

## The Right Battery for Solar PV System

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**W**hat makes a battery suitable for a Solar PV System? In order to answer this question, one must understand how the battery works in a system and what batteries are available.

A battery is the charge storage tank for your Solar PV System. Solar energy is delivered in short durations and the energy needs to be stored so the system can continue to operate at night and during cloudy days. The solar battery lives on a daily basis in various states of charge. This very characteristic is what makes a battery used in a Solar PV System different from any other battery.

A 12-volt solar battery can be fully discharged approximately 500 times, while a marine battery may last only 50 – 200 cycles in the same conditions. An automotive battery may only last 1 or 2 cycles.

There are two basic types of lead acid battery categories designed for solar applications: flooded batteries and sealed, valve regulated batteries (also known as VRLA).

### Flooded Batteries

Flooded batteries are the lowest cost batteries available and are tolerant of rough charging conditions and cycling. This battery type is popular for residential solar systems because they are inexpensive and rugged. However, flooded batteries are not the best selection for off grid industrial applications.

Flooded batteries require overcharging for optimum performance which causes two things to happen; gases are vented and water is depleted from the battery. If the water is not replaced several times a year, the battery will rapidly degrade. The gases are highly explosive and highly corrosive. Batteries require active venting and isolation from charging equipment to prevent component damage or possible explosions.

Some maintenance-free batteries are actually flooded batteries with extra water. These batteries exhibit all of the same issues as standard flooded batteries except a reduced need to water and less tolerance to overcharging.



*A battery bank used in a Solar PV System*

### Sealed Batteries

Sealed batteries are available in two common configurations: absorbed glass mat (AGM) and gel electrolyte (GEL). Both are considered truly maintenance free in that they do not require watering or manual intervention for proper operation.

AGM and GEL configurations are sealed from spilling acid and do not vent during normal operation. Sealed batteries are therefore the proven choice for industrial applications and they can be safely transported and co-located

with charging equipment with little risk of damage to the system.

AGM batteries are available in all battery sizes from a few amp-hours up to several hundred amp-hours. They are more expensive to manufacture than flooded batteries because they require more complicated assembly techniques to seal them.

GEL batteries are available in fewer configurations and their complex packaging is also expensive to manufacture. They are available in sizes from a few amp-hours to several hundred amp-hours. GEL batteries perform well in cyclical applications such as solar and are ideal for small solar electric systems.

Batteries designed for small solar systems last between 4 to 7 years depending on the system design and the average temperature to which the batteries are exposed. Larger systems using 2-volt batteries may last as long as 7 to 10 years as the batteries are designed for longer cyclical life.

### **Batteries Affect System Performance**

Batteries not designed specifically for solar applications will lead to poor system performance. The battery life, if the battery is a deep discharge model such as a marine battery, may only be 1 – 2 years. If the battery is not a deep discharge battery, such as a car battery, the battery may only last a week or less which leads to early system failures. In addition, when a battery reaches end of life suddenly, it is prone to shorting cells and venting gas when charged, which may lead to severe system damage.

Since batteries designed for solar applications degrade gradually, there is more opportunity to detect a problem before it becomes a serious issue. Remember, all batteries should be treated with respect, as they are potentially hazardous if not used appropriately.

### **A GREEN MESSAGE**

Using renewable solar energy enables us to reduce the use of fossil fuels to generate energy. Fossil fuel energy generation pollutes our environment. You are empowered to help. Do your part. Be a responsible global citizen.

### **SAVE GAIA.**

