

 Eskom	Specification	Kusile Power Station
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Title: **Kusile Power Station: Overhead Crane, Hoist and Crawler Beam Maintenance Service and Spares Supply Scope of Work**

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1. Introduction

Kusile Power Station Management has decided to partner the overhead crane maintenance service function to a suitably qualified, experienced and well-established Contractor. This document describes the detail of the applicable plant areas, scope of work, standards, quality, requirements, specifications, terms & conditions as well as the criteria to be met to qualify for the tender.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

The purpose of this document is to define the Overhead Crane Maintenance Service requirements for Kusile Power Station. The station is expected to perform at 92% UCF, 6% PCLF and 2% UCLF, and the Overhead Crane Maintenance activities and management strategy efforts must support this requirement. It is therefore imperative that the successful and suitably qualified Contractor 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 Kusile Power Station.

2.1.3 Effective date

Document is effective from authorisation date.

2.2 Normative/Informative References

2.2.1 Normative

Not Applicable

2.2.2 Informative

Not Applicable

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2.3 Definitions

2.3.1 Contractor: Service provider contracted for supplying specific service to Eskom, Kusile Power Station.

2.3.2 Employer: Eskom, or Eskom Kusile Power Station

2.4 Abbreviations

Abbreviation	Explanation
BS:	British Standard
ISO:	International Standards Organisation
KKS:	Kraftwerk Kennzeichen System
LMI:	Lifting Machinery Inspector
NEC:	New Engineering Contract
PCLF:	Planned Capability Loss Factor
PM:	Planned Maintenance
PSR	Plant Safety Regulations
PTW:	Permit to Work
QA:	Quality Assurance
QC:	Quality Control
QCP:	Quality Control Plan
QMP:	Quality Management Programme
SANS:	South African National Standards
SAP PM:	SAP Planned Maintenance
SAP:	Systems, Applications, Products (Plant Maintenance, Procurement, Finance and Materials Management) integrated maintenance management system.
SHE:	Safety, Health, Environment
SOW:	Scope of Work
UCF:	Unit Capability Factor
UCLF:	Unplanned Capability Loss Factor

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2.5 Roles and Responsibilities

Note: Further roles and responsibilities can be obtained from the NEC3 TSC book.

2.5.1 The Employer

- a. Employer shall measure performance of the Contractor against those areas, which contribute to the Employer's business, and the Contractor shall be compensated accordingly. (e.g. Reliability, Availability and Safety). Areas of measurement include the Employer's key business indicators and will be redefined from time to time.
- b. Employer shall provide training for PSR, FFR and any other training as deemed necessary by the Employer.
- c. The Employer and Contractor in this SOW is committed towards the following;
 - i. Retention of critical skills
 - ii. Continuous cost reduction
 - iii. Health & Environment Safety
 - iv. Transfer of operational experience and skills

2.5.2 The Contractor

- a. The Contractor shall compile improvement programmes to enhance plant performance and achieve cost reductions and the Employer will approve such programmes.
- b. The Contractor shall be responsible for all Overhead cranes, hoists and crawler beams maintenance as per Employer's instructions, processes and systems.
- c. The Contractor shall be responsible for all statutory inspections/tests as defined by the Employer and supply the Employer with proof of such tests.
- d. All statutory tests or inspections done by the Contractor shall be reviewed and accepted by the Employer.
- e. All works will be subjected to anytime inspection by the Employer.
- f. The Contractor shall be responsible for the inspection, maintenance, repair, calibration, testing and replacement of all types of cranes, hoist and crawler equipment associated with this SOW.
- g. The Contractor shall take cognisance of the fact that Overhead cranes, Hoist and crawlers must become available whenever required.
- h. The Contractor shall provide the following complementary services to improve Plant and labour performance:
 - i. Procedure and documentation writing.
 - ii. Compile and review task lists.

