

 <b>Eskom</b>	<b>Standard</b>	<b>Technology</b>
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Title: **PROPOSAL FOR THE  
PURCHASE OF CABLE FAULT  
LOCATOR AND TEST  
EQUIPMENT FOR MV CABLES  
FROM 1KV UP TO AND  
INCLUDING 33KV**

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## **1. Introduction**

This specification has been prepared for the Eskom Distribution Gauteng Cluster (Gauteng Cluster Dx). It will be used by the Gauteng Cluster as a requirement guide when purchasing cable fault locator test equipment for PILC and XLPE-insulated medium voltage (MV) cables with nominal voltages from 1kV up to and including 33 kV.

## **2. Supporting clauses**

### **2.1 Scope**

This specification covers the Gauteng Cluster minimum requirements for the trailer-mounted cable fault locator test equipment that will be used on PILC and XLPE-insulated MV cables with nominal voltages from 1kV up to and including 33 kV for commissioning and maintenance purposes.

#### **2.1.1 Purpose**

This document has been compiled to provide technical requirements for purchasing cable fault locator test equipment, which includes a cable fault locator test set mounted on a trailer for testing PILC and XLPE-insulated MV cables with nominal voltages from 1kV up to and including 33 kV.

#### **2.1.2 Applicability**

This document shall apply for Eskom Holdings Limited (Distribution).

## **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, Quality Management Systems
- [2] SANS 60060-3, High-voltage test techniques Part 3: Definitions and requirements for on-site testing
- [3] IEEE Std 1234™-2007, IEEE Guide for Fault-Locating Techniques on Shielded Power Cable System
- [4] 240-56063805, LV Power and Control Cable with Rated Voltage Standard 600/1000V
- [5] 240-56063792, Specification for Medium Voltage XLPE and Impregnated Paper Insulated Cables Standard

### **2.2.2 Informative**

- [6] 32-9: Definition of Eskom documents.
- [7] 32-644: Eskom documentation management standard.
- [8] 474-65: Operating manual of the Steering Committee of Technologies (SCOT).

## **2.3 Definitions**

### **2.3.1 General**

Definition	Description
<b>Supplier/OEM</b>	Supplier or original equipment manufacturer
<b>Cable fault locator</b>	Test equipment used to locate faults on power cables

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### 2.3.2 Disclosure classification

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

## 2.4 Abbreviations

Abbreviation	Description
Dx	Distribution
LV	Low voltage
MV	Medium voltage
OEM	Original equipment manufacturer
Std.	Standard
SI	Standards Implementation
PD	Partial discharge
PILC	Paper insulated lead cables
PPM	Power Plant Maintenance
XLPE	Cross-linked polyethylene

## 2.5 Roles and responsibilities

All Eskom employees and/or appointed bodies involved in the procurement of the cable fault locator test equipment and/or the associated accessories shall ensure that the product meets the requirements of this specification. Any deviation from these requirements shall constitute a non-conformance unless it was in advance agreed to by a delegated specialist and is based on sound engineering judgement.

All suppliers/OEM of cable fault locator test equipment to Eskom must be conversant with the requirements of this standard and shall comply with the requirements. No deviations will be accepted, and suppliers shall ensure that they obtain clarity where required and obtain all supporting information or documents necessary to comply with this document.

## 2.6 Process for monitoring

A technical evaluation criteria document will be used for process monitoring as per Eskom requirements.

## 2.7 Related/supporting documents

Refer to clause 2.2.

## 3. Requirements

### 3.1 General requirements

The supplier/OEM shall be responsible for the design, manufacture and supply of the trailer-mounted cable fault locator test equipment for fault finding on MV power cables. The cable fault locator test equipment testing techniques and test voltages shall be in line with SANS 60060-3, international standard IEEE Std 1234™-2007 or any other relevant standard. The evaluation criteria on clause 7 will be used to evaluate the technical documentation submitted by tenderers. Each tenderer has to obtain a minimum score of 85% to qualify, any score below 85% will lead to immediate disqualification.

## **3.2 Operating environmental conditions**

The trailer mounted cable fault locator test set shall be able to function in the following operating environmental conditions:

Temperature	5 - 40°C
Humidity	20% to 80%
Altitude	up to 1500 meters
Terrain	Rough, off-road conditions
Rainfall	summer - severe thunderstorms

## **3.3 Cable fault locator test set**

The cable fault locator test set shall be used during commissioning and maintenance of the underground cables to perform the tests stipulated in the subsections below, at 220 -230V at 50Hz.

### **3.3.1 Cable fault finding**

The cable fault locator test set should be able to:

- Have 5kW inverter system with 4x100AH deep cycle batteries
- Inject voltages up to 32kV
- Pre-locate and provide the fault distance from the source.
- Pinpoint the fault. (eg. Ground microphones, Headphones, audio transmitter etc.)
- Pressure-test the cable after repairs.

## **4. Trailer**

The trailer shall be:

- Easily and securely attachable to any Eskom vehicle used during maintenance and/or commissioning
- Suitable for on-road and off-road conditions, due to cable routes that might deviate from normal roadways.
- Compliant with the South African Road Ordinance Act and shall be fitted with the latest approved Eskom Distribution Logos
- Supplied fully fitted with the cable fault locator test set

## **5. Additional information to be submitted by tenderer**

- The functionality and performance specification of each component of the trailer-mounted cable fault locator test set.
- Life span expectancy of the cable fault locator test set.
- Type of maintenance and intervals thereof
- Guarantees offered to Eskom with regards to the safe operation and maintenance of the cable fault locator test set
- List of utility references that have successfully used the cable fault locator test set

- Lead time from date of placement of order to have the cable fault locator test set delivered to Eskom– in weeks
- Warranty information of cable fault locator test equipment

## 6. Training

The supplier/OEM shall provide training on the supplied equipment operation by the OEM accredited instructors.

## 7. Evaluation criteria

Technical evaluation criteria for supply of a trailer-mounted cable fault locator test set		
TASK / MEASURE		
Criteria	Weighting	Score
The testing techniques using a cable fault locator test set are aligned with SANS 60060-3, IEEE Std 1234™-2007 and/or any other relevant standard	20	
The operating environmental conditions of the cable fault locator test set comply with the ones stipulated in this document	20	
The cable fault locator test set shall be able to perform cable fault finding as stipulated in section 3.3.1	20	
The trailer shall comply with requirements as stipulated in section 4	10	
The tenderer shall submit all the required additional information on this document	20	
The tenderer must confirm training to Eskom staff on how to use the test set.	10	
TOTAL		/100

## 8. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Stephen Nkwane	Manager: Standards Implementation (GOU)
Jabu Cele	Manager: Power Plant Maintenance (GOU)

## 9. Revisions

Date	Rev	Compiler	Remarks
June 2019	0	S Mtshaulana	New Document
June 2022	1	S Mtshaulana	Clause 1 and 2.1: Change GOU to Gauteng Cluster
			Clause 2.2.1: Amended normative references

Date	Rev	Compiler	Remarks
June 2019	0	S Mtshaulana	New Document
			Clause 3.1 & 7: Added an option of any other standard the test set can be aligned with
			Clause 6: Re-worded the training requirement
			Corrected the document title

## **10. Development team**

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

- Sandisiwe Mtshaulana: Engineer SI
- Phenny Bopape: Principal Engineering Assistant PPM

## **11. Acknowledgements**

The following PPM cables senior supervisors accepted the document.

- Jabu Cele Manager PPM
- Stephen Nkwane Manager SI