

**AEROSPACE PROCEDURE
FOR
REQUIREMENTS FOR CONTROL OF
INSPECTION, MEASURING AND TEST
EQUIPMENT (SUBCONTRACTOR)**

REVISIONS

Revision Letter	Description	Date
A	REVISED PER ECR/ECO #22286	12/29/11
B	REVISED PER ECR/ECO#24691	5/15/14

1.0 PURPOSE

The purpose of this procedure is to establish the minimum requirements required of any subcontractor selected by Kavlico to provide calibration and maintenance of Inspection, Measuring and Test Equipment. These requirements shall apply to mechanical, electrical, electronic or optical calibrations.

2.0 RESPONSIBILITIES

Quality Assurance

Applicable Sub-Contractor

3.0 REFERENCE DOCUMENTS

- FISO/IEC 17025 General requirements for the competence of Testing and Calibration Laboratories
- ANSI/NCSL Z540-1 Calibration Laboratories and Measuring and Test Equipment – General requirements
- ISO-ILAC-IAF Joint Communiqué – Laboratory Quality Management System – Scope and Operation
- ISO 10012 Requirements for Measurement Processes and Measuring Equipment
- AP0416 - Control of Quality Records

WI691 – Calibrating Kavlico Mexico Facility Equipment

4.0 PROCEDURE

4.1 Subcontractor Responsibilities:

4.1.1 The subcontractor shall assure that all Standards used to calibrate Kavlico's and the subcontractor's tools and equipment, used as a media of acceptance are traceable to the National Institute of Standards and Technology (NIST). Records (Certificates and Accreditations) shall be made available to Kavlico upon Request. Kavlico Mexico Facility shall follow WI691 when calibrating its equipment

- 4.1.2 Calibrations may be performed by subcontractor at Kavlico, the subcontractor's facility, or if necessary, at additional facilities where specific capabilities are available to perform required calibrations and or repairs. If subcontractors use additional facilities to obtain calibration(s), it is the subcontractor's responsibility to obtain copies of the facilities Accreditation Certificate and verify their ability to meet NIST traceability.
- 4.1.3 When new equipment is purchased, whether by Kavlico or the subcontractor, it shall be calibrated prior to use. If the new equipment includes a certificate indicating calibration to NIST, a cursory verification should be performed to ensure the tool / equipment meets the minimum requirements for which it was purchased.
- 4.1.4 Only after acceptability has been determined shall the tool / equipment be identified with an appropriate identification number, placed into the recall system and have a calibration sticker placed in a conspicuous location. After these steps are completed the tool / equipment can then be issued for use.
- 4.1.5 Kavlico or its customers reserve the right to audit the subcontractor's calibration system. If an audit is to take place, as much advance notice as possible should be provided to the subcontractor.

The subcontractor may use their own internal calibration procedures. However, the minimum standards imposed by this procedure must be maintained.

4.2 Definitions:

- 4.2.1 "Primary Standards: shall be those standards that are either directly calibrated by the National Institute of Standards and Technology (NIST) or are calibrated by instruments which have been directly calibrated by NIST.
- 4.2.2 "Secondary Standards" shall be those standards which are calibrated by Primary Standards.
- 4.2.3 "Gages / Tools" – These terms apply to all types of mechanical measuring tools that compare the physical characteristics of an item to a specific dimensional requirement.
- 4.2.4 "Measuring Equipment" – The term applies to calibrated mechanical, electronic and optical measuring devices used to measure variances.

4.2.5 “Certification” – As referenced in this procedure, is “the act of designating that standards and measuring equipment have been calibrated and meet all established requirements.

4.2.6 “Reliability” – As referenced in this procedure, in relationship to equipment being calibrated, is defined as the probability that the equipment will remain in tolerance throughout the established calibration interval.

4.3 General Calibration:

4.3.1 Kavlico or the subcontractor’s “Calibration Standards” shall be stored and utilized in a controlled environment.

4.3.2 All measuring standards used to calibrate measuring and test equipment shall have a test accuracy ratio of 4:1 greater than the equipment being calibrated, when state of the art permits.

