



Solar Panels for Recreation and Small-Scale Installations.  
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## Different Types of Deep Cycle Batteries: Part 2

### What Is A Deep Cycle Battery?

The deep cycle battery is designed to **supply steady power over an extended period** — like those commonly used in marine vehicles. It's why this battery is sometimes called a marine battery.

It's pretty different from the car starter battery, which delivers large amounts of power in a short burst and is recharged by the alternator.

The term "deep cycle" is traditionally used with lead acid batteries to contrast it from lead acid **starter** batteries. It refers to the ability to **discharge most of its capacity** (have a deep discharge) before needing a recharge.

*How are deep cycle and starter batteries different?*

In lead acid batteries, the main difference between a deep cycle and a starter battery is **structural**. Deep cycle batteries have thicker plates with more dense active material and thicker separators. The thicker battery plates resist corrosion through extended charging cycles.

*What about a **lithium battery**?*

Technically, all lithium batteries are deep cycle as they can be fully charged and discharged.

Let's look at the different deep cycle batteries next.

### What Are the Types of Deep Cycle Batteries?

The deep cycle function is applied to both lithium and lead acid battery technologies.

The lead acid battery can be divided into the flooded cell and the **sealed lead acid battery**. And the sealed lead acid category can be further split into AGM and gel cell batteries.

Each deep cycle battery type has its advantages and disadvantages, and you'll have to decide what works best for you.

Let's now look at these battery types separately:

#### 1. Flooded Lead Acid

The standard flooded lead acid battery is the oldest battery type in use.

In the flooded battery, lead plates are submerged in an electrolyte mix of sulfuric acid and water. The chemical reaction during charging and discharging produces gases that are vented from the battery. This creates a drop in the electrolyte level, which needs to be periodically topped up.

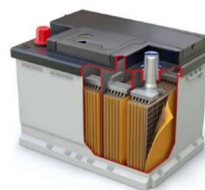
The usable capacity of a flooded lead acid battery falls around 30-50%.

Usable capacity indicates how much of a battery can be used before it must be recharged — in this case, it's up to 50% of the total capacity.

Charging a flooded battery happens in stages, which leaves room for undercharging or overcharging. On average, the charging efficiency of the flooded battery is around 70-85%.

#### Silver Calcium Battery

Silver Calcium Battery is a type of lead-acid battery with grids made from lead-calcium-silver alloy. They stand out for its resistance to corrosion and the destructive effects of high temperatures. This makes it ideal for the installations of Uninterrupted Power supply.



Technological improvements of this new alloy include increased corrosion resistance. The greater resistance to high temperatures and longer shelf life, longer life up to 6 years. The other benefit is a minimal self-discharge and as having the highest breakout.

Silver Calcium alloy batteries are a lead-acid battery. The grids made from lead-calcium-silver alloy, instead of the traditional lead-antimony alloy or lead-calcium alloy. They stand out for its resistance to corrosion and the destructive effects of high temperatures. The result of this improvement increased battery life and maintaining a high starting power over time. Pure lead is too soft and would not support itself. A full discharge permanently reduces battery capacity.

**While the flooded battery is affordable, reliable, and tolerant of overcharging, it requires proper ventilation, must always be upright (to avoid electrolyte leakage), and needs the most maintenance. It also has a shorter lifespan compared to other types.**

## 2. Absorbent Glass Mat (AGM)

The AGM battery is a type of Valve Regulated Lead Acid (VRLA) battery.



AGM is short for Absorbent Glass Mat, which refers to the thin fiberglass mats placed between the lead plates. The glass mat absorbs electrolyte, keeps it from moving and spilling, and acts as a damper between the lead plates.

The damping action of the glass mat makes the battery shock and vibration resistant, with the ability to withstand cold temperatures.

The AGM deep cycle battery has low internal resistance and charges faster than a flooded battery or gel battery. It has a 95% charge efficiency and an 80% **Depth of Discharge (DoD)**.

**The AGM battery's many advantages include being maintenance-free, position insensitive, durable and fast-charging. However, it's more expensive than the flooded cell battery and is sensitive to overcharging, so it needs a regulated charger.**

## 3. Gel Cell

The gel cell battery is another one of the VRLA batteries (like the AGM battery).

The gel battery uses a gelled electrolyte, formed from (typically) sulfuric acid and water suspended in a silica agent.

The gel battery has a charge efficiency of around 85-90%, with excellent heat tolerance and no off-gassing.

However, this battery can't tolerate fast charging. The gelled electrolyte is also very sensitive to overcharging and can be irreparably damaged if this happens.

**The gel cell battery is maintenance-free, spill-proof, position insensitive with a high tolerance to heat. But it's also more costly than flooded or AGM batteries and needs a special charger and regulator.**

## 4. Lithium Ion

The lithium battery is a relative newcomer compared to lead acid battery varieties.



Lithium-ion batteries are 30% lighter than flooded cell batteries and have a usable capacity of 80-100%. They also have the fastest recharge rate and extremely long cycle life — often around 2000-5000 charge cycles.

The lithium-ion battery also offers constant voltage over any rate of discharge. This means your lithium ion powered lights won't dim slowly as the battery loses charge. Once there's no more power, the lights will just go out.

The most recent type of lithium battery is Lithium Iron Phosphate (LiFePO4). LiFePO4 batteries are frequently used in deep cycle applications — such as solar energy banks and backup power systems.

**The lithium deep cycle battery is lightweight, compact, maintenance-free with excellent usable capacity, fast recharge rate, and constant voltage. However, it's much more expensive than lead acid batteries and needs a battery maintenance system (BMS).**

**Note:** The BMS monitors the battery's state and ensures the safety of operation. It's usually equipped internally in deep cycle applications.

