

 Eskom	Strategy	Medupi Power Station
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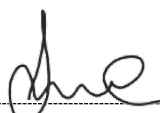
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1. INTRODUCTION

The Scope of Work herein was written for the placement of a contract for Medupi Power Station to supply metallographic replication on medium and high pressure pipework systems and turbine systems, supply of Drone Inspections services as well as services for Tube SOLO (Steam Side Oxide Life Optimisation) on boiler superheater and reheater tubes. The scope of work is applicable for online and offline outage work and other inspections routine that falls within the outage scope.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document covers the technical scope of work for the establishment of metallographic replication, drone inspections and Tube SOLO (Outage) services contract for Medupi Power Station.

2.1.1 Purpose

The station is expected to perform at 92% UCF, 6% PCLF and 2% UCLF (less than 0.5% for boiler tube leaks) and the specified Boiler Outage activities and Management strategy 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 set out in this document.

2.1.2 Applicability

This specification shall apply to all Outage employees as well as contracting employees that are required to perform Outage work and/or activities in support of the Medupi Outage Department on the Boiler Plant at Medupi Power Station.

2.1.3 Effective date

The effective date of this document will be the date of 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] 240-83539994: Standard for Non-destructive testing (NDT) on Eskom Plant
- [2] 240-134999797: Standard for Implementation of Tube-SOLO NDT on Eskom Coal Fired Plant
- [3] 240-75109745: Standard for Metallographic Replication Applicable to High Temperature High Pressure Components in Eskom Plants
- [4] 240-83539806: Manual Ultrasonic Wall Thickness Testing on Eskom Power Plants Standard
- [5] 240-124465578: Standard for Portable Hardness Testing
- [6] ISO9001: Quality Management System
- [7] 240-105658000: Supplier Quality Management Specification

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2.2.2 Informative

- [8] 32-1197: Outage management policy
- [9] 32-1310: Plan and schedule planned outages
- [10] 32-1312: Conduct planned outages
- [11] 32-1311: Close-out planned outages
- [12] 240-109304214: Medupi Power Station Pressure Parts Maintenance Strategy
- [13] 240-156100650: Medupi Power Station Master Test and Inspection Plan MGO
- [14] 240-156131158: Medupi Power Station Master Test and Inspection Plan GO

2.3 DEFINITIONS

Definition	Description
Boiler tube	A boiler thin wall component (operating at high pressure and temperature)
Contractor	Service provider contracted for supplying specific service to Eskom, Medupi Power Station
Employer	Eskom, or Eskom Medupi Power Station
Evaporator	A device in a process used to turn the liquid form of a chemical substance such as water into its gaseous-form/vapor
HP pipework system engineer	A system engineer in the power station's boiler plant engineering department, whose responsibilities include unfired small and big bore piping
Outage SOW	This is a document, compiled by Engineering, approved by the engineering manager and accepted by the outage manager detailing a scope of activities and tasks to be performed during a specified outage.
Pressure parts system engineer	A system engineer in the power station's boiler plant engineering department whose responsibilities include boiler fired piping and tubes
T-X months (Time minus X)	Where "X" is the number of months prior to outage start and T is the outage start date
Thick wall components	<p>Includes feedwater systems, main steam and reheat steam piping systems, all boiler integral piping, headers, and other thick wall components designed to operate above 200 °C and/or 2 MPa.</p> <p>The HP pipework system engineer will also be responsible for all drain lines and the control and instrumentation piping connected to these systems</p>
Thin wall components	Refers to boiler tubing in the heat exchange circuits of the boiler specifically but does not include any of the associated thick wall components

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Tube leak	Is considered to have occurred when a boiler tube's pressure boundary is broken by a leak or rupture
Tube-SOLO	Is an acronym for Tube Steam Oxide Life Optimisation. This includes the measurement of the thickness of boiler tube internal oxide and calculating the remaining life of the tube based on operating hours and creep curves.

2.3.1 Disclosure classification

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

2.4 ABBREVIATIONS

Abbreviation	Description
BTF	Boiler Tube Failure
GO	General Overhaul
HP	High Pressure
ID	Identifier
IP	Intermediate Pressure
LTOC	Long-term Overheating Creep
MGO	Mini General Overhaul
MPa	Megapascal
NDT	Non-Destructive Testing
NEC	New Engineering Contract
OD	Outside Diameter
PCLF	Planned Capability Loss Factor
RH	Reheater
RT&D	Research Testing and Development is a business unit in Eskom
SH	Superheater
SOW	Scope of Work
UCF	Unit Capability Factor
UCLF	Unplanned Capability Loss Factor
UT	Ultrasonic examination
WT	Wall Thickness

2.5 ROLES AND RESPONSIBILITIES

Supplier

The *supplier* shall comply with the specification of this scope of work, procurement process and other Eskom regulations.

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Engineer

Engineer will ensure that this process is initiated, followed up and executed at the best of Eskom's interest and will also ensure that *supplier* adheres to the requirement of the technical requirements.

