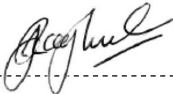


 Eskom	Guideline	Technology
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Title: TECHNICAL EVALUATION CRITERIA FOR MAKHATHINI 22KV SHUNT/FILTER CAPACITOR BANK DESIGN, MANUFACTURE, SUPPLY, CONSTRUCTION, INSTALLATION AND COMMISSIONING	Unique Identifier:	ER00024-00-P03#A1.6-02
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Compiled by	Supported by	Approved by
		
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Date: 15/10/2024	Date: 15 October 2024	Date: 16/10/2024

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1. Introduction

This document specifies the tender technical evaluation criteria for the Makhathini 22kV 2 x 3MVar shunt/filter capacitor banks design, manufacture, supply, construction, installation and commissioning. This document was compiled in accordance with Eskom procurement and supply chain management standard [1].

2. Supporting clauses

2.1 Scope

This document covers the technical evaluation criteria to be used during tender technical evaluations of shunt/filter capacitor banks for Makhathini Substation design, manufacture, construction, supply, installation and commissioning, which includes the civil work, primary plant electrical and control plant works. This document also covers technical evaluation criteria for capacitor banks and damping resistors. Reactors are covered separately in [4].

2.1.1 Purpose

This document is in place to ensure that the technical evaluations on shunt/filter capacitor banks are carried out according to the requirements of Eskom Holdings SOC (Ltd).

2.1.2 Applicability

This document shall apply to Eskom Distribution Central East Cluster in Kwa-Zulu Natal for the Makhathini 22kV Filter/Capacitor bank only.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed below:

2.2.1 Normative

- [1] 32-1034, Eskom Procurement and Supply Chain Management.
- [2] ER00024-00-P05#A1.6-00 Technical Specification for Makhathini Shunt Filter Capacitors
- [3] 240-42587021, Specification for Air Core Reactors.
- [4] 240-89963721, Technical Evaluation Standard for Air Core Reactors
- [5] 240-56030435, Outdoor Ceramic Station Post Insulators for Systems with Nominal Voltages up to 765kV Specification
- [6] 240-79707491, Technical Evaluation Standard for Outdoor Ceramic Station Post Insulators for Systems with Nominal Voltages up to 765kV
- [7] 240-139131823: Technical Evaluation Criteria for Post Type Instrument Transformers Current Transformers, Inductive Voltage transformers, Capacitor Voltage Transformers Coupling Capacitors, CT/VT Metering Units And Line traps
- [8] ISO 9001, Quality Management Systems
- [9] 240-76429758, Specification for Capacitor Units
- [10] 240-75478950, Technical Evaluation Standard for Shunt/Filter Capacitor
- [11] ER00024-00-P05#0.1-00 Substation Project Design Package

2.2.2 Informative

- [12] 32-9, Definition of Eskom documents.
- [13] 32-644, Eskom documentation management standard
- [14] QM58, Supplier contract quality requirements specification

2.3 Definitions

Definition	Description
Capacitor Bank	Capacitor bank is a series and parallel combination of capacitor units constructed for the purpose of improving power factor or improving voltage stability or increasing power transfer.
Capacitor Unit	Capacitor unit is the name given to an assembly of capacitor elements contained in a protective case, with one or two terminals. The previous name for this device was capacitor can.
Eskom Assessment Representative(s)	The person(s) appointed by Eskom to perform evaluation of tender submissions in line with Eskom requirements.

2.3.1 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
BIL	Basic Insulation Level
CG	Care Group
HV	High Voltage
kV	kilo Volt
MVar	Mega Volt Ampere Reactive
SCOT	Steering Committee of Technologies
RAM	Reliability, Availability, Maintainability

2.5 Roles and responsibilities

When evaluating tenders to the applicable specifications, these criteria will be used by the Technical Evaluation Team which will be appointed members from the Eskom Distribution Central East Cluster in Kwa-Zulu Natal.

2.6 Process for monitoring

The Design Engineer for the project is to ensure that this document is updated, always renewed and current.

2.7 Related/supporting documents

Refer to the list of Normative references in section 2.2.1.

