



IECEE OPERATIONAL DOCUMENT

IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components (IECEE System)

Committee of Testing Laboratories (CTL)

Requirements for Traceability of Calibrations and Calibration Intervals



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FOREWORD

Document Owner

CTL WG1 “Metrology and Accuracy/Uncertainty”

History of changes

Date	Brief summary of changes
2018-06-03	Changes are editorial: replaced “Background” with “Foreword”, updated note on page 4 under Section 8.2 from DSH 251 to OD 5014, corrected paragraph references in the Annex A flowchart (6.3 to 8.25, 6.2.1 to 8.2.1), changed numbering of paragraph 8.3 to 8.2.5 to clarify it is part of section 8.2, provided a copy of the document in MS Word format

Effective date	Next maintenance due date Target revision date
201 9 ⁸ -06- 30 ⁰³	2021-06- 30 ⁰³

1 Purpose

The purpose of this document is to establish uniform requirements for traceability of calibrations and calibration intervals to help ensure consistent and repeatable test results.

2 Scope

The requirements contained in this document apply to laboratory equipment required to be calibrated under the requirements of ISO/IEC 17025. These requirements do not apply to chemical testing.

3 Normative References

The following publication contains provisions which, through reference in this text, constitute modification or additions of this Operational Document.

ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
NCSL recommended practice RP-1 2010	Calibration Intervals
ILAC-G24 2007	Guidelines for the determination of calibration intervals of measuring instruments

4 Definitions

For the purpose of this publication, the definitions of IECEE Definitions apply with the following additions:

None

5 Abbreviations

None

6 Responsibility of the laboratory

The laboratory shall have procedures in place to ensure that the requirements for traceability of calibrations and calibration intervals are met.

7 General

Requirements given in this document are to be followed to help ensure test consistency and repeatability.

8 Requirements

8.1 Traceability of Calibrations

8.1.1 Calibrations shall be regarded as being traceable if the calibrations are done by following the requirements of ISO/IEC 17025, "General requirements for the competence of testing and calibration laboratories", and by one of the following:

- a) The instrument was calibrated by a National Metrology Institute.
- b) The instrument was calibrated by an ISO/IEC 17025 accredited calibration laboratory.
- c) The instrument was calibrated by an internal or external calibration laboratory assessed on an annual basis, by the CBTL, NCB or responsible department within the CBTL or NCB, and found to comply with the requirements of ISO/IEC 17025. The assessments shall be conducted by a qualified ISO/IEC 17025 assessor or metrologist.

An external calibration laboratory that is not accredited should only be used in the event that an accredited calibration laboratory is not available or practical to use.

For specialized instruments where no accredited calibration laboratory is available, the instrument may be calibrated by the instrument manufacturer provided that the calibration standards used are traceable to national or international units of measurement, the traceability chain is identified and an estimation of uncertainty of measurement is included on the calibration certificate.

8.1.2 Calibrations shall be made by an unbroken chain of comparisons to:

- a) Units of measure of The International System of Units (SI).
- b) Fundamental physical constants.
- c) Certified Reference Materials, in the event that (a) and (b) do not exist for the measurement property.

8.2 Calibration Intervals for Test Equipment Requiring Calibration

8.2.1 All test equipment requiring calibration shall undergo an initial calibration before being put into service. The initial calibration period shall be of a nominal maximum period as follows:

- a) One year for electrical, electronic and mechanical test equipment.
- b) Three years for mechanical test equipment made of solid materials not subject to deterioration.
- c) As recommended by the manufacturer of the instrument.

Thereafter, the maximum calibration interval applied shall be appropriate to assure that the accuracy of the equipment remains within the specifications stated by the laboratory.

Assigned calibration intervals shall consider, as a minimum, the past calibration results, the environmental conditions and handling to which the equipment is exposed. Reduction of calibration intervals shall be made, when necessary so equipment is maintained within the accuracies indicated by the laboratory.

Laboratories having well established and documented procedures for the adjustment of calibration intervals for test devices may continue to operate according to these procedures. The laboratory may establish the limits within the maximum equipment tolerance specification to determine whether to extend the calibration interval of test equipment based on historical calibration data. Refer to "X" limit in Annex A.

Note: Refer to [IECEE-CTL-254-IECEE OD 5014](#) regarding default test equipment accuracies

8.2.2 Test equipment that is "fail safe" in that failure would be evident to a user (with laboratory procedures requiring the user to check the equipment before use) may be put on the status of "Initial Calibration Only" (ICO). *Periodic inspections shall be performed to determine the condition of equipment placed on ICO status.* Examples of the equipment that can be placed on ICO status are: steel rules, tape measures, weights 4,5 kg or more calibrated to +/-1% tolerance, single piece steel probes greater than or equal to 3 mm diameter with blunt ends, graduate cylinder, thermometers, steel impact balls, steel or plastic probes with no moving parts and sufficient structural integrity so as to not deform.