Outages

Responsible for developing an outage plan for each planned outage, based upon the Outage SOW provided by the engineering function. This includes resourcing, financing, scheduling activities, the daily monitoring and control of outage activities, timely provision of the required services, and recording of history.

Maintenance

Provide assurance that all work executed complies with specified quality criteria, applicable codes, standards, laws or regulations and if nothing is specified, the work will comply with the original design requirements of the boiler.

2.6 PROCESS FOR MONITORING

In case of any additions, subtractions and/or amendments to the contents of the scope of work or any part of this document, prior the revision date, the Service Manager as per NEC shall request a System Engineer to effect the necessary changes and to use the most current approved template for new revision.

2.7 RELATED/SUPPORTING DOCUMENTS

N/A

3. SCOPE OF WORK

The scope of work covers the power station systems that the metallographic replication and Tube-SOLO NDT will be applied. It is the suppliers responsibility to have copies of Eskom standards particularly 240-7510974, 240-83539994 and 240-134999797 that details the roles and responsibilities of the supplier as well as the Eskom processes for personnel approval before they are permitted to perform metallographic replication, NDT and Tube-SOLO on Eskom plants.

The supplier shall provide all equipment and personnel per shift on as and when required basis to perform metallographic replication on Medupi plant according to a task order issued by Eskom (Herein referred to as the Employer).

The work will include all planned outages and may form part of the scope for planned and unplanned opportunity maintenance as well as per scope of work issued by Engineering and/or Outage departments.

3.1 METALLOGRAPHIC REPLICATION SCOPE OF WORK

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The components include: geometry welds, terminal welds, circumferential welds, seam welds, stub welds, branch welds, butt welds, spherical headers, bends, valves bodies, isolating blocks, end caps, T-pieces, T-pieces and spools in the following plan areas:

- Main Steam Pipework and associated Valves
- Hot Reheat Pipework and associated valves
- Cold Reheat Pipework and associated valves
- Feedwater Lines
- All Warming lines and associated valves
- Superheater and Re-heater Interconnecting Pipework and Circulation Pipework
- Superheaters, Evaporator and Reheater Headers – Butt Welds and attachment welds to the headers
- HP Turbine system
- IP turbine system
- Auxiliary system

Other plant areas may be added to the scope as and when required by the system engineer.

3.1.1 Training Prerequisites:

a. Minimum personnel requirements:

- i. 10 x Replica Technicians approved to perform metallographic replication on Eskom Plants.
- ii. One Metallurgist.

3.1.2 Positions to be Replicated

The areas that are prepared for replication must be polished and etched without any rejectable defects to ensure that metallographic evaluation is possible on a slide/film.

The following sizes are applicable:

- ☐ Size of film that can be evaluated
- ☐ minimum size of 10mm X 40mm.
- ☐ At least 15mm Parent Metal and 10mm WM must be visible if the replica is taken across a weldment.

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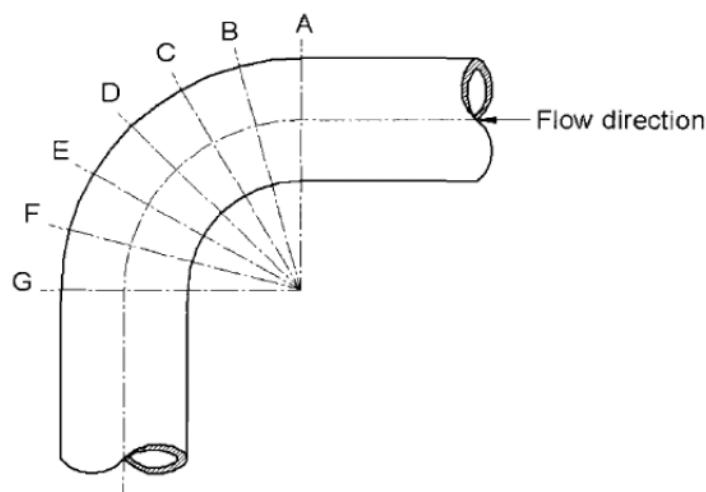


Figure 1a: Bend Location diagram.

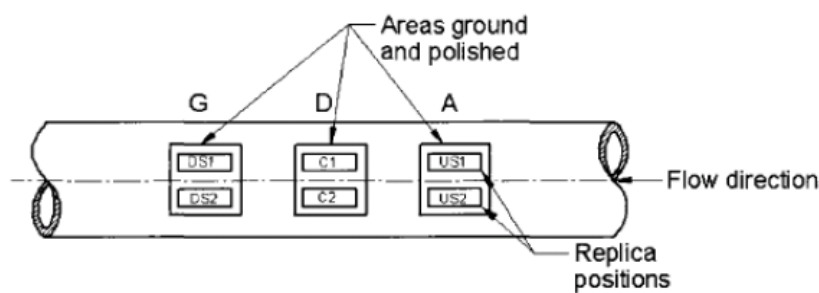


Figure 1b: Replica positions on the Extrados of a Bend. At least 400mm between areas are applicable for bends with an OD of at least 200mm.

