

## RECOMMENDED LOAD BANKING PROCEDURE

### What is a load bank?

A load bank is a device that is temporarily connected to a generator. Simulated load is then applied to the generator through switches on the load bank to produce a specific kw output. This load is applied internally within the load bank using resistive heat producing elements.

### What is the purpose of load banking?

When running a diesel generator for prime power, the biggest issue encountered is wet stacking of the diesel engine. Wet stacking occurs when unburnt fuel remains inside the system. The unburnt diesel condenses and combines with soot in the exhaust system, leading to carbon deposit buildup. Left unchecked, wet stacking reduces engine efficiency and may trigger codes within the ECU, eventually leading to unclearable shutdown codes.

### GENERAL LOAD BANK PROCEDURE

The testing procedure itself is not complicated but does take knowledge of how the process works. The recommended minimum load test is 1 hour.

A technician will begin by connecting a load bank to the generator and ensuring the generator is in a safe location to load bank. They will start and run the generator until the water temperature stabilizes. The technician will apply load steps on the load bank until the desired load level is reached (90%-100% max capacity). After the test has been successfully completed, the technician transfers all load steps back to the off position. The technician will then allow the generator and load bank to cool down before shutting down the generator and disconnecting the load bank.

### Safety Notes:

- Load banking should be conducted in a clear and safe environment.
  - Away from busy traffic ways, away from fuel storage, clear from overhead obstructions and only in dry conditions.**Do not load bank in the rain!**
- Load banking should only be conducted by a trained technician. Please contact a local generator service dealer for additional support if you do not feel confident in this procedure.

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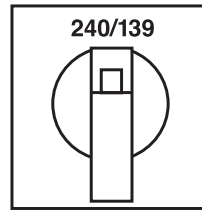
### STEP-BY-STEP PROCEDURE

1. Verify all engine fluid levels are checked prior to beginning a load bank. Be sure there is enough fuel in the tank as it will consume more fuel than typical usage.

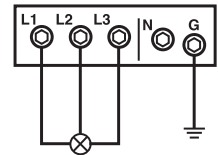
2. Inspect load bank and load cables prior to testing. Verify all load switches on the load bank are OFF. Connect the load bank to the generator and ensure all connections are firmly secured.

*See recommended connection diagrams to the right.*

**Voltage Selector Switch  
Three-phase 240/139V**



**Output Terminals  
Three-phase 240V**



3. Place the voltage selector switch in the 120/208 (139/240) three phase position for optimal load during the load banking procedure. Verify the generator main breaker is OFF.

4. Identify and calculate generator max load capacity.

*\*Keep in mind, load banks run at a 1.0pf and generators are typically rated at a 0.8pf.*

*Be sure to calculate max capacity properly before beginning a load test.*

$$kVA \times 0.8 = kW$$

$$kW \div V \div 1.73 \times 1000 = \text{Rated Amperage @ 1.0 pf}$$

*See the engine generator plate for Generator Output (kVA) and Voltage (V).*

ENGINE GENERATOR	
MODEL	
SER. NO.	
GEN. OUTPUT	_____ kVA
VOLTAGE	_____ V
FREQUENCY	_____ Hz
POWER FACTOR	80% PHASE 3
RULE	JEM 1398
NET DRY MASS	_____ kg
OPERATING MASS	_____ kg
AIRMAN USA CORPORATION ASSEMBLED IN USA	

5. Start the generator and allow it to reach normal operating temperature. Verify correct voltage (120/208). Watch and listen for any possible issues such as abnormal noise or leaks.

*\*If any issues are detected, stop the test procedure until the mechanical failure is corrected.*

6. Turn the main breaker ON and verify correct voltage again (120/208). Verify fan and control operation on the load bank.

7. On the load bank, turn the master load switch to ON and apply 30-50% load for the initial 15-minute test to ensure the generator is functioning properly.

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8. Verify amperage of each leg with an ammeter. This is to ensure that all generator legs are in balance (+/- 2A) and the controls on the load bank and generator are functioning properly.
9. Once the initial 15 minutes have passed, begin adding additional load to the generator until it has reached 90%-100% capacity. Run at this load for the remaining 45 minutes.
10. Monitor the generator during the duration of the test. It is best practice to document readings such as water temperature, oil pressure, amperage, voltage, frequency every 15 minutes. Continue to monitor the generator for abnormal noises as well. If an issue is discovered, end the test (allow the gen and load bank to cool if possible) to minimize damage until repairs can be completed. After repairs, restart the test from the beginning.
11. Upon successful completion of 1 hour load bank test, gradually remove load until the generator is no longer under load. Allow the generator and load bank 5-10 minutes of unloaded run time to properly cool before turning off.
12. Turn main breaker OFF and shut down generator. Disconnect load bank. If needed, return voltage selector switch to previously used voltage.

### Additional Points to Remember:

- Besides load banking a severely wet stacked unit, generators should be load tested in all voltage selections to ensure proper output and function. This can be performed in 30-minute tests, straight from no load to full load.
- Single phase kW is significantly less than three phase kW. By putting the generator in single phase (120/240) selection, you are losing 1/3rd of the generator's potential.  
*\*Verify single phase max capacity prior to running a load test in single phase.*
- Maintaining load bank records can assist in preventative maintenance and mitigating mechanical failures. This will minimize downtime or possible catastrophic failures.