Eskom	Scope of Work	Technology

Title: **Reconstruction of AWR Pump motor base 6**

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1 INTRODUCTION

Duvha Ash water return (AWR) pumphouse has eight pumps that are pumping water to the high level dams so that the booster pump can pump it to the station for ashing and dusting. Currently there are seven pumps that are available for rotation, which poses risk on the plant operation.
Maintenance has identified the compromised structural integrity of AWR motor base number 6 which causes the plant not to operate optimally due to vibrations.
This document outlines the scope for the reconstruction of steel base and concrete base in order to restore the operation of the plant

2 Applicability

This document applies to Duvha Power Station only.

2.1 Normative/Informative References

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

2.2 Normative

[1] ISO 9001 Quality Management Systems.

[2] Construction Regulations, 2014

[3] 32-727 - Eskom Safety, Health, Environment and Quality (SHEQ) Policy

[4] Occupational Health and Safety Act No. 85 of 1993,

[5] QM58 - Suppliers contract quality requirements specification

[6] MGM0001 - Maintenance Quality Manual

[7] Duvha Waste Management Procedure ENVP0005

[8] SANS 1200A - Standardized specification for civil engineering construction

[9] SAS0012 - Safety, Health & Environmental Specifications For Contractors

2.3 Informative

[10] 474-58 (Rev1): Document and Records Management

3 DEFINITIONS

3.1 DISCLOSURE CLASSIFICATION

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

3.2 ABBREVIATIONS

Definitions	Descriptions
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Plan
QM	Quality Management
SANS	South African National Standards
SHEQ	Safety, Health, Environment and Quality

3.3 ROLES AND RESPONSIBILITIES

Appointed Contractor – Execute the scope of work as per the employer's specification. To ensure quality assurance is done as per QM 58 and SHEQ Policy is adhered to.

Project manager – To ensure that the supplier execute all the work specified in the scope of work on the set timelines.

Maintenance Technician – The technician develops the scope of work and ensures execution of work by contractor as per scope of work. Ensure quality of work is achieved by following approved quality control plan.

System Engineer (SE) – The SE will review the scope of work developed by maintenance and the work, which will be executed and ensure that quality assurance is adhered to.

Must inspect the system after the maintainer has maintained, following the approved quality control plan.

4 SCOPE

The purpose of this document is to outline the scope of work of reconstructing the AWR pump motor base which is to be carried out by an appointed contractor on behalf of civil maintenance.

4.1 Description of the works

The scope of work details the reconstruction works at AWR Pumphouse

4.1.1 Reconstruction of AWR pump motor base (2830mmx1280mmx230mm)

- Take levels of the existing current setup (i.e concrete, steel base) in the presence of client's representative and data survey report that has been analyzed by the contractor and signed. The contractor shall submit the report to the client for review and acceptance. Upon acceptance, the final concrete height shall be decided by the client.
- Remove secondary steel base, all beams and hold down bolts from the concrete
- off by a competent surveyor to the client
- Demolish the entire existing concrete base
- Break approximately 50mm into the existing concrete slab carefully not to damage the reinforcement
- Remove all concrete rubble and make clean
- Wire-brush the exposed existing reinforcement on the existing slab to remove all dirt
- Insert formwork to receive and mold reinforced concrete. Concrete height to be that decided upon by the client after. Make concrete chamfer of 30x30mm
- Install rebars of similar diameter as existing, spaced at 150mm center to center
- Apply a concrete bonding agent (Sika Latex or similar approved product) on the existing slab prior casting of concrete. Apply as per the manufacturer's instructions
- Bonding agent product technical data sheet must be submitted to the client for approval
- Cast in fully threaded 6 M20 HD bolts grade 8.8, which must be drilled into the existing slab by 75mm, ensure they align with the holes in the steel base and secure. Bolts to protrude at least by 50mm from the steel base
- Cast 30MPa concrete for pump motor base, ensure concrete top surface is levelled vertically and make good finishes. Cure and protect the new concrete according to SANS 1200G with the prescribed grade of 30MPa with 19mm size of aggregate, with 50mm concrete cover.
- Concrete may not be placed before the *Supervisor* has given permission in writing. A minimum written notice period of 24 hours prior to pouring is required for each part of the structure.

