance with the details indicated below.

The Milling Plant limits are as follows:

- Bunker & raw coal chute system - From and including the mill bunker main isolating slide gate to the mill feeder isolating slide gate;
- Feeder system – From and including the feeder isolating slide gate to the mill raw coal inlet on top of mill classifier turret, including feeder gearbox;
- Mill system – From raw coal inlet on top of classifier turret to PF outlets in classifier turret;

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- Mill auxiliaries – Mill gearbox, mill lubrication filtration and cooling system, cooling water lines from lube oil cooler to boiler tundish and seal air system;
- PF pipe system – From classifier turret to PF burner scroll including hanger support system and slide and knife gates;
- All thermocouple pockets, impulse lines, thermocouples, pressure gauges, flow sensors, speed sensors and limit switches installed on equipment in above mentioned boundaries is also included in scope (Mechanical work only);
- Number of Boilers – 8;
- Number of Mills per Boiler – 5;

4. Acceptance

This document has been seen and accepted by:

Name	Designation
Nkosinathi Khumalo	Senior Supervisor Boiler Maintenance
Malusi Ngcobo	Boiler Senior Technical Advisor

5. Revisions

Date	Rev.	Compiler	Remarks
03 June 2024	01	Doctor Masuku	Original Issue

6. Development Team

Not Applicable

7. Acknowledgements

Malusi Ngcobo

Charlene Naicker

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