Deep cycle battery

for the **solar bubble dryer**

Rice Science for a Better World

Postharvest Fact Sheets

What is a deep cycle battery?

A deep cycle battery, sometimes called a solar battery or inverter battery, is a rechargable battery used in electrical power applications that require the battery to release most of its energy at a steady rate over a longer period of time, after which it is recharged. It is used in photovoltaic (PV) applications such as the Solar Bubble Dryer, in electrical vehicles, or for emergency power supply.

Why use deep cycle batteries and not the cheaper starter batteries?

Different battery types are designed for different purposes. If the wrong battery type is used, performance, durability, and safety are compromised:

- The ***starter battery*** of a car is designed to produce **maximum current** for a very short time, such as when starting the engine. Under normal conditions, the battery is not completely discharged after the engine starts and gets immediately recharged from the running engine. It is kept charged most of the time.
- A ***deep cycle battery*** for a solar-powered application must provide steady power over a long time, during which it releases a major part of the energy stored in it and is then recharged over a longer time. Contrary to a starter battery, a deep cycle battery goes through many deep charge-discharge cycles, and can stay partially discharged for some time.

The two applications are very different, and it is thus impossible to construct a battery that provides optimum performance for both. While both battery types are made from the same materials, they are constructed very differently and, if used the wrong way, will not last very long. Initial savings when buying the wrong battery can turn out much costly from compromised performance or early failure.

Deep cycle battery

Types

The flooded lead acid battery is the most common type of deep cycle battery. Maintenance-free versions are gel and absorbed glass mat (AGM) batteries.The lead plates in deep cycle batteries are thick and solid so there is little surface area for corrosion.

Application

Always use a solar battery charger. Never connect the PV panels directly to the battery.

Tips for maximizing battery life

When properly maintained, deep cycle batteries can last 4–10 years.

- Deep cycle batteries can be discharged down to 20% but not below this level.
- Maximum life can be achieved if battery is kept at 50% charge.
- Never completely discharge the battery; this will quickly break a deep cycle battery.
- For a flooded lead acid battery, regularly check acid level and refill with distilled water when it goes low.

Starter battery or car battery

Most starter batteries are flooded lead acid batteries because these cost less, but gel or AGM batteries are sometimes used, too. The lead plates of starter batteries are made like a sponge; it has more plates to increase surface in order to get the extremely high current needed for starting the motor. This extended surface area causes the lead plates to corrode quickly when the battery is discharged. Using this type of battery in a PV application that discharges them deeply on a regular basis ruins the battery quickly.

Economic comparision

A deep cycle battery may cost twice more than a starter battery of the same capacity. It is clear, though, that the starter battery is not cheaper in the long run if it lasts only 1–2 years in deep cycle mode while the deep cycle battery lasts 4–10 years.
Some users may think that they can still use starter batteries for PV applications by discharging them only a little (e.g., by 20%) and thus avoid the early breakdown. However, the charge efficiency factor in this case is poor (about 60% instead of 85% with deeper discharges). In addition, many more starter batteries are needed to provide the same energy. One deep cycle battery discharged to 20% would need an equivalent of about four starter batteries discharged to 80% to provide the same energy.

Battery safety tips

Batteries contain sulfuric acid, a substance harmful to people and animals. Sulfuric acid also damages clothes and other materials.

- Always install the battery in a well-ventilated place. When charged, it creates oxygen and hydrogen that, when accumulated together, are highly explosive.
- When working with batteries, remove all jewelry and metal accessories (e.g., wrist watch), These can short circuit he battery and cause serious burns.
- Wear gloves, goggles, long-sleeved shirts, and long pants when working with a flooded lead cell battery.
- Work in a well-ventilated area when cleaning or filling up a battery.
- Check the battery for damages (cracks in the body, corrosion on the contact points) regularly and replace when damaged.
- When replacing lost acid with distilled water, pour slowly and keep your face away from the opening.
- When acid spills on your skin, immediately flush with water. Better yet, use a mixture of baking soda and water to neutralize the acid. If the acid caused a burn, seek medical treatment.

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