

# Tier 4 Final Product Line



Blue Star Power Systems offers EPA Tier 4 Final compliant generator sets ranging from 40 - 600 kWe. From standby and prime power to peak shaving\* applications, in both stationary and mobile versions, our FT4 model units meet all Federal, State and local emissions regulations that require certified FT4 model engines. Our decision to use the proven Volvo Penta SCR technology from 100 to 600 kWe has allowed us to eliminate DPF regeneration cycles, resulting in reduced down-time and maintenance of the exhaust after treatment system. This combined with our commitment to fuel efficiency improves performance and minimizes operating costs. All units are UL 2200 Listed, CSA Certified, CARB Certified, & Seismic Certified to IBC 2021.



## Product Line Advantages

### Selective Catalytic Reduction (SCR) Only

No Diesel Oxidation Catalyst (DOC) or Diesel Particulate Filter (DPF) required. Without the DOC and DPF there is reduced down time due to regeneration and required service intervals. Easy service, no cleaning nor replacement of SCR needed through system lifetime. SCR utilizes an ultra-quiet silencer design which results in industry leading decibel level reduction.

### Simplistic Design – Less Complex Engine

Constructed with minimal components for reduced maintenance and easy serviceability. Designed to have fewer points of failure and easy, accessible service points.

### Lower Fuel Consumption

No/Cooled Exhaust Gas Recirculation (EGR) which leads to lower heat rejection resulting in higher power density and increased fuel economy. A robust engine design along with cutting edge SCR technology increases combustion leading to lower fuel consumption.

### Greater Power Densities

A compact package that offers the highest horsepower in a minimal footprint. Maximum torque available at lower RPM means decreased noise levels and lower fuel consumption.

### Reliable & Proven Technology

SCR only technology has been proven with on-highway applications since 2008. SCR technology is widely used in Europe and North America for both on and off highway applications.

### Lower Exhaust Temperature

SCR technology does not increase the amount of cooling capacity needed. Lower exhaust temperatures in addition to insulating the exhaust system means there are fewer restrictions in operational areas.

### Durability & Low Noise

Long experience with SCR systems in combination with base engine development reduces risk of downtime. Well balanced to produce smooth operation with low noise.

### Cost of Ownership

World class fuel efficiency combined with a reliable exhaust after-treatment system means reduced down time. Highly engineered and reliable product with industry proven technologies enhancing return on investment.

### Prototype Test Certification

All Tier 4 Final products have been prototype tested with the assistance and participation of Volvo Penta (see page 2).

UL 2200 Listed

CSA Certified

Seismic Certified to IBC 2021

CARB Certified

\* Models VD550-02FT4 & VD600-02FT4 not available in Peak Shaving Applications.

# Tier 4 Final Product Line Prototype Test Certification (PTC)



Blue Star Power Systems has been producing high-quality engine generator sets for nearly 20 years. Volvo Penta has been a leading diesel engine manufacturer since 1907. Both companies understand the importance of reliable, cost-effective products, and have developed industry-leading test procedures to ensure we exceed this criteria. Our PTC testing program, and Volvo Penta's engineering capabilities and product development ensures that our customers receive products of the highest quality. All final Tier 4 products have been subjected to exhaustive prototype testing to evaluate every aspect of construction and performance. This standard ensures that Blue Star Power Systems gen sets powered by Volvo Penta engines operate properly and provide years of reliable service.



## Prototype Test Procedures

### Rated Load (NFPA 110)

Blue Star Power Systems certifies that all engine generator set models will produce the name-plate rated load in all conditions within the design tolerance of the gen set.

### Extended Run Testing

Blue Star Power Systems certifies that all new gen set models have undergone transient response analysis per ISO 8528-5. Engine/alternator must have the ability to accept application of the full load in a single step and recover fully to the rated voltage and frequency.

### Maximum Motor Starting

Motor starting or instantaneous voltage dip curves are developed with an inductive load bank at 0.3 power factor. Individual loads are applied to the alternator and voltage dip is determined from a high-speed graph recorder. The load is incrementally increased until the voltage dip exceeds 35%

### Endurance Test

The unit is tested to meet or exceed endurance requirements of MIL-STD-705C. At the end of endurance testing, key components are inspected and evaluated to ensure that any wear is within acceptable levels.

### Mechanical Soundness

The unit must be structurally sound and not have any resonant vibration in either rotating components or structural parts.

### Engine Cooling System

Blue Star Power Systems certifies that all gen set models will cool sufficiently within the ambient design conditions per each model. Verification of the engine cooling system is performed by operating the gen set with a sound attenuated enclosure at full rated load in a 110°F ambient.

### Anticipatory Alarms & Shutdowns

Blue Star Power Systems certifies that the pre-alarms and alarms function appropriately to protect the engine generator set from any unforeseen unnecessary failures.

### Torsional Analysis

Blue Star Power Systems certifies that all engine generator set models have undergone torsional stress analysis. While torsional vibration calculations are performed with the participation of both the engine manufacturer and alternator manufacturer, all new products undergo prototype fatigue testing to confirm compatibility. A spectrum analysis was conducted over the speed range of 1750 to 1850 RPM.

### Vibrational Analysis (ISO 8528-9)

Blue Star Power Systems certifies that all new engine gen set models have undergone vibration analysis to ensure that each engine generator coupling is balanced and that there is no destructive resonant vibration.

## Test Codes & Standards

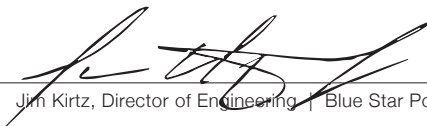
Blue Star Power Systems engine generator sets are compliant with many different codes and standards. Blue Star Power Systems' philosophy and performance are regularly reviewed to ensure continuity with these codes and standards: UL 2200, CSA, EPA, NFPA 99—Health Care Facilities, NFPA 70—National Electrical Code, NFPA 110—Standard for Emergency and Standby Power Systems, Department of Labor and Industry, ISO 8528-5—Generating Sets, and ISO 8528-9 Measurement and Evaluation of Mechanical Vibrations. In addition: ISO 8528-10 Measurement of airborne noise by the enveloping surface method, IEEE 115--Test Procedures for Synchronous Machines. NEMA MG 1--Motors and Generators, MIL-STD-705C

## MIL-STD-705C Methods

Method	Description	Method	Description
301.1c	Insulation Resistance Test*	511.1d	Regulator Range Test
302.1b	High Potential Test*	511.2c	Frequency Adjustment Range Test (as applicable)
401.1b	Winding Resistance Test	513.2a	Indicating Instrument Test (Electrical)
503.1c	Start and Stop Test	515.1b	Low Oil Pressure Protective Device Test
505.2b	Over Speed Protective Device Test	515.2b	Over Temperature Protective Device Test
507.1d	Phase Sequence Test (Rotation)	640.1d	Maximum Power Test
508.1d	Phase Balance Test (Voltage)		
510.1d	Voltage Adjust Range Test (as applicable)		

*\*Performed by Alternator OEM*

I have conducted and witnessed the above testing and verification procedures at Blue Star Power Systems production facility.

  
Jim Kirtz, Director of Engineering | Blue Star Power Systems

  
Geir Hemdal, Applications Engineer | Volvo Penta