

## Battery Protection Methods

### Introduction



It is very important to protect our battery for best performance and better output for long life. The general purpose of battery protection is to provide the necessary monitoring control to protect the cells from out of tolerance ambient or operating conditions and to protect the user from the consequences of battery failures. We must follow proper procedure of user manual which provide by the manufacturer. Always check the cell electrolyte level and proper cleaning of the terminal to escape from sulphation. Time to time verify the charging state of the battery and state of health of battery cell. Ensure that use proper charging cable and charger to charge the battery. Never given extra current to input AH (Ampere hour). During connection verify that same terminal did not connect otherwise it occur short circuit during charging. To escape from sulphation, give proper interval of time and current during charging if battery partially charge it will be getting sulphated.

**General cell protection should address the following undesirable events or conditions:**

- Excessive current during charging or discharging
- Short circuit
- Over voltage – Overcharging
- Under voltage - Exceeding preset depth of discharge (DOD) limits
- High ambient temperature
- Overheating - Exceeding the cell temperature limit
- Pressure builds up inside the cell
- System isolation in case of an accident
- Proper Venting of the Cell & Battery
- Proper Handling & Maintenance of Battery

**a) Excessive current during charging or discharging:**

When we are not verifying the charging current and the discharging current according to specification or the battery capacity it will harm the battery cell condition .so that it will affect our battery life. In future our battery did not accept proper charging, or it will cause in deep discharge also.

**b) Short circuit:**

Before charging the battery main supply we must verify the battery connection and use proper washer and nut bolt should be clean, and connection should be tight. If there is same polarity of the battery terminal than short circuit occurred.

## c) Over voltage – Overcharging:

It is our responsibility to give proper charging program and verify the initial voltage of the battery. And always gave the proper input AH according to battery capacity. Overcharging the battery, it will affect our battery backup and life cycle. Over voltage generate heat and it will affect the plate conditions also.

## d) Under voltage - Exceeding preset depth of discharge (DOD) limits:

If battery remains for long time in discharge condition it affect the depth of discharge. So, charging of battery time to time properly is very important. If battery remain for long time in discharge condition than it is hard to achieve the proper voltage of the battery.

## e) High ambient temperature:

Temperature will directly affect the battery performance and battery life. It is necessary to maintain the temperature as to our given spec. 25°C to 27 °C. If ambient temperature is high than our spec, we can also use chilled water to maintain the temp.

## f) Over Heating - Exceeding the cell temperature limit:

If we avoid the high temperature during charging it will affect the plates and in life. So, presence of water to control the high temperature of the battery is very important. If for any reason a cell overheats, this can cause the separators burn, which is typically made of plastic, to distort or melt. In the worst case this could lead to a short circuit between the electrodes with even more serious consequences. External circuits cannot protect against an internal short circuit and various separators have been designed to avoid this problem.

## g) Proper Venting of Cell/ Battery:

The electrochemical process can give rise to the generation of gases, particularly during conditions of over charge. This is called gassing. If the gases are allowed to escape the active mass of chemicals in the cell will be diminished, permanently reducing its capacity and its cycle life. Furthermore, the release of chemicals into the atmosphere could be dangerous. Manufacturers have therefore developed sealed cells to prevent this happening. Sealed cells will normally incorporate some form of vent to release the pressure in a controlled way if it becomes excessive.

## h) Proper Handling & Maintenance of Battery:

- **Acid:** The maintenance of battery involves periodic checking of the battery so that your battery gives you long life
- **Check Clamp:** Make sure that the battery is firmly secured to the cradle and the cable clamps and lead wire contact is proper
- **Avoid Grease:** Keep the battery top clean and dry. Apply either petroleum jelly or Vaseline to cable clamps and terminals for proper lubrication. Never apply grease
- **Use Distilled Water:** Top up only with distilled water and maintain the level to the line that indicates, maximum. Never add acid
- **Close Tightly:** Keep the vent plugs closed tightly

- **Check Vent:** Ensure that the vent hose in the battery is not folded or damaged by the exhaust system
- **Check Regularly:** Be sure to inspect your electrical system regularly, if there is any breakage or leakage in the wire
- **Service Regularly:** Get your battery serviced regularly from your nearest authorized dealer.

## Protection from deep discharge

For deep discharge protection, we need to identify the cut-off voltage of the battery. After that, we need to design a circuit of inverter & solar system in which, when the battery reaches the cut-off voltage level, a switch disconnects the load from the battery. For cut-off voltage identification, we will choose a Zener diode. And never remains the battery in discharge condition for long time because when we again try to charge our battery after long time, battery did not achieve its open circuit voltage (OCV).

## Cell Protection

One of the prime functions of the Battery Management System is to provide the necessary monitoring and control to protect the cells from out of tolerance ambient or operating conditions. This is of particular importance in automotive applications because of the harsh working environment. As well as individual cell protection the automotive system must be designed to respond to external fault conditions by isolating the battery as well as addressing the cause of the fault. For example, cooling fans can be turned on if the battery overheats. If the overheating becomes excessive then the battery can be disconnected.

## Conclusion



If the user follows all the battery management system properly then battery remains for long life and healthy backup. And follows the guidelines of the battery user manual. Battery protection systems serve to keep the temperature and voltage balanced in your battery. Steady temperatures are critical for optimal battery life, which increases the safety of your operations.