

## Gas Generators and Alternative Fuel

**CASHMAN**  
Power Solutions



### Considerations for Alternate Fuel Types

Cat spark-ignited (SI) engines are diesel units outfitted with appropriate components to allow use of gaseous fuels. They offer built-in strength and durability not found in most other SI engines. Natural gas, propane, or sour gas from sewage digesters, landfills, or manufacturing processes can be viable fuels for gensets. Natural gas or propane fuels burn cleanly and can be used to meet clean air standards in many areas.

By-product fuels, when managed correctly, can power gensets economically. SI engines have proven to be the best choice for use with these alternative low BTU fuels.

### High or Low Compression Engines?

SI engines can be equipped to burn fuels under high or low compression ratios. Each configuration has its own advantages. High-compression ratio units can burn fuels completely and economically, but can use only dry natural gas, sewage gas (methane), landfill gas, or "clean" fuels with high anti-knock qualities.

Low-compression ratio engines are less efficient but can burn unprocessed fuels such as wellhead gas or by-products of petroleum production.

Fuels must be evaluated for their low heat value, which impacts fuel economy. Unprocessed fuels must be tested for contaminants that can be very caustic to engine components. In extreme cases, filtration equipment may be needed to protect engine components.

### Specific Engine Needs

Some turbocharged engines require a minimum of 140 kPa (20 psi) pressure to the gas regulator; and even higher for large engines, although many engines are capable of running on 1.5-5 psi with optional low-pressure gas systems. Naturally aspirated engines need a minimum of 14 kPa (2 psi) regulator pressure.

Engine knock (detonation) can be a problem with fuels used in SI engines. Fuels that contain a significant percentage of hydrocarbons (propane, butane, pentane, etc.) should be used only in low-compression engines to avoid serious detonation.

The likelihood of detonation increases with higher fuel-air temperatures, so aftercooler temperatures must be controlled.

Cat turbocharged high-compression engines perform best with aftercooler water temperatures no higher than 32°C (90°F); low-compression turbocharged SI engines likewise perform best with aftercooler water temperature no higher than 54°C (130°F). Consider how ambient temperature effects aftercooler water temperature; an engine that successfully operates on a fuel during the winter may encounter combustion problems during the summer. Engines may be operated with aftercooler temps higher than shown above, but will derate accordingly.

### Olympian Gas Standby Units

Smaller Olympian Gas Standby Units (30kW-250kW) have different gas requirements. All of the units require their 100% load gas consumption as listed in their applicable spec sheet at a consistent 8-13 inches of water column pressure. These products are designed for use with pipeline natural gas only. Some have propane or dual fuel options, but they will often derate with this fuel. Some also are available with a liquid propane option, which ensures performance in colder environments. NOTE: Due to the Environmental Protection Agency's (EPA) New Source Performance Standard (NSPS) Permitting Requirements, these units are for standby use ONLY.

### Emissions Compliance

The latest NSPS from the EPA requires all gas engines to meet certain requirements. Certain states allow for exceptions for Emergency Standby Use ONLY, but some jurisdictions are choosing not to allow even this exemption. This means you should understand your local air Authority Having Jurisdiction (AHJ) rules and regulations, review them carefully, and only apply your equipment as sold and permitted.

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"Lean Burn" SI engines often meet local requirements with no additional aftertreatment required. If aftertreatment is required for a Lean Burn Engine, Selective Catalytic Reduction (SCR) is typically the only option.

In more restrictive areas, a "Rich Burn" or Stoichiometric engine may be more appropriate as its exhaust composition allows for the use of a standard 3-way catalytic converter. This type of aftertreatment yields the lowest possible emissions from a SI engine and is lower in cost than SCR.

In cases where alternative fuels are to be burned, aftertreatment may not be possible. Lean Burn engines typically qualify as adequately compliant, but special note should be taken of maximum site allowances and minimum pollutant destruction requirements as set forth by the EPA or your local AHJ.

### Maintenance Considerations

Unprocessed fuels such as landfill gas can contain high levels of sulfur and other contaminants that produce caustic acids during combustion. These acids are corrosive to engine components, so timely oil changes and acting on results from Scheduled Oil Sampling (S.O.S.) can minimize maintenance and repair problems.

In addition to supplying the equipment for alternative fuel electrical power generation, we can offer you expert advice in fuel testing and component selection. We can also identify and implement the proper maintenance programs alternative fuel gensets demand.

### Biodiesel

Biodiesel continues to gain attention as environmental concerns rise and availability improves. Generally, Cat engines will operate well on a blend of biodiesel mixed with distillate diesel fuel not to exceed 20% biodiesel. Biodiesel must meet the standards as set forth by ASTM 6751-09. It is important to note that due to the basic nature of biodiesel, it becomes more unstable in storage than distillate fuel. Therefore, we don't recommend its use in standby applications.