

The construction of a flooded lead acid battery

-by Johnny Kennedy



In this article we will look into the basic construction of a lead acid battery and in layman's terms explain the key components and the role they play within the battery.

Container

Most automotive battery containers are made of polypropylene. They are designed to hold the cell groups in individual compartments. Depending on the voltage of the battery will determine how many partitions are in the casing.

Typically a 12 volt battery will have six separate compartments and a 6 volt battery will have three. Containers are designed to be strong and durable and withstand temperature extremes, resist gas, oil, acid absorption and seepage.

Grids



Expanded metal



Full frame gravity cast

The two most common lead acid automotive battery grids are expanded metal and full frame gravity cast grids. The grid is the framework that supports the active material and conducts the current inside the battery.

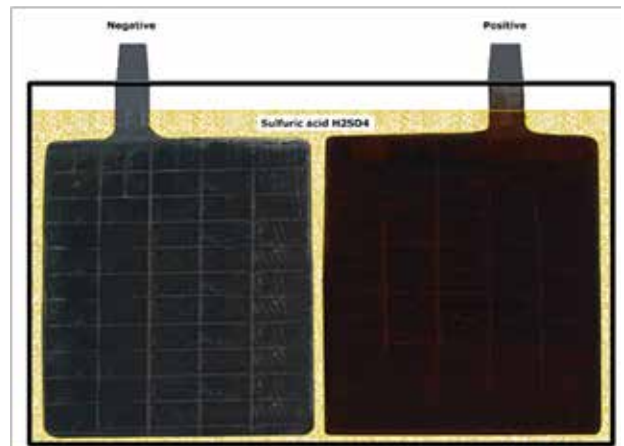
The grid structure is usually a combination of soft lead with the addition of alloying metals to improve the strength of the grid during the manufacturing process.

The grids may also have small additions of antimony, calcium, tin, silver or arsenic to improve life and performance depending on the application and climate.

The use of expanded metal grids during the manufacturing process ensures quality consistency, speed of manufacturing and the ability to make thinner grids to fit within the cell compartments to increase starting capacity.

The advantage of full frame gravity cast grids is the reduction of stress on the plate during manufacturing as the cast grid is more rigid than an expanded grid. The grids' full frame design is also thicker than expanded metal types and provides added durability when used in heavy duty applications.

Active Material



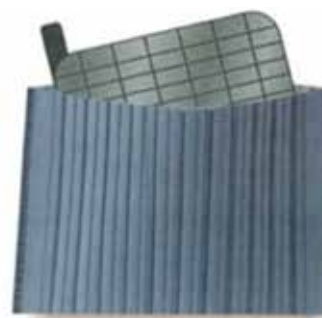
Spongy metallic lead

Lead Dioxide

The active material is a lead compound that is compacted into the grids. The charged plates store electrical energy for use on demand such as when starting your car engine.

During the plate making process, different additives are used in the active material to make the positive and negative plates. The main difference between the plates is the addition of expanders in the negative paste. The expander is required to improve the performance and life of the battery.

The Separators



Envelope separator



Envelope separator with glass or polymeric fiber

The separator is an insulator placed between the positive (+) and negative (-) plates to prevent direct contact causing an internal short circuit and battery failure. The separator is made from polyethylene and the material is microscopically porous to allow the battery to function efficiently.

Envelope separators are the most popular insulator used in automotive batteries and are designed to provide low internal resistance for increased battery performance and be durable to prevent puncturing and oxidization during the life of the battery.

For heavy duty applications a glass fibre sheet may be attached to the separator to support the loss of active material from severe vibration or deep cycle applications.

Cast on straps

COS or Cast-on-Strap, refers to the technique of casting the Intercell connectors on to the lugs of the positive and negative plates. The cast parts comprise the “straps”, to which the plate lugs are fused.



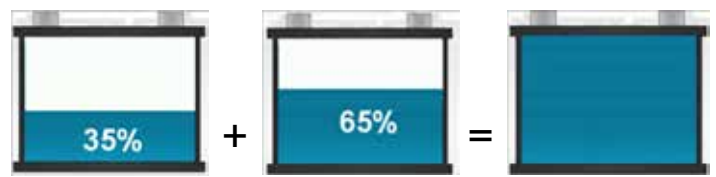
When more plates are added to a battery, the performance is increased. The total opposing plate surface area influences the CCA and the weight of active material influences the RC of an automotive battery.



Intercell Weld

The plate groups are separated by a cell partition moulded into the container and the electrical connection is by a through-the-partition weld. This is a serial connection through a punched hole in the partition that runs through all six cells in a 12V battery. Each plate group provides 2.1V regardless of the number of plates. This voltage is the product of the potential difference of two dissimilar metals in an electrolyte. In this case, lead and lead dioxide.

Battery electrolyte



Sulphuric Acid

Water

Electrolyte

The battery electrolyte is a solution of sulphuric acid and water and is the conductor for the electrochemical reaction.

In our next article we will look into the benefits of hot melt, the sediment or mud rack and the purpose of a flame arrestor.



For more information on Century automotive batteries, contact your Century Batteries specialist on 1300 362 287 or visit www.centurybatteries.com.au

The Wait Is Over

Qualelec have released a range of OEM style dash mounting switches, along with matching USB's and voltmeters making these ideal for most makes and models of 4WD's and other applications.

Currently Qualelec have switches available to suit Toyotas and Nissans plus the older model D-Max, Colorado & Mitsubishi's. Also in the pipeline is a switch to suit the VW Amarok.

The later Toyota switch will be accompanied by a comprehensive range of insignias covering most of your mining, 4WD & RV requirements as well as a range of mounting retaining plates which would allow the switches, USB's and voltmeters to be used in various places such as four-wheel drive drawer systems and electrical panels.



Complementing the switch range is a variety of OEM sized USB outlets and combination USB / Voltmeters to suit all of the above mentioned models. Especially exciting is the dual USB outlet that will be a twin 2.1A outlet to suit two iPad's. This is something the market has been awaiting.

Qualelec Auto & Marine Electrical Supplies started operations in March 1991 on the Sunshine Coast in Queensland and now have customers across the whole nation. In a few short years their reputation grew and are now supplying products to local manufacturers & automotive electrical establishments. Fifteen years later they expanded into importing their own products which then grew into Qualelec's sister company QLED.

QLED has a vast range of LED lighting product that offers both quality and value for money.

For more information or details about your nearest distributor, visit www.qled.com.au or email sales@qled.com.au or phone: 07 5456 2656.