



Powering Safety:

The advantages of LiFePO4 batteries for emergency lighting





In case of an emergency, when artificial lighting fails in buildings, it's crucial to maintain orientation for staff and visitors to escape and emergency services to enter safely. There are legal requirements which dictate the setup and sizing of emergency lighting systems that should activate during power outages.

There are different types of backup battery systems which can provide electricity for emergency lighting, including self-contained batteries, group batteries, central batteries, Central UPS and varies depending on country and building design. In many countries, self-contained emergency is commonplace.

Self-contained emergency luminaires feature an integrated battery that automatically takes over when the main power is lost. The choice of battery is of paramount importance. With batteries localised inside the luminaire, they have to be reliable, long-lasting, safe, efficient and easy to maintain. Over many decades, these luminaires have included batteries of different chemistry as technology has evolved, and each have their own characteristics. These included:

- NiCd – Nickel Cadmium
- NiMH – Nickel Metal Hydride
- LiFePO4 – Lithium Iron Phosphate



LiFePO4 batteries should not be confused with Lithium-Ion batteries. Although they share some similarities in chemistry, Lithium-Ion batteries have much larger energy density and are not suited to Emergency lighting.

LiFePO₄ batteries in Emergency lighting



Lithium Iron Phosphate (LiFePO₄) batteries offer several advantages for emergency lighting applications compared to traditional battery technologies, such as lead-acid or nickel-cadmium batteries.

LiFePO₄ batteries are a type of lithium-based battery known for their stability, safety and long cycle life. They are increasingly being used in emergency lighting systems due to their ability to provide reliable power during outages.

LiFePO₄ batteries have a lower energy density compared to other lithium-ion batteries but compensate with longer lifespan and enhanced thermal stability. They are less prone to overheating and thermal runaway, making them a safer choice for emergency applications.

10 reasons for LiFePO₄ being the best performing battery in emergency lighting:

1

Longer Lifespan:

Longer lifecycle, leads to reduced maintenance and replacement costs over time.

2

Higher Energy Density:

Ideal for space-constrained emergency lighting by storing more energy in a smaller and lighter package.

3

Faster Charging:

Faster charging than traditional batteries, enabling quicker readiness for emergency lighting after a power outage.

4

Improved Safety:

Known for their thermal stability and lower risk of overheating or catching fire, LiFePO₄ is a safer choice for emergency lighting applications.

5

Wide Operating Temperature Range:

By operating effectively in a broader range of temperatures, they are more beneficial in different environmental conditions.

6

Low Self-Discharge Rate:

By having a low self-discharge rate, they retain their charge longer when not in use, compared to other battery types.

7

Environmentally Friendly:

LiFePO₄ contains fewer toxic materials compared to lead-acid batteries, easier to recycle and has a smaller environmental impact.

8

Consistent Performance:

LiFePO₄ batteries maintain a stable voltage throughout their discharge cycle, ensuring consistent lighting performance, ideal for applications needing reliable and steady power.

9

No Memory Effect:

Unlike nickel-cadmium batteries, LiFePO₄ batteries do not suffer from memory effects, allowing them to be recharged at any time without losing capacity.

10

Cost-Effectiveness:

Initially LiFePO₄ batteries may cost more than lead-acid batteries, their longer lifespan, reduced maintenance and higher efficiency can make them more cost-effective over time.

Overview of current emergency light batteries – Pros/Cons

CBS – 24/48V

SLA – Sealed Lead Acid



PROS

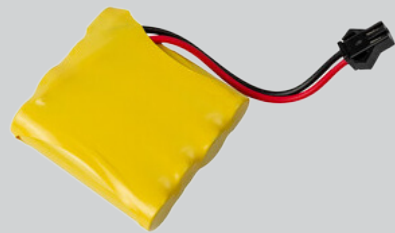
- Cheap
- Powerful
- Easily rechargeable
- High power output
- Maintenance free 4 yrs

