

 Eskom	Standard	Technology
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Title: **STANDARD FOR THE
CALIBRATION OF TEST
INSTRUMENTS USED BY FIELD
STAFF**

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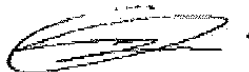
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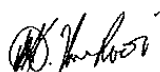


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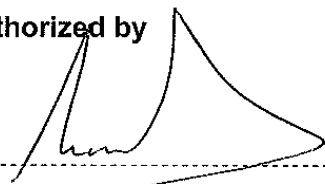


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Content

	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. Requirements	5
3.1 Rationale	5
3.2 Grouping of test instruments	5
3.3 Calibration interval policy	6
3.3.1 Group 1	6
3.3.2 Group 2	6
3.3.3 Group 3	6
3.4 “Abused” test equipment	6
3.5 Defective test equipment	7
3.6 Responsibilities	7
3.6.1 Regional engineering managers	7
3.6.2 Supervisors	7
3.6.3 Auditors	7
4. Authorization	7
5. Revisions	7
6. Development team	8
7. Acknowledgements	8
Annex A – Requirements for “Defective” sticker	9

Figures

Figure 1: Sample sticker	9
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1. Introduction

The document lists the requirements for the calibration of test instrument used by field staff in Eskom.

2. Supporting clauses

2.1 Scope

2.1.1 Purpose

This document defines the calibration interval for test instruments used by field staff in Eskom. The document furthermore defines the minimum requirements for the calibration/test facilities to be used to perform the calibrations on the test instruments.

2.1.2 Applicability

This standard is applicable to all test equipment used by field staff in Eskom.

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] Eskom DST 34-2151: *Standard List for Protection Technician Tools and Test Equipment*
- [3] Eskom 240-70732876: *Metering Technician Tools and Test Equipment Standard*

2.2.2 Informative

- [4] Eskom TESP0019: *Policy for the Calibration of Test Instruments Used in PMC*
- [5] ILAC-G24 Ed.2007: *Guidelines for the Determination of Calibration Intervals of Measuring Instruments*
- [6] SANS 61010-1:2011 *Safety requirements for electrical equipment for measurement, control, and laboratory, Part 1:General requirements*

2.3 Definitions

2.3.1 General

Definition	Description
accredited calibration/test facility	A laboratory that has been accredited by SANAS in accordance with SABS ISO/IEC 17025 or an internal Eskom calibration/test facility approved by the Eskom Calibration Care Group.
accuracy	The degree of closeness between a measured value and the true or nominal value
adjustment	The operation that is intended to reduce the differences between the values indicated by an instrument and the values realized by a reference standard to within a predetermined tolerance.

Definition	Description
calibration	The set of operations that establishes, under specified conditions, the relationship between the values indicated by a measuring system and the corresponding values of a quantity realized by a reference standard or a working standard.
calibration interval	A specified or designated period of time between calibration adjustments or verifications. During this interval the instrument should remain within specific performance levels, with a specified probability, under normal conditions of handling and use.
calibration sticker	A sticker affixed to an instrument that shows its calibration status. The sticker typically indicates the instrument's identification, who performed the last calibration and when, and the date of the next scheduled calibration.
degradation	A gradual reduction in an instrument's performance that proceeds until the instrument fails to meet its performance specifications.
drift	A slow variation over time in the performance of an instrument. In contrast to "degradation", the instrument may continue to operate within its performance specifications.
fixed instrument	Equipment fastened to a support, or otherwise secured in a specific location [IEC 60050-826:2004, 826-16-07, modified]
hand-held instrument	PORTABLE EQUIPMENT intended to be supported by one hand during NORMAL USE [SANS 61010-1, <i>modified</i>]
portable instrument	equipment intended to be carried by hand [SANS 61010-1, <i>modified</i>]
test instrument	This is an instrument which by electromagnetic means tests, measures, indicates or records one or more electrical or physical quantities, also non-measuring equipment such as signal generators, measurement standards, power supplies for laboratory use, transducers, transmitters, etc. Note: This includes <i>portable instruments</i> , <i>hand-held instruments</i> and <i>fixed instruments</i> [SANS 61010-1, <i>modified</i>]
traceability	A process whereby the indication of a measuring instrument can be compared, in one or more stages, with a national standard for the measurand in question.

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
ECS	Eskom calibration services
LPU	Large power users
SANAS	South African National Accreditation System
SPU	Small power users

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2.5 Roles and responsibilities

Implementing of this document is the responsibility of field staff.

2.6 Process for monitoring

Routine inspections.

2.7 Related/supporting documents

This document replaces DPL 34-681.

3. Requirements

No test and/or measurement instrument shall be used for test and/or measurement purposes, if its calibration status is unknown, or if the calibration has expired, as the accuracy of its results could be compromised if the equipment is not properly calibrated and the safety of the equipment may be impaired.

The calibration status of all test and/or measurement instrument(s) must be verified prior to use of such equipment.

3.1 Rationale

Field staff in Eskom use a wide range of test instruments during installation, commissioning and maintenance.

These test instruments are used to set up extremely vital and complex systems and mal-operation of such systems can have catastrophic consequences.