4.3.3 When a minimum of 4:1 test accuracy cannot be achieved, or if requirement is stated differently, or if the collective uncertainty of the measuring standard exceeds 25% of the acceptable tolerance of the characteristic being calibrated, the subcontractor shall document the deviation(s) and demonstrate how the adequacy of the calibration is not degraded.

4.3.4 All measuring and test equipment not calibrated against NIST traceable standards, or items not calibrated to their full capability, or which have other limitations of use must be labeled or otherwise identified as to the limitation.

4.3.5 Where applicable, prior to each equipment calibration, persons performing the calibration shall review the calibration records of the equipment for trends. Where the subcontractor has no access to past calibration results Kavlico shall review the records for trends. Equipment known to have been exposed to rough handling and or extreme usage should be reported to the subcontractor by Kavlico personnel prior to calibration.

4.3.6 The subcontractor shall provide to Kavlico, a formal record of each piece of equipment calibrated, at a minimum, to record for reliability purposes its “As Found” condition and its condition as returned to Kavlico for use.

4.3.6.1 Equipment where acceptable calibration requirements cannot be achieved should have a record, when returned to Kavlico, stating that it is out of calibration and should not be returned to service.

4.3.6.2 Equipment found to be significantly out of calibration at the time calibration is to be performed should be brought to Kavlico's attention so Equipment Reliability and Calibration intervals can be investigated prior to returning the piece of equipment to service.

4.3.7 Calibration intervals may be shortened or lengthened when results of previous calibrations indicate such action is appropriate to maintain acceptable reliability. Equipment where the calibration finding or trend analysis indicates reliability is in question shall have its calibration interval shortened in order to avoid unintentional manufacturing and delivery of product out of tolerance. The reason for any calibration interval change shall become part of that equipment's calibration history record.

4.3.7.1 The subcontractor is responsible to notify Kavlico when equipment requires extensive repairs or is beyond economical repair and requires replacement.

4.3.7.2 Calibration intervals can be changed to increase the time between calibrations when the device has demonstrated stable reliability such that adjustments are unnecessary at the time of original established calibration intervals for a minimum of three cycles.

4.3.8 Laboratory calibration of instrumentation may be conducted according to manufacturer, government, Kavlico's or the subcontractor's calibration procedures when the results of such calibration are acceptable and meet the requirements of NIST.

4.4 Calibration Scheduling:

4.4.1 Kavlico shall maintain a listing and develop a recall schedule for inspection and test equipment and tools requiring calibration. The list consists of equipment due, past due and presumed missing.

4.4.2 Kavlico will schedule subcontractor calibration and ensure equipment and tooling requiring calibration will be made available.

4.4.3 It shall be the responsibility of the owning department or individual to locate all equipment identified on the recall list and see to it that it's delivered to metrology or made available for calibration at the time calibration is to be performed.

- 4.4.4 Tools or equipment deemed lost will be removed from the recall list and transferred to a "Lost Equipment" list. If the tool or equipment is found at a later time it shall be delivered to metrology for re-entry into the calibration system.
- 4.4.5 Allowances for due date extensions will be granted through Kavlico. An example of extenuating circumstance that may provide rationale for granting an extension could be ongoing tests that must not be interrupted due to rendering the test invalid. Extensions up to thirty-one calendar days may be granted.
- 4.4.6 Equipment on extended service shall be identified with a calibration sticker showing the new (extended) due date and clearly marked "EXTENDED". The metrology technician or Kavlico person with the authority to grant the extension, i.e., Quality Manager or designee, shall stamp the sticker.

