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Treatment Processes and  
Technologies**

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Compiled by



A.R. Matlala

Chief Engineer Asset  
Management Mechanical  
Engineering

Date: 28/10/2020

Functional Responsibility



A.R. Matlala

Chief Engineer Asset  
Management Mechanical  
Engineering

Date: 28/10/2020

Authorised by



M. Mthembu

General Manager Asset  
Management Mechanical  
Engineering

Date: 2020-10-29

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## **EXECUTIVE SUMMARY**

Excessive moisture in the coal, particularly when it contains a high percentage of fines, creates a flow problem in the materials handling plant, milling plant and boilers. The supplier of Ramsorb 9922 approached Eskom offering a solution to problems caused by wet coal. Eskom then decided to follow an RFI process to test the market for solutions to wet coal problems. The responses to the RFI have been included as input into this document. This document states the requirements for the Treatment Processes and Technologies that could be applied on the existing coal plant infrastructure to improve the flow-ability of wet and fine coal through storage facilities (Staithe, Silos and bunkers) and reduce coal hang-ups in transfer chutes. It forms the basis of the Request for Proposal (RFP) that will be issued to market.

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## **1. INTRODUCTION**

Excessive moisture in the coal, particularly when it contains a high percentage of fines, creates a flow problem in the materials handling plant such as transfer chutes, staithes, silos and bunkers. It also creates problems in the milling plant as the mills have to work harder to dry the coal and grind it into powder. Further problems downstream are experienced in the boiler as the coal particles may contain moisture beyond the design tolerance of the boiler leading to combustion problems. It is therefore important to keep the coal moisture content within the design tolerance of the materials handling plant, mills and boilers whichever is the lowest.

Intervention is required in the short and medium term to improve the flow-ability of wet and fine coal that is being reclaimed from the coal stockyard during and after rainfall events to the power station boiler bunkers. Eskom is investigating possible Technologies and/or Treatments that could be applied on the existing coal plant infrastructure to improve the flow-ability of wet and fine coal through storage facilities (Staithes, Silos and bunkers) and reduce coal hang-ups in transfer chutes.

As it is predicted that the 2020 rain season will start early October, Eskom plans to preserve coal dry on the coal stockyards and are looking at alternative measures to reduce/remove surface moisture from coal that is reclaimed during and after rainfall events. Therefore, Eskom intends to test equipment and/or products that are available in the market and have the ability to reduce/remove surface moisture from coal in order to establish which equipment and/or products are suitable for use in Eskom power plants.

## **2. SUPPORTING CLAUSES**

### **2.1 SCOPE**

This document explains the requirements for the Treatment Processes and Technologies that could be applied on the existing coal plant infrastructure to improve the flow-ability of wet and fine coal through storage facilities (Staithes, Silos and bunkers) and reduce coal hang-ups in transfer chutes.

#### **2.1.1 Purpose**

The purpose of this document is to state the technical scope for the RFP for the Treatment Processes and Technologies to improve the flow-ability of wet and fine coal.

#### **2.1.2 Applicability**

This document shall apply throughout Eskom Generation Divisions.

### **2.2 NORMATIVE / INFORMATIVE REFERENCES**

#### **2.2.1 Normative**

- [1] CORP 5159 Request for Information (RFI)
- [2] 474-12409 Coal Drying Technologies RFI Evaluation Report
- [3] 474-12412 Wet Coal Technologies and Treatment Processes Position Paper

#### **2.2.2 Informative**

- [4] Benmarc Presentation for Eskom August 14, 2020
- [5] <https://www.maghammerssa.com/>

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[6] <https://drytechaerogels.co.za/>

## 2.3 DEFINITIONS

Not Applicable

### 2.3.1 Classification

**Controlled disclosure:** controlled disclosure to external parties (either enforced by law, or discretionary).

## 2.4 ABBREVIATIONS

Abbreviation	Description
FEL	Front End Loader
MCR	Maximum Continuous Rating
RFI	Request for Information
RFP	Request for Proposal

## 2.5 ROLES AND RESPONSIBILITIES

Not Applicable

## 2.6 PROCESS FOR MONITORING

Not Applicable

## 2.7 RELATED / SUPPORTING DOCUMENTS

Not Applicable

## 3. REQUIREMENTS FOR TREATMENT PROCESSES AND TECHNOLOGIES

The following specific requirements are applicable to any Technology/Treatment Process or product that might be tested:

- Technology and/or product must be installed/added within the already established coal handling systems.
- Any product or chemical added to the coal will require a combustion test to ensure no negative impact on the Eskom Boilers and downstream plant such as Fabric Filter Plant and Electrostatic Precipitators.
- The product added to the coal shall not be hazardous and combustion of the product with coal shall not result in hazardous by-product.
- The product added to the coal shall be added in sufficient volumes to ensure that coal supply volumes are not compromised.
- Coal is transported from the coal stockyard at a given throughput to ensure adequate silo and bunker levels. Any equipment installed will not reduce the required coal throughput.
- There must be proof that the technology or product has been applied successfully elsewhere on wet coal as it is not Eskom's intent to develop new technology or product.

