



The
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"We Will Make It Happen!"

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Golf Cart Maintenance Guide

Watering Your Battery

There are two conditions when watering can be harmful to your batteries. One is over-watering and the other is under watering. It seems like most everyone does one or the other. In our recent meeting with the Trojan battery gurus, they told us that over-watering is perhaps more harmful to the batteries than under watering, but they are both bad for the batteries. So we will discuss over-watering first.

Over-Watering Your Batteries

The electrolyte in a battery is the solution of water and sulfuric acid. During the normal process of charging and discharging the level of the electrolyte changes rather drastically. This is normal. It is also normal in the process of charging to lose some of the electrolyte. We'll explain how this happens in a moment. So it is necessary periodically to bring the electrolyte level to a correct level by adding water and distilled water is HIGHLY recommended. But adding water is where things can get screwed up. This is how it happens.

You come home from playing a round of golf and think, just before you recharge the batteries, "Gosh, I'd better check the batteries. I haven't put water in them for quite some time." So you open up the battery compartment and remove the caps guarding the cells and low and behold, the electrolyte level is low. So you get a jar or can and fill it with tap water and start pouring it into the cells. Oops, got too much in that one, its overflowing. Oh well, not to worry. Wrong! Wrong! Wrong! You just made three mistakes, all bad for your batteries.

Mistake No. 1 -- Do Not Fill Discharged Batteries

In fully charged batteries the electrolyte should be at its highest optimum level. As you discharge the batteries, the level of the electrolyte will decrease as a normal chemical process of the batteries. When you recharge the batteries, the level of the electrolyte will return to its optimum level. If you water battery when it is discharged, you will most likely over water because the level of the electrolyte will increase when you charge those batteries. Do not -- repeat -- do not water any discharged battery. The correct way to water a battery is to first fully charge it, check the level of the electrolyte then add water to bring the electrolyte to the optimum level. The only exception to this is if the tops of the plates are exposed. Then add water to cover the plates, charge the batteries and then check the electrolyte level to the correct level.

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Mistake No. 2 -- Do Not Use Tap Water in Your Batteries

OK, there are certain water supplies that contain absolutely pure water, but that is rare. In most cases tap water contains minerals that are harmful to your battery. Even if there are just trace minerals, over four or five years of battery life these contaminants can add up. The Trojan battery people sent us a long list of bad things common in tap water. One of the worst is water that has been softened by commonly used water softeners. Water softeners leave chlorides in the water and they are very bad for batteries. A new set of batteries for your golf car will cost you about \$450, distilled water is inexpensive. So here is another rule: Use Only Distilled Water in Your Batteries.

Mistake No. 3 -- Do Not Fill Cells to Overflowing

If you water discharged batteries to a point where they will overflow when charged, or if you water to overflow the fully charged batteries, you will deplete the electrolyte of the necessary mixture of acid and water. In this condition the battery will not deliver its proper level of energy. Furthermore it will put corrosive acid all over the place. Now you better clean-up the mess or suffer the consequences. Do not assume that the acid will not hurt the aluminum battery racks of Club Car. Battery acid will eat away the aluminum as well as steel racks

Under Watering Batteries

In our 25 years of golf car maintenance we find that under watering is the most common cause of battery damage. The dumbest statement we have heard about comes from the maintenance supervisor of a large golf course. When asked who did the maintenance on his electric golf car fleet he replied, "Nobody. We don't have to do maintenance. These golf carts are leased." Most of the cars had little water in the batteries and they were failing right and left.

If the electrolyte level is below the plates, the exposed portion cannot engage in the chemical process which results in power from the battery. If the plates are exposed repeatedly or are out of the electrolyte for extended periods of time, a process called sulfation will occur. In this process the active material will turn to a sulfate, which is irreversible. That portion of the battery is dead forever. A sulfate also has a nasty habit of flaking off and falling to the bottom. This will eventually short out the plates and bye-bye battery.

So as far as watering goes, it is, "Dammed if you do -- and Dammed if you don't."

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How Often Should You Water Your Batteries?

