Eskom	Technical Specification and Scope of Work	Matimba Power Station

Title: Procurement of oil drain pump for Matimba Power Station ACC

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Introduction

This document was developed for the procurement of an oil drain pump for Matimba Power Station ACC to change the oil on the gearboxes.

1. Supporting clauses

1.1 Purpose

The purpose of the document is to provide all contractual requirements for the scope of work.

1.2 Definitions

Definition	Explanation
Contractor	The Contractor is the person receiving the order and will be responsible for the execution of this scope of work.
Employer	Eskom Matimba Power Station.
Oil drain pump	A device to extract old oil from the Air-Cooled Condenser gearboxes used to change the gearbox oil.
Abnormal handling	Refers to general abuse by personnel during activities such as lifting, loading, pulling, tilting and working with gloves or awkward positions and does not refer to intentional damage/sabotage.

1.3 Abbreviations

Abbreviation	Explanation
ID	Identification Document
PPE	Personal Protection Equipment
ORFC	O-Ring Face Seal
ACC	Air Cooled Condenser
NRV	Non-return valve
ID	Identification number / Inside Diameter
ISO	International Organisation for Standardization
Kg	Kilogram
kW	Kilowatt
OD	Outer Diameter
PCD	Pitch Circle Diameter
PDF	Portable Document Format
PO	Purchase Order
QCP	Quality Control Plan
USB	Universal Serial Bus

2. The works

2.1 Executive overview

This scope of work is for the procurement of an oil drain pump used to change gearbox oil on the Matimba ACC gearboxes.

2.2 Description of the works

The work consists of the following once an order has been placed:

1. The contractor will provide a detailed data pack that complies to the specification as set out in Section 2.5. This will be submitted within 21 calendar days.
2. The Employer will have 7 calendar days to review the data pack.
3. A meeting will be scheduled between the Employer and Contractor to review the comments or changes if needed.
4. Where applicable, the contractor will have a period of 14 calendar days to make the necessary changes and updates to the data pack.
5. The Employer will then have a period of 7 calendar days to review the finalised data pack.
6. Once the data pack is approved, the Contractor will continue with the manufacturing of the drain pump.
7. The contractor will perform a demonstration at their facility, to demonstrate the operation of the oil drain pump as per the specifications set out in this document. This test shall be completed within 4 months from the PO date.
8. Once the acceptance tests have been approved, the oil pump can be delivered to Matimba where the contractor will witness the use of the pump as used by maintenance.
9. Once the drain pump has been proven to be functional and working as per the design, will the contractor be allowed to submit a delivery note.

2.3 Responsibility of the Employer

The Employer has the following responsibilities:

1. Where applicable, arrange for gate access for the Contractor. See Section 2.7.2.1 for access requirements.
2. Provide induction into Matimba Power Station. See Section 2.7.2.2. The Contractor will need to provide a valid medical certificate and ID number for each person needing induction.
3. For all technical information due for review, review and respond to the Contractor within 7 calendar days from the date of receiving the information.
4. Review and receiving of the goods and performing quality checks for acceptance.
5. Informing the Contractor, in writing, of any discrepancies in the goods received within the delivery period.

2.4 Responsibilities of the Contractor

The Contractor has the following responsibilities:

1. Confirm receival of purchase order and signed scope of work.
2. Ensure all medicals for the Contractors employees visiting Matimba plant are valid, and remains valid. This is required for the Employer to arrange induction into Matimba plant. See Section 2.7.2.2.
3. Formally notify the Employer at least four working days prior to the Employer being required for travel requirements.
4. Arrange access for the Employer to the Contractors facility as and when required and to specify all required items such as ID or PPE. A formal meeting invite shall be shared with the Employer via Email.
5. Adhere to all Eskom safety and lifesaving rules when on site as prescribed during induction.
6. Adhere to all Eskom environmental rules when on site as prescribed during induction.
7. It is the responsibility of the Contractor to justify any technical deviations to that of the scope and it remains the Employers discretion to accept or reject any deviations.

