	<b>Work Instruction</b>	<b>NTCSA/System Operator/Telecommunications</b>
-----------------------------------------------------------------------------------	-------------------------	-------------------------------------------------

Title: **Calibration Work Instruction for Test Equipment**

Document Identifier: **240-137859000**

Alternative Reference Number: **ETPR0719**

Area of Applicability: **Telecommunications**




Functional Area: **Telecommunications**

Revision: **6**

Total Pages: **11**

Next Review Date: **10 2028**

Disclosure Classification: **Controlled Disclosure**

Compiled by	Functional Responsibility	Authorized by
		
<b>Vernon Soobramoney</b>	<b>Bheki Nala</b>	<b>Alison Maseko</b>
<b>Senior Supervisor: Mkondeni</b>	<b>Regional Manager: Eastern Region</b>	<b>Senior Manager: Telecommunications</b>
Date: 30.09.2025	Date: 30/09/2025	Date: 30/09/2025

## Content

	Page
1. Introduction.....	3
2. Supporting Clauses .....	3
2.1 Scope .....	3
2.1.1 Purpose .....	3
2.1.2 Applicability .....	3
2.1.3 Effective date.....	3
2.2 Normative/Informative References .....	3
2.2.1 Normative .....	3
2.2.2 Informative.....	3
2.3 Definitions.....	4
2.4 Abbreviations.....	4
2.5 Roles and Responsibilities.....	4
2.6 Process for Monitoring.....	5
2.7 Related/Supporting Documents .....	6
3. Document Content.....	6
3.1 Principles for Calibration / Verification .....	6
3.2 Calibration Frequency.....	6
3.3 Equipment Status.....	8
3.4 When Calibration Should be done.....	9
3.5 Process for Calibration.....	9
3.6 Equipment for Calibration.....	10
3.7 Records for Calibration .....	10
4. Acceptance.....	11
5. Revisions .....	11
6. Development Team .....	11
7. Acknowledgements.....	11

**CONTROLLED DISCLOSURE**

## **1. Introduction**

Telecommunications makes use of a large variety of test instruments which are used for Network and Equipment maintenance. To achieve accurate readings from such test instruments, it is essential that test equipment as specified in Document 240-133822009, be calibrated on a defined basis. This procedure is to ensure that tests are done with calibrated equipment and that the equipment is fit for service.

## **2. Supporting Clauses**

### **2.1 Scope**

This document covers procedures to be followed, to ensure the regular calibration of test equipment.

#### **2.1.1 Purpose**

The purpose of this document is to provide a procedure to Telecommunications' personnel to ensure that the equipment used for testing is calibrated and that the calibration is valid.

#### **2.1.2 Applicability**

This Document shall apply throughout Telecommunications Department

#### **2.1.3 Effective date**

The Implementation of the changes in this Work Instruction will be effective as of 01 October 2025

## **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

### **2.2.2 Informative**

[2] 240-123858542 Telecommunications Calibration Register for Test Equipment

[3] 240-133822009 Telecommunications list of Test Equipment to be calibrated

[4] General Accreditation Guidance - ISO/IEC 17025:2018

**CONTROLLED DISCLOSURE**

## 2.3 Definitions

- 2.3.1 Critical test instruments - are those test instruments which are used in Telecoms for which the measurement values are required to be precise and within defined tolerances, if these instruments deviate from the required measured value, it can compromise the network integrity / performance. To obtain precise measurements these instruments will require more frequent calibration intervals (as defined in section 3.2 of this document)
- 2.3.2 Non-Critical test instruments - are test instruments which are used in Telecoms, but the measurement values are not critical (the values are not required to be precise), a deviation from the required measured value will not compromise the network integrity. Such instruments will require less frequent calibration intervals (as defined in section 3.2 of this document)
- 2.3.3 Calibration Interval - The period over which there is an estimated high probability that the performance of the instrument will remain within the desired specification.
- 2.3.4 Comparison of Test Results – is the process where an instrument of unknown measurement accuracy can be compared against a calibrated unit or a known reference, such as the Operating Manual for that instrument

## 2.4 Abbreviations

Abbreviation	Explanation
RF	Radio Frequency
NMC	Network Management Centre
SHEQ	Safety, Health, Environmental, Quality
FS	Field Services
SANAS	South African National Accreditation System
OEM	Original Equipment Manufacturer

## 2.5 Roles and Responsibilities

- 2.5.1 The Contracts Manager is responsible for setting up an enabling contract with a Service Provider which will be performing calibration on Telecommunications equipment. The Service Provider must be SANAS (or equivalent) accredited for all the equipment listed on 240-133822009, as requiring SANAS accreditation. Equipment for which the results cannot be SANAS accredited, must be traceable to a national / international standard to ensure that the results are reliable. The Certificate must indicate whether the results are Accredited or Traceable, and what the Standard is that they are traceable to.