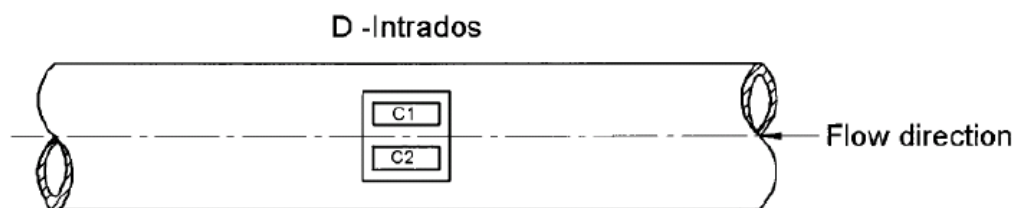


Figure 1c: Replica positions on the Intrados of a Bend.

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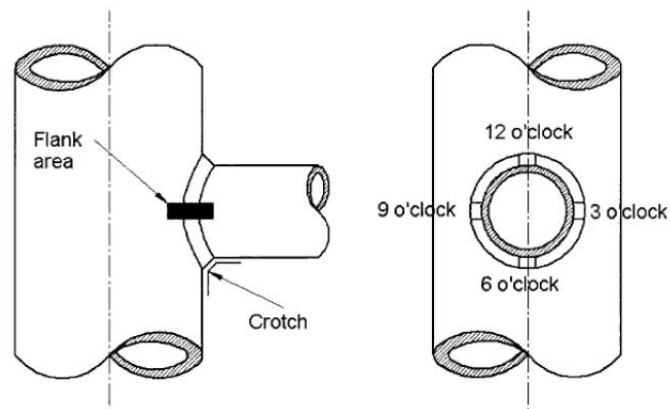


Figure 2a: Typical Branch, Stub & Attachment Weld positions to be replicated.

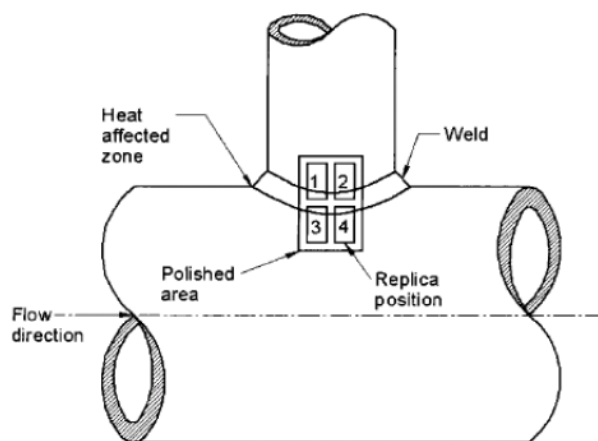


Figure 2b: Replica position on flank side of a branch/attachment weld. Note: If the branch or stub is less than 15mm thick, only do pipe side replicas (#3 and #4).

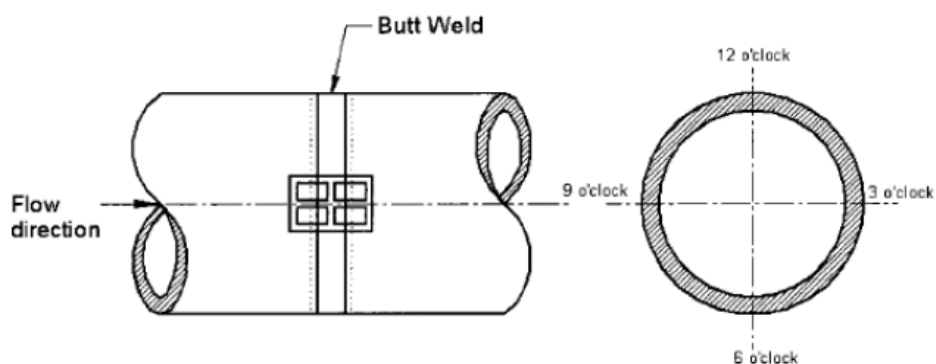


Figure 3a: Typical Butt Weld positions to be replicated.

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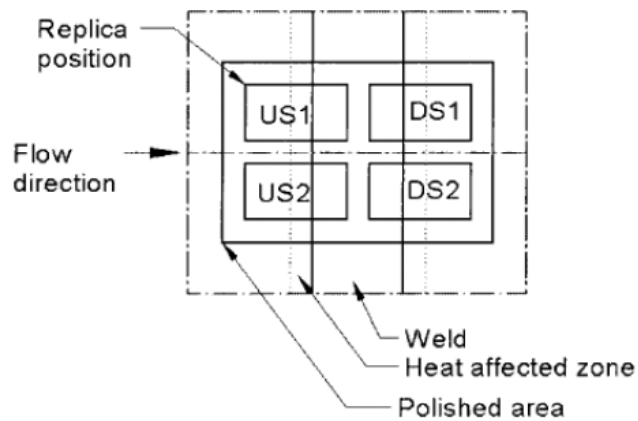


Figure 3b: Typical replica positions across a weld, note inclusion of Weld, HAZ & PM.