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- iii. Implement approved design and modification.
- iv. Spares management, supply all the necessary spares to do routine maintenance and repairs.
- v. Render technical advice.
- vi. Asset management in accordance with ISO 55000.
- vii. Component failure analysis reporting
- i. The Contractor is to ensure that any service rendered does not interfere with the Employer's scheduled work and should align himself with the Employer's work control management process.
- j. Should the Employer become aware of any changes to the activity schedule (programme of notifications), the Employer may issue the Contractor with a revised programme.
- k. The contract entered into with the Contractor is non-exclusive and work against this contract can only be performed upon receipt of a task order.
- l. Please note that equipment will only form part of the works once the respective area has been commissioned and handed over to Generation. The Contractor shall take cognisance of the fact that the contract start date can deviate.
- m. The Contractor maintains all year round, agreed base crew at Kusile Power Station which is supervised by the Contractor with any changes to the crew being negotiated and agreed upon with the Employer.
- n. The Contractor will utilise the rotatable process for all refurbishable spares items.
- o. This contract is for preventative, predictive, corrective maintenance (breakdowns) and opportunity scheduled maintenance.
- p. Containment and clean-up of spillages is viewed to be very important for plant housekeeping and any spillage caused as a result of the Contractor shall be cleaned by the Contractor.
- q. The Contractor shall perform leak checks on all responsible plant areas and inform the Employer's representative accordingly. Defects must be raised on the system to address any plant deviations.
- r. The Contractor shall ensure the integrity of plant labelling and that deficiency with regards to KKS labelling is reported immediately.
- s. The Contractor must ensure that they have Responsible Persons (in terms of PSR) for any work performed on plant.
- t. All maintenance technically qualified (above semi-skilled) Contractor's employees shall be trained and authorised (in terms of PSR) within 6 months of the contract start date.
- u. The Contractor must ensure that all personnel successfully complete a written examination for the relevant regulation based on the Eskom Fossil Fuel Firing Regulations.
- v. The Contractor shall provide relevant tools and equipment as required.
- w. The Contractor shall implement a program of continuous improvement to optimise plant performance and reduce system and equipment failures.
- x. The Contractor shall participate in improvement programs as stipulated by the employer.

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2.5.2.1 Re-commissioning

- a. All Plant equipment maintained shall be re-qualified as per site specific procedure after any maintenance intervention.
- b. The Contractor shall be responsible or held liable for any defects arising from maintenance/operational faults twenty four hours after an intervention, provided that the equipment has been placed into service.

2.5.3 Management and Reporting

- a. The type of reports, level of detail and frequency of reporting will be mutually agreed by the Employer and the Contractor during the contract negotiation phase of this agreement. These may change from time to time on request by the Employer.
- b. The Contractor to be represented at all production and outage related meeting which may be daily, weekly or monthly.
- c. The Contractor to be represented at all Employer safety meetings.
- d. The Contractor to be represented at any ad-hoc meetings that may arise in order to address any production or safety related matters.
- e. Liaison meetings shall be held with the Employer's Representative or his/her delegate on a monthly basis to discuss any technical details, or concerns.

2.5.3.1 Contractor's management, meetings and key people

- a. Before work starts on site, an inaugural meeting shall be held with the Contractor and the Employer, to explain in detail all requirements of the Site Regulations.
- b. The Contractor shall be issued with a file of current Site Regulations on arrival. The file remains the property of the Employer and the Contractor is responsible for its maintenance and updating to include new or revised regulations as issued by the Employer.
- c. The Contractor must ensure that all personnel operating mobile equipment and vehicles are authorised where applicable, this includes but not limited to;
 - i. Forklifts
 - ii. Mobile Cranes
 - iii. Cherry Pickers
 - iv. Sky Jacks
- d. The Contractor shall be responsible for the regular inspections and daily equipment checks of the mobile equipment and vehicles including record keeping.
- e. The Contractor 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. Hazardous substances

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- f. A lifting machinery inspector (LMI) should be part of the works.

2.5.3.2 Communication and Correspondence

- a. All correspondence includes;
 - i. Kusile Power Station
 - ii. Employer's Contract number
 - iii. Contract description
 - iv. Correspondence subject matter
 - v. Employer's name and contact details
 - vi. Contractor contact details
 - vii. Date
- b. Where appropriate the correspondence includes the Employer's reference and is delivered as a single package.
- c. All communications from the Contractor are numbered sequentially with a prefix as advised by the Employer. The Employer responds in like manner. The prefix and numbering system is decided upon at the Inaugural meeting.