The simple answer is, "Whenever it is needed." OK, OK when will it be needed? Well, that is the direct function of battery age and how often you use your batteries. The more often the battery is used, the more electrolyte is expelled in the process of what is called 'gassing'. We will talk about that a little later. The batteries will definitely not need water every time you use them, but a good rule of law and is to check them, say, once a month. As batteries age they will need to be checked more frequently. In warmer climates the water will evaporate faster.

What Is Gassing in a Battery? Is Gassing Bad?

No, gassing is good and a normal phenomenon in the process of recharging a battery. When you discharge a battery the sulfuric acid in the electrolyte is "consumed" by the active material on the plates. When the battery is recharged, the acid is liberated and returns to the electrolyte. But this acid is heavier than water and tends to drop to the bottom. At about 80 or 85 percent of the full charge nearly all of the acid is returned to the electrolyte. The battery people say that the charging process is not completed because the electrolyte is stratified. This essentially means that most of the acid is at the bottom and most of the water is at the top. That condition is not satisfactory for discharging the battery again. This is where gassing comes in. As the charging process continues the electrolyte begins to bubble or gas. This gassing, as it is called, is necessary to return the electrolyte to an even consistency. In the battery business it is called returning to the correct specific gravity.

Now there is a small problem with gassing. The gas escapes from the battery and carries with it a small amount of the sulfuric acid. This acid can corrode the terminals, corrode the hold down brackets, corrode the battery frame holder and just about any other metal it touches. It is no major catastrophe unless you ignore it. We will talk about that under 'corrosion care'.



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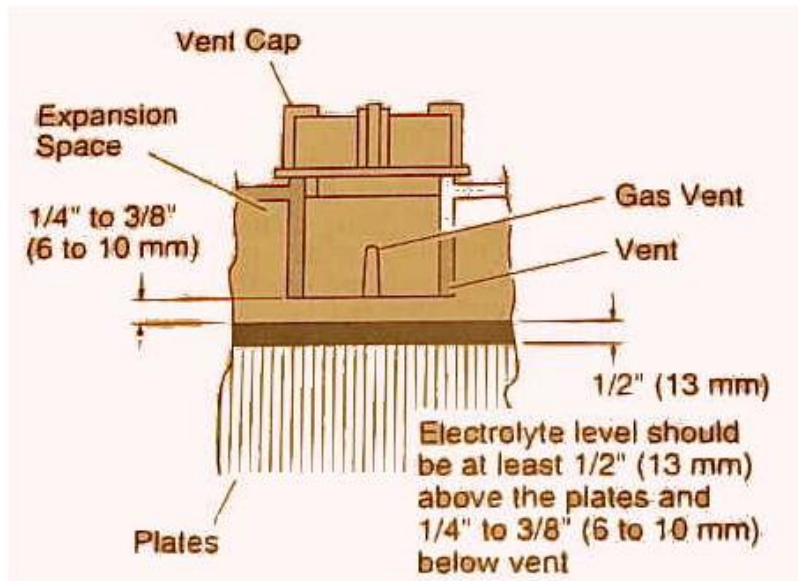
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What Is the Optimum Level of the Electrolyte?

The diagram below shows the optimum level of the electrolyte in each cell when the battery is fully charged.



Want a no brainer? Buy yourself a battery filler bottle (pitcher). Put distilled water in the pitcher then put the filler spout down into a cell. Water will not come out until you press down because the spout is spring loaded. Press down and the cell will automatically fill to the correct level. These filler bottle only cost about \$15 to \$20 at many pro shops and golf cart shops.

Charging and Discharging Your Batteries

When and How Often Should I Charge the Batteries?

There are a lot of different opinions out there on this question. We have read conflicting viewpoints. So when we met with the Trojan battery experts, we asked them this question. Their answer was to recharge the batteries every time you discharge them. That's simple enough.

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How Far Down Should I Discharge the Batteries?

