

Title: **TECHNICAL EVALUATION STANDARD
FOR SUBSTATION TUBULAR
CONDUCTORS – EPC CONTRACTING** Unique Identifier: **240-171000163**

Alternative reference Number: **n/a**

Area of Applicability: **Engineering**

Documentation Type: **Standard**

Revision: **1**

Total Pages: **11**

Next Review Date: **March 2028**

Disclosure Classification: **Controlled
Disclosure**

Compiled by

Approved by

Authorized by



Rukesh Ramnarain
Chief Engineer
Substation Engineering

Mark Peffer
Engineer
Substation Engineering

Subhas Maharaj
Senior Manager
Substation Engineering

Date: 08/08/23

Date: 08/08/23

Date: 08/08/23

Content

	Page
1. Introduction	3
2. Supporting clauses	3
2.1 Scope	3
2.1.1 Purpose	3
2.1.2 Applicability	3
2.2 Normative/informative references	3
2.2.1 Normative	3
2.2.2 Informative	3
2.3 Definitions	3
2.3.1 General	3
2.3.2 Disclosure classification	4
2.4 Abbreviations	4
2.5 Roles and responsibilities	5
2.6 Process for monitoring	5
2.7 Related/supporting documents	5
3. Technical tender evaluation procedure	5
3.1 Desktop / Documentation evaluation	6
4. Authorization	6
5. Revisions	7
6. Development team	7
7. Acknowledgements	7
Annex A – Desktop Documentation Evaluation: Qualitative Criteria	8

1. Introduction

Substation tubular conductors are designed to carry rated normal and fault currents. This standard is intended to ensure that substation tubular conductors supplied to Eskom are properly evaluated to meet the desired performance requirements.

2. Supporting clauses

2.1 Scope

This standard covers the Eskom specific technical evaluation requirements for tubular conductors for use in substations with nominal system voltages up to and including 765kV ($U_m = 800kV$). The substation tubular conductors supplied must comply with the minimum requirements as set out in the relevant Eskom, IEC and European (EN and BS) documents listed.

2.1.1 Purpose

To document, have on record and refer to as required, Eskom's Transmission Division specific technical evaluation requirements for station tubular conductors for use in substations with nominal system voltages up to and including 765kV ($U_m = 800kV$).

2.1.2 Applicability

This document shall apply throughout Eskom Transmission Division. Holdings Limited Divisions. It is also applicable for all external parties constructing substation infrastructure projects that will be handed over operationally to Eskom Transmission.

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] 32-1034, Eskom Procurement and Supply Management Procedure
- [2] 240-48929482, Tender Technical Evaluation Procedure
- [3] 240-171000067, Specification for Substation Tubular Conductors.

2.2.2 Informative

None

2.3 Definitions

2.3.1 General

Definition	Description
A₅ elongation test	% permanent elongation for proportional specimens with length equal to 5 times diameter
Accredited testing laboratory/authority	A laboratory which is ISO/IEC 17025 accredited and/or that holds valid certification issued by ILAC (International Laboratory Accreditation Corporation) or one of its members.

Definition	Description
Aluminium alloy	Aluminium which contains alloying elements, where aluminium predominates by mass over each of the other elements and where the aluminium content is not greater than 99,00%.
Certified test report	A certificate of tests performed as specified within the specification, and carried out by an accredited authority or by the manufacturer and witnessed by an accredited authority that has been accredited in accordance with ISO/IEC 17011.
Eskom Assessment Representative(s)	The person(s) appointed by Eskom to perform evaluation of tender submission(s) in line with Eskom requirements.
Extruded tube	Tube brought to final dimensions by extrusion.
Porthole tube/bridge tube	Tube produced by extrusion of a solid billet through a porthole or bridge die.
Quality control plan	A method for documenting the functional elements of quality control that are to be implemented in order to assure that quality standards are met for a particular product or service. The intent of the quality control plan is to formalize and document the system of control that will be utilized.
Quality management system	A collection of business processes focused on consistently meeting customer requirements and enhancing their satisfaction.
Routine test	Tests done to verify the quality and uniformity of the workmanship and materials used in the manufacture of substation tubular conductors.
Seamless tube	Tube which does not contain any line junctures resulting from the method of manufacture.
Tube	Hollow, wrought product with a uniform cross-section, with only one enclosed void and with a uniform wall thickness, supplied in straight lengths. Cross-sections are in the shape of circles and the inner and outer cross-sections are concentric and have the same form and orientation.
Type test	Tests done on the completion of the development of a new design to establish representative performance data. They need to be repeated if the design is changed to modify its performance or there is a change in the manufacturing process.