- For each class of concrete in production at each plant for use in the *works*, samples of concrete are taken by the *Contractor* at the point of mixing or of deposition as instructed by the *Supervisor* and in the presence of a representative of the *Supervisor*, all in accordance with the sampling procedures described in SANS 5861

Commencing of concreting:

- No concreting commences in any portion of the *works* until the preparations have been accepted and written permission given by the *Project Manager* that concreting in such portion of the *works* may commence.
- The *Contractor* provides to the *Project Manager* an accepted checklist for concrete pours at least four hours before the placing of any concrete. All relevant items are checked by the *Contractor* and the checklist signed off by the *Contractor's* representative as to its completeness and correctness.
- The following information is recorded by the *Contractor* and forms part of the data books in respect of each delivery of concrete:
    - Position in the structure where the concrete is placed.
    - Results of workability tests.
    - Details of test cubes taken.
- The concrete is compacted and placed in its final position within 2 hours of the introduction of cement to the aggregates. The time of such introduction is recorded on the delivery note. When truck mixed concrete is used, water is added under supervision either at the Site or at the central batching plant, but in no circumstances is water added in transit.

Defective Concrete

- No repairing of any concrete is done without the written permission of the *Project Manager* and then only in such manner as he accepts.
- Concrete which does not comply with this Works Information is removed and replaced with sound concrete. This may involve the removal and replacement of otherwise satisfactory concrete associated with the defective material

Formwork

- Formwork with damaged edges or faces is not used. Open joint in timber forms are sealed. Plywood surfaces and cut edges are sealed to prevent the absorption of moisture.
- Immediately before concreting, the forms and all other surfaces which are in contact with the fresh concrete, are cleaned of loose materials and debris including shavings, woods chips, sawdust, pieces of wire, nails, foamed plastic, fragments of hardened concrete and mortar.

Holding Down Bolts and Embedded Fixtures

- Threads of holding down bolts are protected with "Densotape" or similar material accepted by the Project Manager, during delivery and storage. After concreting, the bolt projections with attached nuts and washers, are protected against corrosion with similar sealing tape and protected against mechanical damage with a timber shield or as otherwise approved, until the erection of the steel works or other Plant or fixtures commences.

- Holding down bolts, embedded fixtures and recesses are located in the correct position by means of templates. These are constructed using steel sections fabricated to 1mm tolerance, or as otherwise approved and are held rigidly in position during concreting.
- Particular attention is directed to the placing of reinforcement around bolt assemblies and embedded fixtures.

Trial mixes

- For each mix of concrete the *Contractor*, in the presence of the *Supervisor*, prepare 3 separate batches of concrete using the materials which have been accepted for use in the *works* and the mixing plant which he proposes to use for the *works*.
- The slump of the concrete carried out in accordance with BS 1881 (SANS 5862) is recorded.
- Six cubes are made from each batch for testing. Three cubes are tested for compressive strength 7 days and 28 days.
- The density of all the cubes is determined before the cubes are crushed. The tests will be considered satisfactory if the average value of the crushing strength of each set of 3 cubes tested at 28 days exceeds the characteristic strength plus 3 MPa by a margin sufficient to ensure that the quality control criteria specified is met. If the difference between the highest and lowest results exceeds 15% of the average the tests are discarded and repeated
- After finishing concrete, take levels of the top of concrete to ensure conformance to the previous levels taken and that the surface is straight to receive steel beam
- Remove formwork

4.1.1.1 Concrete Requirements

- SANS 878 - Ready-mixed concrete
- SANS 5860 - Concrete tests - Dimensions, tolerances and uses of cast test specimens
- SANS 5861-2 - Concrete tests -Sampling of freshly mixed concrete
- SANS 5862-1 - Concrete tests - Consistence of freshly mixed concrete - slump test
- SANS 2001 CC2 - Construction works: Part CC2: Concrete works (minor works)
- Concrete strength to be 30MPa
- Course aggregate size of 19mm for pump base
- Cement to be CEM 1 52 5N – general-purpose cement
- High density concrete strength – water/ cement ratio 0:36
- Cement shall comply with SANS 50197 – 1
- Aggregates shall comply with SANS 1083
- Water used in concrete shall be portable (clean / drinkable) water free of impurities
- Concrete slump of 100mm

