

## ELECTRIC FORKLIFTS

*Electric forklifts, or lift trucks, have been material-handling workhorses for years. Recent technology advances have boosted electric forklift performance and utility, enabling them to compete with internal combustion (IC) counterparts indoors and out, while delivering energy and emissions benefits and substantial cost savings over their lifetime.*

### HOW IT WORKS

Electric forklifts operate just like conventional IC lift trucks but are powered by industrial batteries instead of propane, diesel, natural gas, or gasoline fuel and use power electronics-based motor controllers to control travel and hoist functions.

Forklifts are classified by vehicle design and power source, and by their use. Class 1, 2, and 3 trucks are electric. Class 1 forklifts are counterbalanced rider trucks with typical lift capacity of 3,000 to 20,000 lbs. Some models can lift up to 40,000 lbs. A Class 2 narrow-aisle forklift typically has 3,000 to 5,500 lbs. lift capacity, with high reach capacity. Class 3 forklifts are electric hand/rider or pallet trucks. Class 4 and 5 trucks are IC.

Outdoor forklifts, regardless of fuel, use pneumatic tires to improve handling on rough surfaces. They also have enclosed motors and electronic systems to ensure safe operation in wet, dusty, windy conditions. They sometimes have an enclosed cab for driver comfort.

### APPLICATIONS

Electric forklifts are used indoors and outdoors in both large round-the-clock operations and small businesses, including the following sectors:

- Agriculture
- Commercial manufacturing, preparation, and storage of food
- Construction
- Goods movement, shipping, and storage
- Health, technology, and research operations
- Large retail
- Manufacturing
- Mining
- Warehousing and storage
- Waste management



### DID YOU KNOW?

Class 1 electric forklifts compete directly with Class 4 IC units; the market has adopted and sees equivalency between the two power options. Increasingly, Class 1 electric forklifts are also competing with Class 5 IC trucks in outdoor applications that were once considered too heavy-duty for electrics. Today, industry experts believe Class 1 electric forklifts could replace 50% to 80% of existing Class 5 units. However, market adoption and equivalency in this sector is slower.

## BENEFITS

- **Lower total cost of ownership.** Despite their higher upfront capital costs, when compared to IC units, electric forklifts are easier and less costly to maintain because they have fewer moving parts. Payback period is usually less than two years, depending on local energy prices and equipment usage. As a rule of thumb, an electric unit will be the more economic option when usage is greater than 1,000 hours a year.
- **Highly efficient.** New 80VAC technology optimizes energy efficiency and performance, doubling the runtime between battery charges. New high-frequency chargers are roughly 90% efficient.
- **Multiple ways to charge.** Today's charger technologies can charge multiple batteries at once, in the forklift. With opportunity charging and fast charging—newer regimes often chosen by multi-shift operations—users plug-in during breaks throughout the day. Opportunity charging requires lower electrical current than fast charging and generates less internal heat.
- **Zero emissions.** Electric forklifts with their zero local emissions ensure cleaner, more healthful air, indoors and out. Operations may not need to ventilate a facility as much when using electric forklifts. This is good for the environment and may reduce ventilation costs.
- **Quiet, vibration-free operation.** Electric forklifts are quiet; they do not contribute to workplace noise, and drivers and other workers around them do not have to shout to be heard. IC equipment vibrates, which contributes to worker fatigue; electric forklifts do not.
- **Safer, more comfortable workplace.** Because of their zero emissions and quieter operation, electric forklifts contribute to a cleaner, safer, and more comfortable workplace.

## LIMITATIONS

- **Higher capital cost.** Although an electric forklift costs about the same as an IC forklift, the batteries and charging equipment add to the upfront cost. Lower operating costs can quickly make up the difference. In addition, many utilities and government agencies offer incentives for electric equipment. Education about total cost of ownership benefits is a must.
- **Charging infrastructure needed.** Business operations should consider their daily needs before converting from IC to electric forklifts. Newer vehicle and charging technologies have eliminated the need for battery swapping and charging rooms; however, older electric forklift technologies still require separate rooms, equipment, and manpower to swap batteries and monitor charging regimes. In addition, batteries require weekly maintenance.
- **Can meet most, but not all lifting needs.** While electric forklifts today are available with lift capacity of up to 40,000 pounds, some demanding tasks may require even higher lift capacity offered by IC equipment.
- **User misperceptions, and lack of product exposure.** Many users still wrongly believe electric forklifts are underpowered, that batteries cannot last a full shift, and that electric lift trucks are unsafe in wet weather outdoors. Many users have no experience with outdoor electric forklifts, do not hear about the benefits from dealers, and never receive economic payback information. More dealer and user education is needed. Misperceptions change quickly

For more information, contact:

EPRI Customer Assistance Center • 800.313.3774 • [askepri@epri.com](mailto:askepri@epri.com)



3002029016

October 2024

EPRI

3420 Hillview Avenue, Palo Alto, California 94304-1338 USA • 650.855.2121 • [www.epri.com](http://www.epri.com)

© 2024 Electric Power Research Institute (EPRI), Inc. All rights reserved. Electric Power Research Institute, EPRI, and TOGETHER...SHAPING THE FUTURE OF ENERGY are registered marks of the Electric Power Research Institute, Inc. in the U.S. and worldwide.