



WORK INSTRUCTION

Duvha Power Station
Generation

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FINENESS TEST**

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1. INTRODUCTION

The document is being compiled to state and clarify the scope and requirement for determining how to do Routine mill PF distribution and fines test as per FFFRegulations.

2. SUPPORTING CLAUSES

2.1 Scope

This procedure defines the responsibilities and actions of Performance and Testing Staff in performing the above tests on Babcock & Wilcox as well as Loesche vertical spindle mills at Duvha Power Station.

2.1.1 Purpose

The purpose of this procedure is to ensure that a uniform method is followed in carrying out a test to determine the distribution and fineness of pulverised fuel (PF) in the product pipes of a mill which is on load. It also describes the fineness grading of pulverised coal particles using the "Fritsch Analysette 3" sieve shaker and sieves.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited's DUVHA POER STATION in the generation Divisions.

2.1.3 Effective date

This document will be effective from the day authoriser signs.

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

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[2] Fossil Fuel Firing Regulations

[3] PTP0003 - Calibration Of Process Monitoring Test Equipment.

2.2.2 Informative

[4] Suitability Tests With "Fritsch Analysette 3" Sieve Shaker, Potgieter IP, 1980. TRI Report No. 80/MC/FE5

[5] Combustion Information Manuals, Nos. 2a, 3 & 4 Messerschmidt L J, 1972 and 1978.

2.3 Definitions

2.3.1 BPE

Boiler Plant Engineering

2.3.2 Calibrated Test Equipment

Refers to test equipment such as thermocouples, thermometers, manometers, etc., which have been calibrated according to procedure PTP0003, before being used to perform the test described in this procedure. In the context of this procedure it also refers to the integrity of isokinetic PF sampling and grading equipment.

2.3.3 Fineness

The extent to which the mill pulverises the coal.

2.3.4 PF

Pulverised fuel, (coal).

2.3.5 P&T

Refers to the Performance & Testing department which forms a part of the ENGINEERING group.

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2.3.6 Process Technician

The Technician of the Performance & Testing department responsible for carrying out performance tests on the said equipment.

2.3.7 PF Distribution

The relationship of the PF and air flow between each of the product pipes fed from the same mill.

2.3.8 Plant Test Log Sheet

Refer to Form PTP0007-1.

2.4 Abbreviations

Abbreviation	Explanation
BPE	Boiler Plant Engineering
PF	Pulverised fuel, (coal).
P&T	Refers to the Performance & Testing department which forms a part of the ENGINEERING group.

2.5 Roles and Responsibilities

2.5.1 Process Technician

2.5.1.1 The Technician, to whom the responsibility was delegated to do these tests, will do so in conformance with the requirements as set out in section 6 below.

2.5.1.2 Isokinetic PF fineness checks must be performed according to the schedule for routine PF fineness checks.

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2.5.1.3 In addition Isokinetic distribution and PF fineness checks will be carried out in the interest of keep as is, as requested by the relevant System Engineer or at any time when the performance of a mill is such that it is suspected that it is adversely affecting the combustion process.

2.5.1.4 If the test carried out indicates unacceptable variances in fineness or distribution, a deviation form with a copy of the test results is to be submitted to the relevant Process Engineer and the System Engineer responsible for combustion equipment. A copy of the above will be submitted to the P&T Manager for his/her information, if so requested.

2.5.1.5 Once corrective action has been taken by Maintenance, the test will be repeated to ensure that adequate corrective action was taken.

2.5.1.6 Personal, plant and equipment safety precautions are to be observed at all times.

2.5.2 Operating on shift (Shift Supervisor)

2.5.2.1 Shift staff will assist with the test by, e.g. control PA damper on manual at the required flow, make computer printouts, etc.

2.5.2.2. Oil burner support should not be required but to be used at the discretion of the Unit Operator.

2.5.2.3 The control operator to maintain at 55ton/hr during the sampling of the mill.

2.5.3 System Engineer

The engineer in the Boiler Plant Engineering department responsible for combustion equipment will ensure that adequate corrective action is taken by maintenance in cases where unacceptable variances occurred.

2.6 Process for Monitoring

As per P&T schedule.

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2.6.1 Risk Assessment:

2.3.1.1 Personnel, Plant and equipment safety precautions are to be observed at all times

2.3.1.2 A mini risk assessment has to be completed before any work can be executed.

2.7 Related/Supporting Documents

2.7.1 Records Generated

- Electronic copies of test log/result sheets must be forwarded to the Process and System engineer as soon as they are available
- Electronic copies of test log/result sheets must be retained for at least two complete ball cycles. In addition, if the information is stored in a computer data base, at least two complete ball cycles must be available but the records may be indefinite. Performance and Testing department will be the primary custodian of this information.

