

RULE 233 STATIONARY INTERNAL COMBUSTION ENGINES

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RULE 233

STATIONARY INTERNAL COMBUSTION ENGINES

233.1 GENERAL

- A. **PURPOSE:** The purpose of this rule is to limit the emission of oxides of nitrogen (NO_x) and carbon monoxide (CO) from stationary internal combustion engines.
- B. **APPLICABILITY:** This rule applies to any stationary internal combustion engine rated at more than 50 brake horsepower, operated on any gaseous fuel or liquid fuel, including liquid petroleum gas (LPG), gasoline, or diesel fuel. This rule shall not apply to engines used directly and exclusively for agricultural operations necessary for the growing of crops or the raising of fowl and animals.
- C. **EXEMPTIONS:** The provisions of this rule, except for Section 233.5 C., and 233.5 D., shall not apply to the operation of stationary internal combustion engines used under the following conditions:
1. Engines rated 50 brake horsepower or less, or
 2. Engines operated less than 200 hours per calendar year, or
 3. Emergency standby engines operated either during an emergency or maintenance operation. Maintenance operation is limited to 50 hours per calendar year, or
 4. Engines used in research or teaching programs, or
 5. Engine test stands used for evaluating engine performance, or
 6. Diesel engines with a permitted capacity factor of 15 percent or less, or
 7. Diesel engines used to power cranes and welding equipment.

233.2 DEFINITIONS

- A. **BASELINE EMISSION RATES:** Emissions under normal operating conditions, prior to control, as determined by a source test conducted in accordance with Section 233.5 B., of this rule.
- B. **DIESEL ENGINE:** A compression ignited two or four-stroke engine in which liquid fuel injected into the combustion chamber ignites when the air charge has been compressed to a temperature sufficiently high for auto-ignition.
- C. **EMERGENCY STANDBY ENGINE:** An internal combustion engine used only as follows:
1. When normal power line or natural gas service fails.
 2. For the emergency pumping of water for either fire protection or flood relief.
- An emergency standby engine may not be operated to supplement a primary power source when the load capacity or rating of the primary power source has either been reached or exceeded.
- D. **ENGINE RATING:** The output of an engine as determined by the engine manufacturer and listed on the nameplate of the engine, regardless of any derating.
- E. **LEAN-BURN ENGINE:** Any two or four-stroke spark-ignited engine that is not a rich-burn engine.
- F. **MAINTENANCE OPERATION:** The use of an emergency standby engine and fuel system during testing, repair and routine maintenance to verify its readiness for emergency standby use.
- G. **OUTPUT:** The shaft work output from an engine plus the energy reclaimed by any useful heat recovery system.
- H. **PERMITTED CAPACITY FACTOR:** The annual permitted fuel use divided by the manufacturer's specified maximum hourly fuel consumption times 8760 hours per year.

- I. **RICH-BURN ENGINE:** A two or four-stroke spark-ignited engine where the manufacturer's original recommended operating air/fuel ratio divided by the stoichiometric air/fuel ratio is less than or equal to 1.1. Engines using passive emission control technology (such as the use of pre-combustion chambers), and are listed as lean-burn engines on their Permit to Operate, shall be considered lean-burn engines.
- J. **PEAK LOAD:** Maximum instantaneous operating load.
- K. **STATIONARY INTERNAL COMBUSTION ENGINE:** Any internal combustion engine of the reciprocating type that is operated at a site for more than one year or is attached to a foundation, not including engines used for self-propulsion.
- L. **STOICHIOMETRIC AIR/FUEL RATIO:** The chemically correct air/fuel ratio where all fuel and all oxygen in the air/fuel mixture will be consumed.
- M. **WASTE GAS:** Fuel gas produced at either waste water/sewage treatment facilities or landfills containing no more than 25 percent by volume supplemental gas.

