Purpose

To establish a plan for safe handling, transport, storage, use and maintenance (including calibration) of measuring equipment, and appropriate use of correction factors to ensure proper functioning and in order to prevent contamination or deterioration.

Scope / Field of Application

Chemistry and Latent print equipment generally includes the following types:

a) *General Service Equipment* – not used for making measurements or with minimal influence on measurements (e.g., hot plates, stirrers, non-volumetric glassware and glassware used for rough volume measurements such as measuring cylinders) and laboratory heating or ventilation systems.

b) *Volumetric Equipment* – flasks, pipettes, burettes.

c) *Measuring Instruments* – thermometers, timers, spectrometers, chromatographs, electrochemical meters, balances, rulers etc.

d) *Computers and Data Processors* – physical equipment and software.

e) *Cameras and scanners* – physical equipment and software.

f) *Alternate Light Sources/Lasers* – physical equipment and software.

Responsibilities

The performance of an instrument is checked out and appraised by a qualified person before use. This involves a visual inspection and verification of its operation.

Materials Required

The equipment and the required calibration and maintenance items as specified by the manufacturer.

Procedure

Overall Requirements

Handling, transport, storage, use, and maintenance of equipment is outlined in the manufacturer's manual. Specific requirements are outlined in a standard operating procedure for the instrument or equipment type.

All handling, transport, storage, packaging, preservation, and delivery of equipment is verified by laboratory personnel using the appropriate standard operating procedures or manufacturer's specifications.

The manufacturer's manual is critical in describing the safe handling requirements of the equipment, to avoid any damage, alteration, contamination, change of integrity or reliability and condition of the equipment (or samples). The manufacturer's manual also provides guidance for suitable environmental conditions for the calibrations, inspections, measurements and tests performed.

Pre- testing checks verify the performance of an instrument during its operation and could reveal the occurrence of measurement drift.

Laboratory personnel utilize the appropriate correction factors to ensure proper functioning of equipment.

General Equipment

General Service equipment is maintained by performing cleaning and safety checks as required. Calibrations or performance checks will be necessary where the setting can significantly affect the test or analytical result (e.g., the temperature of a muffle or constant temperature bath).

Permanent and Disposable Equipment

The laboratory shall use all equipment, both permanent and disposable, in a manner as to avoid the potential for cross contamination. In the event disposable equipment is used and the analyst has reason to believe that it has been contaminated, the analyst shall replace with new equipment.

Volumetric Equipment

The correct use of volumetric equipment is critical to analytical measurements and is suitably maintained and calibrated as specified in laboratory procedures.

Measuring Equipment

Correct use combined with periodic servicing, cleaning and calibration shall be performed.

The frequency of such performance checks is determined by experience and based on need, type and previous performance of the equipment. Intervals between checks are shorter than the time the equipment has been found to take to drift outside acceptable limits.

It is often possible to build performance checks – system suitability checks – into test methods (e.g., based on the levels of expected detector or sensor response to calibration standards, the resolution of calibration standards in separating systems, the spectral characteristics of calibration standards, etc). These checks are completed before the equipment is used.

The standardization of instruments is performed using reference standards when these are available, or against certified standard instruments when they are not. This is done before the instrument is used.

Calibrations are conducted under the same instrumental and chemical conditions as those that will exist during the measurement process. The frequency of calibration depends on the accuracy requirements of the investigation and the stability of the instruments. Daily calibration checks are recommended when the instrument is in daily use; calibration checks are performed immediately prior to a series of measurements at other times.

The calibration process is vital to all measurement programs and is outlined in the appropriate technical procedure.

Calibration procedures include information on the following if applicable:

- the specific equipment or groups of equipment to which the procedure is applicable
- a brief description of the scope, principle, or theory of the calibration method (an example and a reference may also be included)
- calibration specifications, such as the number of calibration points, environmental requirements, and precision and accuracy requirements
- a list of the calibration standards and accessory equipment needed to perform an effective calibration, manufacturer's name, and instrument model number
- a complete, clear, concise, step-by-step written calibration procedure
- specifications for calibration facilities, equipment, temperature, and humidity, and physical protection for calibration standards
- specific instructions for obtaining and recording the test data (includes data collection forms)

Computers and Data Processors

1. Operating manuals and supplementary procedures are available to operators.
2. Deviations from established procedures are documented in QSP# 4-01-5 Authorizing Deviations.
3. Special procedures relating to security and file management (including archiving, file repair, file back-ups) are outlined in SOP# QSP 4-13-1.
4. The computers and their software are considered validated when correct operation (or expected answer) occurs after the input of well-characterized parameters. The degree of validation necessary depends on the exact use of the computer. Consider testability, traceability, maintainability, and repeatability.
5. When software is updated, a record is kept of the revision history.

Documentation

Documents on standardization, calibration, maintenance, equipment safety, and spare parts accompany each instrument.

Equipment inventory includes the following information if applicable:

- name
- manufacturer
- serial number
- model number
- company asset number
- date received
- date placed in service
- current location
- condition when received (new, used, reconditioned)
- manufacturer's manuals and location
- calibration period
- calibration records and location
- maintenance records and location

Reference Procedures

Equipment manuals
Appropriate test methods and / or specific equipment calibration and maintenance standard operating procedures

References

Eurachem Guidance Document No. 1. 1993. Accreditation for Chemical Laboratories.

Garfield, F.M., Kleska, E., Hirsch, J. 2000. Quality Assurance Principles for Analytical Laboratories. 3rd Edition. AOAC. Gaithersburg, MD.

REVISION HISTORY		
CURRENT VERSION	EFFECTIVE DATE	SUMMARY OF CHANGES
1	2016/07/01	Original version
2	2018/02/07	Add statement to qualify handling of possible contaminated equipment, change issue date to effective date, change rev# to ver# and change revision history table.
3	2018/04/01	Remove Hyperlinks