

Battery Basics

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Practically all batteries used in Ham Radio power backup systems are Lead-Acid type batteries. Even after over a century of use, they still offer the best price to power ratio.

ALL of the batteries commonly used in deep cycle applications are Lead-Acid. This includes the standard flooded (wet) batteries, gelled, and AGM (Absorbed Glass Mat). They all use the same chemistry, although the actual construction of the plates, etc., varies.

The lifespan of a deep cycle battery will vary considerably with how it is used, how it is maintained and charged, temperature, and other factors.

These are some typical expectations for batteries if used in deep cycle service:

Type of battery: Expected battery life in 'deep-cycle' mode

Starting: 3-12 months

Marine: 1-6 years

Golf cart: 2-7 years

Gelled deep cycle: 2-5 years

AGM deep cycle: 4-7 years

Starting batteries are commonly used to start and run engines. Engine starters need a very large starting current for a very short time. Starting batteries have a large number of thin plates for maximum surface area. The plates are composed of a lead "sponge", similar in appearance to a very fine foam sponge. This gives a very large surface area, but if deep cycled, this sponge will quickly be consumed and fall to the bottom of the cells. Automotive batteries will generally fail after 30-150 deep cycles if deep cycled, while they may last for thousands of cycles in normal starting use (2-5% discharge).

Deep cycle batteries are designed to be discharged down as much as 80% time after time, and have much thicker plates. The major difference between a true deep cycle battery and others is that the plates are SOLID lead plates – not sponge. This gives less surface area, thus less "instant" power like starting batteries need. Although these can be cycled down to 20% charge, the best lifespan vs. cost method is to keep the average cycle at about 50% discharge.

Golf cart batteries are quite popular for small systems and RVs. The problem is that "golf cart" refers to a size of battery (commonly called GC-2 or T-105), not the type or construction – so the quality and construction of a golf cart battery can vary considerably – ranging from the cheap off brand with thin plates up to the true deep cycle brands, such as Crown, Deka, Trojan, etc. In general, you get what you pay for.

Marine batteries are usually a “hybrid”, and fall between the starting and deep-cycle batteries. In the hybrid, the plates may be composed of lead sponge, but it is coarser and heavier than that used in starting batteries. It is often hard to tell what you are getting in a “marine” battery, but most are a hybrid.

Gelled deep cycle batteries, or “Gel Cells” contain acid that has been “gelled” by the addition of Silica Gel, turning the acid into a solid mass that looks like gooey Jell-O. The advantage of these batteries is that it is impossible to spill acid even if they are broken. However, there are several disadvantages (must be charged at a slower rate and lower voltage to prevent permanent damage; in hot climates, water loss can be enough over 2-4 years to cause premature battery failure).

AGM, or Absorbed Glass Mat, deep cycle batteries have all the advantages (and then some) of gelled, with none of the disadvantages, and they can take much more abuse. Since all the acid is contained in the glass mats, they cannot spill, even if broken. This also means that since they are non-hazardous, the shipping costs are lower. In addition, since there is no liquid to freeze and expand, they are practically immune from freezing damage. Nearly all AGM batteries are “recombinant” – what that means is that the oxygen and hydrogen recombine INSIDE the battery. AGMs will cost 2 to 3 times as much as flooded batteries of the same capacity. In many installations, where the batteries are set in an area where you don’t have to worry about fumes or leakage, a standard or industrial deep cycle is a better economic choice.
