



8D Vs 4D Vs Golf Cart Batteries in Solar Arrowboard Applications

- Q. Why does Allmand continue to use 8D batteries in their solar arrowboards when other manufacturers use 4D and Golf-Cart batteries?**
- A. There are a number of misconceptions and "old wives tales" regarding batteries and their operating characteristics. The Allmand Eclipse Arrowboards use 8D batteries simply because they have proven to be the best available for this application. In-house testing, outside engineering consultation, manufacturer's specifications and two decades of experience with solar arrowboards all indicate the superiority in this application of the 8D batteries over any other type that is commonly used today.
- Q. Golf-Cart batteries are made for deep-cycle applications. Why aren't they better? After all, solar arrowboards and message boards are deep-cycle devices, aren't they?**
- A. First of all, the Allmand Eclipse is not a deep-cycle device in the classic sense. Golf-Carts deeply discharge their batteries in typical use and require charging after every use, to ensure that the cart will make it all around the course the next time that it is used. In this type of application they perform exceptionally well. The Allmand Eclipse will typically require only a few charging cycles or less per year. Golf-Cart batteries do not reach their peak output capacity until about 30-50 charge-discharge cycles. *This could take as long as 50 years in an Eclipse!* Obviously these batteries will die a natural death long before they reach their peak capacity. The 8D batteries used in the Eclipse produce their peak output from the very beginning.

Another factor to consider is that Golf-Cart type batteries have a much higher rate of self-discharge than the 8D's used in the Allmand products. They are also much more prone to gassing during the charging cycle. Gassing increases the need to frequently check and replenish the electrolyte level in the batteries, contributes to corrosion in the battery compartment and in fact increases the potential for a build up of explosive gasses in the battery compartment.

Finally, since golf cart batteries are only 6 volts, twice as many are required to produce the necessary 12 volts. This requires more cables, more battery connections and more possibility of corroded terminals. Each cable and each connection adds more resistance to the circuit. Although the added resistance is not overly significant, every bit of increased resistance will shorten the operating time somewhat.

Q. Okay then, what about 4D batteries? I have customers that insist that they are a better performing battery than 8D's.

A. 4D batteries are similar in appearance to 8D's but in a somewhat smaller case. The smaller size means less plate area, and less acid capacity. 4D batteries have an amp-hour capacity that is 15-20% less than their 8D cousins. Any report of 4D batteries outperforming 8D batteries in the same application is a myth and is not founded in fact.

Q. Are there any advantages at all to the 4D or Golf-Cart batteries?

A. These batteries are smaller and somewhat lighter, so it may be easier to replace them when they have reached the end of their useful life. However, since they are smaller and lighter, they have less amp-hour capacity and a shorter run time. The 8D batteries in the Allmand Eclipse have a normal life span of as much as three to four years before they will need to be replaced. The trade off between run time and ease of replacing the batteries in this case is significant. Longer run times mean less maintenance and down time, and results in increased profitability.

USEFUL BATTERY INFORMATION

Some common battery size codes used are: (ratings are approximate)

U1	34 to 40 Amp hours	12 volts
Group 24	70-85 Amp hours	12 volts
Group 27	85-105 Amp hours	12 volts
Group 31	95-125 Amp hours	12 volts
4-D	180-215 Amp hours	12 volts
8-D	225-255 Amp hours	12 volts
Golf cart & T-105	180 to 220 Amp hours	6 volts
L-16	340 to 415 Amp hours	6 volts

An Amp/Hour (A/H) is the amount of current a battery is capable of supplying for one hour. In other words, a 100 A/H battery will supply 100 amps for one hour or one amp for 100 hours (or any combination in between).

The batteries we currently use are a 12 volt 8D with a capacity of approximately 252 A/H.

A typical 4D battery is rated at 224 A/H and a typical GC-5 6-volt golf-cart battery has a rating of approximately 227 A/H.

These batteries may be used singly or connected with other batteries in one of three ways; series, parallel or series/parallel.

Series connection = Multiply volts x number of batteries. A/H is equal to the lowest rated battery.

EXAMPLE: Two 6 volt 227 A/H batteries in series = 12 volts at 227 A/H

Parallel connection = Multiply capacity (A/H) by number of batteries. Voltage is average of batteries connected. This is the method with which we currently connect multiple 8D batteries.

EXAMPLE: Two 12 volt 252 A/H batteries in parallel = 12 volts at 504 A/H

Series/Parallel connection = Multiply A/H of series connected set x the number of series sets connected in parallel.

EXAMPLE: Four 6 volt 227 A/H batteries in a series parallel circuit to equal 12 volts requires two sets of two 6 volt 227 A/H batteries in series equaling 12 volts at 227 A/H x 2 = 12 volts at 454 A/H.

The Allmand Eclipse pulls approximately .4 amps in a single flashing arrow mode during the daylight, and .2 amps when operating in dimmed mode during the night. Assuming an equal number of daylight and darkness hours the average current draw displaying the single flashing arrow mode is .3 amps. Using these assumptions, the calculated no sun (no solar-assist) 24-hour per day run time for each battery configuration under ideal conditions is:

Two 8D batteries = 504 A/H (70 days continuous no-sun operation). This is the configuration typically specified in the Allmand Eclipse.

Two 4D batteries = 448 A/H (61 days continuous no-sun operation)

Four GC-5 Golf Cart batteries = 454 A/H (62 days continuous no-sun operation)

The above calculations are for comparison purposes only and do not take line losses, battery age and condition, etc. into account. Line losses will be basically the same for both the 8D and 4D battery configurations and slightly greater for the GC-5's due to the increased number of terminal connections required in a series/parallel configuration. Age and condition of batteries as well as general maintenance condition also have a significant effect on equipment performance.

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