Eskom	Works Information	Engineering

Title: **Tutuka Fuel Oil Pump Refurbishment Scope of Work**

Unique Identifier:	**15ENG GEN-2311**
Alternative Reference Number:	**N/A**
Area of Applicability:	**Engineering**
Documentation Type:	**Scope of work**
Revision:	**2**
Total Pages:	**11**
Next Review Date:	**N/A**
Disclosure Classification:	**CONTROLLED DISCLOSURE**

Compiled by	Functional Responsibility	Authorized by
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Boiler System Engineer	**Senior Boiler Engineer**	**Engineering Manager**
Date: 22/07/2025	Date: 22/08/2025	Date: 25/08/2025

EXECUTIVE SUMMARY

The fuel oil pumps play a critical role in ensuring that the oil supplied to the burners is delivered at the correct pressure to support stable and reliable combustion. However, the plant has experienced several incidents where pumps have either failed prematurely or underperformed, resulting in fuel oil supply interruptions, unit trips, and environmental incidents.

Currently, the pumps are maintained according to Eskom's approved maintenance strategy. This includes routine minor services performed by the Eskom maintenance team, and major overhauls and refurbishments conducted by appointed contractors as required. This document outlines a detailed refurbishment scope of work to restore and maintain the reliability and performance of the screw pumps installed in the fuel oil plant.

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1.DESCRIPTION OF THE WORKS

1.1 INTRODUCTION

Tutuka Power Station uses fuel bunker 150 for unit light-ups and combustion support. The oil is delivered to the power station by road tankers. It is then transferred from the road tankers by means of transfer pumps to the fuel oil bulk storage tanks. Tutuka power station has two pump houses; each pump house has two fuel oil storage tanks; one pump house supplies units 1 to 3 and the other supplies units 4 to 6.

Fuel oil is delivered from the storage tanks to a common low pressure (LP) system. The LP system consists of three booster pumps one in service, one on standby and the third one in reserve. This portion of the plant is common to all three units. The unitised portion of the pump house consists of heating equipment and High Pressure (HP) pumps supplying each unit individually. After the fuel oil is heated it flows to the HP pumps (one in service and one standby) to the oil burners of each unit.

The fuel oil pumps used are the positive displacement 3-rotor screw pumps. Below are the model names and number of the screw pumps installed in the fuel oil plant (east and west):

- Transfer pumps (2 off) - SNH 1300ER46E.9-W2-TO-2.
- LP pumps (6 off) - SNH 940R4666W2.
- HP pumps (12 off) - SNH 440-40/46.

During the course of the contract, Tutuka Power Station may install new pump models that are equivalent or similar to the pumps currently listed. The introduction of such models may impact or alter the scope of work under this contract.

1.2 SCOPE OF THE WORKS

The scope of work entails the disassembly of the screw pump to allow for a comprehensive inspection of all internal components. All worn, damaged, or non-functional parts shall be replaced with Original Equipment Manufacturer (OEM) components to ensure full compatibility and reliability. Upon completion of reassembly, the pump shall undergo functional testing to verify performance against original specifications before being returned to service.

The inspection and refurbishment of HP pump (model SNH 440-40/46) assembly shall include but not limited to the following scope for execution:

1. Clean pump to strip and inspect.

2. Remove and inspect bearing housing.
3. Replace mechanical seal (400SP/OR/3F753/27).
4. Replace bearing 6308.C3 (external bearing, regreasable: SKF63087ZZ/C3WT).
5. Inspect main mounting flange balancing disc landing.
6. Repair balancing disc landing.
7. Inspect idler spindle bushes.
8. Replace idler spindle bushes.
9. Inspect main drive spindle bearing and seal landings.
10. Repair bearing and seal landings.
11. Inspect idler spindle bearing bush landings.
12. Inspect and measure spindles as per specification.
13. Straighten or replace spindle set.
14. Crack test insert casing.
15. Measure insert casing as per specification.
16. Replace gasket set.
17. Assemble pump.
18. Pump performance and static tests.
19. Quality assurance.

