Eskom	Standard	Generation Engineering

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Compiled by	Approved by	Authorised by
…….	…….	…….
Nomthetho Nkwali	**Tshidi Ngoasheng**	**Dheshan Naran**
Metallurgical Engineer	**Senior Advisor: Generation Engineering**	**Materials & Plant Integrity Senior Manager (Acting): Generation Engineering**
Date: 21 September 2023	Date: 21/ 09/2020	Date: ……

Supported by SCOT TC

……..

Marlize André

Power Plant TC Chairman

Date: ……

PCM Reference: **Manage Maintenance Base**

SCOT Study Committee Number/Name: **Material NDE and Welding**

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1. INTRODUCTION

This standard provides the minimum requirements for approvals of companies intending to offer the metallographic replication service to Eskom power plants. The document is intended to give processes to follow when approving new service providers and managing the existing ones for replica lifting on both HP Pipework and Turbine components.

2. SUPPORTING CLAUSES

2.1 SCOPE

The document covers the system that Eskom employs to manage the replication service proposals for new companies and the performance evaluation of existing service providers.

2.1.1 Purpose

The purpose of this document is to ensure that Eskom's requirements are consistently met by all replication companies and clarify measures that Eskom shall take against any company that deviates from this standard.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings SOC Limited Generation Power Plants.

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] ISO 9001 Quality Management Systems.

[2] 240-71443868: Standard for Evaluation of Surface Microstructures Using the Metallographic Replication Technique

[3] 240-75109745: Metallographic Replication Procedure Applicable to High Temperature High Pressure Components on Eskom Plant

[4] 240-75114345: Standard for Metallographic Replication Applicable to High Temperature High Pressure Turbine and Generator Components on Eskom Plant

[5] 240-83539806 Manual Ultrasonic Wall Thickness Testing on Eskom Power Plants

2.2.2 Informative

[6] None

2.3 DEFINITIONS

Definition	Description
Company	A service provider approved by Physical Metallurgy Section to perform the duties of taking metallographic replicas on Eskom plants
Site Representative	An Eskom appointed Metallurgical Engineer/Technologist/Advisor that is responsible for advising a Power Station with regard to remaining life analysis of high temperature high pressure components
Service Provider	An organisation that needs approval/approved by Physical Metallurgy and Structural Integrity to perform the duties of taking metallographic replicas on Eskom plants

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2.3.1 Disclosure Classification

Controlled Disclosure: Controlled Disclosure to external parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
ESMQR	Eskom Metallographic Quality Representative
HP	High Pressure Components
NCR	Non-Conformance Report
QC	Quality Control
QCP	Quality Control Plan
WHMIS	Workplace Hazardous Material Information System

2.5 ROLES AND RESPONSIBILITIES

2.5.1 Company

The service provider must submit a request or proposal (detailing the company profile, with the proposition letter to render replication services) to the Physical Metallurgy and Structural Integrity section together with their internal Metallographic Replication Procedures (if their procedures differ from the Eskom standards) and the Quality Control Plan (QCP). Should the above- mentioned documents be approved by the Physical Metallurgy and Structural Integrity section, the following will be required:

1. Names of the company personnel and Identity numbers and levels of approval for:

- Responsible Metallurgist.
- Supervision approval will include site knowledge and replication procedure knowledge, which will be assessed by means of a written exam. QC approval will include replica quality, understanding labeling and addressing replica quality issues.
- Site Supervisor (Supervisor and replication approval) approval will include understanding the basics of replica preparation, labeling knowledge, i.e., positions on site and component descriptions.
- Quality Control technician (QC approval).
- Replica technician (Replication approval).
- Replica preparation technician (Basic surface preparation approval).
- Admin support (Labeling approval) approval will include basic knowledge of the plant and components, i.e., Unit, Pipework System and Area (U1, 3:00 up-stream). Labeling standard with regards to rework and additional work.

2. Arrangements for the practical and theoretical evaluation dates for the evaluation of the technicians and the Metallurgist, which will take place at the Physical Metallurgy and Structural Integrity premises, must be made via the ESMQR. The evaluation will require the individuals to have the following knowledge:

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Theoretical evaluation:

- Knowledge of metallography (QC technician and Metallurgist).
- Knowledge of the Eskom plant.
- Knowledge of Eskom's Metallographic Replication Standard, for the boiler or turbine plant whichever is applicable.
- On-site safety (all except for Labeling technicians – Including Workplace hazardous material information system WHMIS training).
- Quality requirements and cleanliness especially important in the turbine plant (all except for Labeling technicians).