**CONTROLLED DISCLOSURE**

- 2.5.2 Senior Supervisors are responsible for identifying equipment which requires Calibration and create the purchase request to draw off the enabling contract, where Calibration is required.
- 2.5.3 Unless otherwise specified, the cost of "Calibration" does not include "Repair" to any instruments. It is the responsibility of the person sending in the instrument to first verify the working status of such equipment. If the equipment is faulty, then it needs to be repaired first before calibration, and that would be a separate cost. Please refer to the Calibration Contract to check if repair to instruments is catered for, and if not, then the relevant Service Provider must be contacted first to provide a quotation to repair the instrument.
- 2.5.4 Whenever new equipment is purchased, the Senior Supervisor must confirm with the Supplier at the time of purchase, whether the instruments being purchased will require calibration, AND, if calibration is required then the Calibration Interval must be specified / recommended by the Manufacturer. This must be done in writing from the Supplier, and a record of this maintained by the Service Centre for audit purposes
- 2.5.5 The Field Services section is responsible for the packaging and despatch of the relevant test equipment to the Supplier, and for the receipt of such equipment.
- 2.5.6 Senior Supervisors are to ensure that a Calibration Register (240-123858542) is maintained together with calibration certificates, within the section's SHEQ file. The calibration certificates will indicate the pre and post results and what adjustments (if any) were made to the equipment. These records will assist in determining the historic measurement stability / drift of the test equipment
- 2.5.7 All Telecoms personnel who make use of test instruments are to ensure that such instruments are always well maintained, stored, and transported safely and with due care, that they possess the relevant skills in the use of such equipment and are to comply with this procedure to ensure the timeous calibration, to keep equipment well maintained. Compliance to the above requirement will improve the longevity of the calibration intervals of test equipment

## **2.6 Process for Monitoring**

- 2.6.1 Senior Supervisors are to ensure that the correct Procurement Processes are followed, and that Suppliers comply to agreed-upon lead times as per the enabling contract
- 2.6.2 Refer to Calibration Register (240-123858542) for equipment status.

**CONTROLLED DISCLOSURE**

## 2.7 Related/Supporting Documents

- 240-133822009 Telecommunications List of Test Equipment to be calibrated
- 240-123858542 Telecommunications Calibration Register for Test Equipment

## 3. Document Content

### 3.1 Principles for Calibration /

To instil confidence that Telecoms test instruments do produce accurate measurements, all Telecoms equipment listed on 240-133822009, will be calibrated, based on the criticality of its use.

Test equipment will fall into 2 categories namely **Critical** and **Non-Critical** Test Equipment and the calibration intervals will be based on these categories.

It is important to note that the determination of Critical versus Non- Critical equipment and their corresponding calibration intervals in this document (and on the List of Test Equipment 240-133822009) are based on the general Telecoms work environment. Some Service Centres in Telecoms (eg the DC Specialist section) perform specialised work where the measurement requirements are more stringent. In these cases, that Service Centre needs to categorise the equipment accordingly on their Calibration Register and apply the relevant calibration intervals as per this document

### 3.2 Calibration Frequency

As per ISO/IEC 17025:2005 (now 2018 ed 3 section 7.8.4.3) - Calibration Laboratories are not permitted to include any recommendation on the calibration interval unless this is agreed to by the customer or is a legal requirement.

***Calibration Frequency, will, by default, be based on the OEM Recommendation.*** Where proof of such recommendation is available, then this recommended frequency will supersede any other stated frequency in this work instruction. Where proof of OEM recommendation is not available, then the process listed below (3.2.1) will be used to determine calibration frequency.

Note that different Manufacturers (even for same type of equipment) will recommend different calibration intervals. Since Telecoms makes use of a variety of test instruments from various manufacturers, the onus lies with the Service Centre (End Users) to keep records of the specific equipment in use. It is therefore also vital that the End User acquire, in writing, the OEM recommendation for calibration frequency, where possible. All new equipment purchased should be accompanied with this recommendation.