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
°C	degree Celsius
Al	Aluminium
Cr	Chromium
Cu	Copper
Fe	Iron
g	Acceleration due to gravity

PCM Reference: **Substation Design**

SCOT Study Committee Number/Name: **Substation**

Abbreviation	Description
kV	kilovolt
m	meter
Mg	Magnesium
mm	millimetre
Mn	Manganese
MPa	Megapascal
OD	Outside diameter
QCP	Quality control plan
QMS	Quality management system
SANS	South African National Standard
Si	Silicon
Ti	Titanium
Um	Maximum system voltage
WT	Wall thickness
Zn	Zinc

2.5 Roles and responsibilities

Suppliers are responsible for manufacturing, testing and supplying products in accordance with document [3]. All personnel involved within the substation environment shall ensure compliance to these requirements and that tubular conductors are evaluated in accordance with this document.

2.6 Process for monitoring

All tubular conductor to be supplied to Eskom shall be in accordance with [3]. All personnel involved within the technical evaluation of these products shall ensure compliance to stipulated requirements and that submitted products are evaluated in accordance with this document. The relevant management structures shall ensure compliance.

2.7 Related/supporting documents

This document must be applied together with document [3].

3. Technical tender evaluation procedure

The technical evaluation procedure is specific to each item tendered for. The technical evaluation for tubular conductors shall consist of a desktop/documentation evaluation.

All supplier submission documentation, reports and certificates shall be in English.

For the supplier's submission to be compliant all tender technical returnables must be submitted as required and score at least 70% in the qualitative evaluation.

Suppliers who are tendering but are not the OEM of the product must source the required technical returnable from the OEM where relevant. Missing information will not be requested after the Enquiry closing date.

If any part or sub-component of the production process is outsourced, the Supplier shall retain full and complete accountability for the (entire) product.

3.1 Desktop / Documentation evaluation

This evaluation exercise is performed by the Eskom Transmission evaluating representatives. This part of the evaluation starts when submissions are opened for the first time. It begins with confirmation that all tender technical returnables have been submitted as required. Tenderers are to submit all the required tender technical returnables and highlight any clarification prior to tender close. Refer to Annex A for details.

During the qualitative assessment, the Eskom Transmission evaluating representatives will go through the qualifying submissions in detail and score each item evaluated. Refer to Annex A. The tender submission must score a minimum of 70% in the qualitative evaluation to be considered as technically qualified.

The score that each tenderer receives will provide a numeric basis for tender comparison. The minimum weighted average score required for the qualitative evaluation for a busbar tubular conductor to be considered shall be 70%.

All type test certificates must be supplied prior to contract award. This is a mandatory requirement. Furthermore, all test reports must have a 100% pass rate.

The type test certificates are:

- Material composition and temper test report
- Resistivity test
- Tensile Strength Test
- 0.2% Proof Strength Test
- Elongation Test

Short Circuit Withstand ([3] section 3.3.1.3) and Stress-Corrosion Cracking ([3] section 3.3.2.4) tests have been removed as tender submission requirements.

4. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Mark Peffer	Chief Engineer
Subhas Maharaj	Senior Manager

5. Revisions

Date	Rev	Compiler	Remarks
Aug-23	1	Rukesh Ramnarain	First Issue

6. Development team

Not Applicable.

7. Acknowledgements

- NA

Annex A – Desktop Documentation Evaluation: Qualitative Criteria

After it has been confirmed that all the tender technical returnables have been submitted, the submission will be assessed against the following criteria (shown below with their weightings) with detail as stipulated in [3], 240-171000067 Specification for Substation Tubular Conductors.

Criteria	Section	% weight	Weighted Score
Material properties	A1	30	
Manufacturing method, shape, dimensions and dimensional tolerances	A2	30	
Electrical requirements	A3	20	
Mechanical requirements	A4	20	
Total		100	

Threshold: The score that each tenderer receives will provide a numeric basis for tender comparison. The minimum weighted average score required for a busbar tubular conductor to be considered must be above 70%.