4.5 Environmental Controls:

- 4.5.1 The subcontractor's primary standards shall be stored and utilized in a controlled Environment equal to the following conditions:
- a) Temperature: Metrology Lab 74 Deg. +/- 5 deg
Metrology cold room 68 Deg +/- 1 deg.
 - b) Relative Humidity: 30% to 55%
 - c) Lighting: 80 ft. candles minimum at bench level.
 - d) Electrical Power: Shall be sufficient to not adversely affect the calibration

4.6 Issuance of Equipment to Subcontractor:

- 4.6.1 Equipment leaving Kavlico needs to be recorded and accounted for utilizing a Kavlico shipper, which shall identify the Subcontractor, the date, work order or purchase order number, name of equipment and serial number or asset number of the equipment. The shipper shall indicate the Kavlico representative and the subcontractor representative performing the transaction.
- 4.6.2 A copy of the shipper shall be retained on file at least until the equipment is returned by the subcontractor.

4.7 Subcontractor Standards:

- 4.7.1 When equipment used by the subcontractor to calibrate Kavlico equipment is found during calibration to depart greater than 10% of the manufacturers recommended tolerance.
- 4.7.2 This equipment and condition shall be brought to Kavlico Quality Management's attention immediately.
- 4.7.3 The out of calibration condition needs to be validated.
- 4.7.4 An assessment will need to be made to see what impact the out of calibration condition may have on Kavlico's operation.

4.8 Tamper-Resistant Seals:

- 4.8.1 Equipment which has adjustments accessible to the operators / technicians which can affect the calibration of the equipment shall be suitably sealed to prevent unauthorized adjustment. Tamper resistant seals or the calibration tag shall be placed over the access of the adjustment feature. Access of this adjustment feature would require destruction of this seal and render the equipment calibration void.

4.9 Identification / Evidence of Calibration:

- 4.9.1 All equipment entered into the calibration system will be identified with a number. The equipment, as a result of this identifying number, shall be traceable to specific calibration history records.
- 4.9.2 Kavlico owned equipment shall have a permanent means of applying identification numbers, i.e., electro-etch, vibro-etch, steel stamp, serial number plates, or other appropriate method.
- 4.9.3 Employee owned equipment shall receive an identifying number which will be applied to a sticker which in turn will be affixed to the equipment.
- 4.9.4 Primary Standards shall be distinctly identified with an identification number that indicates its "Primary Standard" status. Primary Standards are not to be issued as "inspection equipment". Primary Standards are for metrology use only for verification and calibration purposes.

4.9.5 Secondary Standards shall be distinctly identified with an identification number that indicates its "Secondary Standard" status. Secondary Standards are not to be issued as inspection equipment and are restricted to metrology use only for verification and calibration purposes.

4.10 Equipment requiring Calibration Control:

4.10.1 Equipment controlled by the Calibration System shall have a Calibration Sticker affixed to it, except when the size, use or geometry of the equipment does not allow for such a sticker to be attached. In such cases the calibration sticker or a calibration card/record showing the equipment's current calibration status should be attached to the equipment's storage container.

4.10.2 Calibration Stickers will have a minimum of the following information:

- A) Instrument Number
- B) Date Calibration performed
- C) Date next Calibration is due

4.10.3 Calibration stickers applied by Kavlico or its subcontractor showing current calibration status will take precedence over all outside laboratory identification.

4.10.4 In the case where a test console contains multiple pieces of equipment requiring simultaneous calibration it is acceptable to attach one sticker to the console identifying each instrument's assigned identification number, calibration and due date.

4.10.5 Equipment that is to be set or adjusted before each use shall have a sticker stating "Set Prior to Use", "Adjust Prior to Use", or some statement making it clear that the equipment will be adjusted at the time of use to accurately perform the task. Persons performing this adjustment need to be able to demonstrate this process with proficiency.

4.10.6 Measuring equipment issued to production but only used as a reference needs a sticker indicating "Reference Only" or "Indication Only" attached to it.

5.0 RECORDS

5.1 Metrology records pertaining to calibration controls shall be available for auditing purposes upon request.

- 5.2 Calibration Equipment List, Recall List, Lost Equipment List, etc., shall be maintained by Kavlico representative as designated by Kavlico Quality Manager.
- 5.3 Kavlico representative, as designated by Kavlico Quality Manager, will maintain equipment Calibration History Records.
- 5.4 Records shall be maintained in accordance with AP0416 Control of Quality Records.