Lithium-ion Batteries – guidance on safe use

Lithium-ion (Li-ion) batteries are commonly used in mobile phones, laptops, power tools and other equipment. They can pose a fire risk during use, charging or storage, particularly where larger more powerful batteries are involved.

Staff should follow these basic precautions:

- Do not cover a battery (e.g. phone) when on charge (including bedding and pillows).
- Do not charge a battery on or near combustible material (e.g. carpet, paper, fabric).
- Try to avoid charging overnight (unsupervised).

Risks

The main risk is fire caused by battery fault, overheating, damage, incorrect charging or misuse.

In a thermal runaway event Li-ion batteries generate oxygen ensuring that associated fires burn extremely hot and have a tendency to reignite after being initially extinguished. Fires can escalate with subsequent explosions which can spread the fire further. Additionally, toxic compounds are released by these fires in significant amounts & are extremely harmful.

There are a number of factors that can cause these batteries to ignite, the most likely being overheating and physical damage;

- **Overheating**: When a Li-ion battery is exposed to high temperatures, thermal runaway can occur which results in the battery heating up uncontrollably. Some of the more common reasons for thermal runaway are exposure to heat sources, being left in direct sunlight or internal factors such as a short circuit or internal damage.
- **Physical damage**: Puncturing, crushing or impact damage can cause internal short circuits and lead to thermal runaway, resulting in ignition and potential fire.
- **Manufacturing defects**: In low-cost batteries with less stringent quality controls, manufacturing defects such as impurities in the electrode materials or the incorrect assembly of the battery itself can increase the risk of thermal runaway and potential fires.
- **Overcharging or over-discharging**: Charging beyond manufacturer limits or allowing batteries to discharge too far can damage internal components. Operating the batteries at these extremes can lead to failure of internal components and overheating.
- **Incorrect use or modification**: DIY upgrades, altered batteries or unsuitable chargers can increase fire risk.

e-bikes, scooters & mobility aids

Staff, residents or service users may use e-bikes, scooters or mobility aids and request to charge them on site.

Workplace charging should be discouraged wherever possible. Where charging is necessary, it must be approved by the Premise Manager and subject to the below controls where possible.

Controls for the safe procurement, use & charging of Li-ion batteries

- Use only the original battery and charger, or manufacturer-approved replacements. After-market alternatives must not be used.
- Chargers **must** display the UKCA safety mark.
- Carry out visual condition checks before charging.
- PAT test chargers annually.
- Charge only in a controlled area that is:
  - Away from busy or populated work areas
  - Clear of emergency exit routes, corridors, kitchens and shared areas
  - Not in bedrooms, including residential care settings
  - Free from combustible materials wherever possible
  - Protected by smoke detection and a fire door kept shut or located in a suitable weatherproof outbuilding.

- Remind staff, residents and service users that Li-ion battery fires can:
  - Start suddenly following overheating, damage or misuse
  - Develop rapidly through thermal runaway
  - Burn intensely and spread quickly
  - Produce harmful toxic gases.

- Emergency procedure:
  - **Do not** attempt to fight a Li-ion battery fire.
  - Evacuate the immediate area and close doors behind you.
  - Raise the alarm at the nearest call point, or by any available means.
  - Follow the site evacuation and emergency plan.
  - Call the Fire Service and state that a Li-ion battery is involved.
  - Move people away from smoke and toxic gases, considering wind direction where relevant.