If you needed to, you could fully discharge the batteries to where they cannot move the golf car any longer, but it is definitely not good for the batteries to do it repeatedly. You will shorten the overall life of the batteries. The battery experts say that 50 to 60 percent discharge of the battery is ideal. In modern electric golf cars that amount of discharge would probably not be reached in 18 holes of golf. A round of golf is somewhere around 4 or 5 miles, depending on the course. New batteries will go 2 or 3 rounds from a full charge. But again that would not be good for the batteries. It is a good idea to have a 'state of charge indicator' for your electric golf car. You can find these at any golf cart shop.

Caring for Your Batteries

New Batteries

If you have the new electric golf car or an older golf car with new batteries, you can start from scratch in caring for your batteries. If you have a brand-new golf car, you will notice that the terminals of the battery are covered with an anti-corrosion substance. If you have replaced your batteries, you probably will not have this anticorrosion coverage. We were fortunate this summer to find a Battery Terminal Anticorrosion Gel at a trade show. We do not have it listed in our online store yet, but we can get it for you. It comes in a small plastic container and with a brush attached to the cap. There is plenty in the container to do all of your batteries. It will not wash off with water.

All batteries gas when being fully charged. Acid is escaping into your battery compartment during this process. If your batteries are new and there is no corrosion, you can wash them down with a hose every day, every week, or once a month. But we recommend that you at least do it once a month. The key is, the more you use them, the more you need to clean them. Charge them correctly, clean them often and your batteries will 'purr' and give you many years of faithful service.

Old Cars-- Old Batteries

Now if you have an old car and old batteries that have not been taken care of, you have your work cut out for you.

1. Charge the Batteries

Be sure your batteries are fully charged then check the electrolyte level.

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2. Clean the Battery Posts

Disconnect the battery terminals from all batteries.

Warning! Danger! Do not wear any jewelry such as rings or bracelets. A ring shorted to ground can take off your finger. Your finger and the battery would both be trashed. A metal bracelet or necklace can cause equal damage. Be careful with the tools you use. Do not let the tools touch any battery posts and anything else at the same time.

Check all the battery posts for corrosion. If they are not bright and shiny, they are corroded. Use a wire brush battery terminal cleaner? Absolutely not! They are next to useless. The battery posts should be bright and shiny. Taking wide screwdriver and scrape the side of the post and you will see the shiny difference. The posts should be shiny all the way around. You can find a simple tool for this at any golf cart shop.

3. Clean the Battery Terminals

Next you need to clean the inside of the battery terminals. These are the round fasteners at the end of the battery leads. Use the same method as above to make the inside bright and shiny. If the battery leads are frayed or partially broken, replace them. If the cable ends are badly corroded, soak the ends in battery acid neutralizer until all corrosion is gone. Another caution is that jostling the batteries can cause active plate material to slough off and reduce battery life.

4. Check the Battery Holder Frame And Hold Down Brackets

While you have the batteries disconnected, lift them out and check the condition of the frame that holds them. If the frame this are rusted or corroded, they must be cleaned. It would also be a good idea to paint the frame with a rust preventative once they are cleaned. If the hold-down brackets are in bad shape, they should be replaced.

5. Clean the Entire Area with Battery Neutralizer

It is not a good idea to use baking soda to neutralize battery acid. The byproduct of baking soda and acid is environmentally unfriendly. Instead, paint all the areas with a good battery neutralizer and wash everything down. You can get this neutralizer at any golf cart shop.

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6. Anticorrosion Gel for All Connections

Now that everything is nice and clean and properly reconnected, apply the anticorrosion gel to all connections. You can get the gel at any golf cart shop.

7. Mysterious Liquid on top of Your Batteries

Strangely enough we have found that not all batteries (of the same type) are actually the same. When you charge your batteries and one or more of them may have a mysterious liquid appear on top. The liquid is not mysterious, it is electrolyte from the battery. What is mysterious is why some batteries do this and some do not. This electrolyte has acid in it and you cannot allow it to stay. There is not much you can do about the problem except clean those batteries (as described above) every time you notice it. And be sure and check for it more often. Always be cautious and safe when working around battery acid, protecting your eyes at all times is especially wise.

Hope you find this guide helpful, but we are not experts on golf cart maintenance and you should consult other sources for information on anything troubling you about the care of your golf cart.