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- All manpower, equipment and/or product needed to treat the coal during the test will be for the account of the supplier.
- Operations and Maintenance of equipment installed specifically for this RFP will be done by the supplier.
- Eskom will consider more than one Technology and will, where possible, make available services such as water and power supply if required to facilitate testing of the equipment and/or Treatment Process per site as applicable.
- If the Treatment Process or Technology generates effluent, it is the responsibility of the supplier to classify and discharge into the station drains or effluent channels to the pollution control dam.
- It is incumbent on the supplier of any Technology or Treatment Process to ensure that all Civil and Electrical works is in accordance to Eskom standards.
- The supplier must provide the load schedule of any installation that requires electrical supply.
- The suppliers must provide a description of the Treatment Process or Technology they intend to offer and the typical moisture reduction of the technology or treatment process if any.
- For the Treatment Process, the coal throughput per day for Kriel, Komati and Kendal Power Stations is 36000, 19200 and 49000 tonnes respectively.
- For the Technology, the coal throughput per transfer chute for Kriel, Komati and Kendal Power Stations is 550, 1000 and 3600 tonnes per hour respectively, and the coal throughput per mill chute for Matla Power Station is 61 tonnes per hour.
- The success criteria for the test will be developed and agreed prior to the test with the suppliers who's treatment process or technology has been chosen to be tested. The test is part of the evaluation process for the suitable treatment process or technology to be applied in Eskom.

Treatment or technologies of coal at full supply capacity may be applied within the coal supply stream as outlined below.

### **3.1 COAL STORAGE**

#### **3.1.1 Coal Stockyard**

The coal stockyard is utilised for bulk storage of coal for the purpose of recovery when the tied down colliery of the imports trucks/trains are not available to supply coal. Coal is stored typically in three types of stockpiles;

Live pile: Where coal is delivered from a conveyor, gantry or stacker and dropped onto the ground. A live pile is not compacted by any mobile equipment.

Seasonal pile: Where coal is moved away from the live area by mobile equipment, as a short to medium term storage. These piles are semi compacted by mobile equipment.

Strategic pile: A pile built to profile and compaction specifications. A fully compacted stockpile constructed for long term strategic storage.

#### **3.1.2 Coal Staithes**

Where applicable, staithes may be utilised to store and control the flow of handle-able coal. This may be of a specific quality and sized product that is stored separately from the "normal" delivered coal. This coal can then be drawn off and either mixed with other delivered coal to either reduce moisture content or maintain/increase the quality of the final delivery into the station.

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There are various operational models within the Generation Fleet for the sites that have coal Staithes. The site identified for coal treatment operates the coal staithe at an average capacity of 80% throughout the entire year.

## **3.2 COAL HANDLING**

### **3.2.1 Reclaim Equipment**

Coal is collected on the coal stockyard by means of mechanical plant i.e Combined Stacker/Bucket Wheel Reclaimers, Bridge Scraper Reclaimer or Drum reclaimers for live stockpiles. The majority of Power Station sites utilize mobile feeders (chain scraper type) that are fed by means of Front End Loaders (FEL) and/or Dozers. The mobile feeders are fed with coal reclaimed from any of the three types of stockpiles as listed in paragraph 3.1.1. Other types of feeding equipment include conventional loading bins and/or belt type feeders that are fed by means of FEL's.

### **3.2.2 Coal Transportation**

Coal is transported via a series of conveyors belts from the coal stockyard to either coal staithes or silos, except for the case of Komati and Camden Power Station where coal is fed directly to the mill bunkers.

This stream of conveyors typically;

- Has certain conveyors that are below surface,
- Has several transfer chutes,
- Is enclosed as minimum on one side and the top.

### **3.2.3 Stockyard to Station Conveyors**

Stockyard to station conveyors are typically a series of conveyors with an adjacent redundant stream able to transport coal at a high rate that would enable all the installed boilers to operate at Mean Continuous Rating (MCR) which is typically 80 to 85 percent of boiler efficiency. These single stream conveyors are able to supply coal the combined station burn rate. These are high speed high tonnage conveyors mostly steel cord design.

### **3.2.4 Station Terrace Conveyors**

The station terrace conveyors draw coal from the staithe or silos and are usually sized in carry capacity for single boiler consumption. In certain sections there are redundant streams but typically at the boilers become single streams. These conveyors are fully enclosed and typically low speed, low tonnage conveyors. There are some sections of the conveyors that are of the steel cord type with the majority being of the fabric belting type.

#### **4. AUTHORISATION**

This document has been seen and accepted by:

<b>Name</b>	<b>Designation</b>
Andrew Matlala	Chief Engineer Asset Management Mechanical Engineering
Eugene Venter	Chief Engineer Asset Management Mechanical Engineering

#### **5. REVISIONS**

<b>Date</b>	<b>Rev.</b>	<b>Compiler</b>	<b>Remarks</b>
October 2020	0.1	A R Matlala	First Draft to document requirements for the treatment processes and technologies for the RFP
October 2020	0.2	A R Matlala	Final Draft after Review Process
October 2020	1	A R Matlala	Final Document for Authorisation and Publication

#### **6. DEVELOPMENT TEAM**

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

Andrew Matlala

Eugene Venter

#### **7. ACKNOWLEDGEMENTS**

None

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