

	SCOPE OF WORK	Engineering
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Title: **Scope of Work for Refurbishment of Tutuka P/S WTP Vertical Sandfilter and Anion Supply Pumps on an “As and When” Required Basis**

Document Identifier: **15ENG GEN-2952**

Alternative Reference Number: **N/A**

Area of Applicability: **Tutuka Power Station**

Functional Area: **Engineering**

Revision: **02**

Total Pages: **28**

Next Review Date: **N/A**

Disclosure Classification: **Controlled Disclosure**

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1. Introduction

Tutuka Power Station's Water Treatment Plant (WTP) is equipped with three (3) demineralised water (ion exchange) production trains. Each train is fitted with a Vertical Spindle (CPW-V 8x5x17L) Centrifugal Anion Supply Pump (full 316L stainless steel construction – Demineralised Water Application), capable of delivering at a duty point flowrate of 222m³/hr at a discharge pressure of 6.35bar (A). An illustration of the vertical spindle pump is depicted below:



Fig.1: Tutuka P/S – Vertical Anion Supply Pump (3.0m length)

In addition, the Potable Water Production Plant is also equipped with eight (8) Vertical (CPW-V 8x4x17S) Centrifugal Sandfilter Supply Pumps [316L stainless steel (wet-end) / carbon steel construction (top-end)] capable of delivering at a duty point flowrate of 225m³/hr at a discharge pressure of 4.8bar (A). An illustration of the vertical spindle pump is depicted below:



Fig.2: Tutuka P/S – Vertical Sandfilter Supply Pump (4.8m length)

2. Supporting Clauses

2.1 Scope

This scope details the full refurbishment on an “as and when” required basis (i.e. pump collection from site and transport to Pump Repairer Workshop, full pump strip down to component level and detailed component condition assessment, sourcing and supply of pump OEM manufactured and approved spare parts, pump re-assembly, pump performance testing and delivery of pump to Tutuka Power Station Main Stores) of the Anion and Sandfilter Supply Vertical Pumps at Tutuka Power Station’s Water Treatment Plant. This pump refurbishment works is required to be carried out within a maximum period of four (4) working weeks per pump refurbishment (from the time of collection of the defective pump from site). In the event, when it is not economically feasible to carry-out a full refurbishment of the pump (due to its condition/state when fully assessed) a full replacement of the pump, with a complete new pump unit will required to be costed, sourced and supplied by the Contractor to the Employer, within a maximum period twelve (12) to fourteen (14) weeks.

2.1.1 Purpose

The purpose of this scope of work is to detail the requirements for the full refurbishment of the Anion and Sandfilter Supply Pumps on an “as and when” required basis over a five (5) year contractual period.

2.1.2 Applicability

This document is applicable to Tutuka Power Station only.

2.1.3 Effective Date

The effective date of this document will be from the signed Authorisation date of this document.

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 9001:2015 Quality Management Systems
- [2] QM 58 / 240-105658000: Suppliers contract quality requirements specification
- [3] Act No 85: Occupational Health and Safety Act & Regulations

- [4] 240-44175038: Control of Non-conformance product or service procedure
- [5] ISO 9906 (2012) - Rotodynamic pumps - Hydraulic performance acceptance tests Grades 1, 2 and 3
- [6] ISO 10816-6 (1995): Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts
- [7] 240-101712128: Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings
- [8] 240-106365693: Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings

2.2.2 Informative

- [1] Vertical Pump Maintenance Guide (EPRI) - Supplement to NP-7413, Deep Draft Vertical Centrifugal Pump Maintenance and Application Guide

2.3 Definitions

Definition	Description
Contractor	The Pump Refurbisher/Repairer having the main contractual responsibility to the Employer for execution of the SoW detailed in this document.
Deviation	It is a condition which does not satisfy the purchase, design, or operations criteria, thus causing the item or process to operate outside the parameters of its design intent. A condition could be a variation in characteristic, documentation or procedure or specification.
Employer	Eskom Contract Manager (Tutuka Power Station)
Hold-Point	It is a predetermined stage in the quality control plan (QCP) beyond which Work/Manufacturing shall not proceed without the attendance of, and written authorisation of, an Eskom representative or Eskom inspection agency, whichever is applicable.

Non-Conformance	It is a deficiency in characteristics, documentation or procedure which renders the quality of an item unacceptable or indeterminate.
Quality Control Plan (QCP)	It is a document which defines acceptance criteria in sequential order for critical activities during maintenance/refurbishment, commissioning, manufacturing and or erection. It indicates hold witness points and includes the necessary in process checks. It also refers to all relevant maintenance and control documentation for technical data and test parameters.
Surface Preparation	The preparation of a substrate prior to applying the corrosion/erosion protection system, i.e. cleaning, grinding, blasting, application of bonding agents and tie coats.

