Connecticut Department of Energy and Environmental Protection

Connecticut Department of
ENERGY & ENVIRONMENTAL PROTECTION

National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE Rule)

40 CFR 63 Subpart ZZZZ
Major Source New Non-Emergency Spark Ignition 2-Stroke Lean Burn Engine >500 Horsepower

Connecticut Department of Energy and Environmental Protection

To comply with this rule, you must meet the following emission standards:

- Limit concentration of formaldehyde in engine exhaust to ≤12 ppm at 15% O_2 or reduce CO emissions by 58% or more.
  - Compliance with the limit is based on the results of testing the average of three 1-hour runs using the specified testing requirements and procedures.

- To achieve this standard, your unit will probably require an emissions control retrofit. For 2SLB engines, this is an **oxidation catalyst**.
  - Estimated capital cost of catalyst: $12.8*HP + $3,069
  - Estimated annual cost of catalyst: $1.81*HP + $3,442

    (where HP = horsepower of the engine)

- Comply with emission and operating limits at all times

- At all times you must operate/maintain all equipment in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require you to make any further efforts to reduce emissions if levels required by this standard have been achieved.

What are my operating limits?

- For each engine **using an oxidation catalyst**:
  - -Maintain your catalyst so that the pressure drop across the catalyst does not change by more than 2" of water at 100% load ±10% from the pressure drop across the catalyst measured during the initial performance test; and
  - -Maintain the temperature of your engine exhaust so that the catalyst inlet temperature is ≥450°F and ≤1350°F.
    - -You can petition EPA for a different temperature range

OR

- For each engine **not using an oxidation catalyst:**
  - -Comply with any operating limitations approved by EPA.

To comply with this rule, you must perform:

An initial emission performance test within 180 days after engine startup

- You may not be required to conduct an initial test on units for which a test has been previously conducted, but the test must meet the following conditions:
  - –Test must have been conducted using the same methods specified in the rule, and methods must have been followed correctly.
  - –Test must not be older than 2 years.
  - –Test must be reviewed and accepted by EPA.
  - –Test must be conducted at any load condition within ±10% of 100% load.
  - –Either no process or equipment changes must have been made since the test was performed, or you must be able to demonstrate that the results of the performance test, with or without adjustments, reliably demonstrate compliance despite process or equipment changes.

To comply with this rule, you must perform:

Subsequent performance tests semi-annually if you are not using a CO CEMS

- After you have demonstrated compliance for two consecutive tests, you may reduce the frequency to annually.
- If the results of any subsequent annual test indicate noncompliance with emission or operating limits, you must resume semi-annual testing.

Note: Testing must be conducted within ±10% of 100% load.

If your RICE is currently non-operational:

-Do not startup the engine solely to conduct the performance test; conduct the test when the engine is started up again.

Photo credit: EPA

What are my testing requirements?

COMPLYING WITH THE REQUIREMENT TO…	YOU MUST…	USING…	ACCORDING TO THE FOLLOWING REQUIREMENTS…
Reduce CO emissions	Measure the O_2 at the inlet and outlet of the control device; and	Method 3, 3A or 3B of 40 CFR part 60, appendix A, or ASTM Method D6522-00 (2005)[a]	Measurements to determine O_2 must be made at the same time as the measurements for CO concentration.
	Measure the CO at the inlet and outlet of the control device	ASTM D6522-00 (2005)[a b] or Method 10 of 40 CFR part 60, appendix A.	CO concentration must be at 15% O_2, dry basis.
Limit the concentration of formaldehyde in the engine exhaust	Select the sampling port location and the number of traverse points; and	Method 1 or 1A of 40 CFR part 60, appendix A 63.7(d)(1)(i)	If using a control device, the sampling site must be located at the outlet of the control device.
	Determine the O_2 concentration of the engine exhaust at the sampling port location; and	Method 3, 3A or 3B of 40 CFR part 60, appendix A, or ASTM Method D6522-00 (2005)[a]	Measurements to determine O_2 concentration must be made at the same time and location as the measurements for formaldehyde concentration.
	Measure moisture content of the engine exhaust at the sampling port location; and	Method 4 of 40 CFR part 60, appendix A, or Test Method 320 of 40 CFR part 63, appendix A, or ASTM D 6348-03[a]	Measurements to determine moisture content must be made at the same time and location as the measurements for formaldehyde concentration.
	Measure formaldehyde at the exhaust of the engine	Method 320 or 323 of 40 CFR part 63, appendix A; or ASTM D6348-03[a], provided in ASTM D6348-03 Annex A5 (Analyte Spiking Technique), the percent R must be ≥70 and ≤130	Formaldehyde concentration must be at 15% O_2, dry basis. Results of this test consist of the average of the three 1-hour or longer runs.

a. Incorporated by reference, see 40 CFR 63.14. You may also obtain copies from University Microfilms International, 300 North Zeeb Road, Ann Arbor, MI 48106.
b. You may also use Method 320 of 40 CFR part 63, Appendix A, or ASTM D6348-03.

You must use the following testing procedures:

- Conduct 3 test runs for each performance test required in this section. Each run must last at least 1 hour.

- Use the following equation to determine compliance with the percent reduction requirement:

$$(C_i - C_O)/C_i \times 100 = R$$

C_i = concentration of CO at the control device inlet

C_O = concentration of CO at the control device outlet

R = percent reduction of CO emissions

You must use the following testing procedures:

•You must normalize the CO or formaldehyde concentrations at the inlet and outlet of the control device to a dry basis and to 15% O_2, or an equivalent percent CO_2. If pollutant concentrations are to be corrected to 15% O_2 and CO_2 concentration is measured in lieu of O_2 concentration measurement, a CO_2 correction factor is needed. Calculate the CO_2 correction factor as described in (i) through (iii):

(i) Calculate the fuel-specific F_O value for the fuel burned during the test using values obtained from Method 19, section 5.2, and the equation:

$$\mathbf{F_O = (0.209F_d)/F_c}$$

F_O= Fuel factor based on the ratio of O_2 volume to the ultimate CO_2 volume produced by the fuel at 0% excess air.

0.209 = Fraction of air that is O_2, percent/100.

F_d= Ratio of the volume of dry effluent gas to the gross calorific value of the fuel from Method 19, dsm^3/J ($dscf/10^6$ Btu).

