

	<b>SPECIFICATION</b>	<b>Medupi Power Station</b>
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**Coal Stock Yard Safety Tests**

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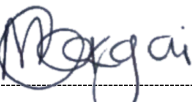



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## **1. Introduction**

Spontaneous combustion of coal is an oxidation reaction that occurs without an external heat source. The process changes the internal heat profile of coal leading to a rise in temperature. This can eventually lead to open flame and burning. This process of self heating of coal has become one of the major problems for coal fired Power Stations in South Africa and it has been extensively studied. Since spontaneous combustion is a time-dependent phenomenon early attention to the potential sources of problems may prevent occurrences of heating progressing to full-scale spontaneous.

There must be control measures put in place in order to prevent or reduce the likelihood of spontaneous combustion occurring at the stockyard. It is, therefore very important to monitor coal stock yard at regular intervals by means of performing coal stock yard safety tests. Coal stock yard safety tests helps to determine the physical condition of the stockpiles and helps for early detection of spontaneous combustion before any smoke and/or flame comes out of the stockpiles. This has to be performed by a suitably qualified expert.

## **2. Supporting Clauses**

### **2.1 Scope**

#### **2.1.1 Purpose**

The purpose of this document is to define the works information, the technical requirements, and all the relevant and necessary information required to perform the Medupi Power Station coal stockyard safety tests.

The proposed contract must support the station achieve Zero Environmental and Safety contraventions.

#### **2.1.2 Applicability**

This document shall apply to all persons responsible for coal stock yard safety tests at Medupi Power Station.

#### **2.1.3 Effective date**

This document shall be effective on the date of authorization.

### **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] Occupational and Safety Act No. 85 of 1993

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[3] GGR 0992 Eskom Plant Safety Regulations

[4] 240-62196227 Eskom Lifesaving rules

### **2.2.2 Informative**

[1] 240-78787829 Medupi Power Station Coal Plant Operating and Control Philosophy

[2] 240-78790897 Medupi Power Station Coal Plant Maintenance Strategy

[3] 240-87607698 Coal Quantity and Quality Accounting Standard for Thermal Efficiency Determination

## **2.3 Definitions**

### **2.3.1 Terms**

<b>Term</b>	<b>Definition</b>
Bulk Density	The weight of coal occupying a unit volume.
Comprehensive Safety tests	This includes monitoring if temperature and gas concentration for all the coal stockpiles is still within the safe allowable limits to avoid spontaneous combustion.
Gas Tests	Monitoring the concentration of Carbon Monoxide, Carbon Dioxide and Oxygen on the coal stockpiles.
Inertness	Inability of a substance to readily react with another substance.
Voidages	The amount of space that is left between coal particles stacked or packed together.

## **2.4 Abbreviations**

<b>Abbreviation</b>	<b>Explanation</b>
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
O <sub>2</sub>	Oxygen
CSY	Coal Stockyard
LAR	Limited Access Register

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PPE	Personal Protective Equipment
SANAS	South African National Accreditation System
t/h	Tonne per hour
t/m <sup>3</sup>	Tonne per cubic metres

## **2.5 Roles and Responsibilities**

Performance and Testing: To manage the Medupi Power Station CSY Safety Tests contract on behalf of the *Employer* and ensure a suitable database is maintained.

The Contractor: To execute the work as per the works specification.

## **2.6 Process for Monitoring**

SAP PM will be used as a process for monitoring.

## **2.7 Related/Supporting Documents**

Not Applicable

# **3. Document Content**

## **3.1 Works Information**

### **3.1.1 Description of the works**

The scope of work is for performing gas tests and voidage tests on the Strategic, Live, Seasonal and Excess coal stockpiles of Medupi Power Station over a period of 5 years.

It is expected that the stockpiles will be tested quarterly. The tests could however be requested on as an as and when is required basis on the instruction by the *Employer* and not all stockpiles will necessarily be included on the task order when *Contractor* is called to site.

#### **3.1.1.1 Gas Tests**

The *Contractor* shall sample gases below the coal surface at the stockpile to detect the presence and concentration of gases.

The *Contractor* shall monitor concentration of Oxygen, Carbon Dioxide and Carbon Monoxide whose presence will indicate that spontaneous combustion is taking place or is about to take place.

The *Contractor* shall analyse the collected data so as to establish the degree of inertness of the atmosphere within the stockpiles.

The *Contractor* shall specify if the quantity of all the gases monitored are still within acceptable limits.

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### **3.1.1.2 Voidage Tests**

Should the volume of the strategic and excess stockpiles increase the percentage measurements of voidages must be done to indicate the degree of attainable compaction.

The Contractor shall specify if the percentage voids are still within the acceptable limits.