2.5 Data pack submission

Once the drain pump assembly has been tested at the Contractors facility, the final data pack for each drain pump will be submitted prior to the submission of the delivery note. i.e. the data pack is a deliverable of the delivery note, but the device will first be tested by maintenance on the plant in the presence of the Contractor before the delivery note can be signed off. A soft and hard copy will be supplied for each pump. The data pack will consist of the following:

1. Original signed scope of work (This document).
2. Final manufacturing drawing pack as per Section 2.6.10.
3. Approved acceptance test as per Section 2.6.13.
4. Approved operating, maintenance and fault finding manual as per Section 2.6.11.

The soft copy and hard copy data pack shall be provided via the Eskom large file transfer method for which an E-mail link will be provided. If this is unsuccessful, the data will be provided via USB.

The data pack shall not be scanned from the hard copy that will reduce the quality. The Contractor will merge all PDF files into a single PDF file for final submission. The following PDF formatting specifications shall apply:

1. The PDF will be text based and not image scans.
2. Text must be searchable on the PDF.
3. Scanned documents such as QCP`s shall have accurate Optical Character Recognition (OCR) applied.
4. Drawings should retain full zoom clarity without pixelation or blurring.

2.6 Oil drain pump technical specification

The following general considerations shall be included in the design process.

1. Only Viton O-Rings/seals shall be used on the pump.
2. The pump is used in harsh environments that involves lifting, tilting, bumping, vibrations, ambient temperatures >60°C, UV conditions and rain. The contractor shall ensure that the device is designed to withstand such conditions.
3. All parts shall be sourced from local manufacturers or distributors with the intent that future spares will be easily sourced as and when needed.
4. The statement “abnormal handling” refers to general abuse by personnel during activities such as lifting, loading, pulling, tilting and working with gloves or awkward positions and does not refer to intentional damage/sabotage.

2.6.1 Pump

The pump shall comply to the following technical requirements:

1. Self priming.
2. Positive displacement.
3. Flowrate: Average of 10L/min @ ±20°C for ISO VG320 oil, but shall be required to provide at least 5L/min @ <15°C for ISO VG320 oil. The oil operating temperature is often 80°C.
4. Dry suction lift of 1m with specified hoses.
5. Tolerable to dirt with an existing oil specification of ± 28/27/25 as per ISO4406.
6. Tolerable to frequent dry starts.
7. Maximum discharge pressure needed for future use with minor replacement requirements (discharge hoses and pressure gauges): 5MPa.
8. Tamper proof screw adjusted recirculating pressure relieve adjustable from 500 kPa to 5 Mpa.
9. Easy pump replacement as and when needed.
10. Only Viton O-Rings/seals shall be used on the pump.

2.6.2 Suction hose:

The suction hose shall comply to the following technical requirements:

1. Length: 1.5m.
2. ID: ±25mm.
3. Hose end 1: Crimp on Claw coupling to attach to gearbox suction fitting. Also see Section 2.6.4. Unless practically demonstrated to have a disadvantage an NRV shall be fitted at the end where the claw coupling is. The intent is to retain priming, but also to not spill oil when moving the hose from one gearbox to the other.
4. Hose end 2: 90° Bend swivel fitting with O-ring face seal and only Viton O-ring to connect to oil pump suction.
5. Transparent, wire reinforced.

6. Suitable for hydraulic oil (ISO 320 Mineral/synthetic oil).
7. Allowable operating temperature: 80°C.

2.6.3 Discharge hose

The discharge hose shall comply to the following technical requirements:

1. Length: 2.5m.
2. ID: ±15mm.
3. Hose end 1: 90° Bend swivel fitting with ORFC seal and only Viton O-ring to connect to oil pump discharge.
4. Hose end 2: 90° Bend fitting to discharge into the oil drum. Also See Section 2.6.5. Unless practically demonstrated to have a disadvantage an NRV shall be fitted at the discharge end. The intent is to not spill oil when moving the hose from one gearbox to the other.
5. Suitable for hydraulic oil (ISO 320 Mineral/synthetic oil).
6. Allowable operating temperature: 80°C.
7. Maximum allowable **working** pressure as selected to be above the pump safety device pressure.