F_c= Ratio of the volume of CO_2 produced to the gross calorific value of the fuel from Method 19, dsm^3/J ($dscf/10^6$ Btu).

(ii) Calculate the CO_2 correction factor for correcting measurement data to 15% O_2, as follows:

$$\mathbf{X_{CO2} = 5.9/F_O}$$

X_{CO2}= CO_2 correction factor, percent.

5.9 = 20.9% O_2–15% O_2, the defined O_2 correction value, percent.

(iii) Calculate the CO and formaldehyde gas concentrations adjusted to 15% O_2 using CO_2 as follows:

$$\mathbf{C_{adj} = C_d(X_{CO2}/\%CO_2)}$$

C_{adj} = Calculated concentration of CO or formaldehyde adjusted to 15% O_2.

C_d = Measured concentration of CO or formaldehyde, uncorrected.

$\%CO_2$= Measured CO_2 concentration measured, dry basis, percent.

Testing Procedures

If you comply with the emission limitation to reduce CO and you are not using an oxidation catalyst, or if you comply with the emission limitation to limit the concentration of formaldehyde in the exhaust and you are not using an oxidation catalyst or NSCR, you must petition EPA for operating limitations to be established during the initial performance test and continuously monitored thereafter, or for approval of no operating limitations. **You cannot conduct the initial performance test until the petition has been approved by EPA.**

If you petition EPA for approval of operating limitations, petition must include:

(1) Parameters you propose to use as operating limitations;

(2) Relationship between these parameters and HAP emissions, identifying how HAP emissions change with changes in these parameters, and how limits on these parameters will serve to limit HAP emissions;

(3) How you will establish the upper and/or lower values for these parameters which will establish the limits on these parameters in the operating limitations;

(4) Methods you will use to measure and instruments you will use to monitor these parameters, as well as relative accuracy and precision of these methods/instruments; and

(5) Frequency and methods for recalibrating the instruments you will use for monitoring these parameters.

Testing Procedures

If you petition EPA for approval of no operating limitations, petition must include:

(1) Parameters associated with operation of the engine and any emission control device which could change intentionally (*e.g.,* operator adjustment, automatic controller adjustment, etc.) or unintentionally (*e.g.,* wear and tear, error, etc.) on a routine basis or over time;

(2) Any relationship between changes in the parameters and changes in HAP emissions;

(3) For parameters which could change in such a way as to increase HAP emissions, a discussion of whether establishing limits on the parameters would serve to limit HAP emissions;

(4) For parameters which could change in such a way as to increase HAP emissions, a discussion of how you could establish upper and/or lower values for the parameters which would establish limits on the parameters in operating limits;

(5) For the parameters, a discussion identifying the methods you could use to measure them and the instruments you could use to monitor them, as well as the relative accuracy and precision of the methods/instruments;

(6) For the parameters, a discussion identifying the frequency and methods for recalibrating the instruments you could use to monitor them; and

(7) Why you feel it is infeasible or unreasonable to adopt the parameters as operating limits.

Testing Procedures

Engine percent load during a performance test must be determined by documenting the calculations, assumptions, and measurement devices used to measure or estimate the percent load in a specific application. A report of the average percent load determination must be included in the Notification of Compliance Status. The following information must be included in the report:

- –Engine model number and manufacturer
- –Year of purchase
- –Manufacturer's site-rated brake HP
- –Ambient temperature, pressure, and humidity during the performance test
- –Explanation of all assumptions that were made to estimate or calculate percent load during the performance test
- –If measurement devices such as flow meters, kilowatt meters, beta analyzers, stain gauges, etc. are used, the model number of the measurement device, and an estimate of its accuracy in percentage of true value

How do I demonstrate initial compliance with the emission limits and operating limits?

If complying with the requirement to reduce CO emissions and using an oxidation catalyst, and a CPMS:

You have demonstrated initial compliance if:

- The average reduction of emissions of CO determined from the initial performance test achieves the required CO percent reduction; and
- You have installed a CPMS to monitor catalyst inlet temperature according to the monitoring requirements in this module; and
- You have recorded the catalyst pressure drop and catalyst inlet temperature during the initial performance test.

If complying with the requirement to reduce CO emissions and not using an oxidation catalyst:

You have demonstrated initial compliance if:

- The average reduction of CO determined from the initial performance test achieves the required CO percent reduction; and
- You have installed a CPMS to monitor operating parameters approved by EPA (if any) according to the monitoring requirements in this module; and
- You have recorded the approved operating parameters (if any) during the initial performance test.

If complying with the requirement to reduce CO emissions, and using a CEMS:

You have demonstrated initial compliance if:

- You have installed a CEMS to monitor CO and either O_2 or CO_2 at both the inlet and outlet of the oxidation catalyst according to the requirements in this module; and
- You have conducted a performance evaluation of your CEMS using PS 3 and 4A of 40 CFR part 60, appendix B; and
- The average reduction of CO calculated using 40 CFR 63.6620 ≥ the required percent reduction. The initial test comprises the first 4-hour period after successful validation of the CEMS. Compliance is based on the average percent reduction achieved during the 4-hour period.

How do I demonstrate initial compliance with the emission limits and operating limits? (cont'd)

If complying with the requirement to limit the concentration of formaldehyde and using an oxidation catalyst:

You have demonstrated initial compliance if:

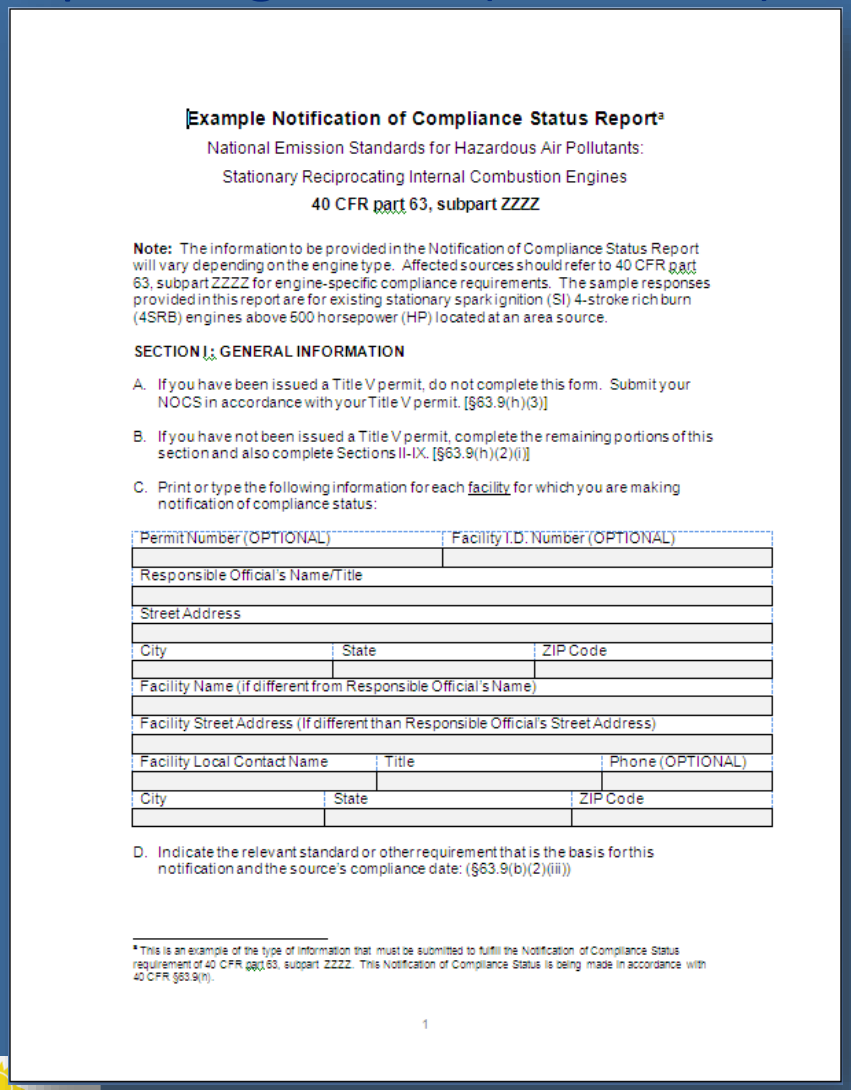
- The average formaldehyde concentration, corrected to 15% O_2, from the 3 test runs is ≤ formaldehyde emission limit; and
- You have installed a CPMS to monitor catalyst inlet temperature according to the monitoring requirements in this module; and
- You have recorded the catalyst pressure drop and catalyst inlet temperature during the initial performance test.

If complying with the requirement to limit the concentration of formaldehyde and not using an oxidation catalyst:

You have demonstrated initial compliance if:

- The average formaldehyde concentration, corrected to 15% O_2, from the 3 test runs is ≤ formaldehyde emission limit; and
- You have installed a CPMS to monitor operating parameters approved by EPA according to the monitoring requirements in this module; and
- You have recorded the approved operating parameters (if any) during the initial performance test.

How do I demonstrate initial compliance with the emission limits and operating limits? (continued)



Example Notification of Compliance Status Report[a]

National Emission Standards for Hazardous Air Pollutants:

Stationary Reciprocating Internal Combustion Engines

40 CFR part 63, subpart ZZZZ

Note: The information to be provided in the Notification of Compliance Status Report will vary depending on the engine type. Affected sources should refer to 40 CFR part 63, subpart ZZZZ for engine-specific compliance requirements. The sample responses provided in this report are for existing stationary spark ignition (SI) 4-stroke rich burn (4SRB) engines above 500 horsepower (HP) located at an area source.

SECTION I: GENERAL INFORMATION

A. If you have been issued a Title V permit, do not complete this form. Submit your NOCS in accordance with your Title V permit. [§63.9(h)(3)]

B. If you have not been issued a Title V permit, complete the remaining portions of this section and also complete Sections II-IX. [§63.9(h)(2)(i)]

C. Print or type the following information for each facility for which you are making notification of compliance status:

Permit Number (OPTIONAL)		Facility I.D. Number (OPTIONAL)
Responsible Official's Name/Title		
Street Address		
City	State	ZIP Code
Facility Name (if different from Responsible Official's Name)		
Facility Street Address (If different than Responsible Official's Street Address)		
Facility Local Contact Name	Title	Phone (OPTIONAL)
City	State	ZIP Code

D. Indicate the relevant standard or other requirement that is the basis for this notification and the source's compliance date: (§63.9(b)(2)(iii))

[a] This is an example of the type of information that must be submitted to fulfill the Notification of Compliance Status requirement of 40 CFR part 63, subpart ZZZZ. This Notification of Compliance Status is being made in accordance with 40 CFR §63.9(h).

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-Establish the operating limits discussed earlier; and

-Submit the Notification of Compliance Status containing the results of the initial compliance demonstration

- Notification must be sent before the close of business on the 60th day following completion of the initial performance test and again before the close of business on the 60th day following the completion of any subsequent required performance test.
- Notifications may be combined as long as the due date for each notification is met.

Continuous Compliance Requirements

Complying with the requirement to reduce CO emissions and using an oxidation catalyst, and using a CPMS:

- Conduct semi-annual performance tests for CO to demonstrate that the required CO percent reduction is achieved; and
- Collect the catalyst inlet temperature data according to the requirements in this module; and
- Reduce these data to 4-hour rolling averages; and
- Maintain the 4-hour rolling averages within the operating limits for the catalyst inlet temperature; and
- Measure the pressure drop across the catalyst once per month and demonstrate that the pressure drop across the catalyst is within the operating limit established during the performance test.

Complying with the requirement to reduce CO emissions and not using an oxidation catalyst, and using a CPMS:

- Conduct semi-annual performance tests for CO to demonstrate that the required CO percent reduction is achieved; and
- Collect the approved operating parameter (if any) data according to the requirements in this module; and
- Reduce these data to 4-hour rolling averages; and
- Maintain the 4-hour rolling averages within the operating limits for the operating parameters established during the performance test

Complying with the requirement to reduce CO emissions and using a CEMS:

- Collect the monitoring data according to the requirements in this module, reduce the measurements to 1-hour averages, calculate the percent reduction or concentration of CO emissions according to 40 CFR 63.6620; and
- Demonstrate that the catalyst achieves the required percent reduction of CO emissions over the 4-hour averaging period, or that the emissions remain at or below the CO limit; and
- Conduct an annual RATA of your CEMS using PS 3 and 4A of 40 CFR part 60, appendix B, as well as daily and periodic data quality checks in accordance with 40 CFR part 60, appendix F, procedure 1.

