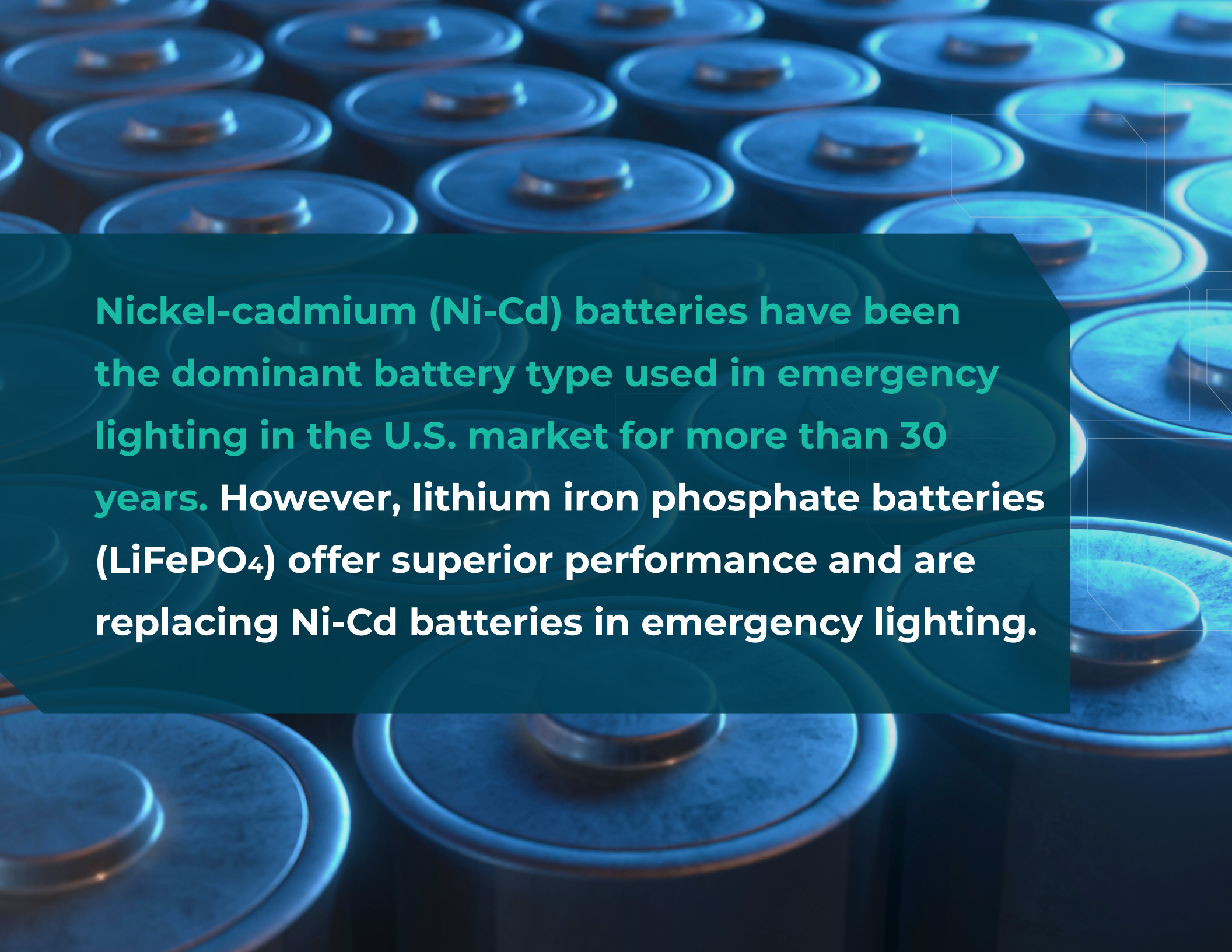


LONG-TERM STORAGE OF LITHIUM IRON PHOSPHATE BATTERIES

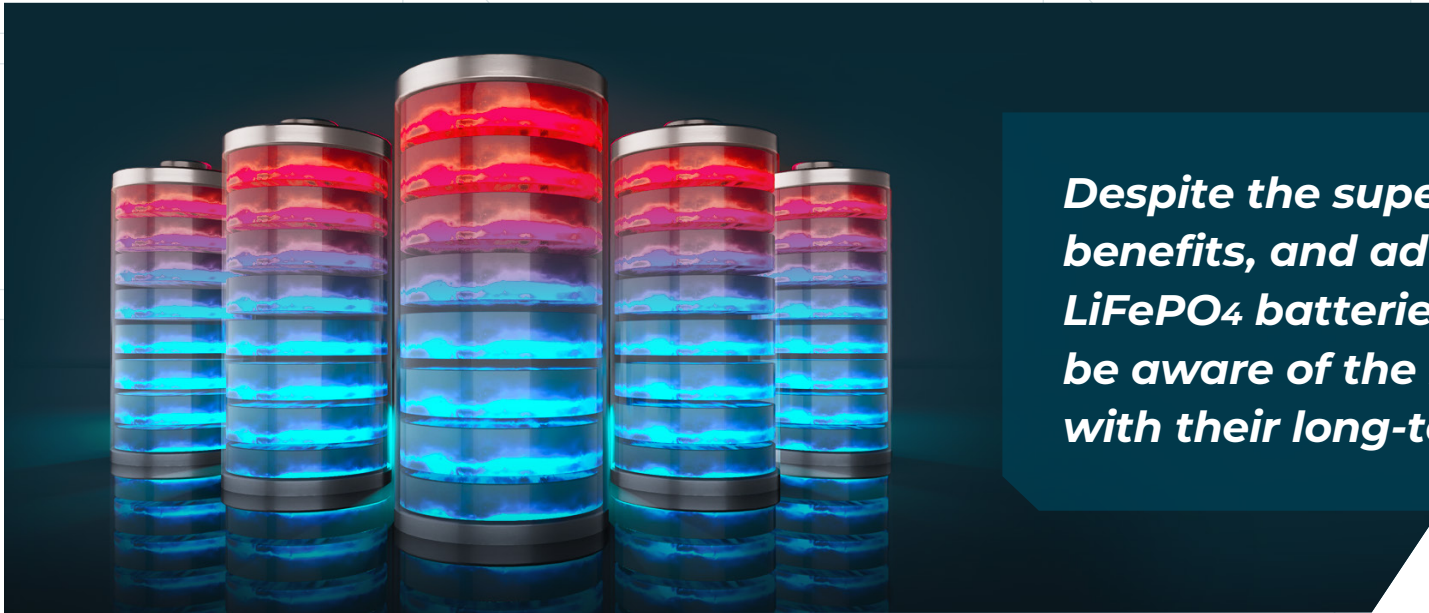
APRIL 2023





Nickel-cadmium (Ni-Cd) batteries have been the dominant battery type used in emergency lighting in the U.S. market for more than 30 years. However, lithium iron phosphate batteries (LiFePO₄) offer superior performance and are replacing Ni-Cd batteries in emergency lighting.

SELF-DISCHARGE and long-term storage



Despite the superior performance, benefits, and advantages of LiFePO₄ batteries, users need to be aware of the risks associated with their long-term storage.

This paper discusses the self-discharge and associated long-term storage limitations of LiFePO₄ batteries, and how ACE LEDs is taking special measures to help mitigate the risks associated with the long-term storage of products that use LiFePO₄ batteries.

Lithium iron phosphate batteries used in emergency lighting have many advantages

over Ni-Cd batteries. Compared to Ni-Cd batteries, LiFePO₄ batteries have a higher specific energy (energy per unit mass), a higher energy volume density (energy per unit volume), a greater specific power (power per unit mass), a greater cycle-life, a greater charge acceptance efficiency, and have a lower self-discharge rate. Simply stated, LiFePO₄ batteries store

more energy and deliver more power in a much smaller battery pack size, are lighter weight, more efficient, and last longer than Ni-Cd batteries. In addition, LiFePO₄ batteries are environmentally safer than Ni-Cd batteries. However, despite the superior qualities of LiFePO₄ batteries, users should be advised of their long-term storage limitations.

LONG-TERM STORAGE of Lithium Iron Phosphate Batteries



All batteries have a depth of discharge (DoD) limit. The DoD limit represents the maximum amount of discharge possible without sacrificing future battery performance.

