



MSU DAWG TRACKS

Lithium batteries are found in everything from cell phones and cordless drills to electric vehicles. Their popular use is due to this battery's high-power capacity in a relatively small package.

There are several different types of lithium batteries, some rechargeable and some non-rechargeable, both of which are generally safe and unlikely to fail; but only as long as there are no defects or damage.

When lithium batteries fail to operate safely or are damaged, they may present a fire or explosion hazard. Damage can occur immediately or over a period of time, caused by ...

- Improper use, storage, or charging.
- Physical impacts - dropping, crushing, or puncturing.
- Exposure to extreme temperatures.
 - Too high (above 130°F); open flames, continuous direct sun exposure, heaters, etc.
 - Too low (below freezing, 32°F) during charging.

All the above results in cell failure, releasing intense heat and damaging other nearby cells causing a chain reaction known as a thermal runaway. The high energy density in lithium batteries makes them more susceptible to these reactions. Lithium cell failures can result in chemical and/or combustion reactions, which can result in heat releases and/or over-pressurization quickly leading to acid exposure, smoke, fire, or explosion.

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Lithium battery fires are extremely difficult to extinguish. Fire extinguishers may only temporarily knock the flames down and large amounts of water are often ineffective. Lithium fires usually re-ignite and have to burn-out before no longer a threat. Therefore, isolating the burning object from other material is often the only way to prevent the spread of a lithium battery fire.

The reality of lithium battery incidents makes prevention steps that much more important:

- ✓ Ensure lithium batteries, chargers, and associated equipment are a high-quality product (recognized by national testing standards; example: UL).
- ✓ Store, use, and maintain by that particular manufacturer's recommendations.
- ✓ When replacing lithium batteries, ensure they are specifically designed for and match that device.
- ✓ Remove lithium-powered devices and batteries from the charger once they are fully charged.
- ✓ Store lithium batteries and devices in dry, cool locations.
- ✓ Clean batteries with a clean, slightly damp cloth; do not use solvents.
- ✓ Avoid damaging lithium batteries and devices.
- ✓ Inspect them for signs of damage, such as bulging/cracking or rising temperature.
- ✓ If they are damaged, leaking, smoking, remove them from service and isolate them from everything else. For example, smaller batteries can be placed outside in a fire-resistant container (e.g., metal drum).

To see some examples of lithium battery fires:
<https://www.youtube.com/watch?v=8nz5ijXcckI>

Sources:

<https://www.osha.gov/sites/default/files/publications/shib011819.pdf>

<https://www.dewalt.com/why-dewalt/featured-articles/battery-safety>