About ACDelco batteries

Typically there are a number of different styles of batteries including:

STARTING / CRANKING (TRADITIONAL AUTOMOTIVE TYPE BATTERIES)

Which are designed primarily for short term minimal discharge but high cold cranking ability (e.g. start an engine).

A HIGH CYCLE BATTERY

Fits in between a cranking / starting battery and a dual purpose deep cycle / cranking battery. Primarily it is a starting / cranking battery, but has the ability to be cycled (similar to deep cycle), but not to the same DOD (Depth of Discharge) as a deep cycle. These batteries would be used in applications that required high Cold Cranking Amps (CCA) (for starting) and were being discharged to 25% DOD (light duty cycle).

DUAL PURPOSE STARTING AND DEEP CYCLE (MARINE / RV BATTERIES)

Which combine the characteristics of a deep cycle battery with the cold cranking ability of a traditional battery. These batteries are the perfect choice for the recreational boater, providing a balance between effective starting power and deep cycle power and recharge capacity.

DEEP CYCLE BATTERIES

Which are designed to be run down and then charged up again on a regular basis, e.g. running powered items in a boat, caravan or SUV. These batteries traditionally have limited cold cranking / starting ability and are generally not used for engine starts, although they can be depending on the nominated current draw for a particular engine.

The ACDelco Battery range consists mainly of two different battery designs:

ACDelco Sealed Maintenance Free Battery (SMF)

ACDelco Low Maintenance Accessible Battery (LMA)

The ACDelco difference

The ACDelco Sealed Maintenance Free (SMF) and Low Maintenance Accessible (LMA) manufacturing and design process differs from most other conventional batteries in several strategic ways.

ACDelco Batteries use wrought-lead calcium expanded grids that provide:

- Strong corrosion resistance.
- Long shelf life.
- Maintenance free usage.
- Resistance to overcharge.

Most other conventional batteries use cast antimony grids which make the battery more susceptible to corrosion and water loss.

The ACDelco flat-bottomed, polypropylene rib case provides improved vibration resistance and stronger durability.

While some other batteries use removable covers, the ACDelco SMF Battery incorporates sealed covers with built in flame arresters for better resistance to acid loss, electrolyte contamination and explosions from external sparks.

ACDelco SMF Batteries incorporate a patented Liquid Gas Separator which prevents electrolyte losses. The liquid is collected and returned to the reservoir.

ACDelco SEALED MAINTENANCE FREE ADVANTAGE

ACDelco Sealed Maintenance Free Batteries have a very low self-discharge rate below 27 °C, see Figure 1. Although storage above 27 °C increases self-discharge, ACDelco Sealed Maintenance Free Batteries stored at constant elevated temperatures (38 °C) have a shelf life that.

- Is three times longer than conventional wet antimony batteries.
- Is comparable to dry charged batteries that are not vacuum sealed.
- Permits installation without charging where good stock rotation and
- inventory control is maintained (three turns or more a year).

Cold temperatures are not harmful to ACDelco Sealed Maintenance Free Batteries when they are fully charged. When the hydrometer eye is green, these batteries may be stored at temperatures as low as – 29 °C.

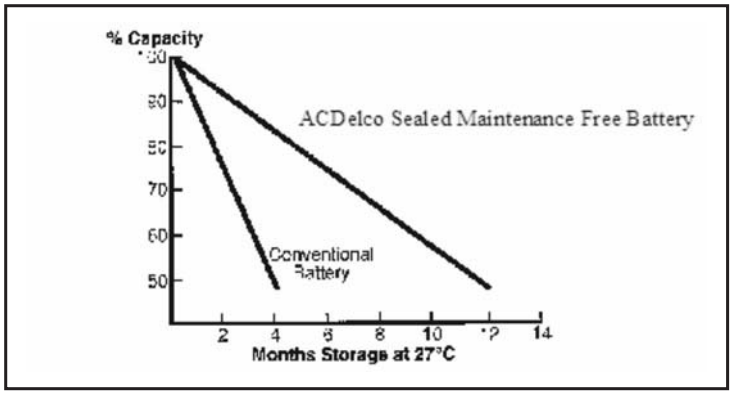


Figure 1

Caution:
To prevent electrolyte freezing and battery damage, do not store ACDelco Sealed Maintenance Free Batteries below -7 °C unless it is fully charged and the green eye is visible in the state of charge indicator.

Why You Should Choose
ACDelco SMF batteries

All ACDelco Sealed Maintenance Free (SMF) Batteries feature lead calcium expanded grids (lead calcium technology) for improved resistance to corrosion, overcharging, gassing, water usage, self discharge and thermal runaway, all of which limit battery life in conventional lead acid batteries. The range includes batteries to suit cranking / starting (traditional automotive), high cycle, dual purpose starting / deep cycle and deep cycle applications.