2.5.4 Quality and Documentation Control

- a. The Contractor shall compile QCP's and Method Statements and submit to the Employer for review and approval.
- b. The Contractor shall ensure that any witness, hold and inspection points are strictly adhered to.
- c. The Contractor to ensure that all measuring and test equipment is calibrated at all times & proof thereof must be readily available (load test certificates should be valid on all lifting equipment).
- d. All Quality References and Standards as stipulated in this document will be adhered to.
- e. Work will only be conducted with an Employer approved Quality Management Programme.
- f. The Contractor shall utilise the Employer's quality documentation management system and processes.

2.5.5 Project Implementation

- a. The Contractor shall supply a project implementation plan including at least the following;
 - i. Site establishment
 - ii. Manpower plan
 - iii. Organogram
 - iv. SHE plan

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2.5.6 Manpower Requirements

- a. The number of maintenance staff required to execute the works is to be decided by the Contractor after his/her assessment of the scope of work and submitted to the Employer for approval.
- b. The successful Contractor shall utilise/provide skilled and suitably qualified staff with current experience in, but not limited to, the following disciplines;
 - i. Overhead crane maintenance
 - ii. Overhead crane load testing
 - iii. Overhead crane failure analysis investigation
 - iv. Occupational Health and Safety Act 85 of 1993
 - v. NEC contract management
 - vi. Quality Management Control and Assurance procedures
 - vii. Spares optimisation
 - viii. Procedure writing
 - ix. BOM compilation
 - x. Task list development/review
- c. Staff must meet minimum requirements of Eskom job descriptions, with additional requirements specified where applicable.
- d. All staff brought onto site in connection with this work scope should be able to fluently speak, understand, read and write in English.
- e. Proof of Contractor and staff qualifications is to be supplied on request by the Employer.
- f. Provide daily supervision of all related plant through trained and competent personnel to ensure that inspections & work activities are conducted daily.

2.6 Process for Monitoring

Not Applicable

2.7 Related/Supporting Documents

Not Applicable

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2.8 Outages

The employees representative, in conjunction with the Contractor, is to prioritise work on non-outage and outage to ensure overhead crane service availability during both non-outage and outage periods. A full overhead crane inspection/ maintenance plan shall be carried out on all overhead cranes that are going to be utilised within an outage. Should a malfunction occur, the Contractor is to make every effort to provide the crane service required to restore plant to operating order, as soon as possible.

3. Works information

3.1 Overhead Crane, Hoist and Crawler Maintenance Service and Spares Supply

3.1.1 Applicable Plant Area

3.1.1.1 Constraints

- a) Overhead cranes, Hoist and Crawler will only form part of the works once the respective plant area has been commissioned and handed over to Generation.

3.1.1.2 Mechanical description of service

- a) Overhead Crane Services include servicing of overhead cranes, hoists, crawlers, load testing and load testing crawl beams, as per the requirements of the OH&SA, of all equipment at the Employer's site as identified by the Employer.
- b) Annual load testing and thoroughly examine all ropes, chains, hooks, safety latches and safety devices (of whole installation) by a Registered LMI.
- c) Lubrication of all equipment as required.
- d) The list of cranes, hoists and crawlers on site shall be compiled by the Employer based on the progress of the project. See Appendix A for the current list.
- e) The list will change anytime during the contract period due to required engineering changes i.e. modifications, installations of new items and establishment of other lifting items.
- f) The Contractor is required to ensure total reliability of all overhead cranes, hoists, crawl beams and crawls.