Continuous Compliance Requirements

Complying with the requirement to limit the concentration of formaldehyde and using oxidation catalyst:

- Conduct semi-annual performance tests for formaldehyde to demonstrate that your emissions remain at or below the concentration limit; and
- Collect the catalyst inlet temperature data according to the requirements in this module; and
- Reduce these data to 4-hour rolling averages; and
- Maintain the 4-hour rolling averages within the operating limits for the catalyst inlet temperature; and
- Measure the pressure drop across the catalyst once per month and demonstrate that the pressure drop across the catalyst is within the operating limitation established during the performance test.

Complying with the requirement to limit the concentration of formaldehyde and not using oxidation catalyst:

- Conduct semi-annual performance tests for formaldehyde to demonstrate that your emissions remain at or below the concentration limit; and
- Collect the approved operating parameter (if any) data according to the requirements in this module; and
- Reduce these data to 4-hour rolling averages; and
- Maintain the 4-hour rolling averages within the operating limitations for the operating parameters established during the performance test.

What are my monitoring requirements?

-If you install a CEMS, you must install, operate, and maintain a CEMS to monitor CO and either O_2 or CO_2 at both the inlet and outlet of the control device as follows:

(1) Each CEMS must be installed, operated, and maintained according to the applicable performance specifications of 40 CFR part 60, appendix B.

(2) Conduct an initial performance evaluation and an annual relative accuracy test audit (RATA) of each CEMS according to the requirements in 40 CFR 63.8 and according to the applicable performance specifications of 40 CFR part 60, appendix B as well as daily and periodic data quality checks in accordance with 40 CFR part 60, appendix F, procedure 1.

(3) Each CEMS must complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period. You must have at least two data points, with each representing a different 15-minute period, to have a valid hour of data.

(4) CEMS data must be reduced as specified in 40 CFR 63.8(g)(2) and recorded in ppm at 15% O_2 or the equivalent CO_2 concentration.

What are my monitoring requirements?

-If required to install a CPMS, you must install, operate, and maintain each CPMS as follows:

(1) Prepare a monitoring plan that addresses the monitoring system design, data collection, and the quality assurance and quality control elements outlined in (i) through (v) and in 40 CFR 63.8(d). You may request approval of monitoring system quality assurance and quality control procedures alternative to those specified in (1) through (6) of this section in your monitoring plan.

(i) The performance criteria and design specifications for the monitoring system equipment, including the sample interface, detector signal analyzer, and data acquisition and calculations;

(ii) Sampling interface (e.g., thermocouple) location such that the monitoring system will provide representative measurements;

(iii) Equipment performance evaluations, system accuracy audits, or other audit procedures;

(iv) Ongoing operation and maintenance procedures in accordance with provisions in 40 CFR 63.8(c)(1)(ii) and (c)(3); and

(v) Ongoing reporting/recordkeeping procedures in accordance with provisions in 40 CFR 63.10(c), (e)(1), and (e)(2)(i).

(2) Install, operate, and maintain each CPMS in continuous operation according to the procedures in your monitoring plan.

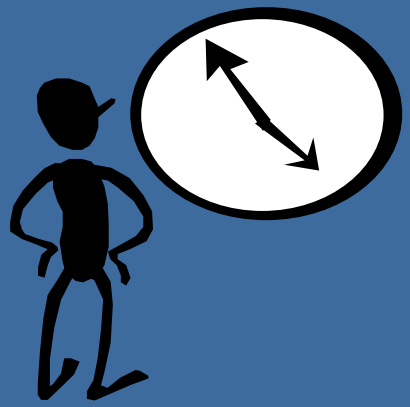
(3) The CPMS must collect data at least once every 15 minutes.

(4) For a CPMS for measuring temperature range, the temperature sensor must have a minimum tolerance of 2.8°C (5°F) or 1% of the measurement range, whichever is larger.

(5) Conduct the CPMS equipment performance evaluation, system accuracy audits, or other audit procedures specified in your monitoring plan at least annually.

(6) Conduct a performance evaluation of each CPMS in accordance with your monitoring plan.

Monitoring Requirements, continued



•Minimize the engine's time spent at idle during startup and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the non-startup emission limits apply.

Continuous Compliance Requirements

- Except for monitor malfunctions, associated repairs, required performance evaluations and required quality assurance or control activities, you must monitor continuously at all times that the engine is operating. Monitoring failures caused in part by poor maintenance or careless operation are not malfunctions.

- You may not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels. You must, however, use all the valid data collected during all other periods.

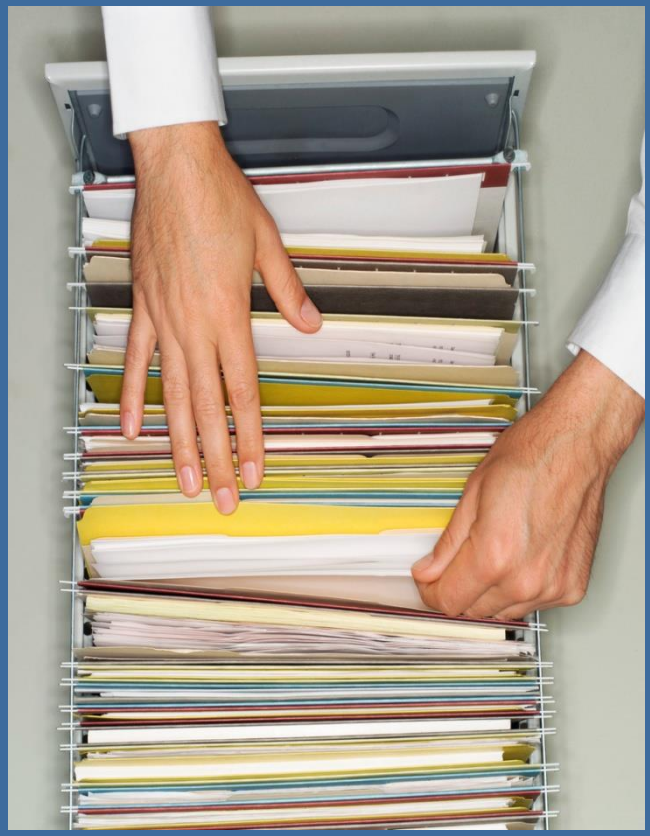
To demonstrate compliance with all rule requirements, keep records of:

- Each notification and report submitted and all supporting documentation
- Occurrence and duration of each malfunction
- Performance tests and evaluations
- Required maintenance performed on air pollution control and monitoring equipment
- Actions taken during malfunctions to minimize emissions and corrective actions

If you have a CMS, keep the following:

- Records:
  - Each period during which a CMS is malfunctioning/inoperative/out-of-control
  - All required measurements needed to demonstrate compliance with a relevant standard
  - All CMS performance test results and evaluations
  - All measurements as may be necessary to determine the conditions of performance tests/evaluations
  - All CMS calibration checks
  - All adjustments and maintenance performed on the CMS
- Previous versions of the performance evaluation plan
- Requests for alternatives to the RATA

- Keep records for 5 years from the date of creation.



