Eskom	Technical Specification	Technology

Title: **Kriel H2 coolers and Slip ring coolers cleaning - Scope of work**

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Compiled by	Functional Responsibility	Authorized by
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1. Introduction

Chemical cleaning is required to remove accumulated deposits on the heat exchanger surfaces which adversely affect the performance and availability of the equipment. The accumulated deposits reduce heat transfer restrict flow, foster corrosion of the underlying metal and ultimately result in tube failures.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

To remove the accumulated deposits by dissolving them in an inhibited chemical to ensure functional and long-term availability of the heat exchangers. The scope only covers cleaning and delivery to site. Note the installation and removal from generator is excluded here. The scope covers the following areas:

- Slip ring coolers
- H2 coolers

2.1.2 Applicability

This document shall apply to Kriel Power Station.

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] 240-107677940 – Specification Standard for High Pressure Water Jetting of Condenser andHeat Exchanger Tubes

[2] 240-56030499: Condenser Healthcare Guideline, Revision 1

2.2.2 Informative

N/A

2.3 Definitions

Definition	Description
None	

2.4 Abbreviations

Abbreviation	Explanation
ID	Internal Diameter
IP	Internet Protocol
MP	Mega Pixel
MPa	Mega Pascal
OD	Outside Diameter
QCP	Quality Control Plan
H2	Hydrogen

2.5 Roles and Responsibilities

Engineering: Compile scope of work/ works information, Inspections

Asset Management: Review scope of work, conduct Inspections.

Outages: Manage the contract during outages, and co-ordinate scope execution, conducts inspection.

Maintenance: Manages, supervise the contractor during execution, conducts inspection, Employer QC.

3. Scope of Work Overview

3.1 Specification of coolers

Description	H2 coolers (4 per unit)	Slip Ring coolers (4 per unit)
Tube ID [mm]	22	22
Tube OD [mm]	24	16
Tube length [mm]	3320	2200
Number of tubes	126	24
Tube Material	Admiralty brass	brass
Fins Material	Copper	Copper

3.2 Scope of Work

The following scope to be executed on unitized 4 off H2 coolers and 4 off Slip ring coolers.

a. Clean all four cooler tubes by means chemical cleaning. All the scale in the tubes should be removed. The coolers are made of Brass tubes: Commence circulation and begin acid injection: 5 - 6% HCl. This cleaning solution is only suitable for removal of calcium carbonate deposits/scales. The acid solution is required to be inhibited with the correct concentration of appropriate inhibitor. The acid concentration shall not at any time exceed 7.5% by mass. Continue circulation and acid injection until the acid has been added.
b. HP cleaning at 300 bars to be conducted on all the tubes after chemical cleaning to remove loose flakes or debris in the tubes.
c. An endoscope to be run through the length of all the tubes to check for cleanliness.
d. Conduct hydraulic test on the coolers at 4 bar pressure for 30 minutes. Only gauges calibrated every year by an SANAS Accredited Laboratory shall be used. Where tubes are found to be leaking on the tube expansion area, the following to be executed on inspection and approval by engineer:
    - Inspect tube expansion points and expand where possible
    - The Contractor shall propose an expansion map or sequence to minimize any distortion of tube plate.
    - Roller expanders will be cleaned at least after every 5 tubes, and will be lubricated for each tube.
    - Rotate manually and inspect rollers and verify free movement and inspect mandrill shaft for defects (score, abrasion & pitting).
    - Verify torque setting on expander torque scale to be correct and ensure that locking mechanism is in fixed.
e. Plug leaking tubes that cannot be repaired by using rubber plugs, ensure complete sealing of all leaking tubes. Note steel plugs will not be allowed.
f. All broken studs should be removed and replaced
g. An inspection of damaged covers and whether replacement is necessary or not will solely be on Eskom discretion.
h. Check and repair sealing faces to ensure no leakage of liquid or gas
i. Damaged bolt holes for the water box on the tube sheet to be repaired. A repair by drill and

tap to be reported to site engineer before work execution.

j. Clean out the find with a suitable solvent to remove oil and grease, air blow the fins with air to remove any debris at a pressure not more than of 2.0 bar (g). A provision for repairing damaged fins should be made by the contractor.

k. A detailed report of the scope above shall be provided to Eskom as part of the hand over package.

l. Note the coolers to be collected from site and delivered once the work is completed. Eskom to provide rigging and lifting equipment for loading and offloading. Coolers to be transported in designated box and supported to protect damage.

4. Roles and Responsibilities

The following table gives the roles and responsibilities during execution:

Scope of Work	Responsible Person
Isolation and Permit to Work.	*Employer*
Removal from generator	*Employer*
Site access to heat exchangers.	*Contractor & Employer*
Load coolers in boxes	*Employer*
Load and offload coolers to/from contractors' truck	*Employer*
Clean the coolers as per scope	*Contractor*
Deliver to site	*Contractor*

5. Technical Tender Returnables

5.1 Mandatory Tender Returnables

1. The Contractor shall provide proof of ISO 3834 Part 2 certification. [Yes/No]

5.2 Qualitative Technical Tender Returnables

Phase one will consist of a desktop review of the following. If a score of more than 70% is achieved for phase one, phase 2 will be done and scored. Tenderers need to obtain a minimum weighted score of 70% overall or more for both phases to technically qualify for further evaluation

1. Exclusions or deviations from the above specification. If no exclusions or deviations, a specific statement to this effect is to be included in the tender.
2. The Contractor shall provide a verifiable reference list of chemical cleaning projects in which at least 5 industrial shell and tube heat exchangers (preferably on admiralty brass tubing) has been

successfully conducted in the past 5 years. Submit order number for service, proof of previous chemical cleaning activities in Power plant or similar industries.

3. Project specific Quality Control Plan (QCP) or Inspection & Test Plan (ITP) that will be used. Must be detailed and as per the scope of work and the method statement for H2 coolers.
4. Detailed method statement as per scope of work. Method statement should be detailed and comprehensive as per the requirements, failure to demonstrate clear understanding of the SOW will automatically result in a floor rating.
5. ECSA Registration number and name of Professional Engineer who will approve procedures of the works.

6. Acceptance

This document has been seen and accepted by:

Name	Designation
Gontse Mathibedi	Senior Engineer
Zacharia Ledwaba	Turbine Engineering Manager (Acting)
Sammy Joe Mathabatha	Turbine Engineer
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7. Revisions

Date	Rev.	Compiler	Remarks
Feb 2025	1	G Mathibedi	First Issue

8. Development Team

N/A

9. Acknowledgements

N/A