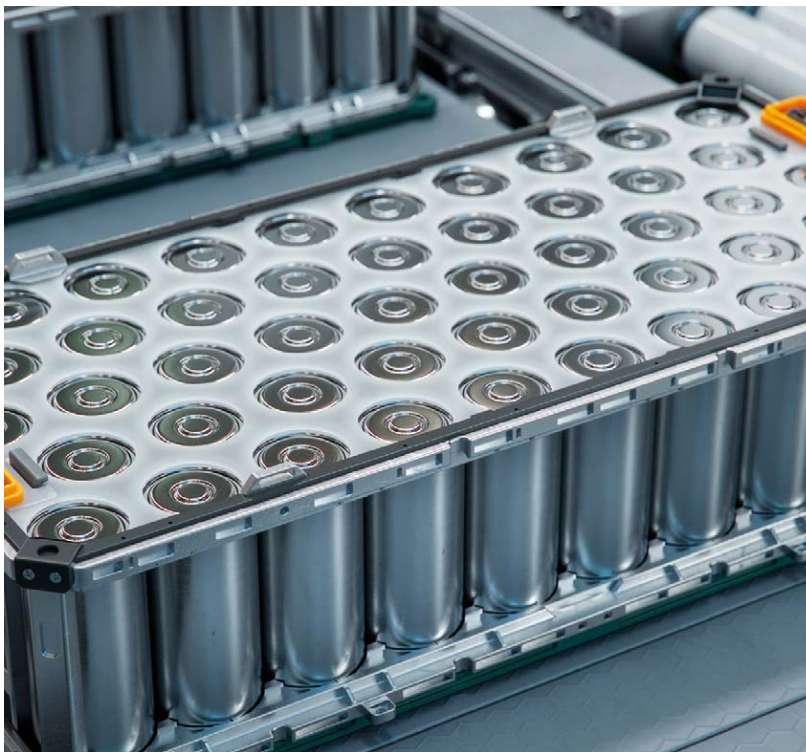


10 ways to mitigate risk in use and storage of lithium-ion batteries

As a leading business insurer, QBE is aware of the risks that lithium-ion batteries can pose in commercial and industrial environments. Adrian Simmonds, interim practice leader at QBE Europe, outlines the steps employers can take to mitigate the risks



Rechargeable lithium-ion batteries were first introduced in 1991. Today, they're everywhere.

Think about how many rechargeable devices are in your home and workplace – from the fitness tracker on your wrist, cell phone and computer, to e-bikes and electric vehicles. With a growing focus on sustainability influencing many – if not all – businesses, new applications

for lithium-ion batteries are being embraced, including for use in energy storage, power tools, forklifts and electric vehicles.

In normal use, lithium-ion batteries are stable and work as intended. However, these batteries are particularly sensitive to high temperatures and are inherently flammable, as well as being sensitive to cold temperatures and over-charging.

In certain circumstances – if the battery has been damaged by dropping, piercing or even heavy jolting, for example – a fault can cause a short circuit and severe overheating leading to thermal runaway: an irreversible pathway to fire.

Lithium-ion batteries can be difficult to deal with because they release a flammable and toxic vapour which helps to further fuel the fire. Fire extinguishers are available that release a water-based solution of a material called vermiculate. This seals around the damaged battery to limit further fire spread but it does not halt the thermal runaway. The thermal runaway process will continue under the vermiculate, and is waiting to accelerate again given the chance. This can reignite the fire even after hours or days or weeks of it seeming to be contained.

Any by-standers should evacuate and stay at least 10 metres away from the fire, as the explosive force of a fire and thermal runaway release can throw hot metal and burning chemicals many metres. No one should attempt to extinguish the fire unless they're trained and are using Lith-Ex extinguishers.

Ten strategies to mitigate risk

Mitigating lithium-ion fire risk can be addressed as part of emergency response plans for businesses. In addition to any contingency plans, general risk control recommendations around lithium-ion battery use and storage could include:

1. Establish a pre-defined emergency response plan to tackle damaged or overheating lithium-ion batteries. Key employees should be trained before lithium-ion batteries are permitted on site.
2. Avoid using lithium-ion batteries/ battery-powered equipment in extreme heat and freezing temperatures. Do not expose the battery to condensation, excessive humidity or water. Employees should be advised to never stack heavy objects on top of batteries or devices containing batteries.
3. Charge lithium-ion battery-powered personal mobility devices or mobile plant (such as forklift trucks and powered pallet trucks) in a fire-rated non-combustible structure, or room located outside the main building or attached to the external wall. Charging inside the main building requires a minimum four metres clearance from all combustibles and charging to be interlocked with localised or premises fire detection to shut off the power to the charger bay and raise a fire alarm.
4. Ensure all charging is completed during working hours. If battery charging is undertaken out-of-hours, additional, expensive control measures are recommended, such as dedicated fire-rated cabinets or battery charging rooms, early alert off-gas detection, and localised automatic fire suppression, such as water mist protection to contain fire spread.
5. If the battery is detachable, remove it from the equipment when it is not in use for extended periods. Lithium-ion batteries not in use must be stored in a cool, dry location, in a charged state. In industrial or vehicle workshop premises, where the state of

charge can be checked or changed, the batteries should be stored at 30 per cent SoC if being kept for extended periods, and certainly no more than 50 per cent. This is because the energy in a fire situation has been found to be significantly less at around 30 per cent than if the SoC is above 50 per cent, and it makes fire-fighting much easier.

6. Segregate lithium-ion batteries from other materials if bulk-stored in a warehouse, in a non-combustible, well-ventilated structure/room with sufficient clearance between the walls and the battery stacks. There should be clearance between batteries to allow air to circulate.

7. Control floor stacking of lithium-ion batteries in designated areas with limited stack heights, footprints and separation distances. Rack storage of lithium-ion batteries should not be permitted unless the building and the racks are fully sprinklered with solid metal horizontal and vertical barriers between each storage bay (use FM DS 8-9 Scheme A with horizontal and vertical solid barriers for every bay for an internationally accepted sprinklered rack storage protection standard).

8. Use a hand-held infrared temperature gun to perform thermography inspection for any battery that has, or may have sustained damage. Any deviation from the normally expected general temperature by 3°C or more on any individual lithium-ion battery package should be reported to management immediately so the pre-defined emergency response action plan can be initiated.

9. Maintain a steel bin partially filled with water (or similar arrangements) at least three metres clear of the

building, in readiness for any lithium-ion batteries with elevated temperatures to be placed into by a forklift truck. Other fire containment materials such as vermiculite or sand can be used to smother the affected battery. These measures might not stop the chemical fire from continuing but they will assist with fire containment.

10. Never open, destroy or incinerate a lithium-ion battery as it may leak or rupture, and release the ingredients they contain into the environment. Any swollen, dented or otherwise damaged batteries should be recycled or disposed of by a company qualified to do so.

Risk management services for QBE customers

QBE helps businesses build resilience through risk management and insurance.

Depending upon the size and complexity of the business needs, QBE customers can access a wide range of risk management services, self-assessment questionnaires and risk management toolkits which are focused on the key causes of claims, and on generating action plans for improved outcomes – including protecting employees, reducing risk and making claims less likely.

You can find out more about how QBE helps businesses to manage risk at: www.qbeeurope.com/risk-solutions



Adrian Simmonds,
interim practice leader
at QBE Europe