3. DOCUMENT CONTENT

3.1 Actions

Before proceeding ensure the following are done:

3.1.1 That the PF sampler is in good working condition with an undamaged sampling probe nozzle when testing isokinetically.

3.1.2 Pressure measuring ports in the nozzle are clear and pressure measuring impulse lines purged.

3.1.3 Sample containers are clean and free from moisture.

3.1.4 Sieves to be used for PF grading are clean and not damaged.

3.1.5 Connecting lines are connected to the correct points and are not leaking when manometers

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are used.

3.1.6 The mill to be tested is on the currently prescribed load line.

3.1.7 Grinding element loading pressures are as specified by Boiler Plant Engineering.

3.1.8 The test procedure and communication strategy has been discussed with the Unit Operator in advance.

3.2 Test procedure

3.2.1 Request the Unit Operator to put the PA damper for the mill to be tested on manual control leaving the Secondary air, Tempering air and Feeder speed on automatic control.

3.2.2 Adjust the PA flow until a coal flow of approximately fifty five tons per hour for the mill being tested is indicated by the DEMAX process computer. Allow ± 10 minutes for conditions to settle out.

3.2.3 Collect a pulverised fuel sample from the mill outlet pipes to the burners as described in the instruction for the use of the Cyclostatic PF sampler.

Record the mill operating conditions at the time of the test on the plant test log sheet or make a copy of the MILL GROUP DISPLAY and also record the mill condition and running hours.

On completion notify the Unit Operator that the mill may be returned to normal service.

3.3 Grading of PF

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3.3.1 In the P&T workshop, determine the mass of PF collected from each fuel pipe by weighing the sample container with the sample in it and then subtracting the pre-weighted container mass from it. Use is to be made of the electronic scale provided in the workshop for this purpose.

3.3.2 Assemble the sieve nest for grading of the PF sample by placing the pan at the bottom, followed by the 75 micron sieve, and then the 300 micron sieve. The Plexiglas dome is to follow last after the sample has been introduced.

3.3.3 For routine checks only the 300 and 75 micrometer sieves plus the pan need to be used in the sieve nest, assuming that the intermediate grades of fineness will fall between these points when plotted on ROSIN and RAMMLER graph paper.

3.3.3 Scoop a 50g PF sample from any one of the four sample containers and place it on the top (300 micrometer) sieve.

Clamp the sieve nest containing the sample including the plexi-glass dome to the vibrator table taking up the slack on the toothed straps and tensioning the plastic star screws.

3.3.4 Set the function switch (RH bottom) to "inter", the time knob (RH top) to the halfway position and the timer switch to 10 minutes before switching the sieve shaker on.

3.3.5 When the shaker is switched on set the amplitude knob until the frequency is on 3, 5 (frequency gauge is on top of the plexi-glass dome). The amplitude must e on non-continuous vibration to avoid conglomeration and entrainment of finer particles in air stream

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3.3.6 On completion of the sieving period weigh the contents of each sieve starting with the 300 micrometer one by tipping it into the selected weighing pan. Fines sticking to the sides of the sieves should be brushed off using a clean paint brush and shaken through manually onto the next finer sieves. Record the values on the test log sheet (The values must be multiplied by 2 to convert to percentage).

3.3.7 Repeat with the other samples until all four samples have been completed.

Record all values on the test log sheet.

NOTE: The above method of grading is as specified by BPE to meet their requirements and is to be used for routine tests. For more comprehensive performance testing refer to Refs: 3.2 and 3.4 above

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3.4 Evaluation of Results

3.4.1 Plot the percentages passing the sieves on ROSIN and RAMMLER graph paper. The points must fall within the upper and lower control limits if the grading was carried out in an acceptable manner. If not, repeat the process with a second sample from the same container.

Acceptable Fineness Limits for PF , for Mpumalanga Coals	
Sieve size	Fineness Limits
75 microns	65-75% Passing
300 microns	0,2-1,0% Retained

NOTE: The target lower limit for passing through a 75 micron sieve at Duvha is 68%

3.4.2 Input the values read from the test log sheet for P&T the different criteria as well as the sample mass for each fuel pipe in the spaces provided in the electronic spread sheet, PTP0007-1

The spread sheet will automatically calculate the values and create a graph ready for printing.

4. ACCEPTANCE

This document has been seen and accepted by:

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5. REVISIONS

Date	Rev.	Compiler	Remarks
October 2020	4	MS Diale	Change to new format and was due for review 4, changig from revision 3 to revision 4
June 2017	3	P Swanepoel	Due for review 2 to 3

6. DEVELOPMENT TEAM

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7. ACKNOWLEDGEMENTS

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- Uwe kaphengst

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