

10.0 Measurement Traceability and Calibration

10.1 Policy

10.1.1 Standards and measuring and test equipment significantly affecting the integrity of the measurements conducted by the laboratory are monitored for stability as part of the measurement control program. Standards and equipment are calibrated and/or verified before use to ensure the recall or removal from service of any equipment or standards that are unreliable or that have exceeded the calibration interval. The laboratory maintains procedures for safe handling, transport, storage and use of reference standards, materials and equipment (see Appendix H, AP Nos. 13 and 14).

10.2 Measurement Traceability

10.2.1 Measurements of the laboratory are traceable to the international system of measurements (SI) through an unbroken chain of measurements. Measurement traceability for the laboratory test are documented in traceability charts (see Appendix R).

10.2.2 The laboratory has a program of calibration and verification of measuring and test equipment that has an affect on the test results. The program is designed to ensure that the tests are valid and that the measurements made by the laboratory are traceable to national standards of measurement (see Appendix H, AP No. 14).

10.2.3 To provide external evidence of traceability, the laboratory participates in interlaboratory and collaborative experiments, as available (see Appendix K and Appendix H, AP No. 4).

10.3 Calibration/Verification (See Procedure for Calibration Intervals, Appendix H, AP No. 13)

10.3.1 Calibration of Standards

10.3.1.1 An accredited or approved laboratory with traceability to a national laboratory calibrates working standards.

- 10.3.1.2 Working standards are calibrated on a periodic basis, are monitored, and are under the custody of trained laboratory personnel (see Appendix H, AP No. 13). Records of the calibrations are maintained in the laboratory.
 - 10.3.1.3 Standards are recalibrated if there is damage to the standards or any significant change is observed in the monitoring program (see Appendix H, AP 13).
 - 10.3.1.4 If measurement traceability to SI units is not possible, there is traceability to certified reference materials or agreed methods and/or consensus standards (see Appendix H, AP No. 4).
- 10.3.2 Verification of Standards
- 10.3.2.1 Standards are continuously monitored to ensure the integrity of the test (see Appendix H, AP No. 13).
 - 10.3.2.2 Measurement assurance procedures and standard and reference material monitoring results are maintained in the laboratory files (see Appendix H, AP No. 13 and Appendix J, Control Charts).
- 10.3.3 Calibration of Measuring and Test Equipment (M&TE)
- 10.3.3.1 Type evaluation test equipment that might affect test results is calibrated by a national laboratory, or by a laboratory whose traceability to a national laboratory has been validated through a verification process. A calibration interval is established for the equipment and the equipment is labeled, marked, or otherwise identified to indicate its calibration status (see Appendix H, AP No. 14).
 - 10.3.3.2 Procedures for setting and changing M&TE calibration intervals are maintained in the laboratory files (see Appendix H, AP No. 14).
 - 10.3.3.3 Calibration of equipment is conducted at a frequency to ensure that the equipment remains in tolerance during its use in the laboratory.

Frequency of calibration is based on a review of calibration, maintenance, and repair history. The technical manager conducts reviews and the records of the review are maintained with the internal audit records in the laboratory files (see Appendix H, AP No. 14).

10.4 Measurement of Uncertainty

10.4.1 The laboratory is a type evaluation laboratory that performs testing and evaluation of weighing and measuring devices. A variety of tests are performed on each device under test to include accuracy, influence factors, and permanence testing. The laboratory identifies all components of the test uncertainty that might affect the integrity of the test results, makes a reasonable estimation, and ensures that the form of reporting the results does not give a wrong impression of the uncertainty. NIST Technical Note 1297 “Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results and the ISO Guide to the Uncertainty in Measurement are used as the basis for the expression of uncertainty in measurement (see Appendix I, “Assessment of Uncertainties”).