

WHITE PAPER

The Importance of Load Bank Testing

BY MARSHALL LEWIS

Technical Service Sr. Manager, Generac Mobile

ABSTRACT

An important facet of preventative maintenance is generator load bank testing. A load bank test ensures that your generator will run at proper rating so you can have peace of mind when you need power. If a load bank test is not performed, your generator may not function properly when needed. This paper will detail purpose, process, results and frequency for proper load bank testing

INTRODUCTION

Load bank testing simulates the designed usage of the generator at the advertised rating located on the nameplate of the unit. It verifies that all primary components of the generator set are functioning properly under loaded conditions. The equipment used to perform a load bank test produces an artificial load on the generator by bringing the engine to an appropriate operating temperature. The key to a proper test is that your generator must be tested at its full output rating. When a generator operates during a normal exercise, it runs at a lower load than the unit's full-rated output ability. Load banking tests the generator's ability to execute and deliver the required kW.

For mobile generators, it is key to perform a load bank test anytime a generator has been idle for a prolonged time to ensure proper operation when called upon. A load bank test should also be completed after major repairs and before going into a NFPA110 operation.



TYPES OF LOAD BANK TESTING

Load banks can be defined as a self-contained, unitized, systematic device that includes load elements or steps. The following types of load testing are available:

- **Resistive Load Bank Tester:** Individual resistor load banks provide the load to the generator. Power resistors convert electrical current into heat. This testing is used to test the engine to its design capacity.
- **Reactive Load Bank Tester:** Generators that primarily supply power to motor-driven equipment and capacitors may be tested by reactive load banks. This testing adds apparent power (VA) to the load and fully tests the alternator performance as well as the engine.

HOW LOAD BANK TESTING WORKS

When a test is executed, an artificial load is placed on the generator. The test is timed and progressively increases the kW load. Each time the kW is increased, the engine and alternator parameters are recorded. The important thing to note with load bank testing is actually making sure that the system operates to full capacity with either your engine output or your alternator output depending on if you're testing at a 0.80 (reactive test) or 1.0 (resistive) power factor.

The recommended steps to follow for the load bank test include:

- Connect the load bank to the output of the generator. This is typically done at either a dedicated load bank circuit breaker or spare bus connections.
- Start and run the generator at no load until the water temperature stabilizes.
- In increments, load the generator with the load bank until you reach the desired load.
- After the test, step the load down, allowing the generator to cool based on the manufacturers' guidelines. For safety, while disconnecting the load bank, isolate the breaker. Then, turn the generator off and remove the load bank.

Both natural gas generators and diesel generators need to be load bank tested. Load bank testing helps burn unwanted moisture out of the exhaust system, lubrication system, and engine. Performing the test on a gaseous generator helps burn unwanted deposits out of the engine when it gets operating temperature. Testing also demonstrates that the unit is operating at rated capacity and will isolate any weakness in the system that can be corrected. This ensures 100% uptime when needed. While you have the engine

operating under load, it is important to make sure that the air-fuel mixtures are operating to the manufacturer's specifications. During the test, you want to make sure that your generator is not operating too lean or too rich during your run cycle. Load bank testing is a great way to do that. While testing the gen-set at no load, problems may not present themselves until it is loaded in a critical moment.

When a diesel engine powered generator is not used frequently or only run on light loads, it can be prone to experiencing unburned fuel and soot buildup in the exhaust system. This is called wet stacking. Wet stacking occurs when the generator does not reach designed operating temperature, allowing carbon and unburned fuel to build up in the exhaust system. Wet stacking can compromise the reliability of the diesel generator. It is recommended diesel systems be load tested with a portable load bank for a minimum of two hours annually. The full load operation created during load bank testing will burn off excess soot and moisture to reduce the impact wet stacking will have on the generator.

Load bank testing is a thorough and economic way of putting the generator to the test without putting critical loads and processes in jeopardy. Load bank testing ensures peace of mind after the fact with knowing the unit was fully load tested. A load bank test will indicate:

- Capacity to provide the required power output.
- Voltage regulator response time.
- Alternator's capability to provide the required voltage and frequency stability.
- The gen-set control system under different loads.
- The general performance of the whole system, oil and fuel pressure, etc.
- With data logging software, load testing can be recorded and be analyzed.

CONCLUSION

With an increase of dependency on power systems, proper testing and maintenance is becoming extremely important. A good maintenance program, that includes completing the manufacturer's recommended service and regular load bank testing, should be a standard practice for any customer's generator system to ensure long life and reliable service that is ready to operate.