



# The heat is on— for cold storage equipment

Forklift batteries that promote peak performance in refrigerator and freezer environments are in demand as e-commerce intensifies the need for cold storage warehousing.

DEMAND FOR COLD STORAGE WAREHOUSING IS RISING NATIONWIDE, creating a growing need for material handling equipment that can withstand harsh-temperature environments. Choosing the right forklift battery is an important part of that process, as it can mean the difference between sluggish performance and top-notch productivity. We asked a handful of battery makers about what works best in refrigerator and freezer environments and found that some of the newest battery technologies on the market are making the most headway in low temperatures.

## HEAT IT UP

All types of batteries, from traditional lead-acid batteries to newer technologies such as lithium-ion and thin-plate pure lead (TPPL) varieties, work in cold storage environments. The difference is how well they perform based on the requirements of the job. Heat is an important factor; a warm battery will perform better than a cold one because the chemical energy in a battery becomes less available as the battery gets colder, explains Tim Vaughan, director of engineering for lithium-ion battery manufacturer Flux Power.

“Just as it can be difficult to start your car on a cold morning, [lift] trucks can become more sluggish [in colder conditions],” he says, adding that a heated battery results in less degradation.

Lead-acid batteries that are in continuous use throughout a shift, for example, will perform better than those used intermittently, which will cool down during periods of inactivity and then warm up again when put back in use. But in general, these batteries don’t work as well as some of the newer technologies do in harsh environments, Vaughan adds. Several studies have shown that lead-acid

batteries can lose as much as 30% of their capacity in refrigerator environments and up to 50% in freezer environments.

Other batteries are specifically designed to work in cold environments. These include lithium-ion batteries that feature on-board heat-

ers that use only the energy necessary to keep the units to a proper functioning temperature, according to Vaughan. This allows the equipment to maintain normal truck performance without wasting energy to keep the battery warm.

"We use special solutions to make

the lithium-ion battery operate better in the freezer," explains Tim Karimov, president of battery maker OneCharge, referring to lithium-ion battery designers in general. "[We use] either insulation or a heater, or both, and when you apply those solutions, the batteries work at the same level as they do in ambient temperatures."


OneCharge has introduced two types of batteries for cold storage applications, one that is ideal for coolers and can work efficiently in temperatures from 32 to 68 degrees Fahrenheit, and one that is ideal for freezer environments, functioning down to -22 degrees Fahrenheit, according to the company. Mark D'Amato, sales manager for OneCharge, emphasizes their high-performance capabilities.

"You get the same high level of performance out of the vehicle—that's the key advantage," he explains. "The battery doesn't cause sluggish performance on site—you get the same high-speed operation throughout the discharge cycle despite the temperature."

TPPL batteries come with similar benefits. EnerSys, which makes a range of battery solutions for material handling equipment, says its PURE TPPL battery can perform in temperatures as low as 12 degrees Fahrenheit, in addition to being able to withstand extreme shock and vibration. The company recently put the product through a series of extreme tests, including submerging it in ice to gauge low-temperature performance.

"Despite being put through some of the toughest conditions imaginable, our [battery] still produced power," according to Jordann Gaspari, senior manager of marketing, motive power Americas at EnerSys, which produced a video highlighting the testing. "It's a testament to its unwavering ability to perform in even the most extreme circumstances."


Battery management systems help too. These are electronic systems that monitor and manage rechargeable batteries, keeping track of a range of performance and maintenance data, including temperature. In some systems, sensors can detect when a battery's temperature falls below the level at which it can run efficiently, allowing managers to heat the battery's cells to bring the temperature back up.



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Flux Power has introduced an updated version of its battery management system and is continually adding to its data-collection and reporting capabilities, Vaughan adds.

“For many of our customers, we are producing a data-collection system that attaches to the batteries [so they can get] usage data in real time,” he explains, adding that more and more customers are demanding this information so they can make data-driven decisions to improve overall equipment and facility performance. “We’ve got to measure everything on our batteries.”

#### LOW MAINTENANCE, HIGH PRODUCTIVITY

The minimal maintenance requirements of newer-technology batteries can also be a big benefit in cold storage environments, where food and other perishable items are often stored and handled. The maintenance involved with traditional lead-acid batteries includes the risk of acid spills and fumes generated during watering and charging protocols, which also require removing the batteries and caring for them in separate charging rooms. Lithium-ion and TPPL batteries don’t require watering or long equalization charges; instead, they can be fast-charged and opportunity-charged throughout a shift to keep them running at peak efficiency. They also don’t require separate battery rooms for maintenance, freeing up space in a facility.

Battery makers have long touted the low-maintenance nature of lithium-ion batteries in particular, and Vaughan underscores their advantages in food and beverage operations.

“In general, they require much less operator or infrastructure involvement,” he explains. “Reduced maintenance applies in all environments, but the elimination of hazardous materials is a unique benefit utilized by food-storage folks.”

Experts agree the need for such equipment will only rise in the years ahead. As e-commerce continues its upward trajectory, online grocery and food-delivery orders are a growing part of the equation—especially as consumers have become more comfortable with online

ordering during Covid-19–related shutdowns. Commercial real estate services firm CBRE has estimated that an additional 75 million to 100 million square feet of freezer/cooler space will be needed in the United States to accommodate that growth, for instance.

“We are seeing general growth in demand for our products, even though the material handling market is down,” Karimov of OneCharge says. “In terms of cold storage, we see repeat purchases for these applications and good acceptance of lithium-ion in [these environments].” □

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