- For on site mixing of concrete, a trial mix of $0.1m^3$ is to be done prior to execution of the work in order to verify workability of the proposed concrete mix
- If ready mix concrete is being used, then a mix concrete delivery note must be provided
- the *Contractor* receives from the ready-mixed concrete Supplier, a certificate with the following information:
  - The nature and source of each constituent material.
  - The proposed quantity of each constituent material per m3 of supply compacted concrete.
  - Concrete mixed design appproved by a registered professional Civil Engineer shall be submitted prior for approval
- Concrete should be thoroughly compacted by using a suitable concrete vibrator to eliminate bubble forming when settling
- The construction area is to be barricaded for the entire duration of the works
- Shutter finish to be smooth
- Cube test samples to be taken and tested by an approved laboratory which will be agreed upon prior to execution
- Reinforcement steel shall comply with SANS 10144

Failure to comply with requirements

- The *Contractor* takes action as instructed by the *Supervisor* without any additional payment to remedy concrete which fails to comply with the requirements stipulated in the Works Information. Such action may include, but is not necessarily confined to, the following:
  a) Adjusting the mix proportions until the concrete again complies with the Works Information.
  b) Cutting test cores from the failed concrete and testing in accordance with SANS 5865.
  c) Full scale load tests or sonic investigations.
  d) Carrying out additional Works to overcome the effect of the failed concrete.
  e) Removing the failed concrete.
  f) Increasing the frequency of sampling until control is again established

4.1.2 Refurbishment of secondary steel base

- Clean and sand blast existing steel base
- Check for straightness in the presence of the client's representatives and correct as per client recommendations.
- Steel base must be hot dipped galvanised if client's recommendation is to replace; ifclient's recommendation is to refurbish, steel shall be coated with corrosion protection compound, suitable for highly corrosive environment, which the supplier must submit to the client for review and acceptance for the base to protect it against corrosion
- Install steel base and secure

4.1.3 Welding Requirements

- 240-106628253 - Standard for Welding Requirements on Eskom Plant.
- 240-83539994 - Standard for Non-Destructive Testing (NDT) on Eskom Plant
- Welding shall be in accordance with AWS D11 – structural welding code steel
- Welds sizes to be 6mm thick of fillet welds all around
- All electrodes to be stored in dry weatherproof container
- Non Destructive Test (NDT) all welds MPI shall be conducted and certicifates to be submitted to the Project Manager
- Welding certificates to be submitted to the Project manager for acceptance

WELDING REQUIREMENTS

- All welding activities are in accordance with the OHS Act, and 240-106628253 “Standard for Welding Requirements on Eskom Plant”. Where requirements of a referenced code or standard differ from the Eskom Welding Requirements, the more stringent or restrictive requirements are applied.
- Any request for deviation from specified requirements are submitted in writing and include the proposed deviation, rationale for the deviation, any technical data supporting the deviation, and historical experience supporting the deviation.

Welding processes

- Unless otherwise specified, only shielded metal arc welding (SMAW), gas metal arc welding (GMAW), flux cored arc welding (FCAW), submerged arc welding (SAW), plasma arc welding (PAW), stud welding, and gas tungsten arc welding (GTAW) processes are permitted.

Welding procedure qualification

- Welding procedures are prepared and qualified in accordance with the referenced code. Unless otherwise specified, the *Contractor* is responsible for conducting the tests required by the referenced code to qualify the Welding Procedure Qualification Record (PQR).
- Welding Procedure Specifications (WPS) and supporting PQRs are submitted for review and acceptance by the *Project Manager* prior to start of fabrication.

Welder/Welding operator performance qualification

- Welders and welding operators are qualified in accordance with the referenced code. The welder and welding operator qualification records are available at the shop facility or on Site and are made available for review when requested.
- The *Contractor* is responsible for the qualification of welders or welding operators. Welder or welding operator performance qualification testing is performed under the full supervision and control of the *Contractor*.