CONS

- Very heavy
- Tend to be large bricks

Older Battery Cell Technology

Ni-Cd – Nickel Cadmium



PROS

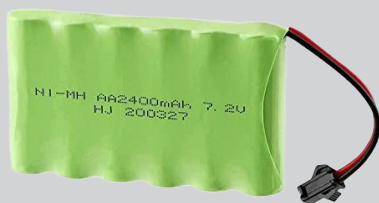
- Fast & simple to charge
- High Number of cycles
- Available in numerous form factors.
- Simple storage & transportation
- Low cost

CONS

- Environmentally unfriendly.
[Contains toxic metals]
- High self-discharge.
[Needs recharging after storage]

Older Battery Cell Technology

Ni-MH – Nickel Metal Hydride



PROS

- Fast & simple to charge
- High number of cycles
- Available in numerous form factors.
- Low internal output impedance
- Environmentally friendly.
[No cadmium, mercury or lead]

CONS

- Not suitable for long-term storage
- Performance drop after long storage
- Risk leaking
- High self-discharge rate

New Battery Cell Technology

Lithium Iron – LiFePO4



PROS

- Reduced form factor
- Higher energy density
- High lifetime / warranty.
5-6 yrs
- Thermal stability
- Low environmental impact

CONS

- Transportation.
[Special safety measure and marking are required to ship LiFePO4 batteries]
- Not suitable for negative temperature environments

Embrace a sustainable energy future with LiFePO4 batteries



Lithium Iron Phosphate (LiFePO₄) batteries offer a safe, dependable and environmentally friendly method of energy storage. Their high energy efficiency (~95% conversion efficiency), outperforms lead-acid batteries. They feature a long cycle lifespan, stable chemical composition and safe operation, which reduces energy wastage from overheating or deterioration. LiFePO₄ batteries are a safe, efficient, and eco-friendly choice for emergency lighting solutions, offering durability, reliability, and sustainability benefits that help reduce costs and environmental impact.

Advantages for emergency lighting:

- safety, durability and consistent performance
- reliable illumination during power outages
- fast recharge times and efficient energy storage
- high energy density and deep discharge capabilities minimising energy loss
- help lowering overall energy consumption and costs

Additional benefits:

- minimal maintenance requirements
- lower environmental impact, supporting sustainability
- contributes to carbon reduction by improving energy efficiency and lifespan
- stable performance across various temperatures

LiFePO4 batteries and carbon reduction

LiFePO4 batteries are widely acknowledged within the industry for their relatively advantageous carbon reduction potential. Organizations dedicated to science-based targets can incorporate the lifecycle emissions of these batteries into their comprehensive climate strategies, aligning with the broader objectives endorsed by the SBTi.



Companies utilizing LiFePO4 batteries can set science-based targets for reducing their overall carbon footprint, including the embodied emissions of their energy storage solutions:

Environmental Benefits:

Their relatively low environmental impact during manufacturing and longer cycle life, reduces the need for frequent replacement.

Lower Lifecycle Emissions:

LiFePO4 batteries typically have a smaller carbon footprint during manufacturing compared to NMC lithium-ion batteries because they don't contain cobalt or nickel, whose extraction and processing produce higher emissions.

Sustainable Manufacturing:

Efforts to reduce the carbon footprint involve sourcing raw materials responsibly, improving manufacturing efficiency and increasing the use of renewable energy in production facilities.

Recycling and Lifecycle Management:

Enhancing battery recycling and extending lifespan contributes to overall reductions in lifecycle emissions.

Efficiency and Longevity:

Their high thermal stability and safety features improve energy efficiency, extending battery lifespan, reducing the carbon footprint per unit of stored energy over its lifetime.

Application in Renewable Energy:

LiFePO4 batteries, when combined with renewable energy sources such as solar or wind, enable clean energy storage and help decrease dependence on fossil fuels.

Although every effort has been made to ensure accuracy in the compilation of the technical detail within this publication, specifications and performance data are constantly changing. Current details should therefore be checked with Feilo Sylvania International Group Kft.

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