2.6.4 Suction hose connection fitting:

Two adaptor fittings will be provided to allow oil drainage on different types of gearboxes. All fittings will be required to be attachable to the trolley if not in use.

1. One stainless steel tube that is ±15mm ID with wall thickness at least 2mm that is 700mm long. The suction pipe will be inserted into the gearbox breather to drain the oil. The one end connection has a fish mouth cut to allow adequate oil drainage and the other end has a ORFC fitting that connects to the suctions hose`s jaw coupling.
2. One hydraulic flat face quick connect coupling to connect to the existing gearboxes. quick connect coupling shall be able to attach to the suction hose`s jaw coupling. Contractor to take sample of the existing flat face quick connect coupling.

2.6.5 Discharge hose connection fitting

Two adaptor fittings will be provided to allow oil drainage on different types of dirty oil drums. All fittings will be required to be attachable to the trolley if not in use.

1. One stainless steel swivel screw in fitting that screws into the 210L oil drums. See Figure 1. The adaptor shall have a ORFC connection that connects from to the discharge hose onto the fitting that is screwed onto the oil drum. The fitting must be able to swivel on the discharge hose to secure it to the oil drum. The tube end shall have a single angled cut. The fitting shall also allow oil drainage if there is spills ad depicted in the image.
2. One stainless steel tube that is ±15mm ID with wall thickness at least 2mm that is 700mm long to insert into the oil drum. The tube shall have a ORFC fitting connecting the oil discharge hose to the steel tube that goes into the oil drum.

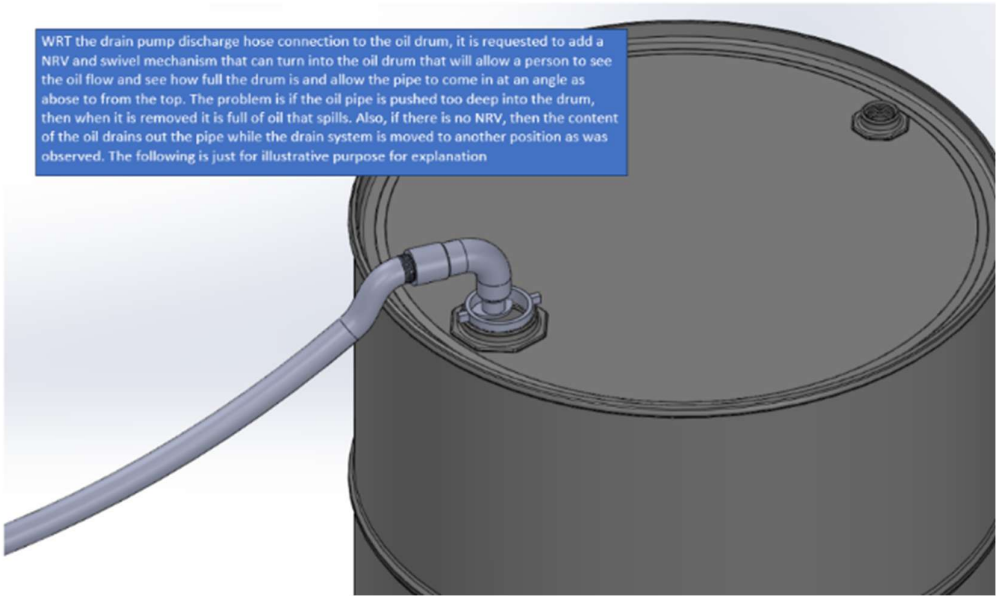

Figure 1: Swivel fitting to connect to oil drum

2.6.6 Fault finding requirements

The drain pump shall have the following fault-finding features:

1. Discharge pressure gauge, liquid filled, ±70mm diameter, glass, stainless steel housing, BAR.
2. Motor direction verification inspection hole/point.
3. Coupling inspection/connection inspection hole/point.
4. Power available indication light.
5. Pump running indication light.
6. Pump off indication light.
7. Motor overload protection indication.
8. Overpressure protection capability.

2.6.7 General trolley structure

The general trolley structure shall comply to the following technical requirements:

1. Frame color: red powder coated to at least 160 micron thick.
2. 2 Wheel vertical cylinder type trolley made from industrial grade aluminium. Also see Figure 2.
3. Reinforced webs and supports to allow for frequent use, lifting and vibration. There shall be no rigidity doubts/concern while remaining as light as possible.

