Battery Safety
Always Remember...Safety First!

- Always wear personal protective equipment according to OSHA guidelines and your company policy when handling lead-acid batteries.
Operator Battery Training

- Weekly operator inspections and maintenance are vital in maximizing battery and charger performance. The following are industry guidelines to help achieve optimum performance, prevent expensive repairs and premature battery and/or charger failure.
Hazardous Elements

- Sulfuric Acid
- Explosive Gasses
- Electricity
- Weight
Sulfuric Acid

- The electrolyte in a lead-acid battery is a diluted solution of sulfuric acid and water. Although the acid content is only about 37%, it is still strong enough to burn skin and eyes, and eat holes in many types of fabrics.
Explosive Gases

- When charged, batteries produce an explosive mixture of hydrogen and oxygen gases. Make sure that all vent caps are securely in place so that any gas is safely vented from the battery. Keep open flames, arcs, and sparks away from battery at all times.
Electricity

- Shock hazards are present on batteries. The higher the voltage, the greater the shock hazard.
- In addition, metallic objects coming in contact with exposed cell connectors will cause a short, as well as severe burns.
- Always remove jewelry and keep metallic objects away when servicing batteries.
Weight

- Batteries are not only a reliable source of power for the lift truck, but also acts as a counterweight.
- Average battery weight is 2,000 lbs (1-ton)
- Batteries can cause serious injury or death if not handled carefully during installation, removal and transport.
- Use proper handling equipment and follow proper procedures at all times.
Visual Inspection

Before placing the battery in service perform the following visual checks...

- Check electrolyte levels.
- Check for proper cable polarity.
- Inspect cables for cut or torn insulation.
- Inspect contact tips.
- Inspect connector. Check for loose springs and cracked or broken housing.
- Make sure all vent caps are securely in place.
Discharging

- A battery is designed to deliver so many cycles. One cycle is defined as discharge, charge, and cool.
- Limit battery depth of discharge to 80% before recharging.
- Battery discharge indicator or fuel gauge on the lift truck is designed to prevent over discharging.
- Over discharging will lead to premature battery failure.
Recharging

- Charging
  - Today’s chargers are designed to return the energy that was removed by the lift truck plus a % more due to heat loss.
  - Chargers are specific to battery voltage and ampere hour capacity. Chargers should match battery within 10% +/- . Outside this range can lead to under/over charging that can again result in premature failure.
  - Once a battery is connected to it’s corresponding charger, leave connected until charger terminates automatically.
Recharging

- Charging
  - If battery is required before full recharge, always push the “STOP” button before disconnecting battery from charger.
  
  - Disconnecting while charger is operating can cause damage to the charger and arcing at the connectors.
Equalizing Charge

An equalization charge extends a typical recharge by an estimated three hours at a low rate to correct cell imbalances.

- During normal cycling, cells become discharged at different levels.
- Improper discharging, charging and maintenance will increase these imbalances.
- A weekly equalizing charge will correct these imbalances, and bring all cells to a more equivalent capacity.
Electrolyte Levels

When a battery is discharged, the internal components of each cell undergo chemical changes.

The composition of the positive plates changes from lead peroxide to lead sulfate, and the negative plates from sponge lead to lead sulfate. The sulfate on both plates comes from the sulfuric acid in the electrolyte combining chemically with the active material of the plates.

This reaction reduces the specific gravity of the electrolyte resulting in a decrease in voltage and electrolyte levels.
Electrolyte Levels

During recharging, the discharging reaction is reversed and the chemical energy is restored. The lead sulfate on the positive plates changes back to lead peroxide and the lead sulfate on the negative plates changes back to sponge lead.

The released sulfate returns to the electrolyte solution, increasing the sulfuric acid content and electrolyte levels.

A fully charged battery is the ideal time to add water to the battery.
Battery Watering

Batteries normally lose a certain amount of water due to evaporation and electrolysis during charging. It’s very important not to allow the electrolyte level in any cell to drop below the top of the separator protectors, since low levels can damage the plates and shorten life.

Avoid overfilling the cells.

Adding too much water or adding water at the wrong time will result in tray corrosion, reduced capacity and premature battery failure.

Corrosion causes a direct current path to the lift truck and will affect lift truck performance and increase maintenance costs.
Proper Watering

- Frequently check electrolyte levels and add water when needed.
- Water should only be added after a battery has received a full charge.
- Electrolyte levels should never drop below separator protector during discharging.
- Electrolyte levels should be at a ¼” below the bottom of the vent well when fully charged.
Cleaning & Neutralization

Maintaining clean batteries will maximize battery life, increase lift truck performance and reduce your cost of ownership through extended battery life.
Carolina Industrial Products offers application specific maintenance programs including on-site battery neutralization in a closed loop system.

Please contact us for additional information.