

## BATTERY SAFETY

Lead-acid batteries are built with a number of individual cells containing layers of lead plates immersed in sulphuric acid. When the sulphuric acid comes into contact with the lead plate, energy is produced. The battery will have a negative and a positive terminal on the top or side of the battery, and will have vent caps on top. The purpose of the vent caps is to allow for the escape of gases formed when the battery is charging. In addition, the vent caps allow water and acid levels of the battery to be checked during maintenance.

Lead-acid batteries can produce explosive mixtures of hydrogen and oxygen gases when they are being charged. If ventilation is poor, the escaping hydrogen creates an explosive atmosphere around the battery. Always keep sparks, flames, burning cigarettes, and other sources of ignition away from the battery recharging area because the gas can be ignited. The result of an explosion could be severe burns and/or fire.

### General Safety when working with Batteries

When working with batteries it is very important to know where the deluge showers and eyewash stations are located. In addition, knowing proper first aid treatment for dealing with acid splashes is also essential. Acid neutralizing bottles can be purchased from local first aid companies, which can be used to allow you to reach the deluge shower or eye wash.



The following are some useful practices when working with batteries:

- Keep metal tools and jewellery away from batteries (to prevent short circuits)
- When handling batteries, make sure that metal objects do not fall across the terminals
- Inspect the battery for any defective cables, corroded cable connectors, corroded/broken battery terminals, cracked cases or covers, etc.
- Always use the proper wrench size when tightening cable clamp nuts
- Do not use excessive force when tightening connections to the battery terminals

- Loosen corrosion from battery terminals and carefully brush it off; use a tapered brush when cleaning the battery terminals and cable clamps
- Clearly mark the positive and negative terminals when the battery cables are removed to ensure that reconnected correctly
- Clean your hands with soap and water immediately after working with batteries

### Handling Batteries

Lead-acid batteries can be very heavy, therefore, it is very important to ensure proper lifting and carrying techniques to avoid any injuries.

- Get your body as close as possible to the battery before lifting or lowering it
- Bend your knees slightly before lifting or lowering the battery
- Do not lift a heavy battery alone – ask for help from a co-worker or use a lifting device
- Use the battery carry straps to lift or carry a battery
- Carry the battery close to your body and at the centre of your body
- Do not twist; first lift the battery and then move your feet to move the battery
- Watch for slippery floors and obstructions as you move
- When carrying the battery, place a clean cloth or rag between the battery and your clothing to absorb any spilled acid

### Working with Battery Acid

- Wear the proper personal protective equipment (PPE) – specifically splash-proof goggles, an apron, and rubber gloves - a face shield may also be necessary when handling certain batteries
- Store acid away from hot locations and direct sunlight

- Slowly pour concentrated acid into water; do not add water into acid
- Use non-metallic containers and funnels
- Use extreme care to avoid spilling or splashing the sulphuric acid solution
- Neutralize any spilled or splashed sulphuric acid solution with baking soda and rinse the area with clean water
- Use self-levelling filler that automatically fills the battery to a predetermined level - never fill cells above the level indicator
- Clean up spilled acid safely – first with a solution of sodium carbonate or sodium bicarbonate (baking soda) to neutralize it, and then with large volumes of water to rinse the area

### Charging Batteries

- Make sure that you have been trained how to charge the battery
- Wear safety gloves and goggles
- A safety shower and an eyewash station should be installed in a battery-charging area
- Charge batteries in a properly ventilated area
- Ensure there is an ABC-type fire extinguisher nearby
- Make sure the power is shut off at the charger before connecting or removing the cable clamps
- Before recharging a battery, check the electrolyte level
- If the electrolyte is covering the top of the plates, do not add more water
- If the battery has been outside in cold weather, make sure that the battery is not frozen
- Connect the negative cable to the frame or motor block instead of the battery terminal
- Check that the battery ventilation holes are clean and clear to allow the hydrogen gas to escape and prevent the battery from exploding

- If the battery is not maintenance-free, remove the filler caps to vent hydrogen gas
- Stand at arm's length when removing battery caps
- Recheck the fluid level after the battery has been recharged
- If water needs to be added, use distilled, not tap water

### First Aid Measures

When administering first aid to someone who has come into contact with sulphuric acid, always avoid direct contact. Wear chemical-resistant protective clothing, if necessary. Follow any first aid treatment and transport the victim to an emergency care facility immediately.

#### Contact with skin

- Flush the contaminated area, as quickly as possible, with gently flowing lukewarm water for at least 30 minutes
- If any irritation persists, repeat flushing
- Do not interrupt the flushing – if necessary keep the emergency vehicle waiting until the flushing is complete
- Under running water, remove contaminated clothing, shoes and other leather goods (e.g., watchbands, belts)
- Discard any contaminated clothing, shoes, etc.

#### Acid in eyes

- Immediately flush the contaminated eye(s) with gently flowing lukewarm water for at least 30 minutes while holding the eyelid(s) open
- Do not interrupt the flushing – if necessary keep the emergency vehicle waiting until the flushing is complete
- Be careful not to rinse contaminated water into the unaffected eye or onto the face

- If any irritation persists, repeat flushing and see a doctor immediately

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