Next up, let's go over some maintenance tips.

### Tips For Maintaining the Deep Cycle Battery

Here are a couple of pointers to keep your deep cycle battery in optimal condition:

**Monitor charge levels:** Start charging at 50% and don't let the charge drop under 20%.

**Charge even when not in use:** This will help to prevent sulfation and maintain battery life. Trickle charge your flooded, gel, and AGM batteries if you're not using them for a long time (lithium batteries don't require this).

**Rest the battery:** Let the battery cool down after continuous use to avoid grid corrosion.

**Clean battery extremities:** Keep the battery terminal and covers free of dust and corrosion.

Now that we've covered deep cycle battery basics, let's run through some FAQs.

## 9 Deep Cycle Battery FAQs

### 1. Can A Battery Be Both a Deep Cycle and A Starter?

Yes, these are called "dual purpose" batteries.

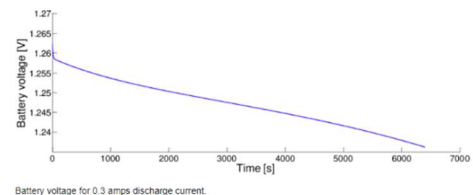
They deliver the powerful amps for cranking that a starting battery in addition to a low amp draw for steady deep cycle support.

### 2. What Do Deep Cycle Battery Specifications Mean?

Say you've got a deep cycle battery and its specifications list that it produces:

**100Ah at 20 hours, rated 1000 full cycles at 80% DoD**

*What does this mean?*



#### A. Battery Capacity

The Amp Hour (Ah) denotes battery capacity and shows **how much current can be delivered for a specific time.**

A 100Ah battery at 20 hours means it can produce 5 Amps for 20 hours ( $100/20 = 5$ ). Deep cycle batteries are typically rated for a 20-hour discharge.

The main thing to understand is that if you're going to load more appliances, you'll need a higher battery capacity.

#### B. Discharge Cycle

The discharge cycle defines **how many times a battery can be discharged and charged** without reducing performance or capacity.

1000 full cycles simply mean it can be charged and discharged 1000 times. The more full cycles there are, the longer the battery life.

#### C. Depth of Discharge

Depth of discharge determines **how much of the battery can be discharged safely** compared to its original capacity, before it must be recharged.

Deep cycle batteries are meant to discharge more of their energy. An 80% DoD means the battery can discharge down to 20% of its capacity.

### 3. What Are Some Deep Cycle Battery Features to Consider?

Apart from Amp Hour, discharge cycle life, and depth of discharge, here are some other features you may want to consider in a deep cycle battery.

**Size and weight:** Smaller batteries are easier to carry and reduce overall vehicle weight.

**Voltage rating:** Higher voltage batteries should be used for larger loads.

**Charging time:** The smaller the number, the faster the battery charges.

**Durability:** Batteries can be susceptible to extreme temperatures, vibrations, shocks. Pick one suited to your usage.

**Shelf life:** The ideal shelf life for a deep cycle battery is 10 years before it loses maximum capacity.

**Charging method:** Note how the battery is charged. You can often use a smart charger to help adjust **voltage and current.**

**Temperature tolerance:** Check its ability to deliver power at different temperatures, especially if you live in very hot or extremely cold climates.

### 4. How Long Do Deep Cycle Batteries Last?

For the most part, deep cycle batteries will last up to six years with proper care and maintenance.

In general, their lifespans are:

Lithium batteries: 3-10 years

Lead acid and AGM batteries: 6 years

Gel batteries: 10 years

### 5. What's The Charging Time for Deep Cycle Batteries?

The actual timing depends on several factors, including the battery capacity, age, battery charger, etc.

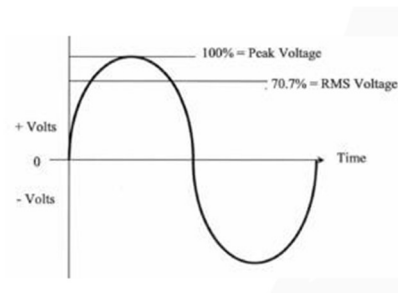
But on average, here's how long they'd take to charge:

Flooded lead acid battery: 8-16 hours

AGM battery: 5 hours

Gel battery: 5-10 hours

Lithium battery: 2-3 hours



### 6. Where Are Deep Cycle Batteries Used?

Deep cycle batteries are used for anything that requires continuous power for an extended period.

These include:

RVs, golf carts, wheelchairs, scooters

Marine trolling motor, navigational devices

UPS backup technology, emergency lighting

Solar battery for off-grid energy storage systems

### 7. Can I Connect Different Deep Cycle Batteries?

No.

Only connect batteries of the same type, model, capacity, and age.

For example, if you want to connect your deep cycle RV battery with another one to increase output, make sure the second battery meets the mentioned criteria.

### 8. Can I Start My Car with A Deep Cycle Battery?

No.

Deep cycle batteries aren't designed to deliver high currents to start a car. Using one could damage the battery or the car. Stick to a starting battery for this.

### 9. Can I Solar-Charge My Deep Cycle Battery?

Yes.

Any deep cycle battery can be charged with solar panels. Make sure to use a solar charge controller for deep cycle solar batteries to regulate the charge.

### Closing Words

While you won't need a deep cycle battery to start your internal combustion engine, they make an excellent RV battery or battery bank for your solar panel system.

### Acknowledgements to: RepairSmith.com