ISO 3834

All companies performing welding related activities on Eskom plant have accreditation to ISO 3834 as follows:

Table 1: ISO 3834 accreditation

Equipment Group	Minimum Quality Level	Type
Eskom Level 1 Plant	IS0 3834 Part 2	Comprehensive
Eskom Level 2 Plant	IS0 3834 Part 3	Standard
Eskom Level 3 Plant	IS0 3834 Part 4	Elementary

Non-Destructive Examination (NDE)

NDE on welds are performed according to the requirements of the relevant design and construction codes, applicable (additional) engineering or product specifications and the Eskom “Standard for Non-Destructive Testing on Eskom Plant” (240-83539994).

All NDE is performed in accordance with the methods specified in the referenced code and any supplemental NDE specified within the other Welding Technical Supplemental Specification sections.

NDE is performed in accordance with written procedures that are prepared in accordance with the referenced code and as specified herein. NDE procedures are submitted for acceptance by the *Project Manager* prior to their use.

100 percent of all welds receive a visual examination. Visual weld examination acceptance criteria and other NDE acceptance criteria are in accordance with applicable referenced codes and design documents. The *Contractor* records these examinations.

The NDE results are provided in a NDE Report that is evaluated, interpreted, and approved by a Level II or Level III NDE personnel.

4.1.4. Structural steel sections requirements

- All material certificates for steel sections shall be submitted to the Project Manager for acceptance prior fabrication
- Steel grade shall S355JR
- Steel shall be Hot rolled
- Taper flange channel (TFC) shall be in accordance with SANS 1431
- Hot dip galvanised coatings on fabricated iron and steel shall be in accordance with SANS 121
- Dimensional tolerances shall be in accordance with SANS 2001 – CS 1

Notes:

- It is the contractor’s responsibility to verify all dimensions mentioned herein or dimensions reflecting on drawings provided by the client. All differences should be discussed between the contractor and the client and agreed upon continuing with the works.

5 PROJECT REQUIREMENTS

5.1 Quality

The *Contractor's* ISO 9001:2015 Certificate of compliance or equivalent must be supplied with tender documents. If the *Contractor* is not certified, the objective evidence of a developed and fully implemented Quality Management System that complies with ISO 9001:2015 requirements shall be submitted.

The *Contractor* shall comply with the *Employer*'s Quality Requirements as specified in the Supplier Quality Management Specification 240 – 105658000 (QM-58). Form A (Tender and contract quality requirements for QM 58 and Quality Requirements for ISO 9001 standard) of this Specification indicates the specific application thereof.

All Quality Control documentation must be submitted to the *Employer* at least one month before project start. Quality Control Plans must include hold and witness points, must clearly state 3rd party interventions and quality/test specifications where applicable.

The Quality Control documentation that will be handed over within 30 days of order placement by the successful *Contractor* to the Employer and shall consist of the following:

5.1.2 Quality Control Plan

The Quality Control Plan shall consist of the following as a minimum and shall be accepted by the *Quality representative* of the *Contractor* prior to commencement of work and shall be sent to Eskom for approval. The QCP will also include welding procedures where applicable.

A covering page, table of contents and QCP which includes and makes provision for the following but not limited to:-

- QCP unique number.
- Revision number.
- Page number
- Provision for QCP approval signatures by the *Contractor* (Supervisor and Quality Controller) and Eskom System Engineer and/ or Eskom QC.
- Provision to incorporate all inspection reports or any form of records to prove conformity to requirements.
- High level description of work in execution including Item/ component/ system/ sub-system.
- Provision for nomination of intervention points for each activity as per SOW.
- Provision for review and approval signatures and dates by the *Contractor* (Supervisor and Quality Controller) and Eskom System Engineer and/ or Eskom QC.
- Provision for final acceptance/ releases approval signatures by the *Contractor* (Supervisor and Quality Controller) Eskom System Engineer and/ or Eskom QC.

5.1.3 Test Reports

Where tests were performed they shall be recorded and the positions of measurements are traceable to the specific area of testing against the records. Therefore the Contractor will submit all test reports that has been performed in the form of Data Pack.

5.1.4 Procedures

Contractor to submit all work procedures/instructions before any work commences. These must be submitted together with QCP for approval.