FEATURES & BENEFITS

- Inbuilt hydrometer (most batteries) - Indicates state of charge.
- Factory sealed - Makes these batteries truly maintenance-free.
- Polypropylene case - Reinforced design is precisely tailored to support the battery elements to withstand road shock and vibration. This strong durable material combines light weight with high impact strength.
- Liquid-gas separator area - Returns liquid to reservoir for longer life.
- Integrated or rope handle - For ease of transport and installation.
- Flame arrestor - Safety system, prevents explosion from sparks outside the battery, minimizes acid leakage and prevents inflow of dust.
- Heat sealed covers - Helps prevent electrolyte contamination and increase case strength.
- Centered cast on plate strap - Stronger than thinner gas-burned conventional connectors.
- Low resistance envelope separators - Encapsulated negative plates help to prevent shorting / treeing between negative and positive plates as well as aid in vibration durability.
- Increased battery shelf life - Up to 12 months shelf life without charging due to the use of Calcium / Calcium grids (compared to conventional batteries).

Polypropylene Case combines light weight with high –impact strength.

Heat Sealed Covers help prevent electrolyte contamination and increase case strength.

Inbuilt Hydrometer indicates state of charge at a glance.

Factory Sealed, Lead Calcium Technology makes this battery truly maintenance free.

Separator Envelopes encapsulate plates to prevent shorting.

ACDelco Offers a Comprehensive Product Range to Suit Most Makes Most Models.

Compare the ACDelco
SMF battery advantage

ACDelco Sealed Maintenance Free Battery (SMF)

Conventional Battery - Other Brands

Comparision of ACDelco SMF Batteries to Conventional Batteries		
ACDelco Sealed Maintenance Free Batteries (calcium / calcium)	**VS**	**Typical Conventional Lead Antimony Batteries**
Routine testing and maintenance not required		Require frequent checking and testing
All feature latest calcium / calcium grid technology		Generally use older type lead antimony cast grids
Inbuilt hydrometer – Check the charge of the battery at a glance		
Very low water loss rate		Higher water loss rate
Completely sealed design eliminates electrolyte leakage		– Require fill caps allowing electrolyte leakage that can reduce life, corrodes terminals, wiring and battery tray – Required regular maintenance resulting in potential acid contact
Liquid–gas separator area – Returns liquid to reservoir for longer life		
Acid contact risks eliminated		Required regular maintenance resulting in potential acid contact
Highly resistant to heat damage		Vulnerable to high temperature
Excellent resistance to vibration and road shock		Less resistant to vibration and road shock
Extremely low self–discharge rate, up to 12 months storage life		High self–discharge rate – Less than 4 months storage life when filled
Low gassing rate, reduces the explosion hazard during charging		High gassing rate, increases the explosion hazard during charging
No acid handling – Batteries are filled at the factory		Acid handling can increases exposure to the environment
Centered cast on plate strap – Stronger than thinner gas–burned conventional connectors		
Reduced recycling frequency (due to longer life) results in reducing environmental pollution		– High recycling frequency results in higher amount of scrapped batteries – Acid / lead handling increases exposure to the environment
Polypropylene case – Combines light weight with high impact strength		
Separator envelopes – Encapsulate plates to prevent shorting		
Integrated or rope/plastic handle – For ease of transport and installation (most part numbers)		

Why You Should Choose
ACDelco LMA batteries

All ACDelco Low Maintenance Accessible (LMA) Batteries feature lead calcium expanded grids (lead calcium technology) for resistance to corrosion, overcharging, gassing, water usage, self discharge and thermal runaway, all of which limit battery life in conventional lead antimony batteries.

FEATURES & BENEFITS

- Accessible coin top vent caps (most batteries) to allow filling if required - Coin top vent caps also allow easier fitment for applications that require a flat top for top hold down bracket mounting.
- Polypropylene case - Reinforced design is precisely tailored to support the battery elements, a strong durable material to withstand road shock and vibration. Combines light weight with high impact strength.
- Integrated or rope / plastic handle (most batteries) - For ease of transport and installation.
- Centered cast on plate strap - Stronger than thinner gas-burned conventional connectors.
- Heat sealed covers - Help's prevent electrolyte contamination and increase case strength.
- Low resistance envelope separators - Encapsulated negative plates help to prevent shorting / treeing between negative and positive plates as well as aid in vibration durability.
- Increased battery shelf life - Up to 6 months shelf life without charging due to the use of calcium / calcium grids (compared to conventional batteries).

ACDelco Offers a Comprehensive Product Range to Suit Most Makes Most Models.