233.3 STANDARDS

A. **LIMITS:**

- 1. After the applicable compliance date specified in Section 233.4 A.1., of this rule, the owner or operator of an existing stationary internal combustion engine to which this rule is applicable and who does not need to retrofit the unit or install new control equipment to comply with the provisions of this rule, shall limit the emissions from that engine to no more than the following:
 - a. Rich-burn stationary internal combustion engine NO_x emissions shall not exceed 50 ppmv and CO emissions shall not exceed 2,000 ppmv.
 - b. Lean-burn stationary internal combustion engine NO_x emissions shall not exceed 125 ppmv and CO emissions shall not exceed 2,000 ppmv.

- c. Diesel fired stationary internal combustion engine NO_x emissions shall not exceed 700 ppmv and CO emissions shall not exceed 2,000 ppmv.

where: ppmv = parts per million volume at 15% oxygen on a dry basis
NO_x = oxides of nitrogen
CO = carbon monoxide

- 2. After the applicable compliance date specified in Section 233.4 A.2., of this rule, the owner or operator of an existing stationary internal combustion engine to which this rule is applicable and who must retrofit the unit to comply with the provisions of this rule, shall limit the emissions from that engine to no more than the following:

- a. Rich-burn stationary internal combustion engine NO_x emissions shall not exceed 50 ppmv and CO emissions shall not exceed 2,000 ppmv.
- b. Lean-burn stationary internal combustion engine NO_x emissions shall not exceed 125 ppmv and CO emissions shall not exceed 2,000 ppmv.
- c. Diesel fired stationary internal combustion engine NO_x emissions shall not exceed 600 ppmv and CO emissions shall not exceed 2,000 ppmv.

where: ppmv = parts per million volume at 15% oxygen on a dry basis
NO_x = oxides of nitrogen
CO = carbon monoxide

- 3. The owner or operator of any new or replacement stationary combustion engine shall limit the emissions from that engine to those levels established in Section 233.3 A.5 or 233.3 A.6.
- 4. In lieu of the emission limits specified in Sections 233.3 A.1., or 233.3 A.2., of this rule, an owner or operator of an internal combustion engine may elect to replace the unit with an electric motor or permanently remove the engine from service in accordance with the applicable compliance schedule specified in Section 233.4 A.8., of this rule.

5. After the applicable compliance date specified in Section 233.4 A.5., of this Rule, the owner or operator of a stationary internal combustion engine which does not require retrofit or installation of new control equipment in order to comply with the provisions of this rule shall limit the emissions from that engine to no more than the following:
- a. Rich-burn stationary internal combustion engine NO_x emissions shall not exceed 25 ppmv or shall attain a 96 percent NO_x reduction and CO emissions shall not exceed 2,000 ppmv.
 - b. Lean-burn stationary internal combustion engine NO_x emissions shall not exceed 65 ppmv or shall attain a 90 percent NO_x reduction and CO emissions shall not exceed 2,000 ppmv.
 - c. Diesel fired stationary internal combustion engine NO_x emissions shall not exceed 700 ppmv and CO emissions shall not exceed 2,000 ppmv.

where: ppmv = parts per million volume at 15%
 oxygen on a dry basis
 NO_x = oxides of nitrogen
 CO = carbon monoxide

6. After the applicable compliance date specified in Section 233.4 A.6., of this rule, the owner or operator of an existing stationary internal combustion engine to which this rule is applicable and who must retrofit the unit to comply with the provisions of this rule, shall limit the emissions from that engine to no more than the following:
- a. Rich-burn stationary internal combustion engine NO_x emissions shall not exceed 25 ppmv or shall attain a 96 percent NO_x reduction and CO emissions shall not exceed 2,000 ppmv.
 - b. Lean-burn stationary internal combustion engine NO_x emissions shall not exceed 65 ppmv or shall attain a 90 percent NO_x reduction and CO emissions shall not exceed 2,000 ppmv.

- c. Diesel fired stationary internal combustion engine NO_x emissions shall not exceed 600 ppmv and CO emissions shall not exceed 2,000 ppmv.

where: ppmv = parts per million volume at 15% oxygen on a dry basis
NO_x = oxides of nitrogen
CO = carbon monoxide

- 7. In lieu of the emission limits specified in Sections 233.3 A.5., or 233.3 A.6., of this rule, an owner or operator of an internal combustion engine may elect to replace the unit with an electric motor or permanently remove the engine from service in accordance with the applicable compliance schedule specified in Section 233.4 A.8., of this rule.

