

Lithium-ion Battery Fires:

What You Need to Know

Lithium-Ion Battery Hazards

Lithium-ion batteries can overheat, catch fire, and explode due to a chain reaction called thermal runaway. This happens when the battery rapidly increases in temperature, releasing energy and potentially causing catastrophic failure. Lithium-ion battery fires are very aggressive, spread quickly, reignite, and are difficult to extinguish. They can also release toxic gases, smoke, and heat.

Common cause of lithium-ion battery failure

- Thermal abuse (thermal shock, or localized high-temperature)
- Electrical abuse (overcharging /discharging and short circuit)
- Mechanical abuse (damage to shell casing, collision, or impact damage)

How Can I Prevent a Lithium-Ion Based Fire?

Thermal runaway (occurs when the lithium-ion cell enters an uncontrollable, self-heating state)

- Temperatures above optimum levels: Lithium batteries at or above 130°F are susceptible to damage and overheating. External heat sources can contribute to damage of the cells leading to thermal runaway.
- Temperature below optimum levels: Temperatures below freezing at 32°F during charging can lead to metallic lithium plating on the anode (lithium metal buildup), increasing the risk of short circuits and increased internal heat of the battery.

Mechanical Damage

- Never use batteries or devices that show signs of mechanical damage such as being cracked, dented, crushed, or punctured.
- Never store batteries or devices in areas where they can be exposed to moisture or heat.

Electrical Abuse

- **Avoid overcharging** - Overcharging is the most dangerous type of electrical abuse and one of the most frequently observed reasons for Li-ion safety incidents.

Environmental Impact

- Lithium-ion batteries contain toxic metals that can contaminate water supplies and ecosystems.
- Improper disposal of lithium-ion batteries in landfills can lead to contamination of water systems and the environment or cause landfill fires.

What to Do if Your Lithium-Ion Device Catches Fire?

For small lithium-ion battery fires, a foam extinguisher, CO2 extinguisher, ABC dry chemical extinguisher, water mist extinguisher, sand, or baking soda may be used. A common misconception is that water will create combustible hydrogen, however, the lithium inside of these batteries are lithium salt electrolyte and not pure lithium metal. Pure lithium metal is highly reactive with water, while lithium salts are non-reactive with water.

For large fires exit the location and call **911**.

Tips When Using, Charging, Maintaining & Storing:

Lithium-ion batteries in devices like phones, tablets, e-scooters, e-bikes, and similar are rechargeable, small, and powerful. While they offer many benefits in technological advancement if used incorrectly, they can overheat, catch fire, or explode. It is important to know how to properly use, store, and charge your lithium-ion battery devices.

Safety Tips

- Only purchase and use certified UL 1642 devices.
- Only use the battery that is designated for the device.
- Only use the charging cord designated for the device.
- Only charge one device or device battery at a time to prevent overloading the circuit.
- Only Charge devices on a non-combustible surface: **Do Not** charge on a pillow, bed, or couch!
- Remove the device from the charging station once the battery is fully charged: **Do Not** continue to charge after the battery is fully charged!
- Plug directly into an electrical wall outlet for charging: **Do Not** use extension cords!
- Only charge devices during wake hours: **Do Not** charge a device while sleeping.
- Do not charge, or store e-bikes, e-scooters, and other devices near a primary exit.
- Keep batteries/devices at room temperature and away from heat or direct sunlight: **Do Not** charge devices below 32°F or above 105°F.

What are Warning Signs of a Lithium-ion battery Fire?

Look out for these warning signs that a failing Li-ion battery may catch fire

- An odor from the device.
- Change in color or shape.
- Leaking or odd noises from the device.
- The device is extremely hot to the touch or is smoking.
- The device is not keeping a charge.

How Do I Dispose of Lithium-Ion Batteries?

- Take lithium-ion battery devices to an e-waste location on campus: [E-Waste Drop-Off Locations](#)

Do not dispose of lithium-ion battery devices in regular trash. It is illegal to discard electronic waste in a landfill per Public Law 94-580, or the Resource Conservation and Recovery Act.