Garages

Garages - Batteries

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What is important to know about batteries?

Lead-acid batteries contain layers of lead plates immersed in sulfuric acid. Lead-acid batteries can produce explosive gasses. The vent caps allow these gasses to escape during charging. Batteries should only be handled in well-ventilated areas by trained and authorized personnel.

When talking about lead-acid batteries, people usually call sulfuric acid "battery acid" or the "electrolyte". An electrolyte is a general term used to describe a non-metallic substance like acids such as sulfuric acid or salts that can conduct electricity when dissolved in water.

- Consult the safety data sheet for the battery or sulfuric acid before beginning any work with batteries.
- Use extreme care to avoid spilling or splashing the sulfuric acid solution. It can destroy clothing and burn the eyes and skin.
- Always wear splash-proof goggles and protective clothing (gloves and aprons). A face shield (with safety goggles) may also be necessary.

Batteries can weigh about 14 to 27 kg (30 to 60 lb) or more, so use a battery carrier to lift a battery whenever possible. Alternatively, ask for help or place hands at opposite corners and practice safe lifting and carrying procedures to prevent back injuries.

In all cases, workers should be trained on safe work procedures, spill response, first-aid, and other related duties. Refer to the manufacturer's instructions and safety data sheets (SDS).

NOTE: This OSH Answers document provides general guidance for lead-acid batteries used to operate vehicles and is not meant to replace the manufacturer's or legislation's requirements.

What do I do if I splash some battery acid in my eyes or skin?

If the eyes are splashed with acid,

- Use an emergency eyewash station if the solution is splashed into the eyes.
- Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes while holding the eyelid(s) open. Neutral rinsing solution may be used as soon as it is available.
- If irritation persists, repeat flushing.
- DO NOT INTERRUPT FLUSHING. If necessary, keep the emergency vehicle waiting if advised by medical professionals.
- Take care not to rinse contaminated water into the unaffected eye or onto the face.
- First aiders should avoid direct contact. Wear chemical protective gloves, if necessary.
- Call for medical help and transport the victim to an emergency care facility.

If the skin is splashed with acid,

- As quickly as possible, flush the contaminated area with lukewarm, gently flowing water for at least 30 minutes using an emergency eye wash station or shower.
- If irritation persists, repeat flushing.
- DO NOT INTERRUPT FLUSHING. If necessary, keep the emergency vehicle waiting if advised by medical professionals.
- Under running water, remove contaminated clothing, shoes and leather goods (e.g., watchbands, belts). Discard contaminated clothing, shoes and leather goods that cannot be cleaned.
- Call for medical help and transport the victim to an emergency care facility.

What should I do after handling batteries?

- Rinse off your gloves well before removing them. Then, rinse the apron to remove any battery acid that may have contaminated it.
- Wash with soap and water immediately after servicing a battery.
- Neutralize spilled or splashed sulfuric acid solution with an appropriate neutralizing solution (e.g., baking soda (sodium bicarbonate) solution), clean the spill area using spill response supplies (e.g., cleaning pads, disposable bags), and rinse the area with clean water. Make sure appropriate personal protective equipment is worn.
- Dispose of contaminated items safely.
- Keep tools and other metallic objects (including jewellery) away from the tops of batteries to prevent short circuits.

What should I do when charging a battery?

- Follow the manufacturer's recommendations for charging rates, connections and vent plug adjustment. Properly maintained vent caps will reduce the chance of electrolyte spray.
- Charge batteries in a designated, well-ventilated area.
- Do not attempt to recharge a frozen or damaged battery.
- Unplug or turn the charger off before attaching or removing the clamp connections. Carefully attach the clamps in proper polarity to the battery.
- Rinse off batteries and clean terminals before recharging according to the manufacturer's instructions.
- Fill sulfuric acid (electrolyte) to the prescribed level before charging to reduce the possibility of the electrolyte heating up excessively. If water is added, use distilled water, not tap water.
- Turn off the charger before disconnecting the cables from the battery.

What are some safety tips to know when servicing batteries?

- Read all safety or warning labels and consult the SDS.
- Keep metal tools and other metallic objects away from batteries to prevent short circuits.

- Inspect for defective cables, loose connections, corrosion, cracked cases or covers, loose hold-downs and deformed or loose terminal posts.
- Replace worn or unserviceable parts.
- Tighten cable clamp nuts with the proper size wrench. Avoid subjecting battery terminals to excessive twisting forces.
- Use a cable puller to remove a cable clamp from the battery terminal.
- Remove corrosion on the terminal posts, hold-down tray and hold-down parts.
- Use a tapered brush to clean dirt from the battery terminals and the cable clamps.
- Use a battery carrier to lift a battery, or place hands at opposite corners.
- Do not lean over a battery.

How should the battery charging area be designed?