B. ENGINE OPERATOR INSPECTION PLAN: The operator of an engine subject to the provisions of Sections 233.3 A., of this rule shall submit to the Air Pollution Control Officer an Engine Operator Inspection Plan. The plan shall be approved by the Air Pollution Control Officer in writing. The plan shall be updated after any change in operation. For new engines and modifications to existing engines, the plan shall be submitted to and approved by the Air Pollution Control Officer prior to issuance of the Permit to Operate. The operator may request a change to the plan at any time. The plan shall include the following:

- 1. The manufacturer, model number, rated horsepower, and combustion method (i.e., rich-burn, lean-burn, or diesel) of the engine.
- 2. A description of the NO_x control system installed on the engine (if any), including type (e.g., nonselective catalyst, "clean-burn" combustion) and manufacturer, as well as a description of any ancillary equipment related to the control of emissions (e.g., automatic air/fuel ratio controller, fuel valves).
- 3. The company identification and location of the engine by a schematic of the affected facilities.

4. A specific emission inspection procedure to assure that the engine is operated in continual compliance with the provisions of this rule. The procedure shall include an inspection schedule. Inspections shall be conducted every quarter or after every 2,000 hours of engine operation. In no event shall the frequency of inspection be less than once per year. Testing results from individual engines in terms of rate brake horsepower, operational conditions, fuel used, and control method may satisfy these inspection requirements. Prior to implementation of testing, test plans shall be submitted to and approved in writing by the Air Pollution Control Officer.
5. Each preventative or corrective maintenance procedure or practice that will be used to maintain the engine and NO_x control system in continual compliance with the provisions of this rule.

233.4 ADMINISTRATIVE REQUIREMENTS

A. COMPLIANCE SCHEDULE:

1. Owners or operators of existing engines shall comply with the applicable provisions of Section 233.3 A.1., of this rule in accordance with the following schedule:
 - a. No later than **April 18, 1995**, submit to the Air Pollution Control Officer:
 1. An Engine Operator Inspection Plan pursuant to Section 233.3 B., of this rule and a complete application for an Authority to Construct, as necessary, or
 2. Support documentation for each exempt engine, pursuant to Section 233.5 C., of this rule.
 - b. Demonstrate full compliance with all provisions of this rule no later than **May 15, 1995**.
2. Owners or operators of existing engines shall comply with the applicable provisions of Section 233.3 A.2., of this rule in accordance with the following schedule:

- a. No later than **April 18, 1995**, submit to the Air Pollution Control Officer:
 1. An Engine Operator Inspection Plan pursuant to Section 233.3 B., of this rule, or
 2. Support documentation for each exempt engine, pursuant to section 233.5 C., of this rule.
 - b. Submit a complete application for an Authority to Construct for all modifications no later than **May 15, 1995**.
 - c. By **January 1, 1997**, commence construction of all retrofits and/or additions of new control equipment, as approved by the Air Pollution Control Officer.
 - d. Demonstrate full compliance with the applicable provisions of this rule no later than **May 15, 1997**.
3. Any owner or operator of a new or replacement unit that is constructed on or after **October 18, 1994**, shall complete an application for an Authority to Construct prior to beginning construction of the unit. The owner or operator shall demonstrate that the unit will be operated in compliance with all applicable provisions of this rule within 60 days after the date of initial startup of the unit.
 4. An owner or operator that elects to replace a stationary internal combustion engine with an electric motor as specified in Section 233.3 A.4., of this rule or permanently removes the engine from service shall demonstrate compliance with all the applicable requirements of this rule no later than **May 15, 1999**. The owner or operator shall submit a complete application for an Authority to Construct for conversion to electric power no later than **January 1, 1997**, and shall commence conversion of the unit no later than **January 1, 1999**, or permanently remove the engine from service by **May 15, 1999**.