3. Project Summary

Eskom Distribution Central East Cluster in Kwa-Zulu Natal has severe voltage constraints on certain sections of the high voltage network being supplied from Normandie 400/132/88kV Transmission Substation. The voltages experienced on the 132kV busbars at Candover, Makhathini, Nondabuya, Ndumo and Mkuze substations are below NRS-048 acceptable limits. It is therefore required that two (2) 3MVar 22kV shunt capacitor banks with C-Type 3rd Harmonic Filters be installed for VAR compensation on the 22kV Busbar at Makhathini 132/22kV Substation, which will assist with reactive power injection thus improving the HV Busbar voltages on the system.

4. Project Scope of Work

- a) Establish the terrace, drainage and extend the existing earthmat for the capacitor bank 1 yard. The terrace for capacitor bank 2 is existing.
- b) Establish foundations with earthing, supply and install steelwork and equipment for 2 x 22kV capacitor bank bays 1 & 2 (busbar isolator and combo breaker with surge arrestor).
- c) The Capacitor Bank Bay equipment (22kV isolator and combo breaker with surge arrestor) shall be supplied and installed by the contractor in accordance with Eskom equipment specifications.
- d) Supply and install all conductors (jumpers), clamps and associated equipment for the 22kV capacitor bank bays 1 and 2.
- e) Design and construct foundations for the 22kV filter/capacitor banks and associated equipment.
- f) Establish 1.8m wire mesh safety fencing around each capacitor bank with its associated reactor and resistor. This fence shall be connected to the main earth mat.
- g) Establish an oil bund for each capacitor bank with its associated reactor and resistor.
- h) Establish a concrete slab within the bunded area for each capacitor bank with its associated reactor and resistor for prevention of weeds and ease of maintenance.
- i) Supply and install 100mm thick yard stones around the new capacitor bank 1 bay.
- j) Establish additional lighting for the capacitor bank bays on the existing 22kV columns.
- k) Supply and install equipment labels and safety signs around capacitor bank yards 1 & 2 mounted on the wire mesh safety fence.
- l) Trench, install and terminate all LV cables to the capacitor bank bay.

-
- m) Design, supply, install and commission all control equipment (protection, DC and telecontrol with suitably calculated settings) in the control building and substation yard (lighting, auxiliary supply boxes) as per the Control Plant Scope of Work Document #ER00024-00-P05#4.1b-01 and the Control Plant Detailed Specification and Quality Assurance Document #ER00024-00P05#4.1a-01. The designs including drawings and the settings and settings templates are to be handed over to Eskom and would belong to Eskom thereafter.
- n) The appointed contractor/supplier shall be responsible for the review of the Eskom harmonic studies, completion of switching and other related studies, design, manufacture, testing, supply, installation and commissioning of the shunt filter/capacitor bank installation (*refer to Eskom Document No. 240-64688878, Generic Specification for Shunt/Filter Capacitor Installations, Eskom Group Technology and ER00024-P05#A1.5-00 Technical Specification for Makhathini Substation 2 X 3MVar, 22kV Shunt Capacitors & C-Type Filter*). The equipment components to be supplied by the Contractor for the complete capacitor installations shall include but not be limited to those specified in ER00024-P05#A1.5-00).
- o) The contractor is to test and commission all installed bay equipment (isolators and breakers).
- p) The contractor for the filter/capacitor bank is to commission the new equipment and complete final checks before energising the filter/capacitor banks as per the *Technical Specification for Makhathini Shunt Filter Capacitors (doc #ER00024-P05#A1.5-00) and the Specification for Air Core Reactors (doc #240-42587021)*.
- q) Under an outage or under live work, the contractor is to connect the new 22kV filter/capacitor bank bays to the 22kV busbars.
- r) The filter/capacitor bank may only be energised once the Commissioning, Operating and Safety Earthing Procedure specific to the installation is approved by the Sector/Zone Manager (*refer to example the standard for Safety Earthing of Capacitor Banks doc #240-85660696*).
- s) The Contractor is to manage all interactions with the surrounding community members and interested parties. To this effect the Contractor is to establish and run a "Community Interaction Forum" that will manage all greater community interactions including but not limited to the Traditional Leadership (Inkosi, Indunas, Traditional Council); the Political Leadership (Councillor, Local Council, Ratepayers Association); the local businesses (Business Forums, local business owners); interested parties (Surrounding land occupants, environmental groups, job seekers, opportunists, etc)."
- t) Rehabilitating of the site in accordance with the Environmental Management Plan.

