

	Scope of Work	Kusile Power Station
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Title: **Kusile Power Station Mechanical
Evaporators Refurbishment Scope of Work**

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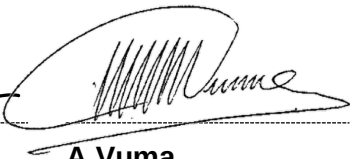
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Content	Page
1. Introduction.....	3
2. Supporting Clauses	3
2.1 Scope.....	3
2.1.1 Purpose.....	3
2.1.2 Applicability	3
2.1.3 Effective date.....	3
2.2 Normative/Informative References	3
2.2.1 Normative.....	3
2.2.2 Informative.....	3
2.3 Definitions	3
2.3.1 KKS.....	3
2.3.2 Mechanical evaporation:.....	4
2.4 Abbreviations	4
2.5 Roles and Responsibilities	4
2.5.1 Contractor	4
2.5.2 Employer	4
2.6 Process for Monitoring.....	4
2.7 Related/Supporting Documents.....	4
3. Mechanical Evaporators Refurbishment Scope of Work	5
3.1 Plant Specification.....	5
3.2 Scope of Work.....	5
3.3 Plant Availability	8
3.4 Warranties and Guarantees.....	8
4. Acceptance.....	8
5. Revisions.....	9
6. Development Team	9
7. Acknowledgements	9

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1. Introduction

The Station previously installed six mechanical evaporators at the Ash Dump Dirty Dam (ADDD) as a mitigation for high water levels at the dam. The evaporators have been running when required with little to no maintenance on the equipment.

A suitably qualified Contractor is required to refurbish and commission the equipment. The mechanical evaporators play a critical role in the management of dirty water on the Station.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

The purpose of the works is to reinstate the Station's mechanical evaporators to their original design condition to improve the equipment's effectiveness at the ADDD.

2.1.2 Applicability

This document applies to Kusile Power Station only.

2.1.3 Effective date

This document will be effective from the date of its 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] KUS-20231180 400V ADDD Evaporators Switchgear Replacement – Technical Specification

2.2.2 Informative

Not applicable

2.3 Definitions

2.3.1 KKS

The KKS Code is an approved identification code for power plants, sections of the plant, equipment, items of the equipment and it consists of alpha letters and numbers.

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2.3.2 Mechanical evaporation:

Mechanical evaporation is a process that uses mechanical energy to remove water from a solution.

2.4 Abbreviations

Abbreviation	Explanation
ADDD	Ash Dump Dirty Dam
HDA	Heavy Duty Gravity Die-Cast Aluminium
HVAC	Heating, Ventilation and Air Conditioning
ITP	Inspection, Testing Plan
KKS	Kraftwerk Kennzeichnen System (German term for Power plant Classification system)
MCC	Motor Control Centre
P&ID	Piping and Instrumentation Diagram
QCP	Quality Control Procedure

2.5 Roles and Responsibilities

2.5.1 Contractor

- a) Execute the defined scope according to contractual agreements.
- b) Submit an inspection report for approval by the Employer.
- c) Commission the plant.
- d) Compile a data pack at the completion of the scope.

2.5.2 Employer

- a) Review and approves the Contractor's method statement procedure, Quality Control Procedure (QCP) and Inspection, Testing Plan (ITP).
- b) Is present for all applicable points of the ITP.
- c) Provide Engineering support for the technical assurance of the plant.

2.6 Process for Monitoring

This scope of works will be revised on an as required basis.

2.7 Related/Supporting Documents

Not applicable.

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3. Mechanical Evaporators Refurbishment Scope of Work

3.1 Plant Specification

3.1.1 45kW Rhino Evaporator 380V

- a) Rhino Evaporator on single centre shaft mounted onto a chassis equipped with heavy duty gravity die-cast aluminium (HDA) impeller, and cowling manufactured from 304 stainless steel with 304 stainless steel safety guard in front of fan blade.
- b) Skid mounted.
- c) 45 kW BMG motor.
- d) Hydraulic hand pump and cylinder for the tilting operation of cowling.
- e) Manual oscillation.
- f) Stainless steel nozzle ring manifold with 24 nozzles.
- g) Manifold water supply line with 50mm stainless steel ball lever valve, 50 mm stainless steel strainer and 20mm dump valve.
- h) Pressure gauge (0 – 1600kPa range).
- i) Flexible braided hose to allow for tilting.

3.1.2 Booster Pumps

- a) Duty: 90m³/h at 7 – 9 Bar.
- b) ECW 65/320 end suction pump in cast iron construction, packed gland.
- c) 285mm diameter impeller.
- d) Directly driven by a 45kW, 380 Volt, 2900 RPM motor complete with coupling, guard, mild steel baseplate.
- e) 10 x 150mm Heliflex suction hose with foot valve, strainer, and pipe float.

3.2 Scope of Work

3.2.1 Execution of Refurbishment

The Contractor is required to conduct a detailed inspection of the six mechanical evaporators and associated equipment, submit a scope and project schedule for review and acceptance by the Employer.

The scope must identify all the components that have to be repaired and replaced. All the materials required for the refurbishment must be provided by the Contractor.

The scope must include the plant listed below:

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3.2.1.1 Mechanical Evaporators

The Contractor is required to remove the six (i.e., 6) mechanical evaporators and associated components (i.e., section 3.1.1) from site for a thorough inspection. The Contractor must submit an inspection report that details the work required on each mechanical evaporator for acceptance by the Employer. The mechanical evaporators must be refurbished as agreed to by the Employer.

