Eskom	Technical Specification	Camden Power Station

Title: **Camden Power Station LV Motor Replacement (Equivalency) Project**

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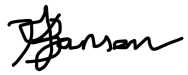		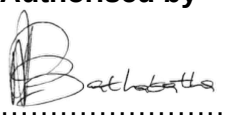
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Bernie Jansen	**Steyn Drotsky**	**Mokgoba Mathabatha**
System Electrical Engineer	**Electrical Engineering Manager**	**Engineering Manager**
Date: 25/05/2022	Date: 26/05/2022	Date: 27/05/2022

Content

1. Introduction

Camden Power Station is installed with old type Low Voltage motors that are no longer available in the market for supply and support. These motors are required to be replaced by equivalent type motors that are readily available in the market. By doing so, a risk of LV motor spares unavailability suitable for the existing installations will be eliminated. The project will only be implemented on units 5 and 8 due to the generation shutdown plan.

This project will include the supply of LV motors, gearboxes, couplings and baseplates and no installations.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

The purpose of this document is to provide a scope of work that should be adhered to when replacing all old type LV motors with equivalent type motors in Camden Power Station.

2.1.2 Applicability

This document shall apply throughout Camden Power Station.

2.1.3 Effective date

Shall be effective from date of authorisation.

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 References

[1] ISO 9001 Quality Management Systems.

[2] ISO 10007: Guidelines for Configuration Management

[3] IEC 61355: Classification and designation of documents for plants, systems and equipment

[4] QM-58: Contractor Contract Quality Requirements Manual

[5] 240-109607332: Plant Labelling Standard

[6] 240-56227443: Requirements for Control and Power Cables for Power Stations Standard

[7] 240-56355815: Control & Instrumentation Field Enclosures and Cable Termination Standard

[8] 240-76992014: Technical Document and Record Management Work Instruction

[9] 240-66920003: Documentation Management Review and Handover Procedure for Gx Coal Projects

[10] 240-65459834: Project Documentation Deliverable Requirement Specification

[11] 240-53114026: Project Engineering Change Management Procedure

[12] 240-54179170: Technical Documentation Classification and Designation Standard

[13] 240-86973501: Engineering Drawing Standard- Common Requirements

[14] 240-57617975: New Low Voltage Motors Procurement Standard

[15] 240-240-56357424: MV and LV switchgear Protection Standard

[16] 56227426: Management of Power Station MV and LV Protection and Settings Standard

[17] 240-56356396: Earthing and Lightning Protection Standard

[18] 240-89217674: Refurbishment and Repair of Power Station Electrical Motors Work Instruction

[19] 240-100457684: Motor Commissioning Work Instruction

[20] 240-56360387: Storage of Power Station Electric Motors

[21] SANS 10142-1: The wiring of premises

2.2.2 Informative

[1] 240-56364545: Structural Design and Engineering Standard

[2] 240-72273656: Power generation Asset Criticality Classification Standard

2.3 Definitions

2.3.1 Disclosure Classification

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

2.4 Abbreviations

ABBREVIATION	DESCRIPTION
AC	Alternating Current
DC	Direct Current
IP	International Protection Rating / Ingress Protection Rating
ITP	Inspection Test Plan
KKS	Kraftwerk Kennzeichen system
LV	Low Voltage
QCP	Quality Control Plan

ABBREVIATION	DESCRIPTION
SANS	South African National Standards

2.5 Roles and Responsibilities

Engineering Change Design Review Panel - A committee/individual appointed by the Project Engineering Manager. Their responsibilities include:

- Authorising the proposed Level 1 and Level 2 engineering changes.
- Authorising the engineering change based on the principles, use of technologies, and alignment to the process and procedure.
- Confirming the engineering change impact (change classification, environmental assessment, risk ranking, priority and technical content, etc.).
- Performing change level classifications.
- Periodical reviews of Level 3 changes.

*The responsibilities of the committee could be delegated to one person in certain instances.

Engineering Design Work Lead (EDWL) - EDWL is an engineering practitioner assigned by a delegated engineering person to co-ordinate the design work provided by the discipline Design Engineering roles and integrates this work into a final integrated design product. The EDWL is the custodian of the requirements set and the interface register between packages and part of his/her role is to maintain this information. The EDWL remains responsible for the integrity of the engineering product and is accountable for the overall management of interfaces and delivery of an integrated product.