What notifications should I submit?

Notification of:

- Applicability (120 days after effective date) or construction/reconstruction
- Actual Startup (15 days after actual startup)
- Intent to Conduct Performance Test (60 days prior to test)
- Compliance Status (60 days after compliance demonstrated)

Photo credit: EPA

What reports should I submit?

Semi-Annual Compliance Report

- Due January 31st and July 31st each year:
  - –Covers the period from January 1-June 30 or July 1-December 31
  - –Report must contain:
    - Statement by responsible official certifying the accuracy of the report
    - If any malfunctions occurred during the reporting period, including the number, duration, and a brief description for each type of malfunction which occurred and which caused or may have caused any limits to be exceeded. Also include actions taken during malfunction to minimize emissions and correct malfunctions.
    - If no deviations occurred, a statement indicating so.
    - If there were no periods during which the CMS was out-of-control, a statement indicating so.

- For each deviation that occurs where you are not using a CMS, report must contain:
  - Statement by responsible official certifying the accuracy of the report
  - If any malfunctions occurred during the reporting period, including the number, duration, and a brief description for each type of malfunction which occurred and which caused or may have caused any limits to be exceeded. Also include actions taken during malfunction to minimize emissions and correct malfunctions.
  - Total operating time of the engine at which the deviation occurred
  - Information on the number duration, and cause of deviations, and the corrective action taken.

What reports should I submit?

Semi-Annual Compliance Report

- For each deviation from an emission or operating limitation occurring for an engine where you are using a CMS to comply with the limits, you must include:
  - Statement by responsible official certifying the accuracy of the report
  - If any malfunctions occurred during the reporting period, including the number, duration, and a brief description for each type of malfunction which occurred and which caused or may have caused any limits to be exceeded. Also include actions taken during malfunction to minimize emissions and correct malfunctions.
  - Date and time each malfunction started and stopped.
  - Date, time, and duration that each CMS was inoperative, except for zero (low-level) and high-level checks.
  - Date, time, and duration that each CMS was out-of-control, using the information in 63.8(c)(8).
  - Date and time that each deviation started and stopped, and whether each deviation occurred during a period of malfunction or during another period.
  - Summary of the total duration of the deviation during the reporting period, and the total duration as a percent of the total source operating time during that reporting period.
  - Breakdown of the total duration of the deviations during the reporting period into those that are due to control equipment problems, process problems, other known causes, and other unknown causes.
  - Summary of the total duration of CMS downtime during the reporting period, and the total duration of CMS downtime as a percent of the total operating time of the engine at which the CMS downtime occurred during that reporting period.
  - Identification of each parameter and pollutant (CO or formaldehyde) that was monitored at the engine.
  - Brief description of the engine and CMS.
  - Date of the latest CMS certification or audit.
  - Description of any changes in CMS, processes, or controls since the last reporting period.

What reports should I submit?

Semi-Annual Compliance Report

- Report each instance in which you did not meet each emission limit or operating limit.
- Report each instance in which you did not meet the requirements of any of the General Provisions
- If your source has a Title V Operating Permit, you must report all deviations in the Title V Semi-Annual Monitoring Report.

Where do I send notifications and reports?

EPA REGION 1:

US Environmental Protection Agency
5 Post Office Square, Suite 100, Mail code: OES04-2
Boston, MA 02109-3912
Attention: Air Clerk

By when must I comply with the rule?

Upon startup

Photo credit: EPA

Spark Ignition New Source Performance Standards (SI NSPS)

You are subject to the SI NSPS (40 CFR 60 Subpart JJJJ) if:

–Your engine was constructed (ordered*) after June 12, 2006 **AND** manufactured on/after July 1, 2007 (for engines with HP≥1,350)

OR

-Your engine was constructed (ordered*) after June 12, 2006 **AND** manufactured on/after January 1, 2008 (for engines with HP<1,350)

OR

–Your engine was modified or reconstructed after June 12, 2006

*NOTE: For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator.

Spark Ignition New Source Performance Standards (SI NSPS)

If you are subject to the SI NSPS, you must meet these requirements:

- **Emission and Operating Limits, Testing Requirements:**
  - See Table
  - Must meet these standards for the life of the engine
- **Fuel Requirements:**
  - Gasoline engines must use gas that meets the sulfur limit: cap of 80 ppm/gal

Spark Ignition New Source Performance Standards (SI NSPS)

If you are subject to the SI NSPS, you must meet these requirements:

- **Compliance Requirements:**
  - If you have a *certified* engine:
    - Install, configure, operate and maintain engine according to manufacturer's instructions
    - If you do not operate/maintain according to manufacturer's instructions-
      - –Keep maintenance plan and maintenance records, operate consistent with good air pollution control practices
      - –Initial performance test and subsequent testing every 8,760 hours or 3 years, whichever is first
  - If you have a *non-certified* engine:
    - Maintenance plan
    - Initial test and subsequent testing every 8,760 hours or 3 years, whichever is first
- **Recordkeeping/Reporting:**
  - Documentation of certification (EPA Certificate of Conformity)
  - Records of engine maintenance
  - Initial notification for non-certified engines
  - Notification of Intent to Conduct Performance Testing 30 days prior to test
  - Results of performance testing within 60 days of test

