

TAM International, Inc.

QI-8.2.4-03 Maintenance, Calibration and Verification of IMTE

Approved by Quality Assurance Manager
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Revision Level: C
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1.0 Purpose

- 1.1 These instructions define the requirements for maintenance, calibration and verification of IMTE used by TAM for inspection operations.

2.0 Status and Documentation

- 2.1 Documents associated with these instructions shall be the responsibility of the Quality Manager or designee and maintained per the requirements of QP-4.2.3, Control of Documents.
- 2.2 Any changes to these Instructions shall be documented per the requirements of QP-4.2.4, Control of Documents
- 2.3 Completed forms shall be maintained by the Quality Manager or designee for the period of time that the instrument is in service plus five years after the device has been removed from service.

3.0 Reference Documents.

- 3.1 The following internal documents are referenced in this procedure to define their interaction with our product inspection system. Hereafter, these will be referred to by document number.
- * QP-8.3 Control of Nonconforming Product
 - * QP- 4.2.3 Control of Documents
 - * QP- 4.2.4 Control of Records

4.0 Initial Verification of IMTE

- 4.1 When IMTE are manufactured or purchased, the Quality Manager shall assign the next sequential IMTE serial number from the IMTE database, and update the database with information about the instrument.
- 4.2 The Quality Manager shall identify, verify and place the instrument in service as follows.
- 4.2.1. After receipt of the IMTE from TAM manufacturing or new purchase, the instrument shall be inspected for dimensional correctness and proper operation.

- 4.2.2. The instrument shall be verified for proper calibration prior to use and an IMTE Calibration History form shall be completed and placed on file.
- 4.3 The IMTE number assigned in 4.1 shall be marked on the instrument.
 - 4.3.1. Once identified, the IMTE shall be placed in the inspection area storage cabinets when not used.
- 4.4 An IMTE Calibration History Form, QF-01, shall be completed for all IMTE devices.
 - 4.4.1. The IMTE Device Description shall provide a full description of the device and as a minimum, manufacturer and type of IMTE.
 - 4.4.2. The IMTE Traceable Number assigned.
 - 4.4.3. The applicable measurements such as diameters, taper and depth as required for verification shall be identified in the columns provided.
 - 4.4.4. The actual date of manufacture or purchase and date of verification.
 - 4.4.5. The "Description of Action" shall be "TAM Manufactured" or "Purchased" as applicable. It should also note if this is the initial inspection or verification.
 - 4.4.6. The Measurements shown shall be the actual dimensions of the device noted by the inspector manager or inspector.

5.0 Tolerance Criteria for IMTE

- 5.1 IMTE devices utilized for measurements from 0.000" to 1.000" shall be verified to be accurate to within ± 0.0005 ".
- 5.2 IMTE devices utilized for diameter measurements greater than 1.000" shall be verified to be accurate to within ± 0.001 ".
- 5.3 IMTE devices utilized for linear measurements of overall length shall be verified to be accurate to within \pm one (1) incremental graduation.
- 5.4 IMTE devices utilized for measurement of pressure or temperature shall be verified to be accurate to within $\pm 3\%$ of the full scale reading of the device.
- 5.5 IMTE devices utilized for measurement of angles shall be verified to be accurate to within ± 5 degree.
- 5.6 All IMTE devices utilized for measurement of radii shall be verified to be accurate within $\pm 5\%$ of the radius measuring device or a maximum of ± 0.005 ".

6.0 Verification of Standards

- 6.1 All standards utilized for verification of IMTE devices shall be verified and/or calibrated traceable to national standards by an outside approved vendor.
- 6.2 The following items shall be considered as standards for the purpose of determining the requirements of 5.0.
- 6.3 Linear Dimensional Blocks, Rods and Rings.
- 6.4 Any reference device which is marked "for verification only" and requiring accuracy verification equal to or greater than ± 0.001 ".

7.0 Outside Diameter Measuring IMTE Verification

- 7.1 Micrometers and vernier calipers shall be verified at two points at or within 10% of the maximum and minimum operating range of the device using the standards referenced from 6.0 and acceptance criteria from 5.0.
- 7.2 Pi tape measuring devices used for checking rubber O.D. shall be verified at 1.0" and 10.0" using a linear measuring device at 3.142" and 31.42" respectively and acceptance criteria from 5.0.

8.0 Inside Diameter Measuring IMTE Verification

- 8.1 Micrometers, dial bore indicators and vernier calipers shall be verified at two points at or within 10% of the maximum and minimum operating range of the device using an outside diameter micrometer preset and verified against the standards from 6.0. Acceptance criteria shall be determined from 5.0.
- 8.2 Thickness gauges used to calculate and determine the inside diameter of a flexible tube (such as an elastomer bladder) shall be verified against standards from 5.0 and acceptance criteria from 4.0.

9.0 Linear Measuring IMTE Verification

- 9.1 Tape measures utilized for measuring overall length shall be verified against 1.0" and 29.0" standards or against a tape marked "for verification only" as available and acceptance criteria from 5.0.
- 9.2 Devices utilized for measuring depths and heights shall be verified against standards using the surface plate and acceptance criteria from 5.0.

10.0 Angle and Radius Measuring IMTE Verification

- 10.1 Devices utilized for measuring angles shall be verified at 30° angles and 45° using linear measuring devices or geometric calculations as follows.
 - 10.1.1. 30° angles; base length = 1.73 times vertical

10.1.2. 45° angles; base length = vertical

10.2 Radius measuring devices shall be verified by using dial calipers and acceptance criteria of 5.0.

11.0 Pressure, Temperature and Time IMTE Verification

11.1 Pressure measuring devices shall be verified against a master gauge, which is traceable to National Standards and accurate to within 0.25% of full scale. The device being verified shall be within tolerance of accuracy from 5.0.

11.2 Temperature measuring devices shall be verified at two points using ice for 32° F and boiling water at 212° F.

11.3 Time measuring devices shall be verified against two independent time devices and shall be accurate within 1 minute per hour.

12.0 Calibration of an IMTE

12.1 Hardness and Rubber tester(s), standards and devices used "for verification only" shall be independently calibrated by an approved vendor to within acceptable tolerances from 5.0.

12.2 IMTE devices found to be out of tolerance of 5.0 shall be adjusted, repaired or scrapped in accordance with:

12.2.1. All IMTE devices found to be out of tolerance through verification shall be adjusted or repaired and calibrated by an approved vendor with standards traceable to a national standard.

12.2.2. IMTE devices, which cannot be adjusted or repaired, shall be scrapped by disposition in accordance with QP-8.3, Control of Nonconforming Product.

Rev	Date	Description	Prepared By:	Reviewed By / Approved By	Date
A	--	New Document	--	--	--
B	11/10/04	No Documents in Synergy	--	--	11/23/04
C	3/19/08	No Documents in Synergy	--	--	3/28/08
C	7/22/15	Add Revision Box, No Rev Change	G. Fletcher	G. Fletcher, T. Young	7/18/2016