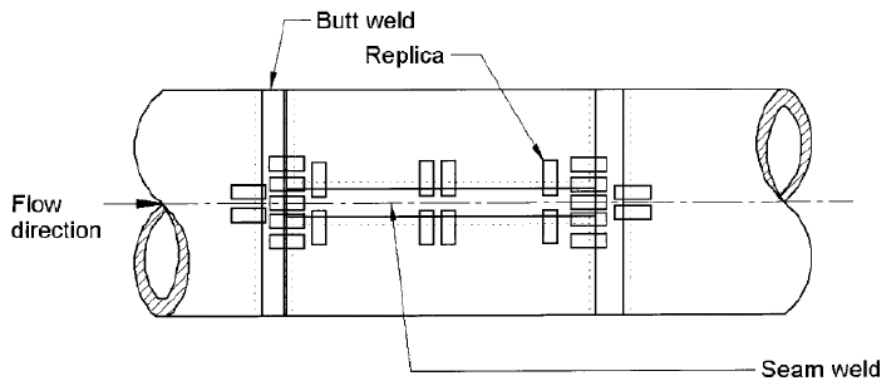


Figure 4a: Typical replica positions on a seam weld.

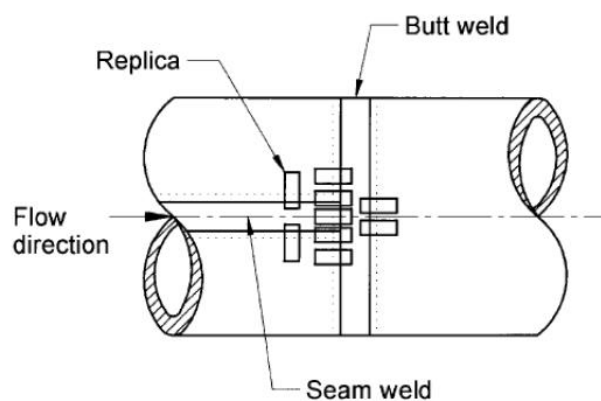


Figure 4b: Triple-Point replica positions on seam weld.

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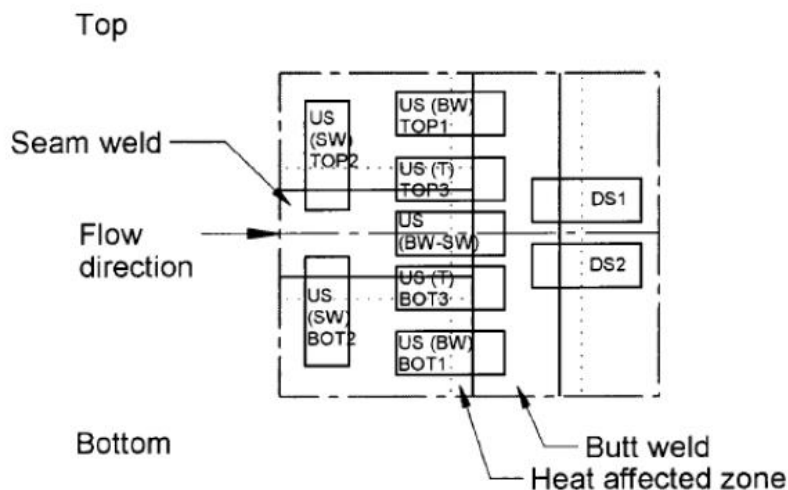


Figure 4c: Triple-Point replica positions and numbering on a seam weld.

3.1.3 Component Identification, Labelling & Transmittals

The NDT supervisor and NDT technicians must be able to read and interpret P&ID and Isometric Drawings. Before work commences, the NDT supervisor together with his technicians must walk the system and perform visual inspections. All the components must be correctly marked as per the inspection drawings supplied. If anomalies exist between the system and the drawings, the drawings shall be updated or red-lined to reflect the true situation before replication commences.

The component numbers on the replicas shall always be correct and be reflected on the updated drawing used during the replication process and supplied after the outage.

To avoid mix-up of areas, if replication is done on a previously replicated area, the replica label and transmittal must indicate "old" after the replicated position unique number to clearly identify the history of the area.

Care must be taken not to touch the replica film during labelling, and to work meticulously to ensure correct numbering.

The replica slides shall be stored in conventional microscope slide storage boxes, away from dust, damp and extreme variations in temperatures.

When a replica is lifted, the component and area and the unique number, i.e., Inner Casing RT 3, shall be written in pen on the mounting tape. During this step absolute care shall be taken to use the correct component and area description.

