# Forklift Battery Changing Station Safety – Quick Tips



Powered industrial trucks are used in many industries for a variety of applications. Due to increasing technological advancements, battery-powered industrial trucks are becoming more and more prevalent. With longer run times, shorter recharging times and reduced emissions (which virtually eliminate the hazards associated with carbon monoxide), this type of truck is becoming even more popular. Currently, there are numerous styles of battery-operated trucks that range from small motorized pallet trucks to much larger high-lift trucks.

No matter what kind of electric-powered industrial truck you have, there are similar hazards associated with their batteries and maintenance. Electric industrial trucks are powered by large lead-acid batteries, which must be routinely charged and changed. Suggested practices for charging and changing batteries are:

- Designate an area for the purpose of battery charging.
- Make sure that the industrial truck is charged before using.
- Recognize that heavy loads drain the battery more quickly.

## Forklift Battery Changing and Charging Safety

Only trained personnel should change and charge batteries in electric industrial trucks. In addition to training in battery changing and charging procedures, these employees should be trained on emergency response procedures in the event of an acid spill, including using proper personal protective equipment (PPE) and how to use eyewash and shower facilities.

In order to ensure that battery changes are performed safely, certain steps should be taken. Always follow your facility’s specific procedures and the recharger manufacturer’s recommendations for attaching and removing cables.

OSHA regulations that must be followed for changing and charging storage batteries in powered industrial trucks are found in Title 29 Code of Federal Regulations (CFR) 1910.178(g)(1)-(g)(12).

OSHA’s online powered industrial truck etool is a stand-alone interactive web-based training tool that can be used to help you understand and comply with the

powered industrial truck requirements found in 29 CFR 1910.178.  Under the “Types and Fundamentals” tab click on “Power Sources” and then “Electric” to review potential hazards associated with electric forklifts and suggested recommended practices.

Suggested battery charging and changing procedures include:

- Wear proper PPE as determined in PPE hazard assessment [29 CFR 1910.132(d)(1)] Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body must be provided within the work area for immediate emergency use. [29 CFR 1910.151(c)]
- Check the electrolyte level before recharging; check the specific gravity with a hydrometer; record it in the service log and check the pilot cell
- Check the water level –do not add water prior to recharging–record level in service log.
- Check the voltage and if the battery has sealed vents, do not recharge with a current greater than 25 amperes.
- Unplug and turn off the charger before connecting or disconnecting the clamp connections.
- Attach the positive clamp (+, usually colored red) to the positive terminal first and then the negative clamp (-, usually colored black) to the negative terminal, keeping the proper polarity.
- Turn off the charger if the battery becomes hot or the electrolyte fluid comes out of the vents and restart charging at a lower charging rate.
- Check the water level after charging and add distilled water or de-ionized water if water level is below level indicator–record in service log.
- Check the indicator on the hour meter to see that battery is fully charged.

## Proper Personal Protective Equipment (PPE)

Whenever changing or servicing a battery proper PPE should be worn to prevent harm if an accident should occur. The first area of concern is the weight of the battery. Batteries are very heavy and pose a dropping hazard. To help protect workers against a dropped battery, proper safety footwear that meets ASTM F2413-2018 impact and compression requirements should be considered. For additional insight into this guiding footwear standard and others, see Grainger Quick Tip 252: Protective Footwear Standards.

Lead-acid batteries contain highly corrosive sulfuric acid. Also, contact with battery cells may cause electrical short circuits which can cause burns to unprotected skin. To prevent corrosive and contact burns to the body always wear appropriate PPE as determined in the PPE hazard assessment required in 29 CFR 1910.132(d)(1). Suggested minimum PPE includes:

- Indirect vented / chemical splash goggles and a face shield
- Acid-resistant gloves–verify resistance to sulfuric acid with the supplier
- Acid-resistant apron / clothing–verify resistance to sulfuric acid with the supplier
- Acid-resistant footwear–verify resistance to sulfuric acid with the supplier

In the event of an acid exposure ensure your facility has procedures in place addressing how to treat a victim for:

- Splash to the eyes
- Splash to the skin
- Ingestion

## Hydrogen Gas

Flammable hydrogen gas is always present during battery recharging. Toward the end of the battery charging process, batteries can give off highly explosive hydrogen gas. This is commonly referred to as “out gassing.” Ignition and/or explosion of accumulated hydrogen gas is possible. Take the following steps to prevent accumulation and explosion of hydrogen gas:

- Post no smoking signs.
- Use non-sparking tools.
- Prevent open flames, sparks or electrical arcs in the charging area.
- Provide adequate ventilation.
- Open the battery cover when charging so that hydrogen gas can vent.

## Sulfuric Acid Spill

- Personnel responding to sulfuric acid spills must follow your established procedures. The response may include steps to contain the spill, neutralize the acid, absorb the spill and properly dispose of the absorbed material in accordance with guiding regulations. OSHA has provided some recommended guidelines: Neutralize the spill with soda ash or baking soda—use one pound of baking soda to one gallon of water.
- The acid reaction is complete when it stops fizzing—make certain that the acid is neutralized by checking the pH (neutral is between six and eight).
- Absorb neutralized material onto clay or other absorbent material, if necessary and if the spill is very large, contain the spill with earth or clay dikes.
- Brush under the battery connectors and remove all grime and rinse the residue from the battery with clean water with a hose.
- Report the incident to your supervisor.
- Determine proper disposal by contacting local environmental authorities.

## Commonly Asked Questions

**Q: What type of gloves should be worn when working with battery acid (sulfuric acid)?**

**A**: Workers should wear chemical-resistant gloves – neoprene gloves are normally sufficient for battery acid. Check with the chemical supplier, glove supplier or Grainger’s Technical Product Support for information to help you make the right product selection.

**Q: Is wetness on the top of a battery a problem?**

**A**: Wetness around the terminals on a battery can be a sign of three things – overfilling, excessive gassing during charging or leaky seals. Not only can this be a hazard for workers but to the equipment as well. Once wetness is detected, the problem should be corrected to prevent corrosion of the cell posts and other components. If this problem is left unattended, the top of the battery can become electrically conductive. Stray current flowing over the top of the batter drastically reduces the battery’s performance.

**Sources**

29 CFR 1910.178, Powered Industrial Trucks

29 CFR 1910.151, Medical Services and First Aid

Powered Industrial Trucks (Forklifts) etool

ASTM F2413-2018

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