LOFTIN

Final EPA Emissions (Standby & Prime) for Stationary Spark Ignition Generators

Information Sheet # 12

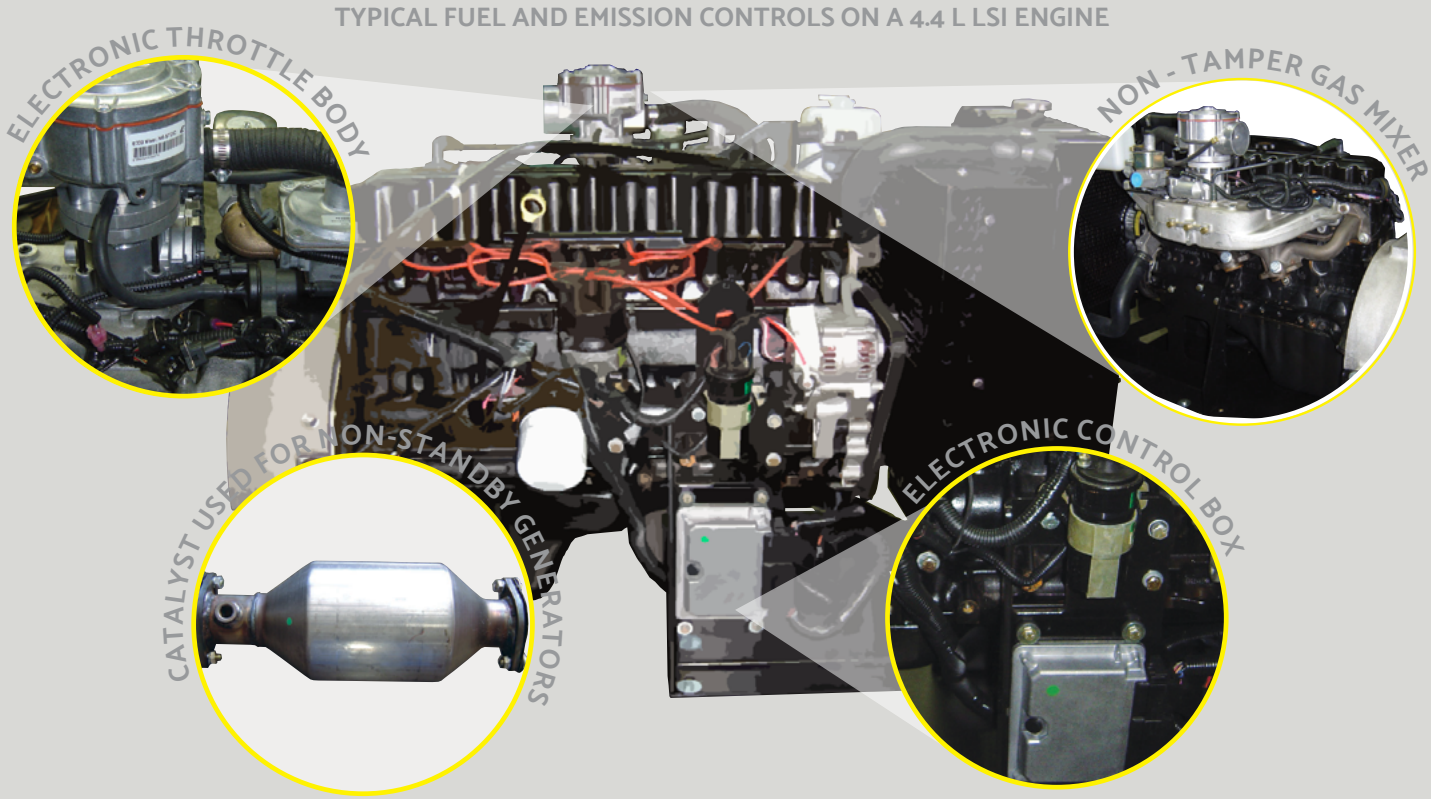
Your Reliable Guide for Generator Maintenance

1.0 INTRODUCTION

On January 18, 2008, the US Environmental Protection Agency (EPA) finalized its New Source Performance Standards (NSPS) for stationary spark-ignition engines, effective in 2009. Until then, there had been no Federal emission regulations for natural gas or propane-fueled engines, as these were normally governed by state or local permitting authorities and varied by the number of annual operating hours of the application.