Engine Certification

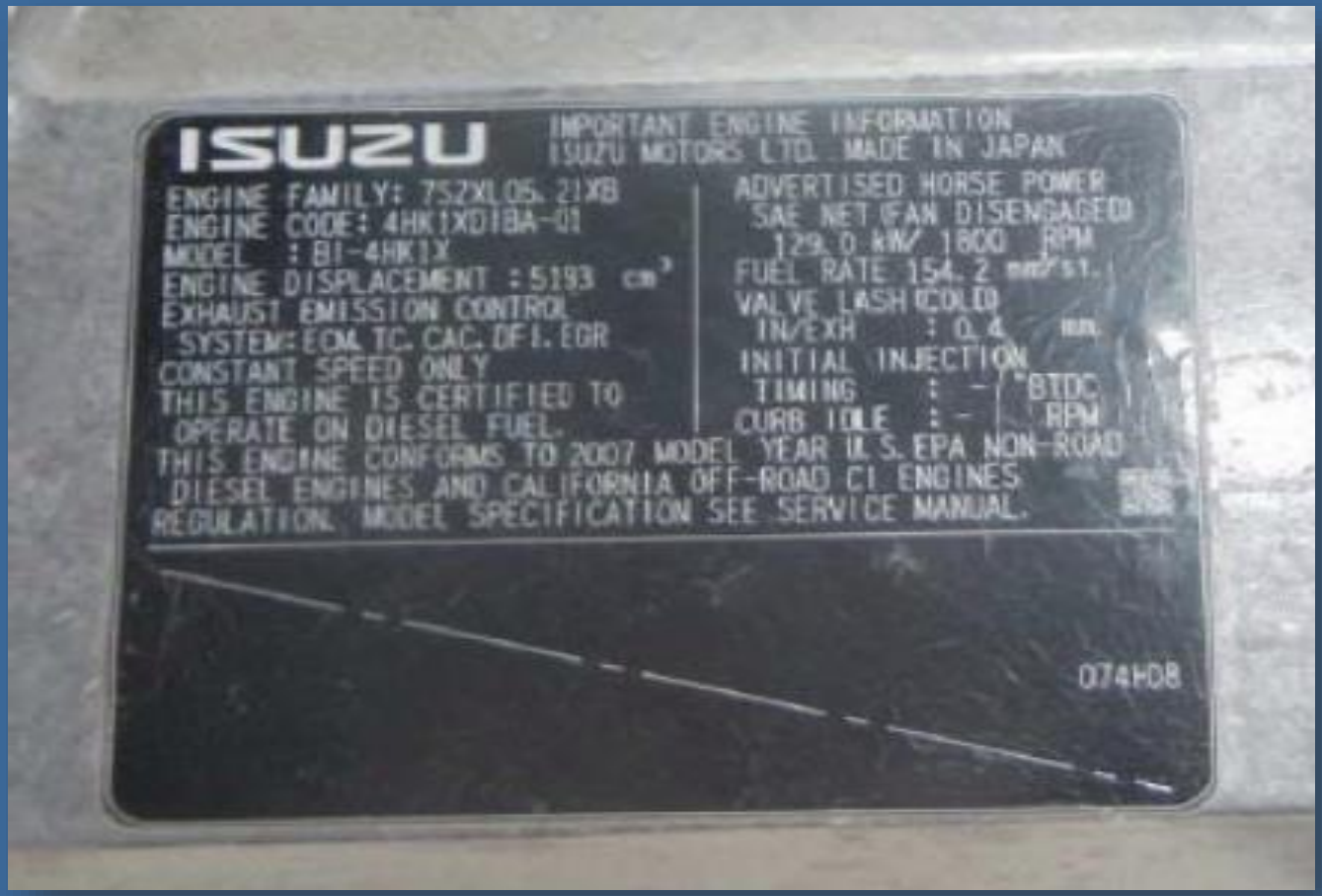
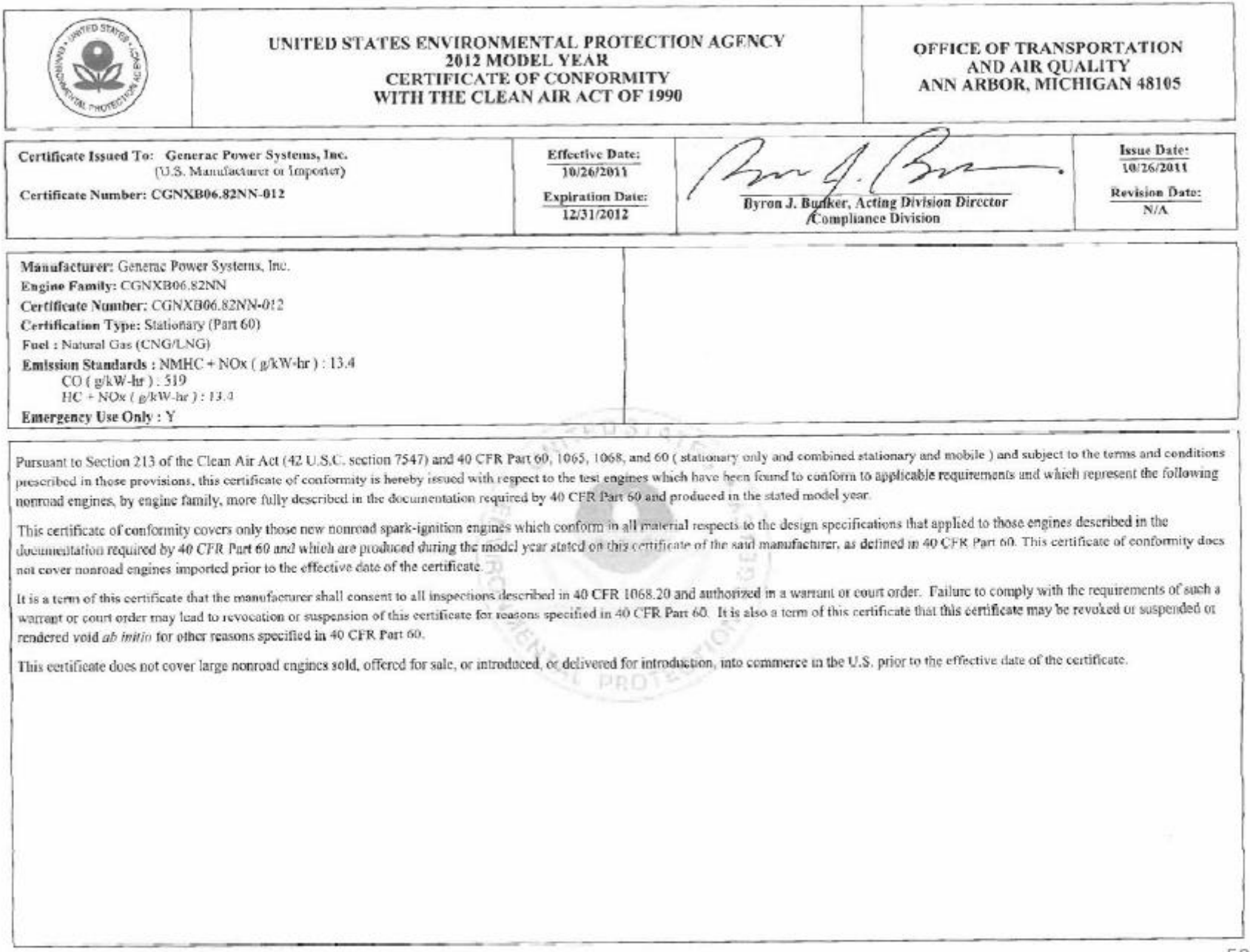