5. Owners or operators of new or existing engines which do not require retrofit or installation of new control equipment in order to comply with the provisions of this rule shall comply with the applicable provisions of Section 233.3 A.5., of this Rule in accordance with the following schedule:
 - a. No later than **October 22, 2002**, submit to the Air Pollution Control Officer:
 1. An Engine Operator Inspection Plan pursuant to Section 233.3 B., of this rule and a complete application for an Authority to Construct, as necessary, or
 2. Support documentation for each exempt engine, pursuant to Section 233.5 C., of this rule.
 - b. Demonstrate full compliance with all provisions of this rule no later than **October 22, 2002**.

6. Owners or operators of new or existing engines which require retrofit or installation of new control equipment in order to comply with the provisions of this rule shall comply with the applicable provisions of Section 233.3 A.6., of this rule in accordance with the following schedule:
 - a. No later than **October 22, 2002**, submit to the Air Pollution Control Officer:
 1. An Engine Operator Inspection Plan pursuant to Section 233.3 B., of this rule, or
 2. Support documentation for each exempt engine, pursuant to section 233.5 C., of this rule.

- b. Submit a complete application for an Authority to Construct for all modifications no later than **October 22, 2002**.
 - c. By **July 1, 2004**, commence construction of all retrofits and/or additions of new control equipment, as approved by the Air Pollution Control Officer.
 - d. Demonstrate full compliance with the applicable provisions of this rule no later than **December 1, 2004**.
7. Any owner or operator of a new or replacement unit that is constructed on or after **June 11, 2002**, shall complete an application for an Authority to Construct prior to beginning construction of the unit. The owner or operator shall demonstrate that the unit will be operated in compliance with all applicable provisions of this rule within 60 days after the date of initial startup of the unit.
8. An owner or operator that elects to replace a stationary internal combustion engine with an electric motor as specified in Section 233.3 A.7., of this rule or permanently removes the engine from service shall demonstrate compliance with all the applicable requirements of this rule no later than **December 1, 2005**. The owner or operator shall submit a complete application for an Authority to Construct for conversion to electric power no later than **December 1, 2003**, and shall commence conversion of the unit no later than **May 1, 2005**, or permanently remove the engine from service by **December 1, 2005**.
- B. **REPORTING REQUIREMENTS:** Prior to renewal of any Permit to Operate, each operator subject to the provisions of this rule shall provide the Air Pollution Control Officer with data specifying the actual annual usage (e.g., fuel consumption, actual operating hours) of each affected engine. The data shall also include the engine manufacturer, model number, Permit number, and location of each affected engine, a summary of the maintenance and testing reports required in Section 233.3 B., of this rule, and an annual emissions report.

C. SOURCE TESTING FREQUENCY:

1. If applicable to this rule, conduct screening analysis with the use of a portable NOx analyzer
 - a. During any quarter in which a source test is not performed, a portable NOx analyzer shall be used to take NOx emission readings to verify compliance with the emission limits or percent control specified in section 233.3 A.
 - b. All emission readings shall be taken at an engine's actual peak load and under the engine's typical duty cycle.
 - c. The analyzer shall be calibrated, maintained and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the Air Pollution Control Officer.
 - d. In conducting quarterly screenings with a portable analyzer, an instrument reading in excess of the emission compliance values shall not be considered a violation, so long as the engine is brought into compliance within 15 days of the initial out of compliance reading. All NOx readings shall be reported to the Air Pollution Control Officer (APCO) or the APCO's designee in a manner specified by the Air Pollution Control Officer.
2. If applicable, emission source testing for Stationary Internal Combustion Engines.
 - a) The owner of operator shall arrange for and assure that an emissions source test is performed on each stationary internal combustion engine at least once every 24 months.
 - b) All emission readings shall be taken at an engine's actual peak load and under the engine's typical duty cycle.
 - c) Prior to any source test required by this rule, a source test protocol shall be prepared and submitted to the Air Pollution Control Officer. In addition to other information, the source test protocol shall describe which critical parameters will be established and incorporated into the Engine Operator Inspection Plan described in section 2333.3 B. The source test protocol shall be approved by the Air Pollution Control Officer prior to any testing. NOx and CO concentrations shall be reported in ppmv, corrected to 15 percent oxygen. For engines using exhaust controls, NOx shall also be

reported as a percent reduction across the control device. All source test reports shall be submitted to the Air Pollution Control Officer or his designee.