4. A 2m power supply cable shall be provided and there shall be a cable reel/hanger to firmly secure the cable and the cable shall not be in the way of the pipes or visa versa and shall not easily come off from the cable reel/hanger when in transit.
5. Power and control cables shall be mechanically secure to the trolley frame by means of steel with plastic/rubber lined cable cleats or clamps to relief strain before any cable glands/termination. Cable glands shall not be used as the primary means of resisting loads. Cable entry points shall be protected against accidental impact and cable pull-outs during normal/abnormal handling of the device.
6. The wheels shall be heavy duty industrial castors with solid elastic rubber tyres. The hubs shall be solid steel/casting and have double sealed double ball bearings to allow for heavy radial and lateral loads. The wheel diameter shall be between ±200mm and ±250mm.
7. Shall not exceed a total width of more than 490mm. See Figure 2.
8. Shall have a drip tray.
9. The suction and discharge hose shall have reels/hangers to secure the hoses in a manner that mechanically secures the hoses to prevent the hoses from falling off while in transit during lifting/vibration/tilting.
10. Means shall be provided to reduce oil leaks from hoses after work has been done and the hoses are reeled/secured.
11. Shall be stable when all hoses and cables have been reeled and not be at risk to tilt over.

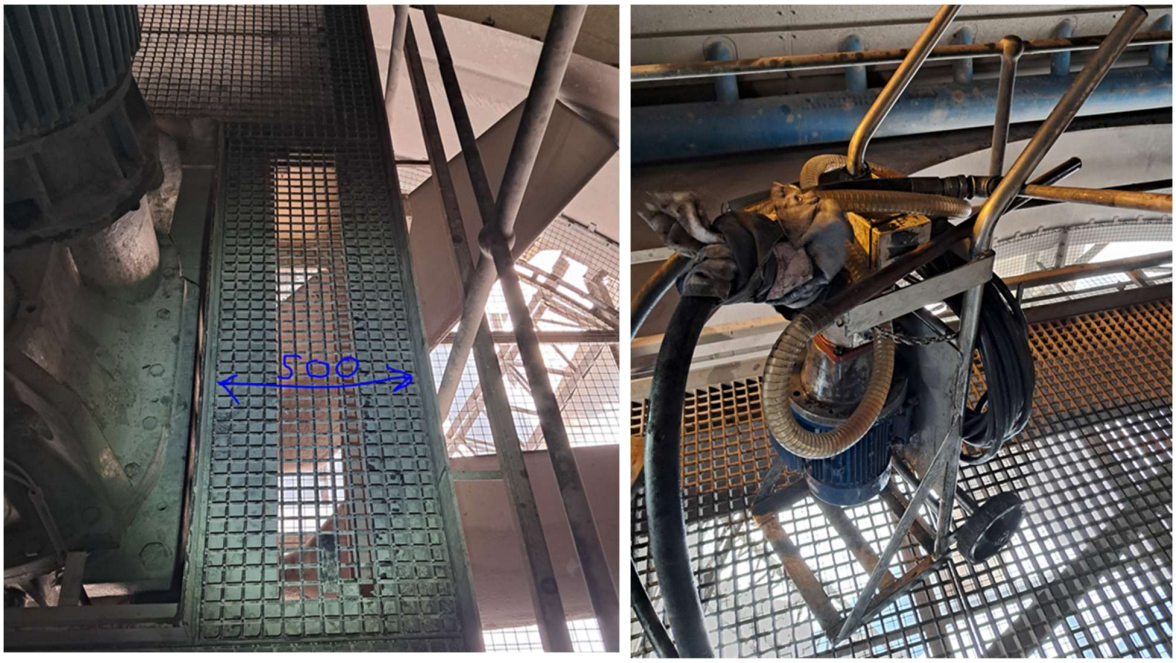

Figure 2: Maximum width restricted by 500mm passage. Existing trolley.

