



SOMPO INTERNATIONAL RISK CONTROL SERVICES

Controlling the fire hazard of Lithium-ion batteries

The range of portable electronic and electrical equipment used in daily life is ever increasing. Laptops, tablets, smartphones, and other devices are commonplace in the majority of homes and businesses. We are also seeing an increase in large battery use in modes of transportation such as scooters, e-bikes and electric vehicles.

To meet the demand for these products, battery technology has developed rapidly. Lithium-ion batteries (LIB) have become the technology of choice thanks to their ability to provide a strong power source from a relatively small unit.

As the batteries and their chargers become more common, so are significant fire incidents attributed to their use. The electrolyte used in LIB's are hydrocarbon based and once alight, can lead to a chemical reaction known as thermal runaway. This is a very intense and rapidly growing exothermic reaction which can cause overpressure and explosion of the batteries as well fires which can be a challenge to extinguish.

Traditional fire-fighting techniques may not be effective on LIB fires as they can often reignite once extinguishing media is removed due to the ongoing chemical reaction.

Under normal conditions LIB's are generally safe, but there may be factors which can lead to dangerous situations, such as mechanical damage, external heat sources, or electrical faults.

This document provides an overview of the key controls for mitigating the hazard posed by LIB's in general use. It does not provide guidance for active fire protection for bulk storage locations.

Safety Controls:

There are practical and simple steps that can be taken to reduce the likelihood or severity of an event involving LIBs:

- Large flames can develop on a failing battery. Leave a free space of about 2-m (6.5-ft) around the equipment that is being charged along with the charging unit itself. This will prevent soft furnishings, curtains, clothes, papers, cardboard, and plastics from igniting and spreading the fire
- Wherever possible utilize the original charger and batteries. When not possible, only use replacement units from the original equipment manufacturer or a reputable seller but ensure that any replacement units are sized according to the need of the equipment. An incorrect charger can damage the battery, or not have the necessary safety systems.
- Batteries should be removed from chargers when charging is complete. Do not store or leave batteries on charger for extended periods.
- If small equipment is to be charged unattended, a check should be made first to ensure that chargers are working correctly, all connections are tight and all potential fire hazards identified and mitigated.
- Some small products such as electronic cigarettes contain LIB's. When charging, they should not be covered or left unattended.



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- The charging of vehicles and large batteries should be carried out either in a separate building of non-combustible construction reserved for this purpose or in a specially designed charging area. Charging areas should be in single storey buildings and should be separated from other areas by fire resisting construction, including door sets, offering at least a 60-minute fire resistance rating. Where this is not possible, consult with your Sompo International Risk Control specialist who can assist in developing alternative solutions.
- Do not charge equipment where they may block escape routes.
- Equipment should be included in regular electrical maintenance programs. Any damaged equipment should be removed from use and disposed of immediately. Damaged batteries should be removed from buildings and properly disposed of. A tell-tale sign of a damaged battery is swelling; however, this is not the only sign, rather one of the most common.



Fire Fighting:

The characteristics of how LIBs burn mean that careful consideration needs to be given to them within any emergency response plans. It may be that existing plans or resources need updating:

- The fire risk assessment for any location should consider the presence and use of LIBs and what controls are in place. At a minimum, residential dwellings should include easily accessible portable fire extinguishers strategically located on each level.
- LIBs may re-ignite once the fire is extinguished if they have not cooled enough. This is a particular challenge with larger battery units and firefighting strategies should take this into account.
- Firefighting measures should be proportionate to the risk with consideration given to provision of automatic firefighting systems. The most effective extinguishing agent for the application should be selected following the recommendations of the Fire Risk Assessment. Consult with your Sompo International Risk Control specialist to understand possible solutions.
- Automatic fire detection interfaced to a constantly attended or monitored location should be provided to set-up a prompt response.
- Storage cabinets with built in extinguishing systems may be suitable for small amounts of equipment.
- Burning LIBs can produce a large amount of toxic smoke and fumes. Adequate area ventilation should be provided to reduce exposure.



A proactive approach to addressing potential hazards is critical to keeping your property and employees safe. Please reach out to you Sompo International Risk Control Specialist or contact us at 1 877 667 5733 or RiskControlQuestions@sompo-intl.com for more information on how to minimize the risk.

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