2.4 Abbreviations

Abbreviation	Description
CoC	Certificate of Compliance
EN	European Standards
GA	General Arrangement
ISO	The International Organization for Standardization
MSDS	Material Safety Data Sheet
NDT	Non-Destructive Testing
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
P/S	Power Station
QCP	Quality Control Plan
SANS	South African National Standards
SHEQ	Safety Health Environmental and Quality
SoW	Scope of Work
SS	Stainless Steel
WTP	Water Treatment Plant

2.5 Roles and Responsibilities

- a) The Eskom Engineer and Maintenance Technician together with the Eskom Quality Inspector will conduct all quality checks during the pump refurbishment works, which are carried out by the Contractor.
- b) Contractor shall be fully responsible for the implementation of the defined scope of work.
- c) The Contractor shall be responsible for ensuring that all Sub-Contracting Parties are fully conversant with the requirements of this scope of work and referenced standards in this document.
- d) The Contractor shall be responsible for quality assurance and control. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by Eskom (including absence of disapproval) shall not relieve the Contractor from any responsibility under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.
- e) The Contractor shall take note of, and respond to any comments made by Eskom on the Contractor's documents. However, Eskom is not bound to check the Contractor's documents for any errors, omissions, ambiguities or discrepancies or compliance with the requirements of the Contract. Eskom's receipt of, or review of, or comment on, the Contractor's documents will not relieve the Contractor from responsibility for the Contractor's errors or omissions or departure from the requirements of the Governance Standards.
- f) Any such approval or consent, or any review shall not relieve the Contractor from any obligation or responsibility.
- g) Any specific queries or requirements not covered by this document shall be referred to the Eskom Engineer.
- h) The Eskom Contract Manager should ensure the Contractor performs the Works as per the Scope of Work requirements.

2.6 Process for Monitoring

Monitoring will be conducted through internal and external audits, inspection and non-conformance reporting. Non-conformance reporting must be conducted by utilising the following procedure: 240-44175038: Control of Non-conformance product or service procedure.

The monitoring of the pumps refurbishment will be subject to: A pre-job meeting to discuss and analyse the procedures and processes to be used during the length of the Contract and shall be held prior to commencement of any work. The purpose of the pre-job meeting would be to ascertain specifics in relation to this SoW. Attendance shall include the Eskom Contract Manager, Eskom Engineer, Eskom Maintenance Supervisor and Contractor (Contact Manager).

2.7 Related/Supporting Documents

Refer to below drawings for full build details of the Anion and Sandfilter Supply Pumps:

- a) SAM-22108: CPW-V 8x4x17S, SPINDLE PUMP / 55KW 4P, D250S/M / PINFLEX 204 / 4829mm LONG
- b) SAM-22086: CPW-V 8x4x17S PUMP SECTIONAL ARRANGEMENT
- c) SAM-23267: CPW-V 8x5x17 / 110kW 4POLE D280S/M - FENNERFLEX COUPLING
- d) SAM-25448: CPW-V 8x5x17 PUMP SECTIONAL ARRANGEMENT
- e) Sandfilter Supply Pump Datasheet
- f) Anion Supply Pump Datasheet

3. EXECUTIVE SUMMARY

The scope of work for Tutuka Power Station's Water Treatment Plant Anion and Sandfilter Supply Pump refurbishment/maintenance contract will include the following: Pump collection from site (Tutuka P/S Main Stores), pump visual inspection prior to strip-down, pump complete disassembly, component cleaning, full component level detailed inspection of all parts, non-destructive testing/examination of required components, dimensional checks/inspection of components in accordance with pump OEM specifications, source/supply and fitment of pump OEM and OEM approved replacement spare parts, internal/external corrosion protection of all carbon/mild steel pump components, full re-assembly of the pump, pump performance testing in accordance with ISO 9906 (including detailed pump vibrational analysis) and the delivery of the refurbished pump to Tutuka Power Station Main Stores. This service (pump overhaul/repair/refurbishment) will be on an "as and when" required basis from Tutuka Power Station, over a five (5) year contract duration.

4. General

4.1 Preliminary and General

- a. The Contractor studies the Employer's SoW to prepare and submit a detailed Work Methodology and Quality Control Plan (QCP) to the Eskom Contract Manager, for each section of works, in order to obtain acceptance before each activity is started. The Contractor liaises with the entire Employer's team such as engineer, quality controller/s, pump specialist/s etc. and requests clarification from the Contract Manager immediately, if any discrepancy or ambiguity is discovered in the SoW, which was not clarified during the tender period. The Employer will review and provide decisions on all such discrepancies and ambiguous areas of scope within seven (7) days of the contract award and thereafter, the Contractor provides the Works as per the Works Information.
- b. The Contractor submits the following pre-requisite documentation, during the tendering period, for technical evaluation by the Employer:
 1. Contractor to provide a Work Methodology for the Vertical Anion and Sandfilter Supply Pumps, detailing the complete step-by-step Disassembly and Re-assembly Procedures for the pumps (NB: all component clearances during assembly process to be clearly defined within the Contractor's Procedures).
 2. Contractor to provide current experience level for Refurbishment of Vertical CPW Centrifugal Pumps (i.e. Sandfilter and Anion Pumps). And a list of verifiable references where complete refurbishments have been carried out on these vertical pumps shall be provided.
 3. Contractor to provide certification of ISO 9001:2015 (Quality Management System) and a quality control plan (QCP/ITP – with referenced documentation) shall be provided detailing all activities and intervention points for the refurbishment of the Sandfilter and Anion Supply Pumps.
 4. Contractor to provide certification of his/her Pump Performance Testing Facility, to demonstrate compliance/equipment calibration as per ISO 9906 Grade 2b for Centrifugal Pumps requirements: For pump flowrate, head, power, NPSH, efficiencies, hydraulic/hydrostatic and vibration testing.
 5. Provide a detailed typical pump refurbishment schedule/programme for the Sandfilter and Anion Supply Pump.
 6. Provide the minimum performance warranty/guarantee period for the pump refurbishment works