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The following information shall be shown on each slide:

- ☐ Power Station, Unit, System - *Medupi, U6, MS Pipes.*
- ☐ Date – *12 Sep 2022.*
- ☐ Component No/Name. - *Butt weld LBA33BR001-1.*
- ☐ Replica unique No - *3:00 (U5 side), U/S, No.1(old).*

The areas of a specific component must not be mixed between boxes.

The replicas of different systems (Rotor & Steam Chest) must not be together in one box.

Each box must have a unique number and must contain the following information:

- ☐ Unique Box No., Date - *Box MS 1, 12 September 2022.*
- ☐ Power Station, Unit, System - *Medupi, U6, MS Pipes.*
- ☐ Component No. - *LBA33BR001-1.*

The boxes in which repeated replicas (either due to poor quality or additional work) are submitted should reflect the box number of the original component. For example - if unique No RT3 from Box TC26 was rejected due to dust, the replica box should be labelled TC26-R1, and if additional work was requested on unique No RT3, the replica box should be labelled TC26-E1.

Each box shall be indicated on a transmittal sheet. Transmittal sheets must contain the following information:

- ☐ Power Station, Unit, System - *Medupi, U6, MS Pipes.*
- ☐ Date - *16 September 2022.*
- ☐ List the following in table format:
 - # Box No.
 - # Component type (Butt weld, bend, stub weld, etc.).
 - # Component No.
 - # Area description (3:00, U5 side, U/S, old).
 - # WT before replication. o WT after replication.
 - # Depth of replication.

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Comments (no access due to flange, MT defect, etc.).

The boxes of different systems (Rotor & Steam chest) must not be listed together on one transmittal.

3.1.4 Flow and Delivery of Replicas

All replicas taken on day 1 must be labelled and transmittals prepared on day 2. The replicas, with FULLY COMPLETED transmittals (WT included) must be handed over to Physical Metallurgy Offices (Rosherville or Middelburg) not later than 7:00 on day 3, preferably Day 2. **No hoarding of replicas will be accepted.**

Contractor shall ensure good quality before labelling and delivery of replicas. The role of the metallurgist is to strictly ensure that the highest level of quality is achieved and maintained.

It is the Contractor's responsibility to hand over the labelled boxes together with the transmittals and wall thickness results to the Rosherville or Middelburg offices.

Daily records of areas replicated, handed over and not yet done shall be kept by the Contractor. Daily progress shall be reported in the morning meetings.

Quality problems will be handled via the System Engineer and must be addressed immediately after the problems are detected. **All rework due to poor quality will be repeated on the Contractors' cost.**

Boxes and slides that are incorrectly labelled during or after the outage will not be accepted. Should this happen, boxes and slides will be rejected and the issue will be addressed as a quality issue (Contractor to retake all at own cost).

Safety, environmental and quality control of the replication process is the full responsibility of the Contractor. Project management of the replication process is also the contractor's responsibility including attending of daily meetings to discuss and solve problems.

3.1.5 Rejection of Replicas

Metallographic replicas can be rejected for the following reasons:

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1. Bubbles - none accepted (treated case by case).
2. Dust - limited to 10 particles/mm².
3. Scratches - none accepted.
4. Etch and cleaning artefacts - no deviations accepted.
5. Size of film - refer to minimum size of PM visible.
6. Incorrect marking - not acceptable.
7. Replicas not mounted correctly (upside down) - not acceptable.
8. Replica not flat - not acceptable.
9. No transmittal Sheet - not acceptable.
10. No evidence of WT measurement - not acceptable.
11. Damaged Slides - not acceptable.
12. Under and Over-polishing or etching - not acceptable

3.2 TUBE-SOLO SCOPE OF WORK

Tube-SOLO (Tube - Steam Oxide Life Optimization) is a technology that is used to carry out creep damage analysis on high and low alloy boiler tubes. Creep remains one of the leading boiler tube failure (BTF) mechanisms in Eskom. The technology involves the combination of Non-Destructive Testing (NDT) and metallurgical analysis to examine the condition of boiler tubes by estimating the remaining tube life.

Tube-SOLO consists of two processes.

- a) Non-Destructive Testing using a thickness gauge.
- b) Boiler tube creep management strategy.

Tube-SOLO is performed using advanced ultrasonic testing (UT) thickness gauges that have many powerful measurement features. The gauges are able to measure precisely the thickness of multilayer materials with a single transducer. The measured layers (i.e. remaining wall and internal oxide scale) are used with unit operating data to estimate the remaining creep-rupture life of a tube. The metallurgical data acquired from sampling is then used to verify the Tube-SOLO data and the replacement programs are generated based on consolidated results.

The intention of this part of the document is to specify scope of work for executing Tube-SOLO effectively on Eskom Medupi Power Station.