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- g) The crawl beams and crawls installed above the mill bunkers and all the other areas in the plant (where the crawl and crawl beam are installed) should be cleaned regularly and tested to ensure that they are in good working conditions and they can freely move to all the positions required on the beam.
- h) Load testing of overhead cranes and crawl beams is to be planned and executed in conjunction with the Employer's work management section.
- i) Valid Load test certificates to be provided to the Employer.
- j) All work executed under this SOW shall conform to the existing quality control procedures of the Employer.
- k) Results of any maintenance inspections or examinations has to be dated and signed by the Competent Person or an Authorised Lifting Machinery Inspector and be kept for the life of the Power Station or at least for as long as the specific overhead crane is in operation on SAP.

3.1.1.3 Electrical and C&I description of service

- a) The following are the Electrical and C&I components to be covered when maintenance has to be performed on the overhead cranes and hoist:
 - i. Electric motors
 - ii. Electric motor drives
 - iii. Electronic control circuit (switchgear)
 - iv. Lighting and plugs
 - v. Wiring, including trailing cables, wiring to gate locks and to drive motors
 - vi. Normal cabling
 - vii. Electronic feedback sensors
 - viii. Emergency lights
 - ix. Position indicators

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- x. Emergency/safety gears
- xi. Push button panels
- xii. Limit switches, relay contactors, timers and star-delta circuits
- xiii. Control panels
- xiv. Interlock switches
- xv. Load timers

3.1.1.4 Servicing scope

- a) The strategy required to determine the conditions of the overhead cranes, hoist, crawlers and crawl beams are fixed periodically:
 - i. Visual Inspection and cleaning
 - ii. Tests and measurements
 - iii. Repairing and replacing of defective equipment

3.1.1.4.2 Visual Inspection

- a) Visual inspections are carried out on the entire C&I, Electrical and Mechanical components of the overhead cranes, hoist, crawlers and crawl beams. The following criteria are covered on the inspection list:
 - i. Inspect all main components of the overhead cranes for defects
 - ii. Check for any signs of overheating on the electric motors
 - iii. Confirm exact controller response to commands from the cranes
 - iv. Check for any undue contact arcing
 - v. Observe the operation of the relays, contactors, timer circuits and star-delta timing for any abnormalities
 - vi. Check all fuses for correct cartridge and amp rating according to the specifications

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- vii. Inspect/ repair condition of lights and plugs
- viii. Ensure all the indication signs/ lights on the cranes are in order
- ix. Motor to be inspected
- x. Emergency stops and alarms on the cranes to be maintained
- xi. Inspect all domestic circuits
- xii. Inspect any abnormality on the crane movement
- xiii. Ensure the protection indication devices and mechanisms are working
- xiv. Do visual inspection on crane structure
- xv. Carry out cleaning on all equipment and structure

3.1.1.4.3 Testing and Measuring

- a) Ensure all tests are performed and carried out as per statutory requirement
- b) Repairing and replacing of defected items
 - i. Replace any damaged wires or cables
 - ii. Tighten any loose connections on the wires and control circuit
 - iii. Check the functioning of the sensors and repair or replace where required
 - iv. Replace any damaged emergency lights
 - v. Replace any faulty components in the cranes circuits
 - vi. Lights to be inspected and replaced if required
 - vii. Any mechanical failure on the cranes must be repaired
 - viii. Report any defective lights to the Supervisor or Responsible Person
 - ix. Any other deviations and defects must also be reported to the Supervisor or Responsible Person.

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- x. Fault finding on the cranes must be done in case of faults
- xi. Any faulty motor, motor drives and/or control circuit must be replaced or repaired where required.
- xii. Any default or defect that has a safety risk must be reported and attended to within 24 hours.

3.1.1.5 Oil Spillage Management

- a) The Contractor will be required to contain spillages and clean up oil/ grease spillages.
- b) The Contractor to compile a spillage procedure for the employer's approval.
- c) The philosophy around spillages is whoever spills pay.

