

	<p style="text-align: center;">Scope of Work</p>	<p style="text-align: center;">Kriel Power Station</p>
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Title: Supply and Install Coriolis flow and density meters on the fuel oil offloading pipe on North and South offloading bays

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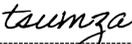
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1. Introduction

Kriel Power Station fuel oil system is used to store and deliver fuel oil to the burners for unit light up, stabilising combustion in the furnace when a mill is being put in or taken out of service and when there are combustion instabilities in the boiler.

The fuel oil is delivered to Kriel Power Station by large road tankers at either of the two-fuel oil pump houses. There is a North fuel oil pump house which supply units 1-3 and South fuel oil pump house which supply units 4-6 with fuel oil. Each pump house has two transfer pumps or offloading pumps with one of the two pumps is on standby.

The current problem is that fuel oil deliveries at Kriel Power Station are not metered. The current method that is used to measure the fuel oil supplied to Kriel Power Station has gaps that are exploited to steal fuel oil supplied. The method used to measure deliveries is that the fuel oil truck is weighed at weigh bridge before and after delivery. The weigh bridge delivery note serves as a confirmation of delivery and quantities delivered; however the weigh bridge measured fuel oil quantities are not always offloaded to Kriel Power Station fuel oil tanks. The recent fuel oil theft incidences at Eskom necessitate that Eskom strengthen checks and balances on fuel oil deliveries. Metering at the fuel oil offloading point will provide an important measurement that will serve as a confirmation of delivered and offloaded quantities of the fuel oil to the fuel oil tanks.

2. Supporting Clauses

2.1 Scope

The scope of this document is to provide requirements for the supply, installation and commissioning of the Coriolis Flow and density meters on the fuel oil offloading pipe on North and South fuel oil offloading bays. This include local control panel and Interfacing to the control HMI DCS T3000 at the units control rooms and SCADA system at outside plant control room.

2.1.1 Applicability

This document is applicable to Kriel Power Station Fuel oil offloading bays on the North and South.

2.1.2 Effective date

This document is effective from the date of authorisation on the cover page.

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

- [1] ISO 9001 Quality Management Systems
- [2] Unit Standard ID:114458
- [3] 240-48929482 Tender Technical Evaluation Procedure

2.2.2 Informative

- [4] Common plant Fuel Oil system P&ID drawing
- [5] 240-48929482 Tender Technical Evaluation Procedure

2.3 Definitions

None.

2.4 Abbreviations

Abbreviation	Explanation
C&I	Control and Instrumentation
CID	Control and Instrumentation Maintenance Department
DCS	Distributed Control System
EC	Engineering Change
HMI	Human Machine Interface
I/O	Input Output
ISO	International Organization for Standard
P&ID	Piping and Instrumentation diagram
SCADA	Supervisory control and data acquisition

2.5 Roles and Responsibilities

The system engineer compiles the scope of work that will ensure that all requirements are brought forward and are met as stipulated on this scope of work and involvement of all relevant stakeholders.

2.6 Process for Monitoring

The process for monitoring will be as per Eskom processes and procedures on the Procurement Management, Project Management and Technical Management of the project from start to completion.

2.7 Related/Supporting Documents

Unit Standard ID : 114458

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3. Scope of Work

3.1 Boiler Engineering Requirements for monitoring and Operation

- Installation of Coriolis Flowmeters that shall measure fuel oil flow on fuel oil offloading pipe on North fuel oil offloading bay and South fuel oil offloading bays
- Density meter that shall measure the density of the fuel oil
- The fuel oil flow and density measurements will be measured from the offloading pipe for the North fuel oil offloading bay and offloading pipe for the South fuel oil offloading bay
- All required operations shall be done on the local operating panels, separate operating panel on the North offloading bay and a separate operating panel on the South offloading bay
- All Operation and information on local control panel must be displayed and recorded on the control HMI DCS T3000 at the units control rooms and SCADA system at outside plant control room. All the information shall be extended to PI ProcessBook.
- All operation in the system shall be done on the local operating panel
- The person conducting the offloading function shall be able to reset on the local operating panel for each fuel oil truck delivery
- Localised reading with accumulative flow (reset after every delivery) and totalizer on the local display. This will serve as a back-up system
- The localised operating panel shall display instantaneous flow, totalizer flow, cumulative flow value and fuel oil density, this information shall also be displayed on HMI DCS T3000 and outside plant SCADA display

3.2 Fuel oil and Mechanical information

- Fuel oil offloading pipe:
 - Pipe size: Internal diameter (ID) = 155mm
 - Outside diameter (OD) = 170mm
 - Pipe Material: Carbon Steel
- Fuel oil offloading pump:
 - Allweiler positive displacement screw type,
 - Discharge pressure 5-6 bars
 - Speed 1450RPM
 - Discharge flow 1250 – 1300L/min
 - Specification: SHN1300SR46D12.1.W2
- Fuel oil specification: Refer on Eskom standard GGS0957 (Eskom Fuel Oils Specification)
The instrument shall be able to measure all the fuel oils as per GGS0957 standard

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3.3 Description of work that shall be executed by the Contractor

3.3.1 Supply Coriolis Flow meter and technical specification

- Selection of an appropriate Fuel oil flow meter and density measuring instrument as per requirements
- Fuel oil specification as per Eskom Standard GGS0957 (Eskom Fuel Oils Specification)
- Flow range 0 to >1300 litres per minute
- Pressure > 6 bars
- Ambient Temperature up to 60°C
- Coriolis measurement instrument with an instantaneous flow, totalizer on the local display and fuel oil density.
- Process connection: Flanged
- Accuracy $\pm 0.10\%$ or 0.20%
- Power supply: 24 V DC/220 AC VDC
- 4-20 Milli Amps Output.
- IP rating for the transmitter IP20 and IP rating for the sensor IP67
- The measurement system must comply to the following requirements:
 - Hazardous area: Red Zone Requirements
 - Eskom level 1 plant

