Eskom	Standard	Technology

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1. INTRODUCTION

The Secondary Air heater plays vital role in the overall thermal efficiency of the boiler cycle. This is achieved using heat exchange element packs specially designed and optimise to remove required heat energy from the flue gas to heat the combustion air thereby increasing the overall boiler thermal efficiency. The heat exchange elements consist of thousands of profiled sheets bundled together to form packs. These are customised to fit in the rotor which has cylindrical shape with radial segments.

The Element packs are designed to last for twelve years but due to susceptibility to fly ash erosion and fouling, the elements ended up being replaced before their design life span is reached. Due to unpredictability of these failures and early degradation of the it is required to keep spare(s) as recommended on the Strategic spare manual standard **240-61379840** to minimise down time

This standard details the procedure for storing the element packs while there are not in use. The proper storage of the element packs will ensure that the condition and integrity of the packs is not compromised when they are required for service.

Proper storage and preservation will ensure that the spare is available during unexpected major plant failure without causing any delays in returning the unit. The element packs are listed on the strategic spares list which are considered as items that has adverse effects of production load loss during major plant failure if the spare is not available. The item has long lead times for manufacture hence it imperative that it forms part spares inventory.

2. SUPPORTING CLAUSES

2.1 SCOPE

2.1.1 Purpose

The purpose of this document is to document requirements and actions that must be followed for the proper storage and preservation of air heater element packs after manufacturing and on site. This includes both new and used element packs which are desired to be kept as spares for future usage.

2.1.2 Applicability

This document shall apply throughout Eskom Generation Stations when handling and storing SAH element packs.

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] 240-61379840 Management and Reporting of Strategic Spares Manual

2.2.2 Informative

[1] 36-1042 Material Control, Preservation & Storage Handling.

[2] ISO 9001 Quality Management Systems.

[3] QM 58 Supplier Contract Quality Requirements Specification.

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2.3 DEFINITIONS

Definition	Description
Approved by	The accountability of the Approver of the document is equivalent to the specified role of Functional Responsible/Owner as identified in 240-53114186 and 32-6 for Documents and Records Management.
Handling	The physical action of moving an item by hand or mechanical machinery.
Element Packs	Elements for air heaters comprise a combination of various types of flat and/or form-pressed steel plates which are stacked in spaced relationship in baskets to form packs
Packing	Some sort of cover in form of container or wrap material to protect the item.
Record	Documents that are kept satisfy the objective of quality that the item has justified the requirement(s) and specification(s)
Storage	A designated area prepared for safe keeping of the item under the control of the store until the item is required to be installed plant
Spare	Referred to additional element packs kept in case another item of the same type becomes worn out or degraded. The strategic spare can be more than one type depending on what the station uses in each unit.
QA	Quality Assurance – refer to function group ensuring that all documentation and material are conforming to required practice
QC	Quality Control – refer to function group ensuring correct quality requirement are complied with.
Wrap	A flexible/solid material furnish around the item to protect the item from water and dirt ingress and facilitates with handling

2.3.1 Disclosure Classification

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

2.4 ABBREVIATIONS

Abbreviation	Description
CE	Cold End
HE	Hot End
QA/QC	Quality Assurance/Quality Control
QCP	Quality Control Plan
SAH	Secondary Air Heater
SAP-PM	System Application Product (Plant Maintenance Management System)

2.5 ROLES AND RESPONSIBILITIES

All parties interfacing with the power stations or working under the power station are required to comply with this standard for safe handling and storing of the Secondary Air Heater Element Packs.

The following roles and responsibilities are explained below for each relevant personnel relating to the implementation of this procedure.

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SYSTEM ENGINEER

- Develop a station specific storage and preservation procedure for the item as per this standard guideline.
- Provide correct specification for the procurement of the spare. This includes detailed packaging specification of the spare for Contractor's info.
- Review and approves QCP's for manufacturing of air heater packs, indicating witness/hold points and ensure all intervention are signed prior to the final release of the spare.
- Inspect the spare upon arrival for identification of any defects during transportation and off loading

STOREKEEPER

- All operations carried out by the store operation function
- Ensure the engineer prepares the required quality inspections and signed quality documentation before new or refurbished spares are booked into the stores
- Inspect the spare upon arrival with all relevant parties involved
- Responsible for Hand-over Protocol of the spare upon acceptance of the spare
- Report and record, stock control for both the incoming and outgoing stock
- Carry out proper handling and storage as per the procedure stipulated below.
- Ensure the storage area shall cater for movement of crane or forklift during the storage or removal of the material
- Carry out normal routine inspection - ensure no water accumulation around the packs, and report any mechanical or chemical damage to engineering and Maintenance

MAINTENANCE

- Responsible for quality control on new/refurbished spares before it is booked into the stores. This includes capturing history on SAP (per serial number) and handing in a hard copy of the newly procured packs/refurbished spares quality documentation at the documentation centre.
- The execution of the required maintenance activities for the spares
- Reporting of defects found during maintenance of the spares
- Control of spares and record keeping of used spares during outage and maintenance

2.6 PROCESS FOR MONITORING

The business unit manager shall ensure development of a customised procedure as per guideline given in this procedure and the adaption and implementation thereof at the station. All the relevant personnel involved at the station shall ensure compliance to the procedure for storage and preservation of the element packs. The compliance to the procedure will be ensured through audit which will be conducted every 3 years.

