Submission No 27

ELECTRIC AND HYBRID VEHICLE BATTERIES

Organisation: Lithium Batteries Australia & LifeTech Energy

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Lithium Batteries Australia

Performance Quality Reliability Safety

Pioneers of the Lithium Battery Industry in Australia

January 29th 2024

Lithium Batteries Australia (LBA) submission on the NSW Legislative Council's Joint Standing Committee on Road Safety – Inquiry into Electric and Hybrid Vehicle Batteries

Overview

Lithium Batteries Australia introduced the very first Lithium Iron Phosphate (LiFePO4) battery to Australia from Texas in the USA in March 2007 (where it was invented and patented by Dr John Goodenough from the University of Texas), and are the first and only certified Australian manufacturer of high safety military grade batteries for professional use in the government, oil, gas, mining and industrial sectors. Lithium Batteries Australia are the only local Australian designer and manufacturer of professional grade fully serviceable, repairable and upgradeable lithium batteries in Australia using high safety military grade cells which can't catch on fire or explode. We are proudly Australian-owned and operated, and we support our community by employing locally in conjunction with our Sydney manufacturing partners, right from acquiring materials, to the assembling of batteries and final inspection and test before delivery to customers all over Australia.

Lithium Batteries Australia manufacture rechargeable batteries in three lithium chemistries-

- Lithium Iron Phosphate (LiFePO4 or LFP)
- Lithium Nickel Cobalt Manganese (LNCM)
- Ultra-High Power Lithium Titanate Oxide (UHPLTO)

Lithium Batteries Australia is the only battery company in Australia that manufactures and supplies high safety military grade Lithium-ion batteries which cannot catch on fire or explode- even if the battery is impacted, punctured or otherwise catastrophically damaged. Many of our government customers specify our batteries for public liability reasons. For example, all of the LiFePO4 batteries manufactured to provide power for the marine electronics aboard the entire Sydney Harbour Ferries fleet built by Incat in Tasmania use high safety LiFePO4 batteries since

batteries are fitted in compartments in close proximity to public passenger areas and the government will not take the risk of being sued should an inferior quality imported battery catch on fire and a member of the public is burnt and then decides to sue the government. There are 3x large 24V 150Ah batteries supplied for each of these ferries and during 4 years of continuous service in all ferries in the fleet the batteries have proved to be 100% reliable with nil reported battery failures to date.

Types / grades of Lithium-Ion batteries available in Australia-

1) **General purpose / Consumer use**- Due to being the cheapest, these batteries make up the largest sector of lithium battery sales. These batteries are exclusively mass produced cheaply in China. They use a welded lithium cell pack with basic BMS fitted inside a standard plastic sealed lead acid battery housing. These batteries often use the very common and extremely cheap tiny 18650 size welded tab type cells or other welded tab cells as used in most consumer appliance batteries such as lap top pc batteries and cordless tool batteries. Since these battery cells are welded together in a pack and the pack is then sealed in a plastic housing, these batteries are not serviceable or repairable and are throw away only. These batteries not only pose the highest risk of fire but they are the most environmentally damaging lithium battery type since a battery will need to be disposed of even if a minor fault develops since the battery cannot be opened to replace any faulty individual cells or BMS. These batteries are the cause of many fires and have come close to causing fatalities in Australia. An example of a sealed lithium-ion battery fire is shown below after burning out a new caravan-

2) **High Safety (Military Grade)-** In a nutshell these batteries are fully repairable, serviceable and upgradeable. The battery housing is able to be opened for access to the cells and BMS for service and repairs in an approved workshop. It will have some type of fasteners such as machine screws. The cells used to manufacture the battery have been extensively tested for safety and the results of all tests are always “no fire / no explosion”.

The Lithium Battery Fire Problem

As is the case with most new products, the original / genuine (patented) article is not the problem. With regard to recent lithium battery fires this problem is a direct result of the Chinese battery companies stealing the intellectual property from the original inventors of the technology and then copying and manufacturing on a mass scale as cheaply as possible by cutting corners to save costs, these inferior lithium batteries are appealing to consumers in western countries such as Australia due to their cheap price. This is especially the case for batteries used in recreational applications such as for e-bikes. e-scooters as well as batteries used in caravans and motorhomes.

It should be noted that the lithium battery fires have mostly occurred in the last few years. This coincides with the large-scale manufacture of poor-quality inferior consumer use batteries in China. One such Chinese factory showing the large scale manufacturing of these batteries is as shown below-

Unfortunately, the recent surge in lithium battery fires has resulted from the sale of these batteries to the general public by unscrupulous sales and marketing companies who have little or no experience or training with lithium batteries. These companies simply go on Chinese buying sites such as Alibaba.com and import these inferior batteries for sale to the general public with little regard for the battery quality and safety since these companies' sole purpose is to "jump on the lithium band wagon" to make a fast buck. It is very concerning that these companies also often provide false information which can lead to the battery purchaser being

disappointed when the battery fails in a very short time or in the worst cases catches on fire. It is noted by Lithium Batteries Australia that one of the worst offending lithium battery sellers based on the sunshine coast in QLD is not only labelling their cheap Chinese batteries as “Australian Made” but also advises on their website that “any battery charger can be used including lead acid chargers”. This is highly irresponsible and false information as only lithium specific chargers utilising a constant current / constant voltage (CC/CV) should be used to charge lithium batteries. Use of non-specific and lead acid chargers will lead to early failure of a lithium battery.

