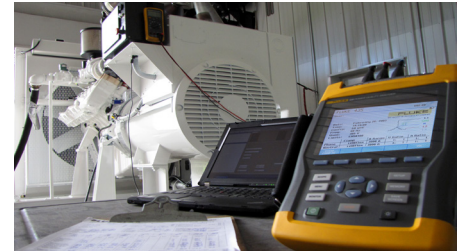


# Factory Load Test



Blue Star Power Systems, Inc's factory testing is performed with the same extreme diligence and attention to detail that is given to the prototype testing process. Every engine generator set receives a complete factory load test that certifies and ensures that the set will function in accordance to every specific application. Test metering will have an accuracy of 1.3% or better. This metering equipment is calibrated annually, and is directly traceable to the National Institution of Standards & Technology (NIST). All test procedures are conducted in accordance with MIL-STD-705C where applicable.



## Factory Acceptance Testing Procedures

- ▶ Insulation Resistance Test (301.1c)\*
- ▶ High Potential Test (302.1b)\*
- ▶ Alternator Over Speed
- ▶ Complete Engine Inspection
- ▶ Generator Inspection
  - Winding Resistance Test (401.1b)
  - Exciter Field Stator
  - Main Field Stator
- ▶ Mounting & Coupling Inspection
- ▶ Engine Fuel System Inspection
- ▶ Engine Lube Oil System Inspection
- ▶ Engine Cooling System Inspection
- ▶ DC Charging System Inspection
- ▶ Main Output Circuit Breaker Inspection
- ▶ Anticipatory Alarms and Shutdowns Test (505.2b, 515.1b, 515.2b)
- ▶ Optional Equipment Inspection (513.2a)
- ▶ Load Test (640.1d)
  - Regulator Range Test (511.1d)
  - No Load
  - MAX Load @ 1.0 P.F. (640.2d)
  - MAX Load @ 0.8 P.F.
  - Block Loads @ 0-25%, 0-50%, 0-75%, 0-100% of rated load tests (640.2d)
- ▶ 1.0 Power Factor Max Load
- ▶ 1.0 Power Factor Max Block Load Pickup
- ▶ Full Name Plate Rated Load.
- ▶ Standard Readings Taken Every 5 Minutes.

\* Performed By Alternator OEM

### Standard Reading Recorded During Load Test Inspection

<b>Run Time</b>	<b>AC Frequency</b>
<b>AC Voltage</b>	<b>Exciter Field Voltage</b>
<b>AC Amperage</b>	<b>Exciter Field Current</b>
<b>kVA</b>	<b>Lube Oil Pressure</b>
<b>kWe</b>	<b>Engine Coolant Temp.</b>
<b>Power Factor</b>	<b>Ambient Temp.</b>

## Factory Load Test Summary

All engine generator sets are visually inspected prior to testing. This includes a complete visual/mechanical inspection to ensure that all fasteners and electrical connections are secure, that all rotating components are free of obstruction/interference and are properly guarded.

Once the unit is started, the AC voltage and frequency are set to rated values. The unit is operated at no load while all of the safety shutdowns and warnings are verified and tested. The unit is then restarted and run at 25%, 50% and 100% of rated load and power factor until the engine temperature has stabilized for at least ten minutes. During the rated and maximum load pickup portion of the test, the voltage regulator gain, stability and under frequency compensation adjustments are set for optimal performance. All test procedures are performed in accordance with MIL-STD-705C where applicable.

Throughout these test procedures the AC parameters, engine oil pressure, engine temperature, exhaust temperature, timing and air/fuel ratio (gaseous units) are monitored and recorded. The unit and all installed accessory equipment are continually examined for oil and coolant leaks, excessive vibration and foreign noises.

Once all test procedures are performed and recorded, the unit is allowed a cool down period prior to being shut down. The unit is once again inspected for leaks, loose fasteners and connections prior to leaving the test facility.

The unit receives another complete final inspection process prior to packaging and shipment.

Note: All units are tested after the painting process is complete to prevent unforeseen difficulties resulting from the painting process being performed after testing.

## Witnessed Factory Load Test

Standard witnessed factory load testing must be scheduled and approved at least four weeks prior to the engine generator sets scheduled shipping date. Any requests for witnessed factory load testing after this four week period may incur additional charges.

## Witnessed Extended Run Factory Load Test

Witnessed extended run factory load testing must be scheduled and approved at the time of order placement. Any requests for witnessed extended run factory load testing after this time could be denied and would if approved incur additional cost.