### **3.1.1.3 Reporting**

The *Contractor* shall compile a detailed report on the works completed. The report must be electronically submitted with 7 days after the completion of the test. The report shall contain the following:

- a. Date and Time of the test
- b. Name of the test conducted
- c. Method of testing used
- d. Test results
- e. All test points to be shown
- f. Diagram or picture showing pile divisions
- g. Acceptable limits shall be specified
- h. Recommendations

### **3.1.2 Technical Specifications**

The coal stockyard consists of the following stockpiles:

#### **3.1.2.1 Live stockpiles**

Live stockpiles have no compaction and are designed for short term storage duration of less than 3 months. The bulk density is usually between 0.95 and 1.05 ton/m<sup>3</sup>, this value is however depended on the size grading, height of the stockpile and moisture content.

#### **3.1.2.2 Seasonal stockpiles**

Seasonal stockpiles also have no compaction and they are designed for storage duration of less than six months. Bulk density is generally between 1.05 and 1.4 ton/m<sup>3</sup>.

#### **3.1.2.3 Strategic stockpiles**

Strategic stockpile is compacted and is designed for planned storage of more than six months. The general bulk density of compacted coal is between 1.3 and 1.5 ton/m<sup>3</sup>.

#### **3.1.2.4 Excess stockpiles**

Excess stockpile is compacted and is designed for planned storage of more than six months. The general bulk density of compacted coal is between 1.3 and 1.5 ton/m<sup>3</sup>.

**Table 1: Stockpile Technical data**

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Stockpiles	Number of beds	Tonnage stockpile of	Approx. Length (m)	Approx. Width (m)	Stockpile configuration
Live	4	130 000 ton	794	45	2 in-line
Seasonal	8	32 036 ton	152.875	41.0	4 in-line
Strategic	1	2 200 000 ton	650	246	1 bed
Excess (Phase 1)	1	6 500 000 ton	1430	520	1 bed
Excess (Phase 2)	1	2 600 000 ton	1034	244	1 bed
Excess (Phase 3)	1	200 0000 ton	1034	244	1 bed

**Table 2: Expected number of safety tests to be conducted per annum**

Item number	Description	Quantity	Frequency
1.	<p><b><u>Strategic Stockpile Tests:</u></b></p> <ul style="list-style-type: none"> <li>Gas Tests (CO-CO<sub>2</sub>-O<sub>2</sub>)</li> <li>Temperature Tests</li> </ul> <p><b>Note:</b> The employer will determine when.</p>	1	Quarterly
2.	<p><b><u>Live Stockpile Tests:</u></b></p> <ul style="list-style-type: none"> <li>Gas Tests (CO-CO<sub>2</sub>-O<sub>2</sub>)</li> <li>Temperature Tests</li> </ul> <p><b>Note:</b> The employer will determine when.</p>	4	Quarterly
3.	<p><b><u>Seasonal stockpile Tests:</u></b></p> <ul style="list-style-type: none"> <li>Gas Tests (CO-CO<sub>2</sub>-O<sub>2</sub>)</li> <li>Temperature tests</li> </ul> <p><b>Note:</b> The employer will determine when and the number of the stockpiles to be tested.</p>	8	Quarterly
4.	<p><b><u>Excess Coal Stock Yard Tests:</u></b></p> <ul style="list-style-type: none"> <li>Gas tests (CO-CO<sub>2</sub>-O<sub>2</sub>).</li> <li>Temperature Tests.</li> </ul> <p><b>Note:</b> The employer will determine when.</p>	1	Quarterly

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Item number	Description	Quantity	Frequency
5.	<b><u>Tests to be done when strategic stockpile volume increases:</u></b> <ul style="list-style-type: none"><li>• Gas Tests (CO-CO<sub>2</sub>-O<sub>2</sub>)</li><li>• Voidages</li><li>• Bulk density measurements (Total dry basis)</li></ul> <b>Note:</b> The employer will determine when.	1	As required

### 3.1.3 General Requirements

The Contractor shall provide own testing equipment.

The Contractor shall ensure that the testing equipment is calibrated by a SANAS accredited calibration authority and that the certificate remains valid at all times.

The Contractor shall provide a valid calibration certificate to the Employer prior to the commencement of the tests.

The contractor shall provide its own transport.

## 4. Acceptance

This document has been seen and accepted by:

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## Revisions

Date	Rev.	Compiler	Remarks
July 2024	3	MP Makgai	Review document
November 2017	2	BS Mdaki	Review document
April 2015	1	SE Khumalo	Original document

## 5. Development Team

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

- Bongani Mdaki
- Siphelele Khumalo

## 6. Acknowledgements

Louis Snyman

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