**CONTROLLED DISCLOSURE**

**3.2.1 The calibration frequency of test equipment will be categorised as per the table below**

Category 1	Annually	<p><b>Critical equipment</b> for which:</p> <p>a) There are no previous calibration records to provide confidence in the measurement accuracy to justify a longer calibration interval AND</p> <p>b) There is no documented proof of OEM recommendation for calibration frequency</p>	<p>Such equipment will be calibrated annually for the first 3 years to analyse the "stability" of measurement values. Should there no signs of drift as per the "before and after" results on the calibration certificates, then the calibration interval will be extended to 3 years. Should there be excessive drift as per calibration results, then consideration must be given toward decreasing the calibration interval.</p>
Category 2	3 Yearly	<p><b>Critical equipment</b> for which:</p> <p>a) There is no documented proof of OEM recommendation for calibration frequency BUT</p> <p>b) Confidence HAS been established in measurement stability through previous calibration records. Other factors which have led to this determination are listed in 3.2.2.1 on this document</p>	<p>Such equipment will be calibrated every 3 years. A recommendation to further satisfy oneself of the measurement accuracy is to compare the instrument against one which has been recently calibrated, or against a known reference, such as the Operating Manual</p>
Category 3	5 Yearly	<p><b>NON - Critical equipment</b> where the risk of uncertainty will not compromise or affect the network integrity. Factors which have led to the 5-year determination are listed in 3.2.2.2 on this document</p>	<p>Such equipment will be calibrated every 5 years.</p>

**CONTROLLED DISCLOSURE**

## Factors contributing to the determination of calibration intervals

### 3.2.2.1 Critical Equipment

- Confidence in stability - Past Calibration History will determine the confidence in stability
- Storage and Transportation – Equipment will be stored and transported in a safe and stable environment which is not subjected to extremes such as temperature, vibrations, dust, rain, etc.
- Risk of damage or misuse – Eskom technicians are skilled in the use of test equipment hence the risk of damage or misuse is minimised
- Rising Cost of calibration – cannot be ignored in determining calibration intervals.
- Accuracy of measurement sought – inaccurate measurements could compromise network performance
- Regular comparison of measurements to similar equipment of known calibration – will assist in providing regular authentication on the status of the equipment stability.

### 3.2.2.2 Non-Critical Equipment

- Confidence in stability – Not a requirement, such test equipment is not network-affecting.
- Storage and Transportation – Equipment will be stored and transported in a safe and stable environment which is not subjected to extremes such as temperature, vibrations, dust, rain, etc.
- Risk of damage or misuse – Technicians are skilled (or should be adequately skilled) in the use of test equipment hence the risk of damage or misuse is minimised
- Rising Cost of calibration – cannot be ignored in determining calibration intervals.
- Accuracy of measurement sought – inaccurate measurements will not compromise the network stability, the risk to the network of measurement inaccuracy is very low.
- Regular comparison of measurements to similar equipment of known calibration – will assist in providing regular authentication on the status of the equipment stability.

## 3.3 Equipment Status

3.2.1 The calibration status of all test equipment must be known prior to use of such equipment.

3.2.2 The calibration status of equipment can be checked by one of the following two systems:

- Checking on the test equipment for a calibration sticker, which should provide details of company which last performed calibration, the serial number of the equipment and the date last calibrated.
- Referring to the calibration register or the calibration certificate for such equipment, which should also contain all the above details, and which should be made available in a SHEQ register.

3.2.3 Test equipment should not be used to do tests / measurements if the calibration status is unknown, or if the calibration has expired, as the accuracy of the test results could be compromised if a test instrument is not properly calibrated.

**CONTROLLED DISCLOSURE**

### 3.4 When should Calibration be done?

#### Calibration will be done in the following instances:

- 3.4.1 When the calibration status of the test equipment is not known, and details are not available to verify when calibration was last done.
- 3.4.2 When re-calibration is due, calibration will be performed as per the frequency guidelines outlined in section 3.2 of this document. These details must always remain up to date in the calibration register.
- 3.4.3 Whenever a repair has been carried out on the instrument, the equipment must be re-calibrated, unless such repair would not have affected the calibration.
- 3.4.4 When a comparison of the instrument to another instrument of known calibration has proven that the results fall outside of the operating parameters
- 3.4.5 When the instrument has been exposed to extremes, such as temperature extremes, overloading (e.g. RF power overloading), physical impact (e.g. vibration / dropping instrument). If the user becomes aware that the instrument has been exposed to such extremes, then the instrument readings should be **compared** with another test instrument of known calibration. Should it be determined that the instrument is out of calibration, then such instrument will be taken out of service, until it has been re-calibrated.
- 3.4.6 At any time when the instrument does not produce accurate results. If unsure, this can often be compared with another test instrument of known calibration.

