

Instruction for Battery Use

Introduction



A battery is made up of a plastic case containing six cells. Each cell is made up of a set of positive and negative plates immersed in a dilute sulfuric acid solution known as electrolyte. The six cells are connected to produce a fully charged battery of about 12-Volt system.

A battery uses an electrochemical reaction to convert chemical energy into electrical energy. Basically, when a battery is being discharged, the sulfuric acid in the electrolyte is being depleted so that the electrolyte more closely resembles water. At the same time, sulfate from the acid is coating the plates and reducing the surface area over which the chemical reaction can take place. Charging reverses the process, driving the sulfate back into the acid. But for increasing the life of battery we need to maintain the battery properly and always follow the guidelines to use it.

General Instructions:



Battery can present a risk of electrical shock and high short circuit current. The following precautions shall be followed when working with batteries.

1. Verify that the Power Supply is "OFF", and that power cord is disconnected from the power source
2. Remove watches, rings, or other metal objects
3. Use tools with insulated handles to prevent inadvertent shorts
4. Wear rubber gloves and boots
5. Do not lay tools or metal parts on top of batteries
6. Determine if the battery is inadvertently grounded, remove source of ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance
7. Verify circuit polarities before making connections
8. Disconnect charging source and load before connecting or disconnecting terminals
9. Do not smoke, cause a flame or spark in the immediate area of the batteries. This includes static electricity from the body.

Equipment Needed:

- Proper personal protective equipment (Eye's protection Acid Resistance)
- Terminal protector Spray/Petroleum Jelly
- Hydro meter for Flooded battery (Wet Battery)
- Voltmeter (Multi meter) & Clamp meter for reading
- Insulated Tools
- Discharger & Charger (If available)

Battery Installation:



To ensure you install your batteries properly and safely always use the eyes protection kit, hand kit, remove your watches/bracelets and follow the below guidelines:

➤ Connection Method with Inverter System:

- The following connection points should be considered when connecting your battery with Inverter / Solar systems
1. The length between wire and inverter / system should not be more than approx. 1 meter (recommended), if more than 1 meter then it will lead to reduced battery backup due to wire losses
 2. Recommended wire size is 10 Sq.mm
 3. Before connecting the battery to Inverter/ Solar System apply petroleum jelly to the battery terminals
 4. Connection should not be losses across the battery terminals after complete installation
 5. Before installing the battery, follow the proper size of wire according to the table for connecting the battery:

Wire Size (AWG)	Cross Functional Area (mm ²)	Current Carrying Capacity (in Amps)	Operating Temperature	Applications
1	42.4	110-145	60°C to 90°C	For Welding Purpose
2	33.6	95-130		For Heavy Lighting Applications
3	26.7	85-115		For Heavy Lighting Applications
4	21.1	70-95		For Construction Applications
6	13.3	55-75		For Battery & Automotive Applications
7	10.54	45-65		For Battery Applications
8	8.36	40-55		For Indoor Electrical wiring appliances
10	5.26	30-40		Used in Electric Dryers, Air Conditioners, Water Heaters
12	3.31	25-30		
4/0	107	195-260		For Industrial & Aerial Applications
1/0	53.5	125-170		For Building Wires

➤ **Battery Connections:**

Battery cables provide the link between the batteries, equipment and charging system. Faulty connections can lead to poor performance, terminal damage, melt down, or fire. To ensure proper connections, please use the following guidelines for cable size, torque value and terminal protection.

➤ **Correct Hardware Installation:**

If using flat washers, it is very important to ensure the battery cable lug is contacting the lead surface of the terminal, and the washer is placed on top of the lug. Do not place a washer between the battery terminal and the lug, as this will create high resistance and cause excessive heating of the connection and terminal. It is important that fasteners be tightened to the appropriate torque for each terminal type.

➤ **Overcharging at High Current & Reverse Charging:**

Never reverse charge or overcharge with high currents (i.e., higher than rated). Doing so causes rapid gas generation and increased gas pressure, thus causing batteries to swell or rupture. Do not leave the battery in the charger once it is fully charged.

➤ **Using old and new batteries together:**

Avoid using old and new batteries together. Also avoid mixing batteries using differing cell chemistries such as ordinary dry-cell batteries or with another manufacturer's batteries. Differences in various characteristic values, etc., can cause damage to the batteries or the product.

➤ **Storage:**

Store the batteries in a cool place and when in use do not allow them to remain in environments which may be subject to overheating. And maintain the battery temperature 25°C to 27°C.

➤ **Temperature:**

Many chemical reactions are affected by temperature, and this is true of the reaction that occurs in a storage battery.

The chemical reaction of a lead-acid battery is slowed down by a lowering of the electrolyte temperature that results in less capacity. A battery that will deliver 100% of rated capacity at 27°C will only deliver 65% of rated capacity at 0°C.

Excessive heat will increase the natural corrosion factor of lead acid battery. This increase in corrosion of the positive plates contributes greatly to reducing the overall life of the battery.

➤ **Lifting Batteries:**

Always use the proper lifting equipment to reduce the risk of tray damage, shorting and possible injury.

Chain hoists used to handle batteries should be equipped with a non-metallic container or bucket to prevent the

chains from dangling and possibly causing a short by coming in contact with exposed inter cell connectors on the battery top. If no protection is available, cover the battery with a non-conducting insulating material such as plywood or heavy plastic.

➤ **Points to be Checked Before Installing Batteries:**

There should be some type of barrier/racking between the floor and the batteries. Battery rack(s) should be installed per rack manufactures instructions. Battery rack should be securely a chore to the floor. Floors choirng and its design are the responsibility of the owner and should meet all local, state and/or federal codes. Caution should be observed when installing battery on racking system. Consult battery layout to ensure batteries are installed in the correct polarity order. Batteries are shipped assembled, charged, and filled with electrolyte to just below the bottom of the end well. If the electrolyte level is above the low end of the vent well after the battery has been on along open circuits and, care must be taken to avoid flooding during the initial charge. Electrolyte may be removed to the bottom of the vent well to prevent over lowing. Battery terminals should be cleaned of all oils, greases, or corrosion prior to installing cables. The surface of the battery terminals may be cleaned using a stiff bristle non-metallic brush clean bright surface is accomplished.

Ensure all inter-battery connections and battery cables are properly connected and polarity is correct. Always check for the sulphation on it. If found remove it with brush. All inter-battery cables should be of the same length and wire gauge. (Please refer the table for Wire Gauges'. Ampacity). Cables should be at minimum length to reduce voltage drop. Use a voltmeter to confirm correct polarity.

➤ **Personal Precautions**

Because Tubular Conventional batteries contain acid, always wear protective clothing, and use the correct safety tools.

In case of skin contact with sulphuric acid, immediately:

1. Remove contaminated clothing
2. Flush the area thoroughly with water at least 15 minutes with large amounts of water
3. Get medical attention, if required
4. Apply the solution until bubbling stops, then rinse with clean water
5. In case of eye contact with sulphuric acid, immediately wash your eyes with plenty of water or take medical attention
6. Apply a solution of sodium bicarbonate solution (1.0lb/1.0gal or 0.5 kg/5.0 liters of water).