

	SCOPE OF WORK	Kusile Power Station
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1. Introduction

Compressed air systems across Eskom fleet are regarded as level 1 plant, meaning this plant can cause MUT. The main contributors to MUT risk at Kusile Power Station are the loss of aux cooling water, lack of redundancy/unavailable compressors, power loss and high air consumptions or usages. Thus far at Kusile Power Station, load losses caused by insufficient compressed air have been experienced.

At this point Kusile Power station has high compressed air consumption from station consumers. A large amount of compressed air is being consumed in an excessive amount, but the cause is difficult to trace. This project to install air flow meters at all station consumers will help to determine which system is consuming more and can be repaired.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

This document serves as the scope to install flow meters on all compressed air users for monitoring consumption at Kusile Power Station.

2.1.2 Applicability

This document shall apply to Kusile Power Station for the installation of flow meters on all compressed air users.

2.1.3 Effective date

Document is effective upon from the authorisation date.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs:

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2.2.1 Normative

- a. ISO 9001 Quality Management Systems.
- b. The National Environmental Management Act, Act No 107, 1998.
- c. ISO 14001 Environmental Management System.
- d. 240-105929225: Compressed Air System Standard Rev 3.
- e. 240-164479614/203 – 108663: Kusile Power Station Multiple Unit Trip (MUT) Risk Report for Grid Code Compliance.
- f. 240-89346203: Kusile Power Station Compressed Air Maintenance Strategy Rev5.
- g. 240-164818098: Kusile Power Station System Health Report for Compressed Air Plant June 2024.
- h. 240-97174554-1: Kusile Power Station Operating Technical Specification for Compressed air systems Rev 4.

2.2.2 Informative

- a. Occupational Health and Safety Act No. 85 of 1993.

2.3 Definitions

- a. **Contractor:** Service provider contracted for supplying specific service to Eskom, Kusile Power Station.
- b. **Employer:** Eskom, Kusile Power Station
- c. **Plant:** Any structure, machinery, apparatus, or equipment which does not fall within the scope of the operating regulations for high voltage systems, and excludes, mobile, portable lifting equipment, domestic circuits' appliances, and tools.
- d. **Air quality:** Correct flow rate and purified compressed air.

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2.4 Abbreviations

Abbreviation	Description
SOW	Scope of Work
MUT	Multi-Unit Trip
OEM	Original Equipment Manufacture
ISO	International Organization for Standardization
QCP	Quality Control Plan
SANS	South African National Standards
PSR	Personal Safety Regulation
BOP	Balance Of Plant
DCS	Distributed Control System
P&ID	Process and Instrumentation Diagram
KKS	Kraftwerk Kennzeichen System

2.5 Roles and Responsibilities

2.5.1 The Employer

The responsibilities of the Employer include the following:

- Employer shall provide training for PSR, ORHVS, and any other training as deemed necessary by the Employer.
- The Employer and Contractor in this SOW is committed towards the following.
- Retention of critical skills

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- d. Continuous cost reduction
- e. Health & Environment Safety
- f. Employer shall ensure that the contractor appointed are qualified, demonstrated experience and skills to execute the scope of work.
- g. Provide clarify on the scope of work to the contractor as and when required.
- h. Participate in quality control holding point as stipulated on the quality control plan.
- i. Authorise final release of product.

2.5.2 The Contractor/OEM

The responsibilities of the Contractor include the following:

- a. To proof by any means that they have qualifications, skills and experience to execute the scope of work.
- b. Complete the scope of work as outlined in this document.
- c. Ensure compliance with relevant health and safety standards.
- d. Work against this contract can only be performed upon receipt of a task order.
- e. All works will be subject to anytime inspection from the Employer.
- f. Housekeeping for any work is the responsibility of the Contractor.

2.5.3 Manpower Requirements

The contractor shall provide suitable work force to executive this scope of work according to Eskom procedures explained in this document.

2.6 Process for Monitoring

N/A

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3. Scope of Work

The installation of the flow meters should address the issue of having systems consume more process, service, and control air. These flow meters readings must be connected and displayed on the DCS for monitoring. The system to be monitored are as follows:

- Dust Handling Plant (DHP) including Ash silos.
- Pulse Jet Fabric Filter Plant (PJFFP).
- Water Treatment Plant (WTP).
- Waste-water Treatment Plant (WWTP).
- Aux Boiler.
- Flue Gas Desulphurisation (FGD).
- Coal Silos.
- Boiler.
- Turbine.
- Fuel Oil.
- Condensate Polishing Plant (CPP).

3.1 Scope to install flowmeters:

- Total of **48** flow meters to be installed in all system consume compressed air. The list in Appendix – A shows all system with KKS for location of where the flow meters should be installed. Appendix-B attached are the P&IDs for systems.
- All the flow meters to be connected on the DCS at the BOP for plant flow rate monitoring.
- Work shall begin once all designs are approved for construction, QCP's are approve by Eskom representatives.
- Final release of the flow meter after installation should be done by Eskom System Engineer.