3.3.2 Mechanical Fitting and Installation

- Conduct necessary risk assessment to work on a red zone area.
- Conduct a risk assessment on fuel oil tank levels in relation to the projected fuel oil demand on the particular period where fuel oil offloading pipe will not be available.
- Modification of the offloading pipe as per agreed method, cutting or opening of the offloading pipe to accommodate the Coriolis flow and density meter/s.
- Allocate AKZ numbers for the new instrumentation.
- Update P&ID drawings

3.3.3 Control and Instrumentation configuration

- Commission from point of installation to Junction Box and up to DCS I/O Module
- I/O FUM Cards signal cables termination (Black wiring on SAE).
- Identification of Function blocks SPPA T3000 DCS.

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- Update loop diagrams and termination sheets
- Configure new instrumentation signals on to DCS logic for monitoring on HMI
- Configure also flow meter measurement on the outside plant HMI SCADA

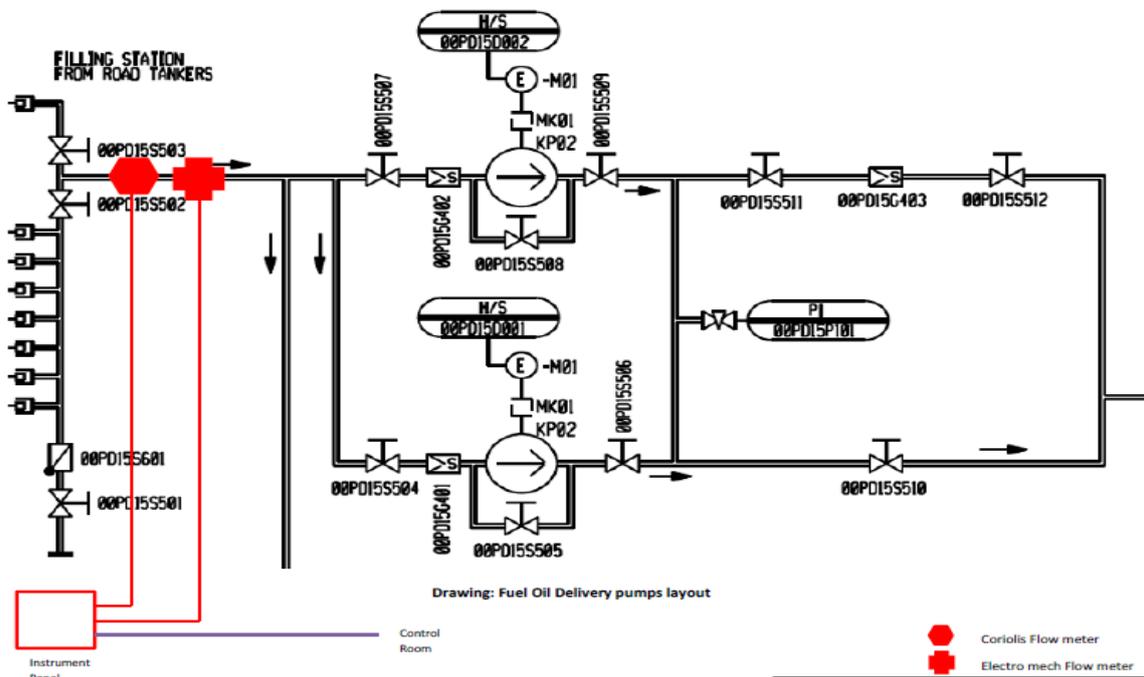
3.3.3.1 Cabling

- Supply, install instrument cabling from the instrumentation to an existing junction box.
- Supply, install and commission UVG 8 cabling from the junction box to the equipment room cubicle.
- Supply and stable UVG 40 cable of 15m in length per unit.
- Existing cable rack to be utilised

3.3.3.2 Electrical Power Supply

The Contractor to provide cabling and installation for all instrumentation that require external 220V AC or 24VDC power supply and 24V with 4-20mA output feedback.

3.3.4 Instrumentation Points of Installation SOW Diagram.



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3.4 Standard and Specification

3.4.1 C&I Standards

- 240-56227443 Requirements for Control and Power Cables for Power Stations Standard.
- 240-56355535 Process Calibration Equipment Standard
- 240-56355728 Human Machine Interface Design Requirements Standard
- 240-56355754 Field Instrument Installation Standard
- 240-56355815 Field Instrument Installation Standard Junction Boxes and Cable Termination
- 240-56355843 Flow Measurement Systems Installation Standard
- 240-56355888 Temperature Measurement Systems Installation Standard

3.4.2 Configuration Management Standards

A Competent and an OEM authorised service provider with a proven record of similar works

3.4.3 Boiler Standards

- 240-106628253 Standard for welding requirements on Eskom plant
- BS EN 13480 Metallic Industrial Piping
- BS EN 12952 Water-tube boilers and auxiliary installations

4. Acceptance

This document has been seen and accepted by:

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5. Revisions

Date	Rev.	Compiler	Remarks
July 2022	1	Xolani Sigwebela	Scope of work

6. Development Team

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

- Thulani Magagula

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7. Acknowledgements

- Nomatshawe Gantsho
- Harry Mokabane

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