5. Contractor's Scope of Work

The below sections outlines and details the requirements for the refurbishment/repair work of Anion and Sandfilter Pumps:

5.1 Pump Collection from Tutuka Power Station (Main Stores)

The Employer will inform the Contractor to collect the defective pump requiring repair/refurbishment from the Power Station, by issuing an instruction. The Contractor shall provide a sufficiently sized truck (and driver) with a hydraulic high-up to load the pump from Tutuka P/S Main Stores, or from the Water Treatment Plant (within 48 hours of Employer's notification) and transport the defective pump to the Contractor's Workshop. Prior to loading of the pump onto the transportation vehicle, the Contractor shall take photographic pictures of the external condition/state of the pump prior to transportation (these pictures will form part of the Contractors detailed Pump Assessment Report).

5.2 Pump Visual Inspection (prior to pump disassembly)

The Contractor shall:

- a) Catalogue all loose parts upon arrival of the pump at Contractors Workshop.
- b) List any transport/shipping damage or other visible damage before pump disassembly.
- c) Visually inspect all components upon receipt for any abnormalities/defects, or unusual wear during transportation.

5.3 Strip, Disassembly and Components Identification

The Contractor shall conduct the full disassembly of the pump down to each component level in accordance with the pump's original equipment manufacturer dis-assembly procedures.

5.4 Pump Components Cleaning, Dimensional Checks, NDT and Inspections

- a) Steam clean, bead blast, and/or grit blast stationary components as required to remove rust or scale and to prepare critical surfaces for non-destructive examination (NDE) and dimensional inspection.
- b) Bead/Grit blast the rotating components as required to prepare critical surfaces for NDT and dimensional inspection.
- c) Clean the shaft using a stainless wire brush, or blast with aluminium oxide, walnut shells, or similar non aggressive blasting media to prepare the shaft surface for NDT and dimensional inspection.

- d) All non-rotating/stationary mild/carbon steel components shall be abrasive blast cleaned and shall be carried out in accordance with Clause 5.3 of SANS 10064 (ISO 8504) and the degree of cleanliness achieved shall be Sa 2.5 in accordance with ISO 8501/1.
- e) The profile, peak to valley, when measured by SANS 5772 (ISO 8503-4), shall be as specified in the relevant manufacturer's Product Data Sheet for the coating system being utilised (typically, 50 to 100 micron blast profile). All quality control records shall be documented by the Contractor and provided to the Employer during inspections.
- f) After cleaning, all components of the pump to be thoroughly inspected and condition documented.
- g) Component Non-Destructive Examinations and Testing: Certified and qualified personnel shall perform Magnetic Particle Inspection and/or Liquid Penetrant, Ultrasonic Testing Examinations on welds and wall thickness examinations, where required on specific pump components (i.e. shafts, pump columns, pump discharge pipework, pump baseplate), to reveal any possible cracks or flaws. All results from NDT assessments to be documented and provided within a detailed report. All defects and deficiencies highlighted during the NDT and examinations shall be marked for repair or replacement by the Contractor.
- h) Component Dimensional Inspections/Checks: Dimensional inspections and checks (e.g. shaft run-outs checks) shall be conducted by the Contractor on all pump components/parts as per pump OEM specifications/tolerances and recommendations. All components that are found to contain defects or found to be outside the recommended specifications/tolerance/clearance ranges of the OEM, shall be marked for repair or replacement by the Contractor.
- i) The Contractor shall also perform Hydrostatic (Hydro) Testing of the pump casing to ensure it can safely hold the amount of pressure it is rated for, and maintain structural integrity during the testing [in accordance with requirements of ISO 9906 (2012)].
- j) The Contractor shall identify each stationary component, its alignment registers, and the components that attach and align with it. The registers must be on the same centreline, identify the components by item or part number on the cross-sectional drawing from pump manufacturer.
- k) As per the submitted and approved Contractors Inspection and Quality Control Plan, the Employer's Representatives (Engineer/Maintenance Personnel/QC Personnel) shall be informed to carryout inspections at the Contractors Workshop, to view and assess the pump components condition. During these inspections the Contractor shall provide all relevant testing documentation to the Employer, for review (Quality Control Hold-Point).
- l) Once consensus has been reached between the Employer's and Contractor's personnel on the required pump repair scope, the Contractor shall then proceed with the finalisation of his/her Assessment, Costing and Repair Scope of Work Report.