For a test or measurement to be legitimate, the test instruments need to be calibrated by an accredited calibration/test facility.

Some advantages of calibration are:

- Traceability to national standards is ensured.
- The accuracy of the test instrument is confirmed/restored.
- Degradation and drift are detected.
- The general condition of the test instrument is reported on and a recommendation as to the continued safe use of the instrument is made.
- Calibrated test instruments give field staff confidence in the measurements that they make.
- A calibration sticker, indicating the test instrument's calibration status, is affixed to the test instrument.
- Measurements made with non-calibrated test instruments will not be accepted by a court of law.

3.2 Grouping of test instruments

Test instruments are used by numerous sections within Eskom and in order to specify calibration intervals it is required to group test instruments based on the application of the test instruments and the criticality of the measurements.

Name of Group	Description	Examples of Test Instruments in Group
Group 1	These test instruments shall be classed as instruments used on power plant in live conditions. These instruments are generally used by field services staff to determine for example the presence and level of voltages and/or currents.	HV ammeter, etc.
Group 2	These test instruments shall be classed as instruments used to determine the accuracy of metering equipment. These instruments are generally used by Metering field staff verifying LPU, Transmission and Generation metering equipment and field services staff verifying accuracy of SPU and prepayment meters.	Meter reference standards, meter accuracy verification unit, etc.
Group 3	These test instruments shall be classed as instruments used by staff to test the operation of equipment.	Digital multi-meter, AC current clamp, etc.

3.3 Calibration interval policy

The following calibration intervals shall be supplemented by regular safety and functional checks. Such checks shall be conducted and recorded at least every two months.

The safety and functional checks shall be conducted according to the test instruments' operation manuals. Where such manuals are unavailable or are available but do not cover safety and functional checks, the responsible person shall consult with the test instrument's manufacturer to determine the nature of safety and functional checks that should be conducted.

3.3.1 Group 1

All test instruments shall be withdrawn from service and shall be returned to an accredited calibration/test facility for calibration once a year (annually).

3.3.2 Group 2

All test instruments shall be withdrawn from service and shall be returned to an accredited calibration/test facility for calibration once a year (annually)..

3.3.3 Group 3

All test instruments shall be withdrawn from service and shall be returned to an accredited calibration/test facility for calibration once every two years.

3.4 "Abused" test equipment

Test instruments are sometimes accidentally "abused". Examples are when over-voltages or over-currents are applied or when an instrument is dropped. In many instances the instrument will still appear to function normally, but may be producing wrong readings/outputs.

Field Staff shall report incidents, involving test instruments, which may have an influence on the operation of the instruments. Such instruments shall immediately be withdrawn from service and shall be returned to an accredited calibration/test facility for re-certification.

3.5 Defective test equipment

A "Defective" sticker as described in Annex A shall be attached to defective instruments by the accredited calibration/test facility before returning such equipment back to their owners.

3.6 Responsibilities

3.6.1 Regional engineering managers

Regional Engineering Managers shall be responsible for the implementation of 3.3, 3.4 and 3.5.

3.6.2 Supervisors

All supervisors shall perform regular inspections to determine the general state and the validity of calibration of test instruments. Such inspections shall be made at least every two months.

3.6.3 Auditors

Verification of the implementation of paragraphs 3.3, 3.4 and 3.5 shall be included in audits.

4. Authorization

This document has been seen and accepted by:

Name and surname	Designation
M van Rensburg	Senior Manager (Transmission)
S Mkhabela	Senior Manager (Distribution)

5. Revisions

Date	Rev.	Compiled By:	Clause	Remarks
Aug 2018	2	KS Papi	1 2.2 2.3.1 3 3.2 3.3	Changed word <i>equipment</i> to <i>instrument</i> Added new references Added new definitions Modified text for clarity Replaced text with table and added example instruments Added text to mandate safety/functional checks
Feb 2015	1	HPD Groenewald	- 3. 3.5	New number allocated to document 240-76624513 Added requirements on instruments without calibration stickers. Added paragraph 3.5 on defective equipment.

Date	Rev.	Compiled By:	Clause	Remarks
Feb 2010	0	JA Knoetzen		Document reformatted and new reference number issued, changed from DISPBABB9 to 34-681
				The requirements of DISPBABB9 and SCSASAAY5 have been combined into this policy
			3.2	New paragraphs added for grouping of test instrument requirements
			3.3	Calibration interval policy is broken up into 3 groups
			3.4	Requirements amended on "abused" equipment
			3.5	Responsibilities stated for engineering managers, supervisors and auditors

6. Development team

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7. Acknowledgements

Not applicable.

Annex A – Requirements for “Defective” sticker

Requirements for “Defective” sticker

- It shall be a polyurethane, permanent sticker.
- Printing shall be red on a white background.
- The size of the sticker shall be 45mm long and 10mm wide.
- The printing on the sticker shall use Bold Arial font, size 20 and all in capital letters - see sample.
- The letter spacing shall be as shown in the sample.

DEFECTIVE

Figure 1: Sample sticker

Instructions for the use of the sticker

- The sticker shall be applied to the display of the instrument by the person responsible.