TfL Stay Connected Safety Alert - Lithium Cells - Small Tools

WHAT HAPPENED

A number of organisations have reported incidents with the lithium-ion batteries on power tools catching fire or exploding. Please follow link to watch the video that provides a chilling example of the type of fires that can occur.

https://www.linkedin.com/posts/bjoernkuiper_brandschutz-brandschutzexperte-kuiperbrandschutz-ugcPost-7008664079007424512-9aPG?utm_source=share&utm_medium=member_desktop

The use of battery powered tools is increasing, both in numbers being used and the size of tool for example disc cutters/floor saws with voltages increasing to up to 50 volts. The quality of packaging protecting the tools is becoming cheaper whilst the tools may be exposed to damage from rough handling such as being thrown around in the back of vans. This can increase the risk of the type of incident shown on the video increasing.

In addition to the fire risk, if the gasses produced from a fire were inhaled this could result in serious consequences with a potential risk to life!

An individual, who has spent some time in the recycling sector, has personally been involved in two major fires where people have attempted to recycle cells incorrectly.

Common ways in which damage to a battery can occur

Lithium-ion battery failures can occur due to imperfections in the construction of the cell or through abuse. Damage to cells, packs or modules can create the risk of fire. The damage could arise from incidents such as a simple impact, dropping or collisions in transit, piercing from tooling, shorting, over charging, being exposed to higher or lower temperatures than those the battery is designed for. Interestingly, once a battery has been damaged, fire or explosion is not instantaneous, it may take some time to develop symptoms such as swelling or heating.

Possible reactions once damaged

Lithium-ion batteries can react in a variety of different ways depending on the type of fault, the area that is damaged, state of charge and chemistry of the affected battery. It has been difficult to consistently predict the same failure behaviour of a cell, even in laboratory conditions.

• Damaged cells may vent / smoke without ignition.

• Fires may occur when the electrolyte ignites.

• A jet of flame and burning material being ejected from a single point can create a flare.

• The battery may burn or create a fireball, depending on the failure mode.

• The battery may also explode.

Lithium-ion cells can transition between reactions. Venting cells can catch fire, then explode, they may also vent then explode without catching fire.

Burning lithium-ion cells can and do create carbon dioxide and water. This smoke is generally made of hydrogen, carbon monoxide, carbon dioxide and a range of hydrocarbons although the exact composition of the smoke is dependent on the chemistry used. Fluorine can also be released from the battery, which can combine with hydrogen to produce hydrogen fluoride, this in turn will react with water, including water vapor or with mucus membranes in the human body to create hydrofluoric acid, nasty stuff!! Fumes of Fluorine inhaled at and once absorbed into blood reacts with blood calcium and may cause cardiac arrest, worthy of note for vulnerable people with conditions being at increased risk!!

Once a battery cell has failed the heat generated can cause other cells in close proximity (stored together or together in modules and packs) to fail, resulting in a chain reaction (also known as the snowball effect or runaway).

LEARNING POINTS / ACTIONS TAKEN

Detailed below are some thoughts on control measures for Lithium-ion battery hazards, their storage and movement.

- Correct storage and protection of batteries is vital to reduce the risk of damage. Batteries should be segregated as much as possible to prevent a failure propagating through storage or work areas.
- Competence of staff carrying out the task eg Consider how damaging batteries may occur? Detection, Monitoring and Reacting to Failing Batteries
- Monitoring systems should be used when determined within the fire risk assessment which has identified the need, to monitor the temperature of batteries as failing devices tend to increase in heat before more severe reactions occur.
- If there is a possibility of vented gasses, then monitors should be used so that employees can be evacuated. Evacuation routes should be provided to quarantine areas if monitoring systems detect a damaged device.
- Review emergency incident plans or prepare to accommodate lithium cells so that in the case of a battery venting or a fire, there is a clear action plan is in place. This should be practised where possible. This may involve isolating the damaged product safely or leaving the product in place. If the product is left in place, then the risk of fire spreading through storage or equipment should be considered.
- When moving or removing a potentially damaged battery, then appropriate personal protective equipment such as goggles, aprons and RPE should be provided for those exposed and where the operation is actually carried out and guidance provided on how they are then stored or recycled?
- Consideration should be given to how to vent hazardous fumes, a system of ventilating the area may be considered. Also, because of the possible time delay in detecting a damaged battery especially out of hours, a quarantine system should be provided to enable suspect cells, modules, or entire packs to be isolated safely away from people or flammable material including other batteries.
- Please share or add this information to your SSofW

LOCATION:	**COMPANY-WIDE**	**ALERT STATUS:**	**Normal**
ACTIVITY:	**POWER TOOLS AND BATTERY SAFETY**	**DATE ISSUED:**	**22/12/2022 18:55:04**
SUB ACTIVITY:	**NO SUB ACTIVITY AVAILABLE**	**INCIDENT No:**	**03631**