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Fire and explosion risks associated with Lithium-ion batteries



Incident Notification



Alert



Information



Toolbox Talk



Introduction

We all use Lithium-ion batteries within our day to day lives, most commonly smartphones, computers, e-Bikes, e-Scooters, e-Cigarettes and Electrical Vehicles (EV). The use Lithium-ion batteries within construction industry is also increasing rapidly with them being used as as part of a wide range of plant, tools, and equipment. As we move towards a wider demand of applications it is crucial to understand how these batteries operate and how to use, store and maintain them safely.

Recently there has been several high-profile incidents in the press associated with Lithium-ion batteries failing resulting in serious fires / explosions. These events are also becoming more frequent within the construction and waste industry in the UK.

A recent report from the Fire Protection Association (FPA) Identified an estimated 700 fires every year in waste compactors and waste processing centres costing the industry £158 million each year. There have been 102 fires associated with e-Bikes and e-Scooters and 35 other Lithium-ion battery fires so far in 2023. Fires started by faulty Lithium-ion batteries have injured at least 198 people, with eight of these being fatal.

What is the concern?

With technology ever evolving and the demand for Lithium-Ion battery operated tools and equipment increasing this is resulting in more and more batteries being present on our projects.

Whilst Lithium-ion batteries are considered safe under normal operations, they can be highly reactive within the construction environment where they may be subject to heavy use with little maintenance. If there is a technical defect or a battery is damaged because of an abuse condition, the situation could quickly become critical. Lithium-ion batteries can fail or degrade due to various abuse conditions as indicated below.

Crushing - Through disposal

Penetration – Dropped batteries

Overcharging - causes the battery to discharge and leak rapidly

Overheating – Do not like to get hot!

Short Circuit – Spontaneous ignition



Damaged batteries can cause the battery to discharge and leak rapidly. The discharge process generates intense heat which is called "Thermal Runaway" with temperatures reaching between 1000 to 2000°C. This triggers a decomposition of the battery cell material affecting its stability. The result of this is a release of harmful and toxic gases venting from the battery as a vapour cloud, this is then followed by the ignition of the battery itself creating a self-oxidising fire that is extremely difficult to extinguish.

These fires are known to be fierce and can spread more rapidly than normal fires. Batteries can also reignite hours or even days after the event, even if cooled. Once damage has occurred batteries can explode and may spread a fire via projectiles.

Actions required by Skanska projects.

It is important that Skanska projects risk assesses the hazards associated with Lithium-ion batteries, ensuring that suitable arrangements are in place to raise awareness amongst our staff and supply chain on the safe use, management, maintenance and risks associated with them. Projects must provide suitable provisions for charging and disposing of batteries in a safe way.

1. Where battery charging cabinets are provided, these should be CE compliant fire resistant safety cabinets. Charging Stations should be positioned external to the building undergoing construction / refurbishment. If located within the building under construction / refurbishment Charging Stations require suitable fire resistant compartmentation (minimum 60 minutes) and an active means of fire detection should be provided.
2. Charging stations should ideally be installed on a time clock switch to prevent out of working hours charging.
3. Suitable class fire extinguishers must be in proximity of the charging point. (Example; Lithium-ion 1Ltr 60-100Wh fire extinguisher).
4. The charging of site equipment within the project offices or welfare environments is not permitted.
5. Suitable arrangements should be provided for the workforce to dispose of Lithium-ion batteries. Pyro bubble Boxes are considered the best solution.
6. Suitable arrangement for the storing of e-Bikes must be provided. These should be located external to the building away from fire exits and emergency escape routes. The charging of this equipment must not be permitted on site. Note: e-Scooters are prohibited on any Skanska project.

Actions required by supply chain members working on Skanska projects.

1. This briefing is to be issued to the workforce to further raise awareness on the safety concerns and arrangements relating to Lithium-ion batteries.
2. Trade contractors to ensure suitable daily and pre-use inspection of tools are carried out. Any damaged or defected tools / batteries are to be disposed of in a safe way.
3. Battery charging units are to have an in date PAT.

4. Ensure tool and equipment batteries are charged in suitable charging point locations - NOT within the open construction area or within the office environment.
5. Only use chargers, devices and batteries from reputable manufacturers.
6. Do not store batteries in direct sunlight.
7. Do not store or transport batteries in tool bags loose with other conducting tools / materials.
8. Tape over the terminals of batteries to prevent sparks - dead batteries can still spark. Tape helps prevent sparking and the discharge of energy.
9. If batteries are damaged use battery disposal bags / plastic zip bags and only dispose of them in designated areas.
10. Skanska do NOT permit the charging of e-Bikes or similar equipment on its premises – e-Scooters are prohibited on all Skanska projects.

Further Information

HSG 168 (3rd edition) "Fire Safety in Construction" now identifies Lithium-ion batteries as a significant source of ignition and pays particular attention to the safe use, maintenance and management of these modern batteries.

The Joint Code of Practice (JCOP) 10th edition amendment; now includes a completely new revision on the safe use of Lithium-ion batteries, Electric Vehicles (EV) and battery energy storage systems (BESS).

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