



Home fire safety fact sheet

Lithium-ion batteries

Many portable devices today are powered by rechargeable lithium-ion batteries. Lithium-ion batteries are widely used, powering many households' rechargeable devices, including:

- Toys and handheld gaming devices
- Power tools
- E-bikes and e-scooters
- Mobility devices such as mobility scooters
- Mobile phones and smartphones
- Smart watches and fitness trackers
- Laptops and tablets
- Vapes and e-cigarettes
- Electric and hybrid vehicles
- Home energy storage systems (home solar batteries)

Lithium-ion batteries are a type of rechargeable battery that can store a large amount of energy in a smaller amount of space than traditional batteries. They are also comparatively lightweight and more compact than other battery types. Lithium-ion batteries have a unique structure which contains highly flammable electrolytes, making their safe use essential. To minimise safety risks, lithium-ion batteries should always be used and charged according to the manufacturer's instructions.

How do I know if I have a Lithium-ion batteries?

Lithium-ion batteries come in various shapes and forms, including cylindrical, prismatic (brick shaped), flat and pouch (device specific). Identifying them can be challenging as there is currently no requirement for labelling or standard marking. However, most lithium-ion batteries will have some form of marking on the device containing words such as, 'lithium-ion', 'Li-ion', 'li-po', 'lithium-polymer' or 'Li+'. If the battery is rechargeable and has 'Li' or 'lithium' printed on it, you can safely assume that it is a lithium-ion battery.

Minimise your risk

There are several avoidable situations which may lead to lithium-ion batteries catching fire, including:

- overcharging
- DIY battery building
- use of non-compliant or incompatible charging equipment
- use of non-compliant or incompatible spare batteries
- overheating and short-circuiting from exposure to heat or extreme temperatures
- physical damage (e.g. dropping, crushing, piercing and/or vibrations)
- short-circuiting, battery cell malfunctions or system faults
- modifying or tampering with battery system
- installing used batteries into a new or different device, including the use of poor quality, non-genuine or non-compatible batteries and charging equipment
- Improper storage.

To minimise the risk of a lithium-ion battery incident, follow the below advice:

- Only plug in one electronic device per outlet.
- Charge larger devices, such as e-bikes and e-scooters outside and away from combustible materials whenever possible.
- Ensure a working interconnected smoke alarm or heat alarm is installed in any space where devices are charged and stored.
- Use chargers that are supplied with the device or that are recommended by the manufacturer. If a charger is not included, only use chargers from reputable brands and suppliers that are made for the device.
- Follow the manufacturers charging and operation instructions.
- Charge batteries on hard surfaces that can't catch on fire, like stone, concrete or tiles.
- Only charge devices when you are home so you can monitor their charging cycle.
- Disconnect the battery from the charger once the recommended charging cycle is complete.
- Ensure the battery and charger have no signs of damage, defects or electrical faults.

Warning signs: damaged batteries

When lithium-ion batteries fail, they may enter a process called 'thermal runaway'. Thermal runaway in lithium-ion batteries begins when the battery gets too hot and can't cool down fast enough. This creates a cycle where the heat keeps increasing, and can lead to fire or explosion. Thermal runaway can cause battery cells to burst violently, releasing toxic, flammable and explosive gases. This may lead to intense fires with sparks and jet-like flames. The resulting chemical reaction releases energy that is self-sustaining and can be difficult to extinguish.

Thermal runaway can occur at any time, and without any warning. Warning signs of thermal runaway include:

- Heat: A rapid rise in the temperature of the battery, feeling extremely hot to touch
- Appearance: Discolouration, blistering, bulging or swelling of the casing. Corrosion or crusting around terminals.
- Noise: Popping, hissing, whistling and crackling sounds.
- Odour: strong odours or leaking electrolytes (fluids).
- Vapour or smoke: Production of vapour, smoke and/or fumes.
- Flames: intense jet like flame.

Do not use batteries or devices that show signs of swelling or bulging, leaking, overheating, or signs of mechanical damage (cracked, dented, punctured, or crushed). Lithium-ion batteries with any sign of damage, or that have been exposed to water or liquid should be treated as damaged and highly dangerous.

If your battery or device is not on fire or smoking but does show signs of damage or risk of thermal runaway, providing it is safe to do so, disconnect the device from the power supply and move the device outside away from any combustible items and call Triple Zero (000).

Never touch a swollen or ruptured device or battery with bare hands as the heat and/or chemicals can cause severe burns.

Safe disposal

Safe disposal – undamaged lithium-ion batteries:

- Never dispose of lithium-ion batteries or devices in industrial waste, general household waste or recycling bins.
- When a battery is no longer able to keep a charge, it is considered end-of-life. Do not store end-of-life batteries together in a pile.
- If the battery is end-of-life, do not sell or donate the battery or device.
- Contact your local council for instructions about how to discard or recycle lithium-ion batteries in your local area.
- Tape over battery terminals with electrical tape before giving them to a disposal or recycling facility.

Safe disposal – damaged lithium-ion batteries:

- Do not touch a device or lithium-ion battery that is emitting vapour, gas, or is on fire.
- Never touch a swollen or ruptured device or battery with bare hands as the heat and/or chemicals can cause severe burns.
- Always use gloves/hand protection before touching or moving leaking batteries.
- Place leaking or damaged batteries in a plastic container, providing they are not hot to touch or producing gas.
- Fire or smoke-damaged batteries should be kept outside in a well-ventilated area and stored away from any other dangerous goods or materials that are combustible or flammable.
- Check safe disposal options at Recycle Mate, WasteMINZ or B-Cycle to safely dispose of lithium-ion batteries or products.

In an emergency

- In an emergency call Triple Zero (000)
- Do not touch anything that is on fire.
- If any device or battery starts to give off smoke or emit flames: Call Triple Zero (000)
- Evacuate the area and close doors behind you, this may slow the spread of smoke and fire.
- Do not re-enter the building for any reason, until the area is made safe by firefighters.
- Avoid inhaling the vented battery gases, vapour, and smoke as it is highly toxic.
- If anyone has been exposed to spilt electrolyte, flying debris, smoke, vapours, or flames, seek urgent medical assistance.
- Burns should be treated immediately with cool running water for at least 20 minutes. Burns larger than a 20-cent coin require emergency care. Call Triple Zero (000) and follow the advice of the operator.

If a small battery or device such as a smart phone or tablet starts overheating:

- If safe to do so, unplug it from the power outlet and move it to an outside area away from any combustible materials, windows or doorways.
- Be aware the device may be hot and could cause burns.
- Leave the building and call Triple Zero (000) even if you no longer see visible smoke or flames. There is a good chance that the battery might reignite if it has not been cooled enough.