Impact Assessment Team - The impact assessment team is defined by the impact assessment team leader. The impact assessment team shall consist of all affected stakeholders. Each member of the impact assessment team shall provide input (technical, financial, safety etc).

Lead Discipline Engineer (LDE) - The LDE shall ensure that the engineering change request is relevant, reviewed and fit for purpose to be implemented on the relevant plant area(s). The LDE shall verify that the engineering change impact assessment team is duly constituted of all affected stakeholders and CoE representatives.

The Project Engineering Manager – The PEM ensures compliance to the ECP procedure in the project environment, the PEM accepts the engineering change for the implementation in the project based on comments and recommendations from the engineering change design review panel.

2.6 Process for Monitoring

This document is governed by the Project Engineering Change Management procedure. The scope of work execution shall be monitored using the project feedback and ITP's utilised to execute the works as per this document.

2.7 Related/Supporting Documents

- QCP's and ITP's checklist sheets shall be developed by the contractor and approved by electrical engineering.
- LV motor data pack.

3. LV Motor Replacement Requirements

3.1.1 General Requirements

1. The *Contractor* is responsible for the completing of all works that is outlined in the scope of works in Section 3.2 below. The works shall be conducted according to the applicable codes and standards and the requirements in this document.
2. Where this document is not clear about the location of an item to be installed or work to be performed, it is the Contractor's responsibility to determine the correct location from the Employer's engineering representatives.
    - The Contractor will only act upon confirmation by receipt of an Engineering Instruction via the Employer's Project Manager.
    - Incorrect work done will reinstalled by the Contractor at his cost unless it can be explicitly proven that this document unambiguously shows an incorrect arrangement.
3. All referenced Eskom standards will be made available to the *Contractor* upfront.
4. Camden Power Station Plant coding shall conform to KKS Plant Codification Standard – 240-73143217.
5. Plant Labelling shall conform to Plant Labelling Standard – 240-109607332.
6. Each drawing, diagram and list will refer to the area of plant by means of the plant labelling.
7. QCP's/ITP's and related documentation shall be subject to comment and accept by the Employer's Quality Control personnel as well as Engineering. QCP's will make provision for signatures for interventions by at least the Contractor's QC Representative, the Employers QC Representative, the Employer's Engineering Department and the site AIA representative.
8. Intervention points will be signed as the work progresses and no back-dating will be allowed.

9. Notification for hold and witness points shall be in writing and shall be done at least 30 days in advance.
10. The following minimum hold points must be included for the Employer's Quality Control Department:
    - Acceptance of QCP/ITP – Contractor to supply QCP's and approved by Camden Electrical Engineering.
    - Acceptance of "As Required" arrangement and dimensional drawings
    - Final Sign off and Acceptance
    - Final Data book Review
11. Outline drawings of new motors and proposed list of these motors to be approved by Camden Electrical Engineering before any procurement can commence.

3.1.2 Material Requirements

- The *Contractor* is responsible for supplying all supplied materials for LV motors. Where a material is specified in this document, the material supplied shall be exactly in accordance with the specification.
- If the *Contractor* intends to use similar or equivalent materials the *Contractor* must apply in writing to the *Project Manager* for permission and the Responsible Engineer shall be notified and approve the equivalency for the consideration of the request, and respond in writing to either accept the request, request additional information for further consideration, or reject the request. All equipment shall be new and no re-use of any equipment shall be permitted.

3.1.3 Drawings Requirements

- The creation and control of all Engineering Drawings will be in accordance to the latest revision of 240-86973501 (Engineering Drawing Standards – Common Requirements).
- The *Contractor* shall provide detailed "As Required" arrangement/dimensional drawings for all motors.
- "As-built" drawings must be provided by the *Contractor*. The "As-built" drawings are subject to the *Employer's* Engineering representative comments and acceptance.

