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CALIBRATION

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Abstract:
This document describes calibration procedures.

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REVISION LOG

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DOCUMENT CHANGE RECORD

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1.0 PURPOSE

This document defines the procedures necessary for calibration of measuring equipment.

2.0 THEORY

Measurement results are only valid when M&TE of known accuracy is used. This calibration procedure ensures M&TE is properly verified for accuracy against known standards. Measurement devices that are used to indicate process feedback are not subject to calibration, such as short-circuit or open-circuit, hot or cold, off or on, etc; however, when a measurement device is used to determine conformance to a Customer requirement, then the device should be properly verified for accuracy.

3.0 DEFINITIONS

- Accuracy Ratio
- Adequacy
- Calibration:
- Gages
- Inspection Aid
- M&TE
- Procurement of M&TE
- Recall
- Significantly out-of-tolerance
- Special Equipment
- Standards

4.0 GENERAL CALIBRATION PROCEDURE

4.1 Calibration is performed by

4.2 Measuring instruments are calibrated at a temperature of and relative humidity. Sufficient temperature stabilization time is allowed before calibration. For cases where calibration must be conducted in the production area,

4.3 A number is issued when a gage does not provide its own serial number.

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4.4 All M&TE are kept clean and when not in use are [redacted]

4.5 A ***Recall Log*** is maintained on all M&TE and standards. The log provides [redacted]

4.6 The number of items scheduled for monthly recertification is [redacted]

4.7 In addition to the ***Recall Log***, a ***Calibration Report*** is kept on each Company-owned gage/standard. The purpose of this report is to [redacted]

4.8 Calibration intervals may be established based on one or more of the following criteria: [redacted]

4.9 Adjustable M&TE is periodically recalibrated based upon [redacted]

TABLE I, Calibration Intervals

Calibration Cycle	Recalibration Cycles to Qualify for New Calibration Cycle	New Calibration Cycle
Annual	[redacted]	[redacted]
Bi-Annual	[redacted]	[redacted]
3 - 4 Years	[redacted]	[redacted]
5 Years	[redacted]	[redacted]

4.10 Interval Adjustment: M&TE whose calibration error is recorded as being greater than the last recorded calibration error but not significantly out of tolerance [redacted]

4.11 M&TE calibration intervals may be extended or adjusted [redacted]

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[redacted]

4.12 Overdue items should be [redacted]

4.13 A calibration sticker is used to identify individual items of M&TE. The sticker displays [redacted]

4.14 Calibration Standards/Special Equipment

The following is the position of the National Conference of Standards Laboratories (NCSL):

[redacted]

Calibration of standards/special equipment is conducted by checking against laboratory standards available at outside laboratories. Approved calibration laboratories are listed in the ***Approved Suppliers List***.

When calibrations are made for standards/special equipment, the calibration lab is required to submit a report that contains, as appropriate:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]s.
- [redacted]
- [redacted]

4.15 A calibration record and recall log is maintained on all Transfer Standards, indicating [redacted]

4.16 The calibration department places all Customer furnished inspection gages in the calibration system unless [redacted]

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4.17 Traceability: Inspection work instructions and manufacturing travelers specify measurement and test equipment utilized for product conformance inspection.
When specified, [redacted]

4.18 Non-Calibrated M&TE: Upon request, non-calibrated M&TE may be submitted for calibration. Non-calibrated measurement devices may [redacted] under the following conditions:

1) [redacted]
2) [redacted]

A non-calibrated measurement device that is verified accurate [redacted]

4.19 Calibration Not Required M&TE: [redacted] are exempt from calibration; however, [redacted]

4.20 Calibration Not Required M&TE

4.20.1 [redacted] is exempt from calibration, such as but not limited to [redacted]

4.20.2 [redacted] are exempt from calibration, such as but not limited to [redacted]

4.20.3 [redacted] are exempt from calibration, such as but not limited to [redacted]

4.20.4 [redacted] are exempt from shelf life control. NIST traceability is not required for [redacted]

4.20.5 [redacted] are exempt from calibration; however, [redacted]

4.20.6 [redacted] are exempt from calibration; however, [redacted]

4.21 Employee Owned Tools: Personal tooling or gages owned by employees are calibrated prior to use and are placed on a calibration schedule.

4.22 Storage and Handling of M&TE: [redacted]

4.23 M&TE requiring transportation to a calibration laboratory is [redacted]

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4.24 M&TE storage areas are [redacted]

4.25 Archive / Long-Term Storage: M&TE does not require accuracy verification prior to archive / long-term storage if it was not:

- [redacted]
- [redacted]
- [redacted]

M&TE that has been calibrated and stored must [redacted]

5.0 OUT-OF-TOLERANCE EQUIPMENT AND TOOLING

5.1 Calibrated M&TE that is found to be significantly out of tolerance, damaged, inoperative, erratic or exhibiting some other form of anomalous condition is [redacted]

5.2 M&TE found significantly out of tolerance at recalibration for 2 interval cycles is [redacted]

5.3 An instrument whose calibration error is significantly out-of-tolerance over a short portion of a specified range may [redacted]

5.4 Any product certified with M&TE subsequently found to be out-of-tolerance is [redacted]

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6.0 LOST EQUIPMENT

6.1 Measurement and test equipment that cannot be located is classified as "Lost". [redacted]

7.0 MANAGEMENT REVIEW

7.1 Management Review meetings are conducted according to the ***QMS-04 Management Process Procedure***. During Management Review, [redacted]

APPENDIX 1

Setting and/or selecting a reference standard to calibrate a measurement device.

Requirement:

The measurement range of a device being checked for accuracy must [redacted]

VOLTMETER:

A voltmeter shall be verified for accuracy within an equivalent range on the reference standard:

A voltmeter reference standard may have scales that range from 2-20V, 20-200V, etc.

The voltmeter being checked for accuracy must be set to bracket within a range of the reference standard - or - [redacted]

OTHER MEASUREMENT DEVICES:

Any reference standard whose maximum measurement range is the same as the device being checked for accuracy must [redacted]

For instance, [redacted]

APPENDIX 2

Nonadjustable M&TE is inherently stable and includes [redacted]

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The Operator is only required to check inherently stable M&TE for damage prior to each use because [redacted]

For instance, [redacted]

To control the inventory of inherently stable M&TE, the Responsible Authority [redacted]

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