The inspection and refurbishment of LP or booster pump (model SNH 940R4666W2) assembly shall include but not limited to the following scope for execution:

1. Clean pump to strip and inspect.
2. Remove and inspect bearing housing.
3. Replace mechanical seal.
4. Replace bearing 6311.C3.
5. Inspect main mounting flange balancing disc landing.
6. Repair balancing disc landing.
7. Inspect Idler spindle bushes.
8. Replace Idler spindle bushes.
9. Inspect main drive spindle bearing and seal landings.
10. Repair bearing and seal landings.
11. Inspect idler spindle bearing bush landings.
12. Inspect and measure spindles as per specification.

13. Straighten or replace spindle set.
14. Crack test insert casing
15. Measure insert casing as per specification.
16. Replace gasket set.
17. Assemble pump.
18. Pump performance and static tests.
19. Quality assurance.

The inspection and refurbishment of transfer pump (model SNH1300ER46E.9-W2-TO-2) assembly shall include but not limited to the following scope for execution:

1. Clean pump to strip and inspect.
2. Remove and inspect bearing housing.
3. Replace mechanical seal.
4. Replace bearing 6311.C3.
5. Inspect main mounting flange balancing disc landing.
6. Repair balancing disc landing.
7. Inspect idler spindle bushes.
8. Replace idler spindle bushes.
9. Inspect main drive spindle bearing and seal landings.
10. Repair bearing and seal landings.
11. Inspect idler spindle bearing bush landings.
12. Inspect and measure spindles as per specification.
13. Straighten or replace spindle set.
14. Crack test insert casing.
15. Measure insert casing as per specification.
16. Replace gasket set.
17. Assemble pump.
18. Pump performance and static tests.
19. Quality assurance.

Table 1 below lists the specification, model names of the pumps that will be required to be stripped, assessed and refurbished as and when required.

Table 1: List of pumps to be refurbished

Pump	Stock number	Description	Quantity per year
Fuel Oil Transfer Pump (Off Loading Pump Insert)	0177502	Assembly: Type: Rotating; Application: Fuel oil pump; Reference no: SNH1300R466W2; Part no: SNH1300,supplier: unknown; vendors are responsible for ensuring that they are performing against the correct drawing revision number (if applicable).	
Fuel Oil Booster Pump	0641557	Pump:Type:Screw;size:sunction 150; discharge 125 MM; capacity: 856-910 LPM; speed:1450 RPM;rating;1000 KPa;driver:electri motor;specification:ISO9001-2008;Pontential:380V;Furnished ems:pressure removing valve mounted;casing material:CI;application: fuel oil booster:3 spindle type;serial no:15002409;part no: SNH940ER46E.9-W2-TO-2;vendors are responsible for ensuring that they are performing against the correct drawing revision number (if applicable)	
Fuel Oil Booster Pump with PRV fitted on top	0616794	Pump:Type:3 spindle screw ;size:150*125 MM; capacity : 856-910 LPM;speed:1450RPM;rating;1MPa;driver:electricmotor;specification:ISO 9001-2008;Pontential:380 VAC;Furnished items:pressure removing valve mounted; casing material:CI;application: fuel booster;reference no:15002409;vendors are responsible for ensuring that they are performing against the correct drawing revision number (if applicable)	
HP Fuel Oil Pump Insert.	0558278	Pump:Type:Screw;size:440 MM; capacity:771.9LPM; speed:2900 RPM;rating;52bar;driver:electri motor 90KW; casing material: silafont;application:fuel oil;fuel oil pump insert;three rotor screw pump to pump fuel oil bunker 150;operating viscosity 10-15 CST;start up temperature of 45 deg C;operating temperature of 104-106 Deg C; flowrate of 770-830 L/min;sunction pressure of 450 KPa;the pump insert should be delivered with a test performance graph;reference no:SME 440 ER 46 E7US-W2E-TOL2-OR-G1/4;serial no:576175;vendors are responsible for ensuring that they are performing against the correct drawing revision number (if applicable)	

Fuel Oil HP pump specification:

- Quantity per unit: 2.
- Make/Model: Allweiler/SNH 440-40.
- Capacity: approximately 35 t/h at 12cSt.

- NPSH: 5 bar.
- Outlet pressure: 48 bar.
- Motor: 90kW.
- Speed: 2950 rpm.