3.2 Material and Dimensions

- Material and dimensions are stipulated in Appendix-A and Appendix – B.

Figure 3-1 shows the material specification of the pipes installed on the above systems to supply process, service, and control/instrument air.

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	Temperature		Pressure		Material	
	Operating	Design	Operating	Design	≤ DN50	>DN50
Service Air (SCH)	20 °C	60 °C	7.0 bar	10 bar	SANS 62-1	ANSI A106
Instrument Air (QFH)	20 °C	60 °C	7.0 bar	10 bar	SANS 62-1	ANSI A106




Remark	Material of Piping	Pipe Class	Design Pressure bar(g)	Design Temperature °C	Calculation Section
≤ DN50	SANS 62-1	MSA_MS_C7	10 bar(g)	60 °C	
> DN50	ANSI A106 Gr. B	MSA_MS_C7	10 bar(g)	60 °C	
	1.4571	STD16_A1	10 bar(g)	60 °C	

Figure 3-1: Pipe design and material specifications.

3.3 Design

- For power connection and DSC connection, a contractor should connect to the nearest connection point on each system.
- Power supply to the flowmeters is 24V.
- Adhere to Kusile power station standards: Analog output signal is ranging from 4 – 20mA.
- From the Analog out signal will be connected to the junction box at the plant and be used to send communication to the BOP DCS.
- The type of communication used in Kusile power station is PROFIBUS.

3.4 Design Drawings

- All the drawings (P&ID's) should be updated with the flow meters installed; the drawings should meet minimum requirement of Eskom document 240-86973501 Engineering Drawing Standard.
- All updated drawings (P&ID's) shall be supplied for approval by Eskom Engineer.

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3.4 Documentation

The *Contractor's* scope of work includes but is not limited to providing the following documentation before completion of the service required:

3.4.1 Data Book

The *Contractor's* scope of work includes but is not limited to providing the following documentation:

- a. Service report after work to be completed and submitted for approval.
- b. Completed QCP's including QCP's for sub-*Contractors*. (Approved by Eskom).

3.4.2 QCP's, method statements

QCP's, method statements and procedures are to be issued to the *Employer* for acceptance before any work commence. Inspection Test plans and QCPs are issued to the *Employer* to mark up with witness and hold points.

4. Environmental requirements

- a. The contractor must identify all aspect and impact related to the scope of work and put measures in place to minimise/prevent environmental contamination.
- b. All waste including scrap materials to be disposed in allocated bins onsite.

5. Acceptance

This document has been seen and accepted by:

Name	Designation
Grace Olukune	Kusile Engineering Manager
Busi Nkomo	Kusile Auxiliary Plant Engineering Manager
Emmanuel Manganye	Kusile Auxiliary Senior Engineer
Hloni Ramorena	Kusile Compressor Plant System Engineer

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Name	Designation

6. Revisions

Date	Rev.	Compiler	Remarks

7. Development Team

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

8. Acknowledgements

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9. Appendix-A: System pipes location and KKS numbers

System	Type of Air	KKS	Quantity of Flow Meter	Pipe Size (ND)
DHP and PJFFP	Process air	10QEB10BR001, 20QEB10BR001, 30QEB10BR001, 40QEB10BR001, 50QEB10BR001, 60QEB10BR001	6	100
	Control/ Instrument air	10QFB10BR001, 20QFB10BR001, 30QFB10BR001, 40QFB10BR001, 50QFB10BR001, 60QFB10BR001	6	50
Ash Silos	Process air	00QEB17BR001	1 for 3 silos and 1 for 3 silos	80
	Control/ Instrument air	00QFB30BR001	1 for 3 silos and 1 for 3 silos	50
FGD	Process air	00QEB45BR001, 00QEB25BR001, 00QEB28BR001	4	50
	Service air	00QEB27BR001, 00QEB22BR001	3	50
	Control/ Instrument air	00QFB27BR001, 00QFB22BR001	3	50
WTP	Process air	00QEB17BR002	1	50
	Control/ Instrument air	00QFB13BR001	1	50
Boiler				
	Control/ Instrument air	10QFB10BR004, 20QFB10BR004, 30QFB10BR004, 40QFB10BR004, 50QFB10BR004, 60QFB10BR004	6	80
Turbine	Service air	00QEB16BR001, 00QEB11BR001	6	50

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	Control/ Instrument air	10QFB10BR007, 20QFB10BR007, 30QFB10BR007, 40QFB10BR007, 50QFB10BR007, 60QFB10BR007	6	50
Fuel Oil	Service air	00QEB40BR001	1	50
	Control/ Instrument air	00QFB11BR001	1	50
TOTAL: 48				

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10. Appendix – B

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