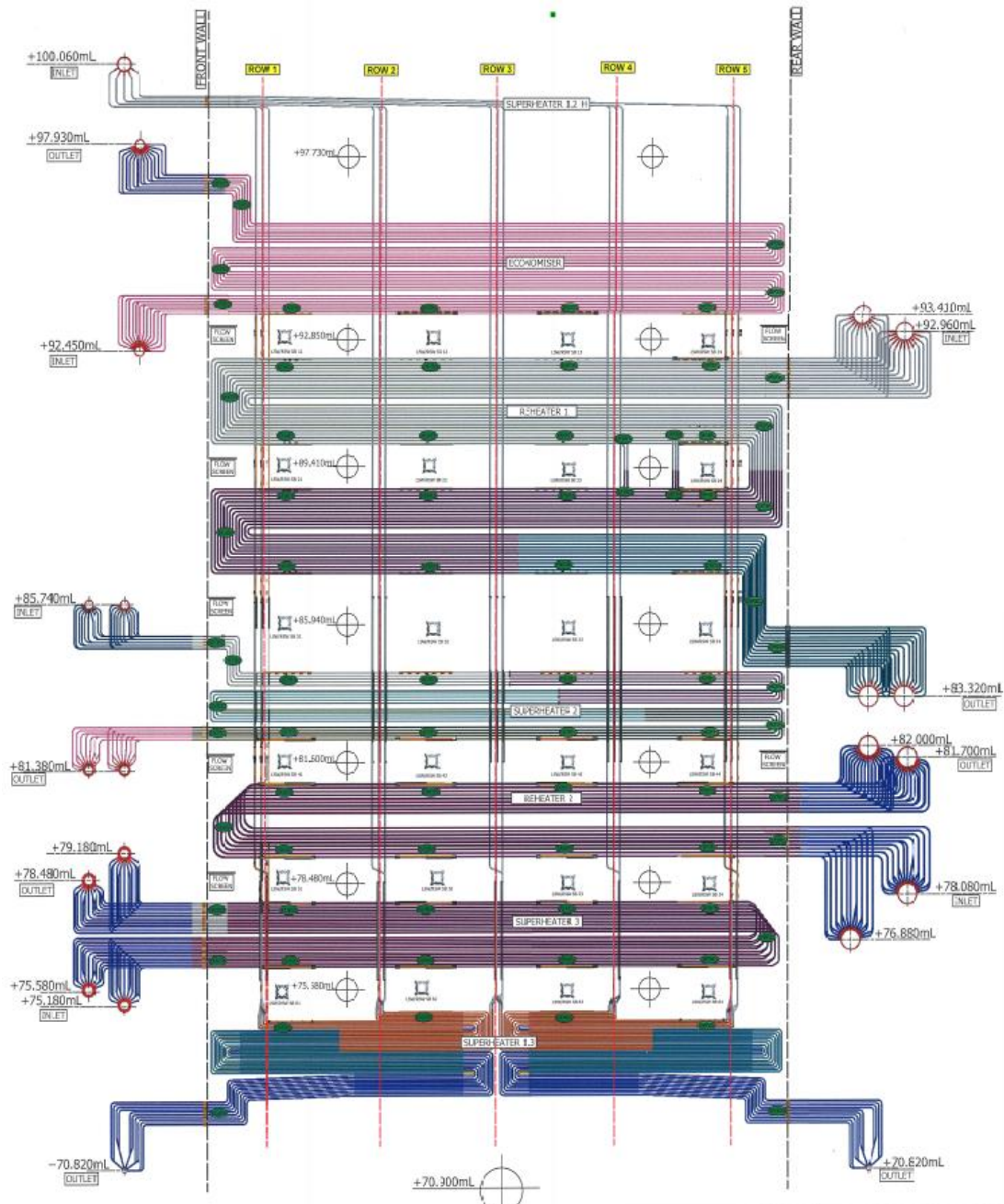
The scope applies to steam boiler tubes operating in the creep regime (>450°C), where Long-term Overheating Creep (LTOC) BTFs may occur.

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This scope of work shall apply to all Medupi Power Station coal-fired boiler plant tubing operating in the creep regime, mainly:-

- a) Superheater tubes; and
- b) Reheater tubes all as per the schematic figure below



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3.2.1 Technical Requirements

Equipment Requirements

3.2.1.1 Ultrasonic Thickness Gauge Minimum Specification

- ☐ Single element transducer default setup.
- ☐ Digital display and A-scan presentation (waveform display).
- ☐ Thickness, velocity, and time-of-flight measurements capability.
- ☐ Able to precisely measure multilayer materials (i.e. the gauge must be able to displays the different multi-layer thickness in millimetres).
- ☐ Shall be portable, single operator.
- ☐ Measurement mode:
 - # Single element transducer - Mode 2: Time interval between the delay line echo and the first back-wall echo. Due to delay laws.
- ☐ High resolution software option of 0.001 mm or 0.0001" with single or dual element transducer.
- ☐ Standard resolution of 0.01 mm or 0.001" for all transducers.
- ☐ Minimum Display: LCD or VGA display with indoor and outdoor light settings.
- ☐ Data logger: Able to save a minimum of 10,000 waveforms with thickness measurements.
- ☐ Able to transfer data to a computer using an interface program.
- ☐ Meet the requirements of EN15317 or approved equivalent.

