SOP: Standardized Equipment Calibration Protocols

This SOP details the **standardized equipment calibration protocols**, covering the procedures for regular calibration, verification of accuracy, documentation requirements, calibration frequency, and responsibilities. The objective is to ensure all equipment is properly calibrated to maintain precision, reliability, and compliance with industry standards, ultimately enhancing quality control and operational efficiency.

1. Purpose

To establish standardized procedures for calibration of equipment to ensure accurate, reliable, and compliant operations.

2. Scope

This SOP applies to all personnel involved in the calibration, operation, and maintenance of equipment requiring routine calibration within the organization.

3. Definitions

- **Calibration:** The process of configuring an instrument to provide a result within an acceptable range.
- **Verification:** Confirmation that the equipment is providing accurate measurements as per required standards.
- **Reference Standard:** A device or material used to calibrate equipment, traceable to national or international standards.

4. Responsibilities

- **Calibration Technician:** Conducts calibrations, records results, and reports anomalies.
- **Department Supervisor:** Reviews calibration records, schedules calibration activities.
- **Quality Assurance (QA):** Verifies compliance with calibration SOP and maintains documentation.

5. Calibration Procedures

1. Identify the equipment scheduled for calibration as per the maintenance log.
2. Review the equipment's previous calibration data and manufacturer's instructions.
3. Gather necessary reference standards and ensure they are up-to-date and traceable.
4. Perform calibration steps as per equipment-specific guidelines, using the approved reference standard.
5. Record all calibration data, including:
    - Date and time
    - Equipment ID
    - Reference standard used
    - Results (before and after adjustment)
    - Technician's name and signature
6. Label equipment with calibration date and due date for next calibration.
7. Notify supervisor and QA of any discrepancies or failed calibrations.

6. Verification of Accuracy

- Perform verification checks at intervals specified in the calibration schedule.
- If equipment fails verification, remove it from service and initiate troubleshooting or recalibration.

7. Calibration Frequency

Equipment Type	Calibration Frequency	Reference Standard
Balances/Scales	Monthly or before critical use	Certified calibration weights
Thermometers	Quarterly	NIST-traceable reference thermometer

Pipettes	Semi-annually	Gravimetric method
pH Meters	Before each use	Certified buffer solutions
Other Critical Instruments	As specified by the manufacturer or risk assessment	Appropriate traceable standards

8. Documentation Requirements

- Maintain a calibration record for each piece of equipment (electronic or paper format).
- Archive records for at least **5 years** or as mandated by regulatory standards.
- Include reference standard details, environmental conditions, and calibration results.
- All calibration forms must be signed and dated by the responsible technician.

9. Nonconformity and Corrective Actions

- Report and document all calibration failures or deviations immediately.
- Remove nonconforming equipment from use until corrective actions are complete.
- QA to review, investigate, and document actions taken to resolve nonconformances.

10. References

- Manufacturer equipment manuals.
- ANSI/NCSL Z540-1-1994 or ISO/IEC 17025 (as applicable).
- Internal calibration policies and regulatory requirements.

11. Revision History

Version	Date	Description	Approved By
1.0	2024-06-16	Initial issue	QA Manager