

Electric Forklift Lithium-Ion Battery Charging and Inspection SOP

1.0 Maintenance Objective & Frequency

The objective of this procedure is to ensure safe charging and daily visual inspection of lithium-ion batteries in electric forklifts. Proper charging practices prevent thermal runaway, extend battery cycle life, and reduce unplanned downtime. This SOP is to be performed daily before the first shift or after each charging cycle.

2.0 Lockout/Tagout (LOTO) & Safety

- **Electrical Isolation:** Turn the forklift key switch to OFF and remove the key. Disconnect the battery connector from the forklift before charging.
- **Charger Isolation:** Ensure the charger is disconnected from the mains supply before inspecting or cleaning the charger cables.
- **PPE:** Wear safety glasses, insulated gloves (rated for DC voltage up to 100V), and non-conductive footwear.
- **Fire Safety:** Keep a Class D fire extinguisher (for lithium fires) within 10 feet of the charging area. No open flames or sparks.
- **Ventilation:** Ensure the charging area is well-ventilated to dissipate any potential off-gassing (though Li-ion does not vent under normal conditions).

3.0 Required Tools, Parts & Lubricants

- Approved lithium-ion battery charger (matching voltage and amperage per OEM spec)
- Insulated hand tools (for terminal inspection, if required)
- Clean, dry lint-free cloth
- Digital multimeter (rated for DC voltage up to 100V)
- Thermal imaging camera or non-contact infrared thermometer
- Battery management system (BMS) diagnostic tool (if available)
- Class D fire extinguisher

4.0 Step-by-Step Maintenance Procedure

1. Park the forklift in the designated charging area. Ensure the area is clean, dry, and free of combustible materials. Turn the key switch to OFF and remove the key.
2. Visually inspect the battery casing for cracks, bulges, or signs of swelling. If any deformation is found, do not charge the battery. Tag it as defective and contact the battery supplier.
3. Inspect the battery connector and charging cable for frayed wires, melted insulation, or corrosion. Use a clean, dry cloth to wipe any dirt or moisture from the connector pins.
4. Using a digital multimeter set to DC voltage, measure the battery pack voltage at the connector terminals. Record the voltage. It should be within the OEM-specified range (typically 48V to 80V depending on the model).

5. Connect the charger cable to the battery connector. Ensure the connection is fully seated and locked. Then plug the charger into the mains supply.
6. Verify that the charger display indicates a proper connection and that the charging cycle has started. The BMS should show a charging status (e.g., constant current or constant voltage mode).
7. During the first 15 minutes of charging, use a thermal imaging camera or infrared thermometer to scan the battery surface and connector area. The temperature should not exceed 45°C (113°F). If any hot spots exceed 50°C, stop charging immediately and investigate.
8. Allow the charging cycle to complete automatically. Do not interrupt the charge unless an anomaly is detected. The BMS will terminate charging when the battery reaches full state of charge (typically 100% SOC).
9. Once charging is complete, disconnect the charger from the mains supply first, then disconnect the charger cable from the battery connector. Inspect the connector again for any signs of overheating (discoloration, melting).
10. Reconnect the battery connector to the forklift. Turn the key switch ON and verify that the forklift's battery gauge shows a full charge. Perform a brief test drive (forward and reverse, lift and tilt) to confirm normal operation.

5.0 Verification & Return to Service

1. Confirm that the battery voltage after charging is within OEM specifications (e.g., 54.6V for a 48V nominal pack). Record the voltage and temperature in the PM log.
2. Verify that the BMS reports no fault codes. If a diagnostic tool is available, download the BMS log for review.
3. Perform a full functional test of the forklift: drive at low and high speeds, lift and lower the forks, and tilt the mast. Ensure all functions respond smoothly.
4. If any abnormalities were detected during inspection or charging, tag the forklift as 'Out of Service' and submit a work order in ServiceGrid for further diagnostics.
5. Sign off on the PM work order in ServiceGrid, noting the battery voltage, temperature, and any observations. Return the forklift to production.

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.