5.5 Contractor's Pump Assessment and Repair Scope of Work Report

Once the required inspection works (as detailed above) has been completed by the Contractor, the Contractor is required to compile and submit (to the Employer) a comprehensive report of all findings (cause of failure, where applicable), components condition and recommendations required for the complete repair/refurbishment of the full pump unit, to bring it back to its original design limits/standard as per the pumps OEM requirements. The assessment report shall include a full list of all required spare parts that has been marked for repair/replacement, including a detailed pricelist (with material bill of quantities and labour rates) to carry out the repair/refurbishment of the pump unit. The Contractor will be afforded a period of seven (7) calendar days (from the time of pump collection) to provide the Employer with the Pump Assessment Report, Repair SoW together with the repair price breakdown for review.

The Contractor also is also required to submit detailed programme/plan including breakdown of all tasks to be executed, date of completion for the pump refurbishment works and the amount of time needed to complete each activity for Employer to approve before commencement of the works.

In the event, when it is not economically feasible (repair costs exceeds 70% of a new pump cost) to carry-out a full repair/refurbishment of the pump (due to its condition/state when stripped and assessed), the Contractor's Pump Assessment report should highlight as such, and a full replacement cost for a complete new identical pump unit will required to be supplied by the Contractor to the Employer. Should the complete pump unit replacement route be selected and accepted by the Employer, it is the expectation that the new pump unit will be available and delivered to site within a maximum period twelve (12) to fourteen (14) weeks of order placement.

5.6 Sourcing/Supply of Pump Spare Parts and Consumables

- a) Upon review and acceptance (by the Employer) of the Contractors Pump Assessment, Repair/Refurb SoW Report and Repair Costing Breakdown. The Employer shall issue a Task Order to the Contractor to proceed with the SoW. The Contractor shall then proceed with the sourcing and supply of required spare parts/components and consumables as stated on his bill of quantities.
- b) All required pump spare (casted/machined) components and parts (i.e. pump volute/casing, wear plates, impellers, pump back covers, casing lugs, pump columns, thrust bearing assemblies, intermediate bearing housings, all pump shafts, pump shaft couplings, pump shaft sleeves, gland seal box, pump base plate, motor stool) shall only be sourced directly from the OEM of the pump. This will ensure standardisation of all pump components and ensure the performance integrity of the pump is maintained.
- c) All other spare parts (seals, bearings, bushes, gaskets, nuts and bolts, etc.) shall be sourced and supplied by the Contractor as per the recommendations provided by the pump OEM.

- d) All rolling and wear elements (ball bearing, seals, line shaft bushes, gaskets, etc.) which are removed during the stripping process shall be replaced and not be re-used.
- e) The Contractor will be required to supply and install replacement pump guards (located on motor stool/frame). New pump guards (conforming to OSHA 29 CFR 1910.217) shall be fitted with a hinge mechanisms to allow for easy access during online pump thrust bearing vibration data collection by the on-site condition monitoring personnel.
- f) The Contractor shall ensure that all rotating components (impellers and shafts) are trimmed and dynamically balanced in accordance with ISO 21940-11: Mechanical vibration — Rotor balancing – Quality Grade G2.5. Impeller balancing/testing shall be witnessed by the Employer and certificates provided shall be reviewed and form part of the Pump Quality Control Data Package.
- g) Pump shafts run-out and deflection testing shall be conducted all existing and new shafts, to determine the degree the straightness of the three or four piece shaft contained with the Sandfilter and Anion Supply Pumps. Shaft run-out and deflection testing shall be witnessed by the Employer and certificates provided shall be reviewed and form part of the Pump Quality Control Data Package. Any defects and deficiencies highlighted during the testing shall be rectified by the Contractor, prior to the pump assembly process.
- h) The Contractor shall ensure all required quality control testing documentation (material certificates, impeller trim and balancing certificates, shaft run-outs and deflection certificates) for the new spare components are in place and provided to the Employer for review, during inspections/workshop visits.
- i) As per the submitted and approved Contractors Inspection and Quality Control Plan, the Employer's Representatives (Engineer/Maintenance Personnel/QC Personnel) shall be informed to carryout inspections at the Contractors Workshop, to view and inspect all new pump spares/components that has been sourced by the Contractor. During these inspections the Contractor shall provide all relevant testing documentation to the Employer, for review (Quality Control Hold-Point).