Fuel Oil LP/ booster pump specification:

- Quantity: 6.
- Make/Model: Allweiler/SNH 940-46.
- Capacity: approximately 53 t/h at 350cSt.
- Operating pressure: 5-8 bar.
- Motor: 22kW.
- Speed: 1450 rpm.

Fuel Oil offloading pump specification:

- Quantity per unit: 2.
- Make/Model: Allweiler/SNH 1300-46.
- Capacity: approximately 69 t/h at 350cSt.
- Motor: 30kW.
- Speed: 1450 rpm.

A general arrangement drawing of the screw pumps described in table 1 above is shown below.

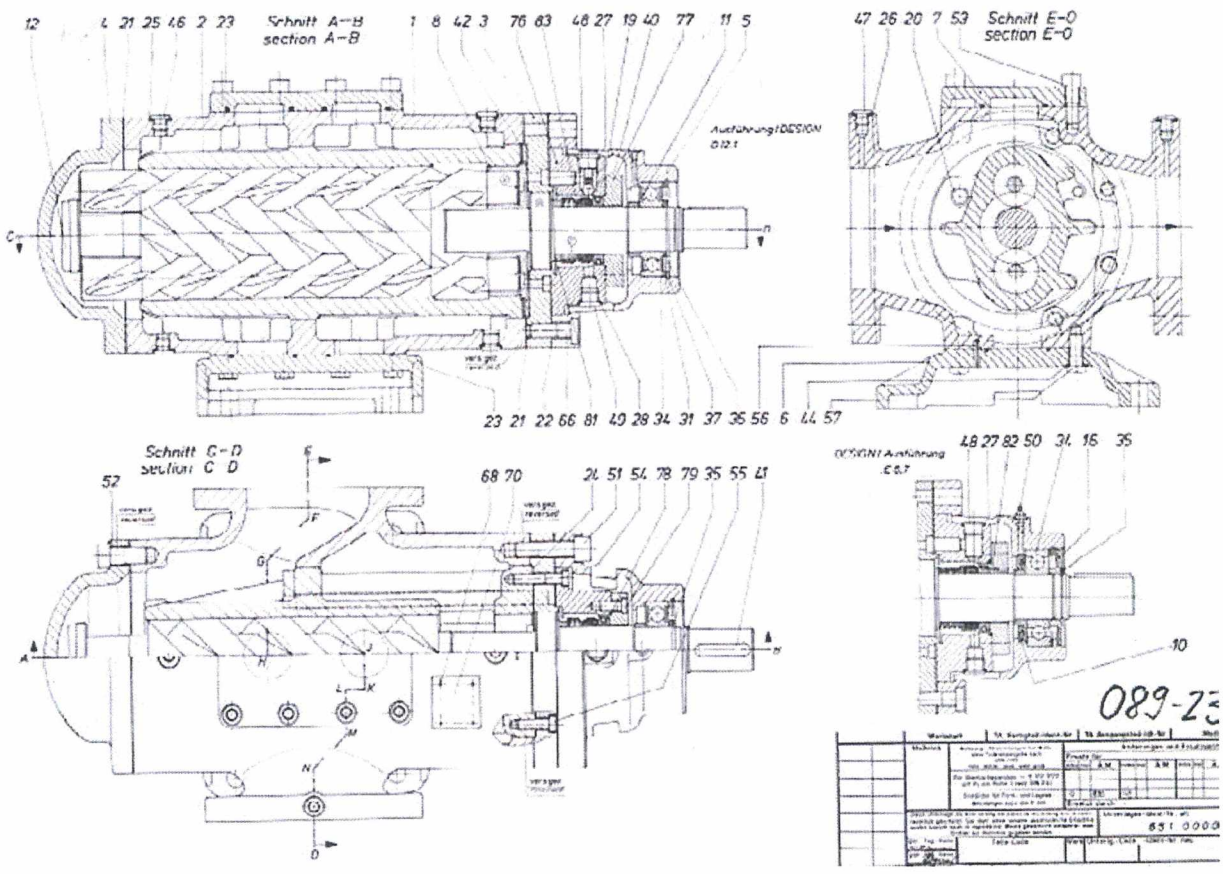

Figure 1: A typical positive displacement 3-rotor screw pump.