NB:

All ultrasonic equipment suitable for Tube-SOLO must meet or exceed the performance of the Eskom's Tube-SOLO ultrasonic NDT work instruction. New equipment that may be compatible with the above specification must undergo a qualification process as required by the Eskom Non Destructive Testing Inspection Qualification Standard.

3.2.1.2 Transducer Specification

- a) Must have a small foot print (i.e. smallest surface area contact).
- b) Probe tip diameter: 6mm to 8mm
- c) Delay lines (wedge) tip diameter: 6mm to 8mm
- d) Frequency range: 20MHz to 30MHz
- e) Single or dual element contact transducer.
- f) Wall thickness range: 1.0mm to 12mm.

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g) Oxide thickness range: 0.20mm to 1.25mm.

3.2.1.3 Couplant Requirements

- ☐ Thick and sticky semi-fluids (non-dripping)
- ☐ Density close to 1400 kg.m⁻³ at room temperature.
- ☐ The couplant must not harm the component to be inspected or represent a health hazard to the operator and must meet the Eskom standard for chemical restriction and control.
- ☐ The coupling medium shall be chosen to suit the surface conditions and the profile of the surface to ensure adequate coupling.

3.2.1.4 Calibration Step Wedge Design (Wall Thickness)

- ☐ This shall be manufactured using material that shall be tested.
- ☐ Typical material being tested on Medupi boiler plant:
 - DIN P235GH (ASME/ASTM SA-192 or 1.0345)
 - DIN 16Mo3 (ASME/ASTM SA-209 T1 or 1.5415)
 - DIN 13CrMo44 (ASME/ASTM SA-213 T11 or BS3059 620 or 1.7335)
 - DIN 10CrMo9-10 (ASME/ASTM SA-213 T22 or BS3059 622 or 1.7380)
 - DIN X10CrMoVNb9-1 (1.4903)
 - DIN 7CrMoVTBi10-10 (1.7378)
- ☐ Thickness sizes: 2mm, 4mm, 6mm, 8mm, 10mm, 12mm

3.2.1.5 Calibration Tube Samples (Oxide Thickness)

- ☐ Eskom RT&D shall provide new Tube-SOLO NDT service providers with only six calibrating samples.
- ☐ The samples shall cover the minimum, middle and maximum readings.
 - o Wall thickness range: 3.00mm and 12.00mm.
 - o Oxide thickness range: 0.20mm and 0.80mm.
 - o Outside diameter (OD) range: 30mm and 70mm.
- Note: The OD of the tubes that shall be supplied to the NDT service providers shall not have any influence on the readings measured because of the probe's small footprint.
 - o A maximum of four readings shall be measured around the circumference of the tube samples (i.e. at 0°, 90°, 180 and 270°).
- ☐ The oxide and wall thickness readings shall be labelled on the external surface of each sample.
- ☐ The samples shall be catalogued and labelled clearly.
- ☐ The samples shall be referenced on the reports.
- ☐ The tube sample height shall not exceed 100mm for handling purposes.

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3.2.2 Tube-SOLO Competency Certification Criteria

- ☐ The Tube-SOLO training shall only be offered to NDT service providers as and when required.
- ☐ Retraining shall only be offered to NDT Level 3's, provided:
 - o They are new in the company.
 - o They have not applied Tube-SOLO in past two years.
- ☐ No competency certificates shall be offered if the training prerequisites are not met.
- ☐ Eskom can at any time suspend or revoke the competency certificate provided the following can be proven:
 - o The NDT Service Provider has failed to comply with or implement the requirements of the certification.
 - o The NDT Service Provider has deviated from implementing the Eskom Tube-SOLO work instruction.

3.2.2.1 Training Prerequisites:

a. Minimum personnel requirements:

- i. Two UT Level 1 operators.
- ii. One UT Level 2 operator.

- Preferably also certified on one advanced NDT method: PAUT, TOFT, GUL etc.

- iii. One UT Level 3 operator.

b. Minimum equipment requirements:

- i. Two qualified thickness gauges.
- ii. Two qualified transducers.
- iii. Four step wedges.
- iv. One approved couplant.

c. NDT service provider's Level 3 shall submit a formal request for competency certification to Eskom RT&D.

3.2.3 Key Competency Requirements

- ☐ Must be able to operate advanced UT equipment (A-scan waveform).
- ☐ Project management skills.
- ☐ Data capturing.
- ☐ Computer literacy (Microsoft Office and pdf). Proof of training may be requested (e.g. certificate).
- ☐ Report writing skills.

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3.2.4 Tube-Solo Outputs

3.2.4.1 Communication channels

Communication relating to Tube-SOLO shall be done through the Eskom formal medium of communication.

Tube-SOLO Team:

- ☐ Eskom RT&D Tube-SOLO Technician.
- ☐ Eskom RT&D site metallurgist.
- ☐ Eskom boiler engineer or system engineer.
- ☐ Eskom outage coordinator or project coordinator.
- ☐ NDT service provider (Contractor) project coordinator and supervisor.
- ☐ Sandblasting contractor's supervisor.