5.7 Coating/Corrosion Protection of Required Components

- a) All mild/carbon steel components (i.e. pump columns, pump base plate, motor stool, etc.) shall be abrasive blast internally and externally to a degree of cleanliness achieved of Sa 2.5 in accordance with ISO 8501/1.
- b) Soluble salt concentration must be below 50mg/m², when tested with a Weber Reilly detection kit.
- c) Freedom from dust and debris shall be less than 'dust quantity rating' 2 when tested in accordance with ISO 8502-3.
- d) The primer coat shall be applied as soon as possible after the surface preparation operation during the same shift as the blast cleaning operation, but under no circumstances may the primer be applied over rust bloom or over surfaces that have changed colour due to humidity or other contamination.

- e) Apply two component self-priming, low VOC amine modified epoxy coating system, Phenoline 187 UHS. DFT per coat at 250 microns. Apply 2 coats to a DFT of 500 microns (nominal).
- f) Upon final curing (max 72hrs) of first and second coating layer, the Contractor shall conduct DFT Testing to assess the dry film thickness of the applied layers. If any anomalies are found, it shall be immediately rectified by the Contractor.
- g) Epoxy top coat colour coding: Brilliant Green (H10) – SANS 10140-3.
- h) With specific reference to non-stainless steel pump casing/volutes - A two-part 100% solids co-polymer coating NORDBAK (NORDCOAT 2) which is a corrosion and wear resistant coating, shall be applied to the internal and external surfaces of the pump casing, in accordance with coating manufactures product application requirements.
- i) All quality control records shall be documented by the Contractor and provided to the Employer during inspections (surveillance QC checks will also be conducted by the Employer).

5.8 Pump Re-Assembly

- a) The Contractor shall conduct the full re-assembly of the pump (with its new spare components) in accordance with the pump's original equipment manufacturer approved assembly procedures.
- b) The Contractor shall note and document all component re-assembly records (installation clearances, etc.) during the re-assembly of the pump. An assembly report shall be provided to the Employer depicting (with photographic evidence) compliance with pump OEM acceptable clearances and tolerance that were achieved during the pump re-assembly process.
- c) As per the submitted and approved Contractors Inspection and Quality Control Plan, the Employer's Representatives (Engineer/Maintenance Personnel/QC Personnel) shall be informed to carryout post pump assembly inspection at the Contractors Workshop, to view and inspect the complete assembled pump unit. During these inspections the Contractor shall provide pump assembly records to the Employer, for review (Quality Control Hold-Point).
- d) The pump nameplate/tag is also required to be replaced by the Contractor (with 304L stainless steel material, engraved nameplate), clearly detailing the pump model, serial number, discharge flowrate and head, maximum design pressure, impeller diameter, materials of construction (casing/impeller/shafts), pump speed, liquid SG, pump hydraulic test pressure, and shall include the pump manufacturers full details.

5.9 Pump Performance Testing

- a) Upon full re-assembly of the pump, a full pump performance test [which shall include bearing running temperatures (IR – Infrared Scans) and vibrational analysis] is required to be carried out in the presence and to the satisfaction of the Employer's Personnel (Quality Control Hold-Point).

- b) Vibration Analysis shall be carried out on the pump during the performance test in accordance with the requirement detailed within ISO 10816-6 (1995): Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts.
- c) The Pump Performance Testing shall to be conducted in accordance with ISO 9906 (2012) Rotodynamic Pumps - Hydraulic Performance Acceptance Tests – Grade 2B.
- d) The Contractor shall ensure that the pump main trust bearing is sufficiently greased before commencement of the performance test. And its operating temperatures shall be monitored during the performance testing, and shall be less than the recommended pump OEM operating limits.
- e) The Contractor shall be responsible for the providing the required electric motor and pump-to-motor shaft coupling (which is sized in accordance with the pump design) for the purposes of the pump performance testing.
- f) If in the event the performance test results does not meet the minimum requirements as detailed in ISO 9906 – Grade 2B, it will required of the Contractor to correct all related deficiencies within the pump (at his/her cost). The pump shall then be re-tested to ensure compliance with the performance test standard.
- g) Once a satisfactory performance test is carried out on the pump, with no related defects observed by the Contractor or the Employer, the refurbished pump shall be readied by the Contractor for release and delivery (utilising the Contractor's transportation) to Tutuka Power Station (Main Stores or Water Treatment Plant).
- h) The Supplier shall contact Tutuka Main Stores, 48 hours before any delivery and collections are made at the Main Stores. It should be noted that the Main Stores is opened from 08:00am to 15:30pm (Mondays to Thursdays) and is opened from 08:00am to 11:00am (Fridays). It is preferred not to do any deliveries and collections on Fridays and Public Holidays and Weekend (unless under urgent/emergency situations). Urgent delivers can be made after hours, when arranged with the Main Stores Personnel.

5.10 Documentation and QC Data Package Submission

- a) It will be the responsibility of the Contractor to develop, document and submit a detailed and comprehensive Quality Control Data Package (for each refurbished/repaired pump), containing the master QCP (fully signed-off) together with will all referenced reports, testing documentation, certifications, material certificates, etc.
- b) The QC Data Package for the pump shall be submitted to the Employer on the day of the delivery of the pump to the Power Station.