Burnt out new $120,000 caravan after inferior quality lithium battery caught on fire.

The Lithium-Ion cells in professional use batteries are always large format cells with threaded terminals and are joined together with solid copper or brass terminal links and stainless-steel lock nuts and washers. They are the most environmentally responsible battery type since only faulty individual components or parts need to be replaced and then the battery goes back into service rather than going to landfill. High safety military grade LiFePO4 batteries are mostly

used by government and industry where safe lithium batteries are required which cannot catch on fire if the battery is over charged or punctured, impacted or otherwise damaged.

Small format welded throw away cells (left) vs. large format threaded terminal replaceable cell as used in government batteries.

Lithium Batteries Australia only manufactures high safety industrial and miliary grade batteries which cannot catch on fire or explode.

Lithium batteries manufactured for government applications to government safety specifications pose no risk of fire or explosion. These batteries have passed extensive safety testing and have been shown not to catch on fire or explode under many testing situations including crushing, impact, penetration, firing bullets through the battery and several other tests. Batteries which pass all these tests are deemed “high safety military grade batteries”. For example, with regard to Transport for NSW a couple of applications where these batteries are used are in-

- Sydney Olympic Park Authority (SOPA) electric locomotives to be used for tourist rides around Sydney Olympic Park
- Sydney Trains utilise high safety lithium batteries for many applications including power for remote railways signal shelters, possession limit markers (PLM’S) and portable battery field cases.
- Sydney Ferries use high safety LiFePO4 batteries to power all of the marine electronics aboard the Australian built ferry fleet which was manufactured by Incat in Tasmania.
- In addition, high safety lithium batteries were manufactured in Sydney for the Federal Government and are currently in use to provide critical backup power in Parliament House Canberra.

Transport for NSW- Sydney Olympic Park locomotive battery

Sydney Trains high safety railways signals battery rack

Parliament House, Canberra critical power (UPS) back up lithium batteries

Not all EV Batteries are the same (or are a potential fire hazard) – only most of them

Almost all of the EV manufacturers utilize batteries based on the lithium cobalt chemistry. These batteries are used due to the highest energy density available but the risk is this same lithium chemistry is also the most hazardous and prone to lithium battery fires. EV manufacturers use cobalt-based lithium-ion batteries to achieve the longest possible range per charge. The risk of fire is minimised by the use of a very sophisticated (and expensive) battery management system (BMS).

Nevertheless, these EV batteries are a potential fire hazard. For those that are non-technical it could be imagined that an EV battery of this type is a bit like a stick of dynamite wrapped in many layers of cotton wool. Fundamentally it is hazardous but the risk of explosion is minimised to an almost non-existent level by wrapping it in a cushioning material such as cotton wool to prevent any shock or vibration which could cause it to explode.

Not all EV manufacturers use the potentially hazardous cobalt-based lithium-ion batteries for their EV battery packs. For example, the Mitsubishi EV ute which is owned and used by Lithium Batteries Australia for daily run around and pick up of materials around Sydney uses a much safer Lithium Titanate Oxide (LTO) based battery. This battery is completely safe and cannot catch on fire no matter how badly the battery is damaged or over charged. In addition, this battery has a working life of more than 40 years before replacement so will outlast the life of the vehicle (as well as the vehicles owner). The disadvantage of the LTO battery is the lower energy density so shorter range per charge. If we use the same non-technical analogy, while the cobalt lithium ion-battery is a bit like dynamite wrapped in cotton wool, then the titanate oxide lithium battery behaves a bit like a block of wood. It is inert and you would have to hold a flame directly to it a long time before it could catch on fire.

Safe LTO powered EV

Recommendations

1. Importers of inferior, potentially hazardous lithium batteries (especially applying to e-bikes, e-scooters and batteries used in caravans and motor homes, who are providing false claims should be prosecuted to the full extent of the law due to-
   a) False advertising (which is occurring with battery sellers labelling their batteries as Australian made when they are in fact made in China)
   b) These same companies selling non approved battery chargers and advising end user consumers that it is ok to use any battery charger including lead acid chargers when this false information will (at the best) lead to early battery failure- and the consumer wasting their money and (at the worst) resulting in a battery fire.
   c) The general public should be educated that not all lithium batteries are a fire hazard. Safe lithium batteries have existed for many years and are available and are used in applications all around them which they don't even realise. Because these batteries can't catch on fire (and never do), then the public don't know that these safe batteries are all around them in daily life. For example, since no Sydney ferry has ever caught on fire the public would not be aware that safe lithium batteries are providing power for marine electronics on their daily commute and these same lithium batteries have been in daily use for many years without incident. It is only the battery fires which burn out a garage or burn down a house when an e-bike battery is left on charge overnight and then catches on fire, results in media attention and causes concern in the eyes of the general public and consumers using these batteries.

Lithium Batteries Australia strongly encourages ACCC, Department of Fair Trading and any other relevant authority in prosecuting and weeding out all of the irresponsible battery importers who are selling hazardous lithium batteries and providing false claims.

Final Thoughts

Unlike lead acid batteries which are a simple "dumb" battery, lithium batteries are complex and use sophisticated battery management systems so they can be operated in a safe manner. So long as any person or entity is allowed to import inferior lithium batteries from China and sell them to local consumers with no technical training in the application and use of lithium batteries then it is inevitable that there will be an increasing number of lithium battery fires.

Warm Regards,

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