ITEM NO	CLAUSE in [3]	DESCRIPTION	UNIT	Criteria	Score
A1	3.2.2	Material properties			
A1.1	3.2.2	Type of Alloy		6061	5
				Non-compliant	0
A1.2	3.2.2	Designation		AlMg1SiCu	5
				Non-compliant	0
A1.3	3.2.2	Temper		T6	5
				Non-compliant	0
A1.4	3.2.3	Chemical composition		Non-compliant	0 for element
		Silicon (Si)	%	0.40 – 0.80	5
		Iron (Fe)	%	≤ 0.70	5
		Copper (Cu)	%	0.15 – 0.40	5
		Manganese (Mn)	%	≤ 0.15	5
		Magnesium (Mg)	%	0.80 – 1.20	5
		Chromium (Cr)	%	0.04 – 0.35	5
		Zinc (Zn)	%	≤ 0.25	5
		Titanium (Ti)	%	≤ 0.15	5
		Other	%	0.05 – 0.15	5
		Aluminium (Al)	%	95.85 – 98.56	5
Tubular conductor properties (maximum points: 65)				Score	
Tubular conductor properties (section weight: 30%)				Weighted score = $(\text{Score}) * \left(\frac{30}{65}\right)$	

ITEM NO	CLAUSE in [3]	DESCRIPTION	UNIT	Criteria	Score
A2		Manufacturing method, shape, dimensions and dimensional tolerances			
A2.1	3.2.4	Manufacturing method		Die/mandrel	5
				Porthole/bridge	5
				Other	0
A2.2		Shape		Round	5
				Non-compliant	0
A2.3	3.2.5	Outer Diameter	mm	As specified	5
				Non-compliant	0
A2.4	3.2.5	Wall thickness	mm	As specified	5
				Non-compliant	0
A2.5	3.2.5	Length	m	As specified	5
				Non-compliant	0
A2.6	3.2.6.1	Tolerance on outer diameter (applicable OD only)	mm	OD 80mm: ±1.1	5
				OD 120mm: ±1.4	5
				OD 200mm: ±2.0	5
				OD 250mm: ±3.0	5
				Non-compliant	0
A2.7	3.2.6.2	Tolerance on wall thickness (dependent on OD and manufacturing method)	%	As specified	5
				Non-compliant	0
A2.8	3.2.6.3	Tolerance on length (dependent on OD and specified length)	mm	As specified	5
				Non-compliant	0
A2.9	3.2.6.4	Tolerance of straightness (applicable OD only)	mm/m	OD 80mm: ±1.5	5
				OD 120mm: ±1.5	5
				OD 200mm: ±2.5	5
				OD 250mm: ±2.5	5
				Non-compliant	0
Manufacturing method, shape dimensions and dimensional tolerances (maximum points: 45)				Score	
Manufacturing method, shape dimensions and dimensional tolerances (section weight: 30%)				Weighted score = $(\text{Score}) * \left(\frac{30}{45}\right)$	

ITEM NO	CLAUSE in [3]	DESCRIPTION	UNIT	Criteria	Score
A3		Electrical requirements			
A3.1	3.3.1.1	Electrical resistivity at 20°C (verified on test certificate)	Ωm	≤ 0.037 x 10 ⁻⁶	5
				Non-compliant	0
Electrical requirements (maximum points: 5)				Score	
Electrical requirements (section weight: 20%)				Weighted score = (Score) * $\left(\frac{20}{5}\right)$	

Note: If no test certificates or test reports have been submitted, then the applicable score for the item will be five (5) (full marks). In this instance, the successful supplier must supply all the outstanding test certificates and reports post manufacturing of the product.

ITEM NO	CLAUSE in [3]	DESCRIPTION	UNIT	Criteria	Score
A4		Mechanical requirements			
A4.1	3.3.2.1	Tensile Strength Test (verified on test certificate)	MPa	As specified	5
				Non-compliant	0
A4.2	3.3.2.2	0.2% Proof Stress Test (verified on test certificate)	MPa	As specified	5
				Non-compliant	0
A4.3	3.3.2.3	Elongation Test (verified on test certificate)	%	As specified	5
				Non-compliant	0
Mechanical requirements (maximum points: 15)				Score	
Mechanical requirements (section weight: 20%)				Weighted score = (Score) * $\left(\frac{20}{15}\right)$	

Note: If no test certificates or test reports have been submitted, then the applicable score for the item will be five (5) (full marks). In this instance, the successful supplier must supply all the outstanding test certificates and reports post manufacturing of the product.