5.2 HEALTH AND SAFETY

- The contractor shall prepare and submit the SHE file to Safety Risk Management Department for review and acceptance before work commences as per SHE Specification for Contractors – HIGH RISK ACTIVITIES/SERVICES
- The contractor shall provide their personnel with appropriate PPE for the plant area and work to be carried out
- The contractor shall adhere to Occupational health and safety Act No 85 of 1993, including Notification of Construction Work to the Dept of Employment and Labour
- All work to be carried out to be in line with 32-727 – Eskom Saftey, Health, Enviromental and Quality (SHEQ) Policy
- Contractor to comply with Eskom's and Duvha Power Station's Life Saving Rules
- SHE Plan and Project Baseline Risk Assessment shall be in line with the scope of work and not be generic.
- Safe work procedure shall be compiled and approved by both project manager and site manager
- Proof of SHE competency for safety officer to be not less than SAMTRAC, Supervisor shall have proof of training on HIRA and Site Manager shall have proof of training on SHE Legal Liability or OHS Act. Proof of competency on the safe use of every construction equipment required.
- If ready mix concrete is being used, proof of competency of the truck operator required on the day of concrete mixture delivery(Copy to be kept in the company SHE File)

5.3 Environmental

- All demolition concrete waste and rubble shall be disposed by the contractor at a designated skip bin provided by the client.
- The client shall ensure removal and transportation of the skip bins from the plant
- If using ready mix, the contractor shall supply a method statement of the casting procedure which will minimise concrete spillage onto the enviroment. If spillage occurs, the contractor collect and dispose to the designated skip bin for concrete
- If the contractor does on site mixing, the client shall allocate a contained area for mixing concrete
- All work carried out shall be in line with Power Station Environmental Policy (DUV0048)
- All the contractors associated waste management activities shall be carried out in line with the station Waste Management procedure (ENVP0005)
- The supplier must provide MSDS's (16 point) for the bonding agent that will be used.

5.4 Permit to work

- The contractor shall be provided with permit to work on the area by the Project Manager
- No work shall be carried out without a valid permit to work

6 VDSS ITEMS RELATING TO CONSTRUCTION

Item/Activity	**Phase of returnable**
Construction Programme	Final program after contract award
Quality Control Plant (QCP)	7 days before Construction
Concrete method statements, incl: • Curing of concrete • Transport, placing and compaction of concrete	7 days before Construction
Steel method statements, incl: Method statement for erection Method statement for corrosion protection	7 days before Construction
Concrete 7 & 28 day cube test results	2 days after testing
Slump test results	Upon completion of test
Concrete mix design	7 days before Construction
Structural (mill certificates) & Reinforcing Steel grade certificates	7 days before Construction
High Strength Bolts Material Certification	7 days before Construction
Welding procedure specifications	7 days before Fabrication
Weld test certificates	7 days after Construction
NDT testing results	2 days after testing
As-built drawings	7 days after Construction
Data Books	7 days after Construction

6.1 DATA BOOKS

The *Contractor* submits signed off Data Books to the *Supervisor* for his acceptance. Data books include the following, as a minimum (where applicable):

- Document List;
- Instruction for Work/ Purchase Order;
- Approved QCP's;
- Method statements and specifications adhered to;
- Risk assessments;
- Approved As build Drawings;

- Material Certificates;
- Welding Procedure;
- Welders' Qualifications;
- NDT Technician Qualifications;
- NDT Reports/ Results;
- Corrosion Protection Consumables Certificates;
- Calibration Certificates;
- Technical Queries, Engineering Responses and communications with *Project Manager/ Employer;*
- Non-conformance reports;
- Internal Release Notes;
- Concrete 7 day and 28 day cube test results;
- Slump test results;
- Concrete mix designs including all required test results e.g. aggregate test results;
- Steel grade certificates; and
- Pre-concrete and post concrete surveys.

7 RELATED/SUPPORTING DOCUMENTS

None

8 STAKEHOLDER ENGAGEMENT

This document has been seen and accepted by:

Name & Surname	Designation	Signature
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	

9 AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
[redacted]	[redacted]
[redacted]	[redacted]

10 REVISIONS

Date	Rev.	Compiler	Remarks
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]