5. Evaluation Criteria

The following criteria are developed in line with the latest PPPFA regulations and the Eskom Procurement Procedure [1]. It is based on Technical having a **maximum of 100 points**. A tender will be deemed to be technically acceptable if it scores a **minimum of 75%** during the technical paper evaluation of the submitted tender. The technical evaluation of the tenders will be based on the tenderer's ability to meet the requirements defined in the specifications and works information issued to the market. The following sections show the points awarded for various aspects of functionality based on the technical specifications.

5.1 Mandatory Criteria (Gatekeepers)

Mandatory criteria (gatekeepers) are "must meet" criteria that will not be point scored. Table 1 shows the Mandatory criteria that will be assessed. These criteria are to be issued to the potential tenderers as part of the enquiry. The mandatory criteria shown in table 1 are evaluated on a "YES/NO" basis as to whether or not the criteria are satisfactorily met. Complying with the mandatory criteria will allow the tenderer to proceed to the scored evaluation criteria in section 5.2. ***An assessment of "NO" against any criteria will eliminate the tenderer from further consideration.***

No.	GATEKEEPER	RETURNABLE	COMPLIANT
5.1.1	Language of submitted tenders: All information and tender documentation are to be supplied in English.	Tender documents submitted in English	English [YES] Any other language [NO]
5.1.2	Relevant Company Experience Documented proof of the company's experience in a full turn-key project i.e. design, manufacture, supply, installation, construction and commissioning of capacitor banks and harmonic filters , including civil work, power plant electrical and control plant.	Experience Register	Submitted [YES] Not Submitted [NO]
5.1.3	Schedule AB of the Specifications Completion of Schedule AB of capacitor banks and air-core reactor specifications (ER00024-P05#A1.5-00 and 240-42587021)	AB Schedules	AB Schedule Completed [YES] AB Schedule NOT Completed [NO]

CONCLUSION: ACCEPTANCE FOR SCORED EVALUATION?	YES	NO
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Table 1: Mandatory Criteria

5.2 Scored Criteria

No.	SCORED CRITERIA	RETURNABLE	POINTS AWARDED
5.2.1	Company Experience / Expertise: Documented proof of the company's experience in design, manufacture, supply, installation, construction and commissioning of capacitor banks and harmonic filters, <i>including civil work, power plant electrical and control plant commissioning.</i>	Proof of projects undertaken for the scope of work (References with contact details to be included)	No. of projects ≥ 3 [25 pts] No. of projects =2 [15 pts] No. of projects =1 [5 pts] No. of projects = 0 [0 pt]
5.2.2	Skills, Resources, Tools and Equipment - Proof of Specialized tools and equipment required for the design, manufacture, type and factory tests, installation and site tests and commissioning. - Proof of accredited type test laboratories. - Proof of trained and skilled resources in managing a comparable filter/capacitor bank project.	Proof of design & construction skilled resources software, tools and testing equipment	Proof supplied [15 pts] Partial proof supplied [7 pts] No proof supplied [0 pt]
5.2.3	Reliability, Availability & Maintainability Compliance: Compliance with the RAM requirement. RAM studies to be provided for resistor, air-core reactor and capacitors.	Specifications & Schedule AB #240-89963721	RAM Studies Compliant [5 pts] RAM Studies not compliant [0 pts]
5.2.4	Test and Measurements: All required tests offered (at correct test levels) and included in the Tender Price for the damping resistor / reactor and capacitor bank.	Specifications ER00024-P05#A1.5-00 and 240-42587021	Tests offered [5 pts] Tests not offered [0 pts]
5.2.5	Compliance with the technical specification and Schedule AB requirements: Criteria for the capacitor bank, capacitor units and resistor are evaluated according to sections 5.2.5.1; 5.2.5.2 & 5.2.5.3 below. Criteria for the air-core reactor is evaluated according to document #240-89963721 [4]. Deviations shall be declared and submitted.	Specifications & Schedule AB of ER00024-P05#A1.5-00 and 240-42587021	Refer to 5.2.5.1; 5.2.5.2 & 5.2.5.3 & #240-89963721 [4]