6. Performance Guarantees

Post pump installation on the Power Station Water Treatment Plant, a full vibrational analysis and IR bearing scans will be conducted on the pump (and motor assembly) to assess its first service/production run conditions. If in the event, high vibrations (or high thrust bearing temperatures, or any other anomaly) is noted during its first service run, the Employer will immediately notify the Contractor and highlight the defect/discrepancy. All vibrational analysis reports and process conditions will be made available to the Contractor.

It will be the responsibility of the Contractor to conduct an on-site visit and inspection of the pump within 48hrs of the Employer's notification. If the defect or deviation found on the pump cannot be rectified in situ on the plant by the Contractor, it will be the responsibility of the Contractor collect the pump from site (the pump will be removed from the plant by the Employer's Personnel), identify and correct the noted defect and deliver the pump back to Tutuka Power Station (all transportation and re-works/repair/testing costs will be carried and the responsibility Contractor to address).

Monthly condition monitoring reports will also be made available to the Contractor (if and when required). In cases where the running vibration amplitudes in subsequent operation of the pumps are higher than 2.3 mm/s RMS, the Contractor will be required to visit site and perform fault finding with the Employer's personnel and advise the Employer of the potential pump defect and repair method/s.

The Contractor is also required to indicate the full extent of the guarantees he/she is prepared to offer with respect to integrity of his/her repair/refurbishment works carried out on all pumps.

7. Price List

7.1 Sandfilter Supply Pump: Stock Number (566763) (Pump Model: CPW-V 8x4x17S) – 55kW Motor (F120 Coupling)						
No.	Item Description	Material of Construction	Quantity	Unit Price (R)	Total Price (R)	Comment
1.	Pump Collection from site and Transportation to Contractor's Workshop	N/A	1			
2.	Pump Striping/ Disassembly, Cleaning, Dimensional Checks, NDT Inspections and compilation of Contractor's Pump Assessment and Repair Scope of Work Report	N/A	1			
3.	Sourcing/Supply of Pump Spare Parts and Consumables					
3.1	Pump Casing	SS 316L	1			

3.2	Impeller	SS 316L	1			
3.3	Volute Wear Plate	SS 316L	1			
3.4	Volute Back Cover	SS 316L	1			
3.5	Pump Base Plate	Mild Steel (30mm thickness)	1			
3.6	Pump Discharge Pipe	SS 316L	1			
3.7	Pump Column	Mild Steel	3			
3.8	Intermediate Shaft	EN57	2			
3.9	Bottom Shaft	EN57	1			
3.10	Thrust Shaft	EN57	1			
3.11	Motor Support Stool	Mild Steel	1			
3.12	Intermediate Bearing Housing (for Line Shafts)	SS 316L	3			
3.13	Intermediate Shaft Sleeve	SS 316L	7			
3.14	Intermediate Bearing Bush	High-Lube Vesconite	3			
3.15	Shaft Coupling	EN57	3			
3.16	Hook Sleeve	SS 316L	1			
3.17	Casing Clamp Lugs	SS 316L	16			
3.18	Oil Seals (for Intermediate Bearings)	VITON	3			
3.19	Casing Gaskets	Acid Resistant	3			
3.20	Wear Plate Gasket	Acid Resistant	1			

3.21	Column and Discharge Pipe Gaskets	Acid Resistant	Complete Set for Pump			
3.22	Gland Seal Box	EN8	1			
3.23	Gland Seal Cap	EN8	1			
3.24	Thrust Bearing Housing Support	EN8	1			
3.25	Water Deflector Plate (Below Bearing Housing)	Mild Steel	1			
3.26	Grease Deflector Plate (Above Bearing Housing)	Mild Steel	1			
3.27	Thrust Angular Contact Ball Bearing	SKF 3318-19	1			
3.28	Oil Seal (Gland Box)	VITON	2			
3.29	Oil Seal (Below Bearing Housing)	VITON	1			
3.30	Oil Seal (Above Bearing Housing)	VITON	1			
3.31	Bearing Housing	EN8	1			
3.32	Bearing Cap	EN8	1			
3.33	Adjusting Plate	Mild Steel	1			
3.34	Intermediate Bearings Cooling Water Tubing/Piping and Swagelok fittings	SS 316L	Complete Set			
3.35	Bolts, Nuts, Studs, Lock Nuts, Washers, Screws, Caps	SS 316L	Complete Set for Pump			
3.36	Pump Guards	Mild Steel	2			
3.37	Thrust Shaft Key	EN57	1			

3.38	Spare Components Testing/Certification	N/A	As per SoW			
4.	Pump Coating/Corrosion Protection of Required Components as per SoW	Coating Products as per SoW	As per SoW			
5.	Complete Pump Re-Assembly	N/A	1			
6.	Pump Performance Testing	ISO 9906	1			
7.	Documentation and QC Data Package Compilation and Submission	N/A	1			
8.	Supply of Complete New Sandfilter Pump Unit (including all testing and documentation) - In the event original pump requires scrapping.	As per SoW	1			
	TOTALS					