Discharging a battery beyond its DoD limit, by any means, causes irreversible damage resulting in a permanent decrease in battery capacity. There are two means (methods) of discharging a battery – externally and internally. External discharge is due to connecting the battery to a circuit which causes current flow, thus stored charge is removed from the battery. The battery management system (BMS) protects the battery from reaching the DoD limit due to external discharge. Internal discharge is called “self-discharge.”

Battery self-discharge is caused by the internal reactions inside the battery that reduce the charge stored, and is always occurring, even if the battery is not connected to an external circuit. The BMS cannot protect the battery from reaching the DoD limit due to internal self-discharge. The greatest risk of batteries reaching their DoD limit occurs during long-term storage. Therefore, special measures need to be taken to mitigate this risk.

The self-discharge rate of LiFePO₄ batteries is low, but there is still a limit to their long-term storage time.

ACE LEDs takes a special measure to ensure that every LiFePO₄ battery is charged to the maximum allowable amount before products are shipped. This helps users reduce their risks of reaching the DoD limit

due to long-term storage. It is recommended that LiFePO₄ batteries not be placed in long-term storage for more than one year without being recharged.



ACE LEDs
CHARGES BATTERY PRIOR TO SHIPPING



SHIPPING



CUSTOMS



ACE LEDs



INSTALLATION

ACE LEDs takes the initiative to maximize the long-term storage time of products that use LiFePO₄ batteries.

This paper has been produced to provide awareness of the long-term storage limitations of LiFePO₄ batteries, and to help users mitigate their risk of irreversible battery damage due to exceeding long-term storage limitations, and to inform users that ACE LEDs takes the initiative to maximize the long-term storage time of products that use LiFePO₄ batteries.

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