The Contractor must install the refurbished mechanical evaporators using existing brackets, bolts, nuts, and washers. Existing items that cannot be reused must be supplied by the Contractor after being approved by the Employer.

3.2.1.2 Evaporator motor

The Contractor is required to remove the twelve (i.e., 12) evaporator motors (i.e., section 3.1.1 and 3.1.2) from site for a thorough inspection. The Contractor must submit an inspection report that details the work required on each motor for acceptance by the Employer. The motors must be refurbished or replaced as agreed to by the Employer.

The Contractor must install the refurbished motors, using existing power cables, supports, brackets, bolts, nuts, and washers. Existing items that cannot be reused must be supplied by the Contractor after being approved by the Employer.

3.2.1.3 Booster Pump

The Contractor is required to remove the six (i.e., 6) booster pumps (i.e., section 3.1.2) from site for a thorough inspection. The Contractor must submit an inspection report that details the work required on each pump and motor for acceptance by the Employer. The booster pumps must be refurbished or replaced as agreed to by the Employer.

The Contractor must install the refurbished booster pumps, using existing power cables, supports, brackets, bolts, nuts and washers. Existing items that cannot be reused must be supplied by the Contractor after being approved by the Employer.

3.2.2 Welding Standard

The Contractor shall ensure that the parties performing welding during the refurbishment of the mechanical evaporator and associated equipment must have ISO 3834 Part 2 accreditation.

3.2.3 Quality

Work must be done only with a quality control plan (QCP) approved by the Employer. A QCP must be submitted to the Employer for all that will be done at least 3 days before that part of the work starts. QCP's and related documentation shall be subject to comment and approval by the Employer's.

QCP's will make provision for signatures for interventions by at least the Contractor's Representative and the Employer's Representative. Intervention points will be signed as the work progresses and no backdating will be allowed. Notification for hold and witness points shall be sent at least 24 hours in advance.

The following minimum hold points must be included for the Employer's Quality Control

Department:

- a) Approval of QCP

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- b) Approval of "As Required" arrangement and dimensional drawings.
- c) Review of Visual Inspection and NDT Reports
- d) Final Sign off and Acceptance
- e) Final Databook Review

3.2.4 Plant Labelling

The Contractor shall manufacture and install KKS labels to all identified plant items in compliance with labelling ergonomics and relevant material type. The Contractor must ensure that labels are not attached or installed into removable equipment or components but rather on non-removable structures as near to it as possible to point of configuration item location or position (without compromising identity of exact equipment). Any deviation or concession from coding and labelling standards must be pre-approved by the Employer lead before any work execution.

3.2.5 Commissioning

Before commissioning of the plant, the Contractor verifies that all re-assembled and newly installed components are correctly installed and aligned to the existing plant configurations with the necessary plant labels installed. Once verified, the Contractor will be required to perform plant and system commissioning with assistance from the Employer's personnel.

The mechanical evaporators are designed to facilitate the evaporation of between 2,000m³ and 5,000m³ a day, weather depending. After commissioning, the Contractor must demonstrate the refurbished plant's capability to facilitate evaporation of water from the ADDD with a two-month effectiveness study.

The Contractor shall submit a proposed procedure for all tests (including for the tests on completion and the tests after completion) to the Engineer, for approval. These procedures shall be developed to suitably and properly demonstrate that the equipment meets the Employer's Requirements. Commissioning will be executed in accordance with the requirements and procedures approved by the Engineer.

3.2.6 Waste Removal

The Contractor disposes of all waste generated during the cleaning process according to the Employer's waste management procedure. The demarcated area will be communicated, in writing, to the Contractor.

3.2.7 Data Pack

The Contractor must submit the following plant related documents to the Employer upon completion of the work:

- a) All relevant manufacturer's inspection and test certificates
- b) Material certificates
- c) Pump datasheets
- d) Detail design drawings

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- e) Detail design calculations of Cooling system
- f) Equipment list
- g) Piping and instrumentation diagram (P&ID)
- h) Operating and maintenance manuals
- i) Manufacturer 'as-built' drawings
- j) Photocopy of nameplates
- k) Installation inspection certificates
- l) Test and safety clearance certificates

3.2.8 Inspection Test Points (ITP)/Quality Control Plan (QCP)

The Contractor develops inspection test points (ITP) and Quality Control Plan (QCP) for all activities to be performed during the works. The ITP's/QCP's must be submitted for review and acceptance by the Employer before any activity to which they apply commences. The signed ITP's/QCP's must be submitted in the data pack referred to in section 3.2.5.

3.3 Plant Availability

The equipment on the newly refurbished and reinstated mechanical evaporator is required to last for between 10 years before requiring refurbishment again with routine maintenance.

3.4 Warranties and Guarantees

The Contractor is to guarantee the quality of the works performed and remedy any workmanship related defects for a period of 24 months post the commissioning and testing of the mechanical evaporator and associated equipment. This guarantee excludes wear and tear as well as damaged caused by external factors and replacement of parts.

4. Acceptance

This document has been seen and accepted by:

Name	Designation

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5. Revisions

Date	Rev.	Compiler	Remarks
May 2024	2	H Malatsi	Revised SOW, the electrical works were removed from the scope.
November 2023	1	K Kgaladi	New document

6. Development Team

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

- Keoagile Kgaladi

7. Acknowledgements

Not applicable.

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