

What?

Lithium-ion batteries have changed the world of power tools like few other technologies. While misuse of tools and batteries can lead to unsafe situations, operation has become safer by removing restrictive power cords and handling tools with proper care. Choose safety and always use batteries for their intended purposes. When lithium batteries fail to operate safely, or are misused they may present a fire or explosion hazard. Damage from improper use, storage, or charging may also cause lithium batteries to fail.



Hazards

Damage to lithium batteries can occur immediately or over a period of time, from physical impact, exposure to certain temperatures, and/or improperly charging lithium-ion batteries:

- Physical impacts that can damage lithium batteries include dropping, knocking, crushing, vibrating, and puncturing.
- Damage to all types of lithium batteries can occur when the temperatures are too high (e.g., above 100°F/38°C) external heat sources can also accelerate failure in cells with defects or damage from other causes.
- Damage to lithium-ion batteries can occur when the batteries themselves or the environment around the batteries is below freezing (32°F/0°C) during charging.
- Charging in temperatures below freezing can lead to permanent metallic lithium buildup (i.e., plating) on the anode, increasing the risk for failure.
- Charging a device or battery without following manufacturer's instructions may cause damage to rechargeable lithium-ion batteries.
 - For example, some manufacturer-authorized chargers will cycle the power to the battery on and off before it is fully charged to avoid overcharging.
 - Since ultra-fast chargers may not cycle power, do not use them unless the manufacturer's instructions include them as an option.
- Both defects in, and damage to, lithium batteries can lead to battery failure. Heat released during cell failure can damage nearby cells, releasing more heat in a chain reaction (i.e., thermal runaway). The high energy density in lithium batteries makes them more susceptible to hazardous thermal runaway. Lithium cell failures can result in chemical reactions and/or combustion reactions (Fire).

Prevention

Workplace injuries from lithium battery defects or damage are preventable and the following guidelines will assist in incorporating lithium battery safety into an employer's Safety and Health Program:

- Ensure lithium batteries, chargers, and associated equipment are tested in accordance with an appropriate test standard (e.g., PAT Testing) and are rated for their intended use.
 - Follow manufacturer's instructions for storage, use, charging, and maintenance.



- When replacing batteries and chargers for an electronic device, ensure they are specifically designed and approved for use with the device and they are purchased from the device's manufacturer or a manufacturer authorised reseller.
- Remove lithium-powered devices and batteries from the charger once they are fully charged.
- Store lithium batteries and devices in dry, cool locations and in fire-resistant containers.
- Avoid damaging lithium batteries and devices. Inspect them for signs of damage, such as bulging/cracking, hissing, leaking, rising temperature, and smoking before use, especially if they are wearable. Immediately remove a device or battery from service and place it in an area away from flammable materials if any of these signs are present.
- If batteries are damaged, remove from service and dispose in accordance with local regulations. Contact a local battery recycling centre for disposal instructions.
- Follow the employer's policy or manufacturer's guidance on how to extinguish small battery fires, which could include using CO₂, foam, Class D fire extinguishers (for lithium-metal), ABC dry chemical extinguishers, dirt, or sand.

General handling and use:

- Protect battery against mechanical damage.
- Use carefully in wet conditions to protect against intrusion of liquids (DO NOT allow intrusion of conductive or corrosive liquids).
- Use in accordance with manufacturer instructions and requirements.
- Store properly.
- Only use original equipment manufacturer batteries that are designed for the tool and charger.
- Ensure batteries are kept away from metal objects and liquids when transporting.
- Store away from combustible materials.

Safe charging:

- During charging and storage, keep flammable materials away from the charger and battery.
- Keep the charger and batteries away from direct sun or any heat source.
- The battery should always be removed from the tool/charger when not in use/charging.

Discontinue use, remove the battery to a safe location, and contact the manufacturer if:

- There are any abnormalities in the charging process, and stop charging
- Less than full SOC (State of Charge) LEDs are indicated after a full charge process
- The battery is dropped or suffers any mechanical impact with noticeable damage to the housing
- Upon inspection, there are any signs of mechanical damage (punctures, cuts, or deformation in the housing); inspect the battery regularly (before each work shift).

Disposal:

When replacing batteries, don't throw them away. Batteries can be recycled by taking them to a recycling facility. You can also check with manufacturer to see if they recycle batteries.



Important Points to Remember:

- You must always remove damaged, defective or failing batteries from service right away.
- When disposing of a lithium battery or device that contains a lithium battery, you should always do so in a way that is safe and appropriate; for example, it may need to be dropped off at the nearest electronics recycling facility in a timely manner as these are items you don't want to stock pile or keep on site unnecessarily.
- **Fires involving lithium batteries** are different from other types of fires and require special means to suppress, control and eliminate them. Follow the manufacturer's instructions regarding the proper method to extinguish a small battery fire, such as an ABC dry chemical fire extinguisher, a Class D fire extinguisher (for lithium-metal), dirt or sand.

Do you have any questions for me?

NOTE: Failure to comply with safety instructions and RAMS may result in disciplinary actions

Serial	Name	Date of Toolbox Talk	Signature	Site

By signing this register you are confirming that you attended the toolbox talk and understand the requirements for: Lithium-Ion Batteries in Power Tools safety