Compare the ACDelco
LMA battery advantage

ACDelco Low Maintenance Accessible Battery (LMA)

Conventional Battery - Other Brands

Comparision of ACDelco LMA Batteries to Conventional Batteries		
ACDelco Low Maintenance Accessible Batteries (calcium / calcium)	**VS**	**Typical Conventional Lead Antimony Batteries**
Reduced testing and maintenance required compared to conventional lead antimony batteries		Require frequent checking and testing
All feature latest calcium / calcium grid technology		Generally use older type lead antimony cast grids
Very low water loss rate (on most part numbers)		Higher water loss rate
Accessible coin top vent caps to allow filling if required (most part numbers)		– Require fill caps allowing electrolyte leakage that can reduce life, corrodes terminals, wiring and battery tray – Required regular maintenance resulting in potential acid contact
Highly resistant to heat damage		Vulnerable to high temperature
Excellent resistance to vibration and road shock		Less resistant to vibration and road shock
Very low self–discharge rate, up to 6 months storage life		High self–discharge rate – Less than 4 months storage life when filled
Low gassing rate, reduces the explosion hazard during charging		High gassing rate, increases the explosion hazard during charging
Reduced recycling frequency (due to longer life) results in reducing environmental pollution		– High recycling frequency results in higher amount of scrapped batteries – Acid / lead handling increases exposure to the environment
Polypropylene case – Combines light weight with high impact strength		
Centered cast on plate strap – Stronger than thinner gas–burned conventional connector		
Separator envelopes – Encapsulate plates to prevent shorting		
Integrated or rope / plastic handle – For ease of transport and installation (most part numbers)		

ACDelco®

Battery's Calcium Grid
technology explained

The grid is the heart of the battery because it carries current in and out of the plates.

Battery grids are made of lead mixed with other metals to give it greater strength. At one time, antimony was the preferred strengthening agent and is still more common in conventional batteries. However, grids in ACDelco SMF & LMA Batteries are made of lead and calcium.

Lead calcium grids have many advantages over lead antimony grids including their resistance to corrosion as shown here:

Lead Calcium Grid	VS	Lead Antimony Grid
Cold wrought (welded or forged)		Heat cast (formed in a mould)
Fine, uniform surface grain		Course surface grain
Resists corrosion		Accelerate corrosion

GRID CORROSION

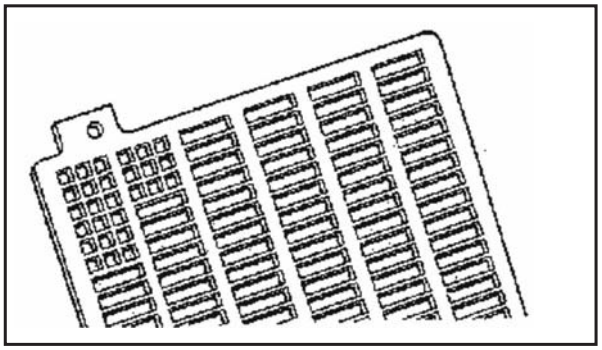
Gradual corrosion is a normal occurrence during the service life of a battery and it is the primary enemy of the positive grid. Corrosion begins on the grid surface at grain boundary sites (places where the grain touches and bonds) and penetrates into the interior of the grid along the grain boundaries. This effect is more prevalent in batteries with course grained grids.

As the grid corrodes, it is weakened because the cross section of the wires are reduced. This decreases the current carrying capacity of the grid. In extreme cases, sections of the grid wires become completely severed and removed from the electrical circuit.

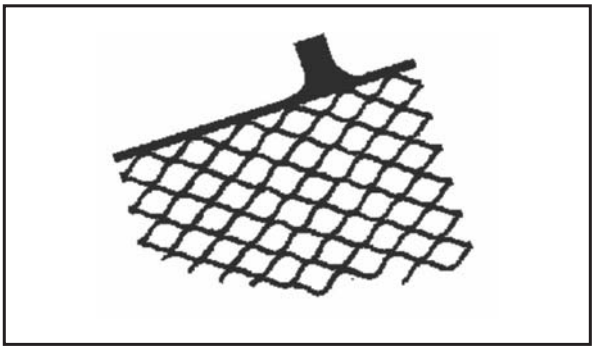
Corrosion takes place primarily at the positive grid, and the process is more pronounced in batteries that routinely experience overcharging.

LEAD ANTIMONY CAST GRID

At one time, lead antimony grids were readily available, inexpensive, easy to cast, and for many years, provided a rechargeable battery that offered optimum efficiency and low cost.



Lead Antimony Cast Grid



Lead Calcium Wrought Grid