**General Laboratory Equipment Maintenance**

**Purpose:**

The purpose of this procedure is to ensure comprehensive maintenance of equipment such as water baths, refrigerators, freezers, microscopes, timers, centrifuges, rotators, balances and incubators. Manufacturers’ recommended instructions should be followed for cleaning and disinfecting procedures.

**Procedure:**

Instruments/Equipment:

* All instruments must be inventoried and uniquely identified. This documentation should include manufacturer, model, serial number, date placed in service, location and current service contact, if any.
* Equipment and instruments must have written records of service and maintenance for the life of the instrument.

Supplies Include:

* Disinfectant/cleaners
* Lens cleaner
* Distilled water
* Soft brush
* Soft cloth
* Catalyst
* Anaerobic indicator strip

Equipment Maintenance:

*All sections can either be entered as a table below, as suggested by CLSI, or listed. These tables are intended as examples and must be customized for your laboratory.*

**A. Carbon Dioxide Incubators:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | Check concentration of carbon dioxide on a daily schedule and record on the maintenance log. |
| **2** |

|  |  |
| --- | --- |
| If | Then |
| * Level is outside acceptable range
 | * Inform supervisor of abnormal level
 |
| * Level can not be restored
 | * Move content to another incubator until problem resolved.
* All corrective actions are recorded on maintenance log.
* Repairs should follow manufacturer’s guidelines.
 |

 |
| **3** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**B. Centrifuges:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Centrifuges should be cleaned with appropriate disinfectant solution daily and after spills.
* If not in use note on Maintenance log as **NIU**.
 |
| **2** | * Centrifuges are calibrated every 12 months or after repair. See Centrifuge Calibration Verification SOP.
* Calibration is noted on the Maintenance log.
 |
| **3** | * Biomedical department is responsible for oiling the bearings and replacement of the brushes.
 |
| **4** | * All performance problems are documented on the Maintenance log and corrective action is noted.
 |
| **5** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**C. Microscopes:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Ocular and stage of the microscope is cleaned daily with approved cleaner and noted on Maintenance log.
* If not in use note on Maintenance log as **NIU**.
 |
| **2** | * Microscopes are serviced every six months by an outside vendor.
 |
| **3** | * All performance problems are documented on the Maintenance log and corrective action is noted.
 |
| **4** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**D. Freezers, Ultra Low and Regular:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Temperature is recorded daily on Maintenance Log.
 |
| **2** | * Defrost freezer every six months and clean, note on Maintenance log.
 |
| **3** | * Preventive maintenance should be done every six months and noted on Maintenance log
 |
| **4** | * All performance problems are documented on the Maintenance log and corrective action is noted.
 |
| **4** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**E. Refrigerators:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Temperature is recorded daily on Maintenance Log.
 |
| **2** | * Defrost freezer every six months and clean, note on Maintenance log.
 |
| **3** | * Preventive maintenance should be done every 6 months and noted on Maintenance log
 |
| **4** | * All performance problems are documented on the Maintenance log and corrective action is noted.
 |
| **5** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**F. Heating Blocks:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Temperature is recorded daily or when in use on the Maintenance log.
* On days not used **NIU** is recorded for Not in Use.
 |
| **2** | * Electrical cords are checked when temperatures are recorded.
 |
| **3** | * Heating blocks are wiped off using a cloth dampened with an appropriate disinfectant/cleaner before and after use.
* Cleaning is noted on the Maintenance log.
 |
| **4** | * All performance problems are documented on the Maintenance log and corrective action is noted.
 |
| **5** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**G. Water Bath:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Temperature is taken either daily or when in used.
* If not in use noted on Maintenance log as **NIU.**
 |
| **2** | * Water bath is cleaned monthly or as needed.
 |
| **3** | * It is recommended that distilled water be used in the water bath.
 |
| **4** | * All performance problems are documented on the Maintenance log and corrective action is noted.
 |
| **5** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**H. Balances:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Clean the balance with a soft brush following each use. If necessary, clean the balance with a damp cloth to remove debris and allow the balance to dry before the next use.
* If not in use noted on Maintenance log as **NIU.**
 |
| **2** | * Prior to use, check for spilled substances, that the balance is level and on a firm surface free from drafts or air currents.
 |
| **3** | * Check the balance pan to ensure that it is properly seated
 |
| **4** | * Balances must be calibrated before initial use.
* Also must be calibrated after service.
* Quarterly calibration is needed on all balance in use.
 |
| **5** | * Balances should be professional cleaned and serviced yearly.
 |
| **6** | * For daily operation and verification see Analytical Balance SOP
 |
| **7** | * All cleaning and operation must be documented on the Maintenance log
* All logs are reviewed by the supervisor monthly
 |

