ENVIRONMENT, HEALTH & SAFETY
UNIVERSITY OF MICHIGAN

Frequently Asked Questions: Emergency Generators

Date: 07/03/17
Revision #: 03

What is a Stationary R.I.C.E?

Reciprocating Internal Combustion Engines (RICE) use pistons that alternatively move back and forth to convert pressure into rotating motion. Stationary refers to any RICE that is non-mobile and not used to propel any vehicle or aircraft. They are commonly used at power and manufacturing plants to generate electricity and to power pumps and compressors. They are also used in emergencies to produce electricity and pump water for flood and fire control. The U.S. Environmental Protection Agency (EPA) has recently finalized new air quality regulations that place requirements on owners and operators of a wide variety of stationary engines.

Source: epa.gov

What is a Stationary Spark Ignition Internal Combustion Engines?

Spark ignition means relating to a gasoline, natural gas, or liquefied petroleum gas fueled engine or any other type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark ignition engines usually use a throttle to regulate intake air flow to control power during normal operation. Dual-fuel engines in which a liquid fuel (typically diesel fuel) is used for compression ignition and gaseous fuel (typically natural gas) is used as the primary fuel at an annual average ratio of less than 2 parts diesel fuel to 100 parts total fuel on an energy equivalent basis are spark ignition engines. Therefore, dual-fuel engines using 2% or more diesel on a total energy basis are compression ignition engines even if they have spark plugs.

Spark ignition engines are either two-stroke or four-stroke. Two-stroke engine means a type of engine which completes the power cycle in single crankshaft revolution by combining the intake and compression operations into one stroke and the power and exhaust operations into a second stroke. This system requires auxiliary scavenging and inherently runs lean of stoichiometric. Four-stroke engine means any type of engine which completes the power cycle in two crankshaft revolutions, with intake and compression strokes in the first revolution and power and exhaust strokes in the second revolution.

Additionally, spark ignition engines are either rich or lean burn. Rich burn engine means 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. Existing engines where there are no manufacturer's recommendations regarding air/fuel ratio will be considered rich burn engines if the excess oxygen content of the exhaust at full load conditions is less than or equal to 2 percent. Engines originally manufactured as rich burn engines, but modified with passive emission control technology for NOX (such as pre-combustion chambers) will be considered lean burn engines. Therefore, engines with operating air/stoichiometric air ratios greater than 1.1 are considered lean burn.

Source: epa.gov and michigan.gov/deq

What is a Stationary Compression Ignition Internal Combustion Engine?

Compression ignition means relating to a type of stationary internal combustion engine that is not a spark ignition engine. Engines using 2% or more diesel on a total energy basis, even if they have spark plugs, are compression ignition engines.

What is the difference between a major source and an area source?

The term "major source" means any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants. The Administrator may establish a lesser quantity, or in the case of radionuclides different criteria, for a major source than that specified in the previous sentence, on the basis of the potency of the air pollutant, persistence, potential for bioaccumulation, other characteristics of the air pollutant, or other relevant factors.

The term "area source" means any stationary source of hazardous air pollutants that is not a major source. For purposes of this section, the term "area source" shall not include motor vehicles or non-road vehicles subject to regulation under title II.

Who do I contact for more information?

For more information about generators on U-M campus or for inquiries about a specific generator, contact EP3 (734) 647-1143. You can also visit:

- EPA: Stationary Internal Combustion Engines
- MDEQ: Air Quality