Practical evaluation on the following materials:

- Carbon steel.
- Low alloy steel.
- 12 Cr steel.
- Austenitic steels.

2.5.2 Eskom Quality Representative (ESMQR)

- Responsible for the management of service providers.
- Approve all replica lifting service providers.
- Keep record of all the replicas evaluated and record all rejected replicas as a percentage of total replicas evaluated per service provider.
- Ensure that the service provider's performance record is available.
- Liaising with service providers in case of quality problems.
- Site visits to power stations to ensure compliance to the Eskom Standard for Metallographic Replication Applicable to High Temperature High Pressure Components in Eskom Plant (Unique Identifier: 240-75109745) and Standard for Metallographic Replication Applicable to High Temperature High Pressure Turbine and Generator Components on Eskom Plant Unique Identifier: 240-75114345).

2.5.3 Site Representative

Assists the ESMQR with the service provider assessments and approvals for HP Pipework and Turbine components

2.6 PROCESS FOR MONITORING

It is the responsibility of the ESMQR to approve the proposal, Metallographic Replication procedure and the Quality Control Plan for new companies and monitor the performance of existing service providers by arranging quality spot checks as and when required.

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2.7 RELATED/SUPPORTING DOCUMENTS

Document Code	Document Title
240-75114345	Metallographic Replication Standard Applicable to High Temperature High Pressure Turbine and Generator Components on Eskom Plant
240-75109745	Metallographic Replication Standard Applicable to High Temperature High Pressure Components on Eskom Plants

3. METALLOGRAPHIC REPLICATION APPROVAL PROCESS

3.1 NEW COMPANY APPROVAL

The company intending to offer a replication service to Eskom must submit all mandatory documents, as stipulated in 2.5.1 above, to the Physical Metallurgy and Structural Integrity section for approval. All new companies are limited to High Pressure pipework replication service. Upon approval of these documents, the process below will be followed:

- The company must submit the names (have at least 5 new technicians) and qualifications of their replication team. The technicians must not be freelancers and must be permanently employed with the company.
- The date and time for theoretical and practical evaluation will be communicated to the company once all the required documents have been retained. The appointment will be sent via email together with Eskom safety rules.
- On the day of the evaluation each technician will independently write an examination to assess their knowledge of Eskom's Metallographic Replication Standard.
- Upon completion of the examination, each technician will be required to practically lift two replicas from two different materials. The technicians will only be allowed a maximum of two (2) hours to perform the replication.
- No preparation technician will be allowed for new companies. Allowance will be at the discretion of the Eskom Replica Quality Representative based on the performance of the technician.
- The Metallurgist of the said company will be tested on replica quality evaluation.
- The Physical Metallurgy and Structural Integrity section will then review the results of the theoretical and practical evaluation and approve staff according to the levels (as specified on Unique Identifier: 240-75109745 Eskom's Standard for Metallographic Replication Applicable to High Temperature High Pressure Components in Eskom Plant).
- Once the company technicians and Metallurgist have passed the evaluation, a six months' approval will be issued to the service provider.
- This approval is valid for the specified technicians and Metallurgist and is only valid for the period that the technicians and the Metallurgist remain employed by that particular service provider. The service provider should inform the Physical Metallurgy and Structural Integrity section if an approved technician and/or Metallurgist is dismissed or has resigned from the company.
- The company is expected to have in excess of two year's HP pipework components replication experience before they may be considered for turbine components replication approval and only technicians and the Metallurgist that remained with the said company over this period are qualified for evaluation. During this period the company must meet Eskom's replication quality expectations on HP pipework fully.
- Should the company fail to adhere to Eskom Standard for Metallographic Replication Applicable to High Temperature High Pressure Components in Eskom Plant (Unique Identifier : 240-75109745),

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Standard for Metallographic Replication Applicable to High Temperature High Pressure Turbine and Generator Components on Eskom Plant (Unique Identifier : 240-75114345) and Manual Ultrasonic Wall Thickness Testing on Eskom Power Plants (Unique Identifier : 240-83539806), it will be suspended for six months and during this period it must re-train its technicians and re-apply for evaluation

3.2 EXISTING COMPANY APPROVAL

These are the companies that already have HP Pipework and Turbine replication approval with Eskom. The service provider management of these companies will be as follows:

- Re-approval to be renewed on a yearly basis based on the previous year's overall performance of the company.
- The service provider must submit a request for re-approval by providing the Physical Metallurgy and Structural Integrity section with all the names of their current staff with identity numbers and level of approval required for evaluation.
- Should a re-test or discussion be required the company will be informed at the time of the request.
- Part of the approval and review system will be continuous site audits to ensure the approved QCP and procedures are being managed on site by all service providers. Furthermore, the replication reject rate should be below 3% per contract, which will be measured based on rejected slides due to poor quality, incorrectly labelled boxes, and incomplete/error transmittal sheets.
- NCR's will be raised should there be deviations which can lead to revoking of the company's Eskom approvals.