An Eskom approved QCP to be signed off by Eskom Engineering prior to the execution of the scope. Inspection and quality hold points to be included in the QCPs. Only OEM spares or parts are to be used when refurbishing or assembling the pump.

1.2.3 Battery Limits

The battery limits will be:

- Inlet and outlet pump flanges (pump inserts and casings).

1.2.4 Scope Requirements

The scope to be performed by the supplier on the listed pumps should be conducted in accordance with section 1.2. Only OEM approved parts and refurbishment methods or procedures are to be employed on the pumps. QCP, ITPs, pump repair procedures or method and data packs for all the

components used on the pump are to be submitted to Eskom by the Supplier. Pump performance and pressure test results are to be submitted to Eskom by the Supplier.

1.2 INTERPRETATION AND TERMINOLOGY

N/A

1.3.1 List of Definitions

None

1.3.2 List of Abbreviations

Abbreviation	Meaning given to the abbreviation
ISO	International Organization for Standardization
QCP	Quality Control Plan
OEM	Original Equipment Manufacturer.
RAM	Reliability Availability Maintainability

2 ENGINEERING DESIGN INFORMATION

2.1 Design information

N/A

2.2. List of drawings

N/A

2.3 OPERATING PHILOSOPHY

The refurbished fuel oil screw pump must be available and reliable for at least 12 months after refurbishment.

3 OTHER REQUIREMENTS OF THE SUPPLIER'S

The supplier submits complete data pack (QCP, ITPs, performance test, static test, etc.) to Eskom for review and approval. The supplier may only use OEM spare components which must be approved by

Eskom before they are used on the pump. The Supplier is to ensure that the refurbished pump is delivered to Tutuka power station on time as committed.

2.4.1Technical Risk Assessments

2.4.1.1 Reliability philosophies

- The refurbished pump does not negatively affect the power station's performance and reliability (current plant outages and maintenance interventions are utilised in order to keep the plant in good operating condition).
- Plant reliability is achieved by utilising proven repair principles to ensure that the pump operates optimally and is reliable.

2.4.1.2 System interface

No changes to the system is required.

2.4.1.3 Application standards

The following is a list of applicable standards:

- OHSA 85 of 1993 Occupational Health and Safety Act 85 of 1993
- 240-44974011, Routine work management
- 240-53114193, Occurrence and Incident Management Procedure
- 240-44974011, Routine work management
- 240-53114193, Occurrence and Incident Management Procedure
- 36-681 Generation Plant Safety Regulations
- NWS 1414 – Fuel Oil Plants for Fossil Fired Power Stations
- 474-12478 - Fuel Oil Generation Engineering Strategic Report 2022

4 MEETINGS AND START UP

3.1 MEETINGS

Initial site clarification meetings of a general nature will be convened and chaired by the assigned Buyer.

5 PROCUREMENT

4.1 PLANT AND MATERIALS

4.1.1 Quality

Only components of OEM specification are to be utilised. No replacement of defective equipment and/or materials is permitted without the Eskom's acceptance and any such repair, if approved, is carried out to the satisfaction of Eskom. Eskom is free to specify hold and witness points during, the repairs.

4.1.2 Tests and inspections before delivery

Pump performance and static tests are to be performed and included in the QCP. The tests results must be submitted to Eskom.

4.1.2.1 Inspection and testing

All pumps are comprehensively tested in accordance with the agreed Quality Control Plans (QCPs) prior to delivery. Eskom reserves the right to appoint a representative or representatives to inspect all parts during refurbishment, and to be present at any of the tests specified. Such witnessing of tests by the client, or if the client chooses to waive the witnessing of any tests, does not relieve the supplier of his responsibilities.

Eskom inspects parts of the plant at their discretion during repair stages and before shipment as per the agreed QCP.

5. AUTHORISATION

This document has been seen and accepted by:

- Pikela Chauke.
- Lele Masote.
- Mikateko Matlole.

6. REVISIONS

Date	Rev.	Compiler	Remarks
January 2022	01		First revision
July 2025	02		Changed scope

7. DEVELOPMENT TEAM

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

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8. ACKNOWLEDGEMENTS

N/A