

# Battery FAQ

## 1. What is the “end of useful life”?

The IEEE defines “end of useful life” for a UPS battery as being the point when it can no longer supply 80 percent of its rated capacity in ampere-hours. When your battery reaches 80 percent of its rated capacity, the aging process accelerates and the battery should be replaced.

## 2. How can I ensure that my UPS batteries are maintained and serviced properly?

With proper maintenance, battery life can be predicted and replacements scheduled without interrupting your operations. These are IEEE and OEM recommendations for general maintenance:

- Comprehensive maintenance programs with regular inspections
- Re-torque all connections, as required
- Load testing
- Cleaning the battery area, as required

## 3. Do I have to replace my UPS batteries with the same brand of batteries?

Eaton recommends that if you use brand X and need to replace one or two batteries in the string you should use the same brand because they will have the same characteristics. If you need to replace the whole string then you can change brands with fewer risks.

## 4. Are maintenance-free batteries maintenance-free?

Though sealed batteries are sometimes referred to as maintenance-free, they still require scheduled maintenance and service. The term maintenance-free refers to the fact that they do not require fluid. Preventive maintenance is the key to maximizing your UPS battery service life.

## 5. What about the disposal of batteries?

It is imperative that your service technicians adhere to EPA guidelines for the disposal of all UPS batteries. Remember, it is the owner’s responsibility to make sure these guidelines are followed.

## 6. Is there any difference between the batteries used by smaller UPSs, from 250 VA to 3 kVA, and the ones used by larger UPSs?

While basic battery technology, and the risks to battery life, remain the same regardless of UPS size, there are some inherent differences between large and small applications. First, smaller UPSs typically have only one VRLA battery that supports the load and needs maintenance. As systems get larger, increasing battery capacity to support the load gets more complicated. Larger systems may require multiple strings of batteries, introducing complexity to battery maintenance and support. Individual batteries must be monitored to prevent a single bad battery from taking down an entire string and putting the load at risk. Also, as systems get larger, wet-cell batteries become much more common. The differences in battery maintenance between VRLA and wet-cell batteries discussed earlier in this handbook apply.

## 7. Our facility was damaged by a flood and our batteries were partially submerged in water. What should I do?

The first concern in this situation is safety. Containing any contamination is critical to preventing hazards to workers and the environment.

## 8. My UPS has been in storage for over a year. Are the batteries still good?

As batteries sit unused, with no charging regimen, their battery life will decrease. Due to the self-discharge characteristics of lead-acid batteries, it is imperative that they be charged periodically during storage. Otherwise, permanent loss of capacity will occur. To prolong shelf life without charging, store batteries at 10°C (50°F) or less.

## 9. What is thermal runaway?

Thermal runaway occurs when the heat generated in a lead-acid cell exceeds its ability to dissipate that heat, which can lead to an explosion, especially in sealed cells. The heat generated in the cell may occur without any warning signs and may be caused by overcharging, excessive charging, internal physical damage, internal short circuit or a hot environment.



Thermal runaway incident

Thermal runaway effects on adjacent battery cabinet



## 10. Is it safe to transport sealed batteries?

VRLA batteries marked as “non-spillable” are safe and approved for all transportation methods.

## 11. What is the difference between hot-swappable and user-replaceable batteries?

Hot-swappable batteries allow the batteries to be changed out while the UPS is running. User-replaceable batteries are usually found in smaller UPSs and require no special tools or training to replace. Batteries can be both hot-swappable and user-replaceable. Please check your user manual for details on your UPS batteries.

## 12. How is battery runtime affected if I reduce the load on the UPS?

The battery runtime will increase if the load is reduced. As a general rule, if you reduce the load by half, you triple the runtime.

## 13. If I add more batteries to a UPS can I add more load?

Adding more batteries to a UPS can increase the battery runtime to support the load. However, adding more batteries to the UPS does not increase the UPS capacity. Be sure your UPS is adequately sized for your load, then add batteries to fit your runtime needs.

## 14. What is the average lifespan of UPS batteries?

The standard lifespan for VRLA batteries is three to five years, and for wet-cell batteries is up to 20 years. However, expected life can vary greatly due to environmental conditions, number and depth of discharge cycles, and adequate maintenance. Have a regular schedule of battery maintenance and monitoring to ensure you know when your batteries are reaching their end-of-life.

## 15. Why are batteries disconnected on small, single-phase UPSs when they are shipped?

This is so that they are in compliance with Department of Transportation regulations.

## 16. If I have the serial number from the Eaton UPS or battery cabinet, can I find out how old the batteries are?

Every Eaton battery has a manufacturer date code that indicates when the battery was made. The battery or battery cabinet will also feature a sticker for each time the batteries have been recharged while in storage. Stored batteries require charging periodically during storage to avoid loss of capacity. Recharging stored batteries does not affect battery warranty.

## 17. Will Eaton replace batteries for another manufacturer's UPS?

Yes. Eaton batteries will work in nearly all other manufacturers' UPSs. In addition, we have extensive knowledge of Best Power, Deltec, IPM and Exide Electronics models because these product lines were purchased by Eaton.

## 18. What are the risks associated with a lack of battery maintenance?

The primary risks of improperly maintained batteries are: load loss, fire, property damage and personal injury.

## 19. Who are the major battery manufacturers?

There are many battery manufacturers, but the major ones are: C&D, Enersys, CSB, Yuasa, Panasonic and GS – to name a few.

## 20. If I have one bad battery, should I only replace that faulty battery, or replace the entire string of batteries?

Batteries in series are similar to a string of holiday lights. When one unit fails, the entire string no longer works. When a battery or group of batteries connected in a series ceases to work, not only is the battery string no longer functional but it can be difficult to determine which battery has failed.

The most effective way to combat this potential problem is to "spot" replace bad batteries that are less than three years old. While the four factors affecting battery life play a large role in determining when a battery is vulnerable to failure, there is no precise way to ensure that battery failure can be predicted. The only way to identify bad batteries early enough for spot replacement is through continuous battery monitoring and scheduled maintenance.

## 21. Why do batteries fail?

Batteries can fail for a multitude of reasons, but common reasons are:

- High or uneven temperatures
- Inaccurate float charge voltage
- Loose inter-cell links or connections
- Loss of electrolyte due to drying out or damaged case
- Lack of maintenance, aging

## 22. What is the importance of power density when talking about batteries?

Batteries differ markedly in the number of watts per cell. A higher density battery provides more runtime for the footprint. You may even find that you can reach your runtime requirements with fewer battery cabinets, which reduces upfront costs and lifetime costs of battery preventive maintenance.

## 23. How is battery performance generally measured?

Batteries are generally rated for 100+ discharges and recharges, but many batteries show a marked decline in charging capacity after as few as 10 discharges. The lower the charge the battery can accept, the less runtime it can deliver. Look for batteries with a high-rate design that sustains stable performance for a long service term.