**I. Timers:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Timers should be cleaned and serviced as recommended by the manufacturer.
 |
| **2** | * Before use, all timers must be calibrated and verified.
 |
| **3** | * Timers must be verified every twelve months
 |
| **4** | * Refer to Timer Verification SOP for details
 |
| **5** | * All corrective action and service should be documented on the Maintenance log and reviewed by supervisor as needed.
 |

**J. Rotators:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Rotators should be cleaned with appropriate cleaner as necessary.
 |
| **2** | * All rotators that are not functioning properly should be serviced and taken out of use if unable to repair.
 |
| **3** | * All rotators requiring specific rotation speed should be verified yearly as follow:

|  |  |
| --- | --- |
| **Step** | **Action** |
| 1 | Turn rotator onto required speed. |
| 2 | Either with your finger or pencil place it so that the rotator will touch it. |
| 3 | Count the number of taps for 15 seconds. |
| 4 | Multiple results by 4. Consult manufacturer’s limits for acceptability. |

 |
| **4** | * Timers must be verified every six months. Refer to Timer Verification SOP for details.
 |
| **5** | * All corrective action and service should be documented on the Maintenance log and reviewed by supervisor monthly.
 |

**L. Ovens:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | * Oven temperature is recorded daily on Maintenance log.
 |
| **2** | * Spills are wiped up as needed with an appropriate disinfectant.
 |
| **3** | * Any repairs needed are performed by service department.
 |
| **4** | * All corrective action and service should be documented on the Maintenance log.
 |
| **5** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**M. Autoclaves:**

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| --- | --- |
| **Step** | **Action** |
| **1** | * Autoclaves should be serviced on a regular schedule, usually every 3 months and documented on the Maintenance log.
 |
| **2** | * Weekly sterility checks must be performed using a biological indicator and documented on the Maintenance log.
 |
| **3** | * Clean and wipe down interior of autoclave monthly or as needed with appropriate disinfectant.
 |
| **4** | * All corrective action is noted on the Maintenance log.
 |
| **5** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**N. Anaerobic Chambers:**

|  |  |
| --- | --- |
| **Step** | **Action** |
| **1** | Gas pressure and temperature are checked daily and recorded on the Maintenance log |
| **2** | The anaerobic indicator strip is checked, results recorded on the Q.C. log and replaced with a fresh strip daily. |
| **3** | The catalyst is replaced daily. |
| **4** | Excess moisture is wipe up daily |
| **5** | * All corrective action is noted on the Maintenance log.
 |
| **6** | * Maintenance logs are reviewed by the supervisor monthly.
 |

**O. Thermometers:**

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| --- | --- |
| **Step** | **Action** |
| **1** | * At daily temperature check, thermometers should be inspected for any cracks, bubbles, or dirt and cleaned as necessary.
* All cracked or bubbled thermometers must be take out of service and documented on Maintenance log.
 |
| **2** | * All thermometers are verified at initial use and yearly thereafter.
* See Thermometer Calibration Verification SOP.
 |
| **3** | * All corrective action is noted on the Maintenance log and reviewed by the supervisor monthly.
 |

**References**:

1. Clinical Laboratory Standards Institute (CLSI). *Laboratory Instrument Implementation, Verification, and Maintenance: Approved Guideline.*  CLSI GP31-A. Clinical and Laboratory Standards Institute, 940 West Valley Road, Suite 1400, Wayne, PA 19087
2. College of American Pathologists (CAP) 2021. Commission on Laboratory Accreditation, Laboratory Accreditation Program; All Common Checklist manual (2021).
3. DAIDS Good Clinical Laboratory Practice Guidelines v. 4.1. Effective 16 Aug 21.

**Appendices**

A. Laboratory Equipment Maintenance Log Example