LITHIUM-ION BATTERY FIRES

BRE investigates causes and consequences of lithium-ion battery fires in new research

***In collaboration with Electrical Safety First, the Building Research Establishment (BRE) fire safety research team has carried out tests into lithium-ion battery fires – the dangers of which are being increasingly well documented.***



The research work involved a series of tests on [lithium-ion batteries used in e-scooters and e-bikes](https://www.ifsecglobal.com/fire-news/are-e-scooters-and-similar-devices-the-new-major-fire-risk/), to understand what causes them to fail and observe what happens when they do.

The results demonstrate the explosive nature of [lithium-ion battery fires](https://www.ifsecglobal.com/fire-news/mitigating-the-risk-of-lithium-ion-batteries-eight-step-action-plan/), says the BRE, as a result of a process known as thermal runaway.

The tests were commissioned by Electrical Safety First, a charity campaigning to reduce deaths and injuries caused by electricity in UK homes.

The charity says it is concerned around the increasing number of incidents from such batteries. In a report published earlier this year, the charity found that [fires from lithium-ion batteries in e-bikes and e-scooters had claimed four lives](https://www.electricalsafetyfirst.org.uk/battery-breakdown/) in the first three months of 2023.

**Tests demonstrate explosive dangers of lithium-ion fires**

A series of methods were used to test the batteries and understand what caused them to fail. These included:

* Crushing
* Penetration with sharp objects
* Dropping from height
* Overcharging with an incorrectly specified charger
* Placing battery terminals next to each other to create a short circuit
* Placing them close to a heat source

During some of the tests, the BRE reported that cells inside the battery would fail, causing a state of thermal runaway, where heat from one of the cells ignites those next to it. Battery failures led to explosions, toxic gases, flames, sparks and significant amounts of smoke generation.

The [BRE’s Raman Chagger](https://www.linkedin.com/in/raman-chagger-bsc-hons-msc-ceng-fiet-762020140/), Principal Consultant (Fire Safety), says the work is intended to highlight the extent of the dangers associated with lithium-ion battery fires, but there is lots more still to do to.

He explains: “With the increasing use of lithium-ion batteries there is a growing fire risk, with these tests highlighting the dangers associated with them.

“Further research is required for the industry to properly understand and mitigate these risks, and we at the BRE are keen to carry out further investigation in future tests. We would welcome collaboration and support for further research, so please get in touch with us if this is something you are interested in.”

**Advice from Electrical Safety First**

To reduce the risk of fires, the charity recommends, among other things, to:

* Regularly check the condition of the battery
* Stop using/charging the battery as soon as you notice any damage and replace it
* Only use the charger supplied with the battery
* If the original charger is not available, obtain a replacement from the original manufacturer
* Don’t leave items on charge continuously
* Charge your batteries in a safe place
* Ensure that you have adequate early warning systems in place (in case of fire)