



Cavendish Scott, Inc

CALIBRATION FAQ's

1. How often does something need to be calibrated? Can I go over 1 year?
 - a. Manufacture Recommendation is typically 1 year
 - b. Past calibration history/data of the instrument may be used to determine shorter or longer intervals. This should be based on at least 3 years of history.
 - c. How often the instrument is used, risk factors of making bad decisions in putting out bad product, and product tolerance/specifications also need to be considered in determining calibration intervals.
Summary: Calibration intervals are best established based on the performance of individual instruments, with consideration given to their application and calibration history.
2. Can I calibrate some things once and forget them? NO
 - a. There is no history to determine the risk factor if the instrument/gage stays within specification since the calibration took place.
3. What instruments/gages might I need to calibrate more often than 1 year?
 - a. Master Standards (i.e. Gage Block Comparators, Super Micrometer)
 - b. Any standard/instrument to guarantee good measurement assurance (especially electronic standards that contain components that can drift)
 - c. Any instrument which is frequently out of specification at scheduled calibration intervals.
4. Can I calibrate instruments myself?
 - a. Yes, if you have appropriate methods/procedures/instructions
 - b. Yes, if you have a calibration system set up to keep history/records on each instrument
 - c. Yes, if you have appropriate standards that are accurate enough for a 4:1 ratio of accuracy to the specification of the things that are calibrated. For example:
 - i. 0.000,1 in. OD Micrometer Standard used is 0.000,025 in. accuracy
 - ii. 0.001 in. OD Micrometer Standard used is 0.000,25 in. accuracy
 - iii. 0.001 in. Dial Caliper Standard used is 0.000,25 in. accuracy
 - iv. 0.000,2 in. Dial Caliper Std. Standard used is 0.000,05 in. accuracy
 - v. 0.000,025 in. Micrometer Std. Standard used is 0.000,25 in. accuracy
 - vi. 0.001 in. Dial Indicator Standard used is 0.000,25 in. accuracy
 - vii. 0.000,1 in. Dial Indicator Std. Standard used is 0.000,025 in. accuracy
5. Do I have to be concerned about temperature and humidity or other environmental conditions?
 - a. Mainly drastic temperature changes in short periods and unclean environments (dirt, dust, oil, moisture that could cause rust, vibration)
 - b. Temperatures affect the co-efficient of expansion of various metals above 68 deg.F, but in the range of millionths (which most machine shops do not measure to that range of accuracy nor have that capability of accuracy to be affected). **It is important regardless of temperature to let product/measuring equipment/standards stabilize to the ambient room temperature before taking measurements.**
 - c. Co-efficient of expansion calculation for steel is (.000,006,4/in./deg.)
 - d. Co-efficient of expansion calculation for aluminum is (0.000,011,5/in./deg.)
 - e. Humidity can also effect some measurements of products (plastics, ESD, weight), so the organization must be aware of product requirements.



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6. What type of records and systems are needed to perform in-house calibrations?
 - a. Calibration records should include the following:
 - i. Equipment ID/Serial Number
 - ii. Calibration Date
 - iii. Calibration Frequency/Due Date
 - iv. Calibration results data (as found/as left conditions) and any adjustment made
 - v. Measurement specification of equipment measured (Tolerance)
 - vi. Standard used for calibration (and it's accuracy)
 - vii. Relevant Environmental conditions
 - viii. Name of Calibration Technician
 - ix. If found OUT-OF-TOLERANCE from specifications, a statement of whether any product was affected and actions taken (This may alternatively documented as a Corrective Action)
 - b. Standards used for calibration MUST be within appropriate ratio of accuracy from equipment being measured. Industry standard is 4:1, meaning the standard used is 4 times more accurate than the equipment being measured.
 - c. "House-built" equipment, jigs, fixtures that are used to determine acceptance of product MUST be calibrated and records maintained of the calibration

Product Specification	Measuring Equipment Tolerance	Calibration Standard Tolerance
+/- 0.008"	+/- 0.002"	+/- 0.000,50"

7. Does in-house calibration need to be certified by any regulatory body? NO
8. Do the calibration technicians need any certification or special training?
 - a. All employees must be competent to perform their jobs. Calibration techs must understand proper calibration techniques, ratio of accuracy, and use proper calibration methods/procedures. They do NOT have to have special certification.
9. Equipment with status "Calibrate before use"
 - a. Records/logs must still be maintained that state who performed the calibration, date/time of calibration, pass/fail results (and any adjustments made)
10. Tape Measures, Rulers, Clocks, Thermostats, etc only need calibration if used to accept/reject product
 - a. Federal Specification exist for measuring rulers/measuring tapes (GGG-R-791G) and (GGG-T-106E)
11. Do I need to label everything that I do not calibrate as "reference only"?
 - a. NO, it depends on the process defined by the company as to how they identify equipment used to determine conformance to specification. Some state "Equipment used to determine conformance to specification will be identified by a calibration label on the equipment or equipment case. Equipment will not be used to determine conformance to specification if the calibration label is missing or expired."
 - b. You MUST remember that there is NO requirement to have a calibration label on the equipment (unless defined in a procedure), so long as the company is able to provide a record of calibration for equipment used to determine conformance. There does need to be a clear way to differentiate between equipment used to accept/reject product and that used for "reference only". There is no record requirement for "reference only" equipment.



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12. Do "Manufacturing aid" tools (calipers, micrometers, etc) used to check parts in-process to make sure the process is going good need to be calibrated, if they go through final inspection using calibrated equipment?
 - a. This is ALL dependent on the risk factor that management is willing to take. Technically if product acceptance is performed using calibrated equipment, then these 'in-process' "reference only" equipment do not need to be calibrated. The challenging question is "why are you using the measuring equipment in the first place, and wouldn't you want to ensure its accuracy?"

13. When does software need to be verified?
 - a. Internally developed test programs or purchased test programs (computer software) used to monitor and/or measure specified requirements need to be confirmed to have the ability to satisfy the intended applications prior to the initial use.
 - b. The software is confirmed that it adequately measures all parameters identified for its intended use and that the test program returns the correct results based on the required inputs.
 - c. Once the test program is confirmed and in use, the program is re-confirmed whenever modifications are made to it or to the parameters being measured.

14. Should companies be allowed to purchase new standards instead of re-calibrating existing standards? (i.e. Pin Gages, Gage Blocks...replace every 3-5 yrs)
 - a. Technically NO....how do they know if these devices were still within calibration at the time they were replaced? There is a possibility they were OUT-OF-TOLERANCE and bad product could have been produced, but if made "reference only" or disposed of and replaced, they would never know. (This is a risk factor that needs to be evaluated by management...and should be documented).