3.2.1 Withdrawal of Replication Approval

The Physical Metallurgy and Structural Integrity section will verbally notify the service provider of any quality control concerns followed up with an e-mail. Should the concerns raised in the email not be addressed to the satisfaction of Physical Metallurgy and Structural Integrity and the problem experienced continues or verbal/email concerns are raised three times within 3 months, an NCR will be raised against the company. The NCR must be addressed and resolved within 7 working days, failure to do so will result in the approval being withdrawn within 30 working days (to give Eskom power stations adequate time to source alternative service providers).

Should a company's approval be revoked, the company will have to submit the following:

- A request for re-approval with a root cause analysis report.
- An action list stating what actions have been implemented to address the concerns raised by the Physical Metallurgy and Structural Integrity section.
- The technicians and Metallurgist must attend an evaluation at the premises of the Physical Metallurgy and Structural Integrity section as per the process stated on 3.1 above.

After provisional approval an audit will be carried out by Physical Metallurgy and Structural Integrity to ensure that the action plan has been implemented and all concerns have been addressed. Should there be other quality concerns within 3 years of re-approval; the replication approval will be permanently withdrawn.

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4. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
Tshidi Ngoasheng	Senior Technician
Lerato Mahau	Senior Technician
Ndifelani Radzuma	Senior Technician
Koelekoele Manabile	Senior Technician
Ntsoaki Tshikhudo	Senior Technician
Fikile Malindi	Technician
Andrew Downes	Chief Engineer
Michael Mkhize	Chief Engineer
Werner Smit	Chief Engineer
Thobeka Pete	Chief Engineer (Materials)
Felicia Ramela	Act. Manager – Physical Metallurgy & Structural Integrity
Sipho Msimango	Senior Engineer – Metallurgical Site Representative
Tebogo Molokwane	Senior Engineer – Metallurgical Site Representative
Eliza Dlamini	Senior Engineer – Metallurgical Site Representative
Mhakamuni Makamu	Senior Engineer – Metallurgical Site Representative
Moripi Mogashwa	Senior Engineer
Makhebele Maake	Metallurgical Site Representative
Aluwani Mabada	Metallurgical Site Representative
Johann Retief	Metallurgical Site Representative
Malekone Maupi	Metallurgical Site Representative
Rudzani Mukwevho	Metallurgical Site Representative
Lindani Meyiwa	Metallurgical Site Representative
Tsholo Nkoana	Metallurgical Site Representative
Shonees Sterris	Metallurgical Site Representative
Sibusiso Moloi	Metallurgical Site Representative
Boitumelo Leso	Metallurgical Site Representative
Kateko Ndlovu	Metallurgical Site Representative
Nakampe Maake	Metallurgical Site Representative
Awelani Shotheli	Metallurgical Site Representative
Kea Mputla	Metallurgical Site Representative
Prince Dlamini	Chief Engineer
Kediemetse Moloko	Chief Engineer (Corrosion)
Rohit Bhagwandas	Chief Engineer (Stress and Vibration)
Liezel Strydom	Mechanical Engineer
Noko Pheta	Senior Engineer
Thapelo Lesola	Mechanical Engineer
Dheshan Naran	Act. Senior Manager – Materials & Plant Integrity
Morris Maroga	Corporate Specialist (Materials)
Felix Bosch	Generation Engineering Document Manager

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5. REVISIONS

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November 2014	0	T Ngoasheng	First Draft Document
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February 2015	1	T Ngoasheng	Final Document for Authorisation and Publication
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November 2017	1.2	T Ngoasheng	Draft Document for Comments Review Process
6 December 2017	2	T Ngoasheng	Final Document for Authorisation and Publication
June 2023	2.1	N Nkwali	Draft Document for Comments Review Process
August 2023	2.2	N Nkwali	Updated Draft after Comments Review Process
August 2023	2.3	N Nkwali	Updated Draft after Comments Review Process
September 2023	2.4	N Nkwali	Updated Draft after Comments Review Process
September 2023	3	N Nkwali	Final Rev 3 Document for Authorisation and Publication

6. DEVELOPMENT TEAM

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

- T Ngoasheng
- N Mbatha
- W Smit
- F Havinga

7. ACKNOWLEDGEMENTS

- Special thanks to everyone who assisted in compiling this document

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