Document Classification: Controlled Disclosure**TECHNICAL EVALUATION CRITERIA FOR MAKHATHINI 22KV SHUNT/FILTER CAPACITOR BANK DESIGN, MANUFACTURE, SUPPLY, CONSTRUCTION, INSTALLATION AND COMMISSIONING**Unique Identifier: **ER00024-00-P03#A1.6-02**Revision: **2**Page: **9 of 11**

5.2.5.1	Capacitor Bank	Clause ER00024- P05#A1.5-00	POINTS AWARDED
a)	Compliance with Schedule AB requirements	AB Schedules	Compliant [10 pts] Non-Compliant [0 pts]
b)	BIL/Creepage requirements (Units)	AB Schedules	Compliant [1 pts] Non-Compliant [0pts]
c)	Bank Sizing	AB Schedules	Compliant [1 pts] Non-Compliant [0pts]
d)	Safety Earthing gear	4.1.2	Present [1 pts] Not Present [0pts]
e)	Vermin proofing	3	Present [1 pts] Not Present [0pts]
f)	Seismic requirement	AB Schedules	Present [1 pts] Not Present [0pts]
g)	Measurements during hot commissioning	8.4.4	Present [1 pts] Not Present [0pts]
h)	Training	9.3	Present [1 pts] Not Present [0pts]
i)	Commissioning spares	9.5	Present [1 pts] Not Present [0pts]
5.2.5.2	Capacitor Units	Clause	POINTS AWARDED
a)	Compliance with Schedule AB requirements	AB Schedules	Compliant [5 pts] Non-Compliant [0pts]
b)	Capacitor ratings (kVAr and C)	AB Schedules	Present [1 pts] Not Present [0pts]
c)	Fusing Technology	AB Schedules	Compliant [1 pts] Non-Compliant [0pts]
d)	Factory failure rate	6.2	Compliant [1 pts] Non-Compliant [0pts]
e)	Losses	AB Schedules	Compliant [1 pts] Non-Compliant [0pts]
f)	Test equipment	8.4	Present [1 pts] Not Present [0pts]
g)	CT's requirements (BIL, Ratio, Cores)	AB Schedules	Present [1 pts] Not Present [0pts]

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5.2.5.3	Damping Resistors	Clause	POINTS AWARDED
a)	Compliance with Schedule AB requirements	AB Schedules	Compliant [5 pts] Non-Compliant [0pts]
b)	Technical report demonstrating overload capability	AB Schedules	Present [1 pts] Not Present [0pts]
c)	Design safety margin	6.9.2	Present [1 pts] Not Present [0pts]
d)	Instruction / maintenance manuals	8.1	Present [1 pts] Not Present [0pts]
e)	Interchangeability	9.8	Present [1 pts] Not Present [0pts]
f)	Losses	AB Schedules	Compliant [1 pts] Non-Compliant [0pts]
g)	Spares	9.5.2	Present [1 pts] Not Present [0pts]
5.2.5.4	Air Core Reactors	Clause	POINTS AWARDED
a)	Compliance with Technical Evaluation Standard for Air Core Reactors document #240-89963721	240-89963721	Compliant [10 pts] Non-Compliant [0pts]

TOTAL SCORE (%) – Minimum 75% Required for Technical Acceptance	XX	%
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Table 2: Scored Criteria

The Technical Evaluation Standards found in [4], [6] and [7] will be used together with these criteria during the technical evaluation stage (where applicable).

6. Revisions

Date	Rev	Compiler	Remarks
Feb 2022	0	J.K. Raghubir	Based on Technical Evaluation Standard for Shunt/Filter Capacitor (Lepini) document 240-75478950.
September 2024	1	J.K. Raghubir	TEC Revised to include the civil, electrical and commissioning as a turn-key project
October 2024	2	J.K. Raghubir	Point system changed from point deduction to points awarded

7. Development team

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

- Jayant Raghubir
- Aroon Sukhnandan
- Phutheho Moabi
- Dave Oerder

8. Acknowledgements

Mashilo Moabelo & Neels van Staden for compiling the Technical Evaluation Standard for Shunt/Filter Capacitor (Lepini) document 240-75478950.