Work areas when working with or charging batteries should:

- Have good ventilation to diffuse gases and prevent explosions.
- Be constructed with acid-resistant materials (racks, trays, floor, tools, etc.).
- Have face shields (with safety goggles), aprons and gloves of the appropriate chemical-resistant materials readily available.
- Have emergency eyewash or shower stations close by, with no obstructions along the path (e.g., stored materials, doors, etc.).
- Have equipment and supplies for flushing, neutralizing, and cleaning spilled chemicals, acid and electrolyte solutions nearby.

Can batteries explode?

Yes, hydrogen gas is produced during normal battery operation. This easily ignitable gas can escape through the battery vents and may form an explosive mixture in the atmosphere around the battery if ventilation is poor.

- Keep sparks, flames, burning cigarettes, and other ignition sources away at all times.
- Do not break "live" circuits at the terminals of batteries.

What should I know about filling batteries?

- Keep battery deposits off your body when cleaning terminals by brushing debris away from the body.
- Do not fill battery cells above the level indicator. Use a self-levelling filler which automatically fills the battery to a predetermined level.
- Do not squeeze the syringe so hard that the water splashes acid from the cell opening.

What are some tips for handling battery solutions?

- Pour concentrated acid slowly into water: Do NOT add water into acid - the water tends to sit on top of the heavier (more dense) acid. The water can become hot enough to spatter.
- Use non-metallic containers and funnels.
- Recap any electrolyte container and store it in a safe place at floor level.
- Do not store acid in hot locations or in direct sunlight.
- Do not store electrolyte solution on shelves or any location where the container can overturn.
- Do not squeeze or puncture a container with a screwdriver or other instrument. The acid solution may splash on the face, hands, or clothing.
- Do not fill a new battery with electrolyte solution while it is in the vehicle. Fill the battery while it is on the floor before installation.

What should I know about using booster cables?

Sparks created from booster or jumper cables can ignite a flammable mixture of hydrogen in the air, causing an explosion.

Before using jumper cables:

- Check the vehicle and equipment service manual for specific requirements.
- Wear eye protection.
- Make sure that the two vehicles are not touching each other.
- Turn off the ignition switches of both vehicles.
- Extinguish all cigarettes, cigars, and other sources of flame or ignition. Remember, explosive mixtures of hydrogen are always present in the cells of batteries.
- Remove the filler caps from both batteries to vent the dangerous hydrogen gas. This action is not necessary if the vehicles are equipped with maintenance-free batteries.

- Do not charge or jump a frozen battery.

WARNING:

When connecting or disconnecting jumper cables, use extreme care when handling the clamps.

Do not allow cables to touch each other, the frame or the body of either vehicle to prevent sparks that can cause an explosion.

- Avoid contact with the revolving cooling fans when disconnecting the cables.
- After removing the booster cables, replace the filler caps on both batteries.

How do I boost a negatively grounded battery?

The vehicle is NEGATIVELY grounded when the cable attached to the NEGATIVE post of the "dead" battery is also attached to the engine block.

To connect cables:

- Clamp one end of the red cable onto the positive post of the "dead" battery.
- Clamp the other end of the red cable onto the positive post of the booster battery.
- Clamp one end of the black cable onto the negative post of the booster battery.
- Clamp the other end of the black cable onto the engine block or one of the engine-connected metal components. This connection should be at least 30 cm (12 inches) and away from the "dead" battery to prevent a spark from causing an explosion. Do not attach the jumper cable to the ground terminal of the dead battery or a vehicle body panel.
- Start the engine of the booster vehicle, then the engine of the "dead" vehicle.

To disconnect cables:

- Remove the black negative clamp from the engine block of the vehicle with the "dead" battery.
- Remove the black negative clamp from the booster battery.
- Remove the red positive clamp from the booster battery.
- Remove the red positive clamp from the "dead" battery.

How do I boost a positively grounded battery?

The vehicle is POSITIVELY grounded when the cable attached to the POSITIVE post of the "dead" battery is also attached to the engine block.

To connect cables:

- Clamp one end of the black cable onto the negative post of the "dead" battery.
- Clamp the other end of the black cable to the negative post of the booster battery.
- Clamp one end of the red cable onto the positive post of the booster battery.
- Clamp the other end of the red cable onto the engine block or one of the engine-connected metal components. This connection should be at least 30 cm (12 inches) away from the "dead" battery to prevent a spark from causing an explosion. Do not attach the jumper cable to the ground terminal of the dead battery or to a vehicle body panel.
- Start the engine of the booster vehicle, then the engine of the "dead" vehicle.

To disconnect cables:

- Remove the red positive clamp from the engine block of the vehicle with the "dead" battery.
- Remove the red positive clamp from the booster battery.
- Remove the black negative clamp from the booster battery.
- Remove the black negative clamp from the "dead" battery.

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