**Thermometer Calibration Verification SOP**

**Background Information:**

Thermometer calibration must be verified once per year, after maintenance, malfunction or in accordance with manufacturer’s recommendations, whichever is most frequent.

**Purpose**

To ensure that thermometers used in procedures, water baths, incubators, refrigerators, and freezers are accurate when compared to a certified thermometer such as a National Institute of Standards and Technology (NIST) traceable thermometer.

**Definitions**

1. NIST certified thermometer: a thermometer that has been verified as accurate from an outside, NIST certified source.
2. NIST verified thermometer: a thermometer that has been verified as accurate against a NIST in-house source.

**Pre-analytic Procedure**

1. Unacceptable thermometers may be cleaned or serviced and retested. If unable to repair, discard.
2. Calibration records should indicate dates of removal or return to service or if thermometer is discarded.
3. All Thermometer Calibration Verification Record sheets should remain on file as a

record, even after the thermometer has been removed permanently from service.

1. Thermometers at time of calibration verification should be inspected for readability and cleaned.

**Analytic Procedure**

Supplies

1. A certified thermometer or a new NIST thermometer comes with period of time for which it is certified. Following this time or an accident that causes the thermometer to malfunction, it must be sent to a service center qualified to recertify its accuracy. This is to be done yearly after the initial purchase certification has expired.

Equipment Calibration/Maintenance

1. Thermometers used at the bench are to be considered as contaminated and should only be handled with gloves and other personal protective equipment and/or thoroughly disinfected before calibration verification.
2. Place the probe of the NIST traceable thermometer under the same conditions and near the thermometer being verified. If the test thermometer is in glycerin or other liquid, then the traceable thermometer must also be is this liquid.
3. Allow both thermometers to equilibrate.
4. Record both temperatures of the test thermometer being verified and the certified thermometer, as accurately as possible. See example Thermometer Calibration Verification Record Sheet.
5. Calculate the difference between the two thermometers and record. If there is a difference between the Test thermometer and the Certified thermometer, indicate whether the Test thermometer difference is low with a minus sign or high with a plus sign.
6. Assess the acceptability of the difference using the criteria specified under Interpretation of Results section. If acceptable, label the thermometer with the date, the tech and the signed difference and proceed to step (8).
7. If the difference is NOT acceptable, repeat the process. If still NOT acceptable, remove the thermometer from use, record the failure on the Thermometer Calibration Verification Record Sheet, notify the supervisor and obtain an alternate, acceptable, and uniquely numbered thermometer.
8. Ensure all fields of the Thermometer Calibration Verification Record Sheet are complete and filed in the Log Notebook. Note all actions taken on Record sheet. (See Thermometer Calibration Verification Record Sheet for example).
9. Repeat the process for all temperatures for which the thermometer is used.

Interpretation of Results

Temperature Tolerances: **Must be established by the lab, examples below**

Instrument Tolerance (˚C)

Incubator + 2˚

Water bath + 2˚

Heating block + 2˚

Refrigerator + 2˚

Freezer (-20˚C) + 2˚

Freezer (-70˚ C) + 5˚, must be cooler than –65˚ C

**Post-analytic Procedure**

Result Entry into Lab Record System

1. Thermometer Calibration Log Notebook for storing documentation
2. Thermometer Calibration Verification Record Sheets should contain the following information: (see example)
* Certified thermometer identification
* Test thermometer identification
* Calibration date
* Technologist signature/initials
* Test thermometer reading
* Certified thermometer reading
* Difference between Test and Certified
* Acceptance or rejection
* Any actions taken (clean, adjust, etc.)

Archiving Results and Report Documents

1. Temperature Calibration records should indicate dates of removal, return to service or if thermometer is discarded.
2. All Thermometer Calibration Verification Record sheets should remain on file as a

record, even after the thermometer has been removed permanently from service.

**References**:

1. College of American Pathologists (CAP) 2021. Commission on Laboratory Accreditation, Laboratory Accreditation Program; All Common Checklist, 2021
2. CLS General Laboratory Equipment Performance Qualification, Use, and Maintenance. CLS QMS23 2nd Edition, June 2019 (Replaces GP31-A). CLS 950 West Valley Road, Suite 2500, Wayne, PA 19087
3. DAIDS Good Clinical Laboratory Practice Guidelines, 2021. NIH Bethesda, MD 20852.

**Appendices**

1. Appendix I – Example of Thermometer Calibration Verification Record Sheet

**Appendix I: Thermometer Calibration Verification Record Sheet**

**Thermometer ID:**

**Location of thermometer:**

**Procedures using thermometer:**

**Acceptability criteria:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Tech** | **Test Thermometer****Reading** | **Certified Thermometer****Reading** | **Certified Thermometer****ID** | **Degree C or F****Difference** | **Accept****or Reject** | **Corrective Actions****Taken** |
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