2.7 RELATED/SUPPORTING DOCUMENTS

Air Heater Element Packs Storage Check Sheet Form (Appendix A)

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3. PROCEDURE

3.1 REQUIREMENTS

3.1.1 Responsibility

The respective manufacturing supplier/Contractor is responsible for the transportation of the finished/ manufactured components to site. The Contractor will take full responsibility of the item handling and storage during packaging at their workshop and during transportation to the respective Client site.

Once the item has officially arrived on site and has been inspected for acceptability by Eskom, the responsibility lies with Eskom Store Manager for storage, control and safekeeping of item.

3.2 MANUFACTURING OF SPARE

Before the manufacturing of the item, the relevant system Engineer together with the QA/QC personnel shall approve manufacturing QCP's of air heater element packs, indicating witness/hold points on the QCP during the manufacturing process up to the final release. The system Engineer to stipulate what package wrapping is desired (either long or short term storage of the spare). For long term storage is advisable that the element packs are packaged with double plastic wrap. The plastic used should have sufficient strength to resist tearing and be water proof. For short term storage the spare can be packaged with single plastic wrap. As rule of thumb it recommended that the packs to be packaged with double plastic wrap if there is uncertainty when will the spares used The identification marking of each pack must be legible at all times.

3.3 RECEIVING OF SPARE TO SITE

The material handling representative of the Contractor, together with client (maintenance and Engineering) representatives and a QA/QC representative shall on receiving the material on site, inspect the consignments for any visual damages, record any discrepancies and damages and issue any Non-Conformance report or issue a clearance receipt if there are none.

The inspection and checking of the item is done to ensure completeness and correctness of the item with the presence of all parties concerned.

Once the delivery of the item have been checked by all parties concerned for completeness and found to be correct and free of damages, then a Handing-over Protocol will be completed and handed to the Contractor for signature. The protocol includes all necessary documentation to officially accept the item.

3.4 SITE STORAGE PREPARATION

The station is responsible to ensure that adequate arrangements and facilities are in place, including storage areas prior to the arrival of equipment on site.

The storage area for the item should be of sufficient size which is flat and paved, as well as protected against floods or pooling of water and vibration.

3.5 STORAGE REQUIREMENTS

The following requirements are mandatory for storage of packs:

- Ideally the material must be stored in a dry covered (with a roof) environment on a surface which prevents the accumulation of water. However if the site does not have a covered storage facility the consignment must be properly protected by the use of double plastic wrap.
- Required to be shielded from ash or dust, as well as rain, water or any other corrosive liquid.
- Equipment must be stored properly in order not to endanger the safety of personnel or equipment and to prevent damage to equipment itself.

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- Packs must be placed on pallets or equivalent which will raise them to minimum of 50mm off the ground and allow for easy removal via forklift or equivalent.
- Packs must be grouped per type and may be stack together, only a maximum of two layers shall be allowed for stacking element packs on top of each other. (i.e. HE with HE/CE with CE)
- The stacking of packs must not exceed a height of two meters (2m) for stability reasons.
- Marking - Every pallet must be marked with a label or other indelible means, showing the number and type of elements stored on the pallet (i.e. 6 off ring 7 hot end elements).
- The area should allow accessibility for the fork lift

A check sheet form shall be completed for record keeping as proof that all mandatory requirements were adhered to. An example of it is shown on Appendix A

3.6 PLACEMENT OF SPARE

During the placement of the packs in the storage area; care must be taken not to damage them. Hence the work should be supervised by the store representative to co-ordinate the loading, off-loading and positioning thereof. The element packs shall be lifted by forklift or similar from base of pallet only. Straps may only be used if they run parallel to the edge of the packs, and do not directly bear on them.

3.7 INSPECTION AND PRESERVATION DURING STORAGE

The packs shall be inspected on a 3 monthly basis to ensure there is no build-up of moisture leading to corrosion of the packs. The plastic covering material shall be checked for integrity (no tearing and piecing). The outcome of the inspection shall be captured and documented accordingly in the SAP-PM system for future referencing and defects must be reported to the system Engineer

4. AUTHORISATION

This document has been seen and accepted by:

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5. REVISIONS

Date	Rev.	Compiler	Remarks
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October 2015	1	CN Tsosane	Final Document for Authorisation and Publication
March 2016	0.4	CN Tsosane	Updates
March 2016	1	CN Tsosane	Final Document for Authorisation and Publication

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

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7. ACKNOWLEDGEMENTS

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APPENDIX A: AIR HEATER ELEMENT PACKS STORAGE CHECK SHEET FORM

STATION NAME…….....

PACKS IDENTIFICATION / SERIAL NUMBER…….....

DATE: ELEMENT PACKS DELIVERED TO SITE…….

DATE: ELEMENT PACKS INSPECTED…….

Check items	Satisfactory (Yes)	Unsatisfactory (No)	Remarks
Pack storage area identified			
Storage requirements: - sufficient size - flat and paved - Roof cover			
Package wrapped as per the Engineer requirement: - Single plastic wrap - Double plastic wrap			
Visual Inspection - Any visual damage - Pack identification marking eligible			
Stacking Configuration - Complacency to pellets stacking limitations			
Placement Arrangement - Placed pellets underneath the packs - Minimum height of 50mm off ground			
Accommodation of lifting equipment - Adequate accessibility for all packs			
Adherence to general safety storage regulations			

INSPECTED AND APPROVED BY:

Name

Designation

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