Photo credit: EPA

EPA Certificate of Conformity



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2012 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT OF 1990

OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Generac Power Systems, Inc.
(U.S. Manufacturer or Importer)

Certificate Number: CGNXB06.82NN-012

Effective Date: 10/26/2011

Expiration Date: 12/31/2012

Byron J. Bunker, Acting Division Director
Compliance Division

Issue Date: 10/26/2011

Revision Date: N/A

Manufacturer: Generac Power Systems, Inc.
Engine Family: CGNXB06.82NN
Certificate Number: CGNXB06.82NN-012
Certification Type: Stationary (Part 60)
Fuel : Natural Gas (CNG/LNG)
Emission Standards : NMHC + NOx (g/kW-hr) : 13.4
CO (g/kW-hr) : 519
HC + NOx (g/kW-hr) : 13.4
Emergency Use Only : Y

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

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Photo credit: EPA

Engine Category	Date Constructed/ Reconstructed/ Manufactured	Size/ Engine Type/ Fuel	Emission Standards	Importing/ Installing Requirements[3]	Compliance Requirements				Notification, Reports, and Records Requirements	General Provisions (40 CFR part 60)
					Engines being operated and maintained in a certified manner[1]		Engines being operated and maintained in a non-certified manner[2]			
					General Compliance	Performance Testing	General Compliance	Performance Testing		
HP<1,350	Commenced construction after 6/12/2006 and manufactured on or after 1/1/2008	HP<1,350	60.4233(e)	60.4236(b)	60.4243(a)(1) If using AFRC: 60.4243(g) 40 CFR part 1068, subparts A-D.	None	60.4243(a)(2)(iii) If using AFRC: 60.4243(g)	60.4243(a)(2)(iii) 60.4244	60.4245(a),(d) **Non-certified**: 60.4245(c)	60.4246 Table 3
HP ≥1,350	Commenced construction after 6/12/2006 and manufactured on or after 7/1/2007	Gasoline	60.4231(b) 60.4233(b)	60.4236(b), (d)	If using AFRC: 60.4243(g) **Manufactured before 7/1/2008:** 60.4243(h) **Manufactured after 7/1/2008:** 60.4243(a)(1) 40 CFR part 1068, subparts A-D.		If using AFRC: 60.4243(g) **Manufactured before 7/1/2008**: 60.4243(h) **Manufactured after 7/1/2008**: 60.4243(a)(2)(iii)	**Manufactured before 7/1/2008**: None **Manufactured after 7/1/2008**: 60.4243(a)(2)(iii) 60.4244		
		All except gasoline	60.4233(e)	60.4236(b)	If using AFRC: 60.4243(g) **If purchasing certified:** 60.4243(b)(1) 60.4243(a)(1) **If purchasing non-certified**: 60.4243(b)(2)	**Non-Certified**: 60.4243(b)(2)(ii), 60.4244 **Certified**: None	60.4243(a)(2)(iii) If using AFRC: 60.4243(g)	60.4243(a)(2)(iii) 60.4244		
Modified/ Reconstructed	Modified or reconstructed after 6/12/2006	Natural gas and lean burn LPG	60.4233(f)(4)	None	If using AFRC: 60.4243(g) 60.4243(i)				60.4245(a),(d)	
		Gasoline	60.4233(f)(2)							

1. If you operate and maintain the certified engine and control device according to the manufacturer's emission-related written instructions, you are operating in a certified manner.
2. If you do not operate and maintain the certified engine and control device according to the manufacturer's instructions, your engine will be considered a non-certified engine.
3. The requirements of this section do not apply to engines that have been modified or reconstructed, and they do not apply to engines that were removed from one existing location and reinstalled at a new location.

Test Methods

Conduct performance tests according to the following procedures:

- Each test must be conducted within 10% of 100% peak (or the highest achievable) load and according to the requirements in §60.8 and under the specific conditions that are specified by Table 2 to the rule.
- You may not conduct tests during periods of startup, shutdown, or malfunction.
- To determine compliance with the NO_X mass per unit output emission limitation, convert the concentration of NO_X in the engine exhaust using the following equation:

$ER = (C_d \times 1.912 \times 10^{-3} \times Q \times T)/HP\text{-}hr$

Where:

ER = Emission rate of NO_X in g/HP-hr.

C_d= Measured NO_X concentration in parts per million by volume (ppmv).

1.912×10^{-3} = Conversion constant for ppm NO_X to grams per standard cubic meter at 20°C.

Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, horsepower-hour (HP-hr).

- To determine compliance with the CO mass per unit output emission limitation, convert the concentration of CO in the engine exhaust using the following equation:

$ER = (C_d \times 1.164 \times 10^{-3} \times Q \times T)/HP\text{-}hr$

Where:

ER = Emission rate of CO in g/HP-hr.

Cd= Measured CO concentration in ppmv.

1.164×10^{-3} = Conversion constant for ppm CO to grams per standard cubic meter at 20°C.