3.2.4.2 Inspection outputs

a. Eskom Outage coordinator/project leader shall:

- ☐ Ensure that the following contracts are in place:
 - o Competent NDT service provider for TUBE-SOLO.
 - o Grit blasting.
- ☐ Contract for the sandblasting service provider.
- ☐ Tube-SOLO outage program.
- ☐ Tube-SOLO scope of work.

b. Sandblasting contractor shall ensure that:

- ☐ Daily progress reports are compiled
- ☐ Approved quality report (after sandblasting has been completed)

c. NDT service provider for Tube-SOLO (Contractor) shall provide to Eskom:

- ☐ Sandblasting quality feedback (including confirming fire-side sandblasting)
- ☐ Daily inspections feedback
- ☐ Inspections raw data.
- ☐ Inspection results (excel spreadsheet).
- ☐ Inspection Reports (Microsoft word or pdf)

d. RT&D Tube-SOLO Technician:

- ☐ Sandblasting quality checks:

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- ☐ Review and approve the following outputs:-
 - Inspection raw data
 - Inspection results
 - Inspection reports
- ☐ Final results shall be issued within one month of the completion of the inspection.
- ☐ Signed reports shall be issued within two months of the completion of the inspection.

3.3 ADHOC SCOPE FOR DRONE & CRAWLERS INSPECTIONS AS AND WHEN REQUIRED

The below scope will only be executed when required by the Outage and Maintenance Departments. Eskom Medupi reserve to give instruction to the Adhoc scope of work. Adhoc scope is as follows:

- **Drone and Crawler Inspections**

- During tube leaks in boiler circuits like evaporator, SH1.2 Screen, SH3 and RH2 (response time 6-12 hours)
- During philosophy and opportunity outages in all boiler house areas with difficult access to do visual inspections
- The drone shall have capability to fly and capture images/videos inside the boiler, which has no GPS reception (non satellite mode), has poor lighting and has ash lying on boiler tubes.

2 x High-tech remote controlled drones with the following minimum specification:

Camera: 12MP with 2x Optical Zoom capability or have attach camera with these minimum specs

Video transmission: 1080P 4K

Durability: Dust and Water Resistant

Flash Light: 3000 Lumens or has capacity to attach a flash light with 3000 Lumens minimum

Flight time: 30 minutes

Speed: 20km/h

Payload: 2Kg

Camera Storage Capacity: 8GB internal storage or SD card support at least 64GB

Dimensions: The longest length in any axis must not exceed 600mm when in flight. When launched the drones must be able to fit through the smallest boiler manhole of 600mm diameter without obstruction.

AND

1 x High Tech remote controlled pipe crawler that can fit in a 50mm ID inspection nozzle and be able to crawl in a minimum 20m long header pipe. The crawler shall have:

Camera: Minimum 5MP with Optical Zoom capability or have attached camera with these minimum specs

Video transmission: Minimum 720P

Durability: Dust and Water Resistant,

Flash Light: Bright

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3.4 EXCLUDED SCOPE

- Sandblasting
- NDT services not specified in 3.1, 3.2 and 3.3
- Thickness Testing (To be performed by Current Medupi NDT contractor)
- Hardness Testing (To be performed by Current Medupi NDT Contractor)

4. RESOURCE LIST

The personnel list and transport consideration shall be provided accordingly as follows:

Item	Personnel/Activity	Quantity
1	Metallurgist	1
2	Metallographic Replication Technician	10
3	UT Level 1	2
4	Site Supervisor UT Level 2	1
5	NDT Level 3 Personnel	1
6	Inspection Drone & Crawler Operator	1
7	Safety Personnel	1
8	Admin Personnel	1
9	Remote Controlled Drone & Crawler	2
10	Ultrasonic Testing Machines for Tube-Solo	1
11	Travelling for Delivery of Replicas at Middelburg and Rosherville	8000 hours

5. AUTHORISATION

This document has been seen and accepted by:

Name	Designation
Teboho Molokwane	Medupi Power Station Metallurgist
Benji Rahlogo	Chief Engineer – Boiler Engineering
Bernard Matanda	Senior Advisor – Boiler Engineering
Rulani Masingi	Senior Advisor – Outage Execution

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Name	Designation
Tebogo Mokoena	Turbine System Engineer
Bongani Masilela	Boiler Health Care Engineer
Oratile Mekgwe	Pressure Parts System Engineer

6. REVISIONS

Date	Rev.	Compiler	Remarks
May 2022	0	M P Sekhuto	Draft
June 2022	1	M P Sekhuto	
February 2023	2	M P Sekhuto	Include Remote Crawlers in the Scope of Work

7. DEVELOPMENT TEAM

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

M P Sekhuto - High Pressure Piping System Engineer

8. ACKNOWLEDGEMENTS

- None

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