
Lithium Ion Battery Storage and Thermal Runaway Emergency Protocol

1.0 Objective & Intent

The objective of this Standard Operating Procedure (SOP) is to establish clear, enforceable safety protocols for the storage of lithium-ion batteries and the immediate emergency response to a thermal runaway event. This procedure is designed to mitigate the risk of fire, explosion, and toxic gas release associated with damaged, defective, or improperly stored lithium-ion batteries. Compliance with WorkSafeBC regulations, including the Occupational Health and Safety Regulation (OHSR) Part 5 (Chemical Agents) and Part 21 (Fire and Explosion), is mandatory. The specific risk this SOP mitigates is the catastrophic failure of lithium-ion batteries leading to uncontrolled thermal runaway, which can cause severe burns, respiratory injury, and structural damage to the facility.

2.0 Operational Scope

This procedure applies to all maintenance personnel, production operators, warehouse staff, and supervisory personnel who handle, store, or work in proximity to lithium-ion batteries used in cordless power tools, mobile equipment, or backup power systems within the cabinet and millwork manufacturing facility. It covers all battery storage areas, including designated charging stations, tool cribs, and temporary staging zones. This SOP does not apply to batteries integrated into finished products or those under active use in handheld tools during a single shift, provided they are not left unattended.

3.0 Hazard Identification & Mandatory PPE

- Thermal Runaway: Uncontrolled exothermic reaction leading to fire, explosion, and release of toxic hydrogen fluoride gas.
- Electrical Shock: Short circuits from damaged terminals or exposed wiring.
- Chemical Burns: Electrolyte leakage (flammable and corrosive organic solvents).
- Fire and Explosion: Rapid ignition of flammable electrolyte vapors.
- CSA-Approved Safety Glasses with side shields (mandatory at all times in storage areas).
- Heat-Resistant Gloves (e.g., leather or Kevlar) rated for at least 500°F (260°C) when handling suspect batteries.
- Chemical-Resistant Apron (e.g., neoprene or PVC) when handling leaking batteries.
- Full-Face Shield (required during emergency response or inspection of damaged batteries).
- CSA-Approved Steel Toed Boots with electrical hazard rating.
- Nitrile Gloves (inner layer) under heat-resistant gloves for chemical protection.

4.0 Required Safety Equipment & Tools

- Class D Fire Extinguisher (copper powder or sodium carbonate) specifically rated for lithium metal fires. Do not use water, foam, or CO2 on a lithium-ion battery fire.
- Lithium-Ion Battery Containment Bag or Metal Drum (with loose-fitting lid) for isolating damaged or suspect batteries.
- Non-Contact Infrared Thermometer to monitor battery surface temperature.
- Insulated Tools (e.g., pliers, cutters) for disconnecting terminals without creating sparks.
- Spill Kit (absorbent pads, neutralizer for electrolyte, disposal bags) for chemical leaks.
- Portable Gas Detector (capable of detecting hydrogen, carbon monoxide, and volatile organic compounds) for use during suspected thermal runaway.

- Emergency Eyewash Station (within 10 seconds travel distance from storage area).
- Fire Blanket (for smothering small fires if safe to approach).

5.0 Step-by-Step Safety Procedure

1. Inspect all incoming lithium-ion batteries for physical damage (cracks, dents, swelling, leaks) before accepting delivery or placing into storage. Reject any damaged batteries and quarantine them in a containment bag in a designated isolated area.
2. Store all lithium-ion batteries in a cool, dry, well-ventilated area away from combustible materials, heat sources, and direct sunlight. Maintain ambient temperature between 5°C and 25°C. Do not store batteries in metal cabinets unless the cabinet is specifically designed for battery storage with ventilation.
3. Ensure battery terminals are covered with non-conductive caps or tape to prevent short circuits. Do not store loose batteries in drawers or bins where they can contact metal objects. Use individual plastic battery cases or original packaging.
4. Charge batteries only on non-combustible surfaces (e.g., concrete, metal charging rack) in a dedicated charging area with a Class D fire extinguisher within 10 feet. Never leave batteries charging unattended overnight or outside of working hours.
5. If a battery shows signs of thermal runaway (hissing, swelling, smoke, or temperature above 60°C measured by infrared thermometer), immediately evacuate the immediate area and activate the fire alarm. Do not attempt to move the battery unless it is safe to do so using insulated tools and heat-resistant gloves.
6. If safe to approach and a small fire is contained (e.g., in a charging rack), use a Class D fire extinguisher to smother the flames. Do not use water, foam, or CO2. If the fire is larger than a wastebasket or spreading, evacuate the building and call 911 immediately.
7. For a leaking battery without fire, don full PPE including face shield and chemical-resistant apron. Use insulated pliers to carefully place the battery into a containment bag or metal drum filled with dry sand or vermiculite. Seal the container loosely to allow gas venting.
8. After the incident, ventilate the area thoroughly using exhaust fans or by opening doors. Use a portable gas detector to confirm no flammable or toxic gases remain before re-entering. Document the event in the incident log and notify the safety officer.
9. Dispose of damaged or thermally runaway batteries as hazardous waste. Contact a licensed hazardous waste transporter. Do not place in regular trash or recycling. Label the containment container with the date, battery type, and 'Hazardous Waste - Lithium Ion Battery'.
10. Conduct a weekly inspection of all battery storage areas to ensure compliance with this SOP. Verify that fire extinguishers are in place and not expired, containment bags are available, and no batteries show signs of damage or swelling. Document inspections on the SafeDesk digital checklist.

Regulatory Disclaimer: This document is a generic safety template provided for educational and informational purposes only. It does not constitute professional engineering, legal, or regulatory compliance advice. The end-user assumes all liability for validating all safety protocols against specific machinery manufacturer manuals and local occupational health and safety regulations (e.g., WorkSafeBC, CSA standards) before deployment.