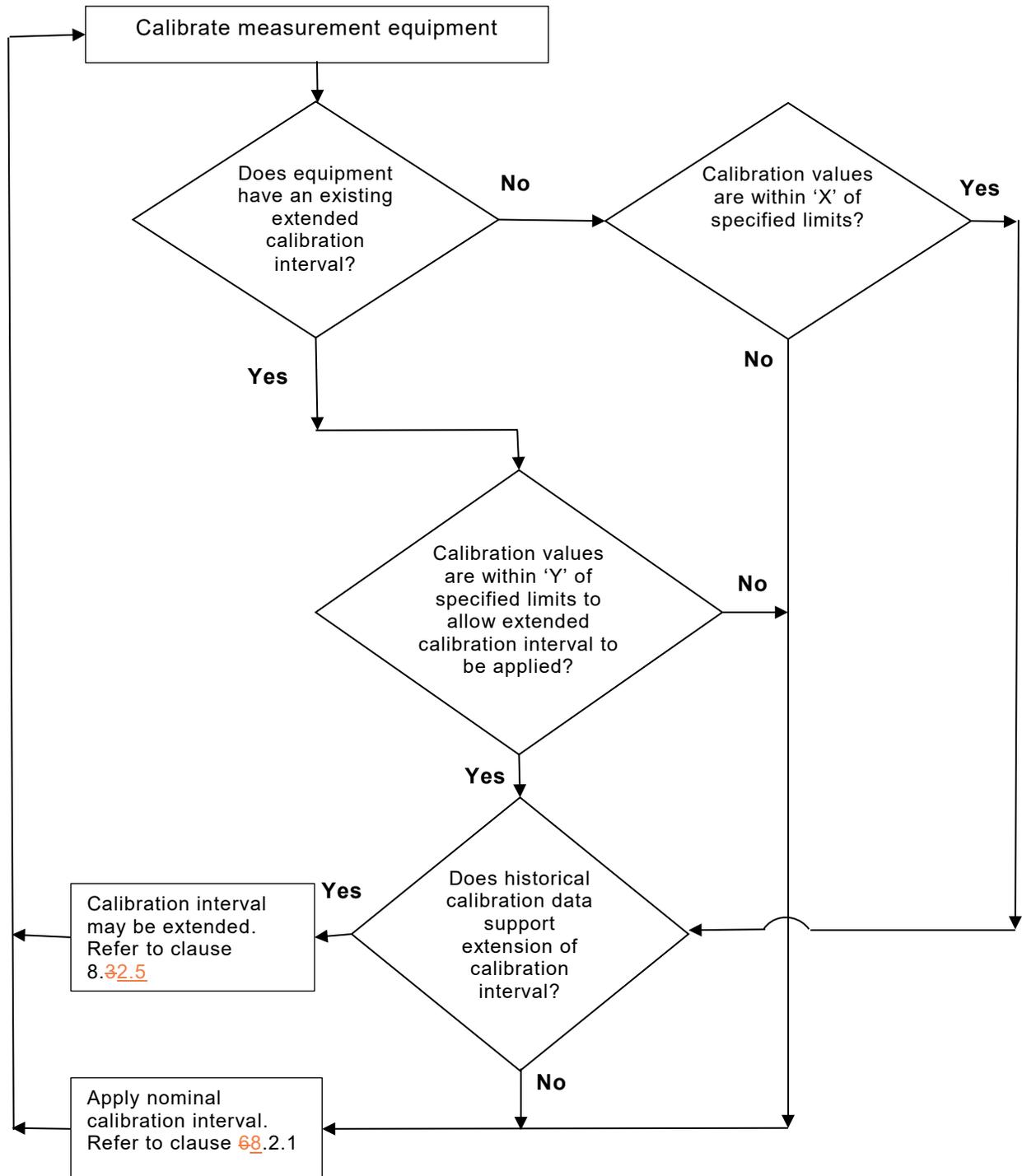
8.2.3 Weights do not need to be calibrated if verified with a calibrated scale (balance) before each use. The verification must be documented.

8.2.4 Infrequently used test equipment may be assigned the status of "calibrate before use" instead of a periodic calibration.