2.6.8 Power supply

The power supply shall comply to the following technical requirements:

1. 220VAC.
2. 4mm^2 3 core Heavy-duty flexible rubber trailing cable (H07RN-F Cable).
3. 2m installed cable length with industrial type extension connector.
4. Two x40m long extension cables with industrial grade plug connection with isolation switch, suitable to connect to the Existing Matimba plugs.
5. Push button stop/start (industrial grade, steel, with shroud, IP65, resistant to oil- vibration and mechanical impact, suitable for glove operations).
6. Operations isolator switch (industrial grade, steel, with shroud, IP65, resistant to oil- vibration and mechanical impact, suitable for glove operations).
7. Emergency stop (industrial grade, steel, with shroud, IP65, resistant to oil- vibration and mechanical impact, suitable for glove operations).
8. A COC shall be issued and there shall be traceability to the trolley serial number.
9. Only steel glands shall be used.
10. Only a steel junction box/panels shall be used with durable thick steel
11. The junction box/panel shall be as small as possible with a steel square cam lock.
12. Appropriate rails and cable racking/routing shall be used and there shall be no open conductors.

2.6.9 Name plate:

A name plate shall be included onto the trolley that is clearly visible. The name plate shall comply to the following technical specification:

1. The name plate shall be riveted to the frame.
2. The name plate shall be corrosion resistant stainless steel 316.
3. The name plate shall be at least 1 mm thick.
4. All writing shall be etched and filled with a black colour that shall be corrosion resistant to chemical degreaser.
5. All information shall be in English.
6. Shall first be reviewed and accepted by the Employer before manufacturing.

The Contractor shall supply a name plate of the drain pump that contains the following information as a minimum. The motor and pump shall have its own designated name plate as provided by the motor and pump manufacturer.

Identification number	MTP ACC 01…
Power (KW)	
Voltage (V)	
Supply phase	
Manufacturer	
Mass (kg)	
Design flow (kg/s)	

Motor speed (RPM)	
Minimum suction head (m)	
Maximum oil temperature (°C)	

2.6.10 Drawings and bill of materials

The following shall be provided by the Contractor:

1. The drain pump shall be supplied with an assembly drawing detailing the general dimensions and item numbering linked to the Bill Of Material (BOM).
2. BOM with procurement specific detail. Includes all fasteners, couplings and off the shelf items.
3. Detailed manufacturing drawing of the trolley frame shall be supplied.
4. Detailed wiring and panel drawing with logic with internationally recognised symbols.
5. The drawing template for drawings shall first be reviewed before drawings are developed.
6. Only once the Employer has approved the drawings “Authorised for Eskom by:” will the drawing be considered complete and accepted.
7. Drawings will be provided in PDF format as per Section 2.5.
8. All views and sections must be clear and unambiguous.
9. All data sheets for each component shall be provided e.g. for the motor, pump, wheel, pressure gauge, hose etc.

2.6.11 Operating, maintenance and fault-finding manual

It is required to provide an operating, maintenance and fault-finding manual. The manual shall address, but not limited to the following:

1. Stop and start procedure.
2. Priming procedure.
3. No flow investigation procedure.
4. General warning conditions.
5. Setting of bypass safety devices if applicable.
6. Upgrades necessary to operate on a discharge pressure of 5MPa.

2.6.12 Technical review and analysis

The Contractor shall provide the necessary operating, maintenance, fault finding procedures and all drawings for review by the Employer. A meeting shall be scheduled between the Employer and the Contractor to review the technical specifications for acceptance. The Employer shall have 7 calendar days to review the technical documents. Only after acceptance may manufacturing commence unless taken at the risk of the Contractor.

