VHP7100GLD/5904LTD One Megawatt Landfill Gas Engine/Generator Systems

- *LANDFILL-SPECIFIC HARDWARE*
- *HIGH TEMPERATURE COOLING*
- *OPTIMUM FUEL MIXTURE CONTROL*
- *NO_X EMISSIONS MEET BACT*

DESCRIPTION

Waukesha offers years of experience turning methane gas from renewable sources into a marketable commodity – electricity – through the use of proven generator packages. Waukesha offers a 12 cylinder, clean-burn, landfill gas-fueled engine that can reliably and efficiently provide a full megawatt of power! This engine uses clean-burning technology to obtain BACT (EPA-Best Available Control Technology) NO_X emission levels.

Waukesha Engine has a long history of operating engine/generator packages on renewable energy fuels. Waukesha delivered its first digester gas engines in the 1950s, and its first landfill gas engines around 1980. This experience has allowed Waukesha to develop the right components and operating methods to maximize generator set life. Waukesha products are supported with parts and service within 24 hours through 60 distributors in 110 locations worldwide.

Engine users have access to over 450 gas engine certified technicians worldwide and factory training is available to owners and operators of Waukesha products. Through the distributor organization or from the factory, Waukesha provides engineering assistance and customer product training to assure the best installation and operation of the unit.

FEATURES AND BENEFITS

Low Stress for longer, more productive life: The platform for the Waukesha 1 MWe landfill gas engines was created specifically for spark ignited gaseous fuel operation in stationary, industrial applications. Therefore, engine size and weight have not been compromised, which often happens when trying to convert mobile marine and railroad diesel engines. In addition, low speed operation (1000-1200 RPM), and low power density result in less stress on engine power cylinder components. This low stress level provides longer maintenance and overhaul intervals, as well as more reliable continuous operation. Typical operation is 24/7 (8760 hours/year) at 95%+ uptime. Other built-in design benefits include:

- **Landfill-Specific Hardware:** Built with corrosion-resistant components for protection from the sulfuric and hydrochloric acids formed during combustion of landfill-fuel contaminants.
- **High Temperature Cooling:** Engine jacket water operating temperature is maintained at 220° F to avoid condensation of hydrochloric and sulfuric acid in the combustion chamber. Preventing condensation of these acids extends lube oil life, and avoids corrosive attack on internal engine components.
- **Optimum Fuel Mixture Control:** Mixing of air and fuel is primarily controlled using the "venturi effect" for drawing fuel into air. This mechanical system gives reliable mixture consistency for a wide range of flow conditions. Fine tuning of this system is accomplished using Waukesha's patented CEC Air Fuel Module (AFM) utilizing exhaust oxygen feedback to determine optimum operating air/fuel ratio. The AFM effectively handles changes in fuel quality, ambient conditions, and component wear to maintain power, fuel efficiency and proper emission levels.

Other sources of problems with landfill gas are water and siloxanes. Waukesha has a Gaseous Fuel Specification available describing limitations for all contaminants. This can be obtained by contacting a Waukesha Authorized Distributor or contacting Waukesha Engine directly.

PERFORMANCE DATA — VHP7100GLD/5904LTD GAS ENGINE/GENERATOR SYSTEMS

	VHP7100GLD		VHP7100GLD		VHP5904LTD	
NOx Setting	0.6 g/bhp-hr		1.0 g/bhp-hr		2.0 g/bhp-hr	
Performance	1200 RPM (60 Hz)	1000 RPM (50 Hz)	1200 RPM (60 Hz)	1000 RPM (50 Hz)	1200 RPM (60 Hz)	1000 RPM (50 Hz)
Power (bhp) [1]	1408	1280	1408	1280	1408[5]	1275[5]
Electric Output (kWe) [1]	1000	900	1000	900	1000	900
Fuel Consumption (BTU/bhp-hr) [2,3]	7800	7500	7550	7250	7370	7309
Fuel Consumption (SCFM of 50% by volume methane fuel)	407	356	394	344	384	345

SPECIFICATIONS — VHP7100GLD/5904LTD GAS ENGINE/GENERATOR SYSTEMS

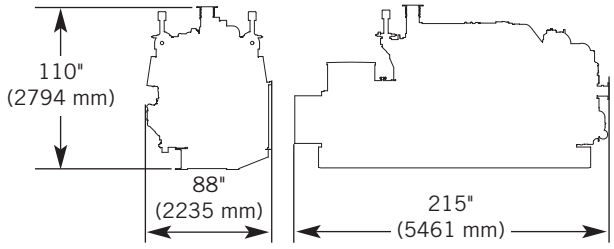
	VHP7100GLD	VHP5904LTD
Bore	9.375" (238 mm)	8.5" (216 mm)
Stroke	8.5" (216 mm)	8.5" (216 mm)
Configuration	12 Cylinder	12 Cylinder
Displacement	7040 cu. in. (116 liter)	5788 cu. in. (95 liter)
Engine Compression Ratio	10.5:1	10.5:1
Dry Weight (Approximate)	38,000 lbs. (17,000 kg)	38,000 lbs. (17,000 kg)
Main Chamber Fuel Pressure	1 psi (70 mbar)	1 psi (70 mbar)
Pre-Chamber Fuel Requirements	13 SCFM @ 30 psi (22 nm^3/hr @ 2 bar)	N/A
Generator Voltage 1200 RPM	Standard-480/277 V, 60 Hz, 3 Phase	
Generator Voltage 1000 RPM	Standard-400/220 V, 50 Hz, 3 Phase	

Generator Temperature Rise: 105°C; ⅔ pitch (for third harmonic)

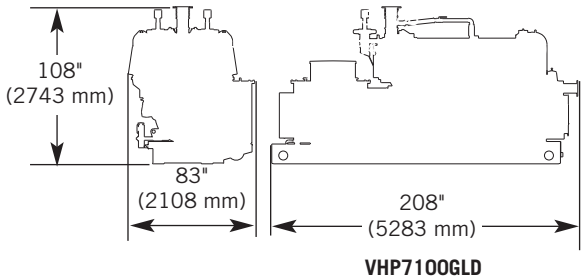
Notes:

1. *Performance ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and Tcra limited to ±10ºF.*
2. *Fuel consumptions based on ISO 3046/1-1995 with a +5% tolerance for landfill gas having a 450 Btu/ft^3 saturated low heat value.*
3. *Data based on standard conditions of 77ºF (25ºC) ambient temperature, 29.53 inches Hg (100 kPa) barometric pressure, 30% relative humidity (0.3 inches Hg/100 kPa water vapor pressure).*
4. *Data will vary due to variations in site conditions. For conditions and/or fuels other than standard, consult the Waukesha Engine Sales Engineering Department.*
5. *Consult Waukesha's Sales Engineering for ratings above 77ºF.*

Approximate Dimensions:



VHP 5904LTD



VHP7100GLD

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