This Information Sheet discusses the final EPA emissions for stationary spark ignition generators.

EPA regulates stationary power sources, such as diesel, natural gas, or propane generator sets differently to non-road rental or portable (mobile) engine/generators. In addition, emergency and non-emergency generators are also regulated differently. The purpose of EPA New Source Performance Standards regulations is to limit the amount of nitrogen oxide (NOX), carbon oxide (CO) and volatile organic compounds (VOC) emitted from new or modified stationary spark ignition engines.



To fulfill our commitment to be the leading supplier in the power generation industry, the Loftin Equipment team ensures they are always up-to-date with the current power industry standards as well as industry trends. As a service, our **Information Sheets** are circulated on a regular basis to existing and potential power customers to maintain their awareness of changes and developments in standards, codes and technology within the power industry.

Final EPA Emissions (Standby & Prime) for Stationary Spark Ignition Generators

STATIONARY SPARK IGNITION GENERATOR SET EMISSIONS REGULATIONS

APPLICATION	FUEL	GROSS ENGINE POWER (HP)	2008 (NOx + HC) / CO (g/kWm-hr)	2009 (NOx + HC) / CO (g/kWm-hr)	2010 (NOx + HC) / CO (g/kWm-hr)	2011 NOx / CO / (g/kWm-hr)	2012 NOx / CO / (g/kWm-hr)
Standby	NG	(25-130)	Non-Regulated	Final	(13.4) / 519 Part 90 V		
	NG	(>130-240)	Non-Regulated	Interim	Interim	2.0 / 4.0 / 1.0 Part 60 V	
	LP	(25-130)	Non-Regulated	Final	(13.4) / 519 Part 90 M		
	LP	(>130-240)	Non-Regulated	Final	(2.7) / 4.4 Part 1048 M		
Prime	NG	(25-100)	Non-Regulated	Interim	Interim	(2.7) / 4.4 Part 1048 V[1]	
	NG	(>100-240)	Non-Regulated	Interim	Interim	1.0 / 2.0 / 0.7 Part 60 V	
	LP	(25-240)	Non-Regulated	Final	(2.7) / 4.4 Part 1048 M[1]		

Non-Regulated
Interim
Final

M = Manufacturer's certificate required V = Manufacturer's voluntary certification or end user mandatory certification

1 = alternatively can use emissions limit formula: (NOx + NMHCO) x CO <8.57 rounded to the nearest 0.1 g/kW-hr
You may not select an HC + NOx emissions standard higher than 2.7 g/kW -hr or a CO emission standard higher than 20.6 g/kW-hr

2.0 NEW SOURCE PERFORMANCE STANDARDS (NSPS) FOR STATIONARY SPARK-IGNITION ENGINES

The chart shown overleaf illustrates the NSPS standards effective dates and references the limits and Parts of the Code of Federal Regulation, Title 40, that vary based on fuel type, duty, engine size (shown only for generator sets between 15 and 150kW), and the date of manufacture.

The manufacturer must factory-certify all gasoline and rich burn LPG engines, but they have the "option" of factory certifying all other regulated engines. This means that any engine not certified by the manufacturer must be brought into regulation compliance by the owner/operator. This differs from the Diesel NSPS rule, in that the Owners/Operators are now responsible for compliance.

Even if the unit is factory certified, the local state or county authority can impose more stringent standards for stationary spark-ignition engines than the federal NSPS regulations. This is the first time EPA has discharged such responsibilities.