3.1.1.6 Overhead Crane and Hoist Testing Requirements for Performance Tests

- a) Contractor must conduct performance testing including both operational performance testing and load performance testing. For any overhead crane, the manufacturer's guidance has precedence over this general guidance and the manufacturer's guidance shall be followed
- b) The following sequence and limitation shall be complied with when conducting performance tests:
 - i. Test rigging first
 - ii. Conduct the operational performance test before the load performance test
 - iii. Test the main hoist before testing the auxiliary or whip hoists
 - iv. Test loads shall be raised only to a height sufficient to perform the test
- c) The Contractor shall conduct visual inspection by a Crane Inspector of the cranes installation, is required prior to testing.
- d) The following tests are required after inspection:
 - i. Load testing to manufacturing standards or to 110% of the maximum Safe Working Load if the manufacturing standard is not available.
 - ii. Deflection tests to be carried out in accordance with the standard which crane was manufactured or 1/750th of the span under maximum safe working load if the standard does not specify deflection.
 - iii. Test the operation of the hoist brake with the power supply turned off and maximum safe working load applied.

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3.2 Exclusions

- a. Scaffolding & Insulation
- b. Non Destructive Testing
- c. Unauthorised Modifications

4. Acceptance

This document has been seen and accepted by:

Name	Designation

5. Revisions

Date	Rev.	Compiler	Remarks
May 2022	04		3 th Review
October 2016	03		2 nd Review
September 2015	02		1 st Review
July 2013	01		First Issue

6. Development Team

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

Name	Surname	Designation

7. Acknowledgements

Revision 1 & 2 Development Teams

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Appendix A - Overhead Cranes and Hoist List

No.	Description/Location	KKS	QTY	Installed	SWL (KG)
	Single girder bridge crane				
1	Absorber pump area A & B	00HTD13-23AE001	2	1	
2	ACC CT condensate extraction pump		6	3	
3	Condensate Polishing Building Crane	1 0ULD10 AE001	6	3	
4	West Compressor Building Crane	0 1UTF10 AE001	1	0	
5	East Compressor Building Crane	0 2UTF10 AE001	1	1	
6	Steam Cleaning and Refuse Crane	0 1UYQ10 AE001	1		
7	Holding & Recycle Dam Pump Building Crane	0 1UGM10 AE001	1		
	Double Girder Bridge Crane				
8	Ash Dump Pump Building		2	2	
9	Ash Dump Workshop Crane		1	1	
10	Fly ash conditioning		1	1	
11	Dewatering bridge crane	00HTN30AE002	1	1	
12	Reagent system bridge crane	00HTK10AE002	1	1	
13	Turbine Hall Main Overhead Crane	00SMT10	2	2	
14	Water Treatment Building Crane	0 0UGD10 AE003	4	4	
15	Workshop and Stores Crane	0 0UST10 AE001-2	2	0	
	Semi Portal Crane				
16	Turbine Hall Main Semi Portal Crane		2	2	
	Electric Chain Hoist				
17	Absorber suction valve hoist	10-60HTD20AE001	6		
18	ACC electrical hoist		6		
19	Daily Issue Oil Store hoist	0 1USU10 AE001-10	10		
20	Diesel Generator Building hoist	0 0UBN10 AE001-3	3		
21	Station Dirty Dam Pump Building hoist	0 0UGM10 AE001-2	2	2	
22	Transfer house maintenance hoist and trolley	0 0UED02-09 AE001-7	2		
23	Vacuum pumps hoist (dewatering building)	00HTN30AE003	1	1	
24	Degrit sump		16		
	Electric wire hoist				
25	Absorber expansion joint hoist	10-60HTD20AE002	6		
26	Absorber mist eliminator module hoist	10-60HTD42AE001	8		
27	Dewatering building classifier hoist	00HTN30AE001	1	1	
28	Reagent day bin hoist	00HJT10-30AE001	3		

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29	Reagent preparation building hydro-cyclones hoist	00HTK10AE001	1		
30	Above coal bunkers		18		
31	Under silo building hoist	01 UEB 01 AE 001-6	12		
	Manual Chain Hoist				
32	Condensate Polishing Building Hoist	10-60ULD10 AE002-4	24		
33	Fire Water Pump Building Hoist and Trolley	0 0USG10 AE001-2	2	2	
34	Mist eliminator pump hoist	00HTQ69-72AE001-2	8		
35	Waste Water Treatment Plant Hoist and Trolley		0		
	Jib Cranes				
36	Fly ash degrit sump		4	4	

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