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Battery talk
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Common Battery Terms

A comprehensive glossary of common lead acid battery terms, providing an understanding and definition of each battery term.

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Terminology Glossary

Active Material

The porous structure of lead compounds that produce and store electrical energy within a lead-acid battery. The active material in the positive plate is lead dioxide and the negative plate is sponge lead. When an electrical circuit is created, these materials react with sulphuric acid during charging and discharging according to the following chemical reaction:

$PbO_2 + Pb + 2H_2SO_4 \rightleftharpoons 2PbSO_4 + 2H_2O$

AGM (Absorbent Glass Mat)

A type of non-woven separator material comprised almost entirely of glass microfibres that absorb and retain the electrolyte, leaving no free electrolyte in the cell. AGM batteries require no topping up of liquid electrolyte.

Ampere-Hour (Amp-Hr, Ah)

A unit of measure for a battery's electrical storage capacity, obtained by multiplying the current in amperes by the time in hours of discharge. Example: A battery that delivers 5 amperes for 20 hours delivers 5 amperes x 20 hours = 100 Ah of capacity.

Cold Cranking Amperes (CCA)

A measurement of the discharge current at a high rate that a fully charged battery can deliver for 30 seconds (SAE Standard) and maintain a voltage of 7.2 volts (12 volt battery) at a temperature of -18°C.

Cycle

In a battery, one discharge plus one recharge equals one cycle.

Depth of Discharging (DOD)

The amount of energy that has been removed from a battery, expressed as a percentage of the total capacity in the battery. For example, 50% DOD means that half of the energy in the battery has been used.

Discharging

When a battery is delivering current, it is said to be discharging.

Electrolyte

In a lead-acid battery, the electrolyte is sulphuric acid diluted with water. It is a conductor that supplies water and sulphate for the electrochemical reactions.

Formation

In battery manufacturing, formation is the process of charging a battery for the first time. Electrochemically, formation changes the lead oxide paste on the positive plates into lead dioxide and the lead oxide paste on the negative plates into sponge lead.

Gassing

The evolution of hydrogen and oxygen, from a lead acid battery towards the end of charging and during overcharging. This is a result of electrolysis of the water in the electrolyte.

Gel

Electrolyte that has been immobilised by the addition of a chemical agent, normally fine silica. Batteries made with Gelled electrolyte are often referred to as Gel batteries. Gel batteries require no topping up of liquid electrolyte.

Grid

A lead alloy framework that supports the active material of a battery plate and conducts current. They can be produced in many designs including expanded, cast grid and punched grid.

Maintenance Free (MF)

A battery that normally requires no service watering (topping up of electrolyte) during its lifetime of use. May also be referred to as Sealed Maintenance Free (SMF). A battery that is Maintenance Free may have visible vent plugs however under normal circumstances topping up of the battery is not required during the warranty period.

Open Circuit Voltage (OCV)

The voltage of a battery when it is not delivering or receiving power.

Reserve Capacity (RC)

The time in minutes that a new, fully charged battery will deliver 25 amperes at 27°C and maintain a terminal voltage equal to 1.75 volts per cell. This rating represents the time the battery will continue to operate essential accessories if the alternator of a vehicle fails or the engine is not running.

Separator

The separator is an insulator placed between the positive (+) and negative (–) plates to prevent their direct contact and maintain a distance between the plates. Automotive separators are primarily made from polyethylene and the material is microscopically porous to allow the battery to function efficiently.

Specific Gravity (SG)

Specific Gravity is a measure of the electrolyte concentration in a battery. This measurement is based on the density of the electrolyte compared to the density of water and is typically determined by the use of a hydrometer. By definition, the specific gravity of water is 1.00 and the specific gravity of the sulphuric acid electrolyte in a typical fully charged battery is 1.265-1.300. Specific gravity measurements can be used to determine the state of charge of a battery.

State of Charge (SOC)

The amount of deliverable energy stored in a battery. Expressed as a percentage of the energy when fully charged and measured under the same discharge conditions. If a battery is fully charged the "State of Charge" is said to be 100%.

Stratification

The unequal concentration of electrolyte due to density gradients from the bottom to the top of a cell. This condition is encountered most often in batteries recharged from a deep discharge at constant voltage without sufficient gassing. Continued deep cycling of a 'stratified' battery will result in softening of the bottom of the positive plates. Equalisation charging is a way to avoid acid stratification.

Sulfation

The conversion of the lead sulphate in the plates at discharge to a state that resists normal recharge. Sulfation develops when a battery is stored or cycled in a partially discharged state. Often seen as a build up on the battery plates, it creates resistance to current flow through the battery plates.

Terminals

The electrical structures on a battery to which the external circuit is connected. Typically, batteries have either top-terminals (posts) or side-terminals. Some batteries have both types of terminals.

VRLA (Value Regulated Lead Acid)

VRLA batteries have no "free" liquid electrolyte and operate with a recombination reaction to prevent the escape of hydrogen and oxygen gasses in the cell. This is designed to minimise water loss. VRLA batteries feature vents that are one-way valves. These low-pressure valves prohibit air ingress to the cell while permitting gases to vent from the cell if necessary. The pressure maintained in the battery (<20kPa) is required to facilitate the oxygen recombination reaction, which converts the oxygen generated at the positive plates back into water.

Battery Facts & Myths: True or False?

The higher the cold cranking amps (CCA) the better the battery.

FALSE - A good battery has an optimum balance between CCA and service life. Higher CCA's can be achieved through the addition of more battery plates at times; at the detriment of reduced plate thickness. In colder climates more plates and higher CCA's excel however in hotter climates such as in Australia, the ability to combat corrosion and vibration, with thicker plates is as important.

A Sealed Maintenance Free battery stills requires maintenance.

TRUE - Regular testing and inspection will help to maximise battery life.

- Ensure the battery is clean, dry and free of dirt and grime.
- Inspect the terminals, screws, clamps and cables for breakage, damage or loose connections.
- Inspect the battery case for obvious signs of physical damage or warpage.
- Check the State of Charge Indicator to get a snapshot of the battery condition, whether it is ok or needs to be charged or replaced.

Dispose of your battery responsibly and help create a cleaner future. Simply call 1300 650 702 (Australia) or 0800 93 93 93 (New Zealand). Alternatively, visit recycleMYbattery.com.au or **www.cyb.co.nz** to find your nearest Battery Recycling Centre.

Battery Recycling Centre

For more information contact your Century Yuasa representative on 1300 362 287 (Australia) or 0800 93 93 93 (New Zealand). Alternatively, visit our website www.cyb.com.au or www.cyb.co.nz

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Information contained in this article was obtained from a variety of industry sources including Battery Council International (2010), *Battery Service Manual Thirteenth Edition.*