- All drawings shall contain the following as a minimum:
  1. Description of component with KKS number.
  2. Design Code.
  3. All drawing revisions must be provided as paper copies in original (in all cases at least A3) size as well as provided in *.pdf* format.
- All required drawings shall be prepared in accordance with the requirements as specified in the Engineering Drawing Office and Engineering Drawing Standard (240-86973501). A drawing register which records the drawing's information shall be maintained.
- Drawings to be prepared will include and not be limited to:
  - Equipment drawings;
  - Equipment lists;
  - Original Equipment Manufacture OEM manuals and part catalogues;
  - Set point and parameter lists;

3.1.4 Configuration Management and Document Management

3.1.4.1 Document Submission

- All documents shall be submitted to the Eskom Documentation Centre. The language of all documentation is required to be in English.

3.1.4.2 Transmittal

- The *Contractor* lists all project documents (soft copies and hard copies) for submittal on the transmittal with the following metadata fields:
  - Title of the document
  - Document Unique Identification number
  - Revision number
  - Name of Discipline
  - Reason for issuing/submission
  - Sender's detail
  - Sent date
  - Recipient's Details
  - Date received
  - Quantity of documentation referenced on the transmittal
  - Number of copies

- Format/medium submitted (e.g., paper, USB, etc.)
- Sender signature
- Recipient signature, once submitted, to acknowledge receipt

3.1.4.3 Email Subject

- The email subject shall as a minimum have the following:
  (Project Name_Discipline_Subject)
- The *Contractor* submits documentation to the Eskom Representative as well as the Project's Documentation Centre in the following media:
  - Electronic copies will be submitted to Eskom Documentation Centre. Electronic copies too large for email will be delivered on a USB, large file transfer protocol and/or hard drives to the Project Documentation Centre. The communication will be done directly with an Eskom Representative.
  - Hard copies shall be submitted to the Eskom Representative accompanied by the Transmittal Note.
  - The format of the final documentation handover will be specified in the Vendor Document Submittal Schedule.

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3.1.4.4 Documentation requirements

- All documents supplied by the *Contractor* shall be subject to Eskom's approval. Documents such as QCP's, Method Statements, commissioning procedures and other documents impacting the work must be approved by the *Employer* at least 10 working days prior to commencement of the Works.
- Each revision of a document or drawing shall be accompanied with a list of the comments made by the *Employer* on the previous revision if applicable and the response/corrective action taken by the *Contractor.* Changes will be recorded in a revision table contained on/in each drawing/document.
- Documents and drawings shall indicate the *Employer's* drawing number as allocated by the *Employer*. The *Contractor* may have his own internal document or drawing number on the document or drawing, but where reference is made among documents or drawings, the *Employer's* number shall be used.
- The *Contractor* shall compile a complete data book for all work done containing the following as a minimum if applicable:

1. Scope of work
2. Approved “As built” drawings
3. Approved QCP / ITP
4. Inspection reports
5. Settings and Parameters
6. As built drawings
7. Material summary that gives full traceability between components used, drawings and material certificates
8. Maintenance manual

3.1.4.5 Documentation

- For consistency, it is important that all documents used within the project follow the same layout, style and formatting standard. Therefore, the *Contracto*r shall ensure that the 240-76992014: Technical Document and Record Management Work Instruction is used for any documentation requirements.

3.1.4.6 General Requirement

- The *Contractor* includes the *Employer*’s drawing number in the drawing title block. This requirement only applies to design drawings developed by the *Contractor* and his Subcontractors. It does not apply to drawings developed by manufacturers for equipment and material such as instruments, etc. Drawing numbers will be assigned by the Employer as drawings are developed.
- The project name shall be listed on all drawings, including manufacturers’ drawings. A separate sheet may be attached to the submittal if needed to adequately list all tag numbers associated with the drawings such as instruments which may have numerous tag numbers associated with it.
- The language of all documentation shall be in the English language. The units of measure shall be metric.
- The *Contractor* retains project design calculations and information for the entire life cycle of the plant and provides these to the *Employer* on prior written notice at any time notwithstanding the expiry or termination of the contract.

3.1.4.7 Engineering Change Management

- All Design change management shall be performed in accordance to the latest revision of the Eskom Project Change Management Procedure (240-53114026) and the Employer shall ensure that Contractor is provided with latest revisions of this procedure. Any uncertainty regarding this procedure should be clarified with the Employer and clarification updates should be reflected in updated versions of this procedure.

3.2 LV Motor Replacement Scope of Work

The following scope of works is required to be executed for the replacement of LV motors. The works shall be conducted according to the Eskom standards listed in Section 4. The contractor shall supply all the motors, gearboxes, and couplings necessary and baseplates.