7.2 Anion Supply Pump: Stock Number (566768) (CPW-V 8x5x17L) – 110kW Motor (F140 Coupling)						
No.	Item Description	Material of Construction	Quantity	Unit Price (R)	Total Price (R)	Comment
1.	Pump Collection from site and Transportation to Contractor's Workshop	N/A	1			
2.	Pump Striping/ Disassembly, Cleaning, Dimensional Checks, NDT Inspections and compilation of Contractor's Pump Assessment and Repair Scope of Work Report	N/A	1			
3.	Sourcing/Supply of Pump Spare Parts and Consumables					
3.1	Pump Casing	SS 316L	1			
3.2	Impeller	SS 316L	1			
3.3	Volute Wear Plate	SS 316L	1			
3.4	Volute Back Cover	SS 316L	1			
3.5	Pump Base Plate	Mild Steel (30mm thickness)	1			
3.6	Pump Discharge Pipe	SS 316L	1			
3.7	Pump Column	SS 316L	2			
3.8	Intermediate Shaft	EN57	1			
3.9	Bottom Shaft	EN57	1			

3.10	Thrust Shaft	EN57	1			
3.11	Motor Support Stool	Mild Steel	1			
3.12	Intermediate Bearing Housing (for Line Shafts)	SS 316L	2			
3.13	Intermediate Shaft Sleeve	SS 316L	5			
3.14	Intermediate Bearing Bush	High-Lube Vesconite	2			
3.15	Shaft Coupling	EN57	2			
3.16	Hook Sleeve	SS 316L	1			
3.17	Casing Clamp Lugs	SS 316L	16			
3.18	Oil Seals (for Intermediate Bearings)	VITON	2			
3.19	Casing Gaskets	Acid Resistant	3			
3.20	Wear Plate Gasket	Acid Resistant	1			
3.21	Column and Discharge Pipe Gaskets	Acid Resistant	Complete Set for Pump			
3.22	Gland Seal Box	EN8	1			
3.23	Gland Seal Cap	EN8	1			
3.24	Thrust Bearing Housing Support	EN8	1			
3.25	Water Deflector Plate (Below Bearing Housing)	Mild Steel	1			
3.26	Grease Deflector Plate (Above Bearing Housing)	Mild Steel	1			

3.27	Thrust Angular Contact Ball Bearing	SKF 3318-19	1			
3.28	Oil Seal (Gland Box)	VITON	2			
3.29	Oil Seal (Below Bearing Housing)	VITON	1			
3.30	Oil Seal (Above Bearing Housing)	VITON	1			
3.31	Bearing Housing	EN8	1			
3.32	Bearing Cap	EN8	1			
3.33	Adjusting Plate	Mild Steel	1			
3.34	Intermediate Bearings Cooling Water Tubing/Piping and Swagelok fittings	SS 316L	Complete Set			
3.35	Bolts, Nuts, Studs, Lock Nuts, Washers, Screws, Caps	SS 316L	Complete Set for Pump			
3.36	Pump Guards	Mild Steel	2			
3.37	Thrust Shaft Key	EN57	1			
3.38	Spare Components Testing/Certification	N/A	As per SoW			
4.	Pump Coating/Corrosion Protection of Required Components as per SoW	Coating Products as per SoW	As per SoW			
5.	Complete Pump Re-Assembly	N/A	1			
6.	Pump Performance Testing	ISO 9906	1			

7.	Documentation and QC Data Package Compilation and Submission	N/A	1			
8.	Supply of Complete New Anion Supply Pump Unit (including all testing and documentation) – In the event original pump requires scrapping.	As per SoW	1			
	TOTALS					

8. SHEQ Requirements

8.1 Requirement for the Detailed Risk Assessment

N/A

8.2 Quality Requirements

The Contractor shall comply with the ISO 9001:2008 Quality Management System and Employer's Quality Requirements as specified in Eskom QM58 document:

