Lithium-iron-phosphate batteries lfp philippines bin

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Electric vehicles (EVs) bring not just environmental promise, but also raise critical safety questions - chief among them, the fire risks posed by their lithium-ion batteries. While indispensable for powering EVs, these batteries present unique challenges, especially in confined spaces like parking garages, where the potential for fires carries significant consequences.

At the core of this risk lies the lithium-ion battery (LiB), a powerful energy storage device with considerable vulnerabilities. Several of these batteries" components pose a fire risk, but the part known as the cathode is critical in this regard. These are typically made of either nickel manganese cobalt oxide (NMC) or lithium iron phosphate (LFP). NMC is more cost-effective, but also more prone to thermal runaway, a hazardous reaction that triggers sudden fires in LiB batteries.

Thermal runaway is a self-accelerating reaction that leads to a rapid temperature increase. It is often caused by overcharging, overheating, damage, or defects, and once initiated, it can cause uncontrollable fires that are difficult to extinguish.

The risk of thermal runaway is mitigated by built-in Battery Management Systems (BMS), which include real-time monitoring, automatic deactivation features, and compartmentalised modules to isolate fires. However, as the range and performance of EVs improves, their batteries are getting bigger, making fire safety a serious challenge, especially in indoor environments.

To better understand the global EV market, we analysed 100 EVs from Europe, Asia, and America, covering various brands and models. The data provided insights into vehicle dimensions, battery types, sizes, and placements.

The findings showed that around 90% of these vehicles use NMC batteries. While preferred by manufacturers for lower production costs, these batteries are more prone to thermal runaway, making them a major safety concern.

A battery"s weight to efficiency ratio is an important consideration for EV manufacturers, often dictating

which battery type is used. However, our comparison of NMC and LFP batteries revealed unexpected results. NMC batteries, at 6.74 kg per kWh, are only slightly heavier than LFP batteries at 6.51 kg per kWh.

We looked at data from 24 studies, examining experiments that ignited lithium-ion cells to measure Heat Release Rate (HRR) over time - essentially a measurement of how quickly they burn. While insightful, these tests reflect single-cell behaviour. Fires in full EV battery packs, containing thousands of cells, are far more complex, involving chain reactions and additional energy release from the vehicle itself.

Our analysis did, however, reveal notable differences in fire behaviour between NMC and LFP batteries as capacity increases. At lower capacities, NMC batteries show relatively low maximum HRR, but this spikes dramatically at higher capacities, exceeding 100 kW, as the graph below demonstrates.

In contrast, LFP batteries exhibit more stable HRR, increasing gradually without reaching NMC"s extreme levels. This suggests that NMC batteries pose greater fire risks at higher capacities, emphasising the need to consider battery type and capacity when assessing EV safety, especially for larger packs.

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