



EXPONENTIAL POWER RECOMMENDED CAPACITY TEST FREQUENCY FOR VLA STATIONARY BATTERIES

Our recommendations are based upon IEEE 450 and our considerable experience

VLA batteries should receive an acceptance test at the time of manufacture or installation.

Exponential Power recommends an acceptance test upon installation as this verifies the performance of the battery as *installed* (including all final connections). Battery manufacturers don't intentionally send out bad batteries, but many new batteries are damaged or functionally destroyed through improper storage or improper installation. Performing an acceptance test upon installation ensures that your load is protected by a properly functioning battery.



Exception: We recommend that batteries installed in remote areas with expensive or difficult access, such as offshore oil and gas platforms or remote mountain tops, be fully assembled, charged, tested, and recharged at an accessible location. Then the battery would be disassembled, repackaged, and shipped to the final location for installation.

While expensive, this method ensures that a fully functional and tested battery arrives at the final location, although shipping damage and improper installation are still possible.

Following the initial acceptance test, VLA batteries require a capacity test (either "performance" or "modified performance" as applicable) after two years of service and then at intervals not exceeding 25% of the expected service life.

Service life is defined as the length of time a battery is expected to provide acceptable capacity in its installed location. Temperature plays a critical role in determining service life. Lead-acid battery life is reduced by approximately 50% for every 15°F rise in temperature. Life reduction due to temperature is not linear, meaning that one or two months a year of elevated operating temperatures will reduce life even if the battery is kept at the standard operating temperature for the rest of the year. The appendices IEEE 450 contain a formula and examples for determining service life based upon historical temperatures.

Service life and design life are equal when a battery is installed in an environment where the operating temperature is maintained at the manufacturer recommended standard (usually 77°F/25°C or 68°F/20°C).





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- VLA batteries require annual capacity tests (either “performance” or “modified performance” as applicable) when the battery reaches 85% of the expected service life or when signs of degradation are noted.
 - Degradation is below 90% of rated capacity or when the capacity drops 10% or more between capacity tests.
 - All VLA batteries will require annual capacity tests as they approach end-of-life.
- Pasted plate and tubular plate VLA batteries should be replaced when their capacity drops to 80% of the rated capacity. VLA batteries lose capacity primarily via a corrosion mechanism. As the capacity drops below 80% the rate of internal plate corrosion is advanced enough to consider the battery unreliable.

EXAMPLE 1

20-year design life pasted or tubular plate VLA battery installed in temperature-controlled environment maintained at 77°F: Estimated service life 20 years.

- Perform an acceptance test upon manufacture or at the time of installation. Capacity 96%.
- Perform a performance test at 2 years of service. Capacity 100%
- Perform a performance test at 7 years of service. Capacity 105%
- Perform a performance test at 12 years of service. Capacity 108%
- Perform a performance test at 17 years of service. Capacity 100%
- Perform a performance test at 18 years of service. Capacity 94%
- Perform a performance test at 19 years of service. Capacity 86%
- Perform a performance test at 20 years of service. Capacity 80%
 - This battery requires replacement. Replacement should occur as soon as practical within the next year.

EXAMPLE 2

20-year design life pasted or tubular plate VLA battery installed in a non-temperature-controlled environment. Estimated service life 12-years:

- Perform an acceptance test upon manufacture or at the time of installation. Capacity 96%.
- Perform a performance test at 2 years of service. Capacity 102%
- Perform a performance test at 5 years of service. Capacity 107%
- Perform a performance test at 8 years of service. Capacity 105%
- Perform a performance test at 10 years of service. Capacity 99%
- Perform a performance test at 11 years of service. Capacity 91%
- Perform a performance test at 12 years of service. Capacity 80%
 - This battery requires replacement. Replacement should occur as soon as practical within the next 6 months.



ABOUT EXPONENTIAL POWER



At Exponential Power, we provide peace of mind with stored power solutions tailored to your unique needs, ensuring they're ready when you need them most.

We offer the confidence that comes from knowing your power systems are reliable, keeping your operations running seamlessly. Whether you're in manufacturing, telecommunications, motive power, utilities, or data centers, our team of experts delivers solutions that keep your business powered and ready to perform.

Powering Your Peace of Mind Across Industries

Battery Testing Expertise Tailored to Your Needs

At the forefront of Exponential Power technology, our team of expert battery testing professionals stands ready to address your most complex technical challenges. With decades of combined experience and cutting-edge analytical capabilities, we transform technical uncertainties into precise, actionable insights.

Whether you're developing advanced energy storage solutions, evaluating battery performance under extreme conditions, or seeking comprehensive diagnostic services, our specialists provide unparalleled technical guidance. We understand that every battery testing requirement is unique, which is why we offer personalized consultations designed to meet your specific industry and technological demands.

Ready to optimize your battery testing process? Our experts are just a conversation away.



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