Test Methods

•When calculating emissions of VOC, emissions of formaldehyde should not be included. To determine compliance with the VOC mass per unit output emission limitation, convert the concentration of VOC in the engine exhaust using:

$ER = (C_d \times 1.833 \times 10^{-3} \times Q \times T)/HP\text{-}hr$

Where:

ER = Emission rate of VOC in g/HP-hr

Cd= VOC concentration measured as propane in ppmv

1.833×10^{-3} = Conversion constant for ppm VOC measured as propane, to grams per standard cubic meter at 20°C.

Test Methods

•If you choose to measure VOC emissions using either Method 18 of 40 CFR part 60, appendix A, or Method 320 of 40 CFR part 63, appendix A, then you have the option of correcting the measured VOC emissions to account for the potential differences in measured values between these methods and Method 25A. The results from Method 18 and Method 320 can be corrected for response factor differences using the following equations. The corrected VOC concentration can then be placed on a propane basis using the last equation in this section.

$$RF_i = C_Mi/C_Ai$$

Where:

RFi= Response factor of compound i when measured with EPA Method 25A.

C_Mi= Measured concentration of compound i in ppmv as carbon.

C_Ai= True concentration of compound i in ppmv as carbon.

$$Ci_{corr} = RF_i \times Ci_{meas}$$

Where:

Ci_{corr}= Concentration of compound i corrected to the value that would have been measured by EPA Method 25A, ppmv as carbon.

Ci_{meas}= Concentration of compound i measured by EPA Method 320, ppmv as carbon.

$$C_{Peq} = 0.6098 \times Ci_{corr}$$

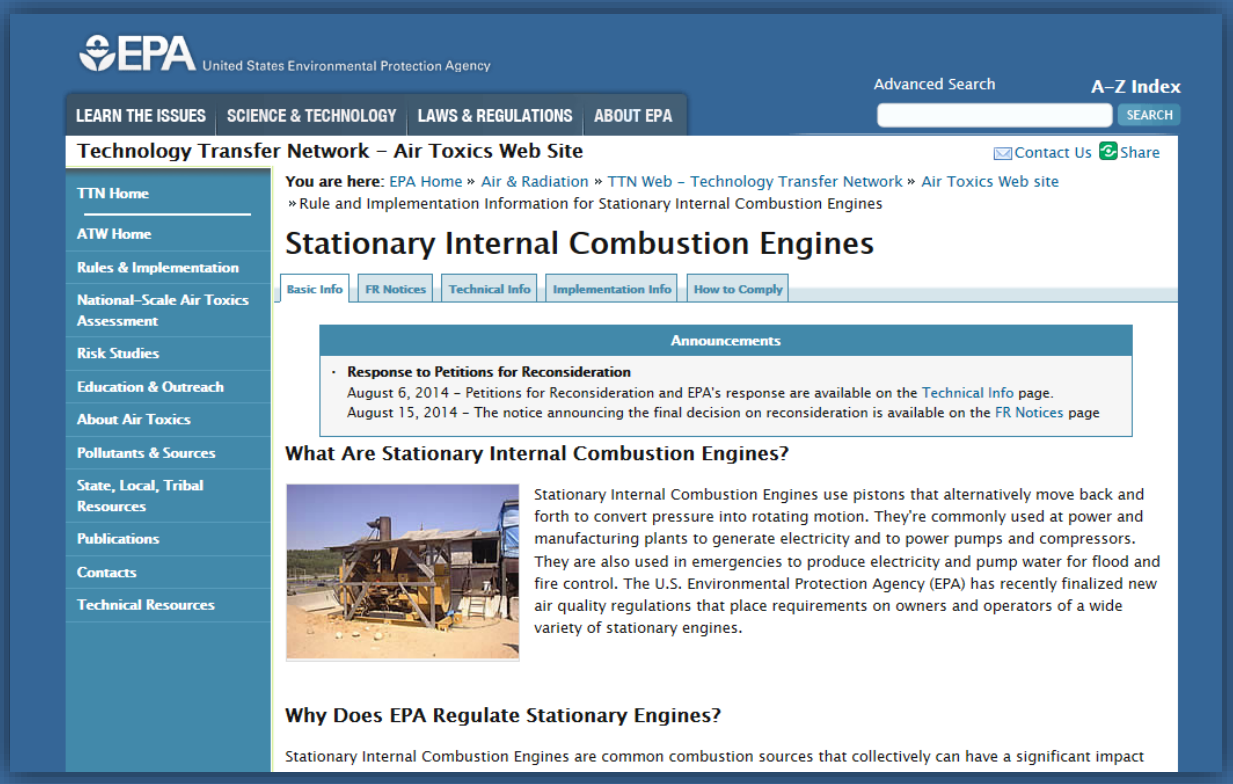
Where:

C_{Peq}= Concentration of compound i in mg of propane equivalent per DSCM.

Visit the EPA RICE Compliance Page

www.epa.gov/ttn/atw/icengines

- Fact sheets
- Regulations
- Example notifications
- Announcements
- Q & A documents
- Testing advice
- Recorded webinars
- …and more!



Take Aways

Engine Type:

•A new or reconstructed non-emergency spark ignition 2-stroke lean burn engine at a major source with a site rating of greater than 500 HP

Emission Standards:

•Concentration of formaldehyde in the exhaust must be ≤12 ppm at 15% O_2 or reduce CO emissions by 58% or more

•Unit will probably require oxidation catalyst

Operating Limits:

•Using oxidation catalyst:

-Maintain catalyst so that the pressure drop does not change by more than 2" of water at 100% load ±10% from the pressure drop across the catalyst measured during the initial test

-Maintain engine exhaust temperature so that the catalyst inlet temperature is ≥450°F and ≤1350°F

•Not using oxidation catalyst:

-Comply with any operating limitations approved by EPA

Testing:

•Initial emission performance test

•Subsequent performance tests semi-annually if you are not using a CO CEMS

•Can reduce frequency to annually

Take Aways

Recordkeeping:
- Keep records of notifications, reports, malfunctions, corrective actions, tests, maintenance, etc.
- Keep documentation of manufacturer's certification (if applicable)
- Retain records for 5 years

Reporting:
- Submit notifications of:
  - Applicability
  - Actual Startup
  - Intent to Conduct Performance Test
  - Compliance Status
- Submit Semi-Annual Compliance Report

Compliance Date:
- Upon startup

NSPS:
- Comply with all SI NSPS requirements, as applicable