2.6.13 Acceptance tests

Once the Employer has approved the design, the contractor will continue to manufacture the device. The device will be tested and assessed according to the following criteria. It is to be noted that technical criteria pertaining to this scope not assessed, does not allow the contractor to deviate from the scope without approval by the Employer:

Item	Criteria	Requirement
1	Rigidity and robustness	The device is proven to be firm, stiff, lightweight and does not have concerns on weld/joint fatigue or bending.
2	Paint quality	The paint work can be seen to be of good quality and is powder coated as per specification.
3	Quality of the wheels	The wheels shall have rubber tyres with double sealed double ball bearings. When handling the device, there is no concern on looseness/lateral movement.
4	Dry suction capability	Does the pumps struggle to take suction on a 1m head at ambient conditions? Can this be repeated without concerns? The system is demonstrated to be drained and is able to easily take suction without concerns.
5	Bucket flow rate functionality test	The pumps flowrate at ambient conditions is on average around 10L/min.
6	Loss of suction test	The pump can be simulated and demonstrated to be capable to operate without concern by simulating intermitted suction/air ingress simulating the emptying of the gearbox.
7	suction and discharge hose fitting acceptance	The necessary attachment fittings provided is practically demonstrated to be as per the specification and is of robust design.
8	simulate zero flow protection (Pump Bypass)	The pump was tested against a zero flow discharge to safely operate on bypass. The necessary pressure protection and indication is functional
9	Hose reel process acceptability	The process to reel/secure up/down the hoses is practical and there is no risk that the hoses can come loose/off during handling/movement.
10	Cable reel process acceptability	The process to reel/secure up/down the cables is practical and there is no risk that the cables can come loose/off during handling/movement.
11	Motor direction inspection verification capability	The motor direction and coupling condition can easily be assessed through an inspection hole.
12	Suction and discharge NRV functionality for hose filling/priming	The discharge and suction hose`s NRV`s are demonstrated to be functional or has significant disadvantages.
13	Trolley stability	The trolley is stable when all hoses and cables are reeled/secured and there is no risk that the trolley can easily or accidentally tilt over.
14	Fittings	ORFC fittings are used and there is no risk of oil leaks.
15	Drip tray	The drip tray is functional and there are no oil leaks.
16	Robustness of the control panel	The control panel is seen to be robust and there are no concerns that mechanical impacts or handling abuse will lead to failure of the buttons, lights and switches.
17	Cable work	Unless deliberate, there is no concern of cables being pulled out the glands through normal and abnormal handing. The necessary cleats.

2.7 Site visits if needed

2.7.1 Site visit to the Contractor

It is the Contractor's responsibility to induct the Employers employee(s) and discuss any SHE requirements while on the Contractor's premises.

The Contractor will notify the Employer of any access requirements at least four working day before the trip.

2.7.2 Site visit to the Employer

The safety and wellbeing of any person entering Matimba Power Station is of great importance. To ensure everyone's safety, the following important requirements are to be adhered to:

2.7.2.1 Gate access

Gate access to Matimba is to be arranged by the Employer. The Contractor will submit the following to the Employer at least three working days before the trip in order to make the necessary gate access permit.

1. Name and Surname.
2. ID.
3. Contact and emergency contact detail.
4. Vehicle make, model, colour and registration detail.

The Employer cannot grant access to site unless the access permit has been arranged.

2.7.2.2 Induction

The Contractor and all its delegates will do induction before visiting the plant area if needed.

Induction is done every working day at 08:00 at the Matimba Lapa (Outside the station). The following is required for induction arrangements and access will not be granted for induction unless the Contractors name is on the approved list for Induction.

1. Name and Surname.
2. ID.
3. At least 48h notice in advance.
4. Valid medical certificate. All persons shall have a valid medical certificate when entering the plant and shall be valid/renewed as needed for the duration of the works when entering Matimba plant.

As a visitor, the Contractor will not be allowed to be on the plant without supervision by the Employer. The Contractor may not walk on the plant unaccompanied by the organiser.

2.7.2.3 PPE requirements when at Matimba.

The following PPE will be required during site visits to Matimba Power Station if needed:

1. Hard hat with chin strap.
2. Eye protection.
3. Ear protection.
4. Reflective overhaul/jacket.

5. Safety boots.

2.7.2.4 Safety and environmental requirements when on Matimba site.

When entering Matimba, the Contractor will adhere to all Eskom safety and environmental rules to be shared during induction.

2.7.2.5 Security

Before entering Matimba, the Contractor will declare all tools, equipment and electronic devices such as laptops, data loggets etc if they are to be removed form site. Any item that is not declared, may be confiscated when leaving Matimba. The Contractor is to request for a declaration form before entering site.