- a) Quality documents for inspections and tests plans shall be required to be submitted to the Employer's Contract Manager for approval before the pump refurbishment works begin.
- b) The Contractor shall compile a detailed Quality Control Plan (QCP) and shall be submitted for acceptance to the Employer Engineer, before the repair works can be executed.
- c) The QCP shall indicate relevant intervention points (e.g. hold, witness, surveillance points, etc.) and shall be agreed upon with the Employer.
- d) The QCPs must meet the technical requirements and include relevant inspections and tests to be done. The reference documentation and acceptance criteria should be included on the QCP.
- e) The Contractor shall prepare suitable quality control plans (QCP's) and Inspection and Test Plans (ITPs) for all work carried out.
- f) The Employer, the Employer QC Representative, and the Contractor shall review these QCPs/ITPs jointly based on the actual scope of work and inspections that are required, which will be agreed upon with the Contractor.
- g) The Contractor is required to notify the Employer at least 72 hours in advance of witness and hold QC inspection intervention points.
- h) Surveillance Inspection by the Employer can be done at any time during execution of the Works. The Employer will have full authority to inspect the Works at any time regardless of if the Employer's Works on site or at the Contractor's premises/workshops or Sub-Contractors premises. This comprises of monitoring or making observations to verify whether material/items or services conform to the specified requirements. Surveillance activities may include audit inspections, witness of testing, review of quality documentation & records, personnel qualifications etc.
- i) Any scope deviation during the execution shall be approved in writing from the Employer.
- j) The Employer shall be given a notice period of three (3) days prior to any inspection or testing that is required to be witnessed by the Employer at the Contractors Premises.
- k) The Supplier will be subject to periodic audits by the Purchaser in order to ensure compliance with the system. Any deviations will be corrected to the Purchaser's satisfaction.
- l) On completion of the works, the Contractor shall provide the Eskom Engineer with a Data Book/Package containing all the relevant Quality Control documents and records pertaining to the pump repair/refurbishment works.

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- m) The Contractor shall submit one (1) hard copy, one (1) soft copy in PDF format using a USB and one (1) native (WORD) updatable copy of the QCP to the Employer, upon delivery on the repaired/refurbished pump to site.
- n) This Data Book/Package shall contain, as a minimum, the following:
 - o The Quality Control Plan (fully signed-off)
 - o The Contractors Pump Assessment and Repair Scope of Work Report (with Cost Breakdown)
 - o NDT/NDE Reports (MPI, Dye Pen, Ultrasonic, Wall Thickness Testing Reports)
 - o Sandblast and Coating Records
 - o Spares Material Certificates
 - o Copies of all Batch Release Certificates from the manufacturer, acquired during the course of the pump refurbishment.
 - o Product data sheets and certificates
 - o Rotor Balance Reports
 - o Shaft Run-Out Reports
 - o All relevant Repairer's Workshop QC records
 - o Copies of all approved pump disassembly and assembly procedures and method statements
 - o Pump Assembly Records
 - o Non-Conformance Reports
 - o Pump Hydraulic and Performance Test Reports
 - o Copy of all Technical Notifications/Clarification (signed by Employer Engineer)

9. Works Programme/Schedule

The Contractor shall submit a detailed program of the works, one (1) week after collection of each pump for refurbishment. The programme must clearly demonstrate the contractor plans to complete the repair works in good time, effective from the task order placement. The programme submission must be in soft copy PDF (Gantt Chart). The pump refurbishment programme shall specify the different activities applicable for the execution of the required SoW from pump collection to the refurbished pump delivery to site, as well as the period allocated for each activity.

10. Documentation

- a) The Employer's Task Order Number must be utilised on all documentation, such as invoices and tests certificates, QC documentation, etc.
- b) On completion of the Works, the Contractor shall provide the Eskom Engineer with a Data Book/Package containing all the relevant Quality Control documents and records pertaining to the pump repair/refurbishment works. This QC Package shall be submitted to the Employer on the day of delivery of the repaired/refurbished pump to Tutuka Power Station.

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11. Transportation Requirements

- a) Packaging and Crating (In accordance with the pump OEM's material control, preservation, storage and handling procedure): The Contractor shall be responsible for the safe packaging and transportation of all repaired and refurbished pump to and from Tutuka Power Station (Main Stores).
- b) Prior to loading on delivering transport, the Contractor shall: Secure the pump unit to the truck to prevent movement.
- c) Cover the pump unit if an open truck is used.
- d) On delivery, all documentation (QC Data Package) shall be handed in and accepted by the Employer.
- e) Transportation by road for the Contractors costs.
- f) The Employer's Contract Manager shall be informed when delivery will be conducted at least two (2) days in advance.
- g) No deliveries to be conducted after 11:00am on Fridays, Weekends or Public Holidays, except under urgent/emergency situations.
- h) Pallets to convey the pump unit shall be sound enough to carry and transport the load of the pump.
- i) All Contractor's transportation vehicles shall be in a roadworthy/compliant condition.
- j) Forklift / Overhead Crane (with driver) will be supplied by the Employer for offloading/loading of pump onto/from transportation vehicle.



Fig. 3: Example of acceptable Packing and Crating during pump transportation/delivery

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12. Acceptance

This document has been seen and accepted by:

Name	Designation
Anton Govender	WTP System Engineer
Nathi Mabaso	Auxiliary Engineering Manager
Bonga Mthembu	WTP Mechanical Maintenance Manager (Acting)
Simo Dlamini	WTP Mechanical Maintenance Supervisor
Chris Mhlongo	WTP Mechanical Maintenance Snr Technician
Elvis Maremene	Stores Manager

13. Revisions

Date	Rev.	Compiler	Remarks
April 2021	01	Anton Govender	Scope of Work Compilation
July 2024	02	Anton Govender	Updated to cater for SF and Anion Supply Pumps, only.

14. Development Team

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

- Anton Govender

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