3.0 GENERAL PROVISIONS

- The unit must meet applicable standards over the useful life of the engine
- Records must be kept of conducted maintenance to demonstrate compliance

4.0 DEFINITION OF LEAN AND RICH BURN ENGINES

1. Lean burn engines: any two-stroke or four-stroke spark ignited engine that does not meet the definition of a rich burn engine.
2. Rich burn engines: any four-stroke spark ignited engine where the manufacturer's recommended operating air/fuel ratio divided by the stoichiometric* air/fuel ratio at full load conditions is less than or equal to 1.1. Engines originally manufactured as rich burn engines, but modified prior to December 19, 2002 with passive emission control technology for NOX(such as pre-combustion chambers) will be considered lean burn engines. Also, existing engines where there are no manufacturer's recommendations regarding air/fuel ratio will be considered a rich burn engine if the excess oxygen content of the exhaust at full load conditions is less than or equal to 2 percent. *Stoichiometric means the theoretical air-to fuel ratio required for complete combustion.

5.0 ENGINE SPECIFIC PROVISIONS

1. Emergency rich-burn propane fueled engines: purchase factory certified engine, EPA permits 100 hours/year for readiness and maintenance checks.

2. Emergency rich-burn natural gas engines: purchase factory certified engine when possible, EPA requires a non-resettable hour meter on the engine, EPA permits 100 hours/year for readiness and maintenance checks.
3. Non-emergency rich-burn propane fueled engines: purchase factory certified engine.
4. Non-emergency rich-burn natural gas fueled engines: purchase factory certified engine when possible, if not a manufacturer certified engine between 100 and 500 hp, conduct an initial performance test within 1 year of engine startup. If not a manufacturer certified engine above 500 hp, conduct an initial performance test within 1 year of engine startup and every 3 years or 8,760 hours, whichever comes first.

6.0 MAINTAINING COMPLIANCE

For certified engines, the owner/operator may adjust, operate, and maintain engine per manufacturer's instructions and keep records of it. If said instructions are not followed, engine becomes non-certified and compliance must be demonstrated.

For non-certified rich-burn, natural gas fueled engines, provisions are broken down based on power output as follows:

1. Engines less than 25 hp: keep maintenance plan and records, operate with good air pollution control practice, and no performance testing required.
2. Engines from 5 to 500 hp: initial performance test within 1 year.
3. Engines above 500 hp: initial performance test within 1 year, plus testing every 8,760 hours or 3 years, whichever comes first.

Manufacturers will supply factory certified gas generator sets equipped with electronic air/fuel ratio controls and oxygen sensors. A three-way catalyst will be included on all generators 85 to 150kW and non-emergency (prime) application for sets between 20 and 75kW.

7.0 TECHNOLOGY TRENDS

Tightening emission regulations will need better monitoring and control devices.

1. Electronic air/fuel ratio controller: The use of a closed-loop feedback allows close monitoring of tail pipe emissions. This system utilizes an oxygen sensor located downstream of the combustion chamber to detect any deviation in oxygen level as compared to desired value and then adjusts the A/F ratio accordingly.
2. Three-way catalytic converters (CC): Helps curb pollutants by carrying out 3 simultaneous tasks which are A.) reduction of nitrogen oxides by converting into pure nitrogen and oxygen B.) oxidation of carbon monoxide to carbon dioxide C.) oxidation of any un-burnt hydrocarbons (HC) to carbon dioxide and water. The CC works best when the engine is running slightly rich.
3. Closed-loop breather system: As a reciprocating IC engine will have some gas seeping past the piston into the crankcase which increases with wear and operational hours. This can build up pressure and most engines vent these crankcase gases to atmosphere via a breather tube. A closed-loop breather system removes these gases and introduces them back to the intake manifold, thus optimizing combustion and reducing HC emissions.

Note! Always consulate your local generator distributor/dealer for the latest regulations that will apply to your particular installation.

8.0 USEFUL SITES FOR FURTHER DETAILS

www.epa.gov http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=%2Findex.tpl