Lithium ion phosphate battery safety

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LiFePO4 batteries, also known as lithium iron phosphate batteries, are rechargeable batteries that use a cathode made of lithium iron phosphate and a lithium cobalt oxide anode.

LiFePO4 batteries are known for their high level of safety compared to other lithium-ion battery chemistries. They have a lower risk of overheating and catching fire due to their more stable cathode material and lower operating temperature. We have also mentioned this in our best LiFePO4 battery list.

Overcharge: If a LiFePO4 battery is charged beyond its maximum capacity (Ah), it can lead to overcharge. This can cause the battery to become unstable and potentially catch fire. This is why it is important to use a compatible charger and follow the manufacturer’s guidelines for charging.

The image below shows the charging voltages of one cell, 12V, 24V, and a 48V battery. Avoiding the top 10% and the bottom 10% is better. To expand the battery’s lifespan, you should cycle the battery between 10 and 90%.

The charging current is usually at 0.5C. For example, a 100Ah lithium battery can be charged with 50Amps. I recommend using a simple 10A benchtop power supply to charge the cells for top balancing. After that, you can use a charger or inverter charger. I use a Victron multiplus 2 at home myself. This is an inverter charger.

Over-discharge: If a LiFePO4 battery is allowed to discharge too far, it can lead to over-discharge. This will damage the battery and reduce its overall lifespan. To prevent over-discharge, you should only discharge to 3V per cell or 12V.

Physical damage: This is especially true if you place the batteries in your vehicle. Strap them down or make a holder that keeps the battery in one place. If you work with raw lifepo4 cells, you need to have a divider in between the cells. Otherwise, the friction can rub away the blue plastic on every cell. If the blue plastic is rubbed off, the negative of one cell comes in contact with the other negative of another, which is not desirable.

High temperatures: LiFePO4 batteries can become unstable if exposed to high temperatures. The temperature of a battery increases if it is charged and discharged at high c-rates. It is important to store LiFePO4 batteries in a cool, dry place.

In general, it is recommended to store LiFePO4 batteries at a temperature between -20?C (-4?F) and 60?C (140?F). Some LiFePO4 batteries are designed to operate at higher temperatures, up to 75?C (167?F). This will depend on the specific battery and its design. Do not charge the battery when it’s at or below freezing. This will permanently damage the battery. Some batteries have internal heaters to operate in freezing temperatures.

Short-circuit: A short-circuit can occur if the positive and negative terminals of a LiFePO4 battery come into contact with each other. This can cause the battery to become unstable and potentially catch fire.

LiFePO4 batteries are generally considered to be safe. They do have some potential safety risks to be aware of. For example, they can still catch fire if damaged or subjected to extreme conditions, such as high temperatures or physical impact. It is important to handle LiFePO4 batteries with care and follow proper storage and usage guidelines to minimize the risk of accidents.

To ensure the safety of LiFePO4 batteries, it is important to handle and maintain them properly. This includes charging them using a compatible charger, storing them in a cool, dry place, and handling them gently to avoid damaging the battery.

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