### 3.5 Process for Calibration

Once it has been verified that a test instrument is due for calibration (after having verified that there are no faults on such instrument), the following process must be followed, to have the instrument calibrated:

- 3.5.1 Create a Purchase Order by drawing off the Enabling Contract in place.
- 3.5.2 Equipment is to be packaged for dispatch by the FS Centre. Great care must be taken when packaging equipment – packaging must be of such a nature, to absorb high impact. The equipment is to be safely packaged, by using bubble-wrap, polystyrene or similar, to safeguard against physical damage and possible damage in transit.
- 3.5.3 Equipment must then be couriered directly from the FS centre to the relevant Service Provider, or by using any other approved method of transport.
- 3.5.4 Unless otherwise stated on the contract, the lead time for calibration only, will be no more than 15 Working days from the date received by the Service Provider to the date dispatched by them, and will not include courier delays. This lead time refers to calibration only and not fault repair, which will be quoted on separately.

**CONTROLLED DISCLOSURE**

- 3.5.5 Upon completion of the calibration, the instrument will be returned directly to the FS centre together with a calibration certificate from the service provider. The certificate shall bear the mark of a SANAS (or equivalent) accredited calibration centre for all the equipment listed on 240-133822009, as requiring SANAS accreditation. Equipment for which the results cannot be SANAS accredited, must be traceable to an international standard to ensure that the results are reliable. The Certificate must indicate whether the results are Accredited or Traceable, and what the Standard is that they are traceable to.
- 3.5.6 A report of calibration results shall be returned by the Service Provider indicating both pre and post calibration results.

### **3.6 Equipment for Calibration**

- 3.6.1 All test equipment which will require regular calibration will be listed on each FS Center's Calibration Register in accordance with 240-133822009.
- 3.6.2 All equipment which is due for calibration / re-calibration must be identified timeously (before expiry) and sent in for calibration.
- 3.6.3 All test equipment for which the measurements have been proven to fall outside of the recommended operating parameters of the User Manual, must be sent in for calibration.
- 3.6.4 Equipment which is listed as "non-Critical" but which require more regular calibration because of the specific nature of the tests being performed, needs to be listed as a "Critical" test equipment for that particular Service Center and must be sent in for calibration accordingly. e.g. Multi-meters for the DC Specialist section, where precise measurements are required due to the nature of their work.

### **3.7 Calibration Records**

- 3.7.1 A **Calibration Register (240-123858542)**, which lists all the Service Centre's test equipment and details required for calibration must be maintained by all FS centers, and must form part of the SHEQ file
- 3.7.2 All calibration certificates from the service provider must also be maintained together with the calibration register.
- 3.7.3 Optional - A label / sticker (from the Service Provider) affixed on test equipment showing the status and validity of the calibration of that equipment.
- 3.7.4 Calibration records will be kept (in the SHEQ file) for the life span of the equipment

**CONTROLLED DISCLOSURE**

#### 4. Acceptance

This document has been seen and accepted by:

<u>Name</u>	<u>Designation</u>
Alison Maseko	Senior Manager: Eskom Telecommunications
Mfundiso Hina	Manager: NPAE
Zane Hassen	Regional Manager: Western Region
Petros Masoka	Regional Manager: Northern Region
Bheki Nala	Regional Manager: Eastern Region
Mark Ganesan	Regional Manager: Central Region
Nompumelelo Khumalo	Manager: Business Architecture
Craig Pitt	Manager: SHEQS
Unathi Dyantyi	Manager: Network Management Centre
Muzi Mlangeni	Manager: Customer Service Management

#### 5. Revisions

<b>Date</b>	<b>Rev.</b>	<b>Compiler</b>	<b>Remarks</b>
August 2025	6	V. Soobramoney	Due for revision
July 2022	5	V. Soobramoney	Due for Revision
January 2019	4	V. Soobramoney	Due for Revision. Redefined Calibration Intervals
November 2014	3	V. Soobramoney	Re-defined list of Critical Instruments
November 2013	2	V. Soobramoney	Defined equipment for Calibration
November 2011	1	V. Soobramoney	Due for Revision

#### 6. Development Team

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

- V. Soobramoney – Senior Supervisor (Mkondeni)

**CONTROLLED DISCLOSURE**