The motors contractor shall comply with all applicable safety standards.

3.2.1 Electrical Requirements

- The contractor to supply all LV motors and gearboxes that needs to be replaced.
- Supply IE3, premium efficiency motors.
- Motors shall be of S1 duty. According to IC 60034- 1, these are motors running continuously.
- Supply/design equivalent AC or DC motor/s for each system (2x Units) in accordance with 240-57617975 standard.
- Motors shall be supplied according to the list of Camden LV Motors (AC and DC) which shall be provided.
- Quality checks shall be done before and after delivery to site for all motors, i.e., for
    - Designed as per the approved design specification.
    - Electrical tests.
    - Vibrations.
- Each motor system must be provided with one, once off, equivalent spares also provided on the list.

Note:

- *The contractor who will be awarded this work shall come to site to verify all motors that needs to be supplied.*
- *Outline drawings and proposed list of these new motors to be approved by Camden Electrical Engineering before any procurement can commence.*

3.2.2 General Earthing Requirements

- All earthing in general conforms to requirements defined SANS 10198-13 and 10142-1.

3.2.3 Mechanical Requirements

Couplings:

- See attached list of all the couplings that needs to be supplied for each of the motors by the contractor and approved by Electrical/Turbine/Boiler Engineering before procured.
- Couplings shall be installed in accordance with the Eskom standards (240-56030558) by the employer.
- The couplings shall be of the correct type (Fenaflex, spider, bibby etc.) and size as indicated on the attached list.

Baseplates:

See attached list of all the baseplates (mild steel) that needs to be supplied for each of the motors by the contractor and approved by Electrical/Turbine/Boiler Engineering before procured.

4. Applicable standards

[1] 240-109607332: Plant Labelling Standard

[2] 240-56227443: Requirements for Control and Power Cables for Power Stations Standard

[3] 240-56355815: Control & Instrumentation Field Enclosures and Cable Termination Standard

[4] 240-76992014: Technical Document and Record Management Work Instruction

[5] 240-66920003: Documentation Management Review and Handover Procedure for Gx Coal Projects

[6] 240-65459834: Project Documentation Deliverable Requirement Specification

[7] 240-54179170: Technical Documentation Classification and Designation Standard

[8] 240-86973501: Engineering Drawing Standard- Common Requirements

[9] 240-56227443: Requirements for Control and Power Cables for Power Stations Standard

[10] 240-57617975: New Low Voltage Motors Procurement Standard

[11] 240-240-56357424: MV and LV switchgear Protection Standard

[12] 56227426: Management of Power Station MV and LV Protection and Settings Standard

[13] 240-56356396: Earthing and Lightning Protection Standard

[14] 240-89217674: Refurbishment and Repair of Power Station Electrical Motors Work Instruction

[15] 240-100457684: Motor Commissioning Work Instruction

[16] 240-56360387: Storage of Power Station Electric Motors

[17] SANS 10142-1: The wiring of premises

[18] 240-56030558 – Centrifugal Pumps Specification

[19] 240-56364545: Structural Design and Engineering Standard

[20] SANS 2001-BE1 Part BE1: Earthworks (general)

[21] SANS 2001-BS1 Part BS1: Site clearance

[22] SANS 2001-CC1 Part CC1: Concrete works (structural)

[23] SANS 5861-2 Concrete tests - Sampling of freshly mixed concrete

[24] SANS 5862-1 Concrete tests - Consistence of freshly mixed concrete - Slump test

[25] SANS 5863 Concrete tests - Compressive strength of hardened concrete

[26] SANS 5864 Concrete tests - Compressive strength of hardened concrete

[27] SANS 10400 The Application of the National Building Regulations

5. Authorization

This document has been seen and accepted by:

Name	Designation	Approval Signatures
Shaun Govender	Turbine Engineering Manager	
Riaan Grobler	Senior Electrical Technologist	
Phello Sejake	Boiler Engineer	

6. Revisions

Date	Rev.	Remarks	Compiler
March 2021	1	Final Report	M. Mkhize
April 2021	2	Incorporates comments from SCCC.	M. Mkhize
May 2022	3	Scope revised	B. Jansen

7. Development Team

- N/A

8. Acknowledgements

- N/A.

9. Attachments

- LV Motor Replacement Project List