All units are built and tested to cUL, CSA and NFPA 110 standards.



June 24, 2014



**RE: Blue Star Power Systems, Inc. Factory Testing Procedures**

Blue Star Power Systems, Inc., based in Lake Crystal, Minnesota, is a world-wide producer of generator sets for various industries.

Having witnessed factory load testing within their facility, my observations indicate that Blue Star Power Systems conducts generator sets testing at a conventional standard of care for the industry. Further, Blue Star Power Systems factory testing procedures meet or exceed industry standards.

Visual inspections are performed before and after generator load testing. General alarms and pre-alarms are tested to ensure they meet NFPA 110 Standards. Block load testing is executed; the generator output is monitored and recorded to confirm the generator can deliver the electrical load per its listing. A summary of their Factory Load Test program is also attached for reference.

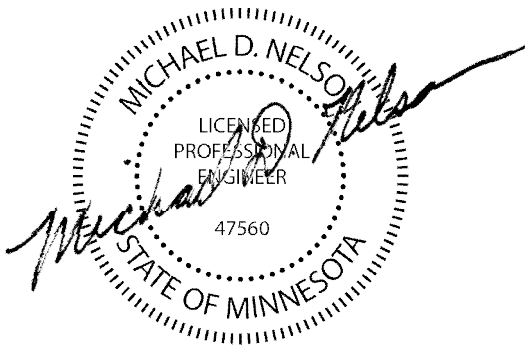
In conclusion, based on the factory load testing that I have observed at their facility, I do not have concerns about the testing procedures implemented by Blue Star Power Systems.

Respectfully Submitted,

Michael D. Nelson, PE  
Electrical Engineer  
Professional License #47560

MDN/saw

Attachment: Factory Load Test Program Sheet



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I+S GROUP

# Standard Factory Load Test



CUSTOMER:	JOB:
UNIT MODEL:	TESTED BY:
DATE:	

**VISUAL INSPECTION CHECK LIST:**

MTG & CPLG	EXH SYSTEM	cULus (UL 2200) Required
FUEL SYSTEM	DRAIN PLUGS	Hipot Tested
LUBE SYSTEM	12VDC                  24VDC	Over Current Set _____ Amps
COOLING SYSTEM	PANEL S/N:	Generator UL Listed

ENGINE:	ENGINE CONTROL:	GENERATOR:
MODEL:	HWT                          LOP	MODEL:                          LEADS:
S/N:	BATT.VOLTS: Off _____ Run_____	S/N:
FUEL:	O'CRANK: CYCLIC                  45 SEC	REGULATOR:
GOV MODEL:	O'SPEED: 71 CPS                  OTHER _____	TEMP RATING: RISE: _____          AMB _____

**RATED:**

KW	KVA	P.F.	RPM	PHASE	WIRE	HZ	VOLTS	AMPS

	ACV	ACI	KVA	KW	P.F.	HZ	EFV	EFI	RUN TIME	OIL PSI	COOLANT Temp° F	AMBIENT Temp° F
NO LOAD		N/A	N/A	N/A	N/A							
LOW		N/A	N/A	N/A	N/A							
HIGH		N/A	N/A	N/A	N/A							
SET		N/A	N/A	N/A	N/A							
25% LOAD												
50% LOAD												
75% LOAD												
100% LOAD												
MAX AT 1.0 PF												
MAX AT .8 PF												
NO LOAD												
MAX PICKUP												
END OF TEST												

**REMARKS:**

PHASE BALANCE: RATED LOAD

ACCESSORIES: CHECK WHEN TESTED

<p style="text-align: center;">FINAL VISUAL INSPECTION</p> <p style="text-align: center;">TESTED BY: _____</p>	PH	VOLTS	AMPS	REMOTE START	REMOTE ALARM PANEL
	1-2	1-N	L1	GROUND STUD	EMERGENCY STOP SW
	2-3	2-N	L2	WATER HEATER	TAP CHANGING SWITCH
	3-1	3-N	L3	BATTERY CHARGER	RECEPTACLES
				PRE-ALARMS	RUN/IDLE SWITCH
				LOW FUEL LEVEL	PANEL DISCONNECT SW.
				FUEL LEAK SW TEST	FAN BLADES
				BREAKER LINES LABELED	GND LABEL IN BKR ENCL