

Torque Wrench Calibration Verification and Usage Procedure

1.0 Maintenance Objective & Frequency

The objective of this procedure is to verify the calibration accuracy of torque wrenches used in critical fastening applications on manufacturing equipment. Proper torque ensures joint integrity, prevents fastener loosening due to vibration, and avoids thread stripping or bolt fracture. This verification must be performed at the start of each shift or prior to any critical fastening operation, and the wrench must be formally calibrated by an accredited laboratory every 12 months or after 5,000 cycles, whichever comes first.

2.0 Lockout/Tagout (LOTO) & Safety

- No machine energy isolation is required for this procedure as it is performed on a bench with a calibration fixture.
- Wear safety glasses to protect against debris or tool slippage.
- Ensure the calibration fixture is securely mounted to a rigid workbench to prevent tipping.
- Keep hands clear of the wrench handle during loading to avoid pinch points.

3.0 Required Tools, Parts & Lubricants

- Torque wrench under test (click-type, dial, or digital)
- Certified torque calibration fixture (e.g., CDI Torque Tester or equivalent, with current NIST-traceable calibration certificate)
- Appropriate socket or adapter to fit the wrench drive and calibration fixture input
- Clean lint-free cloth
- Calibration log sheet or digital CMMS (ServiceGrid) for recording results
- Permanent marker or label for tagging out-of-calibration tools

4.0 Step-by-Step Maintenance Procedure

1. Inspect the torque wrench for physical damage, corrosion, or excessive wear. Ensure the drive head, ratchet mechanism, and adjustment knob operate smoothly. Clean the drive square and socket with a lint-free cloth.
2. Set the torque wrench to its lowest setting and cycle it three times to distribute internal lubricant. Then set the wrench to the desired test torque value (typically 20%, 60%, and 100% of full scale for a three-point check).
3. Mount the torque wrench to the calibration fixture using the correct socket or adapter. Ensure the wrench handle is perpendicular to the fixture axis and that the drive square is fully seated.
4. Zero the calibration fixture display. Apply a smooth, steady pull to the wrench handle at a rate of approximately 1 second per 10 degrees of rotation. Do not jerk or apply impact force.
5. For click-type wrenches, note the peak torque reading on the fixture at the instant the wrench clicks. For dial or digital wrenches, read the fixture value when the target torque is reached. Record the reading on the calibration log.

6. Repeat the test at the same torque setting two more times, allowing 30 seconds between pulls for the wrench to stabilize. Calculate the average of the three readings.
7. Repeat steps 4 through 6 for the remaining test points (e.g., 20% and 100% of full scale). The wrench is acceptable if the average reading at each point is within $\pm 4\%$ of the set value for general industrial use, or within $\pm 2\%$ for critical applications (per ASME B107.300).
8. If the wrench fails any test point, tag it as 'Out of Calibration – Do Not Use' and remove it from service. Initiate a corrective work order in ServiceGrid for recalibration or replacement.
9. If the wrench passes all test points, record the calibration date, next due date, and technician signature in the CMMS. Attach a calibration sticker to the wrench body indicating the verification date and due date.
10. Store the torque wrench in its case or on a designated rack with the adjustment knob set to the lowest setting to relieve spring tension.

5.0 Verification & Return to Service

1. Confirm that the calibration fixture itself is within its own calibration validity period (check sticker or certificate). If expired, do not use and quarantine the fixture.
2. Perform a final functional check by using the torque wrench to tighten a test fastener to a known value (e.g., 50 Nm) and verify with a separate, calibrated torque wrench or torque analyzer.
3. Update the tool inventory in ServiceGrid with the new calibration status and next due date.
4. Return the torque wrench to the tool crib or designated storage location. Notify the maintenance team that the tool is ready for use.

Regulatory Disclaimer: This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.