D. VIOLATIONS:

1. Failure to comply with any provisions of this rule shall constitute a violation of this rule.
2. It is the responsibility of the engine operator to demonstrate to the satisfaction of the Air Pollution Control Officer that an engine subject to the provisions of this rule is being operated in continuous compliance with all applicable provisions of this rule.
3. An engine shall be in violation if it is operated out of compliance with the operating parameters of an approved Engine Operator Inspection Plan. However, if data from a source test of the engine operating under identical conditions indicates that the engine is in compliance with the requirements of this rule, then a violation will not have occurred. The source test shall be conducted at the engine operator's expense. The Engine Operator Inspection Plan shall be amended to reflect the information from this source test.

233.5 MONITORING AND RECORDS

A. RECORDS: The operator of any engine subject to the provisions of Section 233.3 A., of this rule shall maintain an inspection log containing at a minimum, the following data:

1. Identification and location of each engine subject to the provisions of this rule;
2. Date and results of each emission inspection;
3. A summary of any corrective emissions maintenance taken to ensure compliance with the emissions limits or reductions specified in Sections 233.3 A.1., or 233.3 A.2., of this rule; and

4. Any additional information required in the Engine Operator Inspection Plan.

The operator shall maintain the inspection log for a period of two years after the date of each entry. The log shall be available for inspection by the Air Pollution Control Officer upon request.

B. TEST METHODS:

1. Oxides of nitrogen emissions for compliance source tests shall be determined in accordance with EPA Method 7E or CARB Method 100.
2. Carbon Monoxide emissions for compliance source tests shall be determined in accordance with EPA Method 10 or CARB Method 100.
3. Oxygen content for compliance source tests shall be determined in accordance with EPA Method 3A or CARB Method 100.
4. Screening analyses shall be performed by using a portable analyzer approved in writing by the Air Pollution Control Officer.
5. NO_x emission limitations specified in Sections 233.3 A.1., 233.3 A.2., 233.3 A.5., and 233.3 A.6., of this rule shall be expressed as nitrogen dioxide. All ppmv emission limitations are referenced at 15 percent volume stack gas oxygen measured on a dry basis. Source test data point intervals shall be no greater than 5 minutes and data points shall be averaged over 15 consecutive minutes.
6. The heating value of fuel oil shall be determined in accordance with ASTM Method D240-87. The heating value of gaseous fuels shall be determined in accordance with ASTM Method D1826-77.

C. EXEMPTION RECORDS:

1. Any owner or operator claiming an exemption under Section 233.1 C., of this rule shall submit support documentation identifying reasons for the exemption. Such documentation shall contain a list that provides the following for each engine:
 - a. Permit to Operate number;
 - b. Engine manufacturer;
 - c. Model designation;
 - d. Rated brake horsepower;
 - e. Type of fuel and type of ignition.
2. In addition to the requirements specified in Section 233.5 C.1., of this rule, an owner or operator claiming an exemption under Sections 233.1 C.2., and 233.1 C.3., of this rule shall maintain a log of operating hours for each engine.
3. Exemption records specified in Sections 233.5 C.1., and 233.5 C.2., of this rule shall be retained for two years and be made available to the Air Pollution Control Officer upon request.

D. NONRESETTABLE METERS

1. Fuel Meter

All engines subject to this rule, emergency standby engines, and engines operated less than 200 hours per calendar year shall have installed a nonresettable fuel meter.

2. Elapsed Operating Time Meter

All engines subject to this rule, emergency standby engines, and engines operated less than 200 hours per calendar year shall have installed a nonresettable elapsed operating time meter.

ADOPTED: October 18, 1994

AMENDED: September 25, 2001, June 11, 2002

RESCINDED:

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