8.2.5 Calibration intervals may be extended when there is sufficient data from prior calibrations to assure that the instrument will continue to maintain the stated accuracies over the extended calibration interval. It is recommended that the extension of calibration intervals not be more than 50% of the prior

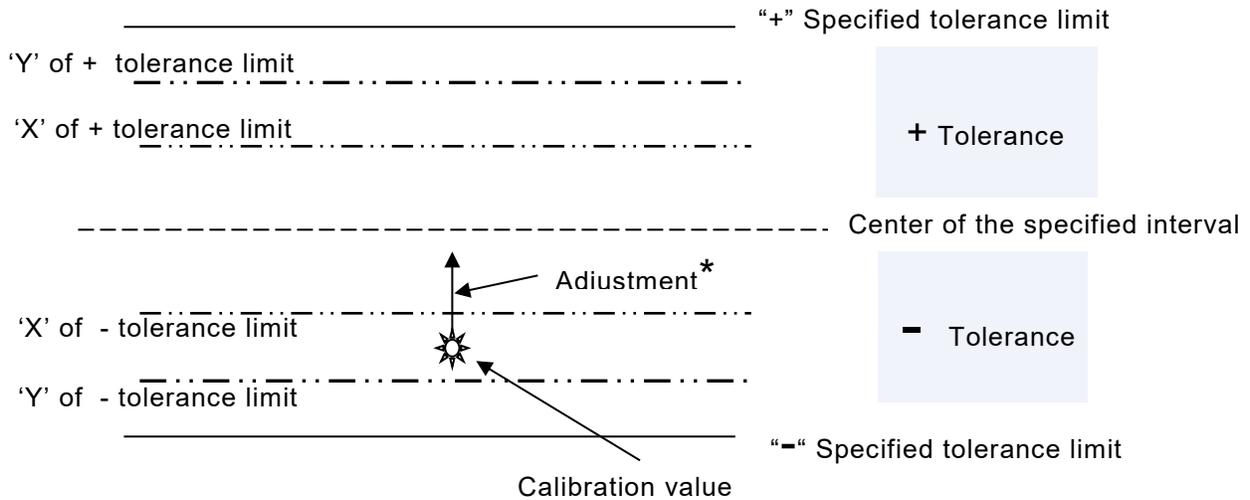
calibration interval. Historical calibration data may be used to support longer calibration intervals where stability of the instrument is demonstrated. Risks associated with the extension of calibration intervals shall be considered with regard to test results and the ability to review all work affected by nonconforming equipment. As a minimum, influences due to the frequency of equipment use, the environment in which the equipment is used and the effects of transporting equipment shall be considered. The laboratory may establish the limits within the maximum equipment tolerance specification to determine whether to continue application of an extended calibration interval based on historical calibration data. Refer to the “Y” limit in Annex A.

Annex A - Calibration Interval Extension Example (informative)

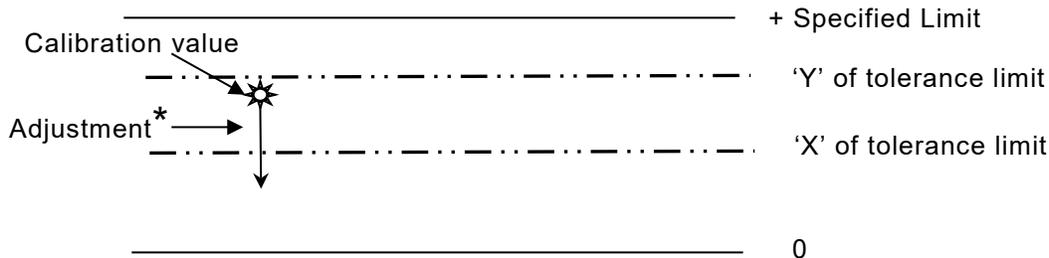


Calibration data obtained from the nominal calibration intervals of equipment that has been in use by the lab provides an indication that all calibrated parameters are found to remain within 'X' tolerance limits. Extended calibration intervals may be applied and continued when calibrations carried out at the end of the extended calibration interval continue to indicate that all calibrated parameters are found within 'Y' tolerance limits. For example, 'X' of the specified limit is used to determine whether to extend the calibration interval for equipment that has been recalibrated. 'Y' of the specified limit is used to determine whether to continue the application of an extended calibration interval. These values may be integers, percentages, etc.

Symmetrical specification



Asymmetrical specification



*The need for adjustment of the equipment is determined by the equipment owner

The above figures refer to values allocated with a tolerance, i.e., gauges, probes, specified amperage values etc. When considering the calibration of instruments, the word 'accuracy' is relevant.

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